

Birds of Wisconsin Northern Mesic Forests

by Randy M. Hoffman

Northern mesic forest is the largest natural community in Wisconsin. The total acreage in presettlement times was estimated to be 11.7 million acres or approximately one-third of the states' total land area (Curtis, 1959). These forests are found predominately north of the tension zone; however, some relict stands occur further south. The mesic forest is usually located on deep loam soils and gently rolling terrain.

Northern Wisconsin mesic forest, about the time of the Civil War, consisted of sugar maple (*Acer saccharum*), hemlock (*Tsuga canadensis*), yellow birch (*Betula alleghaniensis*), beech (*Fagus grandifolia*), white pine (*Pinus strobus*), basswood (*Tilia americana*), elms (*Ulmus* sp.), and several other species which occurred sparingly. Not all species occur at every site. Several species reach their western range limit in Wisconsin and are not found naturally further west. American beech is restricted in Wisconsin from Shawano, eastern Langlade County and central Marinette County to the south and east. Eastern hemlock reaches its range limit in eastern Washburn and Bayfield

Counties, Yellow Birch becomes very scarce near the St. Croix River. The net effect is that the tree species become less diverse as one travels west.

As with tree composition, the understory of the northern mesic forest changes across its range. These changes in composition and structure are dependent upon local relief, soil properties, moisture and canopy structure. Dense stands of mature hemlock have intermediate wood-fern (*Dryopteris intermedia*), clubmoss (*Lycopodium* sp.), and wood sorrel (*Oxalis montana*) as the predominant groundlayer species. Hardwood stands have a different composition and can vary over short distances. Species commonly found occurring in mature northern mesic forest stands include Canada mayflower (*Maianthemum canadense*), twisted stalk (*Streptopus roseus*), Solomon's seal (*Polygonatum pubescens*), naked miterwort (*Mitellanuda*), white baneberry (*Actaea alba*), large-leaved aster (*Aster macrophyllus*), bluebead lily (*Clintonia borealis*), partridgeberry (*Mitchella repens*), starflower (*Trientalis borealis*), large-flowered trillium (*Trillium grandiflorum*) large bellwort (*Uvularia grandi-*

flora), and downy yellow violet (*Viola pubescens*) (Curtis 1959).

Shrub composition also is greatly dependent upon topography, soils, moisture and especially, the percentage of canopy closure (openings). In addition to sapling trees which make up a great proportion of the shrub layer, important species include beaked hazelnut (*Cornus cornuta*), red-berried elder (*Sambucus pubens*), fly honeysuckle (*Lonicera canadensis*), leatherwood (*Dirca palustris*), swamp currant (*Ribes lacustre*), maple-leaved viburnum (*Viburnum acerifolium*) and formerly yew (*Taxus canadensis*) (Curtis 1959).

What did northern Wisconsin look like at the time of first exploration? It is not totally known although there are many accounts of impressions and perceptions by early explorers. These descriptions gave us a general picture of the landscape, but nothing quantifiable came forth until the area was surveyed. Most of Northern Wisconsin was surveyed between 1850 and 1875. The General Land Survey conducted a complete section-by-section survey. The surveyors would blaze and record four witness trees at each section corner and two at each quarter section corner. Data recorded included the species, diameter at breast height, and distance from the corner of each witness tree. In addition, surveyors were to make comments on the condition of the land, quality of the timber, and suitability for agriculture. The land survey records are invaluable in characterizing the vegetation of the mid-nineteenth century and quantifying changes that have occurred since then (Stearns 1949) (Ward 1956).

This forest described by the land surveyors is almost non-existent today. Virtually the entire forest was logged

prior to 1930. Those few areas not logged were either young stands that started development just before the logging era or non-merchantable trees. Today following regrowth and various protective measures, roughly 6.1 million acres now occupy the area identified as northern mesic forest. Of this, 3.2 million acres fall into the classically described northern mesic forest, while the rest is composed mostly of early successional species such as aspen and paper birch (Smith 1986).

The average age of the forest is also changing. The young early successional forest of the early 1930's, has gradually aged. The average age of this second growth forest is increasing even with continued commercial harvest and intensified silviculture practices. Although increasing in age, the median age of mesic hardwood forests is only about 50 years old. By not including aspen, where the median age is younger due to short-rotation regenerative clear-cut practices, the median age is still just over 60 years. While long-lived using the age of a human life reference, it is quite young for a forest where many stands may live 200–300 years and some individual trees may live 500 years (Smith 1986.)

Remnants of the presettlement type forest persist today only in small, scattered, often isolated stands. Within the interval 1969–1983 the Wisconsin Department of Natural Resources conducted a county-by-county search for significant natural areas. This survey revealed that only around 20,000 acres of northern hardwood-hemlock remain in a condition approximating that of the presettlement forest. The rest has been significantly altered, directly or indirectly, by human-related disturbances such as logging, fire and ov-

erbrowsing (R. Epstein, unpublished notes).

Our present northern mesic forest is much different than presettlement northern mesic forest. Foremost is the fact that nearly 100% of the forest has been cut at least once. In addition, large acreages were plowed for farming; while some failed, many farms still exist within the presettlement northern mesic forest boundaries.

The composition of the remaining forest has also changed. The most dramatic change is the tremendous increase in aspen, (predominantly quaking (*Populus tremuloides*) and big tooth (*Populus grandidentata*). Going from a very small component of the presettlement forest to about 2.9 million acres today. Other increasing species are sugar maple and basswood, while those decreasing in abundance are hemlock, white pine, and yellow birch.

The processes working on the present day forest are much different. Natural forces of wind, disease, insects, and fire (although now greatly controlled) still affect the forest dynamics. However, human impacts are by far a greater shaping force. The major process today is logging. Other human related forces that shape forests include transportation, urban sprawl, grazing, vacation homes, and environmental degradation.

The current forest wildlife is also much different than in presettlement times. Although there was very little quantitative ornithology at the time of settlement, we can surmise that there was a somewhat different avifauna then, one that was more reflective of an older, more structural diverse forest. Northern mesic forest birds have been shown (Temple et al. 1979) to support

species both from the south (hardwood lovers) and from the north (conifer lovers). Together they mix in the northern mesic forest to produce a species diversity higher than that found in the physiographic regions to the north or south. Species whose range centers in this forest are few, including Nashville Warbler, Black-throated Blue Warbler, Blackburnian Warbler, Chestnut-sided Warbler and Canada Warbler (Temple et al. 1979).

Table 1 shows the diverse avifauna associated with northern mesic forest. Any particular stand will contain significantly fewer bird species, depending on local physiography and past history. Because the northern mesic forest is so large and diverse it is necessary to understand that different stands will have different species and stands in different stages of succession will have different species.

By understanding current processes working on the forest, the reader should develop an understanding of what species occur within certain tracts. Let's begin at the beginning and start a forest on its long process of succession. We also have to remember the northern mesic forest has species whose main ranges are centered either north (in coniferous forests) or south (in deciduous forests). Therefore, we will follow two different types through the process. A mixed forest of both hardwoods and conifer could harbor anywhere from some to most (but usually not all) of the species in both categories.

A forest is leveled (Figure 1). Whether it be a fire, windstorm or clearcut, the regenerative process begins. The first year the avifauna is largely open-ground species and cavity nesters that use and depend on the

Table 1. Birds which nest in northern mesic forests and their relative abundance.

Species	Abundance
Wood Duck	Common
Osprey (near water)	Uncommon
Bald Eagle (near water)	Uncommon
Sharp-shinned Hawk	Common
Cooper's Hawk	Uncommon
Northern Goshawk	Rare
Red-shouldered Hawk	Uncommon
Broad-winged Hawk	Common
Ruffed Grouse	Common
Mourning Dove	Uncommon
Black-billed Cuckoo	Rare
Yellow-billed Cuckoo	Common
Great-Horned Owl	Common
Barred Owl	Common
Long-eared Owl	Rare
Saw-whet owl	Rare
Common Nighthawk	Rare
Whip-poor-will	Common
Ruby-throated Hummingbird	Common
Red-headed Woodpecker	Rare
Red-bellied Woodpecker(south)	Rare
Yellow-bellied Sapsucker	Uncommon
Downy Woodpecker	Common
Hairy Woodpecker	Common
Northern Flicker	Uncommon
Pileated Woodpecker	Uncommon
Eastern Wood Pewee	Common
Yellow-bellied Flycatcher	Rare
Least Flycatcher	Common
Eastern Phoebe	Rare
Great Crested Flycatcher	Uncommon
Blue Jay	Common
American Crow	Common
Common Raven	Uncommon
Black-capped Chickadee	Common
Red-breasted Nuthatch	Uncommon
White-breasted Nuthatch	Common
Brown Creeper	Uncommon
House Wren	Rare
Winter Wren	Rare
Golden-crowned Kinglet	Uncommon
Ruby-crowned Kinglet	Rare
Eastern Bluebird	Uncommon
Veery	Common
Swainson's Thrush	Rare
Hermit Thrush	Rare
Wood Thrush	Uncommon
American Robin	Uncommon
Cedar Waxwing	Rare
Solitary Vireo	Uncommon
Yellow-throated Vireo	Uncommon
Warbling Vireo	Uncommon
Red-eyed Vireo	Common
Golden-winged Warbler	Uncommon

Table 1. (Continued)

Species	Abundance
Nashville Warbler	Uncommon
Northern Parula	Rare
Yellow Warbler	Common
Chestnut-sided warbler	Common
Magnolia Warbler	Rare
Cape May Warbler	Rare
Black-throated Blue Warbler	Uncommon
Yellow-rumped Warbler	Uncommon
Black-throated Green Warbler	Uncommon
Blackburnian Warbler	Uncommon
Pine Warbler	Rare
Black-and-white Warbler	Uncommon
American Redstart	Uncommon
Ovenbird	Common
Mourning Warbler	Uncommon
Common Yellowthroat	Common
Canada Warbler	Uncommon
Scarlet Tanager	Common
Rose-Breasted Grosbeak	Common
Indigo Bunting	Common
Rufous-sided Towhee	Common
Chipping Sparrow	Common
Song Sparrow	Common
White-throated Sparrow	Common
Dark-eyed Junco	Rare
Common Grackle	Uncommon
Brown-headed Cowbird	Common
Northern Oriole	Common
Purple Finch	Uncommon
Pine Siskin	Rare
American Goldfinch	Rare
Evening Grosbeak	Rare

concentration of snags. Sometimes re-growth is rapid and dense, in the case of aspen after cutting or fire or sugar maple after cutting or windfall. At any one time between 5 and 7% of the forest may be in this stage of development. The birds associated with these young, sometimes dense forests occasionally interspersed with snags are American Kestrel, Ruffed Grouse, American Woodcock, Northern Flicker, Downy Woodpecker, Eastern Kingbird, Least Flycatcher, Tree Swallow, Gray Catbird, Brown Thrasher, Chestnut-sided Warbler, Golden-winged Warbler, Mourning Warbler,

continued



Figure 1. Clearcut on the Nicolet National Forest (Photo by Cliff Germain).

Brown-headed Cowbird, American Goldfinch, Veery, American Robin, Nashville Warbler, Black and White Warbler, Common Yellowthroat, Rose-breasted Grosbeak, Indigo Bunting, and Song Sparrow.

Then, the forest increases in height and density, especially aspen or dense sugar maple forest. Coniferous forest typically have some openings, but may form very dense stands, especially hemlock. The structure of these forest stages is quite simple. There is virtually no shrub understory and a correspondingly sparse ground layer. A majority of present stands of this age are hardwoods, although occasional dense mesic coniferous stands or mixed stand are found. Approximately 20–25% of the present northern mesic forest is in the sapling stage (Figure 2). Birds commonly found in sapling deciduous for-

est include Ruffed Grouse, American Woodcock, Downy Woodpecker, Black-billed Cuckoo, Least Flycatcher, Blue Jay, Black-capped Chickadee, Hermit Thrush, Veery, Red-eyed Vireo, Black-and-White Warbler, Golden-winged Warbler, Chestnut-sided Warbler, Ovenbird, Mourning Warbler, Canada Warbler, American Redstart, Rose-breasted Grosbeak, Rufous-sided Towhee, White-throated Sparrow, Song Sparrow. Those in coniferous saplings include Black-capped Chickadee, Hermit Thrush, Solitary Vireo, Nashville Warbler, Magnolia Warbler, Yellow-rumped Warbler, Ovenbird, Brown-headed Cowbird, Evening Grosbeak, Dark-eyed Junco, Chipping Sparrow, and White-throated Sparrow.

The forest continues to grow older and taller, trees become pole-sized (5–9 inches in diameter). There is a con-



Figure 2. Sapling stage of Northern Mesic Forest with dense trees; notice the stumps in the left center (*Natural Areas File Photo*).

stant thinning process going on as trees compete for light, water and nutrients. More spacing occurs between individuals. The canopy is nearly complete with very few breaks. The light reaching the ground is much reduced; however, the thinning process has allowed the beginnings of a shrub layer to develop. Pole-sized stands occupy approximately 45–50% of all northern mesic forest stands today (Figure 3). Pole-sized deciduous stand birds include Ruffed Grouse, Northern Flicker, Yellow-bellied Sapsucker, Hairy Woodpecker, Downy Woodpecker, Eastern Wood Pewee, Least Flycatcher, Blue Jay, Crow, Black-capped Chickadee, White-breasted Nuthatch, Wood Thrush, Veery, Cedar Waxwing, Red-eyed Vireo, Black and White Warbler, Black-throated Green Warbler, Ovenbird, Canada Warbler, American

Redstart, Brown-headed Cowbird, Scarlet Tanager, Rose-breasted Grosbeak, and Indigo Bunting.

The birds in pole-sized coniferous or mixed forest include Yellow-bellied Sapsucker, Hairy Woodpecker, Downy Woodpecker, Yellow-bellied Flycatcher, Eastern Wood Pewee, Least Flycatcher, Black-capped Chickadee, Crow, Common Raven, Red-breasted Nuthatch, Hermit Thrush, Black-and-White Warbler, Nashville Warbler, Northern Parula, Yellow-rumped Warbler, Ovenbird, Canada Warbler, Purple Finch, Evening Grosbeak, Dark-eyed Junco, Chipping Sparrow, and White-throated Sparrow.

The next stage is sometimes called the saw-timber stage. The trees are still larger (greater than 9 inches in diameter) and more widely spaced (Figure 4). Although the canopy is mostly



Figure 3. Pole-sized paper birch showing lower density; notice the young conifers and large old stumps (Photo by Robert Read).

closed, a shrub layer and understory of sapling trees is developing. These older "mesic" forests are less easily classified as deciduous or coniferous. They often contain both groups in the canopy and understory. About 25–30% of the northern mesic forest is currently classified as saw timber. Typical species in these "mature" forests include Sharp-shinned Hawk, Broad-winged Hawk, Red-shouldered Hawk, Great-horned Owl, Barred Owl, Pileated Woodpecker, Yellow-bellied Flycatcher, Red-eyed Vireo, Veery, Canada Warbler, Ovenbird, Magnolia Warbler, Black-and-White Warbler, Black-capped Chickadee, Black-throated Green Warbler, Blackburnian Warbler, Black-throated Blue Warbler, Hermit Thrush, White-breasted Nuthatch, Scarlet Tanager,

Ruffed Grouse, Wood Thrush, and Solitary Vireo.

If no large-scale catastrophic disturbance occurs, the forest begins to show signs of old-growth (Figure 5). The thinning process continues. Old trees die or topple in the wind. As they fall, gaps are created in the canopy allowing additional light to reach the forest floor. This promotes rapid growth and in little time these gaps are filled with saplings all competing for available light. Other trees may have their heartwood rot out, becoming shells around habitable space for many creatures. Old trunks remain on the forest floor, providing a nursery for many young trees and a foraging ground for animals. The older the few remaining trees become the more layered the forest structure becomes, until a nearly perpetual steady state of death and growth pre-



Figure 4. Mature beech and maple forest showing more spacing between trees (Photo by Robert Read).

vails. This state may last for centuries or it can be wiped clean by a natural or human caused disturbance. The dynamics of an old-growth forest, if looked at on a large enough scale, could provide habitat for nearly all of those species previously listed. Due to past logging, fire and other disturbance history, there is virtually no true old-growth in Wisconsin. The approximately 20,000 acres that have been identified as having qualities closely approximating presettlement conditions represent only about 0.17% of the presettlement forest and about 0.32% of today's northern mesic forest acreage. Most of these old growth acres have a natural disturbance origin.

The succession stages and vertical structure are very important in determining species composition. Equally important is the horizontal structure.

The distance from any edge will determine species composition. Some birds are extremely sensitive to habitat edges (Temple 1988). Other factors which help determine species composition are the patchiness of a tract, shape of a tract, degree of connectiveness with other tracts, and topography.

Changes in horizontal structure caused by man has been great. Exceedingly few areas in Wisconsin are far from the influence of man. One half of Wisconsin's forest is within $\frac{1}{4}$ mile of a maintained road, and 97% is within 1 mile (Smith 1986). The remaining 3% is nearly all swamp, bog, or muskeg land. It is virtually impossible today, in a northern mesic forest, to be more than 1 mile away from marks of civilization.

The forest we have today is much different than the presettlement for-



Figure 5. Old-growth forest showing large diameter trees and downed logs; notice the sapling trees filling a gap in the top center (Photo by M. Jaunzems).

est. Today's northern mesic forest is heavily managed with nearly all of it proposed for some type of silviculture practice in the next fifty years. The effects of this management will be to produce plenty of nesting habitat for those species that optimally use early to mid-aged stands. Those species that do best in mature forest will find little of their preferred habitat, and they will have to utilize younger forests as best they can.

SITES

The four sites described here should give you a good sample of northern mesic forest habitats. Featured will be Plum Lake Hemlocks Natural Area in Vilas County, a site containing old-growth hemlock-hardwoods; Giant White Pine Grove in Forest County,

containing a super canopy of large white pines; Marinette County Beech Forest, a hardwood forest containing the beech component of the canopy; and Flambeau River Hemlocks-Hardwoods, the site of a catastrophic blow-down.

Because the northern mesic forest is our state's largest plant community, any few selected sites would not cover all of the facets of this community. The changing compositional structure of this community is so varied that a large number of sites would have to be visited to get a feel for its complexity. To help you gain a better understanding of the forests, an additional 11 publicly owned areas are described briefly at the end.

PLUM LAKE HEMLOCK FOREST

Size.—The designated State Natural Area covers 228 acres. In conjunction, an adjacent 333 acres of public-use natural area bringing the total acreage to 561 acres.

Location.—Vilas County.

Access.—From east; go 0.75 mile south on County Hwy. N from Star Lake, then west on Hook Road 0.7 mile to Star Creek and into the area. From Sayner; go west 1.75 miles on County Hwy. N, then north 4.4 miles on Razorback Road, then take Rearing Pond Road east to the site.

Site Description.—Plum Lake Hemlock Forest is a large, old-growth hemlock-hardwood stand on rolling topography. Tree reproduction is sparse, and the ground layer depauperate. There is a history of high deer populations and winter yarding. The stand originated about 1810 following fire and has gone from aspen to pine to hemlock. The presence of many white birch in the larger size classes suggests fire origin. A selective cutting for pine occurred in the 1880's. White pine stumps are present but not dense. Importance values of tree species in decreasing order are hemlock, sugar maple, yellow birch, and basswood. Soils are Vilas, Omega, and Hiawatha sands.

Birds.—Foremost in any analysis of Plum Lake Hemlock Forest is its size and configuration. At 561 acres it is one of the largest blocks of older growth anywhere in Wisconsin. Secondly, perched on an isthmus, the forest has linear configuration, but these

long sides are water edges. This affords the interior preference birds a relatively secure place to nest. See Table 2 for regularly nesting species.

GIANT WHITE PINE GROVE

Size.—Although only 25 acres, it lies with the Shelp Lake Wilderness Area. The site is located within the Nicolet National Forest.

Location.—Forest County.

Access.—From the intersection of Forest Roads 2183 and 2414 east of Scott Lake and 9.5 miles east of Three Lakes, go north on 2414, 1.7 miles to an old borrow pit on the north side of the road. Walk northeast on Giant White Pine Trail, 0.5 mile to the site.

Site Description.—Giant White Pine Grove is one of the best examples of mature hemlock-hardwoods with a white pine supercanopy. The canopy species are dominated by hemlock, sugar maple, yellow birch, and basswood with taller white pines (to 3 feet in diameter at breast height) adding a supercanopy stratum. Saplings are nearly all sugar maple; shrubs are mountain maple, beaked hazelnut, red-berried elder, and fly honeysuckle. Groundlayer species are bunchberry, bluebead lily, starflower, wild sarsaparilla, large-leaved aster, shining clubmoss, and oak fern.

Birds.—Although much smaller than Plum Lake Hemlock, this site contains many of the same species plus a few associated with the super canopy white pines. The primary reason is the fact that the site is surrounded by unbrow-

Table 2. Breeding birds of four stands of northern mesic forests.

Species	Plum Lake	Giant White Pine	Marinette Beech Forest	Flambeau
Goshawk	Uncommon	Uncommon		
Broad-winged Hawk		Uncommon	Uncommon	
Black-billed Cuckoo				Uncommon
Ruby-throated Hummingbird	Uncommon	Uncommon		
Yellow-bellied Sapsucker	Uncommon	Uncommon	Uncommon	
Downy Woodpecker		Uncommon	Uncommon	Uncommon
Hairy Woodpecker	Uncommon	Uncommon		Uncommon
Northern Flicker				Uncommon
Pileated Woodpecker	Uncommon	Uncommon		
Eastern Wood-Pewee	Uncommon	Uncommon	Uncommon	
Least Flycatcher	Uncommon	Uncommon	Common	
Great Crested Flycatcher	Uncommon	Uncommon		Uncommon
Blue Jay	Uncommon			Uncommon
American Crow	Uncommon			
Common Raven	Uncommon			
Black-capped Chickadee	Uncommon		Common	
Red-breasted Nuthatch	Uncommon	Uncommon		
White-breasted Nuthatch			Uncommon	
Brown Creeper	Uncommon	Uncommon		
Winter Wren	Common		Uncommon	
Golden-crowned Kinglet	Uncommon	Uncommon		
Veery	Uncommon	Uncommon	Uncommon	Uncommon
Swainson's Thrush	Uncommon			
Hermit Thrush	Uncommon	Uncommon	Uncommon	
American Robin			Uncommon	Common
Cedar Waxwing		Uncommon		Uncommon
Solitary Vireo	Uncommon	Uncommon		
Red-eyed Vireo	Common	Common	Common	
Northern Parula	Uncommon	Uncommon		
Chestnut-sided Warbler				Common
Black-throated Blue Warbler	Uncommon		Uncommon	
Yellow-rumped Warbler	Uncommon			
Black-throated Green Warbler	Common	Common	Common	
Blackburnian Warbler	Common	Common		
Pine Warbler	Uncommon	Uncommon		
Black-and-White Warbler	Uncommon	Uncommon		Uncommon
American Redstart		Uncommon		Common
Ovenbird	Common	Common	Common	
Mourning Warbler				Common
Common Yellowthroat				Uncommon
Canada Warbler	Uncommon			
Scarlet Tanager	Uncommon	Uncommon	Uncommon	
Rose-breasted Grosbeak			Common	Uncommon
Rufous-sided Towhee				Uncommon
Song Sparrow				Common
White-throated Sparrow		Uncommon		Uncommon
Brown-headed Cowbird				Uncommon
Purple Finch			Uncommon	
American Goldfinch				Common
Evening Grosbeak		Uncommon		

ken (although young) forest. See Table 2 for regularly occurring nesters.

MARINETTE COUNTY BEECH FOREST

Size.—40 acres located within county forest land.

Location.—Marinette County.

Access.—From Wausaukee, go west on County Highway C 19 miles, then north on Goodman Parkway Road nearly 5 miles. The road bisects the natural area.

Site Description.—Marinette County Beech Forest State Natural Area is a beech dominated forest within a surrounding landscape of hemlock-hardwood forest. The area has granite and greenstone bedrock overlain by glacial till from the Athelstane lobe of the Cary stage of Wisconsin glaciation. The soils are mildly podolized sandy loams on rough to undulating topography. Forest dominants are beech, sugar maple, yellow birch, and hemlock. Ground layer species include starflower, sweet cicely, pyrolas, large-leaved aster, Canada mayflower, white baneberry, and large-flowered trillium.

Birds.—This site has birds indicative of forest dominated by hardwoods and containing American beech. The forest, although surrounded by other forest land, has marked influences of man acting on it. Primarily is the road which forms a corridor diagonally right through the heart of the site. See Table 2 for regularly occurring nesters.

FLAMBEAU RIVER HEMLOCK-HARDWOOD FOREST

Size.—320 acres lying within Flambeau River State Forest.

Location.—Sawyer County.

Access.—From the intersection of County Hwys. W and M, west of Phillips, go south on County M, 5.0 miles, then west on Hines Grade Road, 1.8 miles, then north on Carlson Road, 1.1 miles, to the southern boundary of the natural area. Caution: Carlson Road is dirt-surfaced, unimproved and not maintained.

Site Description.—Prior to 1977 this old-growth forest was dominated by hemlock, yellow birch, and sugar maple with some white ash, elm, basswood, and very large white pine. A wind storm (downburst) on July 4, 1977, felled the entire stand except for a few large trees, providing a unique opportunity to study the role of natural disasters within natural ecosystems. The forest is now composed of sugar maple, yellow birch, and basswood; the hemlocks are disappearing. Small deer and hare exclosures were constructed in both salvaged and unsalvaged portions of the natural area in 1982.

Birds.—The birds are those typical of a large-scale natural disturbance. This site was chosen to give an excellent comparison between natural disturbance regimes and man-produced disturbance. See Table 2 for regularly occurring nesters.

ADDITIONAL SITES

Birchwood Lakes.—A designated Washburn County Primitive Area. The

site features a large 800-acre block of second growth hardwoods. Of significance is the large intact acreage and the west Wisconsin range. Location: Township 38N Range 10, Section 13 (the E 3/4) and Section 24 (E 3/4 of N 1/2).

Totagatic Highlands Hemlocks State Natural Area.—The site features an old-growth hemlock-hardwood stand within a large block of Washburn County Forest Land. Of significance is hemlock here at its western most range limit. Location: Township 42N Range 10W Section 23 (the SE 1/4 SW 1/4) and Section 26 (the W 1/2 NE 1/4 and SE 1/4 NW 1/4). Access is over 2.5 miles of rutted County forest road.

Plagge Woods State Natural Areas.—The site features an old-growth forest on the flanks of Flambeau Ridge in northern Chippewa County. Of significance is the mixture of northern and southern species at this forest located at its southwest limit in Wisconsin. Location: Township 32 N Range 7W Section 11 (the N 1/2 NE 1/4).

Outer Island Hemlocks.—This site features an old-growth hemlock-yellow birch forest within the Apostles Islands National Lakeshore. Of significance is the lush understory and its associated birds, that develop with the absence of deer. Location: Township 53N Range 12E on the northwest shore of the island.

Memorial Grove Hemlocks.—The site features an old-growth hemlock forest. This site is a candidate research natural area within the Chequamegon National Forest. Location: Township 39N Range 3E Section 1 (the SE 1/4 SW

1/4 and SW 1/4 SE 1/4). This site is easily accessible through a wayside on the north side of Hwy. 70, 1/4 mile east of the Oneida County line.

Patterson Hemlocks State Natural Area.—This site features an old growth hemlock-hardwood stand. Of significance is the fairly dense shrub-sapling layer and its associated bird life. This is due to the low, stable deer populations. Location: Township 39N Range 4E Section 3 within the N 1/2.

Eau Pleine Park Hardwoods.—This site features an old growth hardwood forest within Eau Pleine Park in the Marathon County Park System. Of significance is its location at the south central limit of the northern mesic forest. Location: Township 26N Range 6E Section 18 (within the NW 1/4).

Scott Lake-Shelp Lake Natural Area.—This site features an old-growth hemlock stand on the northwest shore of Scott Lake within Nicolet National Forest. An excellent trail allows easy access of Forest Road 2183. Location: Township 38N Range 12E Section 17 (the NE 1/4 SW 1/4).

Jung Hemlock-Beech Forest State Natural Area.—The site features an old-growth hemlock-beech-maple forest in Shawano County. Of significance is the beech component, here near its western limit. The site, unfortunately, is entirely isolated and now contains many edge species, but it is still valuable for comparative studies. Location: Township 27N Range NE Section 23 (the E 1/2 NW 1/4).

Peninsula Park Beech Forest.—This park features an expansive area of in-

tact forest. This is of great importance to interior forest birds in this highly developed part of the state. The entire forest lies within Peninsula State Park.

Rock Island State Park.—This site features a second growth forest. Of significance is the large size near 800 acres and the small amount of edge (only on the southwest corner and around the old lighthouse). The park is reached by ferry (no cars) from Washington Island.

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