Birds of Wisconsin's Northern Swamps and Bogs

by Randy M. Hoffman and Michael J. Mossman

Northern swamps and bogs have a special significance for Wisconsin birders, for they often contain rare "boreal" birds found regularly in no other natural community type in our state—species such as Palm Warbler, Lincoln's Sparrow, and Yellow-rumped Warbler. Indeed, swamps and bogs contain more of these species than do our very limited examples of boreal (upland spruce-fir) forest (Mossman et al. 1990). Over half of the northern sites described in *Wisconsin's Favorite Bird Haunts* (Tessen 1989) are swamps or bogs: the chapter on Clam Lake states that "spruce-tamaracks are often worth the extra effort"; in Douglas County bogs, "boreal birds abound both in winter and during the breeding season"; and in Forest County "the black spruce bogs seem to be the most likely homes for several of the most sought after species." Francis Zirrer (Matteson 1990) wrote eloquently of such places and their birdlife.

However, the rarity of these boreal breeding-bird species in Wisconsin is more apparent than real, because the vast majority of their habitat is fairly inaccessible to birders. These bog and swamp communities are actually quite extensive, and cover some 855,000 acres—about 8% of the northern Wisconsin landscape. Compared with other natural communities in the state, they have fared well since European settlement began in the early 1800s. Of the 2,350,000 acres that probably existed then, 36% remains today. Yet the poor access and traditionally low commercial value of northern swamps and bogs do not secure their future. Immediate and potential threats include commercial harvest of moss, the expanded use of swamp conifers for pulp, the potential exploitation of conifers and peat for power generation, and overbrowsing by mammalian herbivores.

Northern swamps and bogs comprise a wide variety of types, each with its characteristic range of structures and breeding-bird communities. An important feature common to many is the presence of peat, which forms from sedges, mosses, and other plants, the remains of which decompose poorly in their cool, wet, acidic, substrate. The degree to which peat accumulates in a wetland results from

factors such as water chemistry and flow, and strongly influences the type of vegetation that develops.

Curtis (1959) classified these communities as *open bogs, northern wet forests,* and *northern wet-mesic forests. Open bogs* are dominated by sphagnum moss (*Sphagnum* spp.) and low shrubs. These include ericaceous "heath" species such as leatherleaf (*Chamaedaphne calyculata*), Labrador tea (*Ledum groenlandicum*), bog rosemary (*Andromeda glaucophylla*), bog laurel (*Kalmia polifolia*), blueberry (*Vaccinium angustifolium, V. myrtilloides*) and cranberry (*V. macrocarpon, V. oxycoccus*). Non-ericaceous shrubs such as bog birch (*Betula glandulosa*) and bog holly (*Nemopanthus mucronata*) are sometimes present as well. Characteristic herbs include three-leaved solomon's seal (*Smilacina trifolia*), orchids such as rose pogonia (*Pogonia ophioglossoides*), grass pink (*Calopogon pulchellus*) and red ladyslipper (*Cypripedium acaule*), and the insectivorous pitcher-plant (*Sarracenia purpurea*) and sundews (*Drosera* spp.). Sedges (*Carex* spp.) and cottongrasses (*Eriophorum* spp.) are usually present as well. Open bogs often succeed gradually to wet forest, and may contain very scattered, stunted black spruce or tamarack. They sometimes grade into northern sedge meadow or sedge marsh (Mossman and Sample 1990), or alder (*Alnus rugosa*) thickets (Hoffman 1989).

Northern wet forests—are dominated by black spruce (*Picea mariana*), and/or tamarack (*Larix laricina*), and occur on lake beds, lake fringes, extensive basins, and streamside meanders. The understory flora resembles that of open bog, but with the addition or increased importance of species such as marsh white violet (*Viola pallens*), three-seeded sedge (*Carex trisperma*), tawny cottongrass (*E. virginicum*), and hare's-tail cottongrass (*E. spissum*).

Northern wet-mesic forests—grow on lake beds, river floodplains, streamside meanders and seepage slopes. They can be dominated by white cedar (*Thuja occidentalis*) and sometimes also balsam fir (*Abies balsamea*), or alternatively, by hardwoods such as black ash (*Fraxinus nigra*), yellow birch (*B. alleghaniensis*), and red maple (*Acer rubrum*). Northern wet-mesic forests often include both conifers and hardwoods. Hemlock (*Tsuga canadensis*) may also be present. Common understory plants in cedar-dominated forests are naked miterwort (*Mitella nuda*), Canada mayflower (*Maianthemum canadense*), dwarf raspberry (*Rubus pubescens*), intermediate wood fern (*Dryopteris intermedia*), sweet-scented bedstraw (*Gallium triflorum*), starflower (*Trientalis borealis*), spotted jewelweed (*Impatiens biflora*), and bunchberry (*Cornus canadensis*). In swamps dominated by black ash, common understory plants include lady fern (*Athyrium felix-femina*), spinose wood fern (*Dryopteris spinulosa*), sensitive fern (*Onoclea sensibilis*), bluejoint grass (*Calamagrostis canadensis*), marsh marigold (*Caltha palustris*), sedge (*Carex stipata*), alpine enchanter's nightshade (*Circaea alpina*), blue flag iris (*Iris versicolor*) and marsh skullcap (*Scutellaria galericulata*).

Curtis (1959) presented his open bog, northern wet forest and northern wet-mesic forest types in a simplified manner, suggesting a general, linear, successional relationship between them. Subsequent studies, summarized by Crum (1988), have classified these

communities more precisely, and have identified several successional pathways based largely on the diversity of site characteristics, history, water chemistry, and water flow. Crum and Curtis both recognized the difficulties in classifying this complex of intergrading wetland types, and their respective definitions often do not correspond with each other. However, both schemes are useful. Following is a description of those types that occur in Wisconsin, according to Crum, and their correspondence with Curtis' classification and our own classification in the series *Wisconsin Birding: The Habitat Way*.

Crum first divided wetlands into general types: marshes and sedge meadows, fens, bogs, and swamps. He defined *marshes* and *sedge meadows* as "grassy" or "reedy" wetlands that develop on mineral soil, in areas standing under water at least part of the year. These are well aerated and mineral rich, and store little or no peat. This category includes parts of Curtis' sedge meadow and emergent aquatic communities, and we have used these same Curtis categories for the avifaunas (Hoffman 1990, Mossman and Sample 1990).

Crum's *fens* are peatlands dominated by grasses, sedges, or reeds, often with some shrubs or scant tree cover. They develop only under the influence of mineral rich, well aerated water at or near the ground surface. Typically, very little peat accumulates. In northern Wisconsin, fens may succeed to bog or swamp communities. Curtis reserved the term fen for southern Wisconsin, and we discussed birds of southern Wisconsin fens in conjunction with the closely related wet and wet-mesic prairies (Hoffman and Sample 1988). Curtis apparently included northern fens in both sedge meadow and open bog communities, and because of their characteristic mixture of sedges and rushes we included them with sedge meadows. In the present paper we discuss fens only to the extent that they intermix with bog communities, as is often the case in northern Wisconsin.

Bogs—were defined by Crum as peatlands that derive water and nutrients only from the atmosphere. They are highly acidic and nutrient poor, and are dominated by sphagnum, ericaceous shrubs, and black spruce. They include Curtis' northern wet forest community type and most of his open bog type, and they are a major focus of the current paper. In Wisconsin, most bogs develop gradually as peat accumulates in a lake or pond basin, and the bog boundary thus generally corresponds with that of its basin. Their various, potential successional pathways depend mostly on water chemistry. On alkaline or neutral water bodies, the shorelines normally develop fen vegetation—usually sedges and rushes, often *Carex lasiocarpa*. Gradually, this develops a mat or quaking bog, which begins to grow from shore, over the water. Eventually, sphagnum may dominate, and may form a lawn-like mat. As peat accumulates further, it raises the mat from the direct influence of the alkaline or neutral water—the substrate becomes drier and more acidic, thus favoring the growth of ericaceous and other low shrubs. Eventually this is succeeded by a *forested bog* of black spruce and/or tamarack. Black spruce is favored by the most acidic conditions, whereas tamarack requires some influence of

mineral-rich groundwater. However, if mineral-rich water continues to dominate, due to flow or pooling, white cedar may grow, and the site could succeed to cedar swamp.

Alternatively, margins of the more acidic lakes and ponds tend to harbor sphagnum and leatherleaf, which develop an increasingly acidic mat. A narrow zone of black spruce and tamarack may form, but eventually the highly acidic substrate precludes all trees but black spruce. On either acidic or non-acidic sites, disturbances such as fire can encourage growth of balsam fir, white pine (*Pinus strobus*) or jack pine (*P. banksiana*).

Wisconsin has good examples of many variants of bog: open bogs dominated by sphagnum lawns or heath, sometimes with zones of alkaline fen; conifer forest dominated by black spruce, tamarack, or both species; various admixtures of open and forested types; and basins in which open water is surrounded by concentric zones of fen, sphagnum, heath, conifer forest, and upland forest.

Bogs along Lake Superior have some special features. These peatlands are formed in pools behind baymouth sandbars, where water flow into the lake is impeded, and some mixing occurs with the relatively mineral-rich lake water. Directly behind the bars are areas of fen vegetation, which tend to be "boggy" in areas with thick accumulations of peat. Often there are several baymouth bars, with the vegetation being more acid-loving with increased distance from the lake. The cold, mineral-rich waters of Lake Superior contribute to an unusual combination of plant species, which include those typical of the alkaline bog successional pathway, and other species with tundra affinities. Several far northern sedges are common, and in some cases they dominate the plant community.

Muskegs—are extensive bogs with stunted, usually scattered black spruce trees growing on high, dry, well-aerated deposits of peat. The sites are very acidic, and water and nutrients come only from the atmosphere. Muskegs have a simple vascular flora, with most sites containing fewer than 25 species, and black spruce is the only tree that can grow here. Typically, the most open areas are dominated by sphagnum, leatherleaf, and bog laurel, although labrador tea and blueberry sometimes prevail in areas shaded by spruces.

Some well developed muskegs present an apparent anomaly, in that the spruces decrease in size, density, and vigor toward the center of the bog. Rather than being the youngest trees on the most recently formed part of the mat, these are actually often the oldest trees, growing very slowly in the extremely acidic conditions that prevail atop the greatest accumulation of peat. The periphery of these bogs often supports a zone, termed "lagg", characterized by relatively tall spruces and a diverse ground flora, which results from mineral-rich run-off from the surrounding uplands and more acidic run-off from the bog's elevated center. Immediately adjacent to the upland, mineral rich run-off may also discourage peat formation to the extent that a moat of open water remains.

Swamps—are distinguished from bogs mainly by a periodic or constant flow of groundwater or surface water,

a relative lack of peat, and less acidic conditions. Although Curtis lumped white cedar swamps and northern hardwood swamps into a single northern wet-mesic forest community, Crum considered these as distinct types. White cedar requires a flow of mineral water, and also often occurs on calcareous substrates. Consequently, *cedar swamps* grow primarily along streams or lakes, and in depressions in glacial drift over limestone or dolomite. They usually contain many plant species characteristic of fens. They result from several different successional pathways.

Northern hardwood swamps—are dominated by black ash, yellow birch, and red maple, sometimes with an admixture of lowland conifers, especially white cedar. They grow primarily along floodplains and at stream headwaters in moraines, always on mineral soil or shallow muck (oxidized peat), with no sphagnum or substantial accumulation of peat.

In order to describe the breeding-bird communities of northern bogs and swamps, we have distinguished 7 habitat categories (Table 1) based on the definitions of Crum and Curtis, and our assessment of the habitat structures that most affect breeding-bird distribution. Thus, the first 3 community categories in Table 1 represent a structural continuum from open bog (dominated by sphagnum and/or heath, often with a sedge component), to muskeg (dominated by variously spaced, generally stunted black spruce 1–6m tall in a matrix of sphagnum and/or heath), to forested bog (a forest of black spruce and/or tamarack, generally over 6m tall, usually with both heath and shrubs in the understory). It is important to note that this is not necessarily a *successional* continuum, because muskeg is more nearly climax than transitional in nature, and may develop from forested bog as a result of peat accumulation.

The fourth column in Table 1 represents a common stage of basin bog succession in Wisconsin, in which a central pond or lake is surrounded by concentric rings of fen and/or sphagnum lawn, open bog, and forested bog. These concentric bands are often only 10–100m wide, and surrounded by upland forest. Thus, the breeding avifauna tends to be a mixture of species characteristic of open water, open bog, forested bog, upland forest, and forest edge.

The fifth column represents bogs along Lake Superior, as described above. At these sites, avifaunas are likewise affected by mixtures of wetland and upland types, as well as by proximity to Lake Superior. The last 2 columns represent the 2 fairly distinct but sometimes intergrading types of Curtis' northern wet forest, or Crum's cedar and hardwood swamps.

The most common species of open bogs are Sedge Wren, Common Yellowthroat, Savannah Sparrow, Song Sparrow, and Red-winged Blackbird. Other characteristic but less common species include Clay-colored Sparrow, Lincoln's Sparrow, Swamp Sparrow, Bobolink, Brewer's Blackbird, and American Goldfinch. This is very similar to the corresponding list for Wisconsin sedge meadow, especially northern sedge meadow (Mossman and Sample 1990). Notable differences occur with the sparrows: open bogs have relatively more Clay-colored Sparrow, Savannah Sparrow, Song Sparrow, and Lincoln's Sparrow, and

Table 1. Breeding-bird species abundance in 7 types of fen, bog, and swamp communities. A = Abundant. The average number of territorial males expected on 100 transect points is more than 100. C = Common. The average number of territorial males expected on 100 transect points is 50 to 99. FC = Fairly Common. The average number of territorial males expected on 100 transect points is 20 to 49. U = Uncommon. The average number of territorial males expected on 100 transect points is 5 to 19. R = Rare. The average number of territorial males expected on 100 transect points is less than 5.

Species	Open Bog+	Muskeg+	Forested bog+	Small bog around lake+	Lake Superior bog+	White Cedar Swamp+	Northern Hardwood Swamp+
Pied-billed Grebe					R		
Great Blue Heron	R			U	U	R	U
American Bittern	R			R	R		
Least Bittern					R		
Green-backed Heron			R		R		
Canada Goose					R		R
Wood Duck				U			
Green-winged Teal	U						
American Black Duck		R					
Mallard	R		R	U	U	R	
Blue-winged Teal					R		
Gadwall				R			
Ring-necked Duck				U			
Hooded Merganser				R			
Red-breasted Merganser					R		
Bald Eagle			R	U	R		
Northern Harrier	R	U			R		
Sharp-shinned Hawk		R	R				
Red-shouldered Hawk		R		U		R	R
Broad-winged Hawk			R	U		R	R
Red-tailed Hawk			R				
American Kestrel		R					R
Merlin	R						
Spruce Grouse			R				
Ruffed Grouse			R		R	U	U
Sharp-tailed Grouse	R						
Yellow Rail					R		
Virginia Rail					R		
Sora					R		
American Coot					R		
Sandhill Crane		R			R		
Killdeer				R	R		
Common Snipe	R			R	U	R	
American Woodcock			R	U	R	R	
Ring-billed Gull					R		
Herring Gull					U		
Black Tern				FC*			
Mourning Dove		R					R
Black-billed Cuckoo			Y	U	R		R
Yellow-billed Cuckoo					R		U
Great Horned Owl					R		R
Barred Owl						R	
Great Gray Owl		R					
Long-eared Owl						R	
Short-eared Owl	R						
Northern Saw-whet Owl						R	
Chimney Swift				R		U	R
Ruby-throated Hummingbird				U			
Belted Kingfisher			R		U		
Red-bellied Woodpecker							U

continued

Table 1. (*Continued*).

Species	Open Bog+	Muskeg+	Forested bog+	Small bog around lake+	Lake Superior bog+	White Cedar Swamp+	Northern Hardwood Swamp+
Yellow-bellied Sapsucker			R	R	R	U	R
Downy Woodpecker			R	U	U	R	R
Hairy Woodpecker		R	U	U	R	U	U
Three-toed Woodpecker		R					
Black-backed Woodpecker			U			R	
Northern Flicker		R	R	U	U	U	U
Pileated Woodpecker			R	U	R	U	U
Olive-sided Flycatcher			R	R	U	R	
Eastern Wood-Pewee		R	R	U	R		U
Yellow-bellied Flycatcher		FC	U	R	U	FC	R
Alder Flycatcher	R	U		R	U	R	
Least Flycatcher					U	R	U
Eastern Phoebe					R		
Great Crested Flycatcher		R	U	FC	R	U	FC
Eastern Kingbird	R	R		FC	U		R
Purple Martin			U		R		
Tree Swallow		FC	U	U	FC	U	
Northern Rough-winged Swallow					R		
Bank Swallow					R		
Cliff Swallow		FC		R	R		
Barn Swallow	R	R		R	R		
Gray Jay		R	R	R		R	R
Blue Jay		FC	FC	FC	FC	FC	U
American Crow		R	U	FC	U	U	U
Common Raven		U	U	R	R	U	R
Black-capped Chickadee		R	U	C	FC	FC	FC
Boreal Chickadee		U	R				
Red-breasted Nuthatch		U	FC		U	FC	U
White-breasted Nuthatch				U	R		U
Brown Creeper		R	U		R	U	R
House Wren						R	
Winter Wren		R	U	R	U	C	U
Sedge Wren	A	C	U		U		
Marsh Wren					R		
Golden-crowned Kinglet		U	C	U		FC	R
Ruby-crowned Kinglet			FC*	R	U		
Eastern Bluebird	R	R			R		U
Veery		U	C	C	C	FC	C
Swainson's Thrush			U			U	
Hermit Thrush		C	FC	FC	R	FC	R
Wood Thrush			U	U		R	
American Robin	U	U	U	FC	FC	U	U
Gray Catbird		R		R	R		U
Brown Thrasher					R		
Cedar Waxwing		FC	FC	FC	FC	R	FC
European Starling					R		
Solitary Vireo		R	U		R	U	R
Yellow-throated Vireo			R			R	R
Warbling Vireo				U	R		
Red-eyed Vireo		U	U	FC	FC	U	A
Golden-winged Warbler	R		R		R	R	R
Nashville Warbler		A	A	A	C	A	U
Northern Parula			FC		R	FC	U
Yellow Warbler	R	FC	R	FC	FC	R	R
Chestnut-sided Warbler				FC		R	

continued

Table 1. (*Continued*).

Species	Open Bog+	Muskeg+	Forested bog+	Small bog around lake+	Lake Superior bog+	White Cedar Swamp+	Northern Hardwood Swamp+
Magnolia Warbler			R		R		
Cape May Warbler		U	R		U		
Yellow-rumped Warbler		C	A	R	R	FC	R
Black-throated Green Warbler		R	U	R	R	C	
Blackburnian Warbler			R		U	FC	
Bay-breasted Warbler					R		
Pine Warbler			R		R		
Palm Warbler		C	U		R		
Cerulean Warbler							R
Black-and-White Warbler		U	FC	R	FC	FC	FC
American Redstart				R	FC		FC
Ovenbird		U	FC	FC	U	C	FC
Northern Waterthrush		U	U	R	U	U	FC
Connecticut Warbler		U	R				
Mourning Warbler		R	U	R	R	U	U
Common Yellowthroat	A	C	C	A	C	U	FC
Wilson's Warbler					R		
Canada Warbler		R	R			FC	U
Scarlet Tanager			U	FC	R	U	U
Rose-breasted Grosbeak		R	U	U	R	U	U
Indigo Bunting				R	R		U
Rufous-sided Towhee				R			
Chipping Sparrow				FC	R	U	
Clay-colored Sparrow	C	R					
Savannah Sparrow	A	A	R				
Henslow's Sparrow	U						
Le Conte's Sparrow		FC			R		
Song Sparrow	A	A	C	FC	FC	R	FC
Lincoln's Sparrow	C	A			R		
Swamp Sparrow	C	C	FC	U	C	R	R
White-throated Sparrow		C	A	FC	U	FC	U
Dark-eyed Junco						U	
Bobolink	FC				R		
Red-winged Blackbird	A	FC		C	A	R	R
Brewer's Blackbird	FC	U					
Common Grackle			R	R	U		
Brown-headed CowbirdU	R	U	FC	U			
Northern Oriole				U	R	R	R
Purple Finch		R	FC	U	U	FC	R
Red Crossbill		R					
White-winged Crossbill			R				
Pine Siskin				R			
American Goldfinch	FC	R	R	R	U	R	R
Evening Grosbeak			R	R			

* = value somewhat inflated due to high count at one site.

\+ = number of sites of each type: Open Bog-9; Small Bogs-5; Lake Superior Bogs and Fens-4; Forested Bog-9; Muskeg-7; White Cedar Swamp-11; Northern Hardwood Swamp-4.

neither of the northern sedge meadow specialists—LeConte's Sparrow and Sharp-tailed Sparrow.

The effect of burning on open bogs is illustrated by our count of adjacent tracts near Thunder Lake (Table 2), one of which had been burned the previous spring. As is often the case in open bogs, pastures, sedge meadows, and barrens in northern Wisconsin, Brewer's Blackbird appeared and became abundant immediately following burning. Savannah Sparrow increased with the thinning of shrub cover, while

Table 2. Comparison of numbers of individuals observed on breeding-bird counts and habitat characteristics on adjacent burned and unburned open bog communities at Thunder Lake, Oneida County, 8 July 1989. Each tract was surveyed using 4 "walk-5-min/stand-5-min" periods.

Bird species	Unburned	Burned
Merlin	1	0
Sedge Wren	2	0
Common Yellowthroat	4	3
Brewer's Blackbird	0	14
Savannah Sparrow	7	14
Clay-colored Sparrow	23	7
Lincoln's Sparrow	11	12
Swamp Sparrow	0	1
Song Sparrow	9	8
	Estimated % Cover	
Habitat variable	Unburned	Burned
Conifer seedling	1	0
Heath and shrub	40	20
Grass, sedge, forb	25	50
Sphagnum	19	9
Residual	15	9
Exposed peat	0	9
Dead woody	0	3
Total	100	100

the shrub-loving Clay-colored Sparrow declined. Sedge Wren seemed to decline with the disappearance of residual herbaceous cover. The more generalized open-country species—Common Yellowthroat and Song Sparrow—remained at similar densities, as did Lincoln's Sparrow, which generally occurs with equal frequency over the range of woody cover represented in the 2 stands.

When open bogs are disturbed by sphagnum moss harvest, the sphagnum and heath are replaced for at least a few years by a sedge- and rush-dominated community, often with weedy species intermixed. Savannah Sparrow and Sedge Wren remain abundant, Henslow's Sparrow increases to abundant, and LeConte's Sparrow may appear, while heath-loving species such as Lincoln's Sparrow, Red-winged Blackbird, and Common Yellowthroat decrease (Mossman and Sample 1990).

With the addition of scattered, stunted black spruce trees, the open bog community changes toward that of muskeg. To the degree that the spruces are stunted and dispersed, the open bog species remain, especially Savannah Sparrow, Song Sparrow, and Common Yellowthroat. Lincoln's Sparrow increases with the addition of conifers, and is more abundant than in any other Wisconsin habitat type. Wading birds decrease and raptors increase. Woodpeckers and flycatchers appear, and in the denser stands Yellow-bellied Flycatcher can be common. Several other forest species appear, which can be considered distinctly northern (e.g., Common Raven, Red-breasted Nuthatch, Winter Wren, Golden-crowned Kinglet, Hermit Thrush, Solitary Vireo, Nashville Warbler, Yellow-rumped Warbler, White-throated Sparrow) or even boreal (e.g., Three-toed Woodpecker, Yellow-bellied Flycatcher, Gray Jay, Boreal Chickadee, Cape May Warbler, Palm Warbler).

A comparison between muskeg and forested conifer bog avifaunas shows some predictable differences, the loss or marked reduction of open-country species such as Sedge Wren, LeConte's Sparrow, Lincoln's Sparrow, Red-winged Blackbird and Brewer's Blackbird; or the decrease in birds of semi-open habitats, such as Yellow Warbler, Song Sparrow, and Swamp Sparrow. The increase in tree height is evidently responsible for the appearance of species such as Northern Parula and Blackburnian Warbler, and an increase in Nashville Warbler. Mourning War-

bler and Golden-winged Warbler respond to the increased height and importance of hardwood shrubs, which results from comparatively less acidic conditions in forested stands. Perhaps most instructive is the relative decrease in boreal species and an increase in those birds characteristic of the mixed coniferous-hardwood biome that separates the more northerly boreal forest biome from the more southerly hardwood forest biome in eastern North America. Decreasing boreal species include Cape May Warbler, Palm Warbler, Yellow-bellied Flycatcher, and Boreal Chickadee. Increasing "coniferous-hardwood" species are many, and include Purple Finch, Veery, Swainson's Thrush, Solitary Vireo, and Blackburnian Warbler, Nashville Warbler, Northern Parula, and Black-throated Green Warbler. The increase in Ruby-crowned Kinglet indicated in Table 1 may be anomalous, for this species occurs in both muskeg and forested conifer bog in Wisconsin, usually in very acidic sites, among fairly dense black spruce at least 5m tall. Spruce Grouse is a boreal species that occurs primarily in the larger, wilder, forested conifer bogs, perhaps because of its susceptibility to hunting pressure, as well as a need for extensive habitat (Howe et al. 1992).

Figure 1 illustrates the relative abundance patterns of some representative species between open bog, muskeg, and forested conifer bog habitats.

In comparison with these examples of relatively "pure" bog habitats, the many examples of small bog complexes usually have a more diverse avifauna, although they often lack species that may require extensive tracts of open bog, muskeg, or forested bog. Small lakes surrounded by concentric rings of different bog habitats (Table 1, column 4) often provide nesting and feeding habitat for species that require open water, especially Wood Duck, Mallard, Green-winged Teal, Ring-necked Duck, and Bald Eagle. Where there are thinly vegetated, floating peat mats among or at the edges of the open water, Black Terns and Killdeer may nest and feed. Common species of surrounding fen and open bog habitat include Common Yellowthroat, Song Sparrow, and Red-winged Blackbird. These 3 species are also often common in stunted spruce and tamarack, along with Yellow Warbler, Eastern Kingbird, and Cedar Waxwing. Characteristic muskeg species that are usually missing from these small sites include Lincoln's Sparrow and Palm Warbler. If conifer forest occurs, it often contains generalists such as Great Crested Flycatcher, Blue Jay, American Crow, Black-capped Chickadee, White-breasted Nuthatch, Veery, American Robin, Red-eyed Vireo, Chestnut-sided Warbler, Ovenbird, Scarlet Tanager, and Chipping Sparrow, many of which may have territories that "spill over" from adjacent upland forest. Black-throated Green and Blackburnian Warblers are encountered mostly when adjacent uplands contain mature forest. Brown-headed Cowbirds are especially frequent where adjacent uplands are unforested, as are Rufous-sided Towhee, American Robin and American Crow.

The larger bogs in this category, or those near extensive bogs, are more likely to have conifer forest with more northern species such as Golden-crowned Kinglet and Ruby-crowned Kinglet, White-throated Sparrow, Hermit Thrush, and Yellow-rumped

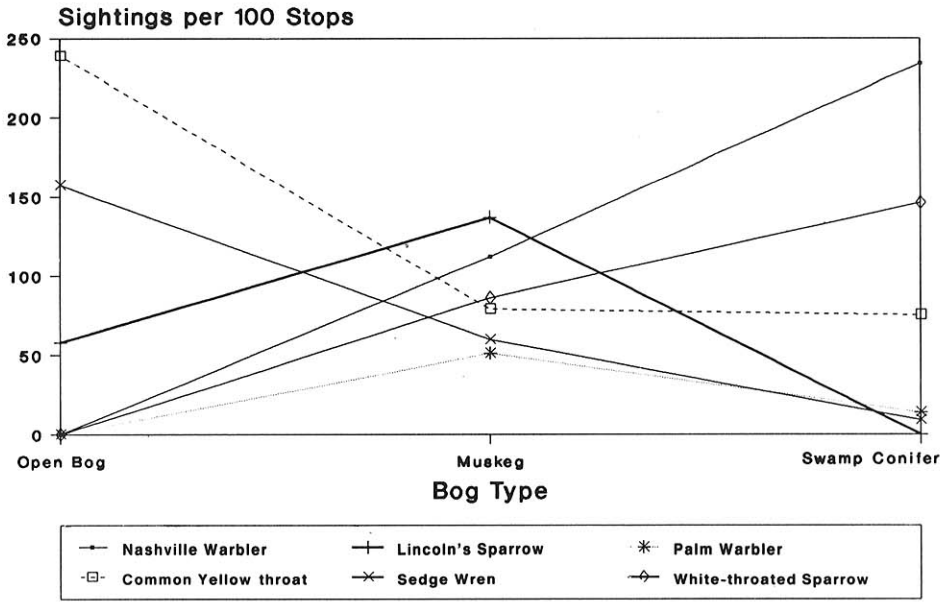

Figure 1. Mean relative frequencies of 6 breeding bird species in 3 bog community types

Warbler. Nashville Warbler is one characteristic species of forested bog that occurs frequently even in tracts as small as 10–20 acres.

Lake Superior peatlands have the most diverse avifauna of any described in this article, because of the range of habitats—pond, fen, open and forested bog, upland ridges, and Lake Superior bays—and their ecotones. Species such as Cape May Warbler, Wilson's Warbler, Bay-breasted Warbler and Tennessee Warbler whose primary range is much further north, are found in summer—- it is uncertain to what extent they breed in these sites, and to what extent they are "stragglers," whose northward migration has been impeded by Lake Superior.

The extensive influence and mixing of mineral rich Lake Superior waters behind baymouth bars has permitted the development of extensive fen and shrub communities. These usually contain common species such as Red-winged Blackbird, Common Yellow-throat, Swamp Sparrow, Yellow Warbler, and others not normally associated with bog: Common Grackle, Marsh Wren, Common Snipe, and rails.

Spruce-tamarack bog often grows in these sites, on older peats or behind an inner baymouth bar. The avifauna here resembles that of other spruce-tamarack bogs, but with a greater complement of boreal species. Although they are rare and sporadic, they provide an interesting component to diversity. Two species that have been found with surprising regularity are Bay-breasted Warbler and Wilson's Warbler. They may be breeding here. Wilson's Warbler has been found breeding in the Apostle Islands (Temple and Harris 1985) and in the Upper

Peninsula (Brewer et al. 1991) in damp, shrubby, thickets with boreal forest elements such as sphagnum, spruce, and heath—similar to its habitat in Wisconsin's Lake Superior bogs.

In eastern Canada, Erskine (1977) found that open bogs were characterized by Palm Warbler, Common Yellowthroat, Savannah Sparrow and Lincoln's Sparrow—species that are also common to abundant in similar Wisconsin sites. In areas with taller scattered spruces he found the following species appearing: Hermit Thrush, Yellow-rumped Warbler, Rusty Blackbird, Dark-eyed Junco, and White-throated Sparrow. In "bog forest" of tamarack and black spruce the species most frequently detected included Cedar Waxwing, Red-eyed Vireo, Tennessee Warbler, Nashville Warbler, and Yellow -rumped Warbler, Common Yellowthroat, Dark-eyed Junco, Chipping Sparrow and White-throated Sparrow.

How do these correspond with our forested bog bird communities farther south, in Wisconsin? Some differences are clear: Rusty Blackbird apparently nested in Wisconsin spruce bogs as recently as the 1960s, and formerly more frequently—but currently it is rare and probably breeds very rarely if ever (Robbins 1992); Tennessee Warbler evidently nests rarely in Wisconsin (Robbins 1992), but occurs in bogs only sporadically, primarily in the Lake Superior bog complexes; in Wisconsin, Dark-eyed Juncos are found only rarely in bogs, but more frequently in cedar swamps and some upland sites. Otherwise, the lists of common breeding-bird species are similar, although several species relative abundances differ between the 2 regions, with Wisconsin having relatively greater numbers of the more southerly-distributed species. For example, Nashville Warbler and Veery—species primarily of the coniferous-hardwood forest biome—are more ubiquitous in Wisconsin bogs. An exception is Red-eyed Vireo, which is common in Wisconsin bogs only where lowland or upland hardwoods are substantially intermixed. As noted above, our most nearly boreal bird communities occur in the most acidic bogs, dominated by heath and/or black spruce, especially when these are extensive.

The breeding-bird community of Wisconsin cedar swamps is dominated by Nashville Warbler, Winter Wren, Black-throated Green Warbler, and Ovenbird. Other species that are less abundant, but which are nonetheless characteristic of this community type, are Yellow-bellied Flycatcher, Red-breasted Nuthatch, Golden-crowned Kinglet, Veery, Hermit Thrush, Northern Parula Warbler, Yellow-rumped Warbler, Blackburnian Warbler, Black-and-White Warbler, Canada Warbler, White-throated Sparrow, and Purple Finch. The presence of hemlocks generally encourages Blackburnian Warbler and Black-throated Green Warbler, Solitary Vireo, Swainson's Thrush, and Golden-crowned Kinglet. An admixture of hardwood trees and especially shrubs tends to favor Canada Warbler, Veery, and perhaps Purple Finch and junco. In areas with pools and the exposed roots of tipped trees, Northern Waterthrushes often reside. Lush sphagnum favors Yellow-bellied Flycatcher, and tamarack, spruce, and fir favor Nashville Warbler. A substantial fir canopy may produce a Cape May Warbler. Winter Wren, and perhaps Black-and-white

Warbler, are more abundant in this Wisconsin community type than any other.

Not surprisingly, the breeding-bird community of northern hardwood swamps differs considerably from those of all other northern bogs and swamps, for it mainly comprises species that prefer hardwood canopy and wet, shrubby areas. The most common species are Red-eyed Vireo and Veery followed in descending order of relative abundance by Great-crested Flycatcher, Ovenbird, Common Yellowthroat, American Redstart, Song Sparrow, Black-and-White Warbler, and Northern Waterthrush. Canada Warbler is also frequently encountered, but not in such high numbers as in cedar swamps. Winter Wrens breed in northern hardwoods swamps, especially when some yellow birch and either cedar or hemlock are present. All these bird species occur more commonly in other habitat types, except Northern Waterthrush and perhaps Veery. Several other species have greater relative abundance here than in any of the other northern swamp or bog communities, especially those that prefer hardwood shrubs and saplings, e.g., Mourning Warbler, Gray Catbird, and Indigo Bunting. Cerulean Warbler is not a usual member of this forest community, but it does apparently breed in the St. Croix Ash Swamp, perhaps because this site is within an extensive, hardwood forest corridor along the St. Croix River.

Certainly, northern swamps and bogs are among the most beautiful and fascinating, but least familiar, of Wisconsin's plant-animal communities. Yet many of the best and most extensive examples are really not so inaccessible as they might seem—for birdwatchers willing to get their feet wet. They hold unique rewards for the visitor in search of rare boreal birds or unusual plants, or for anyone wanting to understand ecological relationships or simply experience another of Wisconsin's diverse natural environments. The following sites, and others described in *Wisconsin's Favorite Bird Haunts,* are worth a visit in any case.

Description of Sites

The following 7 sites exemplify northern Wisconsin's swamp and bog communities. Some, like the Upper Brule, also include a mixture of other habitats, which is reflected in larger bird lists. Data are presented in Table 3.

SCOTT LAKE–SHELP LAKE NATURAL AREA

Size—272 acres within the Shelp Lake Unit of the Headwaters Wilderness area, Nicolet National Forest.

Location—Western Forest County.

Access—From Three Lakes, take Hwy 32 east and south 5 miles, then east on Forest Road 2183 (Scott Lake Road) 3.5 miles to a small parking area. Follow the hiking trail and boardwalk, as directed by the sign.

Description—Scott and Shelp lakes are scenic wilderness lakes with remnant stands of pine and hemlock on the west shore of Shelp Lake and between the two lakes. The upland forest is dominated by hemlock, with sugar maple (*Acer saccharum*), basswood

Table 3. Maximum number of individuals recorded on breeding-bird surveys at 7 bog and swamp natural areas in Wisconsin.

Species	Scott*-Shelp Lake	Bark Bay*	Kissick Bog*	Upper Brule*	Gobler Lake*	Miscauno*	St. Croix Ash Swamp*
Common Loon		3			2		
Pied-billed Grebe		1					
American Bittern	1						
Least Bittern		1					
Great Blue Heron	3	3					1
Green-backed Heron		1		1			
Canada Goose		4					
Mallard		6	1	2			
Blue-winged Teal		4					
Ring-necked Duck			4				
Hooded Merganser			1				
Osprey	1						
Bald Eagle	1	1					
Red-shouldered Hawk							1
Broad-winged Hawk			1			1	
Spruce Grouse			2				
Ruffed Grouse		1		1		2	
Yellow Rail		1					
Virginia Rail		2					
Sora		1					
American Coot		1					
Sandhill Crane		2					
Killdeer		3					
Common Snipe		7					
American Woodcock		1	3	3			
Ring-billed Gull		2					
Herring Gull		6					
Black-billed Cuckoo		5	1	3			1
Yellow-billed Cuckoo		5	1	3			1
Great Horned Owl		1					
Barred Owl						2	1
Long-eared Owl						1	
Chimney Swift			1				
Belted Kingfisher		2	1	1			
Red-bellied Woodpecker							2
Yellow-bellied Sapsucker							2
Downy Woodpecker		2	2	1			1
Hairy Woodpecker				1			1
Black-backed Woodpecker			2				
Northern Flicker	1	4		2			1
Pileated Woodpecker		3		2			1
Olive-sided Flycatcher	1			2			
Eastern Wood-Pewee		3		1		3	3
Yellow-bellied Flycatcher	1		2	7	1	3	
Alder Flycatcher		11		4			
Least Flycatcher		4					
Eastern Phoebe		4					
Great Crested Flycatcher	1	5	1	2	1	5	7
Eastern Kingbird	2	9	1		2		1
Purple Martin		3					
Tree Swallow		24	3	1			
Northern Rough-winged Swallow		6					
Bank Swallow		2					
Cliff Swallow		1					
Barn Swallow		2					
Gray Jay	1			2	1		

continued

Table 3. (*Continued*).

Species	Scott*-Shelp Lake	Bark Bay*	Kissick Bog*	Upper Brule*	Gobler Lake*	Miscauno*	St. Croix Ash Swamp*
Blue Jay		5	5	5	2	25	3
American Crow		16	2	1		4	1
Common Raven	1	4	1	2		9	
Black-capped Chickadee	2	3	7	3		42	3
Red-breasted Nuthatch	2	1		3	2		
White-breasted Nuthatch		1	2			7	4
Brown Creeper	1			5		4	2
Winter Wren				6	2	9	4
Sedge Wren		34		2			
Marsh Wren		1					
Golden-crowned Kinglet				3		25	
Eastern Bluebird		2					
Veery		8	13	8		17	8
Swainson's Thrush			4			2	
Hermit Thrush	2	3	4		3	2	1
Wood Thrush			4			1	
American Robin	1	5	2	26	2	15	1
Gray Catbird				1			
Brown Thrasher			1	1			
Cedar Waxwing		2	4	4	2		8
Solitary Vireo		3	2	1		2	
Yellow-throated Vireo			1				
Warbling Vireo		1					
Red-eyed Vireo	2	11	7	5	1	2	14
Golden-winged Warbler		1		1			
Nashville Warbler	3	20	29	15	1	18	4
Northern Parula		1	11	12			
Yellow Warbler		17	1			3	
Chestnut-sided Warbler	3	6	3	1		3	1
Magnolia Warbler		1		1			
Cape May Warbler			8			3	
Yellow-rumped Warbler	3	1	3	2	2	17	
Black-throated Green Warbler		1		2		22	
Blackburnian Warbler	1			1		8	
Pine Warbler		4		3			
Palm Warbler		1			4		
Cerulean Warbler							3
Black-and-White Warbler	5	5	4	3		6	1
American Redstart		12				7	
Ovenbird	2	7	15	3	1	17	7
Northern Waterthrush		2		3			
Connecticut Warbler				1	3		
Mourning Warbler	2	2	2	1		4	
Common Yellowthroat	3	22	8	7	1	2	4
Canada Warbler				3	1	2	3
Scarlet Tanager		2	2	2		6	6
Rose-breasted Grosbeak		2		7		3	1
Indigo Bunting		1					3
Chipping Sparrow	1	1	3		1		
Le Conte's Sparrow		5					
Song Sparrow	2	23	6	5	24		1
Lincoln's Sparrow		1			19		
Swamp Sparrow	2	37		4			
White-throated Sparrow	5	3	17	8	4		1
Bobolink		3					
Red-winged Blackbird	4	202			3		
Brewer's Blackbird		2			5		
Common Grackle		3					

continued

Table 3. (*Continued*).

Species	Scott*-Shelp Lake	Bark Bay*	Kissick Bog*	Upper Brule*	Gobler Lake*	Miscauno*	St. Croix Ash Swamp*
Brown-headed Cowbird		7		1	1		
Northern Oriole		1					
Purple Finch	1	2	5	1		12	
White-winged Crossbill			1	1			
American Goldfinch		4	2	1			1
Evening Grosbeak		1		2			

* = Number years surveyed: Scott-Shelp Lake-5; Bark Bay-8; Kissick Bay-4; Upper Brule-10; Gobler Lake-4; Miscauno-4; St. Croix Ash Swamp-3.

(*Tilia americana*), yellow birch, white spruce (*Picea glauca*), and white pine; and sparse, patchy shrub and ground-layers. The lakes are less than 5 feet deep, with light brown acid water and muck bottoms. Water lilies are the dominant aquatic plants. Around Shelp Lake is a floating bog mat with acid-loving plants. The remainder of the site is a mixture of conifer swamp and forested conifer bog.

Birds—Data in Table 3 are from counts restricted to the area immediately adjacent to Shelp Lake. Across the road, in the old-growth hemlock stand, a different set of species can be found.

Many of the bird species are characteristic of spruce-tamarack forest and open bog encircling a lake. Nashville Warbler, Common Yellowthroat, Red-winged Blackbird, Black-capped Chickadee, Ovenbird, and White-throated Sparrow are common. Also found regularly are less characteristic species such as Gray Jay, Bald Eagle, Osprey, Chestnut-sided Warbler, Black-and-White Warbler, and Olive-sided Flycatcher. Because of this site's proximity to other lowland conifer communities, other birds from Table 1 may occur here occasionally.

BARK BAY SLOUGH

Size—470 state-owned acres within a 1170-acre lake-fen-bog complex.

Location—Northern Bayfield County.

Access—From Herbster, go northeast on Hwy 13 for 2 miles, then north and west on Bark Bay Road, 0.5 mile to a boat landing. The best access to the sandspit and bogs is by boat or canoe.

Description—The natural area consists of portions of a large bog and fen that was once a part of Bark Bay but is now separated from the open lake by two well-developed beach ridges. Between the baymouth bar and the old beach line, about 0.25 mile inland, are an estuary of open water and a floating fen mat. A small unnamed stream drains the northwest portion of the bog, providing an inlet and outlet to the baymouth bar lake before it joins the Bark River at the east end of the bog and fen. A variety of plant communities and natural features is included within the area. The baymouth bar beach is 1 mile long and 50 to 150

Figure 2. Pond, ridge, fen, and open bog along Lake Superior. Big Bay Natural Area, Bayfield County. (*photo by Cliff Germain*)

feet wide. It rises only a few feet above the fluctuating water level of Lake Superior. Portions of the baymouth bar have a plant cover of blueberry, bearberry (*Arctostaphylos uva-ursi*), alder, sweet gale (*Myrica gale*), and beach grasses. Flora of several subtypes occupy the slough periphery. Most extensive is the floating fen created by the interwoven rhizomes of many sedges and acid-loving plants. The baymouth bar lake is a hard water drainage lake with a maximum depth of 8 feet. There is a good pike-panfish fishery.

Birds—The effects of Lake Superior waters and the resultant development of extensive fen vegetation is reflected by the avifauna. There is a significant component of fen and marsh species, such as Red-winged Blackbird, Sedge Wren, Swamp Sparrow, Common Yellowthroat, Yellow Warbler, Common Snipe, bitterns, herons, and rails. There is also an extensive shrub area, as evidenced by high numbers of Alder Flycatcher. The open lagoon is used by swallows, ducks, loon, and gulls. In recent years, rare northern sedge meadow birds such as Yellow Rail and Le Conte's Sparrow have been found in the fens that result from the mineral rich waters. Additional diversity is due to the development of a forested conifer bog with its typical species. Baymouth bars vegetated with pines and hardwoods harbor additional birds including Pine Warbler, American Redstart, Red-eyed Vireo, and Chestnut-sided Warbler. Finally, the diverse

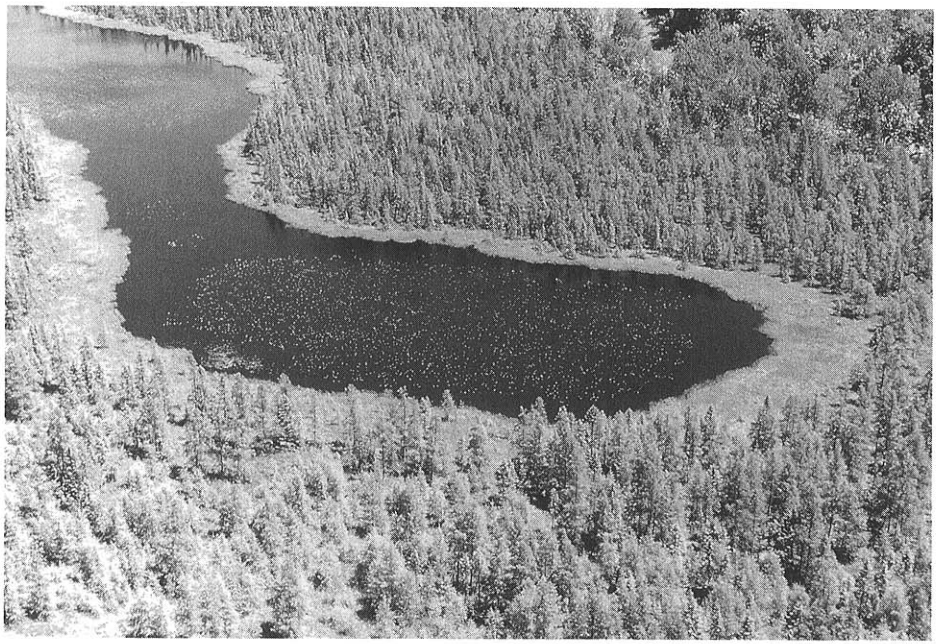

Figure 3. Concentric bands of open bog, forested bog, and forested upland. Dory's Bog, Washburn County. (*photo by R. Moran*)

spectrum of species is completed by the occasional boreal warbler—such as the Bay-breasted—which may or may not be nesting.

KISSICK ALKALINE BOG LAKE

Size—The 135-acre State Natural Area lies within the 940-acre Kissick Swamp Wildlife Area.

Location—Western Sawyer County.

Access—From the intersection of Hwys 77 and 27, and County Hill Road in Hayward, go west on County Hill Road 2.5 miles to the south edge of the natural area. An access road leads north 0.25 miles to a landing on the west shore of Kissick Lake.

Description—This State Natural Area contains a wilderness bog lake with an extensive open bog/fen and northern wet forest. An apparent pH gradient exists in the bog mat, varying from a typical acid shrub bog on the south edge to a more alkaline and sedge-dominated fen at the north edge. Water seems to flow north but no channel exists. This pH gradient fosters plant diversity: more than 100 vascular plant species, including 14 orchids. The 10-acre lake has a maximum depth of 4 feet. The fishery consists of minnow species. Resident amphibians are leopard and green frogs and American toad.

Birds—This is the bog studied a half century ago by Francis Zirrer. The

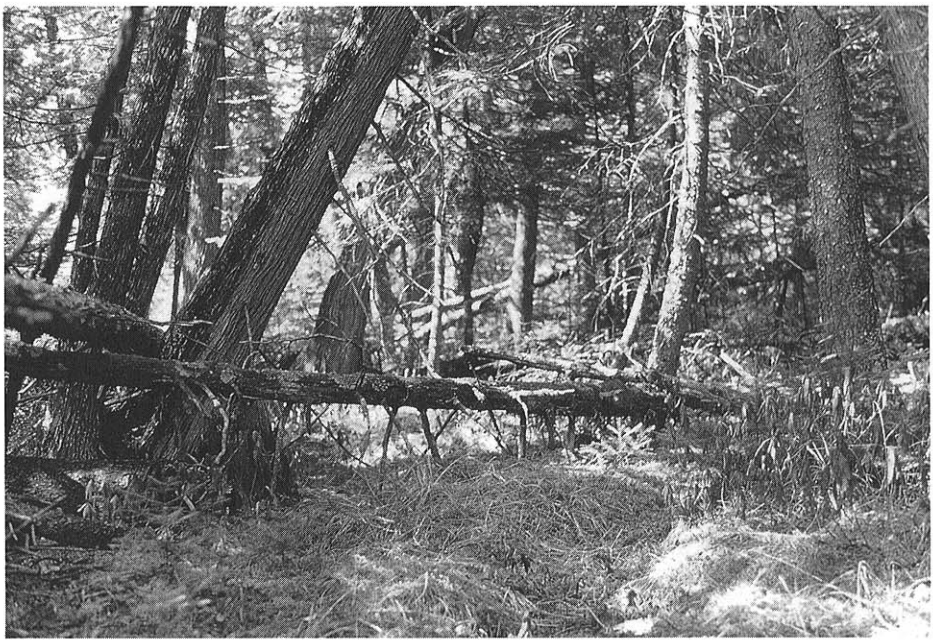

Figure 4. Forested bog. Upper Brule River Natural Area, Douglas County. (*DNR photo*)

bog's incredible diversity, which amazed Zirrer (Matteson 1990) is still evident today. It is due to the alkaline successional pathway of lakeside fen, through extensive spruce tamarack bog to white cedar swamp. This habitat diversity and the site's extensive acreage have produced one of the most diverse bog avifaunas in the state.

Common species are almost exactly the same as the composite for the forest conifer bog. Nashville Warbler, White-throated Sparrow, Ovenbird, Veery, and Northern Parula are the most abundant species. Uncommon Wisconsin species such as Black-backed Woodpecker, Swainson's Thrush, Cape May Warbler, and Spruce Grouse are surprisingly easy to encounter. The lake itself adds to the overall diversity by providing habitat for many water-related birds.

UPPER BRULE RIVER

Size—182 acres of State Natural Area along the Bois Brule River and within the Brule River State Forest.

Location—Douglas County.

Access—From the intersection of Hwys A and P north of Solon Springs, go north 2.6 miles on Hwy P, then east on Stone Chimney Road 1.9 miles to a parking area. Take an angler's access to the southern boundary.

Description—The Upper Bois-Brule River features a segment of the outstanding cold water Bois Brule River and its associated alder thickets, swamp conifer, and swamp hardwoods. This upper reach of the Brule has an entirely different character than

Figure 5. Open bog and forested bog. Big Bay Natural Area, Bayfield County. (*photo by Bill Tans*)

the portion below Stone's Bridge. Here the river meanders sluggishly through a bog with a wide alder zone. North and west of the alders is an area of conifer swamp dominated by white cedar, balsam fir, and spruce; south and east is a hardwood swamp dominated by ash. Bobcats are sometimes seen and often heard.

Birds—The avifauna of this forest conifer bog reflects the high diversity associated with stream corridors, streamside communities, and upland ecotone (Gates and Giffen 1991). Sixteen warbler species have been recorded. The most common are Nashville Warbler, Northern Parula, Common Yellowthroat, Pine Warbler, Black-and-White Warbler, Ovenbird, Northern Waterthrush and Canada Warbler. Other common nesters are Yellow-bellied Flycatcher, Alder Flycatcher, Blue Jay, Brown Creeper, Winter Wren, Veery, American Robin, Rose-breasted Grosbeak, and White-throated Sparrow. Regular, but decidedly uncommon nesting species are Gray Jay, Olive-sided Flycatcher, Golden-crowned Kinglet, Golden-winged Warbler, Magnolia Warbler, Connecticut Warbler, and White-winged Crossbill.

GOBLER LAKE

Size—470 acres of State Natural Area within a 1500-acre muskeg owned by Oneida County.

Location—Southwest Oneida County.

Figure 6. White cedar reproduction within herbivore exclosure, Miscauno Cedar Swamp Natural Area, Marinette County. (*photo by G. Birch*)

Access—From the intersection of Hwys Y and 8 in Bradley, go north and west on Hwy Y, 4.5 miles to a 90° corner, then west on Flowage Road 1 mile, and north on Old 8 Drive 0.9 mile. Then take Kelly Lane north and west 5.4 miles to Burrows Lake Road, then east 0.3 mile to the southwest corner of the site.

Description—Gobler Lake is a 20-acre, muck-bottomed bog lake with slightly acidic water of moderate transparency and a maximum depth of 8 feet. Surrounding the lake is an open bog muskeg, dominated by sphagnum and sedges with scattered stunted black spruce and white pine. The muskeg contains dwarf mistletoe (a parasite on black spruce), several ericaceous shrubs, pitcher plant, sundews, sedges, three-way sedge (*Dulichium arundinaceum*), beak rushes, and cotton grasses. To the south and west is an esker wooded with white pine. The wild character is compromised only by the road, which follows the esker to the south of the lake.

Birds—Gobler Lake and its bird life are fairly representative of a large black spruce muskeg. Because most of the bird surveys have concentrated around the lake, the species associated with the lake are represented in the count summary more so than those found in the 1500 acres of black spruce muskeg.

Despite this bias, the summary gives a sense of muskeg bird life. Lincoln's Sparrow, Song Sparrow, Palm Warbler, Hermit Thrush and White-

Figure 7. Open bog, grading into muskeg. Gobler Lake Natural Area, Oneida County. (*photo by Bob Read*).

throated Sparrow are common. Brewer's Blackbirds have shown an affinity for this site. Further investigation may show high densities of Nashville Warbler, Yellow-rumped Warbler, Connecticut Warbler, Winter Wren, Gray Jay, and Canada Warbler. Boreal Chickadee has been observed in summer and may prove to be a common nester.

MISCAUNO CEDAR SWAMP

Size—555 acres.

Location—Northern Marinette County.

Access—From the intersection of Hwys 141 and Z, 16 miles north of Wausaukee, go east on Hwy Z 1.5 miles to access right-of-way, then south 0.25 mile to the west end of the site.

Description—Miscauno Cedar Swamp is a northern wet-mesic conifer forest of white cedar, balsam fir, and black spruce at the headwaters of the south branch of Miscauno Creek. Timber varies from nearly pure stands of pole-sized white cedar to mixtures of white cedar, balsam fir, and black spruce with some black ash and elm along the stream. Tamarack snags indicate a former forest of this species. The groundlayer is rich in small orchid species along with one-flowered pyrola (*Moneses uniflora*), bunchberry, starflower, bluebead lily (*Clintonia borealis*), gaywings (*Polygala paucifolia*), Canada mayflower, and several fern species. In the numerous headwater

Figure 8. Heath of open bog mat beside open water, with muskeg and wooded island in background. Gobler Lake Natural Area, Oneida County. (*photo by Bill Tans*)

springs is a rich flora of mosses and lichens.

Birds—This cedar swamp was chosen as a example because of its large size and accessibility. There are many other Wisconsin cedar swamps with older trees; however, they are mostly small in acreage or on private land. Miscauno offers a look into a fairly typical white cedar swamp avifauna. Common white cedar swamp birds found at Miscauno are Black-capped Chickadee, Golden-crowned Kinglet, Black-throated Green Warbler, Nashville Warbler, Veery, Blue Jay, Ovenbird, and Yellow-rumped Warbler. Several species uncommonly found in small cedar swamps have been found regularly at Miscauno: Long-eared Owl, Swainson's Thrush, Wood Thrush, Cape May Warbler and Canada Warbler.

ST. CROIX ASH SWAMP

Size

254 acres of swamp hardwoods within Governor Knowles State Forest.

Location—Southwest Burnett County.

Access—From the intersection of Highways 48 and 70 in Grantsburg, go west 4 miles on Hwy 70, then south on River Road 2.3 miles, then west and south on Fish Lake Road 2.4 miles to an unmarked parking area at the southwest corner of the site.

Description—St. Croix Ash Swamp parallels the St. Croix River and features a range of forest types from

Figure 9. Northern hardwood swamp at Spider Lake Ash Swamp, Ashland County. (*photo by Eric Epstein*)

mesic uplands adjacent to the St. Croix River, through extensive low swamp, to droughty uplands on the sandy plain above the river valley. The hardwood swamp is composed of basswood, black ash, American elm (*Ulmus americana*), yellow birch, white oak (*Quercus alba*), red maple, and scattered white cedar, balsam fir, and white pine. On the forest floor small pockets of water lie between mossy hummocks. The side of the river valley is steep and rises nearly 100 feet above the swamp. Small spring-fed streams and seepages have eroded small pockets and tributary valleys in the wooded river valley wall, providing diverse microhabitats. The flat sandy uplands are wooded with young oaks. The primary soils are Omega sand, Cathro muck, Rifle mucky peat, and Emmett loamy sand.

Birds—This site contains all the common ash swamp birds such as Red-eyed Vireo, Ovenbird, Veery, Scarlet Tanager, Great Crested Flycatcher, White-breasted Nuthatch, Brown Creeper, Canada Warbler and Common Yellowthroat. Apparently, because it is within an extensive, north-south forested river corridor, it has souther species such as: Red-shouldered Hawk, Cerulean Warbler, Red-bellied Woodpecker, and Yellow-billed Cuckoo.

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