

A Breeding Bird Survey of Myrick Marsh and Hixon Forest

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ABSTRACT

Breeding bird populations were surveyed in two habitat types sharing a watershed in the Upper Mississippi River basin during the summer of 1999. Two routes in each of two study sites were surveyed mornings during 14 weeks between April 14th and July 31st; night surveys were also conducted to observe nocturnal species. Routes were surveyed using the methodology of the Wisconsin Breeding Bird Atlas, and observations of species present, abundance, breeding level, and habitat were recorded. A total of 124 avian species were observed (84 in Hixon forest and 102 in Myrick marsh). Sixty-five and 74 species in Hixon forest and Myrick marsh respectively were considered summer residents; 41.5% and 58.1% of those respectively were confirmed by observation to be breeders. Diversity indices indicated that avian populations in Hixon forest were slightly more diverse. Average abundance of avian populations in Myrick marsh were found to be significantly higher using an independent T-test ($P < 0.05$). Similar percentages of neotropical migrants, which as a group have experienced recent population declines, were found in Hixon forest and Myrick marsh. Comparisons of this survey with other relevant surveys revealed slight changes in avian communities over time.

INTRODUCTION

In order to make decisions involving the environment and the wildlife it contains, it is necessary to first obtain some idea of species present and their abundance. This information can be used to determine possible effects of habitat changes and thus aid in decisions regarding wildlife management, land use, and land development. Bird surveys are the primary tool used to provide valuable information on avian aspects of ecological communities. These surveys can provide both quantitative and qualitative measures such as species presence, seasonal abundance, migrant, or breeding status.

Myrick marsh and Hixon forest are two areas that are different in habitat, but are part of the same watershed. They are considered significant because they provide important habitat for wildlife in the Upper Mississippi River valley, but are also situated within the La Crosse city limits, therefore sustaining a considerable amount of human recreation. Due to this overlap of wildlife habitat and human use, as well as the potential for further development, it has become crucial to maintain at least a basic inventory of the wildlife present, including birds, and their ecological requirements.

I have conducted a survey of the breeding birds of Myrick marsh and Hixon forest. Breeding birds have been given priority in this survey due to their greater dependence on

these habitats. Although a comprehensive list of birds using these areas does not currently exist, other relevant avian studies have been conducted. The UW-La Crosse Biology Department published a master's thesis by Paul Harris in 1975 in which he studied the year round presence and abundance of avian species utilizing the Myrick marsh; he also noted confirmed breeding species (Harris, 1975). Past observations by Jean Ruhser and Fred Leshner in Myrick marsh have been compiled in the 1998 UW-L Energy Environment Earth Audit (Maly, 1998). A Natural Resource Inventory published by the Wisconsin DNR in 1990 included a list of the birds known to occur and breed in the Upper Mississippi River Valley, which includes Myrick marsh (Thompson, 1990). Additional observations for both sites have been gathered between 1995 and 1999 from project papers of UW-L ornithology students (Pieper et. al. 1995-99).

Although these reports provide pieces of the whole picture of the birds utilizing these areas, none provide a current status of bird species, and none use a survey specifically designed to survey breeding birds. The Wisconsin Breeding Bird Atlas (WBBA) uses such a survey but none of the more than 1000 atlas study areas chosen across the state include either Myrick marsh or Hixon forest. Both study sites are included in the central west (CW) block of the La Crosse quadrant, #4309172, of the topographic quadrangle maps prepared by the U. S. Geological Survey. The WBBA surveys central east (CE) blocks of every quadrant (Wisconsin Breeding Bird Atlas, 1995). The results of the La Crosse CE block have been obtained to compare with results from this study. Also, changes in avian communities may have occurred since earlier avian studies were conducted. Recent concerns over declining North American breeding birds that winter in the neotropics have indicated a need for recent and frequently updated bird surveys. Determining rapid changes in avian populations is crucial in making informed decisions involving these avian communities (Peterjohn, 1995). Since several of the above surveys provide only partial information on the avian communities, a current and complete list of the species and abundance of breeding birds found in these two areas was needed.

The main objective of this research project is to determine what bird species utilize Myrick marsh and Hixon forest for breeding. The information gathered for one summer has several uses. It provides a baseline inventory of the breeding birds of Myrick Marsh and Hixon Forest. It has been sent to the Wisconsin Breeding Bird Atlas to compliment their database. Finally, it was used to develop a breeding bird checklist for Myrick Marsh and Hixon Forest.

Checklists not only detail avian communities for a specific region, but also are available to the public and promote interest in the birds of the region and in their preservation (Greenberg, 1995). I made a checklist for the breeding birds of Myrick Marsh and Hixon Forest available to the Hixon Forest Nature Center, which services the public. Although the checklist contains only breeding birds, future researchers will be able to add information about birds utilizing these areas year round.

Other objectives of this research project included the following: to determine the avian species utilizing Myrick marsh and Hixon forest, their abundance, and breeding status, to compare the results between study sites based on habitat differences, and to compare the findings with those of previous avian studies, particularly the Harris thesis published in 1975, in order to examine changes in avian communities over the last 25 years.

STUDY AREA AND METHODS

Study Area: The breeding bird surveys were conducted at two separate sites, Myrick marsh (Figure 1) and Hixon forest (Figure 2), each located within the city limits of La Crosse, Wis. (maps for figures were obtained from the Hixon Forest Nature Center). Both sites were selected because of their close proximity (~ 0.5 miles apart) and shared watershed. This insured similar physical conditions, such as temperature and precipitation, allowing habitat to be the single main variable in the surveys.

The boundaries of the 700-acre Myrick marsh study area were selected to match those of a bird survey conducted by UW-La Crosse graduate student Paul Harris in 1974 (Figure 1), (Harris, 1975). Myrick marsh is classified as a combination of sedge meadow and shallow marsh communities with sedges (*Carex* spp.) and cattails (*Typha* spp.) as the respective dominant species present (Eggers, 1997). There are also small sections of shallow, open water communities containing submergent species such as coontail (*Ceratophyllum demersum*) and pondweed (*Potamogeton* spp.), and a section of floodplain forest consisting mainly of silver maples (*Acer saccharinum*). The raised dirt paths that interlace the marsh are lined with hardwood trees and shrubs, mostly willow (*Salix* spp.) and alder (*Alnus* spp.).

The 720-acre Hixon forest study site is in the Hixon Forest Park and contains several bluffs sides and valleys; grade within this study site was moderate. The forest is a xeric southern forest community consisting predominantly of oaks (*Quercus* spp.) and hickory (*Carya* spp.), (Curtis, 1987). A small section of meadow that was formerly farmed was situated on a ridge top, and contained mostly Reed Canary Grass (*Phalaris arundinacea*). Several miles of dirt hiking paths are present throughout the forest.

METHODS

A complete survey was conducted for each site for 14 weeks between April 14 and July 31, 1999. Birds were surveyed on alternating weeks until mid-May in order to catch summer residents arriving early without placing emphasis on the

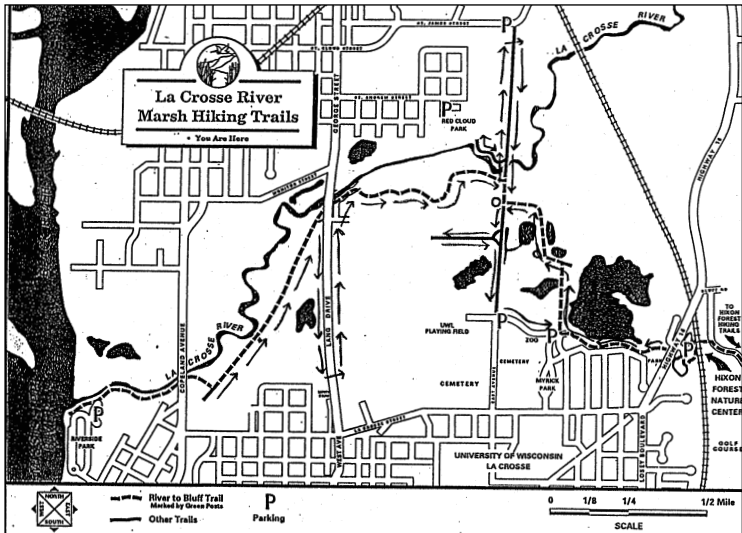


Figure 1. Map and survey routes of Myrick marsh, (map provided by the Hixon

Forest Nature Center). After May 16, surveys were conducted every week for the remainder of the study period. Each site was divided into two survey areas for optimal coverage of the study area and all the habitat types present. Surveys were conducted

four mornings out of each week, with a different survey route followed each morning between 5:45 a.m. and 7:45 a.m. Avian species, specific abundance, habitat type, and breeding evidence were observed and recorded while walking consistent survey routes. A single song from an adult male or visual observation of an adult count-



Figure 2. Map and survey routes of Hixon Forest, (map provided by the

ed as one breeding pair. The number of breeding pairs observed for each species during each survey within a study site were summed each week and recorded as the abundance. Type and amount of breeding evidence for each observed species was also recorded. Duplications of observations were avoided. Once the data was collected, it was translated into the breeding and abundance codes used by the Wisconsin Breeding Bird Atlas (Figure 3), (Wisconsin Breeding Bird Atlas, 1995).

Morning surveys were selected to observe the diurnal avian species when they are most vocal, allowing for optimal observation of species present. Although this covered the majority of species a separate set of night surveys were conducted to observe nocturnal species. Night surveys were conducted between 8 p.m. and 10 p.m. (once it was dark outside) once a week in each site during the first three survey weeks. This time period covered most of the breeding season for owls, when adults are most vocal and early fledglings may be heard. Three to four locations were strategically selected in each study area so the majority of the study area and all representative habitat types would be within range of a series of owl calls emitted from a tape recorder. This method is suggested by the WBBA and consists of playing a series of calls from seven owl species found within Wisconsin, starting with the smallest and allowing five minutes between species to listen for responses.

Once the data was collected, average abundance for each species was calculated for each study site and tested for significant differences between habitats using the independent T-test. Species richness (S), Simpson's diversity indices, and a dominance diversity plot were then derived.

RESULTS

A total of 124 avian species were observed (84 in Hixon Forest and 102 in Myrick Marsh) during the 14 survey weeks between April 14 and July 31, 1999. For each species, weekly abundance, breeding status, and nonbreeding activities were summarized for Hixon forest

Figure 3. Breeding codes and abundance definitions, Wisconsin Breeding Bird Atlas (WBBA), Atlasing Handbook 1995.

Observed (O)

O species observed in a block during its breeding season, but no evidence of breeding. Includes species not in suitable nesting habitat and species such as vultures or raptors, or a colonial nesting species not at the nesting colony.

Possible (PO)

X Species (male or female) encountered in suitable habitat during its breeding season.

Probable (PR)

M Multiple singing or territorial males reported within a block on one day.

S Singing male present at same location on at least two dates 7 days apart.

P Pair observed in suitable nesting habitat during breeding season.

T Territorial behavior (chasing individuals of the same species).

C Courtship behavior or copulation.

N Visiting probable nest-site (hole nesters).

A Agitated behavior or anxiety calls from adult (not provoked by human).

B Nest building by wrens or excavation by woodpeckers.

Confirmed (CO)

PE Physiological evidence of breeding (for use by banders).

CN Carrying nesting material.

NB Nest building at actual nest-site (except wrens and woodpeckers).

DD Distraction display; defense of unknown nest or young or injury feigning.

UN Used nests or eggshells found. Caution: must be carefully identified.

ON Occupied nest. Adults entering or leaving a nest-site in circumstances indicating occupied nest. To be used for nests too high or enclosed (chimneys) for contents to be seen.

FL Recently fledged or downy young. Young incapable of sustained flight, restricted to natal area by dependence on adults or limited mobility.

FY Adults carrying food for young or feeding young.

FS Adult carrying fecal Sac.

NE Nest with egg(s). Cowbird eggs confirm both cowbird and host species.

NY Nest with young. Cowbird young confirm both cowbird and host species.

Abundance Codes

1 1 breeding pair

2 2-10 breeding pairs

3 11-100 breeding pairs

4 101-1000 breeding pairs

5 More than 1000 breeding pairs

Table 1. Summary list of species observed in Myrick marsh and Hixon forest. (Confirmed breeders are in bold.)**Breeders**

Myrick marsh	Hixon forest
Pied-billed Grebe	
Least Bittern	
Green Heron	
Canada Goose	
Wood Duck	Wood Duck
Mallard	Mallard
Blue-winged Teal	
Hooded Merganser	
	Cooper's Hawk
	Red-shouldered Hawk
Red-tailed Hawk	Red-tailed Hawk
American Kestrel	
	Wild Turkey
Virginia Rail	
Sora	
Common Moorhen	
American Coot	
Killdeer	
Black Tern	
Rock Dove	
Mourning Dove	Mourning Dove
	Black-billed Cuckoo
Yellow-billed Cuckoo	Yellow-billed Cuckoo
Eastern Screech-Owl	
	Barred Owl
Chimney Swift	Chimney Swift
Ruby-thr. Hummingbird	Ruby-thr. Hummingbird
Belted Kingfisher	Belted Kingfisher
Red-headed Woodpecker	
Red-bellied Woodpecker	Red-bellied Woodpecker
Yellow-bellied Sapsucker	Yellow-bellied Sapsucker
Downy Woodpecker	Downy Woodpecker
Hairy Woodpecker	Hairy Woodpecker
Northern Flicker	Northern Flicker
	Pileated Woodpecker
Eastern Wood-Pewee	Eastern Wood-Pewee
Willow Flycatcher	
Least Flycatcher	
Eastern Phoebe	Eastern Phoebe
Great Crested Flycatcher	Great Crested Flycatcher
Eastern Kingbird	
Tree Swallow	Tree Swallow
No. Rough-winged Swallow	No. Rough-winged Swallow
Swallow	Swallow
Cliff Swallow	

Non-Breeders

Myrick Marsh	Hixon Forest
Double-crested Cormorant	
Great Blue Heron	Great Blue Heron
Great Egret	
Green-winged Teal	
Northern Shoveler	
Turkey Vulture	Turkey Vulture
Ring-billed Gull	
	Rock Dove
Common Nighthawk	
Pileated Woodpecker	
	Alder Flycatcher
	Brown Creeper
Tufted Titmouse	
Golden-crowned Kinglet	Golden-crowned Kinglet
Ruby-crowned Kinglet	Ruby-crowned Kinglet
Swainson's Thrush	Swainson's Thrush
	Hermit Thrush
	Golden-winged Warbler
Tennessee Warbler	Tennessee Warbler
	Nashville Warbler
Chestnut-sided Warbler	Chestnut-sided Warbler
Magnolia Warbler	
Yellow-rumped Warbler	Yellow-rumped Warbler
	Blackburnian Warbler
Palm Warbler	
Northern Waterthrush	
Wilson's Warbler	
Scarlet Tanager	
Lincoln's Sparrow	
White-throated Sparrow	White-throated Sparrow
	Dark-eyed Junco
Eastern Meadowlark	
Rusty Blackbird	
White-crowned Sparrow	White-crowned Sparrow
Black Poll Warbler	
American Tree Sparrow	
	Fox Sparrow

Myrick marsh	Hixon forest
Barn Swallow	Barn Swallow
Blue Jay	Blue Jay
American Crow	American Crow
Black-capped Chickadee	Black-capped Chickadee
	Tufted Titmouse
White-breasted Nuthatch	White-breasted Nuthatch
House Wren	House Wren
	Winter Wren
Marsh Wren	
Blue-gray Gnatcatcher	Blue-gray Gnatcatcher
	Eastern Bluebird
	Veery
	Wood Thrush
American Robin	American Robin
Gray Catbird	Gray Catbird
Brown Thrasher	
Cedar Waxwing	Cedar Waxwing
European Starling	European Starling
Yellow-throated Vireo	Yellow-throated Vireo
Warbling Vireo	
Red-eyed Vireo	Red-eyed Vireo
Blue-winged Warbler	Blue-winged Warbler
Yellow Warbler	
	Cerulean Warbler
American Redstart	American Redstart
	Ovenbird
Common Yellowthroat	Common Yellowthroat
	Scarlet Tanager
Northern Cardinal	Northern Cardinal
Rose-breasted Grosbeak	Rose-breasted Grosbeak
Indigo Bunting	Indigo Bunting
Eastern Towhee	Eastern Towhee
Chipping Sparrow	Chipping Sparrow
Field Sparrow	Field Sparrow
	Savannah Sparrow
Song Sparrow	Song Sparrow
Swamp Sparrow	
	Bobolink
Red-winged Blackbird	Red-winged Blackbird
	Eastern Meadowlark
	Western Meadowlark
Yellow-headed Blackbird	
Common Grackle	
Brown-headed Cowbird	Brown-headed Cowbird
Baltimore Oriole	Baltimore Oriole
House Finch	House Finch
American Goldfinch	American Goldfinch
House Sparrow	House Sparrow

and Myrick marsh. Abundance and breeding status were defined according to the Wisconsin Breeding Bird Atlas (WBBA) standards (Figure 3).

A list of the species observed in each study site was compiled (Table 1). The species observed were categorized as Breeders or Nonbreeders. Breeders were defined as potential breeders observed at least once in suitable breeding habitat and range; nonbreeders included transient species, late-leaving winter residents, spring or fall migrants, or species observed in unsuitable breeding habitat and range. The names of species confirmed to be breeding during this study by observation of behavior are in bold. Table 2 summarizes the number of species, breeders, nonbreeders, neotropical migrants (WSO, 1999), percent of summer residents that were confirmed breeders and percent that were neotropical migrants.

Comparisons between the two study sites were made using species richness, diversity indices (Table 2), and a dominance diversity plot (Figure 4). The diversity indices showed that generally, Hixon Forest was slightly more diverse than Myrick Marsh. Simpson's diversity index was calculated using the following formula (Krebs, 1989).

Table 2. Comparisons between Hixon forest and Myrick marsh and summary.

Study area	# Species	# Breeders	# Nonbreeders	% Confirmed	Simpson's DI	Harris's DI	% Neotropical Migrants
Hixon Forest	84	65	19	41.5	0.95	21.28	40.0
Myrick Marsh	102	74	28	58.1	0.93	14.39	39.2
Total	124	92	37	58.7			39.1

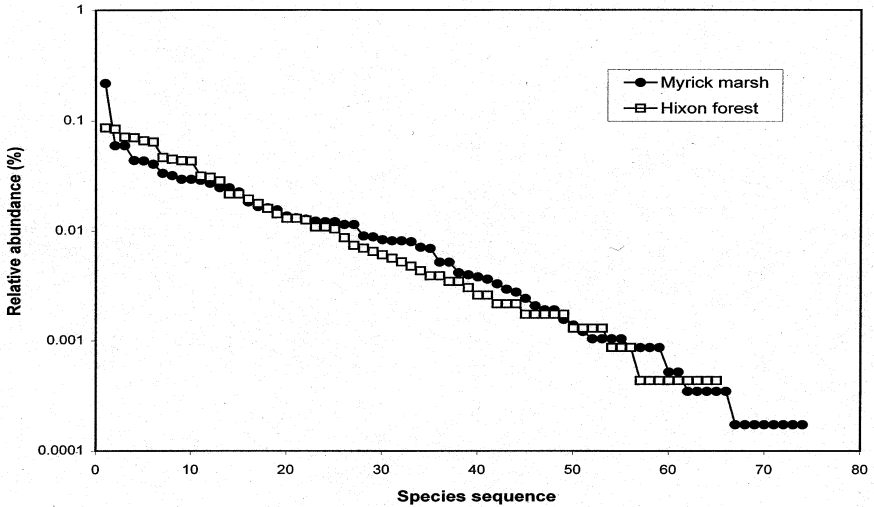


Figure 4. Dominance diversity plot of avian breeders in Myrick marsh and Hixon forest.

Simpson's DI: $D = 1 - \sum_{i=1}^s [(ni(ni-1)/N(N-1))]$
 ni = # of individuals of breeding species i in the sample
 N = Total # of individuals in the sample = sum of (ni)
 s = # of species in the sample

Harris used a diversity index he called a Simpson's diversity index in his thesis. The formula he used, however, did not correlate with the standard Simpson's diversity index found in Krebs, 1989. In order to compare the current findings with Harris's findings in 1975, the following formula, used by Harris, was employed and shall be referred to as Harris's diversity index to avoid confusion.

Harris's diversity index:
 $D = N(N-1) / [n1(n1-1) + n2(n2-1) + n3(n3-1) + ... + nx(nx - 1)]$

The dominance diversity plot used relative abundance and rank of the nth species from n to 1 (Krebs, 1989).

Data of species observed in five previous and relevant studies were summarized in Table 3 along with the observations of this study. The data used for these comparisons include Paul Harris' 1975 thesis "The Avifauna of Myrick Marsh", WBBA data from a nearby Atlas block, a list of birds known to occur within the La Crosse River Valley compiled by the Wisconsin DNR, observations of Myrick Marsh included in the 1998 Energy Environment Earth Audit and observations from 14 UW-La Crosse ornithology student projects.

DISCUSSION

Habitat comparisons: Different habitat types are known to support different avian species. The two study sites compared in this study differed significantly in habitat type; Myrick marsh consisted of a mixture of open water, marsh and upland hardwood shrub while Hixon forest was primarily mature upland, hardwood forest. The close proximity (~0.5 miles) of the sites and their shared watershed ensured similar conditions, such as temperature and precipitation, and allowed a precise comparison between sites with habitat as the single main variable. Species richness, abundance, and diversity indices were used to compare the avian community structure of the two study sites.

Breeding bird species richness was higher for Myrick marsh ($S=74$) than for Hixon forest ($S=65$) suggesting that the habitat type of Myrick marsh was able to support a greater variety of breeding species. Although the habitat types were distinctly different, the mature forest of Hixon was considerably more monotypic and contained a narrower range of species. The abundance levels of the observed species in both sites were relatively similar when compared with a diversity dominance plot, but were in fact significantly different ($P < 0.05$) with Hixon forest containing a lower average abundance per species. Red-winged Blackbirds in Myrick marsh were overwhelmingly the most abundant species; Myrick marsh also contained a larger number of species with very low abundance. These slight differences were reflected in the Simpson diversity indices of Hixon forest and Myrick marsh (0.95 and 0.93 respectively).

Concerns over recent declines in neotropical migrant populations have, in turn, caused concern over the ecological health of areas and habitats supporting these migrants as summer residents. The percent of summer residents that were neotropical migrants in Hixon forest versus Myrick marsh were similar (40.0% and 39.2% respectively). These percents may indicate the habitats of both Hixon forest and Myrick marsh as equally valuable when considering critical breeding habitat for neotropical migrants.

Comparisons to relevant studies: Several relevant studies were used for comparison to this study's results (referred to as Summer 1999 Myrick marsh or Hixon forest surveys), and were grouped in the following way. One group of surveys, vicinity studies, were those conducted in the vicinity of either study site and consisting of the same type of habitat. Comparisons were made between species lists assuming that any differences found are not attributed to local or habitat differences. The surveys in this group include a Wisconsin DNR bird inventory of a nearby section of the Upper Mississippi River valley (Thompson, 1990), and the WBBA results for an area near Hixon forest (Thompson, 1999). A second group of surveys, same site surveys, were conducted actually on either study site, but in earlier years and by different observers using different methods. Surveys included in this group are the UW-L Environmental Audit (Maly, 1998), and UW-L ornithology student projects (Pieper et. al., 1995-99). With study site as a constant, changes in presence of species over time can be established. The last comparison is with a single study, the Harris thesis; this study was considered the most valuable because it was conducted within the Myrick marsh study site by similar methods, but 25 years earlier in 1974 (Harris, 1975). Differences between Paul Harris's thesis data and the Myrick marsh summer 1999 data provide the most reliable indication of changes over time. A second study conducted in 1979 by Kurt Brownell was similar to the Harris thesis but it was found to be less complete and thus was disregarded in the comparisons (Brownell, 1979).

Table 3. Comparisons of observed species from six related studies.

Species	DNR	Myrick	Harris	Campus	Class-MM	Hixon	Craig	Class-HF
Pied-billed Grebe	b	NE-2	b	x	x			
Horned Grebe	x							
Dble-crested Cormorant		0-2						
American Bittern	b		x-p					
Least Bittern	b	X-1	p					
Great Blue Heron	x	O-3	x-p	x		O-2		
Great Egret	x	O-3	x-p	x	x			
Snowy Egret					x			
Green Heron	b	S-2	x	x				
Black-cr Night-Heron	x		x-p					
Yellow-cr Night-Heron			x-p					
Snow Goose			x					
Canada Goose	b	NY-3	x	x	x			
Wood Duck	b	FL-2	b	x	x	P-1		
Green-winged Teal	x	O-2	x	x				
American Black Duck	x		p					
Mallard	b	NE-3	b	x	x	P-1		x
Northern Pintail	x							
Blue-winged Teal	b	P-2	b	x	x			
Northern Shoveler	x	O-1	x	x	x			
Gadwall	x			x				
American Wigeon	x		x	x				
Canvasback	x		x	x				
Redhead	x							
Ring-necked Duck	x		x	x	x			
Lesser Scaup	x		x	x	x			
Common Goldeneye	x							
Bufflehead	x		x	x				
Hooded Merganser	x	FL-1	b	x	x			
Common Merganser	x							
Ruddy Duck			x					
Turkey Vulture		O-2		x		O-1	O	x
Osprey			x	x				
Bald Eagle	x			x	x			
Northern Harrier	x		p		x			
Sharp-shinned Hawk				x				
Cooper's Hawk	x					FL-2	NY	
Northern Goshawk			x	x				
Red-shouldered Hawk			p			X-1		
Broad-winged Hawk			x	x				
Red-tailed Hawk	x	O-1	x	x	x	O-1	NY	x
Rough-legged Hawk	x		x					
American Kestrel	b	X-1	x	x	x		C	
Merlin				x				

Species	DNR	Myrick	Harris	Campus	Class-MM	Hixon	Craig	Class-HF
Ring-necked Pheasant			x					
Ruffed Grouse			x				M	
Wild Turkey	x					X-1	FL	
Northern Bobwhite			b					
Yellow Rail								
King Rail	x		x-p	x				
Virginia Rail	b	S-2	b	x	x			
Sora	b	FY-3	b	x	x			
Common Moorhen	x	X-1	x	x				
American Coot	b	X-2	b	x	x			
Sandhill Crane				x	x			x
American Golden-Plover	x							
Semipalmated Plover	x			x				
Killdeer	b	X-1	b	x	x			x
Greater Yellowlegs	x		x	x				
Lesser Yellowlegs	x		x	x				
Solitary Sandpiper	x		x	x				
Willet	x							
Spotted Sandpiper	x		x-p	x	x			
Upland Sandpiper	x							
Sanderling				x				
Semipalmated Sandpiper	x		x	x				
Least Sandpiper	x		x	x				
Pectoral Sandpiper	x		x	x				
Stilt Sandpiper			x					
Dunlin				x				
Short-billed Dowitcher	x							
Long-billed Dowitcher			x					
Common Snipe	x		b	x	x			
American Woodcock	x		x-p					
Bonaparte's Gull			x	x				
Ring-billed Gull	x	O-2	x	x				
Herring Gull			x-p	x				
Forster's Tern				x				
Black Tern	b	NE-3	b	x				
Rock Dove	x	NY-3	x	x		X-2		
Mourning Dove	b	ON-3	b	x	x	M-2		x
Black-billed Cuckoo	x		x			X-1		
Yellow-billed Cuckoo	x	X-1	b			M-2	S	
Barn Owl								
Eastern Screech-Owl		S-1						
Great Horned Owl	x		x-p	x			NY	
Barred Owl	x		x-p	x		S-2	S	
Short-eared Owl			x-p					
Common Nighthawk	x	X-1	b	x				
Chimney Swift		M-2	x	x		X-2		

Species	DNR	Myrick	Harris	Campus	Class-MM	Hixon	Craig	Class-HF
Ruby-thr. Hummingbird	x	X-1				X-1	NY	
Belted Kingfisher	x	M-2	b	x	x	ON-1		x
Red-headed Woodpecker	x	X-1	x					
Red-bellied Woodpecker		M-2	x-p	x	x	M-2	FY	x
Yellow-bellied Sapsucker	x	X-2	x-p	x		M-2		x
Downy Woodpecker	b	FY-2	b	x	x	FL-3	FL	x
Hairy Woodpecker		FY-2	b	x	x	M-2		x
Northern Flicker	b	C-2	b	x	x	M-2		x
Pileated Woodpecker	x	X-1		x		X-1	C	x
Eastern Wood-Pewee		M-2	b			FY-3	FY	
Acadian Flycatcher	x		x					
Alder Flycatcher	x					O-1		
Willow Flycatcher	b	NY-2				X-1		
Trail's Flycatcher ¹			x-p					
Least Flycatcher	x	S-2	x-p				S	
Eastern Phoebe	x	NY-2	b	x	x	NY-2	NY	x
Great Crested Flycatcher		CN-1	x			X-2	FL	
Eastern Kingbird	b	FL-2					NY	
Horned Lark	x			x				
Purple Martin					x			
Tree Swallow	b	FY-3	b	x	x	NY-2	FY	x
N. Rough-winged Swallow	x	FY-3	b	x	x	X-2		
Bank Swallow	b		b	x				
Cliff Swallow		FY-3	b					
Barn Swallow	b	FY-2	b	x	x	X-2		
Blue Jay	x	X-2	b	x		FL-3	FL	x
American Crow	x	M-2	x	x	x	S-3		x
Black-capped Chickadee	x	FY-2	x	x	x	FL-3		x
Tufted Titmouse		X-1				FL-3	FY	x
White-breasted Nuthatch	x	X-2	b	x	x	S-3	FY	x
Brown Creeper	x		x	x	x	O-2		x
Carolina Wren			x-p					
House Wren	b	NY-2	b	x		NY-3		x
Winter Wren						S-1		
Sedge Wren	b		p				NY	
Marsh Wren	b	N-3	b					
Golden-crowned Kinglet	x	O-2	x			O-2		x
Ruby-crowned Kinglet	x	O-2	x	x		O-3		x
Blue-gray Gnatcatcher	b	X-1	p	x		FY-3	M	x
Eastern Bluebird						NY-2	FL	
Veery			p			ON-2		
Gray-cheeked Thrush			x	x				
Swainson's Thrush		O-1		x		O-1		
Hermit Thrush	x		x	x		O-1		x
Wood Thrush			p	x		CN-2	ON	x
American Robin	x	NE-3	B	x	x	NY-3		x

Species	DNR	Myrick	Harris	Campus	Class-MM	Hixon	Craig	Class-HF
Gray Catbird	b	NE-3	b	x		UN-2		
Brown Thrasher	b	CN-1	b	x			NY	
Cedar Waxwing	x	FL-3	b		x	CN-2	FL	
Northern Shrike			x	x				
Loggerhead Shrike			x-p					
European Starling	b	FL-3	b	x	x	NY-2	NB	x
Bell's Vireo	b		p					
Yellow-throated Vireo	x	M-2		x		S-2	M	
Warbling Vireo	b	FY-2	x	x				
Red-eyed Vireo	b	M-2	x		x	FL-3	FY	
Blue-winged Warbler		X-1	p			X-1	NY	
Golden-winged Warbler			p			O-1		
Tennessee Warbler	x	O-2		x		O-2		
Orange-crowned Warbler			x					
Nashville Warbler			x			O-1		
Yellow Warbler	b	NE-3	b	x			ON	
Chestnut-sided Warbler		O-1	x	x		O-1		
Magnolia Warbler	x	O-1	x					
Cape May Warbler				x				
Yellow-rumped Warbler	x	O-3	x	x	x	O-3		x
Blackburnian Warbler						O-2		
Prairie Warbler	x							
Palm Warbler	x	O-3	x	x	x			
Bay-breasted Warbler			x					
Blackpoll Warbler		O-2	x					
Cerulean Warbler	x					S-1		
Black-and-White Warbler	b		x	x			S	
American Redstart		NY-3	b	x		M-2	FY	
Prothonotary Warbler			x-p					
Ovenbird			x	x		DD-3	NY	
Northern Waterthrush		O-2	x	x				
Louisiana Waterthrush			x					
Kentucky Warbler			x					
Mourning Warbler			x					
Common Yellowthroat	b	CN-3	b	x		P-2	NB	
Hooded Warbler			x					
Wilson's Warbler		O-1	x					
Scarlet Tanager	x	X-1				FL-3	FY	
Northern Cardinal	b	NE-2	b	x	x	FL-2	NY	x
Rose-breasted Grosbeak	b	X-1	x-p	x		P-2	M	
Indigo Bunting	b	X-1	b			FY-2	NY	
Eastern Towhee	b	X-1		x		S-2	NY	
American Tree Sparrow	x	O-1	x	x	x			
Chipping Sparrow	b	FY-2	x	x	x	CN-2	M	x
Field Sparrow	b	X-2	b	x	x	S-2	FY	
Vesper Sparrow	x		x					

Species	DNR	Myrick	Harris	Campus	Class-MM	Hixon	Craig	Class-HF
Savannah Sparrow	b		x-p			P-2	NY	
Grasshopper Sparrow							M	
Leconte's Sparrow			x					
Fox Sparrow	x		x		x	O-1		x
Song Sparrow	b	FY-3	b	x	x	FL-2	NY	x
Lincoln's Sparrow		O-3	x					
Swamp Sparrow	b	M-2	b	x	x			
White-throated Sparrow	x	O-3	x	x	x	O-2		
White-crowned Sparrow	x	O-2	x			O-2		
Dark-eyed Junco	x		x	x	x	O-2		x
Lapland Longspur			x					
Bobolink	b					X-1	S	
Red-winged Blackbird	b	NE-4	b	x	x	FL-2	NY	x
Eastern Meadowlark	b	X-1	x			X-1	FL	
Western Meadowlark	x					X 1		
Yellow-headed Blackbird	b	NE-3	b	x	x			
Rusty Blackbird		O-1	x	x				
Brewer's Blackbird			x		x			
Common Grackle	b	NY-3	b	x	x			x
Brown-headed Cowbird	b	FL-2	b	x	x	FL-2	NY	x
Orchard Oriole	x							
Baltimore Oriole	b	FY-2	b	x		FY-2		
Purple Finch			x	x				
House Finch		NY-3		x	x	X-1		
Common Redpoll			x					
Hoary Redpoll			x					
Pine Siskin	x		x					
American Goldfinch	b	CN-3	b	x	x	NE-3	NY	x
House Sparrow	b	CN-3	b	x	x	X-1	NB	

DNR - x = known to occur in La Crosse River Valley study area (late 1980's - 1990's, included current Myrick marsh study site.)

- b = documented breeder in study area

Myrick - Atlas breeding and abundance codes for summer 1999

Harris - Results from Paul Harris's UW-L master's thesis "Avifauna of Myrick Marsh"

- x = observed during the year

- b = confirmed breeding

- p = hypothetical breeder

Campus - Observations made by Ruhner and Lasher in Myrick Marsh, compiled 1998.

x = found in Myrick Marsh

Class - MM - Avian observations in Myrick Marsh compiled from UW-L student projects

x = found in Myrick Marsh

Hixon - Atlas breeding and abundance codes for summer 1999

Craig - Atlas breeding codes in habitat comparable to Hixon Forest - (1988-1996)

Class - HF - Avian observations in Hixon Forest compiled from UW-L student projects

x = found in Hixon Forest by students

Footnotes:

1. Traill's Flycatcher was later divided into the Alder Flycatcher and the Willow Flycatcher

First comparison, vicinity surveys: The number of total species found in the DNR survey and the Myrick marsh 1999 survey were 138 and 102 species respectively with 81 of those species in common. Of the additional species observed in the DNR survey, 53% were migrants, particularly shorebirds. The comparison between the Atlas site survey and the Hixon Forest 1999 survey revealed 53 and 84 species respectively with 44 of the species in common. Sixty-seven percent of the additional species in the Hixon Forest 1999 survey were also migrants. Therefore, surveys based in the same vicinity and habitat showed similar numbers and species once migrants were removed from the comparisons. Specific migrant species were different likely because the vicinity studies were conducted in different years than the summer 1999 surveys. Removing migrants also resulted in more accurate comparisons since the methodology used in the summer 1999 surveys was geared towards breeding birds, not migrants.

Second comparison, same site surveys: The comparisons with same site surveys showed species lists closer in species present and numbers. The UW-L Environmental Audit and the Myrick marsh 1999 survey had 118 and 102 species respectively with 76 species in common. Once again the main difference in the species lists was due to a large number of migrants included in the UW-L Audit. The species lists of the Myrick marsh 1999 survey and the Myrick Marsh student projects were 102 and 60 respectively with 47 species in common. This indicated similar species were observed by both surveys for each of the sites, but the number of summer residents was more complete in the 1999 surveys. UW-L student ornithology projects were conducted in the months of April and May, months during which migration occurs and some summer resident species have not yet arrived. Observer error was also a probable explanation for the short species lists in the student projects (Ruhser, 1999).

Third comparison, Harris thesis: The last but most comprehensive comparison was between the Myrick marsh 1999 survey and the Myrick marsh survey conducted by Harris in 1974. The species lists were 102 and 160 respectively with 88 species in common. Thirty-eight of the remaining 79 species were migrants and excluded from the comparison. Specific physical changes in habitat conditions, random chance, and actual species population changes over time are three explanations offered to explain the remaining 41 species not in common.

Physical changes over the last 25 years may account for some of the species. The urbanization of La Crosse County has increased from 82,741 in 1974 to 103,149 in 1996. A 25% increase in the county population over that 22-year period translated to increased public use of Myrick marsh leading to increased disturbance for wildlife. Habitat type is a second physical change that may have affected species composition over time. When comparing photos of habitat in Myrick marsh in 1974 with observations during the summer of 1999, decreases in emergent vegetation and increases in open water area within this site were observed. This slight habitat change coupled with a greater disturbance by the public may account for some of the differences in species lists.

Some of the differences may be due to chance alone. A few of the summer residents are naturally less common, have a large foraging range, or have more secretive behavior. The presence or absence of these species can not be easily determined even by regular observation. Species in this category include the Turkey Vulture (*Cathartes aura*) and Osprey (*Pandion haliaetus*) which are wide-ranging, Least Bittern (*Ixobrychus exilis*) which is secretive in nature, and Pileated Woodpecker (*Dryocopus pileatus*) and Le Conte's Sparrow

(*Ammodramus leconteii*) which may be uncommon in the area. Because such species may be missed during a survey, conclusions on changes in their populations over time are difficult to make.

A third explanation for changes in species composition over the last 25 years is actual changes in individual species populations. For example, the ranges of both the Blue-winged Warbler (*Vermivora pinus*) and the House Finch (*Carpodacus mexicanus*) have recently greatly increased and now include La Crosse County in their summer distribution (Craven, 1990). Also, species populations may have changed over time. Double-crested Cormorant populations have been increasing since the 1970's after DDT was banned (del Hoyo, 1992).

Specific species concerns

Surveys of breeding birds and comparisons among related surveys allow the definition of avian community structures for the present, as well as over time. The surveys also provide valuable information on species of special concern, either by the presence, or changing abundance of a species of concern. Special notice was given to certain species during this study.

The Cerulean Warbler (*Dendroica cerulea*) is one such species because it has been declining throughout much of its range, showing the largest decline of any North American warbler between 1966 and 1987 (Peterjohn, 1995). Cerulean Warblers were commonly observed in Hixon Forest during their breeding season from 1982-1988 and not seen during regular visits since, (Wilson, 1999). During this study, however, a lone male was observed singing in Hixon on June 2nd and again on June 22nd. Although this species is of conservation concern, its reappearance indicates that the habitat of Hixon Forest matches the large tracts of mature deciduous forest needed by this species.

The American Bittern (*Botaurus lentiginosus*) is another species of concern that in the past was observed in Myrick marsh in 1974 by Harris and again in 1985 and 1986, (Ruhser, 1999, Leshner, 1999, and Wilson, 1999). The absence of this species during the 1999 survey may be the result of the secretive nature of this bird, or more likely, the population decline of this species in the north central states of the United States (Gibbs, 1992).

A third species of concern is Bell's Vireo (*Vireo bellii*), which has shown significant declines in the central United States (Peterjohn, 1995). The 1990 DNR Natural Resources Inventory found this species breeding within five miles and in similar habitat as the Myrick marsh study site (Thompson, 1990 and 1999). Although not observed during this study, the prior observations indicate Myrick marsh as a potential breeding area for this species.

ACKNOWLEDGEMENTS

I would like to thank Jean Ruhser for valuable field assistance and guidance, Rob Tyser for helpful comments, and Craig Thompson of the Wisconsin DNR, Pat Wilson, and Fred Leshner for sharing past observations. I would also like to thank Bettie Harriman of the Wisconsin Breeding Bird Atlas for providing Atlas forms and encouragement. I am grateful to Hixon Forest Nature Center for their assistance and for providing maps. This research was supported by the UW-La Crosse undergraduate research committee under Bill Gresens.

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