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Send all manuscripts and correspondence to the Editor; information for "Seasonal Field-Notes" should be sent to the Associate Editor or the appropriate Field-Note Compiler. Manuscripts that deal with information on birds in the State of Wisconsin, with ornithological topics of interest to WSO members, or with activities of the WSO will be considered for publication. All manuscripts submitted for possible publication should be typewritten, double-spaced, and on only one side of page-numbered typing paper. Illustrations should be submitted as photographs or good-quality drawings. Keep in mind that illustrations must remain legible when reduced to fit on a journal page. All English and scientific names of birds mentioned in manuscripts should follow *The A.O.U. Checklist of North American Birds (6th Edition)*. Use issues after Vol. 50, No. 1, 1988, as a general guide to style.

Changing of the Guard: Out With the Old . . .

I have just opened the summer 1989 issue of *The Passenger Pigeon* to once again look at my initial statement to the WSO membership. It seems as though I wrote those words only yesterday. Have two years actually transpired?

When time does seem to fly, it is usually because there is a lot happening. To me, the past two years as president have gone by quickly, and have been very fulfilling. A Honey Creek management plan has been completed. A master plan committee has been formed: they will produce a long-range plan and recommendations for our property. We have held our first joint convention. The new edition of *Wisconsin's Favorite Bird Haunts* has been published. Our field trips have expanded to not only a national, but an international scope.

As our new president, Al Shea, takes over, I would like to thank all of the Board Members, and concerned WSO members for their support and constructive guidance. I would like to give special thanks to Alex Kailing for his stellar job in getting our books in order. Thanks also should be given to Chuck Gilmore for an outstanding book store and our new legal counsel Carlo Balistrieri for his valuable work in getting our By-laws and Articles of Incorporation in order.

Although I am leaving the presidency, I will not be lessening my commitment to the organization. I will be assisting Mary Donald in producing an expanded *Badger Birder*. We will still have the news items, current sightings, and calendar of events that Mary has done so ably over the years. I will be supplying and editing articles on such topics as news from Wisconsin's bird clubs, bird identifications, bird habitats, unusual bird behavior, and bird conservation to mention a few. As I ease into the role of assisting Mary, I foresee some changes in the *Badger Birder* format; however, these changes will not affect the basic concept of providing informal news about Wisconsin's birds.

Now allow me to introduce our new president, Al Shea. I have known Al for many years. In my opinion he is one of the finest field birders in the state. He has impeccable organizational skills, especially in planning Big Day and Christmas Counts. With these valuable skills, I believe the organization will be in excellent hands for the next two years.

Out-going President

. . . And in With the New

It will be hard to live up to both the introduction and track record that our departing president, Randy Hoffman, has left me. As illustrated by the accomplishments and on-going activities of the organization referenced above, WSO did indeed progress significantly in the past two years under Randy's guidance. My goals as president, outlined below, include both the continuation of the activities that the Board set in motion under Randy's presidency and a few new initiatives as well:

1. Complete the long-range plan for WSO's Honey Creek Sanctuary. I will ensure that any recommendations forthcoming from this plan will **not** be acted on until the membership has been polled.
2. Expand and strengthen the organization's education and outreach activities. If WSO is to instill an interest in bird observation (and consequently, ecological awareness) in the minds of present and future generations, our education activities should be expanded.
3. Work with the Editor, Associate Editor, Seasonal Field Note Compilers and other interested parties to improve the quality and quantity of bird records submitted to WSO; identify ways in which to automate the compilation and storage of seasonal records; and explore alternative methods of presenting seasonal information to the membership.
4. Support the efforts by the Records Committee Chairperson to improve, and hopefully institutionalize, the Committee's interactions with the membership.
5. Continue to improve the administrative facets of the organization, including the adoption of formal by-laws and management of the budget.
6. Continue WSO's excellent field trip program. Jeff Baughman and Tom Schultz deserve much thanks for their years of effort in putting together a topnotch field trip agenda.

Two years will fly by quickly, and I hope that we, as an organization, will be able to reach all or most of these six goals in that time. I stress the "we" because I believe the strength of WSO is in the many members who volunteer their time to conduct field trips, maintain our Honey Creek Sanctuary lands and properties, plan conventions, conduct bird studies, submit seasonal reports, staff WSO displays, sell books, represent WSO at meetings and on committees, and the myriad other activities which encompass WSO. Thanks to all of you who have contributed to the success of the organization in the past! Lets keep up the good work.

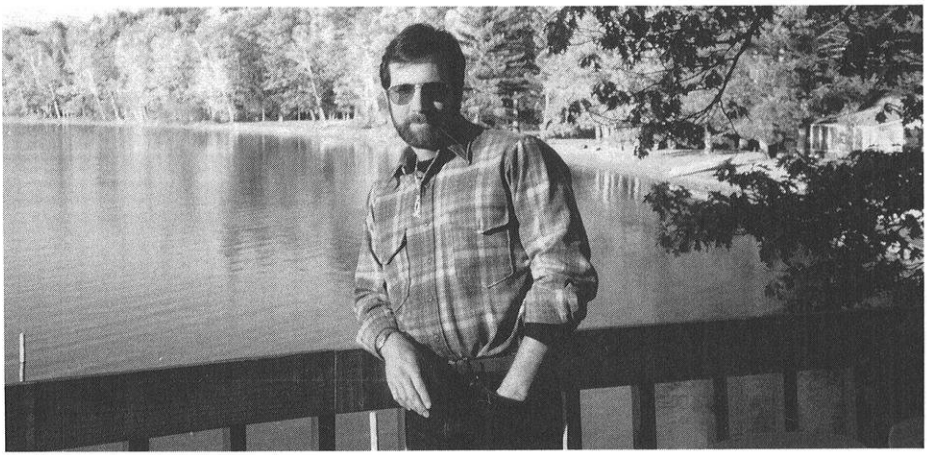
As many of you may not know me, I have provided a short biographical sketch. Born and raised in Rochester, New York, I cut my birding teeth along the shores of Lake Ontario spending many hours counting raptors as they migrated past the Braddock Bay or Derby Hill hawk lookouts in the spring or sorting through

the gull and waterfowl concentrations in the fall. I migrated to Madison in 1976 to attend graduate school and have resided here ever since. I am proud to be employed by the Department of Natural Resources where I manage the budgets for the Department's environmental quality programs. My wife Suzan and I have two wonderful teenage daughters, Jami and Melissa. Suzan is my partner for almost all my birding activities, and is quite possibly more enthusiastic about birding than I am.

Since moving to Wisconsin, I have been very active in birding for fun, environmental education, and bird study. I have served a four-year stint as the Field Trip Chairperson for the Madison Audubon Society and continue to lead trips for that organization. I annually conduct two U.S. Fish and Wildlife Service Breeding Bird Survey routes, as well as one or two breeding bird surveys for the Department's natural areas program. I participate in three to four Christmas Bird Counts each year, and serve as co-compiler on the Madison CBC. I have an absolute passion for Big Days, conducting two or three marathons each May. Until two years ago, my contributions to WSO had been limited largely to the submittal of seasonal bird records. However, in addition to my duties as President, I also presently serve as a member of the Records Committee and as the Spring Field-Notes Compiler.

Let me close by saying I am very honored to be the President of WSO, an organization with a rich history of accomplishments, strong leadership, and supportive members. I hope that in some small way, my two years "at the helm" will continue this rich tradition.

President



Al Shea, our new President

Eastern Bluebird *by Lori Jean Hubanks, 2217 West Hart Road, Beloit, WI 53511.*

Recoveries of Osprey Banded in Wisconsin

Between 1965 and 1989, 554 nestling Ospreys were banded in Wisconsin. As of January 1991, 25 of these banded Ospreys had been recovered. Most were recovered in Wisconsin, but 10 were recovered in Latin America.

by Neal D. Niemuth

From 1965 through 1989, Don Follen and members of the organization he founded, the Wisconsin Foundation for Wildlife Research (WFWR), banded 554 nestling Osprey (*Pandion haliaetus*) in central and northern Wisconsin. Since Follen's death in 1988, WFWR members have continued banding Osprey in portions of the state, working in conjunction with the Wisconsin Department of Natural Resources (WDNR). This banding meets objectives of the WDNR Osprey Recovery Plan, which relies on banding to provide information on the dispersal, survival, and recruitment of Osprey, as well as allowing for collection of addled eggs and dead young from nests to monitor contaminant levels (Gieck 1986). Information presented in this paper is a combination of Follen's unpublished data and continuing research by WFWR members.

Study Area

Principal banding sites were Iron (n = 112), Juneau (98), Burnett (68), Portage (56), Marathon (51), Wood (43), Sawyer (31), Washburn (28), Monroe (28), Douglas (17), Adams (12), Oneida (4), Taylor (4), and Bayfield (2) counties. Number of birds banded varied annually depending on local production and the amount of time and money volunteer banders were able to put into banding efforts.

Methods

Aerial observations from annual WDNR Osprey productivity flights were used to determine nesting success and plan subsequent banding. Banding effort was highest in Iron County, where young were banded in all active nests, except those in inaccessible or extremely dangerous trees. All nestlings were banded with United States Fish and Wildlife Service (USFWS) lock-on bands. Nest entry was scheduled to band nestlings at 4–7 weeks of age.

Results and Discussion

Nestlings from 262 nests were banded with a mean of 2.1 young per

nest (Table 1). It should be noted that the banding described in this report was not a controlled study of populations and production; emphasis was placed on banding a maximum number of birds per unit effort, and as a result, the recorded number of young per productive nest is no doubt inflated over that of the population as a whole. By comparison, Stocek and Pearce (1983) reported 1.8 young per successful nest in New Brunswick from 1974–1977, and Hronek (1987) reported a range from 1.1 to 2.0 young per successful nest for national forest districts in Michigan, Minnesota, and Wisconsin from 1965–1986. In Wisconsin, Gieck and Sindelar (1989) reported 1.9 young per productive territory in 1989 from a sample of 300 active nests.

Twenty-five (4.5%) of 554 birds have been recovered as of January 1991 (Table 2). Using data from the USFWS Bird Banding Lab, Poole and Agler (1987) determined that the recovery rate for Ospreys banded in North America from 1914–1918 was 8.0%. As 261 (47%) of the Ospreys in our study were banded from 1986–1989, inclusive, and mean time for all recoveries is 31 months, we anticipate additional recoveries of banded birds.

Table 1. Brood sizes for 262 Wisconsin osprey nests, 1965–1989[1].

Young per nest	Number of nests	Percent of nests
1	54	20.6
2	120	45.8
3	87	33.2
4	1	0.4

[1]Six young not banded due to early fledging or late development; one young bird fostered into Portage County nest.

Cause of death or recovery was noted for 11 of the 25 recoveries. Gunshot accounted for 8 (32%); encounters with cars, bird banders, and powerlines each accounted for 1 recovery (4% apiece). The remaining 14 (56%) were classified as unknown. In these cases, no information about the cause of death was obtained.

Ten of the recoveries (40%) took place in Latin America; 7 (28%) occurred in Wisconsin during the bird's hatch year; another 7 (28%) took place in Wisconsin after the birds' second year of life; 1 bird (4%) was captured as a breeding 3 year-old in Michigan.

The preponderance of recoveries in Latin America is no doubt due to two factors. Ospreys migrate south for the winter, and young birds remain south of the U.S. border for the year following their year of hatching (Henny 1988, Henny and Van Velzen 1972). As first-year birds have an estimated mortality rate that is almost 3 times that of adults (Henny and Wight 1969), the juvenile birds remaining in Central and South America suffer higher mortality, with a corresponding potential for band recoveries. Of the 10 Latin American recoveries, 7 were from birds less than 2 years of age.

The second factor causing high mortality south of the U.S. border is continued persecution of Ospreys during migration and on winter range (Henny 1988, Poole 1989). Prior to 1972, 47% of all North American Osprey recoveries were due to shooting; of these, 61% came from the United States (Poole and Agler 1987). Since 1972, band recoveries due to shooting have decreased to 30% of all recoveries; of these, 93% are from Latin America and the Caribbean (Poole and Agler 1987). The increased proportion of re-

Table 2. Locations and dates of Osprey banding and recoveries.

Band Number	Banding site (county)	Date	Recovery location	Date	Status of bird
508-30597	Juneau	06-29-65	Oachillero, Ecuador	04-05-81	Unknown. Band turned in by Peace Corps worker who noticed it on a local's necklace.
568-16817	Juneau	07-08-67	Dane County, WI	06-21-69	Found dead.
568-16820	Juneau	07-15-67	Columbia	Fall 1970	Shot dead.
568-16829	Juneau	07-11-71	Stevens Point, WI	07-22-76	Shot & injured. Final disposition unknown
568-16830	Juneau	07-11-71	Unknown WI location	05-09-79	Found with broken wing.
568-16839	Juneau	07-02-72	Puerto Armuelles, Panama	10-25-72	Shot dead.
608-24917	Juneau	06-26-76	Wood County, WI	07-08-86	Killed by car.
608-24971	Marathon	07-11-79	Oranoestad Aruba, Lesser Antilles.	04-13-81	"Caught by hand." Bird later died or was killed.
608-20274	Juneau	07-16-81	Castle Rock Flowage, WI	09-02-81	Found dead.
608-20286	Wood	07-03-82	Tarauaca, Brazil	12-15-82	Shot dead.
608-37926	Portage	06-30-83	Amazon River, Brazil	Nov. 1985	Found injured, "probably shot." Bird later died.
608-37972	Portage	07-07-84	Wood County, WI	04-25-89	Found dead.
608-45603	Juneau	07-08-84	Ucayali River, Peru	01-25-85	Unknown.
608-45614	Marathon	07-09-84	Roscommon County, MI	06-14-87	Captured/released as breeding female.
608-45620	Burnett	07-17-84	Crex Meadows, WI	05-02-88	Found injured. Taken to rehabilitation center, where bird later died.
608-45642	Iron	07-22-84	Iron County, WI	09-13-86	Found dead.
608-45753	Burnett	07-13-85	Huaral, Peru	12-07-85	Shot dead by hunter.
608-45769	Iron	07-15-85	Iron County, WI	09-16-85	Found dead on natal lake.
608-67577	Portage	07-05-87	Portage County, WI	July 1987	Found dead in Wisconsin River.
608-67442	Douglas	07-15-87	Cerro Alto, Guatemala	10-06-87	Shot dead.
608-67586	Monroe	07-17-87	Canton Chone, Ecuador	Aug. 1988	Shot dead.
608-67631	Washburn	07-16-88	Washburn County, WI	08-28-88	Found dead. Autopsy showed peritonitis and internal parasites.
608-80364	Sawyer	07-08-89	Sawyer County, WI	07-24-89	Found dead below nest.
608-67449	Wood	07-12-89	Wood County, WI	08-08-89	Killed by hitting power line.
608-67454	Portage	07-18-89	Lincoln County, WI	08-06-89	Found injured; later died at rehabilitation center.

coveries due to shooting in Latin America is probably due to decreased persecution in the United States, rather than increased shooting in Latin America. Santana and Temple (1987) analyzed pre- and post-1960 Osprey band recovery data for the West Indies and found a slight, but not significant, decrease in the percentage of band recoveries due to shooting. Seven of the 10 Latin American recoveries (70%) in this study were due to Ospreys being shot.

This propensity for shooting Ospreys is evident in a letter written to the USFWS by a man who killed an Osprey banded in 1985. The letter, translated from Spanish by the USFWS, dated December 17, 1985, reads as follows:

"Dear Sirs:

It is a pleasure to address you to inform you about your eagle that came to our country and which I was fortunate to find during one of my hunting days.

On Saturday, December 7, I went hunting to one of the valleys of Cooperative Huando, in the Huaral District, Huaral Province, Lima Department, country of Peru, being 6:00 pm while hunting, I observed that high up on a tree there was a bird of great size, and I was astonished to see it; so I got close, prepared my gun and shot 2 bullets, falling the bird to the ground. When lifting the eagle, I noticed that it was bearing a band on its leg with your address requesting to notify when found. I was amazed with its beautiful plumage and even more because it was coming from the United States. I had it embalmed and now I have it at home as my own trophy.

I would like to apologize to you for the action committed on my part, but at the same time it gives me great pleasure. Also, please answer my letter and inform me about the age and the date the eagle was released to fly.

Hoping to have been excused for the happening and awaiting a reply to my letter, I remain

Attentively,
(signed)
JAIME GONZALES DEGOLLAR
Member of the Peruvian Federation of Hunting, Fishing, and Shooting
I.D. No. 0779"

Of the 7 adult Ospreys recovered in Wisconsin, 2 were found within 10 km of the site where they were banded; 4 others were found within 35, 60, 75, and 100 km from the banding site. Distance from banding site could not be determined for the 7th bird. These findings correspond to those of Henny (1977) who analyzed 32 recoveries and found that 94% of returning Ospreys nested within 125 km of their birthplace.

The only adult recovered in North America outside of Wisconsin was recaptured by Sergej Postupalsky as a breeding female in Roscommon County, Michigan, approximately 400 km east of its banding site. This recovery is in agreement with Poole (1989) who states that female Osprey disperse more than males.

Outlook

The outlook for the Osprey in Wisconsin is good. The number of active territories in the state has increased from 161 in 1980 to 300 in 1989 (Hallowell and Gieck 1989). There are many possible causes for this increase, including the banning of DDT in the United States. In addition, increased environmental awareness and acceptance by the public of the place and value of predators has resulted in decreased persecution of Osprey (Poole and Agler 1987).

Locally, the erection of Osprey platforms has also helped populations to increase. As many natural Osprey nests are located in dead trees, the nests are susceptible to blowout and deterioration of the nest tree. Ospreys readily take to artificial nests (platforms), which provide stable, long-lived nest sites, and, when placed in prime habitat, can have twice the productivity of natural nests (Postupalsky 1978). In Wisconsin's northwest and northcentral WDNR districts, percent nest success and young per active nest were almost invariably higher for platforms than natural nests over a 5-year period (Gieck 1989). The relatively high production noted earlier (2.1 young per nest) could also be attributed to increased nest success at the large number of platforms sampled in this study.

But there are still hurdles that Ospreys must overcome. Even though DDT has been banned in the United States, many developing countries where Ospreys winter still allow the use of DDT (Poole 1989). In addition, acid rain can have an adverse effect on lake ecosystems and the Osprey's prey base (Westall 1986). Obviously, shooting takes a toll on Osprey numbers, but continued education and heightened environmental awareness, especially south of the U.S. border, should help alleviate this problem. These difficulties are not insurmountable, though, and with continued management and enlightened legislation, Ospreys can continue to prosper in Wisconsin.

Acknowledgements

This paper is dedicated to the memory of Don Follen, whose intense interest in raptors served science and inspired others to explore the natural world. The following members of WDNR provided nest locations, production data, and logistical support: Gary Dunsmoore, Ron Eckstein, Jim Hoefler, Mike Johnson, Paul Koiker, Tom Meier, Sam Moore, Kevin Morgan, John Olson, Pat Savage, Lowell Tesky, Ray Vallem and Jeff Wilson. Thanks also go to David Ross and Richard Hilliker of Consolidated Papers and Kim Mello of Fort McCoy for their assistance. Chris Cold, Ken Luepke, Tom Meier, Kim Mello, Keith Merkel, John Olson, Steve Rennhack, and Jeff Wilson braved dangerous trees, unstable poles, and adverse weather to band young Osprey. Ken and Jan Luepke, Keith Merkel, and Steve Rennhack of WFWR and Charlene Gieck and John Olson of WDNR provided data incorporated into this report. Keith Merkel, John Olson and Dick Verch reviewed early drafts of this paper. Special thanks also go to John Olson and Jeff Wilson for erecting so many Osprey platforms. My sincerest thanks and apologies go out to all those who assisted in the banding efforts but are inadvertently not acknowledged above.

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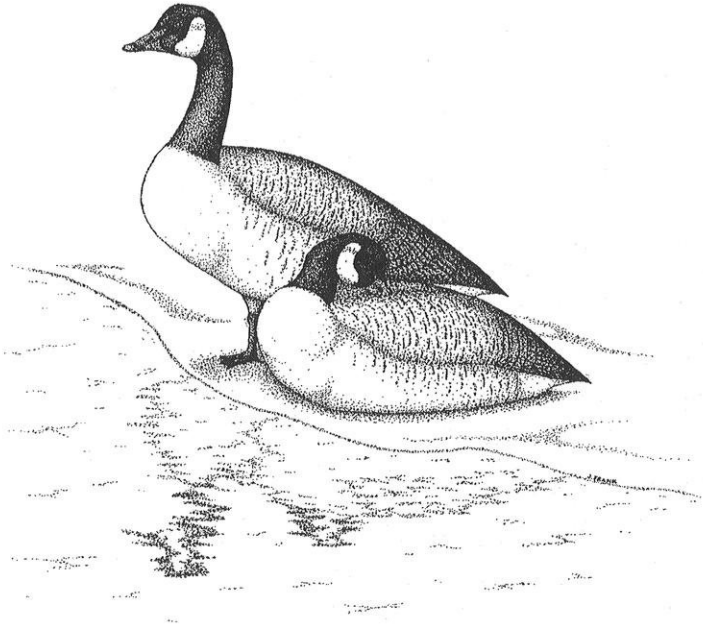

Canada Geese *by James C. Frank*

Northeast Wisconsin Yellow Rail Survey

In 1989, 27 counts at 24 sites revealed only one Yellow Rail. In 1990, two rails were detected during 20 counts at 20 sites. Confirmation of breeding is still needed.

by Mike Grimm

This study was an attempt to locate possible breeding sites of the Yellow Rail (*Coturnicops noveboracensis*) in northeastern Wisconsin through the location of calling adults. This survey was initiated in response to the noted lack of information on the present breeding range of the Yellow Rail in Wisconsin (Robbins 1988) and was made possible by a grant from the Wisconsin Society for Ornithology.

Historically, within northeastern Wisconsin, the Yellow Rail had been verified as breeding in the marshes along the west shore of Green Bay in Oconto and Marinette Counties by Carl H. Richter, who collected eggs and nests in these wetlands from 1926 to 1966. In all Richter collected 69 sets of eggs from this area. However, at the beginning of this study other confirmed breeding sites of the Yellow Rail in northeastern Wisconsin were unknown or at least unpublished. This species' small size, secretive habits, and unusual call may have contributed to this lack of information.

The purpose of this study was then to survey the sites established by Richter as having breeding Yellow Rails to determine if the rails are still present, and to visit new sites within northeast Wisconsin to locate other possible nesting sites.

Methods

Based on habitat descriptions given by Bookhout and Stenzel (1987), Walkinshaw (1937, 1939), and Richter's egg collection notes, the Yellow Rail prefers meadows dominated by sedges and fine grasses which are wet or damp and may have some standing water in spring.

With the above description as a general guide, sites were selected based on personal familiarity with the areas, USGS topographic maps, U.S. Fish and Wildlife Great Lakes Coastal Wetland Report (Herdendorf et al. 1981), Natural Areas Inventory, Wisconsin Great Lakes (Tans and Dawson 1981) and, again, Carl Richter's notes.

The surveys were conducted between 20 May and 16 June in 1989, and 26 May and 25 June in 1990. These intervals were chosen based on the dates in Richter's notes and on

conversations with biologists at the Seney National Wildlife Refuge in Michigan. Richter found nests containing eggs as early as 18 May and as late as 26 June.

Most of the surveys started on or after 2200 and generally ran until around 0200. One morning survey was done between 0525 and 0730 (Table 1). The time spent at each site varied from 2 hours at large good quality sites to 15 minutes at small sites of habitat considered to be unsuitable. Since I was not personally familiar beforehand with all the sites to be visited, a night's selection of sites sometimes contained places that on visual inspection were judged not to be Yellow Rail habitat based on the above habitat description. However, these sites were surveyed also.

The methods used in surveying the sites varied. Some sites were walked, stopping at intervals, other sites were approached by canoe and smaller sites adjacent to roads were surveyed from their periphery. At all sites a combination of calling using tapes and stone clicking (Bookhout and Stenzel 1987), and listening were employed. From notes on water depth and vegetation present the wetland type of each site was estimated, based on the classification system developed by Eggers and Reed (1987) (Table 1).

Results

In 1989, 27 counts were done on 24 different sites, (Table 1). Yellow Rails were heard at only one of the sites. This site is located northeast of the city of Oconto along County Y, just north of the wildlife refuge (T28N, R22E, Sec 8 SE1/4). This site was visited 4 times in 1989 with rails heard on all occasions although in varying numbers (Table 1). During the visit of 10 June, I was fortunate enough to see one briefly in flight at this site.

In 1990, 20 counts were conducted on 20 different sites, (Table 1). Yellow Rails were heard from two sites; the same Oconto County site as in 1989 and a new site in the Killsnake River State Wildlife Area, Calumet County (T18N, R20E, Sec 11 and 12), just south of the intersection of Aebischer and Lemke Roads. Two Yellow Rails were heard here on 26 May.

Discussion

The Oconto County site where Yellow Rails were heard on five occasions during this survey was one of the sites frequented by Carl Richter for egg collecting in the Oconto area. The presence of calling birds from 2 June to 16 June in 1989 and their presence at the site again in 1990 indicates that they are most likely still breeding there. Because of the danger of inadvertently disturbing or destroying one of their well-hidden nests, entering this area during the rails breeding season should be generally discouraged. The presence and location of the rails at this site can be detected by listening from County Highway Y, or from the creek which borders the site to the south. Other sites along the west shore of Green Bay where Richter collected; the Peshtigo Harbor marshes, the Oconto River marsh, and sites adjacent to the above site were also included in this survey, but I detected no Yellow Rails. However, based on the experience at the Oconto County site, the number of birds which call from an area is variable and thus they could have been missed on this survey.

Table 1. Sites surveyed for Yellow Rails in northeastern Wisconsin, 1989 and 1990.

County	Site	Date	Time	Wetland Type	Yellow Rails Detected
Brown	Duck Creek Marsh T24N, R20E, Sec 11,14	6/3/89	2130–2320	Shallow marsh/ wet meadow	0
	West shore, Green Bay T24N, R20E, Sec 1	6/3/89	2335–2355	Shallow-deep marsh	0
	Lineville Road marsh T24N, R20E, Sec 1	6/3/89	2400–2420	Shrub-carr	0
	Sensiba Wildlife Area T25N, R20E, Sec 13	6/3/89	2450–0105	Shallow marsh	0
	Brown County Line Road T26N, R21E, Sec 31	6/3/89	0140–0200	Shallow marsh/ wet meadow	0
	Barkhausen Wildlife Area T25N, R20E, Sec 35	6/10/89	0130–0200	Shallow marsh/ wet meadow	0
	Pine Grove Road wetland T22N, R22E, Sec 5	5/30/90	0130–2245	Wet meadow	0
	Pine Grove Road wetland T22N, R22E, Sec 32	5/30/90	2300–2330	Wet meadow	0
	Wayside Road wetland T21N, R20E, Sec 35	6/25/90	2245–2330	Shallow marsh/ wet meadow	0
Calumet	Killsnake River State Wildlife Area T18N, R20E, Sec 1	5/26/90	2245–2300	Wet meadow	0
	Killsnake River S W A T18N, R20E, Sec 12	5/26/90	2300–2330	Shallow/deep marsh	0
	Killsnake River S W A T18N, R20E, Sec 11,12	5/26/90	2330–2430	Wet meadow	2
	Brillion State Wildlife Area T20N, R20E, Sec 32,33	5/26/90	2130–2200	Shrub-carr	0
	Potter, Manitowoc River wetland T19N, R20E, Sec 15	5/26/90	2215–2230	Shallow marsh	0
	Killsnake River State Wildlife Area T18N, R20E, Sec 11,12	6/25/90	2200–2300	Flooded field	0
Door	Dunes Lake T28N, R27E, Sec 30	5/20/89	2230–2430	Deep marsh/ sedge meadow	0
	Dunes Lake T28N, R27E, Sec 30	6/8/89	2230–2400	Deep marsh/ sedge meadow	0
	Kangaroo Lake T30N, R28E, Sec 25	6/8/89	2430–2445	Shallow marsh	0
	Stoney Creek T26N, R25E, Sec 25	6/9/89	2415–2430	Wooded swamp	0
	Arbter Lake T28N, R27E, Sec 21	6/24/90	2200–2300	Open bog	0

(*continued*)

Table 1. *Continued*

County	Site	Date	Time	Wetland Type	Yellow Rails Detected
	Mud Lake wetlands T31N, R28E, Sec 28	6/24/90	2300–2400	Shallow marsh	0
Kewaunee	Kewaunee River wetlands T23N, R24E, Sec 13	6/9/89	2200–2300	Shallow marsh	0
	Ahnapee River wetlands T25N, R25E, Sec 4,5	6/9/89	2300–2400	Shallow marsh	0
Manitowoc	Collins Marsh T19N, R21E, Sec 35	5/26/90	2430–0115	Deep-shallow marsh	0
Marinette	Peshtigo Harbor wetlands T29N, R23E, Sec 14	6/2/89	2210–2235	Wet/sedge meadow	0
	Peshtigo Harbor wetlands T29N, R23E, Sec 13	6/2/89	2235–2300	Wet meadow/ shrub carr	0
	Peshtigo Harbor wetlands T29N, R23E, Sec 13	6/1/90	2200–2300	Shallow marsh/ wet meadow	0
Oconto	County Y wetland T29N, R22E, Sec 33	6/2/89	2315–2330	Wet meadow/ Shrub carr	0
	County Y wetland T28N, R22E, Sec 4	6/2/89	2330–2345	Wet meadow	0
	County Y wetland T28N, R22E, Sec 8, SE1/4	6/2/89	2345–2430	Sedge meadow/ wet meadow	8
	Oconto Marsh Wildlife Refuge T28N, R22E, Sec 17	6/2/89	2430–2445	Shallow marsh	0
	County Y wetland T24N, R22E, Sec 17	6/2/89	2445–0100	Wet meadow/ Shrub carr	0
	County Y wetland T28N, R22E, Sec 8, SE1/4	6/3/89	0140–0200	Sedge meadow/ wet meadow	1
	Oconto River marsh T26N, R22E, Sec 21	6/10/89	2100–2240	Wet meadow/ Shallow marsh	0
	County Y wetland T28N, R22E, Sec 8, SE1/4	6/10/89	2300–2430	Sedge meadow/ wet meadow	2
	County Y wetland T28N, R22E, Sec 8, SE1/4	6/16/89	0525–0730	Sedge meadow/ wet meadow	1
	County Y wetland T29N, R22E, Sec 33	6/1/90	2315–2330	Wet meadow/ Shrub carr	0
	County Y wetland T28N, R22E, Sec 8, NE1/4	6/1/90	2330–2430	Sedge meadow/ wet meadow	8

(*continued*)

Table 1. *Continued*

County	Site	Date	Time	Wetland Type	Yellow Rails Detected
	Morgan Marsh T27N, R19E, Sec 24	6/16/90	2140–2200	Shallow marsh	0
	Morgan Marsh Road wetland T27N, R19E, Sec 20	6/16/90	2210–2230	Shrub swamp	0
Oneida	Thunder Lake State Wildlife Area T38N, R10E, Sec 1,2,3 T39N, R10E, Sec 34,35,36	6/9/90	2200–2430	Wet meadow/ Shallow marsh	0
Shawano	Navarino State Wildlife Area T25N, R16E, Sec 5	5/31/89	2145–2345	Deep marsh/ wet meadow	0
	Navarino S. W. A. T26N, R16E, Sec 35	5/31/89	2405–2420	Wet meadow	0
	Navarino S. W. A. T25N, R16E, Sec 3	5/31/89	2425–2440	Shrub carr	0
	Navarino S. W. A. T25N, R16E, Sec 15	5/31/89	2445–0105	Shrub carr	0
	Navarino S. W. A. T25N, R16E, Sec 9, 10, 16, 15	6/16/90	2300–2345	Shrub carr	0
	Navarino S. W. A. T25N, R16E, Sec 5	6/16/90	2350–2415	Wet meadow	0
	Navarino State Wildlife Area T25N, R16E, Sec 5	6/16/90	2415–2430	Deep marsh wet meadow	0
Vilas	Spring Meadow Creek Flowage T40N, R11E, Sec 27	6/9/90	1900–2130	Open bog	0

One other site in Oconto County from which Richter collected a nest, but that was not visited on this survey, is the Peshtigo marsh area east of Mountain along Highway 64. This is a large wetland complex along the Peshtigo Brook and should be checked for Yellow Rails.

The Killsnake River State Wildlife Area site needs further investigation to determine if Yellow Rails are indeed breeding there. An early visit to this site this year, 11 May 1991, found 5 rails calling from the same location. If it is subsequently determined that they are breeding there, it would be of interest for it would be one of the most southern breeding sites presently known for the Yellow Rail in Wisconsin (per comm. with WDNR researchers), and south of what is generally considered their present breeding range.

Field guides today describe the breeding range of the Yellow Rail in the Lake States area as north of Lake Superior (Robbins, Bruun and Zim 1966), extending down to the northern edge of Wisconsin (Peterson 1980), or into the northern half of the state (National Geographic Society 1983). It is interesting to note, however, that older bulletins and nest records indicate that at least historically the breeding range extended further

south into northern Illinois. Ridgeway (1895) considered it "not an uncommon bird in Illinois," and Mosley (1907) felt that the yellow was "quite a common summer resident" in the Chicago area. Nelson (1907) agreed, writing that it is "not very rare. . . It undoubtedly breeds here" referring to northeastern Illinois. Kumlien and Hollister (1903) seem to imply that the Yellow Rail was common in the southern part of the state by writing that they "have authentic records from Racine, Milwaukee, Elm Grove, Delavan, Janesville, Milton, etc. and even breeding records as far north as Brown County." Andersen et al. (1942) listed the Yellow Rail under a heading entitled "Birds breeding here or in the immediate vicinity but wintering further south" in an interesting article on the birds of the UW-Madison Arboretum.

Two nest records of the Yellow Rail taken in the 1800's tend to confirm these early judgements on the southerly extent of Yellow Rail's breeding range. One of these nests was collected at Le Roy in Dodge County, WI on 1 June 1882, (Field Museum of Natural History Collection), and the other was taken at Winnebago, Illinois, (about 10 miles west of Rockford) on 17 May 1863 (Smithsonian National Museum of Natural History). Whether this historic breeding range persists is not known.

Coupled with this historical evidence of a more southerly breeding range, an annual breeding presence of Yellow Rails at the Killsnake site would argue for an effort to survey other suitable sites of southern Wisconsin for these birds.

The Killsnake site is dominated by reed canary grass (*Phalaris arundinacea*) with only small patches of *Scirpus americanus* and an unidentified sedge (*Carex* sp.). Dead matted vegetation, a characteristic mentioned by Walkinshaw (1937, 1939) and Richter (Notes 1926–1966) as important for nesting, was abundant at this site. The dominance of this site by a grass characteristic of disturbed sites (Eggers and Reed 1987) is interesting and may indicate the Yellow Rails ability to utilize such altered sites.

Acknowledgments

I would like to sincerely thank the members of the WSO for providing the grant that made this survey possible.

I am also grateful to WSO because this survey has opened new directions for me to follow in my interests with this little rail. Whether it hangs on in the wetlands of southeast Wisconsin is a question I will be pursuing over the next few years. I also hope to revisit the Oconto and Killsnake sites this year to describe the vegetation more completely, as they are quite distinct.

The information gathered on this survey has been communicated to the Wisconsin DNR, the U.S. Fish and Wildlife Service, and the Wisconsin Chapter of The Nature Conservancy.

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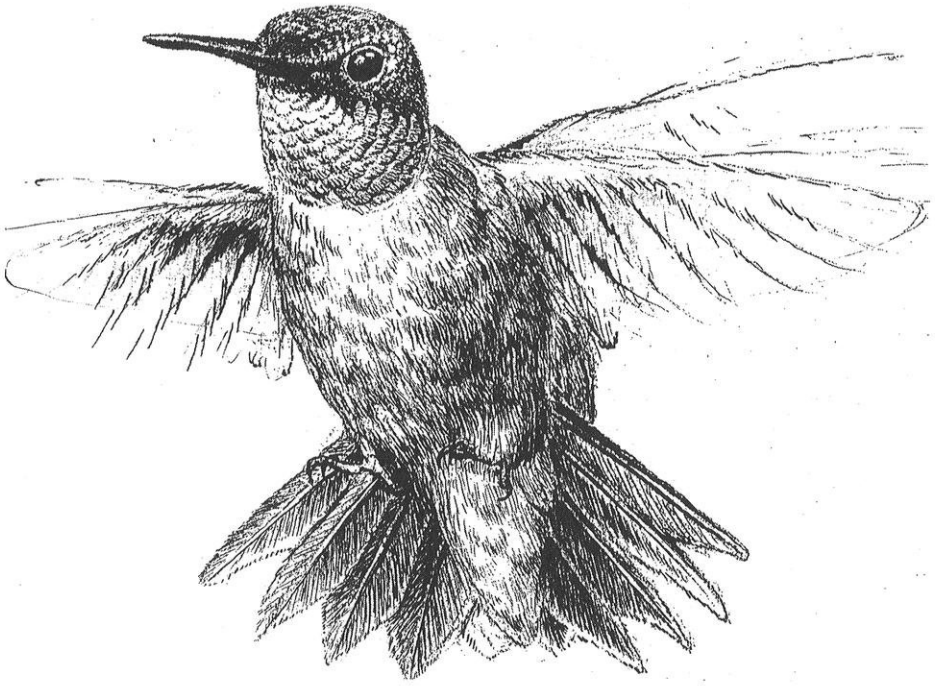
50 Years Ago in *The Passenger Pigeon*

The following was taken from a 1941 article entitled "Pest-hunts" by Aldo Leopold.

"At a Wisconsin fish hatchery a fish warden recently told with pride that over 500 Kingfishers had been shot during the past year to protect the young fish in the hatchery ponds. The kill of Kingfishers at hatcheries might easily account for the growing scarcity of these birds on Wisconsin streams and ponds."

"How long shall we apply the name "conservation" to a system which attempts to replenish game and fish by stripping the landscape of owls, hawks, kingfishers, and herons? How long will those who want ALL kinds of wildlife turn the other cheek also to those who want only ONE kind? How soon will the sportsman find out that the reason for gameless coverts and fishless streams is not owls and herons, but rather overgrazing, over cutting, erosion, and drainage? That the remedy lies not in pest-hunts, but in a system of agriculture which is tolerant and friendly toward wild as well as tame plants and animals?"



Ruby-throated Hummingbird *by Lori Jean Hubanks, 2217 West Hart Road, Beloit, WI 53511.*

An Update on Trumpeter Swans in St. Croix County

Trumpeter Swans returned to St. Croix County in 1990 and successfully reared young, the second nesting of this species since restoration efforts have returned the swans to Wisconsin.

by James O. Evrard

Iпreviously documented efforts to encourage Trumpeter Swans (*Cygnus buccinator*) to nest in northwest Wisconsin (Evrard 1990). In brief, a hand-reared male or cob Trumpeter Swan that was released in Minnesota, established a territory on Oakridge Lake, just east of the Village of Star Prairie in St. Croix County, Wisconsin. The first pen-reared female, released in hopes of providing a mate, proved to be unattractive to the neck-collared cob (80NA). The following year, a second effort to provide the cob with a mate was successful, but the female or pen died from lead poisoning the following winter.

In 1989, a third pen (01NC) was released on Oakridge Lake near 80NA. They formed a pair bond within a few days. The 3-year old pen built a rudimentary nest, despite being too young to produce eggs. The pair were seen together throughout the summer and early autumn. They were last seen on 9 October. We hoped they would survive the winter to return to nest in 1990.

80NA and 01NC were first seen on Oakridge Lake in 1990 on 17 March. During the balance of the month, the 2 swans were observed either on the lake or in a nearby flooded cornfield. On 4 April, Wisconsin Department of Natural Resources (WDNR) Technician Bruce Bacon saw the swans on the cattail (*Typha* sp.) island in Oakridge Lake, the site of the 1989 rudimentary nest.

On 24 April, the cob was seen with an uncollared swan on Hanten Pond, about 2 km north of Oakridge Lake. Both birds were loafing on the shoreline making it possible to see that the unmarked swan had an aluminum leg band. During the next few days, 80NA was seen with the unmarked swan on Oakridge Lake. 01NC was nowhere to be seen. It was obvious that the pen (01NC) had lost her collar.

On 30 April, the uncollared pen was again on the cattail island with the cob nearby. I saw 80NA alone on 10 May loafing on the west edge of the cattail island several meters from 3 Canada Geese (*Branta canadensis*). No antago-

nism was noted. The cob was again seen alone on 14 and 16 May near the cattail island. We began to wonder if the pen was nesting.

Finally, on 22 May, Bruce canoed to the island and found the pen sitting on a nest containing 2 eggs! Both swans swam from the area without defending the nest. On 28 and 31 May and 6 June, the cob was seen alone near the nest site.

On 12 June, the pen was seen on the nest. On 13 June, Bruce Bacon again checked the nest and found it contained 2 newly-hatched cygnets and 4 eggs! The pen was very defensive. The following day, the pen was still on the nest and 80NA was nearby.

On 15 June, Bruce saw the swan pair on the east end of the Oakridge Lake with 5 cygnets! He checked the nest and found 1 addled egg which he collected. During the next week, the adult swans and the 5 cygnets were observed throughout the lake but apparently were spending the night on the nest.

On 24 June, the swans with *4 cygnets* were seen on Volkert Pond, about 100 m west of Oakridge Lake. The swans apparently moved to the 5-ha pond via the lake's outlet. On 28 June, the swans were back on Oakridge Lake and were observed climbing into the nest to spend the night. The adult swans were back on Volkert Pond on 2 July but with only 3 cygnets! Another cygnet was lost to an unknown cause. The now-reduced swan family returned to Oakridge Lake by 7 July and remained there the balance of the summer. On 22 August, the cob was not seen with the brood for the first time since the nest hatched. A few days later he was back with the pen and the 3 cygnets. During the first part of September, the swans again began moving back and forth from Volkert Pond to Oakridge Lake.

The nearly-adult sized cygnets began exercising their wings in preparation for their first flight. They should have been captured for marking (leg-banding and neck-collaring) earlier when they were flightless, but personnel problems delayed this effort until 24 September. When chased on that date, all 5 swans flew, but 1 cygnet was captured and marked (yellow collar with black characters, 51KT). The cob left the pen and cygnets early in the chase and was not seen with them again for the next few days.

I observed 80NA alone on Oakridge Lake on 2, 4, and 7 October. During this period, the pen and cygnets began visiting wetlands near Oakridge Lake. They roosted on Oakridge and flew to Hanten Pond (2 km north) and Bierbrauer Lake (5 km north) where I observed them feeding.

On 20 October, 80NA and 01NC with the 3 cygnets (including 51KT) were seen on a 1-ha wetland in the Deer Park WPA, 5 km east of Oakridge Lake. When checked later in the day, only 1 unmarked cygnet remained on the wetland. The following day, the swan family was seen both on the wetland and on the 5-ha Croes Pond, about 1 km northeast. The birds were last seen on Croes Pond on 31 October.

On 7 November, I observed 80NA, 01NC, 51KT and the 2 unmarked cygnets loafing on the south shore of Early Pond, a 3-ha wetland about 3 km south of Croes Pond. Another pair of adult swans were also loafing on the shoreline and about 20 m from the Trumpeter Swan family. I suspected the strange swans were Tundra Swans (*Cygnus columbianus*) based upon their

smaller size and shorter bill length, although I could not see any yellow spots on their lores.

The Trumpeter Swan family was not seen after that date, apparently leaving the area for the year. Again, the swans survived the Wisconsin waterfowl hunting season until early November, apparently due to the intensive publicity effort by the WDNR warning hunters not to confuse the protected swans with snow geese (*Chen caerulescens*), a hunted species.

The Trumpeter Swan brood hatched on Oakridge Lake was the second wild brood produced in Wisconsin since the species was extirpated in the early 1900's. The first wild brood hatched in Polk County the previous year. Another brood from Minnesota birds was produced in 1990 on the St. Croix River near Osceola but hatched at a later than the Oakridge Lake brood (Mossman 1991).

I wish to thank M. J. Mossman for critical review of the manuscript. Partial funding for my study was provided by the Federal Aid to Wildlife Restoration under Pittman-Robertson Wisconsin Project W-141-R.

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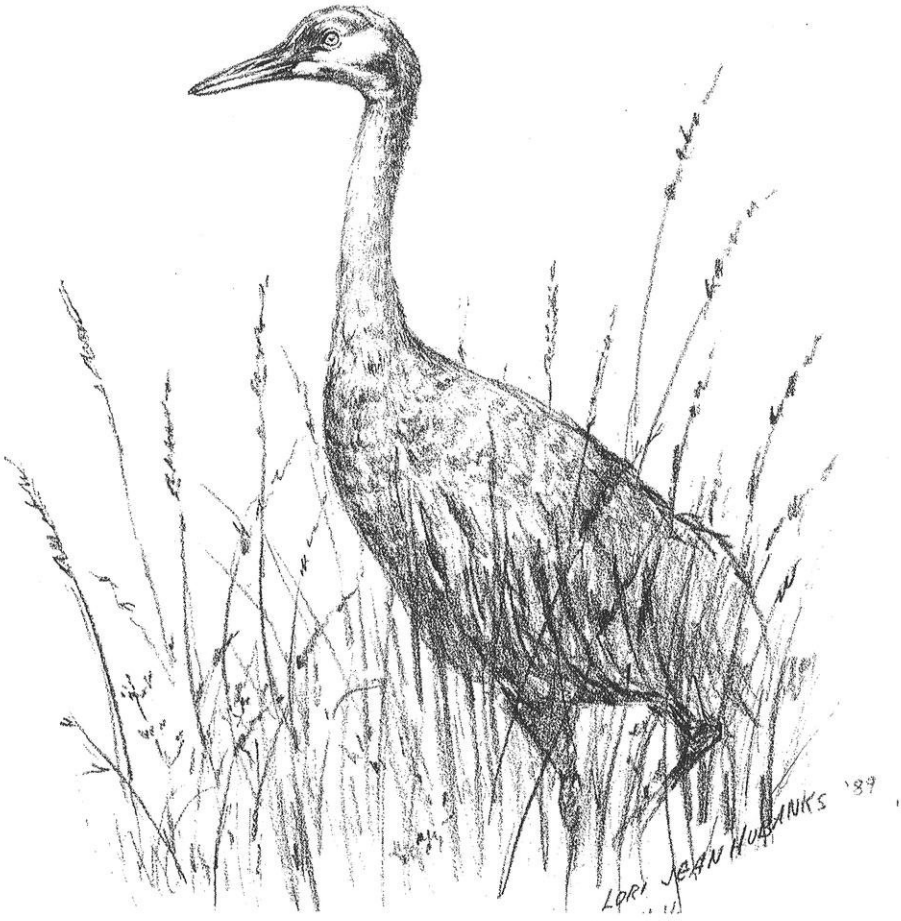
Dark-eyed Junco *by Lori Jean Hubanks, 2217 West Hart Road, Beloit, WI 53511.*



Sandhill Crane *by Lori Jean Hubanks, 2217 West Hart Road, Beloit, WI 53511.*

Cranberry Growing and Wisconsin's Bird Diversity

Over half of the recent losses of wetland habitat in Wisconsin have been conversions for cranberry growing. The impacts of cranberry growing on Wisconsin birds is reviewed and recent political developments are discussed.

by Jeffrey C. Kalinich

In Wisconsin, wetlands are an important resource for birders because they provide habitat for many of the species birders seek to observe (Hoffman 1990). Since presettlement times approximately one-half of Wisconsin's wetlands have been developed for recreation, roads, urban centers and agriculture. From a presettlement estimated ten million acres, these habitats have been reduced to approximately five million acres today (Read 1990). Moreover, the development has resulted in the fragmentation and isolation of small patches of wetland.

Currently the greatest alteration of wetland habitat in Wisconsin is due to conversions for cranberry growing. From January 1982 to August of 1989 the United States Army Corps of Engineers (COE) authorized permits for development of 9247 acres of wetlands in Wisconsin under their authority in section 404 of the Clean Water Act. Table 1 shows wetland losses by activity during this period. Out of the 9247 acres, 4986 acres, or 54% of the wetland loss, was due to conversions for cranberry growing. Out of the 700 total permits, issued, 97 or 14%, were for cranberry operations (Simon and Stoerzer 1989). This indicates that individual cranberry projects involved large pieces of wetland. Proposals involving 200 acres of wetland, though not typical, are not uncommon.

Since August 1989, data compiled from COE public notices on permit applications show that cranberry growers in Wisconsin have applied for wetland fill permits on an additional 1803 acres. To date, permits for 692 acres have been issued. Permits are still pending for 785 acres. Two projects totaling 326 acres have been withdrawn by the cranberry growers.

In 1989, 9200 acres of cranberry beds were harvested. This is twice the amount of acreage harvested twenty-five years earlier (WDATCP 1990). Most of this expansion has occurred since 1980, during which time, an additional 2000 acres was put into production. This 2000 acres of increased

Table 1. Wetland loss: COE Individual Permits, 1982–August 1989 (Source: Simon & Stoerzer, 1989).

Activity[1]	Acres	% of total acres lost	Number of permits	% of total permits issued
Agriculture	922	10	16	2
Cranberries	4986	54	97	14
Development	1009	11	336	48
Dikes	309	3	10	1
Ditches	864	9	11	2
Highways	486	5	125	18
Recreation	670	7	105	15
Total	9247		700	

[1]Agriculture = Excluding cranberry growing. Cranberries = Includes all cranberry related projects. Development = Commercial, residential and industrial. Dikes = Dike construction not associated with other activities. Ditches = Ditch excavation not associated with other activities. Highways = Department of Transportation highway projects. Recreation = Includes boat ramps and non-commercial wildlife ponds.

production does not include most of the acreage that COE has permitted during the eighties. This is because it takes a cranberry bed about five years to come into production. Therefore, most of the acreage permitted for development by COE in the late eighties will not be reflected in harvest statistics until the next few years.

There are a number of reasons why the industry has been expanding so rapidly in Wisconsin during the last decade. First, Wisconsin has an abundant supply of water and relatively cheap land. Second, an 1867 Wisconsin law exempts cranberry growers from state regulations regarding water diversion and dam construction. Third, the market for cranberry products, especially juices, has been rapidly expanding. Finally, the COE has generally determined that cranberry-related wetland conversions are not against the public interest (Eggers 1991).

It is in this general context that conservation issues involving cranberry growing arise. The remainder of this essay will explore the implications of cranberry development, and COE proposed new policies towards that development, on the diversity of Wisconsin's birds.

Most cranberry beds and reservoirs are constructed in sedge meadows, alder thickets, bogs and forested wetlands (Eggers 1990). The focus here will be on sedge meadows since they are illustrative of the conservation concerns involving diversity. Sedge meadows are important habitats for Mallards, Blue-winged Teal, Sedge Wren, Sandhill Crane, Sharp-tailed Sparrow, LeConte's Sparrow, Wilsons' Phalarope and Yellow Rail. Few other habitats in Wisconsin support the Sedge Wren, Sharp-tailed Sparrow, LeConte's Sparrow, Wilson's Phalarope and Yellow Rail (Mossman and Sample 1990).

In addition to being dependant on sedge meadows, Yellow Rail, and possibly Wilson's Phalarope and Sharp-tailed Sparrows, require large patches of it. When sedge meadow patches are large, or form a large patch in association with barrens, bogs, grasslands or marshes, other species such as

Northern Harrier, Sharp-tailed Grouse and Short-eared Owl will also use sedge meadows (Mossman and Sample 1990).

Cranberry growers convert sedge meadows to cranberry beds by scalping off the top two feet of soil and placing a twelve inch layer of sand on the scalped area, to serve as a root zone, while ditching and diking the area to control water flow to the beds. The scalping and sanding eliminate the natural plant community. The ditching lowers the ground-water table under the cranberry beds and in adjacent areas. The lower ground-water table in the adjacent areas results in their succession to shrubs or trees.

The cranberry plant is about ten inches high and grows in a thick mat in the beds. There is little vertical or horizontal structure in the beds. Other than weeds, cranberry beds are a monoculture. They do not serve as nesting areas but do provide food for some species. Dikes and ditches are more valuable to wildlife, but their use as nesting sites and cover is limited. This is because they have steepside slopes, that are often mowed and the dike tops are frequently used as roads (Eggers 1991). Cranberry growers generally construct reservoirs by impounding streams or wetlands. When the area is flooded emergent and shallow open-water communities develop. Sometimes the existing vegetation becomes a floating mat (Eggers 1991). When sedge meadows are converted to marsh and open water habitats Sedge Wren, Wilson's Phalarope, LeConte's Sparrow and Yellow Rail populations decline (Mossman and Sample 1990). However, the marsh and open water forms habitat for a large number of waterfowl and some endangered bird species (Hoffman 1991).

The cranberry growers maintain that when looking at the wildlife value of their operations all areas including cranberry beds, ditches, dikes, reservoirs and adjacent lands must be considered. Table 2 shows the approximate acreage of different land uses on lands owned by cranberry growers. The growers believe that their activities over the entire property actually enhance diversity in the area, and this compensates for any reduced diversity on the 10% of their lands devoted to cranberry beds, dikes, ditches and roads.

In an effort to document these trends, the cranberry industry sponsored a study of wildlife use of Wisconsin cranberry marshes. The focus here will be on the avifaunal aspects of the study, which are indicative of the overall trends. Birds were censused using mist nets and transect surveys on three typical cranberry operations in Wisconsin. The data for the study were collected at the three sites between August 16 and August 28, 1989 (Holland et al. 1990).

Site A was located on Dead Creek in

Table 2. Land owned by Wisconsin cranberry growers (Source: Schreiber, 1988).

Land use	Acres	% of total acres
Cranberry Beds	7900	7
Ditches, Dikes and Roads	3500	3
Reservoirs	23000	21
Wet Marshlands (grasses & sedges)	32000	29
Shrub and Wooded Wetlands	24000	22
Wooded Uplands	19000	17
Total	109400	99

the Town of Scott, Monroe County. Site B was located adjacent to the East Fork of the Black River in the Town of City Point, Jackson County. Site C was located next to Big Lake McKenzie in the Town of Spooner, Burnett County. The study area at each site was defined as all the area within 100 feet of the perimeter of the cranberry beds and reservoirs (Holland et al. 1990).

Mist-net samples were taken by setting out four 36-foot-by-4-foot, 1.25-inch mesh mist nets at each site for three days. The nets were placed in all components of the study area at locations which the biologists conducting the survey thought would provide the most captures. The nets were relocated if no captures were made. Transect surveys were made along dikes and roads in the study area. At sites A and C boat surveys were made of the reservoir, while at site B, the reservoir survey was made by walking the shore. The surveys were conducted for two hours following dawn by two biologists on two consecutive days. On the surveys, both sightings and calls were recorded as observations (Hollands et al. 1990).

The data collected from the mist net trapping are presented in Table 3. A total of 26 species were captured with mist nets at the three sites. The data collected from the transect surveys are presented in Table 4. A total of 50 species was observed on the transects at the three sites. Between both sampling techniques a total of 63 species was observed. Using both sampling techniques, 34 species were found at site A, 40 at site B and 35 at site C (Hollands et al. 1990).

In addition to recording the species observed, the biologists also recorded where in the study area it was observed. Birds simply flying over a habitat type of the study area were not considered to be using it. Only birds foraging or perched in a habitat type were recorded as using it. These data are presented in Table 5. These data indicate that cranberry beds are used by the fewest number of bird species. The adjacent edge of wetland and disturbed areas were found to be used by the most bird species. These areas probably had the greatest number of species because of edge effects (Hollands et al. 1990).

Based on these findings the study concluded that cranberry wetland systems contain a high diversity of bird species. The study also concluded that while there may be a loss in wildlife value in the cranberry beds, wildlife use and diversity may increase due to the creation of open-water reservoir, ditches, forest openings and disturbed areas (Hollands et al. 1990).

A breeding bird survey of sedge meadow in Comstock State Natural Area, in eastern Marquette County, found 14 bird species while a similar survey in Crex Meadows Wildlife Area near Reeds Lake in Burnett County found 22 bird species (Mossman and Sample 1990). While comparing these findings to industry data is tenuous, since they were taken at different times of year, the results indicate that commercial cranberry wetland systems can be expected to provide habitat for a greater number of bird species than sedge meadows. This result, however, is really not very surprising.

In general marsh and shallow open water habitats are very productive and quite diverse (Hoffman 1991). Also, diversity is greater in areas with a mixture of habitats (Temple 1989a). Since commercial cranberry operations com-

Table 3. Birds captured in mist nets at three Wisconsin cranberry operations in August 1989 (Source: Hollands et al. 1990).

Species	Number Caught		
	Site A Monroe Co.	Site B Jackson Co.	Site C Burnett Co.
Solitary Sandpiper	1	0	1
Ruby-throated Hummingbird	0	2	0
Least Flycatcher	0	7	1
Eastern Phoebe	2	2	0
Black-capped Chickadee	0	2	0
Gray-cheeked Thrush	1	2	0
American Robin	1	0	0
Gray Catbird	7	3	0
Cedar Waxwing	0	0	0
Red-eyed Vireo	0	1	0
Tennessee Warbler	0	2	0
Nashville Warbler	0	0	1
Yellow Warbler	0	1	0
Chestnut-sided Warbler	0	3	1
Pine Warbler	0	1	0
American Redstart	0	4	0
Ovenbird	0	2	2
Northern Waterthrush	0	3	1
Common Yellowthroat	0	11	15
Scarlet Tanager	0	1	0
Rose-breasted Grosbeak	0	2	0
Indigo Bunting	0	17	0
Rufous-sided Towhee	0	2	0
Field Sparrow	0	3	0
Song Sparrow	2	22	25
American Goldfinch	1	16	19
Number of Individual Birds	15	109	66
Number of species	7	22	9

bine productive communities with a lot of edge, they would be expected to be quite diverse. Sedge meadows on the other hand have low variation in their horizontal and vertical structure. As a result they are not very diverse and generally only support a simple bird community dominated by a few bird species (Mossman and Sample 1990). However, when comparing sedge meadows with cranberry operations, two additional things must be considered. The first is pesticide use, and the second is natural diversity.

Cranberry growers control a number of insects, weeds and diseases in order to increase crop yields. The primary method of control is pesticide application (Schreiber 1988). Table 6 shows the commonly used pesticides in cranberry operations along with their frequency of use and toxicities. Most of the pesticides are organophosphates. In 1985, 75,000 pounds of active ingredients were applied to 9000 acres of established and developing cranberry beds. The most frequently used pesticide, parathion, bioaccumulates and is acutely toxic to birds through oral exposure. Parathion is the cause of more wildlife die-offs than any other organophosphate. Diazinon is also extremely toxic to birds and has caused die-offs (Meyer 1988).

These chemicals do kill birds in Wisconsin. In July of 1990, eight Canadian

Table 4. Birds observed on transect surveys at three Wisconsin cranberry operations in August 1989 (Source: Hollands et al. 1990).

Species	Number observed		
	Site A Monroe Co.	Site B Jackson Co.	Site C Burnett Co.
Common Loon	0	0	6
Double-crested Cormorant	21	0	0
American Bittern	0	0	1
Great Blue Heron	9	2	6
Green-backed Heron	0	0	2
Wood Duck	0	1	27
Green-winged Teal	1	0	0
Mallard	9	0	13
Bald Eagle	0	0	1
Accipiter species	0	0	1
Red-tailed Hawk	2	0	3
Merlin	1	0	0
Sora	0	0	1
Sandhill Crane	4	1	0
Killdeer	10	0	1
Lesser Yellowlegs	2	0	0
Solitary Sandpiper	1	0	6
Spotted Sandpiper	5	1	1
Common Snipe	2	1	12
Great Horned Owl	0	2	0
Barred Owl	0	2	0
Belted Kingfisher	0	3	3
Downy Woodpecker	1	0	1
Northern Flicker	6	1	1
Pileated Woodpecker	1	0	1
Eastern Wood Pewee	1	1	0
Eastern Phoebe	0	4	2
Eastern Kingbird	1	0	4
Tree Swallow	9	0	0
Barn Swallow	14	3	12
Blue Jay	6	5	4
American Crow	4	13	6
Common Raven	1	0	0
Black-capped Chickadee	1	10	14
White-breasted Nuthatch	1	0	0
American Robin	1	1	0
Gray Catbird	13	6	3
Cedar Waxwing	83	17	0
Red-eyed Vireo	3	0	0
Golden-winged Warbler	0	1	0
Yellow Warbler	0	0	1
Black-and-White Warbler	0	4	0
Common Yellowthroat	2	28	11
Wilson's Warbler	0	1	0
Rose-breasted Grosbeak	0	1	0
Indigo Bunting	0	6	0
Savannah Sparrow	3	0	0
Song Sparrow	29	29	15
Red-winged Blackbird	0	0	6
American Goldfinch	24	7	21
Number of Individual Birds	282	151	185
Number of Species	32	26	30

Table 5. Locations of birds observed in three Wisconsin cranberry operations in Monroe, Jackson and Burnett Counties in August 1989 (Source: Hollands et al. 1990).

	Habitat species observed in:					
Species	Cranberry beds	Reservoir	Ditches/ Dikes[1]	Disturbed Areas[2]	Adjacent Wetland[3]	Adjacent Upland[3]
Common Loon		X				
Double-crested Cormorant		X				
American Bittern			X			
Great Blue Heron		X	X			
Green-backed Heron			X			
Wood Duck		X				
Green-winged Teal			X			
Mallard		X				
Bald Eagle		X				X
Accipiter species	X			X		
Red-tailed Hawk	X		X	X	X	X
Merlin	X					
Sora			X			
Sandhill Crane			X			
Killdeer			X			
Lesser Yellowlegs			X			
Solitary Sandpiper		X	X			
Spotted Sandpiper			X			
Common Snipe			X			
Great Horned Owl					X	
Barred Owl					X	
Ruby-throated Hummingbird					X	
Belted Kingfisher		X	X		X	
Downy Woodpecker					X	
Northern Flicker					X	X
Pileated Woodpecker						X
Eastern Wood Pewee						X
Least Flycatcher				X	X	
Eastern Phoebe				X	X	X
Eastern Kingbird		X		X		
Tree Swallow	X	X				
Barn Swallow	X	X				
Blue Jay					X	X
American Crow	X		X			X
Common Raven		X				
Black-capped Chickadee				X		X
White-breasted Nuthatch						X
Grey-cheeked Thrush				X		X
American Robin		X				X
Gray Catbird				X	X	
Cedar Waxwing	X	X	X	X	X	X
Red-eyed Vireo				X		X
Golden-winged Warbler					X	
Tennessee Warbler					X	
Nashville Warbler					X	
Yellow Warbler					X	
Chestnut-sided Warbler				X		
Pine Warbler				X	X	
Black-and-white Warbler				X	X	
American Redstart				X	X	

(*continued*)

Table 5. *Continued*

Species	Habitat species observed in: Cranberry beds	Reservoir	Ditches/ Dikes[1]	Disturbed Areas[2]	Adjacent Wetland[3]	Adjacent Upland[3]
Ovenbird				X		X
Northern Waterthrush			X		X	
Wilson's Warbler				X		
Common Yellowthroat				X	X	
Scarlet Tanager				X		
Rose-breasted Grosbeak				X	X	
Indigo Bunting				X	X	
Rufous-sided Towhee				X		
Field Sparrow	X		X	X		
Song Sparrow						
Red-winged Blackbird	X				X	
American Goldfinch	X		X		X	
Total	11	15	18	23	26	16

[1]Dikes and Ditches included all Man-made water channels, reservoir dikes and roads on top of ditch banks.

[2]Disturbed Areas included all mowed areas, roadways, berms, ditch banks and cut over wetlands and uplands.

[3]Adjacent Areas were those within 100 feet of the cranberry beds or reservoir.

Geese were found dead in a cranberry bed. The birds died as a result of ingesting a lethal dose of diazinon which had recently been aerially applied to the cranberry beds (P. Helmbrecht, personal communication, 1990). Most reports and studies of these incidents, when they do occur, involve waterfowl that are easily detected when they die. The full extent of the impacts on smaller, less conspicuous birds is unknown.

Most of the other pesticides listed in Table 6 are not as toxic as parathion and diazinon, nor do most of them bioaccumulate. Therefore, they do not pose as significant a threat to birds. However, registration of these products for use does not necessarily uncover all of the environmental impacts of the products. The use of parathion and diazinon, and even to a degree the other pesticides, significantly detracts from the value of the habitat associated with cranberry operations. Before cranberry operations can be considered as a valuable resource in conservation efforts, the use of at least the worst of the pesticides will have to be stopped (Meyer 1988).

The second factor that must be considered is Wisconsin's natural diversity. There is more to managing diversity that simply maximizing the number of species in a local area, such as a cranberry operation. Consideration must also be given to the ecosystem structure and function. This means more than just ensuring the presence of sedge meadows. It also means considering patch size. Habitat fragmentation results in habitat patches that are too small and isolated to sustain populations of some birds (Temple 1989a). Part of the reason for this is that area-sensitive species will not locate in a patch that is too small (Temple 1988). In order to maintain a minimum viable population of an area-sensitive species, relatively large areas

Table 6. Commonly used cranberry pesticides and their toxicities (Source: WGNHS 1990).

Type and common name	Trade name	Percent of acreage treated	Oral LD50[1]
INSECTICIDES			
Parathion	Parathion	87	3
Chlorpyrifos	Lorsban	37	97–276
Carbaryl	Sevin, sevimol	29	307
Diazinon	Diazinon, D-Z-N, Spectracide	27	66
Malathion	Malathion, Cythion, Carbophos	8	885
Acephate	Orthene	2	866–945
HERBICIDES			
Dichlobenil	Casoron, Norosac	57	3160
Glyphosate	Roundup	50	4900
Norflurazon	Evital	30	8000
Napropamide	Devrinol	25	5000
All others		2	
FUNGICIDES			
Captafol	Difolatan	57	5000–6200
Triforine	Funginex	11	16000
Copper Hydroxide	Kocide	9	1000
Maneb		5	na
Mancozeb	Dithane, Manzate, Penncozeb	4	11200

[1]Oral LD50 expressed as milligrams of chemical per kilogram of body weight. na = Not Available.

may have to be preserved (Temple 1989b).

As was indicted by Table 2, cranberry growers own a significant amount of land beyond that currently used for cranberry beds, dikes, ditches and reservoirs. However, this land should not be considered as a conservation area. Much of this land is used by the cranberry growers. Some of the uses, like sand pits, impact the land quite severely. But, even if the land is not currently being used, current regulations do not protect it from future expansions.

The COE is currently reevaluating its Section 404 permit issuance policy for cranberry growers. The COE recognizes that cranberry beds result in the greatest reduction in wildlife value. Since there is evidence that cranberries can be grown on upland sites, the COE has proposed a policy of not issuing permits for cranberry bed development in wetlands. They would still permit cranberry bed development in wetlands if an upland site is not feasible and wetland development is a less environmentally damaging alternative (Eggers 1991).

The COE views reservoir construction as destroying habitat for some species and creating habitat for others. According to COE the public is split over which habitat type should be preferred. As a result, what they propose to do, when reservoirs are part of the permit application, is to balance the public interests by using diversity as a decision-making tool.

As an example of how this policy would work the COE uses a hypothetical 1000 acres of sedge meadow. They believe that converting 100 acres of this to cranberry beds, dikes and reservoir would enhance the diversity of the area and this would offset any losses. At some unstated point, however, COE believes that the loss of natural vegetation in the area makes what remains

more important for maintaining biological diversity and permits should not be issued (Eggers 1991). Unfortunately, these diversity considerations do not acknowledge the alterations that have already occurred and fail to recognize the value of large patches of habitat in preserving diversity.

Prior to settlement there were an estimated 1,135,000 acres of sedge meadow in Wisconsin. Today only about 30,000 acres of moderate to high quality sedge meadows remain. Many sedge meadows are already highly fragmented and only a few large patches of sedge meadow remain. Most of the large patches are on state lands. Moreover many sedge meadow bird populations are declining (Mossman and Sample 1991). This suggests that those large patches of sedge meadow that remain, both on public and private lands, should be highly valued and any intrusions into them severely limited.

Since few large sedge meadows remain outside of pubic land, restricting their development would not be a significant burden on private land holders. Restricting their development could be considered as mitigation for past, present and future development in other wetlands. That is rather than permitting the development of large patches, the COE should only grant permits in areas that are already highly developed and that have already lost much of their inherent structure and function.

Managing diversity includes considerations for managing natural diversity. Preserving natural diversity requires the preservation of community structure and function. In order to maintain the structure and function of some community types, like sedge meadows, large patches must be preserved. On a relative scale some communities are not very diverse, yet they add to the overall diversity of the state and should be preserved.

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Birds of Wisconsin Pine and Oak Barrens

by Michael J. Mossman, Eric Epstein, and Randy M. Hoffman

In the mid 1800s, surveyors of the General Land Office Survey crisscrossed the Wisconsin landscape, creating the section lines that would provide the basis of legal land descriptions for the settlers, loggers, and speculators that followed. In much of northern and central Wisconsin they encountered extensive sandy areas which they collectively referred to as "barrens." These were dominated by open areas of grasses and low shrubs or "heath," such as sweet fern (*Myrica asplenifolia*) and blueberry (*Vaccinium* spp.), sparsely timbered with pine and "scrub" oak, and sometimes with tall shrubby vegetation. The surveyors were not generally impressed with the utility of the barrens to early settlers, typically describing the soils as "third rate" and the timber "worthless." They sometimes remarked on the evidence of recent wildfires, which were essential to maintaining the barrens community, and which could burn thousands of acres during a single event.

Over the ensuing decades, countless attempts were made to eke agricultural and economic benefits from these landscapes, only to confirm the doubts of the early surveyors. By the end of the Great Depression these regions had been ravaged by wildfires and drought, and farming and forestry held even less promise than in the early settlement days. Yet some of the barrens landscape survived intact. The barrens region of northwest Wisconsin was then described as:

> ". . . coniferous forests and open expanses of sweet fern dwarf into insignificance the few evidences of man's present occupancy and use of the land . . . Jack pine [*Pinus banksiana*] predominates in the forests, either in pure stands of thickly set trees, or mixed with the useless, ubiquitous scrub oak. Great piles of jack pine bolts [small logs] in clearings along the railroads or at railway stations await the call of the pulp mills of Central Wisconsin, and clumsy truck loads of similar logs are met jogging along the two-rut, sand roads which crisscross the Barrens. The grassy and sweet fern barrens bear no mark of present utilization, but are desolate open tracts where only an occasional charred stump, a cluster of jack pines, or a scrub oak bush, breaks the monotonous sweep of the rolling, thinly clad ground surface.

> At rare intervals small cultivated areas with isolated tar paper shacks or log cabins interrupt the continuity of forest and barrens. . . . Typically, the farmstead scene does not include children playing around the house and barns. There are some large families, of course, but the region is characteristically one of people past middle age—weatherworn old Scandinavians who came here with their wives and children many years ago. The children have grown up and gone. The barrens does not hold its younger generation. No new settlers are moving in, and one gets the impression that when the present hardy survivors pass on there will be none to take their places. . . . Almost as numerous as the occupied farms are the abandoned, tumbled-down farmhouses surrounded by fields going to waste. Sometimes only a few stones and a patch of quack grass remain to mark the site of a former home, and to give the impression of poor land and unsuccessful farming." (Murphy 1931)

Oddly enough, those difficult times brought the dawn of a new appreciation of barrens, and an understanding that one of their best uses was as wildlife habitat, particularly for upland game such as Sharp-tailed Grouse. The reversion of tax delinquent lands to public ownership and new developments in the field of game management would eventually put control of several barrens tracts into the hands of public conservation agencies. Barrens are certainly one of the more resilient natural communities in Wisconsin, and management was successful, with the help of prescribed burning, in protecting and restoring some of these landscapes. By the 1960s, for example, it could be said of Crex Meadows Wildlife Area, an important complex of barrens and wetlands in the northwest:

> "In its history, Crex Meadows has been drained, logged, plowed, burned, and its soils depleted and abandoned. . . . Sometimes man does not seem to recognize what is best ecologically for the land. Crex Meadows is an example of the land winning out despite all of man's efforts to change it. Here man has had to learn to live in harmony with his land and to respect the inherent ecological principles of this sand country. The first surveyors called Crex Meadows 'third rate—soil and timber worthless.' But now, in terms of birds, plants, and wildlife, Crex Meadows is of priceless value . . ." (Vogl 1964)

The distinctive birdlife of today's pine and oak barrens remain unfamiliar to many birdwatchers and naturalists. This stands to reason, for most barrens are rather isolated in the far northwestern and northeastern sections of the state, accessible only by long, dusty roads, and during the breeding season they tend to be well endowed with deer flies and ticks. Yet, apart from the state's large wetlands, barrens include some of the few sizeable tracts of relatively natural, wild, open lands with engaging vistas that invite exploration. There are not many richer ornithological experiences than to be out in a large barrens early on a June morning, totally surrounded by the lazy singing of Clay-colored Sparrows and calls of Rufous-sided Towhees, with perhaps some chuckling of sharptails lingering on a nearby lek, and the wolf-whistle of an Upland Sandpiper high overhead.

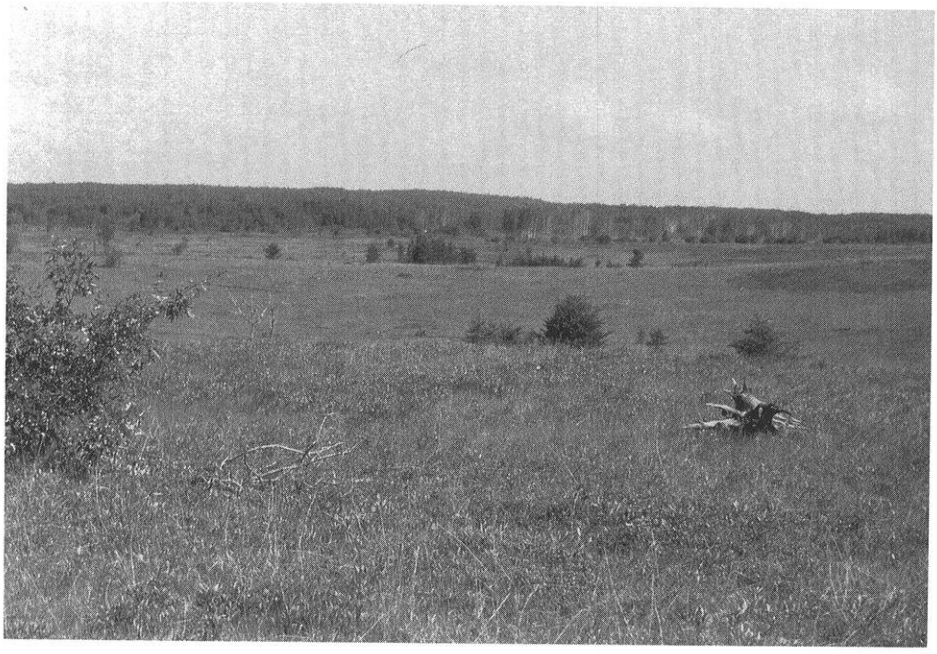
This birdlife is dependent on the varied structural characteristics of the barrens landscape, which warrants our discussion at this point. Prior to settlement, barrens habitats were widespread in Wisconsin, always associated with coarse-textured sandy or gravelly

soils. The most extensive barrens were in large areas of sandy glacial outwash, or in the sandy beds of extinct glacial lakes, but they also occurred on river terraces, old dune systems, gravelly moraine, and sandspits. Geographically, areas of extensive barrens were concentrated in northeastern, north-central, northwestern, and central Wisconsin. They were also common on the extensive outwash terraces along the Lower Wisconsin, Lower Chippewa, and Mississippi rivers. In general, trees occurred in low density, usually as scattered individuals or in small groves, punctuating an open grassy landscape that was often dotted with deciduous brush. Where outwash was pitted, the topography was more pronounced and varied, and lakes and wetlands were sometimes frequent. In such areas, the pattern of vegetation was likely to be a mosaic of open prairie-like areas, brush, savanna, and occasional stands of deciduous, coniferous, or mixed forest. The interplay of topographic and edaphic factors strongly influenced the behavior and effects of the primary disturbance factor affecting the barrens—fire—and is responsible for much of the structural and compositional variability demonstrated by this community.

Surveyors' descriptions of the vegetation and general aspect of the barrens reflected this variability. In southern and western Wisconsin, the trees most often noted were oaks, especially black (*Quercus velutina*), bur (*Q. macrocarpa*), Hill's (*Q. ellipsoidalis*), and occasionally white (*Q. alba*). Where barrens adjoined extensive prairies, the aspect was that of a savanna, with widely spaced large trees over an open understory of prairie grasses and forbs. Fires were probably frequent and of relatively low intensity. Where the landforms and vegetational mosaic were more complex, the barrens aspect was more varied, sometimes characterized by dense brush, scattered stands of stunted, gnarly oaks, and smaller patches of open prairie. Fires may have been less frequent, but of greater intensity due to the buildup of woody fuels. The effects were sometimes catastrophic, with raging crown fires reducing the oaks to the status of low, multistemmed grubs. The barrens oaks are well adapted to cope with fire, possessing the ability to regenerate following each episode of destruction.

Characteristic shrub species of southern Wisconsin oak barrens include hazelnut (*Corylus americana*), gray dogwood (*Cornus racemosa*), rose (*Rosa* spp.), willow (*Salix humilis*), and smooth sumac (*Rhus glabra*). The ground layer typically includes prairie species such as lupine (*Lupinus perennis*), goat's rue (*Tephrosia virginiana*), flowering spurge (*Euphorbia corollata*), lead plant (*Amorpha canescens*), june grass (*Koeleria cristata*), little bluestem (*Schizachyrium scoparium*), needlegrass (*Stipa spartea*), western sunflower (*Helianthus occidentalis*), rough blazing star (*Liatris aspera*), goldenrods (*Solidago* spp.), and asters (*Aster* spp.).

In northern, eastern, and central Wisconsin, pines were frequently prominent in the barrens landscape. Jack pine was the most common species, occurring sometimes as single trees, but more often in scattered groves. The cones of jack pine are "serotinal," remaining closed for long periods until scorched and opened by fire. The fire that kills the parent tree thus liberates the seeds, which drop onto a well-prepared bed free of com-



"Open" aspect at Dunbar Barrens, Marinette County. (*Photo by Bill Tans*)

peting vegetation, and initiate the next generation. Red pine (*Pinus resinosa*) and, rarely, white pine (*P. strobus*) also occurred in the northern barrens, but typically as very widely scattered large "standards" or in groves protected from most catastrophic fire by lakes, moist depressions, or other topographic features. True pine savannas with large, sparsely distributed pines (usually red pine), like the oak savannas, were probably maintained by relatively frequent fires of low intensity. Today, large open-grown pines are almost totally absent from barrens, due to logging and altered fire regimes. Hardwood trees most characteristic of the northern barrens included Hill's oak, usually as grubs or thickets of small trees, and aspen (*Populus grandidentata, P. tremuloides*), typically in scattered small stands or clones.

The understory of northern pine barrens frequently supported areas of low shrubby heath with blueberries, sweet fern, bearberry (*Arctostaphylos uva-ursi*), bracken fern (*Pteridium aquilinum*), and dewberry (*Rubus pubescens*) being especially common. Thickets of hardwood shrubs, particularly hazelnut (*Corylus americana*), pin cherry (*Prunus pensylvanica*), and juneberry (*Amelanchier* spp.) were also characteristic. In north-central and northeastern Wisconsin, barrens landscapes often included "bracken grasslands" (Curtis 1959, Vogl 1964b), where bracken fern was especially abundant.

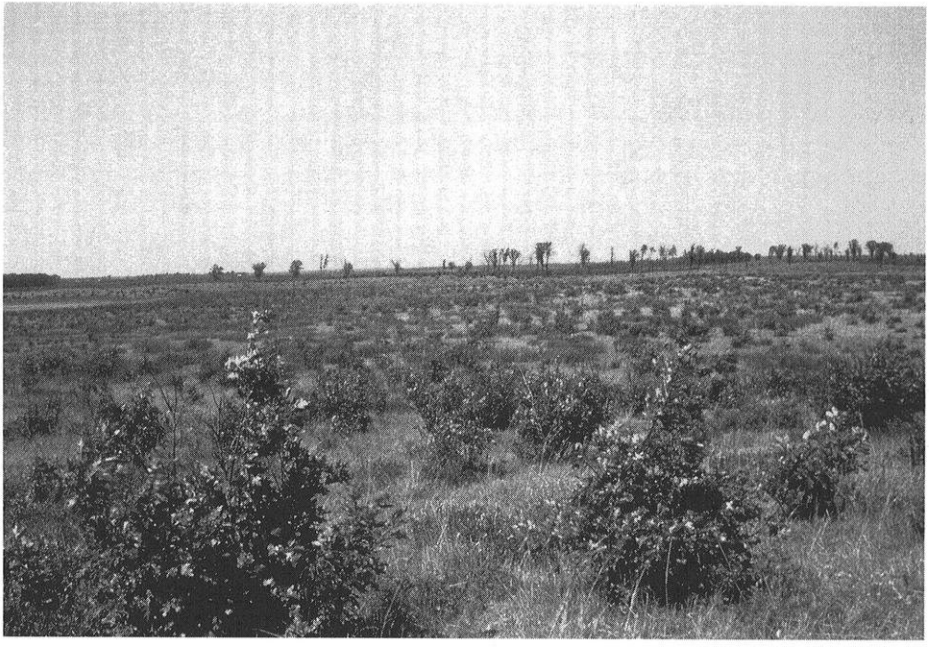
Throughout the present range of Wisconsin barrens, elements of the southern oak-dominated barrens and northern pine-dominated barrens intermix. Even in the most "northern,"

cool and moist stands, which occur in the northeastern counties, one can find at least a few plant species of prairie affinity such as little bluestem, big bluestem (*Andropogon gerardi*), and bush clover (*Lespedeza capitata*). In some stands of relatively hot and dry southwestern Wisconsin (for example near Gotham, on the lower Wisconsin River terraces), plants usually associated with more northern areas such as jack pine and blueberry occur. In northwestern and central Wisconsin, complex mixtures of northern and southern plant species can occur together, either heterogeneously or in relatively discrete patches that express the differences in soil moisture, slope aspect, edaphic factors, or site history.

An illustration of the complexity of local vegetational mosaics is found in the original land survey notes for what is now the southern part of Fort McCoy Military Reservation in Monroe County. These notes described the uplands variously as "oak openings," "level prairie," "oak brush," "jack oak and pine openings," "thinly-timbered with pine-oak," "pine-oak brush," "pine brush," and "oak forest."

More detailed information on Wisconsin oak and pine barrens is available in Curtis (1959), Murphy (1931), and Vogl (1964a, 1964b, 1967, 1970).

Curtis (1959), using information compiled and analyzed by the geographer R.W. Finley, estimated that at the time of the original land survey, over 4.1 million acres (11.8%) of Wisconsin land surface could be characterized as barrens. He classified 1.8 million acres (5.1%) south and west of the tension zone as oak barrens, and 2.34 million acres (6.7%) north and



Brush prairie at Crex Meadows, Burnett County. (*Photo by Signe Holtz*)

east of the tension zone as pine barrens. The Wisconsin Natural Heritage Inventory, which tracks high quality occurrences of biotic communities that have retained their presettlement character, has file information on barrens totalling ca 10,000 acres at 65 sites. Some of these are very small and hopelessly isolated from other barrens, with little prospect of expansion, but a few sites, especially in northwestern (e.g., Crex Meadows, Namekagon, and Moquah barrens) and central Wisconsin (Necedah National Wildlife Refuge) have been restored and expanded considerably, and there is potential to do more. At best, however, there are currently only about 50,000 acres remaining, including reclaimed forest and abandoned, semi-restored fields. This represents but 1.2% of the presettlement acreage. The loss has been due in part to grazing and cultivation. Irrigation is practiced extensively on river terraces and in the central Wisconsin sand counties. Other causes are tree planting (particularly red pine in recent years), and perhaps most importantly, the suppression of fire as a dynamic force on Wisconsin's landscape. In the absence of fire, barrens can succed to dense young forest of oak or pine in just a few decades. This can be devastating to plant and game species that need open habitat, especially large openings, and to species with low dispersal capability.

The southern Wisconsin oak barrens have declined even more, with good examples of the "savanna" form being particularly rare. These persist at only a few small sites, on terraces of the lower Wisconsin and Chippewa rivers, at Fort McCoy, and 1–2 other locations. Restoration efforts at some sites have been relatively successful, but opportunities to reestablish extensive areas of oak barrens are limited.

Most of the northern barrens sites are under public agency management, and efforts to reintroduce fire into the barrens ecosystem have succeeded in restoring "brush prairie" conditions to thousands of acres, for example at Crex Meadows and Namekagon Barrens. True pine savannas are extremely rare, and are likely to become more so unless management prescriptions are developed which are more effective at restoring and maintaining savanna conditions. Currently, most barrens management in the north is focused on benefitting Sharp-tailed Grouse, a species that finds optimal habitat in Wisconsin in brush prairie. For the following discussion of barrens avifaunas we have distinguished several general categories of barrens structure that exist today. In this discussion we use the term "heath" to describe hardwood growth of less than 1 m in height, regardless of whether it is a true ericaceous heath species such as blueberry, or whether it represents other hardwood shrub species or even oak grubs or aspen seedlings. Similarly, "shrubs" refers to the woody layer 1–3m in height, "saplings" 3–6m, and trees >6m.

We surveyed 58 barrens sites statewide, as well as several cutovers and young conifer plantations that occurred on sandy soils and presented a barrens-like aspect. This total of 79 sites was divided among the 4 barrens regions roughly in proportion to the available habitat in each (Table 1). The northwest had a high proportion of open and brush prairie tracts, and the central region had most of the conifer

Table 1. Distribution in Wisconsin of barrens stands surveyed for Table 2.

	Number of stands in indicated region:				
Habitat category	Northwest	North Central	Northeast	Central	Total
Open Aspect	4	0	0	1	5
Oak Savanna	0	0	0	2	2
Pine-dominated	1	0	0	5	6
Brush Prairie	8	0	0	1	9
Nearly Forest	3	1	1	4	9
Diverse	9	1	7	2	19
River Terrace	0	0	0	8	8
Cutover	5	0	0	1	6
Conifer Plantation	2	2	0	11	15
Total	32	4	8	35	79

plantations and conifer-dominated barrens.

"Open barrens" were characterized by predominant herbaceous cover and sometimes up to 35% heath cover. Some had a few pine or hardwood trees or saplings, or patches of shrubs (<5% cover). These sites, unless maintained in an open condition by frost, had generally been burned within 5 (usually 3) years prior to the survey.

"Oak savanna" was of the barrens type described above, as distinguished from oak savanna on more mesic soils, which is not treated in this paper. Our only examples of this type of barrens were at Fort McCoy, where there were scattered groves and individuals of both scrubby and open-grown Hill's oaks, relatively little shrub cover, and a predominance of open, herbaceous cover, which included some prairie grasses and forbs, but mostly penn sedge (*Carex pensylvanica*). In "conifer-dominated barrens," jack pine cover was 10–31%, and was not less than total hardwood cover. Structures were fairly diverse, with pines, and sometimes hardwoods, usually well represented in at least 3 of the 4 height classes. Common hardwood trees and shrubs were dewberry, Hill's oak, pin cherry, black cherry (*Prunus serotina*), and hazel. Sites were in Sauk, Adams, Jackson, and Burnett counties.

"Brush prairie" was common in Sharp-tailed Grouse management areas such as Crex Meadows, where most of the survey sites were located. Total woody cover was 30–60%, in some cases all within the shrub layer, and in others more equally divided between shrub and heath. At least one site had been recently burned, but only the heath layer died. Common plant species were sweet fern, hazel, oak grubs, cherries, redroot, and, on dampish sites, willow.

"Diverse barrens" are mainly those that are over 200 acres in size, and which incorporate large patches of 2 or more of the structural types described above. Some tracts were smaller, but still included patches and varied vegetational heights.

Central and southern Wisconsin "river terrace barrens" were extremely variable admixtures of jack pines, red cedar (*Juniperus virginiana*), oaks, and/or hardwood shrubs. Wisconsin River barrens included those at Blue River, Gotham, Sauk City, and Mazomanie,

Diverse barrens structure at Moquah Barrens, Bayfield County. (*Photo by Bob Read*)

and those along the Chippewa were at Nine-mile Island and the former Meridean Prairie. Total woody cover varied from 10% to 65%.

We sampled 15 young "conifer plantations" on sandy soils, where maximum tree height ranged from 0.3 to 4m, mostly 1–2m. Planted conifers included red, white, and scotch pines, blue, white, and Norway spruces, and balsam fir. For those 12 stands in which plant cover was estimated, conifer cover was 1–70% (mean = 29%), and hardwood heath and shrub cover was 0–40% (mean = 9%).

"Cutover" tracts had been logged within 1–3 years previous to our surveys. Structures were variable. In some tracts, scattered hardwood trees were left standing, and in others a few pines were left, while others had been totally clearcut. On the 6 stands for which cover was estimated, total woody cover was 30–60%, most of it in the shrub and heath layers.

As described above, the barrens is a tenuous community pulled in opposing directions by fire/frost and succession. The barrens avifauna responds to the variety and pattern of structures and dominant plant forms in this dynamic community, and can be seen as a variable combination of elements from related communities such as dry prairie (Sample and Hoffman 1989), xeric pine and hardwood forests (Hoffman and Mossman 1990), and even boreal forest (Mossman et al. 1990). Yet barrens also represent a real natural community with unique characteristics, and has undoubtedly been a major component of the upper Midwest landscape for centuries; thus it is not surprising that several bird

Diverse barrens structure at New Barrens, Florence County. (*Photo by Eric Epstein*)

species appear to be especially adapted to it. Following is a discussion of this avifauna according to the 7 general structural categories and 2 related, artificial habitat types described previously. Bird survey data from the 79 sites are summarized in Table 2. A total of 110 species were recorded.

Altogether, the most common and regular species of Wisconsin pine and oak barrens are Blue Jay, Common Yellowthroat, Rufous-sided Towhee, Brown-headed Cowbird, and the Chipping Sparrow, Clay-colored Sparrow, Field Sparrow, and Vesper Sparrow. Other characteristic species that are found here equally or more commonly than perhaps in any other native Wisconsin community include Sharp-tailed Grouse, Upland Sandpiper, Northern Flicker, Eastern Kingbird, Eastern Bluebird, Brown Thrasher, Tennessee Warbler, Lark Sparrow, Brewer's Blackbird, and American Goldfinch.

Open barrens are characterized by dry sand prairie birds, most of which tolerate or prefer some low (<1m tall) woody vegetation: Chipping Sparrow, Clay-colored Sparrow, Field Sparrow, Vesper Sparrow, Grasshopper Sparrow, Song Sparrow, Upland Sandpiper, Brown Thrasher, Bobolink, Western Meadowlark, Brewer's Blackbird, Brown-headed Cowbird, American Goldfinch. Although not represented in Table 2 because of detectability problems, the Common Nighthawk is another species common to open barrens and dry sand prairie. The relatively high abundance of Brewer's Blackbirds in open barrens is partly a consequence of its common association with recently burned sites

Table 2. Comparison of abundance of breeding birds on various types of barrens and related communities in Wisconsin.

	Abundance in indicated type of barrens									
Species	Overall	Open aspect	Oak savanna	Pine dominated	Brush prairie	Nearly forest	Diverse	River terrace	Cutover	Conifer plantation
Turkey Vulture	R	—	U	—	—	—	—	—	—	—
Northern Harrier	R	—	—	—	U	—	FC	—	—	R
Sharp-shinned Hawk	(R)	—	—	—	—	—	(R)	—	—	—
Cooper's Hawk	R	—	—	—	—	—	R	—	R	—
Broad-winged Hawk	(R)	—	—	—	—	—	(R)	—	—	—
Red-tailed Hawk	U	U	—	U	—	U	FC	—	—	R
American Kestrel	U	—	U	—	—	—	U	U	R	R
Ring-necked Pheasant	R	—	—	—	R	—	—	—	—	—
Ruffed Grouse	R	—	—	—	—	U	U	—	—	—
Greater Prairie-Chicken	(R)	(R)	—	—	(R)	—	—	—	—	—
Sharp-tailed Grouse	U	U	—	—	U	—	U	—	—	—
Northern Bobwhite	R	—	U	R	—	—	—	U	—	—
Sandhill Crane	R	U	—	—	—	—	—	—	—	—
Killdeer	R	U	—	—	R	—	U	—	—	—
Upland Sandpiper	U	C	FC	—	—	—	C	—	—	—
American Woodcock	R	—	—	—	—	R	—	—	—	—
Mourning Dove	FC	U	FC	U	U	U	FC	C	—	FC
Black-billed Cuckoo	FC	—	—	FC	FC	U	FC	U	U	R
Yellow-billed Cuckoo	R	—	—	—	—	U	R	—	—	—
Great Horned Owl	U	—	—	—	—	U	—	—	—	—
Common Nighthawk	U	—	—	U	—	—	—	—	U	—
Whip-poor-will	R	—	—	—	—	—	—	—	—	R
Chimney Swift	R	—	U	—	—	—	—	—	—	—
Ruby-throated Hummingbird	R	—	—	—	—	—	—	—	—	R
Red-headed Woodpecker	R	—	U	—	—	U	—	U	—	—
Red-bellied Woodpecker	R	—	—	—	—	—	—	U	—	—
Yellow-bellied Sapsucker	R	—	—	—	—	—	R	—	—	—
Downy Woodpecker	U	—	—	—	—	FC	U	U	—	—
Hairy Woodpecker	U	—	—	—	—	U	—	U	FC	—
Northern Flicker	FC	—	U	—	U	FC	C	C	U	—
Eastern Wood-Pewee	R	—	U	—	—	FC	U	—	—	—
Alder Flycatcher	R	—	—	—	U	—	R	—	FC	—
Least Flycatcher	R	—	—	—	—	U	U	—	—	—
Eastern Phoebe	(R)	—	—	—	—	—	(R)	—	—	—
Great Crested Flycatcher	U	—	U	U	—	FC	FC	FC	U	—
Eastern Kingbird	FC	FC	C	U	FC	U	C	U	C	U
Horned Lark	R	—	—	—	—	—	—	—	—	U
Purple Martin	R	—	—	—	U	—	R	—	—	U
Tree Swallow	U	FC	FC	—	—	U	C	U	—	U
Bank Swallow	R	—	—	U	—	—	—	U	—	R
Cliff Swallow	R	—	—	—	—	—	R	—	—	R
Barn Swallow	R	—	U	—	—	U	U	U	—	R
Blue Jay	C	—	C	C	U	A	C	A	U	U
American Crow	FC	FC	U	U	—	FC	C	—	U	—
Common Raven	R	—	—	—	—	U	U	—	U	—
Black-capped Chickadee	FC	—	U	C	U	A	FC	FC	U	U
Red-breasted Nuthatch	R	—	—	—	—	U	R	—	—	R
White-breasted Nuthatch	R	—	—	—	—	FC	R	U	U	—
Northern House Wren	FC	U	—	FC	U	FC	FC	FC	C	R
Sedge Wren	R	—	—	—	U	—	(R)	—	—	—
Blue-gray Gnatcatcher	R	—	—	—	—	—	—	U	—	—
Eastern Bluebird	U	U	C	U	U	U	C	FC	FC	U
Veery	R	—	—	—	—	—	U	—	U	—
Hermit Thrush	R	—	—	—	—	FC	U	—	—	—
Wood Thrush	R	—	—	—	—	—	R	—	—	—
American Robin	FC	—	FC	C	—	C	FC	C	FC	U
Gray Catbird	FC	—	—	FC	C	FC	FC	A	FC	R
Brown Thrasher	FC	FC	C	U	FC	U	C	C	FC	U

(*continued*)

Table 2. (*Continued*)

Species	Abundance in indicated type of barrens									
	Overall	Open aspect	Oak savanna	Pine dominated	Brush prairie	Nearly forest	Diverse	River terrace	Cutover	Conifer plantation
Cedar Waxwing	FC	—	U	U	U	C	C	C	U	FC
European Starling	R	U	—	—	—	—	U	—	—	—
Solitary Vireo	(R)	—	—	—	—	—	(R)	—	—	—
Yellow-throated Vireo	R	—	—	—	—	FC	—	—	—	—
Warbling Vireo	R	—	—	—	—	—	U	—	—	—
Red-eyed Vireo	U	—	—	—	R	C	FC	—	—	—
Blue-winged Warbler	R	—	U	—	—	U	—	U	—	—
Golden-winged Warbler	R	—	—	—	—	U	U	—	—	—
Tennessee Warbler	R	—	—	—	—	—	U	—	—	—
Nashville Warbler	FC	—	—	FC	—	C	FC	U	—	U
Yellow Warbler	FC	—	—	FC	C	U	U	U	FC	—
Chestnut-sided Warbler	U	—	—	U	—	C	C	—	C	R
Yellow-rumped Warbler	R	—	—	—	—	U	U	—	—	—
Pine Warbler	R	—	—	—	—	—	R	—	U	—
Palm Warbler	—	—	—	—	—	—	—	—	—	R
Black-and-White Warbler	U	—	—	U	—	U	U	—	U	—
American Redstart	R	—	—	—	—	U	R	—	FC	—
Ovenbird	R	—	—	—	—	C	U	—	—	—
Connecticut Warbler	R	—	—	—	—	U	R	—	—	R
Mourning Warbler	R	—	—	—	—	—	R	—	—	R
Common Yellowthroat	C	FC	—	U	A	FC	C	U	C	FC
Scarlet Tanager	R	—	—	—	—	FC	U	—	R	—
Northern Cardinal	R	—	—	U	—	—	R	U	—	—
Rose-breasted Grosbeak	U	—	U	—	—	C	C	U	U	R
Indigo Bunting	FC	—	FC	FC	FC	C	C	FC	FC	R
Dickcissel	R	—	—	—	—	—	R	—	—	—
Rufous-sided Towhee	C	—	U	C	C	C	A	C	A	FC
Chipping Sparrow	C	U	U	A	U	A	FC	C	U	A
Clay-colored Sparrow	A	C	—	—	A	FC	A	U	C	A
Field Sparrow	A	FC	A	A	C	C	A	A	C	A
Vesper Sparrow	C	A	A	A	C	R	C	C	C	C
Lark Sparrow	R	—	—	R	—	—	—	C	—	—
Savannah Sparrow	R	—	—	—	—	—	R	—	—	—
Grasshopper Sparrow	R	FC	C	—	—	—	R	U	—	—
Song Sparrow	FC	FC	—	FC	C	U	C	U	C	FC
Swamp Sparrow	R	—	—	—	R	—	—	—	U	—
White-throated Sparrow	R	—	—	—	—	U	R	—	—	—
Dark-eyed Junco	R	—	—	—	—	—	R	—	—	—
Bobolink	R	U	—	—	U	—	—	—	—	—
Red-winged Blackbird	U	U	U	—	U	R	R	U	—	U
Eastern Meadowlark	U	—	C	—	U	—	—	FC	—	—
Western Meadowlark	U	U	—	—	—	—	U	U	—	R
Brewer's Blackbird	FC	C	—	—	FC	—	FC	—	U	U
Common Grackle	U	—	U	—	U	R	—	U	—	U
Brown-headed Cowbird	C	FC	C	C	FC	C	C	A	A	C
Orchard Oriole	R	—	U	—	—	—	—	U	—	—
Northern Oriole	U	—	FC	—	—	U	U	FC	—	—
Purple Finch	R	—	—	—	—	—	U	—	—	—
Red Crossbill	(R)	—	—	—	—	—	(R)	—	—	—
Pine Siskin	R	—	—	—	—	—	R	—	—	—
American Goldfinch	A	C	FC	A	C	C	C	C	C	C
Evening Grosbeak	(R)	—	—	—	—	—	(R)	—	—	—

Abundance determinations are partly subjective, but based on the following guidelines: A = Abundant (occurred in 75% of sites, and sometimes in high numbers). C = Common (occurred in 50% of sites). FC = Fairly Common (occured in 25–50% of sites). U = Uncommon (occurred in 5–25% of sites). R = Rare (occurred in 1–5% of sites). Codes in parentheses refer to birds present on one or more stands, but not recorded on the particular counts used in compiling this table. Data are from walk-5-minutes/stand-5-minutes surveys conducted by Mossman, Epstein, Richard Verch (Moquah Barrens) and Hoffman (Ninemile Is.).

and dead, fallen wood. In some cases, Song Sparrows also seem attracted to recently burned areas where remain charred stems of shrubs and oak grubs. Nearly all of the species of Wisconsin's dry prairies are well represented in open or other types of barrens. Because these barrens are generally larger, and in many cases more manageable than southern Wisconsin's isolated, dry prairie relics, they serve an important role in maintaining this natural association of breeding-bird species, especially for those such as Upland Sandpiper that require large tracts.

Even more so than dry prairies, the oak savannas of southern Wisconsin suffer from the effects of small tract size, disturbance, and succession. Here again, the size, manageability, and relatively intact flora of barrens landscapes give them a fairly high potential for maintaining oak savanna bird communities. The only barrens with a purely oak savanna aspect, for which we have bird count data, are on Fort McCoy. They include the characteristic open barrens birds, as well as other true savanna species that associate with scrubby or open-grown oaks, which may be either scattered or in small groves: American Kestrel, Red-headed Woodpecker, Eastern Wood-Pewee, Great Crested Flycatcher, Eastern Kingbird, Blue Jay, Black-capped Chickadee, Eastern Bluebird, Orchard Oriole, and Northern Oriole.

In moderately open barrens that have a substantial component of jack pines, the Chipping and Vesper Sparrows are abundant. Altogether, this community is a combination of very few species of prairie (e.g., Vesper Sparrow) and pines (e.g., Chipping Sparrow, Nashville Warbler), and a large number of generalized "edge" species that are fairly widespread in Wisconsin in various types of open, shrubby woods, woods edge, and other habitats dominated by shrubs and saplings. These include Black-billed Cuckoo, Blue Jay, Black-capped Chickadee, House Wren, American Robin, Gray Catbird, Yellow Warbler, Indigo Bunting, Rufous-sided Towhee, Field Sparrow, Song Sparrow, Brown-headed Cowbird, and American Goldfinch. In addition, Lark Sparrows sometimes occur near sand blows.

Repeatedly burned barrens that are in a brush prairie stage may have prairie birds, especially if near more open habitat, or if shrubby growth is not too tall or thick. But in general, shrub-loving species dominate. Table 3 summarizes the general effects of brush prairie succession on the barrens breeding-bird community in the northwestern region, especially Crex Meadows. Species such as Sandhill Crane, Upland Sandpiper, American Crow, Red-winged Blackbird, Brewer's Blackbird, Eastern Meadowlark and Western Meadowlark, and Grasshopper Sparrow are restricted, to varying degrees, to the more open tracts. Of the prairie birds, Eastern Meadowlark and Bobolink seem to be most abundant, respectively, in heath and heath-shrub stages rather than in open barrens. This is probably a response to the prostrate, residual, herbaceous nesting cover that accumulates in the absence of recent fire, as well as the presence of song perches. Here, as in southern and central Wisconsin's prairies, Western Meadowlarks appear less tolerant of woody encroachment than do Easterns. Sharp-tailed Grouse, although difficult to detect on our bird counts, occur mostly in the early to mid suc-

Table 3. Relative abundance of selected breeding-bird species in successional stages of northwestern Wisconsin brush prairie.

Species	Mean relative abundance in indicated successional stage (%)[1,2]			
	Open	Heath	Heath and Shrub	Shrub
Sharp-tailed Grouse	+	1	+	—
Sandhill Crane	1	—	—	—
Upland Sandpiper	6	5	—	—
Black-billed Cuckoo	—	—	+	2
Eastern Kingbird	1	1	1	2
American Crow	1	+	—	—
Gray Catbird	—	—	3	2
Brown Thrasher	+	1	+	2
Red-eyed Vireo	—	—	—	2
Yellow Warbler	—	1	11	10
Common Yellowthroat	2	13	16	6
Rufous-sided Towhee	—	1	4	10
Clay-colored Sparrow	16	24	25	32
Field Sparrow	1	1	1	12
Vesper Sparrow	8	5	2	2
Grasshopper Sparrow	9	—	—	—
Song Sparrow	1	8	4	—
Bobolink	1	2	3	—
Red-winged Blackbird	13	2	2	—
Eastern Meadowlark	—	1	—	—
Western Meadowlark	+	—	—	—
Brewer's Blackbird	26	11	2	—
American Goldfinch	2	2	4	2

[1]Mean relative abundance = mean percentage of individuals counted in each stand.
[2]Data for the 3 stands in "Open" stage and for 1 of 3 stands in "Heath" stage are from the "Open" category in Table 2. All others are represented in the "Brush Prairie" category of Table 2.

cessional stages of brush prairie. Black-billed Cuckoo, Rufous-sided Towhee, and Field Sparrow increase with an increase in tall shrub cover. Gray Catbirds are most abundant among dense shrub or shrub-heath cover, while thrashers remain at approximately equal levels throughout the succession, wherever both open and shrubby patches exist. Common Yellowthroats and Song Sparrows are most prominent in mixtures of shrub and heath. The Clay-colored Sparrow is clearly the most abundant species throughout all but the most open stages of brush prairie succession, wherever there is much woody cover at heights of 0.7–2m.

When brush prairie reaches an advanced stage, forest bird species may appear. For example, we found 3 territorial male Red-eyed Vireos within extensive brush prairie at Crex Meadows, at a particular site where oak grubs, pin cherries, and hazels attained 50% cover and many grubs were 2–3m tall. These birds sang and foraged within the grubs, at least as low as 1m.

When barrens are left unburned for many years, their structure and avifauna (Table 2) approach those of northern dry forest (Curtis 1959, Hoffman and Mossman 1990). Young oak, aspen, or jack pine trees become dominant. Although many typical barrens birds may remain, others more typical of hardwood forest appear or increase: Ruffed Grouse, Yellow-billed

Diverse structure at Aurora Barrens, Florence County. (*Photo by Eric Epstein*)

Cuckoo, several woodpeckers and flycatchers, White-breasted Nuthatch, Yellow-throated Vireo, Red-eyed Vireo, Blue-winged Warbler, Golden-winged Warbler, Chestnut -sided Warbler, Black-and-White Warbler, American Redstart, Scarlet Tanager, Rose-breasted Grosbeak, and Northern Oriole. Pine and mixed forest species also occur: Common Raven, Red-breasted Nuthatch, Hermit Thrush, Nashville Warbler, Yellow-rumped Warbler, Connecticut Warbler, Chipping Sparrow, and White-throated Sparrow. Blue Jay and Black-capped Chickadee, common in all types of northern dry to dry-mesic forest, become the most abundant species, and another forest generalist—Ovenbird—becomes common.

However, forest-like groves were apparently a part of the presettlement barrens landscape, and often are today as well, especially in tracts that are large enough to incorporate a variety of microsite features such as frost pockets, damp or slightly mesic substrates, and topographic relief. Several such tracts are represented in the "Diverse" category of Table 2, and in the descriptions of specific, high-quality sites at the end of this article. The breeding-bird fauna of this type of barrens is rich, and because of large tract and patch sizes, is not dominated solely by edge species, but instead incorporates nearly the full range of open to closed barrens species.

Several species were found on surveys of these diverse tracts but not on other types of barrens. For some of these, this is a consequence of the large number of sites and the large average area surveyed in each, as well as the

habitat's diverse structure. For example, the Veery and Wood Thrush could also have been found in other forest-like tracts, and Cliff Swallow on various other open barrens, especially those with ponds and near potential nesting sites. The Savannah Sparrow and Dickcissel were apparently present because of somewhat mesic microsites that allowed a relatively lush growth of grasses and forbs and perhaps the buildup of residual ground cover. Warbling Vireos were sometimes encountered in moderately mature trees typical of their usual breeding habitat in Wisconsin, but some were among small patches of scrubby, 2–3.5m tall oaks or 2.5–8m tall aspens, well out in barrens and isolated from any larger trees. Pine Warblers were present only where jack or red pines at least 12m tall had survived cutting or burning; this species was probably more common in presettlement barrens when true pine savanna was apparently more prevalent. Although the Sharp-shinned Hawk, Solitary Vireo, Dark-eyed Junco, Purple Finch, Red Crossbill, Pine Siskin, and Evening Grosbeak might also occur in other barrens that include conifers, we suspect they respond positively to the diverse natural landscape of these large barrens. The Tennessee Warbler is a boreal species that occurs rarely in Wisconsin's boreal coniferous-hardwood forest near Lake Superior (Mossman et al. 1990), but as frequently in 6–10m tall aspens, oaks, and pines of large barrens in Douglas and Bayfield Counties.

The last category of barrens we will discuss is the jack pine, red cedar, and oak-dominated stands of sandy Wisconsin and Chippewa River terraces. The most abundant species are Blue Jay, catbird, Field Sparrow, and cowbird, while Vesper Sparrow and several edge species are common, including Mourning Dove, flicker, robin, thrasher, waxwing, towhee, Chipping Sparrow, and goldfinch (Table 1). Nashville Warblers breed among jack pines in some sites as far south as Gotham and Muscoda on the lower Wisconsin River, but otherwise, northerly-distributed species are absent. Southern species such as Northern Bobwhite, Red-bellied Woodpecker, Blue-winged Warbler, Orchard Oriole, and Cardinal are more abundant than in other barrens types. Clay-colored Sparrows are conspicuously uncommon, while Lark Sparrows are especially common—probably even more so than in dry prairie, its only other native, non-barrens habitat in Wisconsin. Even in these prairie sites, it often breeds where there are scattered jack pines, cedars, or hardwood saplings (Sample and Hoffman 1989). In areas such as the former Meridean Prairie along the Chippewa River, it also breeds in sandy, abandoned cropland. This species was formerly fairly common in the state (Kumlien and Hollister 1903) but is now decidedly uncommon and restricted in distribution, and will probably continue to decline to the extent that habitat is robbed by succession, clean farming, and development. Fortunately, opportunities still exist to protect and manage the lower Wisconsin and lower Chippewa ecosystems, in which these terrace barrens play a significant role.

On sandy soils, clearcutting or intensive, selective logging of hardwood, conifer, or mixed forest can produce an early successional stage of forest regeneration that mimics some barrens structures. Towhees and cowbirds tend to be abundant, while other typical

barrens birds are common (Table 2). Species that are generally more common here than in true barrens include Eastern Kingbird (attracted to snags), Northern House Wren (abundant among slash), Song Sparrow (often near dead standing and fallen wood), and Alder Flycatcher, Chestnut-sided Warbler, American Redstart, and perhaps Black-and-White Warbler (which occur among the thick shrub and sapling growth of such sites). Although not recorded on counts reported in Table 2, other species typical of cutovers on more mesic sites (Hoffman 1989) may also occur (e.g., Golden-winged Warbler and Mourning Warbler).

Most prairie birds—except perhaps Vesper Sparrow—are precluded from cutovers by the rapid resprouting and seeding in of hardwoods and shrubs, along with the usual cover of slash. Unless substantial numbers of pines or aspens are left standing, Nashville Warblers are absent. Those northern species noted above that seem to associate with relatively intact landscapes tend to be missing. If mature pines are left as scattered "standards" or in small groves, some of these species may occur, along with Pine Warbler.

Logging can provide a valuable means of supplementing populations of barrens breeding-birds, and is often the first step in recreating barrens. Several specific practices may help. Leaving mature standards and scattered groves can mimic a natural structure that is rare in today's managed forests and barrens. Setting back post-logging succession by fire will prolong habitat suitability for many barrens birds. Perhaps most important is considering the landscape context of forestry in barrens regions—in this case to maximize the extent of continuous, open tracts, rather than distributing openings in a patchwork pattern among forest. The WDNR is doing this already in its management of Bayfield County Forest land. Here, large, 400m-wide firebreaks are maintained in an open barrens stage by controlled burning; and to further maximize the extent of contiguous habitat for area-sensitive barrens plant and animal species, short-rotation forestry is concentrated at the borders of these breaks, thus assuring a continual addition of temporary barrens-like clearcuts to the edges of the more permanent open habitat.

Conifer plantations, although sometimes nearly useless to breeding birds, can provide suitable habitat for many barrens birds until trees attain a height of about 2.5m or until their cover reaches about 75%, especially so in those areas of the state where barrens naturally dominated prior to this century, and where plantations are large or adjacent to other suitable habitat (Hoffman and Mossman 1990). Table 2 summarizes bird count data from 15 Christmas tree and forestry plantations. The most common species are Chipping, Clay-colored, and Field Sparrows, and to a lesser extent Vesper Sparrow, cowbird and goldfinch—all typical barrens birds. As might be expected, species such as towhee and yellowthroat that prefer hardwood shrubs are less common here than in most barrens, and their abundance in plantations varies according to the extent of volunteer shrub cover. Species such as woodpeckers, pewee, and nuthatches that require snags or conifers of tree size, are also uncommon or absent. Nashville Warblers may appear when planted conifers are about 4m

tall, especially when more suitable habitat is nearby. Clay-colored Sparrows, which are abundant in hardwood shrubs and oak grubs of barrens and brush prairies, are here abundant in planted conifers, regardless of the presence or absence of hardwoods.

One surprise in our plantation surveys was the Palm Warbler. We found a lone, singing male and an agitated pair that evidently had a nest or fledglings nearby, in a pine plantation situated between jack pine woods and a Bayfield County Forest firebreak barrens. This boreal species is otherwise restricted in Wisconsin to muskeg-like spruce swamps, but here it was apparently breeding among 2–4m tall red pines (55% cover), and a total hardwood cover of about 20%, most of which was less than 1m tall, but with some taller shrubs, saplings, and small trees of aspen and oak. This sort of habitat is apparently not unusual farther north, nearer the center of its range, where it breeds in "bogs or barrens or similar situations on either dry or wet ground where trees are scattered and where there is ground shrubbery" (Godfrey 1986).

The suitability of young conifer plantations to barrens breeding-birds is one consideration in evaluating the advisability of creating and maintaining these artificial communities. There are other factors as well: without structural variety resulting from open, treeless patches, hardwood heath and shrubs, and various-sized trees, the plantation bird community comprises typically very few species; the use of pesticides to control plant competition and insect pests may have deleterious effects on birds and other native biota; depending on site and landscape characteristics, the particular species planted, and management, maturing conifer plantations may develop a very depauperate avifauna, which may far outlast the "barrens" stage (Hoffman and Mossman 1990); alternative uses of cutover forest or abandoned agricultural land may have different or greater advantages to Wisconsin wildlife.

Many barrens bird species are faring well in Wisconsin, in part because they tend to inhabit a wide range of habitats. However, the U.S. Fish and Wildlife Service's Breeding Bird Survey (S. Droege, in litt.) shows that several species have suffered highly significant population declines statewide during 1966–1989: Rufous-sided Towhee, Field Sparrow, Vesper Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark and Western Meadowlark, and Brown-headed Cowbird.

Three of the species that are especially characteristic of oak and pine barrens, and which do not occur as commonly in any other native Wisconsin community, are the Sharp-tailed Grouse, Clay-colored Sparrow, and Brewer's Blackbird. The ranges of all three extend primarily northwest from Wisconsin.

The Sharp-tailed Grouse is a bird of open, partly shrubby habitats with some trees. At the time of settlement, it was common throughout the prairie, savanna, and probably barrens areas of the state. With further settlement, it declined while Greater Prairie-Chickens temporarily increased, and Kumlien and Hollister (1903) predicted its "speedy extinction" in Wisconsin. However, populations were maintained, and in some areas certainly increased, in northern and central Wisconsin on barrens maintained by frost and fire, in cutovers (especially

where burned), bogs, and abandoned or low-intensity agricultural lands. These habitats shrunk further as abandoned farms succeeded to forest, active farms became freer of "waste" brushland and weeds, wildfires were better controlled, and commercial and public agency foresters planted openings to conifers. By 1950 it was clear that public agencies must commit to a program of controlled burning if the species was to survive in the state (Grange 1948, Hammerstrom et al. 1952). With the help of hunters dollars through federal Pittman-Robertson funds, such a commitment was made in several Wisconsin barrens areas, where habitat was most easily managed. Yet as unmanaged habitat continued to dwindle, the few remaining sharptail barrens became increasingly isolated, and today it is debateable whether these few remaining barrens are large enough to prevent the species' extirpation in the state, especially with the added pressure of hunting (Temple 1989). In response to this problem, WDNR is considering a major expansion of the Namekagon and possibly Solon Springs barrens, to a minimum of 10,000 acres. The large tract size necessary for sharptails is due in part to their communal nature—forming flocks in winter and mating at social display grounds, or "leks," in spring. Habitat is generally considered ideal when it includes a mixture of open grassy sites for displaying and summer feeding, brush prairie for year-round use, and some patches of open or young woods for winter cover and food. Most managed sharptail habitat is in brush prairie successional stages.

The Clay-colored Sparrow is most abundant in Canada's prairie provinces, especially among aspen parklands (Robbins et al. 1986). It is fairly common in the northern two-thirds of Wisconsin, where it breeds in shrubby meadows, oldfields, and hedgerows, as well as in the habitats described above. Early in the breeding season, nests are usually built in residual grassy cover at the bases of shrubs or saplings, and in the summer they are placed more often in the lower branches of a shrub or small conifer. In the presettlement landscape this species probably occurred in many types of shrubby sites, including barrens, unburned meadows, prairies, savannas, and burned-over forest. It apparently disappeared from southern parts of its range as the Midwestern prairies were replaced by cropland (Root, *in* Bent 1968), and its range later expanded eastward as far as New York, possibly as a result of the opening of the Great Lakes forests (DeVos 1964). Its breeding populations have remained fairly stable in recent decades, both continentwide (Robbins et al. 1986) and in Wisconsin (S. Droege, in litt.).

In southern Wisconsin and elsewhere near the current southern and eastern limit of its breeding range, the Clay-colored Sparrow tends to breed in conifer plantations (e.g., Kelley 1978, Bull 1985, Bohlen 1989). In our state it is nowhere as abundant as on the brush prairies of northwestern and central Wisconsin, including those in the late successional stages of Greater Prairie-Chicken management lands on the former Buena Vista Marsh, Portage County. Overall, it seems to reach its highest densities in dry habitats with a simple structure consisting of either conifers or shrubby hardwoods that are of a rather uniform height, between 0.7 and 2m. They are typically

absent from pine-dominated barrens (Table 2), which tend to have a complex structure, with variously-sized conifers and hardwoods; yet they are invariably found in nearby plantations.

Brewer's Blackbird breeds most abundantly in the western states, where it is widespread in many natural and artificial habitats. Its presettlement status in Wisconsin is unknown. Because there is so little information available on northern Wisconsin birdlife in the succeeding decades of the late 1800s, we can only extrapolate from information in eastern Minnesota (Roberts 1932) and southern Wisconsin (Kumlien and Hollister 1903), and guess that it was probably uncommon and widely scattered. By 1919 it was apparently uncommon or rare in northwestern Wisconsin, for Jackson (1943) did not mention it. However the subsequent range expansion of this species from western Minnesota to eastern Michigan during the period 1914–1960 has been well documented (e.g., Walkinshaw and Zimmerman 1961) and has been called "one of the most remarkable range extensions known within recent history" (DeVos 1964). In Wisconsin, Brewer's Blackbirds began appearing in numbers in 1926; and they were common near Hayward in 1928 and were breeding in several places in southeastern, central, and northwestern Wisconsin during 1926–1931 (Schorger 1934). The species has since disappeared from most of the southeast, but it breeds sparingly in Columbia, Marquette, and Dodge counties, and more commonly to the north and northwest.

As elsewhere (Williams, *in* Bent 1958), it nests here in loose colonies and may fly far to collect food for its young. In central and northern Wisconsin it sometimes breeds in agricultural habitats such as pastures, grass hay, or abandoned fields, although individuals may feed in other nearby habitats such as cultivated fields. However, in more natural settings Brewer's Blackbirds are clearly most regular and abundant in sedge meadows, conifer swamps, and especially barrens, which have recently burned, and particularly where there are dead, standing or fallen trees or saplings. For example, in the successional series of brush prairies summarized in Table 3, Brewer's Blackbirds occurred in 5 of 6 tracts that had burned in the same or previous year that the count was made, and it was sometimes the most abundant species. It was recorded in only 2 of the 6 tracts not recently burned, in low numbers. This species seems most likely to return to a site for several years after a burn, when dead wood remains.

Interestingly, Schorger (1934) noted an even stronger association between this species and recently burned habitats, during the early years of the range expansion in Wisconsin. Yet, neither we nor Schorger knew of similar reports outside Wisconsin. In Michigan, for example, the species was reported as typically breeding in muck farms near ponds in the south, and in bogs and meadows in the north (Walkinshaw and Zimmerman 1961).

It is also noteworthy that whereas Brewer's Blackbirds nest mostly in shrubs and trees from central Minnesota westward, in the more recently invaded breeding areas of the Great Lakes they nest almost invariably on the ground (Roberts 1932, Walkinshaw and Zimmerman 1961). We have found 4 nests in Wisconsin, all of them on the ground. One was in an open

pasture. The others were in barrens, associated with dead wood: at the base of a weathered wooden post, beneath the limbs of a fallen hardwood tree, and near from a rotten, fallen, burned jack pine.

Wisconsin barrens also provide habitat for several notable bird species not included in Table 2. For example, we saw a Burrowing Owl at the Namekagon Barrens on 26 May 1990 (*Passenger Pigeon* 52:401, 1990), and a female Prairie Warbler at the Solon Springs Sharptail Barrens on 23 May 1989. Both were outside their normal breeding ranges, but occurred in suitable nesting habitat. Pat Savage (*Passenger Pigeon* 52:200, 1990) found a Black-shouldered Kite at the Namekagon Barrens in September 1989. Barrens are among the most likely places to encounter Golden Eagles in the winter. Kettle depressions in barrens often hold ponds or marshes. Although we omitted birds of these wetlands in Table 2, they can be an important part of the barrens breeding-bird fauna, especially in the northwest. At a pond on the Solon Springs Barrens, observers have recorded Pied-billed Grebe, a Ring-necked Duck pair, Soras, Killdeer, Spotted Sandpipers, and Sedge Wrens, along with common edge-loving species such as Red-winged Blackbirds and Song Sparrows at its border. At a pond rimmed with emergents on the north unit of the Namekagon Barrens, we found a Common Loon, Great Blue Heron, Mallard, Green-winged Teal, 2 Lesser Scaup, 2 Spotted Sandpipers, 4 Killdeer, and 2 Yellow-headed Blackbirds.

In summary, Wisconsin's oak and pine barrens evolved in a dynamic landscape governed largely by the forces of succession, fire, and frost. Variety on this landscape was imparted by the variable influences of climate, topography, soils, moisture regimes, and fire barriers. Despite the neglect and abuse that most barrens have undergone since settlement, this is one of our most resilient natural communities, and it will respond to careful management by controlled burns and cutting. Moreover, its economic land value is generally low, and comparatively little has been permanently converted to other uses. Perhaps for no other native community are the opportunities for large-scale restoration so great.

Yet restoration and the necessary, continual management demand not only longterm commitment and effort, but also appropriate goals. Wisconsin currently stands at a crossroads in setting goals that will guide the future of the barrens ecosystem. Proposed objectives range from wood pulp production, to species-oriented management for Sharp-tailed Grouse, grassland songbirds, white-tailed deer, upland-nesting waterfowl, reintroduced elk, and endangered plants and butterflies, to community restoration. Hopefully our future course of research and management will provide for all elements of the native barrens ecosystem: the full complement of plants and animals, physiognomic structures, and ecological interactions that to the best of our knowledge belong here.

To ensure the variety and patch sizes of various structural types adequate to support longterm, viable populations of the many constituent species of barrens ecosystems, restoration will undoubtedly have to occur on tracts several thousand acres in extent. Native northern dry and dry-mesic forest,

dominated by pine and oak, are also ultimately dependent on fire, and should be considered as part of this managed landscape (Hoffman and Mossman 1990). Appropriate commercial logging and planting could be incorporated as well—as at the Bayfield firebreaks—to enhance the viability of these ecosystems.

Several sites are especially appropriate for this type of large-scale management in the state. Large barrens complexes are already managed at most of these. Foremost are the Namekagon and Solon Springs barrens, which should be expanded and joined to create a single tract of at least 15,000 acres. WDNR, and Douglas and Burnett counties are currently pursuing this.

Another important area is the Spread Eagle complex in Florence County, the 3 major units of which could be linked into 5,000 acres or more of barrens. This is perhaps the only opportunity to restore a large barrens of the bracken-grassland type, at least the flora of which is distinct from that of the more western and southern barrens. The Moquah Barrens (Bayfield County) has the potential of attaining several thousands acres of quality barrens, but integrated management of the surrounding landscape is sorely needed.

Barrens at Crex Meadows (Burnett County) and Necedah National Wildlife Refuge (Juneau County) are interrupted by managed impoundments, and would be enhanced by expansion into adjacent, mostly forested land. The Necedah refuge offers one of the very few chances for large-scale restoration in the central Wisconsin region.

A few smaller barrens are also worth restoring or maintaining, especially in the central and northcentral regions, where few if any opportunities exist to accomplish this on a larger scale; or where important species populations can be protected. Examples include those at Dunbar (Marinette County), Johnson Lake (Oneida County), Fort McCoy (Monroe County), and Van Zelst (Sauk County). All of these would benefit from expansion. Another central region site, which has received very little attention, is the jack pine barrens and forest located on sterile sands of the popular Mirror Lake State Park (Sauk County), near Wisconsin Dells. It would be a worthy educational site as well. Several of our surveys were done there. Juneau County's Buckhorn State Park has similar potential.

The barrens of the lower Wisconsin and Chippewa Rivers are not capable of being managed on a large scale: they are too fragmented naturally and by surrounding land uses. Yet tracts varying in size from approximately 40–400 acres are possible. They should be considered an integral component of these river ecosystems in management plans.

Description of Sites

The following 4 sites are among the best remaining examples of relatively large, intact pine barrens. All are represented in the "Diverse" category of Table 2. There are two sites each in northwestern and northeastern Wisconsin. A large proportion of the barrens avifauna can be expected at any site.

Solon Springs Sharptail Barrens State Natural Area

Size—240 acres of natural area lying within a 3000-acre barrens.

Location.—South-central Douglas County, within the Douglas County Wildlife Area.

Access.—From Solon Springs go south on Highway 53 for 3 miles, then west on Mead Church Road 0.5 mile to the southeast corner of the natural area.

Site Description.—This site presents a microcosm of the presettlement landscape of northwestern Wisconsin, where pine barrens were a mixture of very open areas, areas with scattered trees, and areas that had clumps of trees and shrubs. Part of an extinct glacial lake bed, it now has rolling topography with melanized sandy podzol soil and a pothole pond. The dominant trees are jack pine and aspen. Other species include Hill's oak, red pine, and choke cherry (*Prunus virginiana*). Common shrubs are hazel, blueberry, sweet fern, dewberry, dwarf willow, and redroot. The ground layer is represented by such species as little bluestem, wild rose, bearberry, asters, *Solidago* sp., puccoon (*Lithospermum* spp.), sage (*Artemisia* spp.) and Canada mayflower (*Maianthemum canadense*). The barrens community persisted here, in part due to its former use as a pointing-dog training and trial area by the Northern States Field Trial Association. It continues to be managed by fire to closely resemble the pre-settlement condition.

Birds.—The bird list here is influenced by the general aspect of large openings interspersed with scattered trees and clumps of jack pine or aspen, along with the presence of a pothole pond. The relatively open areas support birds such as Upland Sandpiper, Clay-colored Sparrow, Vesper Sparrow, and Brewer's Blackbird. Many other species are more closely associated with woodlands and edges: Black-billed Cuckoo, Eastern Wood-Pewee, Least Flycatcher, Veery, Hermit Thrush, Red-eyed Vireo, Chestnut-sided Warbler, Scarlet Tanager, Rose-breasted Grosbeak, Northern Oriole, and Pine Siskin. A comparison of those species found here and those found on the more open Namekagon Barrens is instructive.

Two very intriguing species have been found here in low numbers but with surprising regularity: the Connecticut Warbler, found in jack pine groves with dense understory, and the Tennessee Warbler, found in both aspens and pines. Data in Table 4 are an average from counts conducted by Jack Hailman (1973), Sam Robbins (1971–72, 1974–76), Mossman (1980), and Sumner Matteson (1988).

Namekagon Barrens

Size.—About 5500 acres, in three units.

Location.—Northern Burnett County.

Access.—From Wascott in southern Douglas County, proceed west on County Highway T for about 13 miles, then south on Town Road 2 miles to the northeast corner of the expansive barrens. Follow any of several gravel or dirt roads south and west to explore the barrens.

Site Description.—This is the main part of the Namekagon Wildlife Area. A primary objective of the barrens

Table 4. Average number of birds encountered on four barrens natural areas.

Species[1]	Average number[2] encountered at: Solon Springs	Namekagon	Aurora	Dunbar diverse[3]	Dunbar open[4]
Common Loon*		1			
Pied-Billed Grebe*	+				
Great Blue Heron*		1			
Green-winged Teal*		1			
Mallard*		3			
Ring-necked Duck*	+				
Lesser Scaup*		2			
Northern Harrier	+	2	1		
Red-tailed Hawk	+	2	1	+	
American Kestrel	+		1	+	
Ruffed Grouse		1			
Sharp-tailed Grouse	+	1			
Bobwhite	+				
Killdeer	1	6	4	+	
Spotted Sandpiper*		2			
Upland Sandpiper	1	16	3	2	5
Mourning Dove	3	3	1	+	+
Black-billed Cuckoo	2	1		+	
Common Nighthawk	+				2
Chimney Swift	+				
Downy Woodpecker		1		+	
Hairy Woodpecker				+	
Nothern Flicker	1	5	2	1	1
Eastern Wood-Pewee	1	2		4	
Alder Flycatcher	+	1			
Least Flycatcher	+	4		2	
Great Crested Flycatcher	+	1	1	2	
Eastern Kingbird	3	22	4	4	2
Tree Swallow	3	18	1	1	13
Barn Swallow	+	1			
Blue Jay	3	3	4	3	
Northern Raven	+	4	3	+	
American Crow	3	8	4	3	+
White-breasted Nuthatch					+
House Wren	1	15		1	+
Winter Wren				+	
Eastern Bluebird	2	21	3	2	7
Veery	+	3		2	
Hermit Thrush	+	1		1	+
Wood Thrush		4		1	
American Robin	1	12	3	4	+
Gray Catbird	+	18		1	
Brown Thrasher	4	22	4	4	1
Cedar Waxwing	1	6	2	8	1
Starling	+	1			
Yellow-throated Vireo				+	
Warbling Vireo	2	4			
Red-eyed Vireo	1	4		3	+
Golden-winged Warbler		1	1	+	
Tennessee Warbler	+				
Nashville Warbler		4	1	+	
Yellow Warbler	3	31			
Chestnut-sided Warbler		7	4	1	3

(*continued*)

Table 4. (*Continued*)

Species[1]	Average number[2] encountered at: Solon Springs	Namekagon	Aurora	Dunbar diverse[3]	Dunbar open[4]
Black-and-White Warbler					+
American Redstart				1	
Ovenbird				5	
Connecticut Warbler	+				
Mourning Warbler				+	
Common Yellowthroat	13	33		+	
Scarlet Tanager	+			2	
Rose-breasted Grosbeak		2	1	1	4
Indigo Bunting	1	5	1	3	2
Dickcissel		1			
Rufous-sided Towhee	7	55	4	6	+
Chipping Sparrow	1	2		3	3
Clay-colored Sparrow	23	243	21	4	21
Field Sparrow	5	26	4	7	10
Vesper Sparrow	4	44	2	1	10
Grasshopper Sparrow	+	1			
Henslow's Sparrow			+		
Savannah Sparrow		4			
Song Sparrow	10	15	10		2
White-throated Sparrow					+
Dark-eyed Junco			1	+	
Bobolink	+				
Red-winged Blackbird*		4	2		+
Western Meadowlark		2		+	
Yellow-headed Blackbird*	2	1			
Brewer's Blackbird	3	53	5		
Common Grackle	+			+	
Brown-headed Cowbird	2	18	1	4	2
Northern Oriole	2	1		1	
Purple Finch				1	
Red Crossbill	+				
Pine Siskin	1				
American Goldfinch	2	28	5	1	1
Evening Grosbeak	+			+	

[1]*Species recorded (at least primarily) on or adjacent to a pond.
[2]+ Species present, but $\bar{x} < 0.5$ individuals per survey.
[3]Surveys conducted prior to intensive management.
[4]Surveys conducted after intensive management and erection of nest boxes.

management has been to provide habitat for Sharp-tailed Grouse. Through the use of timber sales and prescribed burns, the former forest of jack pine and oak here was converted to a barrens dominated by brush prairie. The shrub layer consists of oak grubs, hazelnut, redroot, sweet fern, and blueberries. The ground layer is dominated by sand prairie species including little bluestem, panic grasses (*Panicum* spp.), thimbleweed (*Anemone cylindrica*), puccoon, goldenrods, asters, blazing star, and sunflowers. This area does not precisely resemble the presettlement landscape. Jack pine was an important component of the presettlement landscape of this region according to the land surveyors' notes, but it is rare on this barrens today.

Birds.—The Namekagon Barrens is now proposed as a 10,000-acre managed area, to provide enough area to sustain a viable population of Sharp-tailed Grouse. This management will expand the openness of the area. Benefits should also be reaped by other species requiring large tracts and those that utilize the open end of the pine barrens continuum (Table 2). A comparison of Solon Springs and Namekagon Barrens birds indicate bird responses to different barrens structures. A total of 9 hours was spent on 3 counts, all on separate sections of the north and south units, by Epstein and Mossman in 1989. Table 4 gives a total of these counts. In an area of oak grubs burned just a few weeks prior to the surveys, Clay-colored Sparrows, Brewer's Blackbirds, and Rufous-sided Towhees were common. A small, unburned, wooded draw contained Black-billed Cuckoo, Least Flycatchers, Robins, Veery, Hermit Thrush, Red-eyed Vireo, Indigo Bunting, American Goldfinches, and a few other species.

Aurora Barrens

Size.—900 acres. One of 3 units of the Spread Eagle complex, which encompasses nearly 3500 acres of barrens.

Location.—Eastern Florence County.

Access.—From Florence, go south on County Highway N about 7 miles, then east on Roach Fire Lane (also known as the Plains Road) for 2 miles to the western edge of the barrens. This road bisects the barrens.

Description.—Aurora is the most open of the Spread Eagle barrens. It includes rolling glacial till with swales and low spots that are kept free of woody vegetation by growing-season frosts. The higher areas were originally covered with jack and red pines, but are now vegetated with shrubs. It is now surrounded by forest of aspen, oak, and jack pine. Occasional burns have occurred in the past; however, the barrens have been maintained in some parts without burning. This is a representative of bracken-grassland barrens, and bracken fern is the dominant species in several places.

Birds.—Aurora Barrens provides excellent habitat for barrens species requiring open areas. Observers should easily find Northern Harrier, Killdeer, Upland Sandpiper, Eastern Kingbird, Tree Swallow, Brown Thrasher, Eastern Bluebird, Rufous-sided Towhee, Clay-colored Sparrow, Song Sparrow, Brewer's Blackbird, and American Goldfinch.

Table 4 gives an average from 3 counts, conducted by Epstein and Mossman (1986) and Steve and Laura LaValley (1990).

Dunbar Barrens State Natural Area

Size.—A 240-acre natural area within a 1000-acre barrens.

Location.—Northern Marinette County.

Access.—From the intersection of Hwys 8 and U about 1 mile west of Dunbar, go west on Hwy 8 for 2.1 miles, to an unimproved but good ac-

cess road that leads north about 1 mile to the barrens.

Description.—The pine barrens is a portion of a large opening located on a pitted outwash plain. Aspen, oak, and jack pine form the forest on the surrounding, gently rolling topography. The dominant herbaceous vegetation on the barrens consists of strongly rhizomatous grasses and sedges. A well-developed shrub layer is present. The general aspect is that of a prairie with broad sweeping vistas and a distinctive panorama. The action of frost in low pockets contributes to the openness. Common plants include rice grass (*Oryzopsis* sp.), poverty oat grass (*Danthonia spicata*), bearberry, blueberries, sweet fern, barrens strawberry (*Waldsteinia fragarioides*), and hawkweeds (*Hieracium* spp.). There is a diverse and unusual lichen flora.

Birds.—The birdlife at Dunbar Barrens is today quite similar to other heavily managed barrens. Breeding-bird surveys conducted during 1976–85 recorded many forest and edge species. Subsequent management has opened the area more by eliminating or reducing the size of wooded patches or groves. Consequently, species such as forest flycatchers and thrushes, Ovenbird, Red-eyed Vireo, tanager, and Blue Jay have been replaced by more open-country birds such as Upland Sandpiper, Common Nighthawk, Vesper Sparrow, and Clay-colored Sparrow. By comparing surveys from 1976–85 with those of 1988–90, resultant changes in the avifauna are apparent (Table 4). The numbers of Tree Swallows and Eastern Bluebirds has been greatly enhanced by the erection of many nest boxes. Table 4 gives average values for counts conducted by Mr. and Mrs. Elmer Mathis (1975–76, 1978–80, 1982), Mossman (1985), Epstein (1988), and Nancy Meyer (1989–90).

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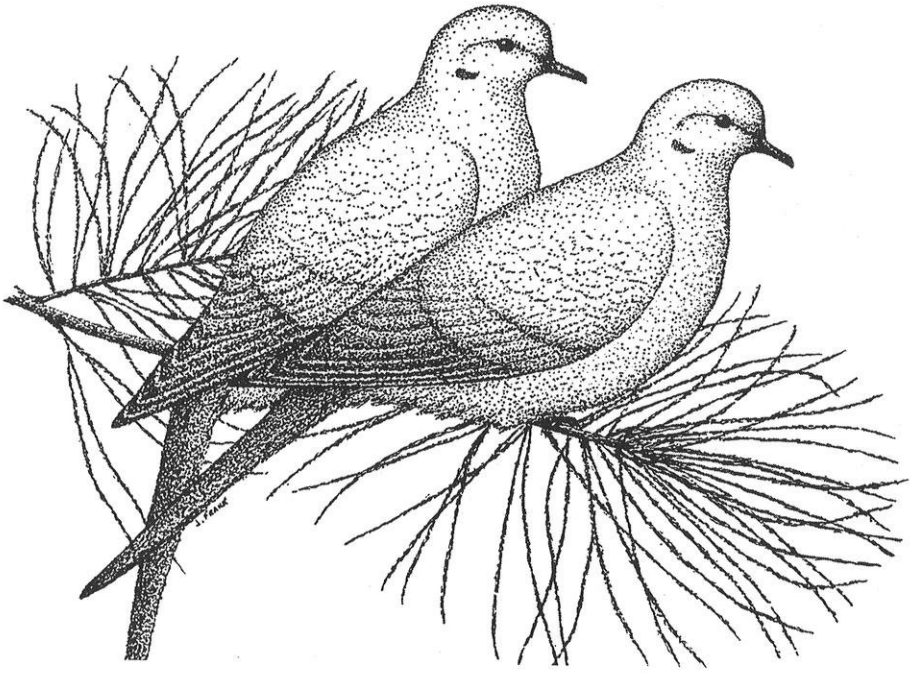

Mourning Doves *by James C. Frank.*

Your Backyard as a Barometer of Bird Populations

by Scott R. Craven

Backyard birders are clearly concerned about the birds in their yards. But does the presence or absence or numbers of a given species in a particular yard tell us anything about the status of that bird's population? Probably not, but this does not mean that backyard birders don't draw conclusions about the status of various bird species from what they observe in their yard or neighborhood. It is possible to investigate the accuracy of conclusions reached by backyard birders by comparing them with actual population trend data derived from the North American Breeding Bird Survey (BBS).

The BBS is run each year throughout the continental United States and most of Canada. It is a roadside survey conducted by about 2000 amateur ornithologists under the direction of the U.S. Fish and Wildlife Service and the Canadian Wildlife Service. The routes are standardized, as are the procedures for counting birds seen or heard. Data have been collected since 1966. The most recent summary of the BBS data includes the period 1966–90; I have summarized these data for selected backyard birds in Table 1.

I receive many calls and letters from people in Wisconsin who are concerned about their local birds. Several questions often arise from observations around the home. One of the most frequent is "What happened to all the. . . ?" closely followed by "Why are there so many. . . ?" In seeking an explanation for the temporary loss of a given species or assemblage of birds, such as winter feeder visitors, people often conjure up explanations based on environmental disasters (the "Silent Spring" scenario), and the assumption is that the changes in the species are widespread. In reality, there are many possible explanations for a local change in the abundance of birds. The observed decline or increase may be real but temporary. Local bird populations do fluctuate from year to year in response to changes in habitat, food supply, and weather conditions, but they tend to fluctuate around a long-term average. When an upward or downward trend is established over a long period of time, the cause is frequently a response to habitat. As a

Table 1. Population trends of common backyard birds as revealed by the North American Breeding Bird Surveys and by local perceptions.

Species	Perceived trend in Wisconsin[1]	BBS national trend	BBS Wisconsin trend
House Finch	increase	decrease	no data
American Goldfinch	no change	decrease	decrease
House Sparrow	increase	decrease	stable
Northern Oriole	decrease	stable	stable
Common Grackle	increase	decrease	increase
Song Sparrow	no change	decrease	decrease
Chipping Sparrow	no change	stable	stable
Northern Cardinal	increase	stable	increase
European Starling	increase	decrease	decrease
Cedar Waxwing	no change	increase	stable
American Robin	decrease	increase	increase
Eastern Bluebird	increase	stable	increase
House Wren	increase	increase	stable
White-breasted Nuthatch	no change	increase	stable
Black-capped Chickadee	no change	increase	increase
American Crow	increase	stable	increase
Blue Jay	no change	decrease	stable
Tree Swallow	no change	increase	increase
Purple Martin	decrease	stable	decrease
Eastern Phoebe	no change	stable	stable
Northern Flicker	no change	decrease	decrease
Downy Woodpecker	no change	stable	stable
Ruby-throated Hummingbird	no change	stable	stable
Whip-poor-will	decrease	stable	stable
Rock Dove	increase	increase	increase
American Kestrel	no change	stable	increase
Mallard	increase	stable	stable
Canada Goose	increase	increase	increase

[1]Perception is a subjective appraisal of population trends based on phone calls/contacts with my office concerned about bird populations.

back yard matures, for example, some bird species move out of the area and are replaced by others. In suburban neighborhoods, the maturation of trees in a formerly open environment is likely to cause an influx of resident American Crows and attendant problems. The local perception is that of a huge increase in the crow population. However, as noted in Table 1, long-term trends suggest that crows have been stable nationwide and increased only slightly in Wisconsin from 1967–1989.

A similar trend occurs as evergreens mature in a neighborhood. The result is often a dramatic local increase in Common Grackles. These birds are noisy, very messy, and from early April until their young are fledged around the first of June, they monopolize feeders and harass pets. The perception then is logically that of a population explosion of pesty grackles that demands immediate and drastic action! However, the BBS data suggest a significant decline in nationwide grackle populations, and only a slight upward trend in Wisconsin. The homeowners' observations are perfectly valid; there are more grackles in their backyards, but it does not mean the regional or national population is exploding.

During winter months the absence of traditional feeder birds around a given feeder is not usually indicative of population declines. The fluctuations in numbers from year-to-year or month-to-month are often weather dependant. A relatively mild, open winter "up north" will not send redpolls, crossbills, siskins, grosbeaks, northern finches and others south to visit feeders in southern Wisconsin. Under open, mild winter conditions, even local resident birds may not be as responsive to feeders. In other cases, species such as Evening Grosbeaks are simply unpredictable. They tend to wander in nomadic flocks and may be "here today and gone tomorrow." There is also the possibility of a more local explanation; perhaps a neighbor has a competing feeder that has attracted some of "your" birds.

A recent caller related serious concern over the disappearance of Whip-poor-wills around a northern Wisconsin lake. The caller related how the large numbers of Whip-poor-wills observed in the 1920's around the wooded, unsettled lake had disappeared. Today there are almost none of the birds; the lake became heavily developed and much of the forest gave way to other land uses. The long-term observation was correct, but it was clearly related to local habitat change, not a widespread population decline of Whip-poor-wills. BBS results suggest Whip-poor-will populations in Wisconsin and nationwide are stable.

Common pest species, such as European Starlings and House Sparrows may give the impression of ever increasing populations because of their noxious habits. In fact the long-term nationwide trends for European Starlings and House Sparrows are significantly downward (Table 1). On a national scale, House Finch populations also show a slight decline. In Wisconsin, however, the House Finch is expanding rapidly in both range and numbers. Backyard observations are certainly consistent with this trend. The decline in House Sparrows and increase in House Finches may be related. In my backyard House Sparrows were very common until House Finches arrived 2 years ago. The House Sparrows have now virtually disappeared. Many backyard birders are concerned about Purple Martins because of their popularity and the number of martin houses on the landscape. Callers frequently lament empty martin houses and the general lack of martins. Although the BBS data suggest slight declines in Wisconsin, the long-term national trend suggests stable or perhaps slightly increasing martin populations. Consider the number of martin houses available for the birds to choose from in many neighborhoods. There are simply not enough martins to go around! Those houses that are placed in poor sites, are in disrepair, or are heavily used by sparrows or starlings will not likely be used by martins.

Backyard birders are frequently misled by observations of predation. These usually involve predation on songbird nestlings by crows or domestic cats. The perception is that crows and cats are causing drastic reductions in songbird populations and something has to be done. It's certainly true that both crows and cats kill nestling birds. There may even be local population reductions as a result. However, BBS data for most common backyard nesters, such as American Robins, reveal stable or increasing populations.

Remember that most species, robins included, produce far more young each nesting season than are needed to replace the adult pair.

The BBS data (Table 1) suggest some interesting trends to compare with your own observations. Note the increase in Canada Geese, Rock Doves (pigeons), Black-capped Chickadees, and Eastern Bluebirds and the declines in American Goldfinches, Song Sparrows, and Northern Flickers.

It should be clear that backyard observations may, indeed, reflect real population trends, but they are just as likely to be misleading. Consider alternatives to population change as the explanations for ups and downs in bird numbers in your backyard. However, don't dismiss any observation as insignificant. Some important environmental problems have been detected through the use of birds as a barometer.

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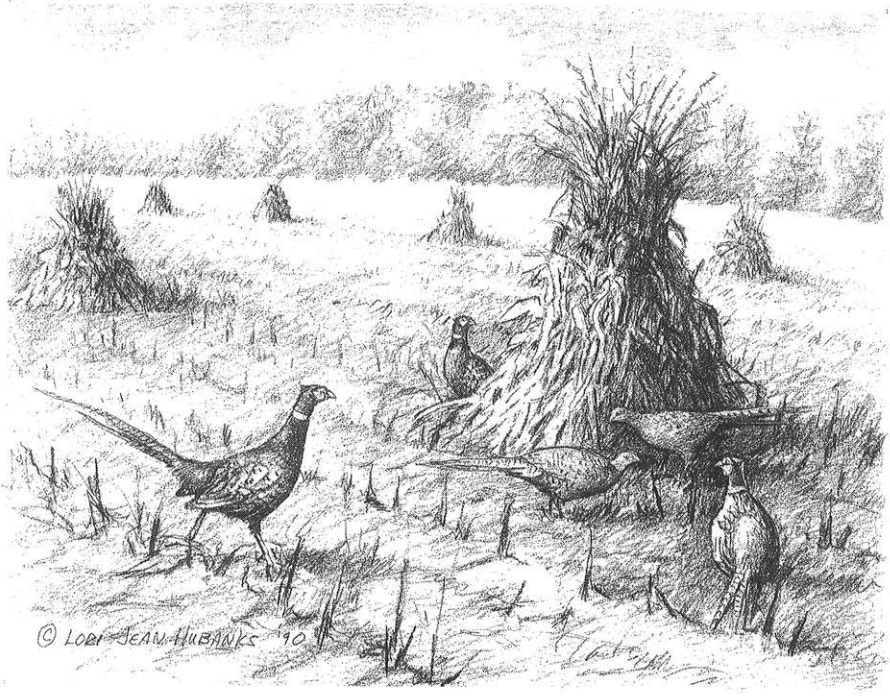

Ring-necked Pheasants *by Lori Jean Hubanks, 2217 West Hart Road, Beloit, WI 53511.*

The Fall Season: 1990

by Mark S. Peterson

The fall of 1990 will probably not be remembered for being moist and without any really noticeable waves of migrants. There was ample rainfall during most of the fall, but most observers did not mention anything more than minor waves of migrants from mid-August to early October.

The fall season of 1990 will be remembered by many state birders for some of the rarities that found their way to the state, and then, unlike so many other times, remained long enough for many others to see them. Wisconsin's first state record of an Anna's Hummingbird somehow found its way to a feeder near Wales in Waukesha County in late August, but was not positively identified until late November. This bird remained for others to see until early December when it was captured during a blizzard and taken to the domes in Milwaukee. A Northern Hawk-Owl in Douglas County, Great Black-backed Gulls along Lake Michigan, and a Purple Sandpiper in Sheboygan made initial appearances in November, but unlike so many others before them, these birds remained for at least several months.

August was a wet month, with the heaviest rains during the middle of the month. Highs of 95° in La Crosse on the 18th and 96° in Cuba City on the 27th were recorded. A low of 33° was reported in Lake Thompson on the 7th.

September, again was a wet month, especially early. A heavy frost was reported in the north on the 17th, with widespread frost in the north on the 23rd. Snow flurries were reported in Superior on the 22nd. A good passerine migration was reported in Dane County on the 8th. Seventeen species of warblers were found in Shawano County on the 3rd, and after a strong cold front passed through on the 14th, 13 species of warblers were found on the 15th. A high of 97° was reported in Cuba City and Mount Mary College in Milwaukee on the 6th, and a low of 28° was reported in Sarona on the 24th.

October was again a moist month, and the coming season made several brief appearances. Snow, with up to 3″ in Jefferson County on the 10th and

up to 4″ in Three Lakes and Superior on the 18th, fell in most locations in the state during the month. The first killing frost occurred in the 2nd week of the month. In several locations, the first measurable snowfall occurred before the first freezing temperatures. A high of 86° occurred on the 5th in Beloit and Cuba City. A low of 17° occurred in Phillips on the 10th and in Black River Falls on the 22nd. A movement of sparrows, wrens, kinglets, and Tennessee Warblers was reported in Portage County on the 5th and 6th.

November was a month of many wide variations in temperature. A high of 75° was reported in Whitnall Park on the 1st. The temperature dropped to 7° in Lake Thompson on the 8th. In La Crosse highs reached 71° on the 14th and 72° on the 21st. Larry Semo reported a low of −1° in Superior on the 29th. Several small snowfalls were reported from the 3rd to the 11th, and up to 7″ of snow was reported in the northwestern part of the state on the 28th. Many of the lakes in the state began freezing over at the end of the month.

Records of all bird sightings in Wisconsin, including those who have never sent their reports to the Wisconsin Society for Ornithology are encouraged. These reports should be sent to Daryl Tessen, the Associate Editor. These reports will be used to determine not only the rarities that were seen during a particular season, but also the population trends of a particular species on a year to year basis.

During the 1990 fall season 68 observers saw a total of 283 species which included the following rarities: Western Grebes in Sheboygan and Winnebago Counties, American White Pelicans in Brown, Douglas, and Polk Counties, Snowy Egrets in Brown County, a Yellow-crowned Night-Heron in Iowa County, Trumpeter Swans in Polk and St. Croix Counties, Greater White-fronted Geese in Columbia and Dane Counties, a Ross' Goose in Columbia County, a Harlequin Duck in Dane County, Golden Eagles in Milwaukee and Ozaukee Counties, a Gyrfalcon in Ozaukee County, a Spruce Grouse in Bayfield County, an American Avocet in Ozaukee County, a Whimbrel in Manitowoc County, Marbled Godwits in Monroe and Sheboygan Counties, Western Sandpipers in Dane and Sheboygan Counties, a Purple Sandpiper in Sheboygan County, Buff-breasted Sandpipers in Dane, Eau Claire, Marathon, and Winnebago Counties, Red-necked Phalaropes in Chippewa, Clark, and Dane Counties, Parasitic Jaegers in Douglas County, Little Gulls in Manitowoc and Milwaukee Counties, Great Black-backed Gulls in Douglas, Manitowoc, and Ozaukee Counties, a Common Mew Gull in Manitowoc County, a Northern Hawk-owl in Douglas County, Great Gray Owls in Douglas and Polk Counties, an Anna's Hummingbird in Waukesha County, Black-backed Woodpeckers in Douglas County, Carolina Wrens in Dane and Milwaukee Counties, a Varied Thrush in Bayfield County, a Loggerhead Shrike in St. Croix County, a Summer Tanager in Waukesha County, and Sharp-tailed Sparrows in Ashland, Manitowoc, and Ozaukee Counties.

Reports (August 1–November 30, 1990)

Red-throated Loon.—Reported by Ashman in Sauk County on November 2, by Peterson in Shawano County on November 8, and by

Verch in Ashland and Bayfield Counties on November 20.

Common Loon.—Found at the beginning of the period south to Monroe, Dane, and Door Counties. The Sheas found 45 on Dane County on November 10. Reported at the end of the period in Dane County by Ashman, Evenson, and Robbins.

Pied-billed Grebe.—Reported at the beginning of the period in scattered areas throughout the state. Robinson found 94 in Burnett County on September 28. Last reported by Evenson in Winnebago County on November 23.

Horned Grebe.—First reported by Johnson in Douglas County on September 16. Verch found 30 in Ashland and Bayfield Counties on October 9. Last reported by Ashman in Dane County on November 22.

Red-necked Grebe.—Reported at the beginning of the period in Winnebago County by Ziebell. Ziebell reported a maximum of 13 in Winnebago County. Last reported by Verch in Ashland and Bayfield Counties on November 1. Also reported during the period in Douglas and St. Croix Counties.

Western Grebe.—4 adults and 5 young were reported on Rush Lake in Winnebago County from the beginning of the period until August 24 by Ziebell. Also reported by Berger in Sheboygan County on September 22.

American White Pelican.—Reported by Mead in Brown County on August 24 and 26, Robinson found 3 in Brown County on August 26, Peterson found 7 in Brown County on August 26, reported by Tessen in Brown County on September 16, Semo found 3 in Douglas County on October 17, and Hudick found 5 in Polk County on November 19.

Double-crested Cormorant.—Reported at the beginning of the period south to Trempealeau, Monroe, and Winnebago Counties. Robinson found 1200 in Brown County on August 26. Found at the end of the period in Ashland, Bayfield, and Manitowoc Counties.

American Bittern.—Reported at the beginning of the period in Ashland, Bayfield, Burnett, Door, Price, and Taylor Counties. Last reported by Thiessen in Columbia County on November 3.

Least Bittern.—Found at the beginning of the period in Shawano and Winnebago Counties. Last reported by Ziebell in Winnebago County on August 15.

Great Blue Heron.—Found throughout the state at the beginning of the period. The Smiths found 20 in St. Croix County on August 26. Reported at the end of the period in Jefferson, Manitowoc, Polk, and Trempealeau Counties.

Great Egret.—Found at the beginning of the period in Burnett, Milwaukee, Monroe, Polk, Trempealeau, and Winnebago Counties. Peterson saw 31 in Shawano County on September 1. Last reported by Hunter in Trempealeau County on November 11.

Snowy Egret.—A maximum of 3 were found in Brown County by Johnson and Semo on August 17, by Mead on August 21, 24, and 26, by Peterson on August 26, and by Tessen on September 16.

Cattle Egret.—First reported by Tessen at the beginning of the period in Brown County. Tessen found 55 in Dodge County on September 8. Last reported by Ziebell in Winnebago County on September 24. Also reported in Monroe County.

Green-backed Heron.—Found throughout the state at the beginning of the period. Belter found 8 in Marathon County on August 11, and Woodmansee found 8 in Milwaukee County on September 10. Last reported by Hunter in Trempealeau County on November 4.

Black-crowned Night-Heron.—Reported at the beginning of the period in Brown, Door, Manitowoc, Milwaukee, Monroe, Shawano, and Winnebago Counties. Ziebell found 14 in Winnebago County on September 11. Last reported by Sontag on November 18 in Manitowoc County.

Yellow-crowned Night-Heron.—Hoffman found an immature in Iowa County on October 30.

Tundra Swan.—First reported by the Mar-

tins in Columbia County on October 10. Hunter fond 500 in Trempealeau County on November 22. Reported at the end of the period in Ashland, Bayfield, Columbia, Door, Jefferson, Trempealeau, and Winnebago Counties.

Mute Swan.—Reported at the beginning of the period in Ashland, Bayfield, Dane, and Portage Counties. Diehl found 24 on Lower Phantom Lake in Waukesha County on September 6. Reported at the end of the period in Ashland, Bayfield, Marinette, Portage, and Shawano Counties.

Trumpeter Swan.—2 adults and 3 young were reported in St. Croix County from the beginning of the period to October 7 by Berner and the Smiths, and 2 adults and 2 young were reported from the beginning of the period to October 19 in Polk County by Hudick.

Greater White-fronted Goose.—Reported by Hoffman in Dane County on October 24, and in Columbia County on November 17 by the Sheas, and on November 22 by the Martins.

Snow Goose.—Reported at the beginning of the period in Burnett County by Hoefler. The Sheas found 234 in Columbia Count on November 18. Reported at the end of the period in Columbia County by Ashman and the Martins.

Ross' Goose.—Reported by Robinson in Columbia County on October 21, and by the Sheas on October 26. See "By the Wayside."

Canada Goose.—Reported throughout the state during the period. A maximum of 585,600 were seen in East Central Wisconsin on November 16. Of these, 199,100 were found in Horicon Marsh.

Wood Duck.—Found throughout the state at the beginning of the period. Ziebell found 200 in Winnebago County on October 6. Reported at the end of the period in Waupaca County by Peterson.

Green-winged Teal.—Reported at the beginning of the period in Ashland, Bayfield, Burnett, and Monroe Counties. Tessen found 240 in Dodge County on October 5. Reported at the end of the period in Dane County by Ashman.

American Black Duck.—Found at the beginning of the period in Ashland, Bayfield, Burnett, Manitowoc, and Marinette Counties. The Martins found 150 in Columbia County on November 10. Found at the end of the period in scattered ares throughout the state.

Mallard.—Found throughout the state during the period. The Martins found 35,000 in Columbia County on November 2.

Northern Pintail.—Reported at the beginning of the period in Burnett and Columbia Counties. Ashman found 150 in Columbia County on October 14. Reported at the end of the period in Columbia County by Ashman and the Martins.

Blue-winged Teal.—Found throughout the state at the beginning of the period. The Smiths found 230 in St. Croix County on September 2. Last reported by the Martins in Columbia County on November 3.

Northern Shoveler.—Reported at the beginning of the period in Dane County by Ashman. Ashman found 35 in Columbia County on October 21. Reported at the end of the period in Dane County by Ashman and Robbins.

Gadwall.—Found at the beginning of the period in Burnett County by Hoefler: Ashman found 50 in Columbia County in October 8, and he found 50 in Dane County on October 20. Reported at the end of the period by Ashman in Dane County.

American Wigeon.—Reported at the beginning of the period in Ashland, Bayfield, and Marinette Counties. Hudick found 350 in Polk County on September 14. Reported at the end of the period in Columbia County by Ashman.

Canvasback.—Found at the beginning of the period in Ashland, Bayfield, and Manitowoc Counties. Ziebell found 70 in Winnebago County on October 25. Last reported by Ashman in Columbia County on November 11.

Redhead.—Reported at the beginning of the period in Ashland, Bayfield, Manitowoc, and Winnebago Counties. Tessen found 125 in Dodge County on September 8. Last reported by Woodmansee in Ozaukee County on November 17.

Ring-necked Duck.—Found at the beginning of the period in Burnett, Douglas, and Monroe Counties. The Smiths found 461 in St. Croix County on October 7. Last reported by Robbins in Dane County on November 26.

Greater Scaup.—Reported at the beginning of the period in Door County by the Lukes. Woodmansee found 3000 in Milwaukee County on October 25. Reported at the end of the period in Door, Manitowoc, Milwaukee, and Sheboygan Counties.

Lesser Scaup.—Found at the beginning of the period in Columbia County by Ashman. Verch found 932 in Ashland and Bayfield Counties on October 23. Found at the end of the period in Ashland, Bayfield, Manitowoc, Portage, Sawyer, and Winnebago Counties.

Harlequin Duck.—Reported in Dane County on November 12 by Ashman and on November 14 by the Sheas.

Oldsquaw.—First reported by Cowart in Ozaukee County on October 21. Woodmansee found 29 in Milwaukee County on November 1. Last reported by Frank in Ozaukee County on November 11.

Black Scoter.—First reported by Tessen in Douglas County on September 29. Hoffman found 19 in Ozaukee County on November 4. Last reported on November 16 in Manitowoc County by Sontag and in Sheboygan County by the Brassers.

Surf Scoter.—First reported by Tessen in Ozaukee County on September 22. Tessen found 33 in Ozaukee County on October 13. Last reported by Verch on November 20 in Ashland and Bayfield Counties.

White-winged Scoter.—First reported by Tessen in Douglas County on September 29. Johnson found 11 in Douglas County on October 27. Reported at the end of the period in Sheboygan County by the Brassers.

Common Goldeneye.—Found at the beginning of the period in Door County by the Lukes. Evenson found 550 in Winnebago County on November 24. Found throughout the state at the end of the period.

Bufflehead.—First reported by Robbins in Green Lake County on August 29. Robinson found 58 in Sawyer County on November 22. Found in scattered areas throughout the state at the end of the period.

Hooded Merganser.—Reported at the beginning of the period in Manitowoc County by Sontag. The Smiths found 113 in St. Croix County on November 4. Found at the end of the period in Ashland, Bayfield, Dane, Manitowoc, Marinette, and Trempealeau Counties.

Common Merganser.—Reported at the beginning of the period in Door County by the Lukes. Hunter found 375 in Trempealeau County on November 25. Reported at the end of the period in Ashland, Bayfield, Door, Douglas, Manitowoc, Trempealeau, and Winnebago Counties.

Red-breasted Merganser.—Reported at the beginning of the period in Ashland, Bayfield, and Door Counties. Sontag found 55 in Manitowoc County on November 6. Found at the end of the period in Door, Manitowoc, Milwaukee, Sheboygan, and Winnebago Counties.

Ruddy Duck.—Found at the beginning of the period in Columbia and Winnebago Counties. Hunter found 120 in Trempealeau County on October 25. Reported at the end of the period in Trempealeau County by Hunter.

Turkey Vulture.—Reported at the beginning of the period in scattered areas throughout the state. Tessen found 40 in Waukesha County on September 22. Last reported by Berger in Sheboygan County on November 7.

Osprey.—Reported at the beginning of the period south to Trempealeau, Monroe, Winnebago, and Manitowoc Counties. Cowart saw 20 in Ozaukee County on September 22. Last reported by Verch in Ashland and Bayfield Counties on October 30.

Bald Eagle.—Found at the beginning of the period south to Portage and Marinette Counties. Hunter found 53 in Trempealeau County on November 22. Reported at the end of the period south to Trempealeau, Portage, and Marinette Counties.

Northern Harrier.—Reported at the beginning of the period in scattered areas through-

out the state. Cowart found 11 in Ozaukee County on November 16. Reported at the end of the period in Burnett, Polk, Richland, Taylor, and Winnebago Counties.

Sharp-shinned Hawk.—Reported at the beginning of the period in Ashland, Bayfield, Door, Douglas, Milwaukee, Marinette, Price, and Taylor Counties. Berger found 189 in Sheboygan County on September 23. Found at the end of the period in Dane and Door Counties.

Cooper's Hawk.—Found at the beginning of the period in Dane, Door, Jefferson, Milwaukee, Monroe, Portage, Sheboygan, and Taylor Counties. Berger found 10 in Sheboygan County on September 23. Reported at the end of the period in Dane, Door, and Monroe Counties.

Northern Goshawk.—Reported at the beginning of the period in Door and Marinette Counties. Semo found 4 in Douglas County on November 30. Reported at the end of the period in Burnett, Door, Douglas, and Portage Counties.

Red-shouldered Hawk.—Found at the beginning of the period in Door, Manitowoc, Monroe, Outagamie, Polk, Portage, Shawano, and Sheboygan Counties. Berger found 4 in Sheboygan County on November 12. Reported at the end of the period in Manitowoc, Monroe, and Polk Counties.

Broad-winged Hawk.—Reported at the beginning of the period south to Portage, Dane, Shawano, and Door Counties. Ziebell saw 400 in Winnebago County on September 19. Last reported on October 21 in Marinette County by Lindberg and in Taylor County by Offord.

Red-tailed Hawk.—Found throughout the state at the beginning of the period. Semo found one with Krider's plumage in Douglas County on October 19. Berger found 61 in Sheboygan County on August 28. Reported at the end of the period north to Burnett, Douglas, Taylor, and Marinette Counties.

Rough-legged Hawk.—First reported by Risch in Taylor County on August 11. Berner saw 9 in Portage County on October 28. Found at the end of the period south to Trempealeau, Portage, Winnebago, and Sheboygan Counties.

Golden Eagle.—Reported by Cowart in Ozaukee County on October 4, by Frank in Ozaukee County on October 4 and 6, and by Woodmansee in Milwaukee County on October 27.

American Kestrel.—Found throughout the state at the beginning of the period. The Smiths found 45 in St. Croix County on August 12. Reported at the end of the period north to Burnett, Taylor, Marinette, and Door Counties.

Merlin.—Reported by Verch at the beginning of the period in Ashland and Bayfield Counties. Cowart found 174 in Ozaukee County on October 6. Last reported by Berger in Sheboygan County on November 23.

Peregrine Falcon.—Found at the beginning of the period in Dane County by Ashman and the Sheas. Cowart found 23 in Ozaukee County on October 6. Last reported by the Martins in Columbia County on November 22.

Gyrfalcon.—Cowart found a dark phase individual at Concordia University in Ozaukee County on October 18. See "By the Wayside."

Gray Partridge.—Found during the period in Dodge, Door, Monroe, Portage, St. Croix, and Winnebago Counties. The Smiths found 8 in St. Croix County on August 30.

Ring-necked Pheasant.—Found during the period north to Burnett, Price, Marinette, and Door Counties. Ashman found 9 in Columbia County on August 19.

Spruce Grouse.—Reported by Robinson in Bayfield County on August 11.

Ruffed Grouse.—Found during the period south to Trempealeau, Richland, and Dane Counties. The La Valleys found 9 in Marinette County on October 17.

Greater Prairie-Chicken.—Found during the period in Burnett, Marathon, and Portage Counties. Belter found 4 in Marathon County on October 8.

Sharp-tailed Grouse.—Reported during the period in Burnett, Douglas, and Taylor Counties. Semo found 25 in Burnett County on October 20.

Wild Turkey.—Reported during the period in Dane, Marinette, Monroe, Richland, Sauk, Trempealeau and Walworth Counties. The La Valleys found 56 in Marinette County on November 30.

Northern Bobwhite.—Found during the period in Dane, Monroe, Richland, and Winnebago Counties. Duerksen found 26 in Richland County on November 16.

Virginia Rail.—Reported at the beginning of the period in Ashland, Bayfield, Burnett, and Price Counties. Last reported by Diehl in Dodge County on September 23.

Sora.—Found at the beginning of the period in Ashland, Bayfield, Burnett, Dane, Shawano, and Trempealeau Counties. Belter found 3 in Marathon County on September 8. Last reported by Hoefler in Burnett County on September 29.

Common Moorhen.—Peterson reported 5 in Brown County on August 26. Last reported by Robinson in Columbia County on October 21.

American Coot.—Found at the beginning of the period in Brown, Columbia, Dane, Manitowoc, Marinette, Shawano, Trempealeau, and Winnebago Counties. Hoefler found 300 in Burnett County on October 20. Reported at the end of the period in Dane, Manitowoc, Sheboygan, and Walworth Counties.

Sandhill Crane.—Reported in scattered areas throughout the state at the beginning of the period. Hoefler found 1400 in Burnett County on October 20. Reported at the end of the period in Burnett County by Hoefler.

Black-bellied Plover.—First reported on August 7 in Milwaukee County by Diehl and Hanbury. Johnson found 11 in Douglas County on September 16. Last reported by Kuecherer in Monroe County on November 8.

Lesser Golden-Plover.—First reported by Tessen in Winnebago County on August 2. Semo found 80 in Douglas County on September 18. Last reported by Tessen in Waukesha County on November 25.

Semipalmated Plover.—Reported at the beginning of the period in Dane, Manitowoc, and Winnebago Counties. Evenson found 15 in Dane County on August 25. Last reported by Sontag in Manitowoc County on September 30.

Killdeer.—Found throughout the state at the beginning of the period. Berner found 209 in Portage County on September 20. Last reported by Tessen in Waukesha County on November 25.

American Avocet.—Tessen saw one in Ozaukee County on September 22.

Greater Yellowlegs.—Reported at the beginning of the period in Ashland, Bayfield, Burnett, Dane, and Manitowoc Counties. Robinson found 34 in Burnett County on September 28. Last reported by Ashman in Columbia County on November 11.

Lesser Yellowlegs.—Found at the beginning of the period in Ashland, Bayfield, Brown, Burnett, Dane, Manitowoc, Milwaukee, and Winnebago Counties. Belter found 60 in Marathon County on August 4. Last reported by Ashman in Dane County on November 3.

Solitary Sandpiper.—Reported at the beginning of the period in Ashland, Bayfield, Dane, Manitowoc, Monroe, Portage, and Shawano Counties. Ashman found 30 in Dane County on August 4. Last reported by Sontag in Manitowoc County on October 9.

Willet.—Reported by Hoffman in Dane County on August 6, by Ziebell in Winnebago County on September 9, and by the Lukes in Door County on September 28.

Spotted Sandpiper.—Found throughout the state at the beginning of the period. Sontag found 18 in Manitowoc County on August 3. Last reported by Sontag in Manitowoc County on October 25.

Upland Sandpiper.—Reported at the beginning of the period in Ashland, Bayfield, Burnett, Columbia, and Portage Counties. Ashman found 3 in Columbia County on August 5. Last reported by Hoefler in Burnett County on September 15.

Whimbrel.—Tessen found one in Manitowoc County on August 27.

Marbled Godwit.—Reported by Berger in Sheboygan County on August 15 and 28 and by Epstein in Monroe County on September 29.

Ruddy Turnstone.—First reported by Hanbury in Milwaukee County on August 7. Sontag found 5 in Manitowoc County on September 7. Last reported by Sontag in Manitowoc County on October 30.

Red Knot.—First reported by Diehl in Milwaukee County on August 7. Epstein and Kuecherer found 6 in Monroe County on October 18. Last reported by Epstein in Monroe County on October 28.

Sanderling.—Reported at the beginning of the period in Sheboygan County by the Brassers. Tessen found 55 in Sheboygan County on September 8. Last reported by the Brassers in Sheboygan County on November 4.

Semipalmated Sandpiper.—Found at the beginning of the period in Ashland, Bayfield, Brown, Dane, Manitowoc, Milwaukee, and Winnebago Counties. Sontag found 112 in Manitowoc County on August 31. Last reported by Cederstrom in Dane County on October 31.

Western Sandpiper.—Reported by Tessen in Sheboygan County on August 27 and by Hansen in Dane County on August 30.

Least Sandpiper.—Reported at the beginning of the period in Ashland, Bayfield, Dane, Manitowoc, Shawano, and Winnebago Counties. Ashman found 50 in Dane County on August 11. Last reported by Cederstrom in Dane County on October 31.

White-rumped Sandpiper.—First reported by Kuecherer in Monroe County on August 24. Last reported by Polk in Eau Claire County on October 26.

Baird's Sandpiper.—First reported by Tessen in Winnebago County on August 2. Epstein found 7 in Monroe County on September 8. Last reported by Epstein in Monroe County on October 18.

Pectoral Sandpiper.—Found at the beginning of the period in Ashland, Bayfield, Dane, Eau Claire, Manitowoc, Shawano, and Winnebago Counties. Epstein found 125 in Monroe County on September 10. Last reported by Polk in Eau Claire County on November 7.

Purple Sandpiper.—One was found in Sheboygan County on November 2 and 23 by the Brassers, on November 25 by Tessen, and on November 27 by Peterson. See "By the Wayside."

Dunlin.—First reported by Hanbury in Milwaukee County on August 7. Tessen found 39 in Milwaukee County on October 27. Last reported by Tessen in Sheboygan County on November 4.

Stilt Sandpiper.—Reported at the beginning of the period in Dane County by Ashman. Johnson found 10 in Douglas County on August 26. Last reported by Sontag in Manitowoc County on October 6.

Buff-breasted Sandpiper.—Reported from the beginning of the period to August 9 in Eau Claire county by Polk, on August 2 in Winnebago County by Tessen, four were seen in Marathon County by Belter on August 17, by Thiessen in Dane County on August 19, and by Robbins in Dane County on September 13.

Short-billed Dowitcher.—Found at the beginning of the period in Milwaukee County by Hanbury and Frank. Diehl found 40 in Milwaukee County on August 16. Last reported by Hoefler in Burnett County on October 13.

Long-billed Dowitcher.—First reported by Verch in Ashland and Bayfield Counties in August 22. Last reported by Epstein in Monroe County on October 18.

Common Snipe.—Reported at the beginning of the period south to Monroe and Winnebago Counties. Beleter found 20 in Marathon County on August 11 and the Smiths found 20 in St. Croix County on October 23. Reported at the end of the period in Monroe and Polk Counties.

American Woodcock.—Found at the beginning of the period south to Monroe and Winnebago Counties. Last reported by Semo in Douglas County on October 29.

Wilson's Phalarope.—Reported at the beginning of the period in Burnett County by

Hoefler. Last reported by Tessen in Douglas County on September 29.

Red-necked Phalarope.—First reported by Evenson in Dane County on August 25. Ashman found 6 in Dane County on September 2. Last reported by Polk in Chippewa County on September 27. Also found in Clark County.

Parasitic Jaeger.—Reported by Johnson in Douglas County on September 16 and by Tessen in Douglas County on September 29.

Jaeger sp..—Reported by Robinson in Douglas County on September 9, and by Tessen in Douglas County on September 29.

Franklin's Gull.—First reported by Semo in Douglas County on August 8. Hudick found 250 in Polk County on October 5. Last reported by Cowart in Ozaukee County on October 6. Also reported in Chippewa, Sheboygan, and Winnebago Counties.

Little Gull.—Reported by Hanbury in Milwaukee County on August 7, by Johnson and Semo in Manitowoc County on August 18, by Diehl in Milwaukee County on August 23, by Cowart in Milwaukee County on August 26, and by Tessen in Milwaukee County on August 27.

Bonaparte's Gull.—Found at the beginning of the period in Manitowoc, Milwaukee, and Sheboygan Counties. Tessen found 200 in Ozaukee County on October 13. Reported at the end of the period in Manitowoc County by Sontag.

Ring-billed Gull.—Found throughout the state during the period. Woodmansee found 1000 in Milwaukee County on October 25 and Ziebell found 100 in Winnebago County on November 2.

Herring Gull.—Reported at the beginning of the period south to Winnebago, Sheboygan, and Milwaukee Counties. Johnson found 2000 in Douglas County on November 20. Found throughout the state at the end of the period.

Glaucous Gull.—Reported on October 13 in Milwaukee County by Cowart, and from November 2 to the end of the period in Douglas County by Johnson.

Great Black-backed Gull.—Reported on October 13 in Ozaukee County by Tessen, on October 17 in Manitowoc County by Sontag, on November 10 in Douglas County by Robinson, from November 10 to 20 in Douglas County by Johnson, and on November 14 in Douglas County by Semo. See "By the Wayside."

Common Mew Gull.—Sontag found one in Manitowoc County on November 30. See "By the Wayside."

Caspian Tern.—Reported at the beginning of the period in Ashland, Bayfield, Door, Manitowoc, Milwaukee, Sheboygan, and Winnebago Counties. Robinson found 47 in Manitowoc County on August 25. Last reported by Sontag in Manitowoc County on October 6.

Common Tern.—Found at the beginning of the period in Ashland, Bayfield, Door, Douglas, Manitowoc, and Marinette Counties. Diehl found 6 in Milwaukee County on August 14. Last reported by Tessen in Shawano County on October 7.

Forster's Tern.—Reported at the beginning of the period in Brown, Manitowoc, and Winnebago Counties. Ziebell found 10 in Winnebago County on August 24. Last reported by Peterson in Shawano County on October 16.

Black Tern.—Found at the beginning of the period in Ashland, Bayfield, Columbia, Douglas, Monroe, Polk, Shawano, and Winnebago Counties. Epstein found 21 in Monroe County on August 25. Last reported by the Smiths in St. Croix County on September 9.

Rock Dove.—Found throughout the state during the period. Belter found 180 in Marathon County on November 25.

Mourning Dove.—Reported throughout the state during the period. Ziebell found 180 in Winnebago County on September 8.

Black-billed Cuckoo.—Reported at the beginning of the period in Burnett, Dane, Door, Douglas, Marinette, and Shawano Counties. Last reported on September 22 in Burnett County by Hoefler and in Ozaukee County by Tessen.

Yellow-billed Cuckoo.—Reported at the beginning of the period in Door, Marinette, and

Milwaukee Counties. Last reported by Robbins in Dane County on August 28.

Eastern Screech-Owl.—Found during the period in Dane, Jefferson, Milwaukee, Monroe, Ozaukee, Richland, Taylor, and Winnebago Counties.

Great Horned Owl.—Found throughout the state during the period. Peterson found 5 in Shawano County on October 16.

Snowy Owl.—First reported by the La Valleys in Marinette County on October 19. Found at the end of the period in Ashland, Bayfield, and Douglas Counties. Also reported from Brown and Sawyer Counties.

Northern Hawk-Owl.—One was found in Douglas County on about November 18 and verified by Johnson and Semo in early December. This bird has been seen by many others since then. See "By the Wayside."

Barred Owl.—Reported during the period south to Richland, Jefferson, and Milwaukee Counties.

Great Gray Owl.—Reported by Tessen in Douglas County on September 29, by Riemer in Polk County on November 18 and 19, and by Semo in Douglas County on November 22. See "By the Wayside."

Long-eared Owl.—Reported by Jacobs in Portage County on October 14, by Berger in Sheboygan County on October 14, with 3 on November 24, by Semo in Douglas County on November 11, and by Risch in Taylor County on November 17.

Short-eared Owl.—Found during the period in Burnett, Chippewa, Manitowoc, Milwaukee, Ozaukee, Price, St. Croix, Sawyer, Sheboygan, and Taylor Counties. The Smiths found 3 in St. Croix County on October 31.

Northern Saw-whet Owl.—Reported during the period in Brown, Milwaukee, Monroe, Portage, Price, Sawyer, and Sheboygan Counties. 27 were seen at the Cedar Grove Ornithological Station on October 22, and 52 were seen at the Linwood Springs Research Station in Portage County on October 24.

Common Nighthawk.—Reported throughout the state at the beginning of the period. Cowart saw over 8000 in 3 hours in Ozaukee County on August 27. Last reported by Berger in Sheboygan County on October 18.

Whip-poor-will.—Reported at the beginning of the period in Door, Monroe, Price, Richland, and Shawano Counties. Last reported by Hardy in Price County on September 20.

Chimney Swift.—Found throughout the state at the beginning of the period. Berger found 1200 in Sheboygan County on August 24. Last reported by Ashman in Dane County on October 17.

Ruby-throated Hummingbird.—Reported at the beginning of the period south to Richland, Dane, and Walworth Counties. Hardy found 25 in Price County on August 27. Last reported by Ziebell in Winnebago County on September 28.

Anna's Hummingbird.—This first time ever sighting in Wisconsin arrived at the Schmidt feeder near Wales in Waukesha County in late August, but was passed off as another Ruby-throated Hummingbird until it was positively identified in late November. It was seen by Adams on November 29 and by Donald on November 30, as well as many others in early December. It was subsequently captured during a blizzard and released in the tropical dome in Milwaukee where it has thrived at least into April. See "By the Wayside."

Belted Kingfisher.—Found throughout the state at the beginning of the period. Berner found 6 in Portage County on September 3. Reported at the end of the period in Dane, Jefferson, Manitowoc, Monroe, and Richland Counties.

Red-headed Woodpecker.—Found throughout the state at the beginning of the period. Richter found 4 in Monroe County on September 3. Reported at the end of the period in Portage and Taylor Counties.

Red-bellied Woodpecker.—Reported at the beginning of the period north to Burnett, Bayfield, Ashland, Marinette, and Door Counties. Ashman found 6 in Dane County on September 8 and the Smiths found 6 in St. Croix County on September 30.

Yellow-bellied Sapsucker.—Reported at the beginning of the period south to Monroe, Portage, and Door Counties. The La Valleys found 12 in Marinette County on September 17. Last reported by Duerksen in Richland County on October 23.

Downy Woodpecker.—Found throughout the state during the period. The Smiths found 10 in St. Croix County on October 23.

Hairy Woodpecker.—Reported throughout the state during the period. The La Valleys found 28 in Marinette County on September 17.

Black-backed Woodpecker.—Reported by Tessen in Douglas County on September 29 and by Semo in Douglas County from October 22 to November 26.

Northern Flicker.—Found throughout the state at the beginning of the period. Hoffman found 600 in Price County on September 20. Reported at the end of the period in Monroe and Winnebago Counties.

Pileated Woodpecker.—Found during the period south to Richland, Dane, and Sheboygan Counties. The Smiths found 3 in St. Croix County on September 30.

Olive-sided Flycatcher.—Reported at the beginning of the period in Douglas County by Semo. Last reported by Berner in Portage County on September 10.

Eastern Wood-Pewee.—Found throughout the state at the beginning of the period. Berner found 11 in Portage County on September 2. Last reported by Hale in Jefferson County on October 5.

Yellow-bellied Flycatcher.—First reported by Woodmansee in Columbia County on August 5. Last reported by Ashman in Dane County on September 15.

Acadian Flycatcher.—The Kuhns found 2 in Sheboygan County on August 2.

Alder Flycatcher.—Reported at the beginning of the period in Ashland, Bayfield, Douglas, Marinette, Portage, and Shawano Counties. Peterson found 4 in Shawano County on August 2 and Woodmansee found 4 in Milwaukee County on August 26. Last reported by Woodmansee in Milwaukee County on September 15.

Willow Flycatcher.—Found at the beginning of the period in Columbia, Dane, and Manitowoc Counties. Ashman found 6 in Dane County on August 4. Last reported by the Smiths in St. Croix County on September 2.

Least Flycatcher.—Reported at the beginning of the period in Ashland, Bayfield, Dane, Door, Douglas, Manitowoc, Portage, and Price Counties. Belter found 4 in Marathon County on August 19 and Berner found 4 in Portage County on September 4. Last reported by Hardy in Price County on September 25.

Eastern Phoebe.—Found throughout the state at the beginning of the period. The Smiths found 8 in St. Croix County on September 29. Last reported by Wierzbicki in Brown County on November 7.

Great Crested Flycatcher.—Reported throughout the state at the beginning of the period. The Smiths found 4 in St. Croix County on August 4. Last reported by Ashman in Dane County on September 17.

Eastern Kingbird.—Found throughout the state at the beginning of the period. The Smiths found 38 in St. Croix County on August 5. Last reported on September 16 in Douglas County by Johnson and Semo and in Winnebago County by Tessen.

Horned Lark.—Reported at the beginning of the year in scattered areas throughout the state. Ziebell found 20 in Winnebago County on November 4. Reported at the end of the period north to Burnett and Marinette Counties.

Purple Martin.—Found throughout the state at the beginning of the period. Woodmansee found 350 in Milwaukee County on August 10. Last reported by Ziebell in Winnebago County on September 9.

Tree Swallow.—Reported throughout the state at the beginning of the period. Berner found 3000 in St. Croix County on October 12. Last reported by Ashman in Dane County on October 15.

Northern Rough-winged Swallow.—Found in scattered areas throughout the state at the beginning of the period. Berner found 21 in Portage County on August 12. Last reported by Tessen in Ozaukee County on September 22.

Bank Swallow.—Reported in scattered areas throughout the state at the beginning of the period. Belter found 70 in Marathon County on September 1. Last reported by Risch in Clark County on September 9.

Cliff Swallow.—Found in scattered areas throughout the state at the beginning of the period. Tessen found over 100 in Ozaukee County on September 22. Last reported by Frank in Ozaukee County on October 4.

Barn Swallow.—Found throughout the state at the beginning of the period. Ziebell found 200 in Winnebago County on August 15. Last reported by the Smiths in St. Croix County on October 14.

Gray Jay.—Reported during the period in Ashland, Douglas, Forest, Oneida, Price, Sawyer, Taylor, and Vilas Counties. Hoffman found 12 in Ashland County on September 18.

Blue Jay.—Found throughout the state during the period. Tessen found over 150 in Ozaukee County on September 22.

American Crow.—Reported throughout the state during the period. Cowart saw over 2000 in Ozaukee County on November 7.

Common Raven.—Reported during the period south to Monroe, Portage, and Outagamie Counties.

Black-capped Chickadee.—Found throughout the state during the period. Hardee found 46 in Price County on November 30.

Boreal Chickadee.—Reported during the period in Ashland, Forest, and Oneida Counties.

Tufted Titmouse.—Reported during the period in Dane and St. Croix Counties.

Red-breasted Nuthatch.—Found in scattered areas throughout the state at the beginning of the period. Berner found 8 in Portage County on September 2. Reported throughout the state at the end of the period.

White-breasted Nuthatch.—Reported throughout the state during the period. The Smiths found 17 in St. Croix County on September 30.

Brown Creeper.—Found at the beginning of the period south to Portage and Outagamie Counties. Sontag found 6 in Manitowoc County on September 28. Found in scattered areas throughout the state at the end of the period.

Carolina Wren.—Found in Dane County on September 3 by Robbins and September 5 and November 10 by Hansen, and in Milwaukee County on September 29 by Cowart, on October 13 and 31 by Woodmansee, and on October 30 by Zehner.

House Wren.—Reported throughout the state at the beginning of the period. Ashman found 7 in Dane County on August 4, and Duerksen found 7 in Richland County on August 6. Last reported by Ziebell in Winnebago County on October 16.

Winter Wren.—Found at the beginning of the period in Ashland, Bayfield, Door, Marathon, Marinette, and Portage Counties. Belter found 6 in Marathon County on September 17. Last reported by Ashman in Dane County on November 17.

Sedge Wren.—Reported in scattered areas throughout the state at the beginning of the period. Peterson found 12 in Shawano County on August 2 and the Smiths found 12 in St. Croix County on August 12. Last reported by the Smiths in St. Croix County on October 13.

Marsh Wren.—Found at the beginning of the period in Ashland, Bayfield, Brown, Columbia, Dane, Shawano, and Winnebago Counties. Peterson found 8 in Shawano County on August 2. Last reported by Ashman in Dane County on October 7.

Golden-crowned Kinglet.—Reported at the beginning of the period in Door, Douglas, and Marinette Counties. Tessen found over 60 in Milwaukee County on October 13. Found at the end of the period in Dane, Jefferson, Manitowoc, Portage, Sawyer, and Winnebago Counties.

Ruby-crowned Kinglet.—Reported at the beginning of the period in Marinette County by the La Valleys. Robinson found 35 in Burnett County on September 28. Last reported by Ashman in Dane County on November 22.

Blue-gray Gnatcatcher.—Found at the beginning of the period in Door, Monroe, Polk, Portage, Richland, and Sauk Counties. Belter found 4 in Marathon County on August 11 and Berner found 4 in Portage County on August 12. Last reported by Ziebell in Winnebago County on September 22.

Eastern Bluebird.—Found throughout the state at the beginning of the period. The Smiths found 41 in St. Croix County on September 23. Last reported by the Brassers in Sheboygan County on November 23.

Veery.—Found in Ashland, Bayfield, Dane, Door, Douglas, Marinette, and Portage Counties at the beginning of the period. Hoffman found 11 in Pepin County on September 2. Last reported by the La Valleys in Marinette County on October 24.

Gray-cheeked Thrush.—First reported by Woodmansee in Milwaukee County on August 21. Hoffman found 14 in Price County on September 20. Last reported by Diehl in Milwaukee County on October 21.

Swainson's Thrush.—First reported on August 24 in Douglas County by Johnson and in Manitowoc County by Sontag. Berner found 87 in Portage County on September 9. Last reported by Tessen in Milwaukee County on October 13.

Hermit Thrush.—Reported at the beginning of the period south to Marathon and Sheboygan Counties. Beleter found 14 in Marathon County on October 6. Last reported by Woodmansee in Milwaukee County on November 19.

Wood Thrush.—Found in scattered areas throughout the state at the beginning of the period. Last reported by Berner in Portage County on September 30.

American Robin.—Found throughout the state at the beginning of the period. Ziebell found 200 in Winnebago County on September 29. Reported at the end of the period in Ashland, Bayfield, Brown, Dane, and Milwaukee Counties.

Varied Thrush.—A male was reported by Verch at the Mihalek feeders in Bayfield County from November 29 to the end of the period.

Gray Catbird.—Found throughout the state at the beginning of the period. Ashman found 23 in Dane County on August 4. Reported at the end of the period in Dane County by Ashman.

Brown Thrasher.—Reported throughout the state at the beginning of the period. Ashman found 14 in Dane County on September 15. Last reported on September 29 in Dane County by Ashman and in Monroe County by Epstein.

Water Pipit.—First reported by Tessen in Douglas County on September 29. Ashman found 6 in Columbia County on October 28, which was also the latest reported.

Bohemian Waxwing.—First reported by Hardy in Price County on September 26. Robinson found 15 in Ashland County on November 22. Reported at the end of the period in Ashland and Bayfield Counties by Verch.

Cedar Waxwing.—Found throughout the state at the beginning of the period. Berner found 500 in Portage County on September 11. Found in scattered areas throughout the state at the end of the period.

Northern Shrike.—First reported by Offord in Taylor County on October 19. Reported at the end of the period south to Monroe and Door Counties.

Loggerhead Shrike.—The Smiths found one in St. Croix County on August 26.

European Starling.—Found throughout the state during the period. The Brassers found over 6000 in Sheboygan County on August 14.

Bell's Vireo.—Reported by Robbins in Dane County on August 31.

Solitary Vireo.—Reported at the beginning of the period in Ashland, Bayfield, Marathon, and Marinette Counties. Berner found 3

in Portage County on October 5. Last reported by Ashman in Dane County on October 15.

Yellow-throated Vireo.—Found at the beginning of the period in Columbia, Dane, Polk, Portage, Shawano, and Walworth Counties. Hoffman found 6 in Pepin County on September 2. Last reported by Berner in Portage County on October 9.

Warbler Vireo.—Found in scattered areas throughout the state at the beginning of the period. The Smiths found 6 in St. Croix County on September 2. Last reported by the Smiths in St. Croix County on September 25.

Philadelphia Vireo.—First reported by Peterson in Shawano County on August 11. The Smiths found 4 in St. Croix County on August 29 and Peterson found 4 in Shawano County on September 3. Last reported by Sontag in Manitowoc County on October 2.

Red-eyed Vireo.—Found throughout the state at the beginning of the period. Ashman found 13 in Dane County on September 8. Last reported by Belter in Marathon County on October 23.

Blue-winged Warbler.—Reported at the beginning of the period in Monroe and Richland Counties. Berner found 4 in Portage County on September 7. Last reported by Peterson in Shawano County on September 17.

Golden-winged Warbler.—Found at the beginning of the period in Door, Douglas, Marinette, Polk, and Portage Counties. Hoffman found 4 in Pepin County on September 2. Last reported by Hoffman in Price County on September 20.

Tennessee Warbler.—Reported at the beginning of the period in Marinette and Price County. Munson found 36 in Portage County on September 8. Last reported by Berner in Portage County on October 14.

Orange-crowned Warbler.—First reported by Johnson in Douglas County on August 24. The Smiths found 13 in St. Croix County on September 24. Last reported by Robbins in Sauk County on October 27.

Nashville Warbler.—Reported at the beginning of the period in Ashland, Bayfield, Door, Douglas, Marinette, and Portage Counties. Robinson found 26 in Douglas County on August 10. Last reported by Belter in Marathon County on October 23.

Northern Parula Warbler.—Found at the beginning of the period in Door and Marinette Counties. Ashman found 3 in Dane County on September 8 and the Smiths found 3 in St. Croix County on September 8. Last reported by the Brassers in Sheboygan County on September 25.

Yellow Warbler.—Found throughout the state at the beginning of the period. Robinson found 16 in Douglas County on August 10. Last reported by the La Valleys in Marinette County on September 17.

Chestnut-sided Warbler.—Found at the beginning of the period in Ashland, Bayfield, Door, Douglas, Marinette, Portage, and Price Counties. Hoffman found 11 in Price County on September 2. Last reported by Belter in Marathon County on October 5.

Magnolia Warbler.—Reported at the beginning of the period in Douglas, Marinette, and Price Counties. Ashman found 18 in Dane County on September 8. Last reported in Outagamie County on October 11 by Anderson and Petznick.

Cape May Warbler.—First reported on August 20 in Sawyer County by Castelein and Lauten. Berner found 13 in Portage County on September 8. Last reported on September 23 in Dane County by Ashman and in Marathon County by Belter.

Black-throated Blue Warbler.—Reported at the beginning of the period in Marathon County by Hoeft. Hoffman found 4 in Price County on September 20. Last reported on October 2 in Dane County by Robbins and in Price County by Hardy.

Yellow-rumped Warbler.—Found at the beginning of the period in Ashland, Bayfield, Door, Douglas, Marinette, and Trempealeau Counties. The Smiths found 155 in St. Croix County on September 30. Last reported on November 12 in Dane County by Ashman and in Portage County by Berner.

Black-throated Green Warbler.—Reported at the beginning of the period in Ashland, Bayfield, Door, Douglas, and Marinette Counties. Peterson found 10 in Shawano County on September 15 and Berner found 10 in Portage County on September 17. Last reported by Belter in Marathon County on October 6.

Blackburnian Warbler.—Reported at the beginning of the period in Ashland, Bayfield, Douglas, and Marinette Counties. Munson found 7 in Portage County on August 28. Last reported by Robbins in Ozaukee County on September 22.

Pine Warbler.—Found at the beginning of the period in Ashland, Bayfield, Door, Douglas, and Price Counties. Last reported by Reardon in Vilas County on September 30.

Palm Warbler.—Reported at the beginning of the period in Douglas County by Johnson. Robinson found 11 in Burnett County on September 28. Last reported on October 28 in Price County by Hardy and in Winnebago County by Ziebell.

Bay-breasted Warbler.—First reported by Sontag in Manitowoc County on August 21. Hoffman found 31 in Pepin County on September 2. A very late individual was found in Ed Stoehr's barn in Pierce County by Carlsen on November 3 and 4. It lingered for about another 2 weeks.

Blackpoll Warbler.—First reported by Berner in Portage County on August 17. Hoffman found 12 in Pepin County on September 2. Last reported by Berner in Portage County on September 30.

Cerulean Warbler.—Reported by Berner in Portage County on September 10.

Black-and-White Warbler.—Found at the beginning of the period in Ashland, Bayfield, Door, Douglas, Marinette, Portage, and Price Counties. Hoffman found 9 in Pepin County on September 2. Last reported by Sontag in Manitowoc County on October 5.

American Redstart.—Reported in scattered areas throughout the state at the beginning of the period. Ashman found 33 in Dane County on September 8. Last reported by Berner in Portage County on October 6.

Prothonotary Warbler.—Reported by Kuecherer at the beginning of the period in Monroe County, by Hudick in Polk County from the beginning of the period to August 14, and by Tessen in La Crosse County on August 17.

Ovenbird.—Found in scattered areas throughout the state at the beginning of the period. Hoffman found 14 in Pepin County on September 2. Last reported by Diehl in Milwaukee County on October 22.

Northern Waterthrush.—Reported at the beginning of the period in Ashland, Bayfield, Door, Douglas, Marinette, Polk, and Shawano Counties. Berner found 6 in Portage County on September 10. Last reported by Berner in Portage County on October 4.

Connecticut Warbler.—First reported by Semo in Douglas County on August 8. Last reported by Hardy in Price County on October 5.

Mourning Warbler.—Found at the beginning of the period in Door, Douglas, Marinette, Monroe, and Portage Counties. Hoffman found 4 in Price County on September 20. Last reported by Hudick in Polk County on October 10.

Common Yellowthroat.—Found throughout the state at the beginning of the period. Peterson found 23 in Shawano County on September 17. Last reported by Ashman in Dane County on November 17.

Wilson's Warbler.—First reported by Hardy in Price County on August 8. Hoffman found 4 in Pepin County on September 2 and Berner in Portage County on September 3. Last reported by Hardy in Price County on October 5.

Canada Warbler.—Found at the beginning of the period in Douglas and Marinette Counties. Hoffman found 11 in Pepin County on September 2. Last reported by Hoffman in Price County on September 20.

Summer Tanager.—A female was reported by Donald to be coming to a feeder in Merton in Waukesha County for several days in early November.

Scarlet Tanager.—Found in scattered ar-

eas throughout the state at the beginning of the period. Hoffman found 13 in Pepin County on September 2. Last reported by Belter in Marathon County on October 5.

Northern Cardinal.—Reported during the period north to Burnett, Douglas, Bayfield, Ashland, Price, Marinette, and Door Counties. Ashman found 17 in Dane County on September 8.

Rose-breasted Grosbeak.—Found throughout the state at the beginning of the period. Hoffman found 115 in Pepin County on September 2. Last reported by Zehner in Milwaukee County on October 4.

Indigo Bunting.—Found throughout the state at the beginning of the period. Peterson found 59 in Shawano County on August 1. Last reported by Tessen in Milwaukee County on October 13.

Dickcissel.—Found at the beginning of the period in Monroe and Polk Counties. The Smiths found 2 in St. Croix County on August 5. Last reported by Hoffman in Grant County on August 9.

Rufous-sided Towhee.—Reported at the beginning of the period north to Price and Marinette Counties. Parsons found 4 in Walworth County on October 16. Last reported by Munson in Portage County on November 14.

American Tree Sparrow.—First reported by Kuecherer in Monroe County on September 25. Ziebell found 160 in Winnebago County on November 18. Found at the end of the period north to St. Croix, Taylor, and Door Counties.

Chipping Sparrow.—Found throughout the state at the beginning of the period. Parsons found 75 in Walworth County on September 22. Last reported by Ashman in Dane County on November 9.

Clay-colored Sparrow.—Reported at the beginning of the period south to Columbia County. The Smiths found 15 in St. Croix County on August 12. Last reported by the Smiths in St. Croix County on October 7.

Field Sparrow.—Found at the beginning of the period north to Burnett, Marinette, and Door Counties. Parsons found over 100 in Walworth County on September 22. Last reported by Parsons in Walworth County on October 31.

Vesper Sparrow.—Reported at the beginning of the period north to Burnett, Marinette, and Door Counties. The Smiths found 19 in St. Croix County on September 23. Last reported by the Smiths in St. Croix County on October 21.

Savannah Sparrow.—Found throughout the state at the beginning of the period. The Smiths found 55 in St. Croix County on September 30. Last reported by Robbins in Sauk County on October 27.

Grasshopper Sparrow.—Reported at the beginning of the period in Door, Monroe, Portage, and Shawano Counties. Last reported by the Smiths in St. Croix County on September 2.

Henslow's Sparrow.—Found at the beginning of the period in Portage and Richland Counties. Last reported by the Smiths in St. Croix County on September 23.

LeConte's Sparrow.—Reported by Hoeft in Marathon County at the beginning of the period, by Semo in Douglas County on August 8, and by Berner in St. Croix County on August 23 and October 12.

Sharp-tailed Sparrow.—Reported by Hoffman in Ashland County on September 18, by Sontag in Manitowoc County on September 20, and by Frank in Ozaukee County on September 25.

Fox Sparrow.—First reported by Hardy in Price County on September 16. Duerksen found 14 in Richland County on October 26. Reported at the end of the period in Dane County by Ashman.

Song Sparrow.—Found throughout the state at the beginning of the period. Berner found 80 in St. Croix County on October 12. Found at the end of the period in Brown, Dane, Jefferson, and Winnebago Counties.

Lincoln's Sparrow.—Reported at the beginning of the period in Douglas County by Johnson. Hoffman found 19 in Ashland County

on September 18 and the Smiths found 19 in St. Croix County on October 7. Last reported by Robbins in Sauk County on October 27.

Swamp Sparrow.—Found throughout the state at the beginning of the period. The Smiths found 17 in St. Croix County in September 30. Reported at the end of the period in Dane County by Ashman.

White-throated Sparrow.—Reported at the beginning of the period south to Marathon, Shawano, and Door Counties. Berner found 75 in Portage County on October 6. Found at the end of the period in Ashland, Bayfield, Dane, Sawyer, and Winnebago Counties.

White-crowned Sparrow.—First reported by Hardy in Price County on September 9. The Smiths found 24 in St. Croix County on October 7. Last reported by Verch in Ashland and Bayfield Counties on November 9.

Harris' Sparrow.—First reported by the Smiths in St. Croix County on October 12. Last reported by Verch in Ashland and Bayfield Counties on October 23.

Dark-eyed Junco.—Reported at the beginning of the period in Marinette County by the La Valleys. Hardy found 900 in Price County on October 5. Found throughout the state at the end of the period.

Lapland Longspur.—First reported by the Smiths in St. Croix County on August 14. Offord found 300 in Taylor County on November 30. Found at the end of the period in Taylor and Winnebago Counties.

Snow Bunting.—First reported by Hoefler in Burnett County on October 14. Belter found 250 in Marathon County on November 9. Found at the end of the period south to Monroe and Winnebago Counties.

Bobolink.—Found at the beginning of the period in Ashland, Bayfield, Burnett, Monroe, Polk, Portage, and Taylor Counties. Epstein found 86 in Monroe County on August 6. Last reported by Robbins in Dane County on September 25.

Red-winged Blackbird.—Found throughout the state at the beginning of the period. Belter found 2000 in Marathon County on October 6 and Ziebell found 2000 in Winnebago County on November 4. Reported at the end of the period in Brown, Dane, Jefferson, Ozaukee, and Price Counties.

Eastern Meadowlark.—Reported throughout the state at the beginning of the period. Richter found 24 in Monroe County on August 27. Last reported by Ziebell in Winnebago County on November 6.

Western Meadowlark.—Found at the beginning of the period in Burnett, Columbia, Dane, Monroe, Polk, and Portage Counties. Last reported by Robbins in Dane County on October 2.

Yellow-headed Blackbird.—Found at the beginning of the period in Columbia, Dane, Polk, Shawano, and Winnebago Counties. The Smiths found 56 in St. Croix County on August 26. Last reported by the Smiths in St. Croix County on October 14.

Rusty Blackbird.—First reported by Semo in Douglas County on September 17. Belter found 70 in Marathon County on October 27. Last reported by Robbins in Dane County on November 26.

Brewer's Blackbird.—Reported at the beginning of the period south to Winnebago County. The Smiths found 400 in St. Croix County on September 23. Last reported by the Smiths in St. Croix County on November 11.

Common Grackle.—Found throughout the state at the beginning of the period. Ziebell found 1000 in Winnebago County on November 4. Reported at the end of the period in Brown, Jefferson, Outagamie, and Polk Counties.

Brown-headed Cowbird.—Found throughout the state at the beginning of the period. Cederstrom found 130 in Columbia County on October 31. Reported at the end of the period in Jefferson and Monroe Counties.

Northern Oriole.—Reported throughout the state at the beginning of the period. Ashman found 13 in Dane County on August 25. Last reported by Johnson in Douglas County on September 13.

Pine Grosbeak.—First reported by Hardy in Price County on October 24. Hardy found 20 in Price County on November 28. Found at the end of the period in Ashland, Bayfield, Douglas, Price, and Sawyer Counties.

Purple Finch.—Found at the beginning of the period south to St. Croix, Portage, and Door Counties. Tessen found 15 in Milwaukee County on October 13. Found at the end of the period in scattered areas throughout the state.

House Finch.—Found during the period north to Taylor, Marathon, Shawano, and Door Counties. Berner found 100 in Portage County on September 1. He also found one impaled on barbed wire by a Northern Shrike on rural Portage County.

Red Crossbill.—Found at the beginning of the period in Ashland, Bayfield, Door, and Douglas Counties. Cowart found over 75 in Ozaukee County on October 23. Found at the end of the period in Ashland, Bayfield, Douglas, Marinette, and Portage Counties.

White-winged Crossbill.—First reported by the La Valleys in Marinette County on November 4. Hardy found 6 in Price County on November 27. Reported at the end of the period in Marinette County by the La Valleys.

Common Redpoll.—First reported by Verch in Ashland and Bayfield Counties on October 27. Ziebell found 16 in Winnebago County on October 21. Found at the end of the period in Ashland and Bayfield Counties by Verch.

Pine Siskin.—Found at the beginning of the period in Ashland, Bayfield, Burnett, Door, and Marinette Counties. Cowart found over 150 in Ozaukee County on October 29. Reported in scattered areas throughout the state at the end of the period.

American Goldfinch.—Reported throughout the state during the period. Tessen found over 125 in Ozaukee County on November 10.

Evening Grosbeak.—Reported at the beginning of the period south to Taylor and Marinette Counties. Hardy found 24 in Price County on October 22. Found at the end of the period south to Monroe, Portage, and Brown Counties.

House Sparrow.—Found throughout the state during the period. Berner found 300 in Portage County on September 1.

CONTRIBUTORS

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"By the Wayside"

Observations of Common Loon, Ross' Goose, migrating raptors, Red-tailed Hawk, Peregrine Falcon, Gyrfalcon, Purple Sandpiper, Mew Gull, Great Black-backed Gull, Northern Hawk-owl, Great Gray Owl, Anna's Hummingbird, American Crow, and American Robin are featured.

Multiple Lake Defense by Common Loons

May–June 1985, Iron County—Although observations of Common Loons (*Gavia immer*) utilizing separate lakes for feeding and reproductive activities have been reported (Rand, *Canadian Field-Naturalist* 62:42, 1948; Parker *Foraging and reproduction of the common loon* (Gavia immer) *on acidified lakes in the Adirondack Park, New York*, M.S. Thesis, State University of New York, Syracuse, 1985), they did not determine if multiple lakes were defended. Miller and Dring (Territorial defense of multiple lakes by common loons: A preliminary report. Pp. 1–14 *in Papers from the 1987 North American conference on loon research and management*, (P.I.V. Strong, ed.). North American Loon Fund, Meredith, New Hampshire, 1988) provided evidence supporting multiple lake defense by 2 Common Loon pairs. I provide additional evidence of multiple lake defense by a pair of Common Loons.

I studied loons on Cranberry (4.8 ha) and Hewitt (31.5 ha) Lakes, Iron County, Wisconsin, during May and June 1985. The lakes are separated by approximately 150 m of upland.

A territorial, breeding pair of Common Loons was present on Cranberry Lake. Territoriality was determined by the pair's aggressive postures and yodel calls in response to broadcasted yodel and tremolo calls (Rummel and Goetzinger, *Auk* 92:333–346, 1975). Single loons were observed periodically feeding on Hewitt Lake; however, no nests were located during 2 complete shoreline searches. When a member of the pair was absent from Cranberry Lake, I visually searched Hewitt Lake from shore and observed 1 loon feeding in 2 of 4 instances. Additionally, simultaneous observations of both lakes on 3 separate occasions documented the presence of 1 loon on each lake. This suggested use of Hewitt Lake as a feeding area by loons from Cranberry Lake. On 4 June, 2 loons were present on Hewitt Lake. An aggressive interaction ensued and 1 loon was driven off the lake. The remaining loon yodeled twice during the encounter. The calls sounded identical to calls I had heard previously from a loon on

Cranberry Lake, suggesting that Hewitt Lake was defended by the Cranberry Lake pair.

Yodels calls were then recorded from loons on Cranberry and Hewitt in addition to other lakes in an effort to determine individual variation (Belant, *Common loon productivity and brood habitat use in northern Wisconsin*, M.S. Thesis, University of Wisconsin, Stevens Point, 1989). I also attempted to stimulate territorial defense of Hewitt Lake by a member of the Cranberry Lake pair. On 9 June, the presence of both loons on Cranberry Lake was confirmed. I left an observer at Cranberry Lake to document loon response to vocalizations broadcast from Hewitt Lake. The loons were immediately alert to broadcast vocalizations and after 37 min, a loon took flight from Cranberry Lake. A loon landed on Hewitt Lake approximately 1 min later. The loon exhibited yodels and aggressive posturing in response to broadcasted calls, and a styrofoam loon decoy placed 5 m from shore. Although the loon was not observed for approximately 1 min during flight, the possibility of the loon from Cranberry Lake flying to a lake other than Hewitt Lake and an unknown loon landing on Hewitt Lake is extremely unlikely. Additionally, discriminant function analysis classified sonograms of yodels collected from Hewitt and Cranberry Lakes as the same loon and separated those calls from 30 additional yodel calls collected from different loons (J. Belant, unpublished data).

Sonographic analysis of yodel calls; lake use patterns; and aggressive response to other loons, broadcast vocalizations, and decoy, indicate that a single pair of loons actively defended both lakes.

Miller and Dring (*op. cit.*) suggested several hypotheses for multiple lake defense by Common Loons: (1) loons may require greater food resources than 1 lake can provide; (2) loons may acquire potentially higher quality habitat as it becomes available; (3) there may be insufficient numbers of breeding loons to occupy all available habitat, allowing multiple lake use with minimal defense; and (4) a complex of lakes may be necessary for successful reproduction by certain pairs.

I contend that food resources were insufficient to support a family of loons on Cranberry Lake, forcing adult loons to forage on adjacent lakes. Although I did not witness adult loons carrying fish while in flight to the nesting lake, as did Parker (*Journal of Field Ornithology* 56:412–413, 1985), adults foraging on Hewitt Lake may provide enough resources for successful chick-rearing on Cranberry Lake. The shoreline of Hewitt Lake was relatively steep and rocky, providing conditions unsuitable for Common Loon nesting.

I support Miller and Dring's (*op. cit.*) statement alerting biologists to possible multiple lake defense by Common Loons when conducting surveys, particularly in areas with many small lakes. Financial support was provided by the University of Wisconsin-Stevens Point, The Swartz-Hart Foundation, and Wisconsin Project Loon Watch. Partial logistical support was provided by the Wisconsin Department of Natural Resources, Mercer Station. Hewitt Lake Company provided access to study lakes; M. V. Gies and J. M. Wilson assisted with field work; and M-K. W. Belant provided helpful comments for manuscript improvement.—*Jerrold L. Belant, State University of New York, College of Environmental Science and For-*

estry, Adirondack Ecological Center, Newcomb, NY 12852.

Ross' Goose (*Chen rossii*)

21 October 1990, Columbia Co.—I stopped by Goose Pond on my way to Tennessee specifically to look for waterfowl and late shorebirds; upon finding abut 40 snow geese there, I scanned all of the white geese (by habit) to look for a Ross' Goose. I did this because my experience with Ross' Geese is that they usually don't apper until mid to late October, and they are usually found with Snow Geese.

I found a Ross' Goos eon the water on the east side of the road. Short, stubby pink bill, short neck and rounded head were seen; along with dark mottling at the base of the bill. It was smaller than adjacent Canada Goose. It then flew and I observed it n flight as it circled Goose Pond with 20 blue phase Snow Geese, for about 5 minutes. smaller size and smaller (by about 1 head length) neck were readily visible, even to the naked eye at 200–300 yards. It flew west and I relocated the bird feeding in a recently-harvested corn field ner highways K and I-90/94. The bird was all white, except for the black primary feathers, indicating an adult. Its legs were pink and it stood a full head length shorter than the nearby Snow Geese. Its bill lacked the "grinning patch" seen in snow geese. The eye was dark. A Snow Goose has a larger, less stubby bill,a nd its bill has a grinning patch and lacks dark mottling at its base. A Snow Goose is also a larger bird (both species were compared side by side) and has a comparatively longer neck.—*John C. Robinson, P.O. Box 1024, Hayward, WI 54843.*

Chronology of Autumn Migrating Raptors in Ozaukee Co.

Fall, 1983–1990, Ozaukee Co., Concordia University—On the basis of 5 fall seasons spent watching migrating raptors and other birds at Concordia University in Ozaukee County, I have tried to determine the peak dates for several species. I have also recorded the highest single-day count for these migrants. Turkey Vultures are at their peak between September 20 and October 18, and the highest single-day count was 16 on 9/23/90. Ospreys are at their peak between August 25 and early October, and the highest single-day count was 30 on 9/23/88. Northern Harriers show no peak dates and migrate between late August and early December; the highest single-day count was 29 on 11/9/86. Sharp-shinned Hawks are at their peak between September 20 and October 15; the highest single-day count was 337 on 9/23/88. Cooper's Hawks are at their peak between September 15 and October 20; the highest single-day count was 15 on 9/27/86. Northern Goshawks are at their peak between October 20 and November 17; the highest single-day count was 16 on 10/25/83. Red-shouldered Hawks are at their peak between October 25 and November 25, the highest single-day count was 4 on 10/25/83. Immature Red-tailed Hawks are at their peak between August 20 and September 10, while adults peak between October 15 and November 10; the highest single-day count was 110 on 10/25/83. Rough-legged Hawks are at their peak between October 20 and the end of November; the highest single-day

count was 25 on 11/5/84. Broad-winged Hawks are at their peak between September 10 and September 25; the highest single-day count was +5,500 on 9/22/83. American Kestrels are at their peaks between August 15 and September 3 and, again, between September 20 and October 5; the highest single-day count was 42 on 10/5/85. Merlins reach their peak between September 10 and October 20; the highest single-day count was 174 on 10/6/90. Peregrine Falcons reach their peak between September 20 and October 10; the highest single-day count was 38 on 9/25/85.

Other notable observations of migrants at Concordia University include the following: 600+ Tundra Swans on 11/9/86, 380+ Killdeer on 11/9/86, 26 Franklin's Gulls on 10/6/90, a Mississippi Kite on 9/20/88, a "Harlan's" Red-tailed Hawk on 11/6/88, 150,000+ Common Nighthawks on 9/4/86, 40+ Ruby-throated Hummingbirds on 9/9/84, and 104 Red-headed Woodpeckers on 10/17/84. Other unusual sightings include Red-throated Loon, a "*Plegadis*" ibis, a Swainson's Hawk, a Willet, a Common Raven, a Bohemian Waxwing, a Pine Grosbeak, Red Crossbills, White-winged Crossbills, and 3 species of exotic parrots! A total of 173 species has been recorded.

Concordia University is located at a good concentration point for migrating birds. It lies at the bottom of a long northeast-southwest stretch of Lake Michigan shoreline. Prevailing westerly winds and the barrier of Lake Michigan channel south-bound migrants along the shoreline.—*Bill Cowart, 3518 N. Murray Ave., Milwaukee, WI 53211.*

Albino Red-tailed Hawk (*Buteo jamaicensis*)

23 August 1990, Buffalo Co., 4 miles north of Fountain City—I have previously reported (*The Loon* 62:114, 1990) the presence of an albino Red-tailed Hawk near Winona, Minnesota. My friend Sam Nottleman and I have continued to try to acquire a clear photo of that bird. In August of 1990 Sam finally succeeded in getting a good enough photo of the bird to draw the attention of the local paper and have it published along with a story of our pursuit of the hawk. The day after publication of the photo in the Winona Daily, we began to get calls from people who claimed to have seen other white hawks in the area. Most calls have proven to be dead end leads.

One caller, a farmer, who lives just across the river in Wisconsin was quite insistent that he had an albino and that we should come and see it. Sam went over the next day, August 23, to see the bird. When he returned, he called me to say that not only had he seen the hawk, but that this one was a full albino and relatively tame. Butch, the farmer who had called, told Sam that the hawk regularly hunted near the barnyard and perched in a dead tree near the base of the coulee wall. We went back the very next day and found the hawk in the indicated tree. Unfortunately, that's the last time we found him there. We have made several return trips and Sam has gotten a reasonably good photo of this hawk as well, though not of publication quality. The pursuit will continue.

The location where this hawk may be found is roughly four miles north of the Mississippi River town of Fountain City. The hawk has often been seen

along Highway 95 between Fountain City and Arcadia, near the junction with County Highway M. This hawk does not migrate south in winter. The farmer who reported it has requested that his proper name not be used, but he has told us much about the hawk. He reported that he has seen this hawk—or one just like it—for at least eight years now and that it has been resident on his property for that entire time. The linear distance between this hawk and the earlier reported albino hawk is only eight to ten miles leading to speculation that the two are likely to be related.

The white hawk is probably a female, judging by its large size when compared to the normal colored Red-tail seen with it. There is no evidence of any pigmentation on the body. All feathers are full white, or appear to be through the 60× Celestron spotting scope we have been using. It is reported to have been seen for a longer period—at least seven years vs. three years--than the other albino hawk, and is probably several years older, based on reports of area residents at both sites. Thus, we are guessing that it is likely that this albino is the mother of the partial albino reported earlier from just southwest of Winona. Such a short dispersal would not be unusual, especially since the surrounding coulee country offers so much good hawk habitat. If our theory is correct, there is a very good chance that other white Red-tails will also be found nearby, as the recessive gene for albinism should exist in many of the local, nonmigrating, Red-tailed Hawks if much inbreeding occurs in the area.

I wish to thank Sam Nottleman for bringing this hawk to my attention, and for the company in the field as we pursue it.—*Dr. Philip C. Whitford, Biology Department, Winona State University, Winona, MN 55987.*

Egg Shell Thickness of Milwaukee Peregrine Falcons

May 1989, Milwaukee Co., Milwaukee.—Much concern has been addressed to the eggshell thickness of various species of birds at the top of the food chain. It is well documented that egg shell thinning due to accumulation of pesticide residues was the major cause of the decline of the peregrine in eastern North America and elsewhere. With peregrine populations returned to nonendangered levels in the eastern U.S. and headway being made with their recovery here in the midwest, we thought it would be interesting to take a look at the thickness levels of the unhatched eggs at Wisconsin's only urban peregrine nest site atop the First Wisconsin building in downtown Milwaukee.

Three eggs were laid between 6–10 May 1989 by "Sibella," the second female peregrine to nest at the Milwaukee site. On 12 May, one of the three eggs hatched; the remaining two eggs were incubated for another 3–5 days but failed to hatch. The unhatched eggs were later removed from the nest and prepared for the Milwaukee Public Museum (MPM) collections. Once dry, they were taken to the University of Wisconsin, Madison on 22 August and weighed and measured by Dr. Stanley A. Temple.

Using the Ratcliffe eggshell thickness index (Ratcliffe, D.A., *Journal of Applied Ecology*, 7:67–113, 1979), the eggshells have a thickness index as follows: MPM VZ#2823 (index = 1.96), MPM VZ#2822 (index = 1.86). These

indices indicate a pre-DDT, normal thickness, which is a good indication that the Milwaukee environs and its birdlife are relatively free of pesticides. It would be interesting to do blood work on our urban peregrines to check for other contaminants and heavy metals.—*Annie Wendt, Wisconsin Peregrine Society, P.O. Box 1148, Milwaukee, WI 53201–1148. Greg Septon, Milwaukee Public Museum, 800 W. Wells St., Milwaukee, WI 53233.*

Peregrine Falcon Strikes Turkey Vulture

18 May 1990, Milwaukee Co., Milwaukee—At 11:35 A.M. Annie Wendt and I were on the 41st floor outer deck (elevation 584 ft.) of the First Wisconsin building. We were in the process of determining the sexes of the new brood of four eyass falcons when "McArthur" (Milwaukee's adult male peregrine) who had been sitting very near on the deck, took off in a near vertical flight kakking loudly. I was in the nest box at the time and quickly withdrew to see what all the ruckus was about. McArthur is normally pretty quiet and relaxed around us so I knew something serious was upsetting him. As I looked up at McArthur's ascending flight, Sibella (Milwaukee's adult female peregrine) came flying in from the north. I then saw what was happening. Sibella began tailing the vulture which had appeared, harrying it above the downtown area and distracting it as McArthur climbed into position. I have seen our peregrine pair hunting before in a similar manner in what seems to be a finely orchestrated and deliberate approach and so expected what was about to happen.

Suddenly, McArthur folded into a direct stoop from about 400 meters and struck the vulture a forceful blow. The vulture rolled and tumbled, but regained its flight while McArthur again climbed into position. Sibella, meanwhile, continued to harry the stricken vulture and McArthur again folded into a power driven stoop striking the vulture a second time, this time, tumbling in to the ground.

As soon as the vulture hit the ground, Sibella returned to the nest site and appeared more aggressive than normal, flying at Annie & me, obviously upset with the disturbance and our proximity to her young. We quickly and carefully left the outer deck and let Sibella return to her chicks.

It is not known if the vulture was killed as it fell into an industrial, rail and manufacturing area south of the city. Peregrines however are known to attack and kill larger birds. According to Bent (*U.S. Nat. Mus. Bull. No. 170*, 1938) "Mr Forbush (1927) cites several instances where a duck hawk (*Falco peregrinus anatum*) has attacked and killed larger birds. A Red-Shouldered Hawk was struck and its skull "split wide open;" another was struck and seen to fall. "Audubon tells of a Snowy Owl which snatched a young duck hawk from its rocky perch, but was followed by an avenging parent, which quickly struck the larger bird dead."—*Greg Septon, Milwaukee Public Museum, 800 W. Wells St., Milwaukee, WI 53233.*

Gyrfalcon (*Falco rusticolus*) at Concordia University.

18 October 1990, Ozaukee Co.—I was driving east on Mequon Rd., had just gone under I-43 and was stopped at a light. The movement of a large bird to

the north caught my eye. It was approaching low, from northeast of me, over a tree line, large, dark and circling like a buteo. Expecting to see a redtail on its next turn, now only 100–150 feet from me, I was shocked to see a very large, dark falcon-very long, extremely pointed wing and medium-long, narrow tail. The low light on this heavily overcast day, although clear with no haze, precluded getting any markings on the bird. However, subsequently watching other raptors in this same light, angle, etc., this day rule out any other raptor species, as this bird was all very dark, breast, belly, and underwings, by comparison. Besides, the very close look at a very large falcon circling and in all-out flight was very convincing. I pulled off the road quickly, got out and watched as the bird flew over my head south along the east side of the freeway, about 50 feet off of the ground. About 100 yards away, it made a sudden turn to the east. With no change in elevation, it made an all-out accelerated rush toward a dove or pigeon-sized bird 200–300 yards away. The flight of this raptor was a seemingly very easy, unhurried wingbeat, however, in immediate retrospect, the suddenness of the true distance covered was astounding. I've watched a good number of the many peregrines which move by Concordia make a sudden move and charge, or rush toward the open fields to the south. However, the only thing like this bird I've ever seen was a gyrfalcon in Superior, which seemingly effortlessly covered about 1/4 mile in an equally amazing instant. The move that this recent bird made gave the impression that a giant rubber band was attached to it and to somewhere near Lake Michigan, and someone just let go of the falcon.—*Bill Cowart, 3518 N. Murray, Milwaukee, WI 53211.*

Purple Sandpiper (*Calidris maritima*)

2 November 1990, Sheboygan Co., North Point in Sheboygan—The bird in question was the same size as the dunlins, which is why I did not pick it out immediately. The body shape was very different from the dunlins. It was "fatter" or stockier, and "built closer to the ground" than the dunlins. Its legs were shorter than the dunlins. Its back was gray-brown with lighter streaks in the feathers; its entire head, throat, and breast were uniformly gray-brown; its belly was white with some brownish streaks coming down from the breast onto the belly. Wings and tail were dark gray-brown. The wings extended approximately to the end of the tail while the bird was feeding. The legs were orange. The bill was orange on the basal third and dark on the terminal two-thirds. Also, the bill was slightly shorter and straighter than the dunlin bills, with just a hint of a downturn. I could barely see a faint white eyering. The bird fed with the dunlins for the entire viewing period. I did not see the bird fly.

On Nov. 23, my wife Margaret and I again saw the same bird, or an identical one, in the same location. This time, we observed it for about 15 minutes also, and observed the same field marks. On Nov. 25, Daryl Tessen called us to say he had also seen the bird on North Point and identified it as a purple sandpiper.—*David Brasser, 813 Logan Avenue, Sheboygan, WI 53083.*

25 November 1990, Sheboygan Co., near Sheboygan Pt. along lakeshore—A

pleasant surprise was the discovery of a purple sandpiper along the lake shoreline at Sheboygan while returning home from the Thanksgiving weekend. I had stopped just south of Sheboygan Pt. to scan the gulls sitting ont he algae-covered rocks when a shorebird head appeared from behind a rock. As the gulls were flying back and forth, the bird remained hidden behind the rocks for almost five minutes. When it finally emerged, it offered an excellent view of what I had felt it was, a winter-plumaged purple sandpiper.

It was a short, chunky shorebird with a decurved bill. The bill was black at the tip with a yellow base. The eggs were yellow-orange, with the head, upper breast, wings, back and tail being dark (purplish). The wing feathers were edged in white. A partial eyering was noted. I watched the bird feeding for almost 30 minutes at distances of 50–100 feet.—*Daryl D. Tessen, 2 Pioneer Park Place, Elgin, IL 60123.*

27 November 1990, Sheboygan Co., Sheboygan Point, Sheboygan—I arrived at Sheboygan about 9:30 A.M., parked the car about 1/2 mile north of the harbor and began walking north along the beach. There were numerous Mallards, Common Goldeneyes, Buffleheads, and a few Herring and Ring-billed Gulls not too far from shore. When I reached a flat, rocky point where the shoreline turned to the west, I found a small, plump shorebird with a slightly down-curved bill feeding in a small pool on this rocky point. The sooty dark-gray-colored head, yellowish-colored legs, and slightly down-curved bill, which was almost black at the distal end and brownish at the proximal 1/2. The base of the bill, closest to the eyes, was a fairly bright yellow. No eyering could be seen. The throat and upper breast was a sooty gray and the belly and undertail area was almost pure white. There were many fine gray streaks on the mid-breast area. The back had a gray, scaly appearance. I watched the bird from 50–75 feet away through 7×35 binoculars for 5–10 minutes, then returned to my car. I drove to a parking area next to the point, relocated the bird and watched it feed on the rocky point for another 15–20 minutes through a 20× scope. Although no eyering could be seen, a slightly paler, narrow area surrounded the eye.—*Mark S. Peterson, Box 53, Caroline, WI 54928.*

Mew Gull (*Larus canus*)

30 November 1990, Manitowoc Co., Little Manitowoc Slough.—An adult bird in winter plumage was found standing with ring-billed and herring gulls on a mud flat in the Little Manitowoc Slough area just south of Waldo Blvd. The bird first attracted my attention because of the darker mantle and its smaller size (about 1 to 1 1/2 inches smaller than the ring-billed gulls that were standing with it in the immediate area). I then walked to within about 150 feet of the birds viewing from the east looking west. This created a problem in lighting as the sun was setting and at an angle of about 10 to 20 degrees to the south. Even under these less than optimal viewing conditions, the following observations were made. The bill was noticeably slimmer and slightly shorter than the Ring-billed Gull and was without a prominant gonys. The bill also lacked the characteristic band of the Ring-billed Gulls.

Because of the lighting, I waited until the bird was standing immediately alongside a ring-billed, where the bill of each was clearly visible and observed under the same conditions. The hood was quite dark making the roundish head evident in the contrasting background. The hood included the head and washed down onto the neck. The rest of the breast and belly was white. The legs were greenish-gray in appearance. I could not determine whether iris was dark because of the lighting. The bird was not seen in flight, therefore the mirrors were not observed. The white tail, however was determined to be unmarked. The general appearance of the gull was that of a slimmer and trimmer bird than the Ring-billed Gulls as it stood and walked about the mud flat.—*Charles Sontag, 801 N. 4th Street, Manitowoc, WI 54220.*

Great Black-backed Gull (*Larus marinus*)

13 October 1990, Ozaukee Co., near Harrington Beach State Park shoreline.—On October 13, while scanning the lake for ducks and gulls off from Harrington Beach State Park, a very large immature gull appeared just south of me. It gradually worked north harassing Ring-billed and Herring Gulls. Its extreme large size (noticeably larger than the herrings) immediately made me think Great Black-backed Gull. As it wheeled back and forth after the gulls its lighter head and tail contrasted with the darker mantle and black tail band. Also, on several close passes, its large bill comparison to herrings was noted. The gull worked its way north towards Sheboygan, eventually passing out of sight.—*Daryl D. Tessen, 2 Pioneer Park Place, Elgin, IL 60123.*

17 October 1990, Manitowoc Co., Manitowoc Harbor.—A first-year bird was found standing in the company of several Herring and Ring-billed Gulls on one of the docks in the Manitowoc Marina. The bird was only slightly larger than the Herring Gulls in the immediate area. The all black bill, however, was noticeably larger with a heavy, drooped appearance. The large wedge-shaped head was evident in all angles of observation. The light head and neck contrasted with the dark mantle, which on close observation had a distinct scaled appearance, a light border on a dark feather. The wings were uniformly dark when the bird was seen in several brief flights. This also exposed the contrasting tail/rump pattern with a dark terminal tail band. The legs were pinkish-gray. The iris was dark.—*Charles Sontag, 801 N. 4th Street, Manitowoc, WI 54220.*

10 November 1990, Douglas Co., Wisconsin Point.—On November 10th, 1990, at the east corner of Allouez Bay, I was scanning a group of about 200 Herring Gulls that were gathered on the edge of new ice with my scope when a huge gull with black wings and back sailed into view. It sat for several minutes before an eagle frightened the whole group into flight. During that time, I observed that the gull was substantially larger than the Herring Gulls, had pure white underparts and tail, pinkish legs and a yellowish bill with a red spot near the top of the lower mandible. The bill was proportionately larger than those of nearby Herring Gulls. The head was white with faint winter streaking. The trailing

edges of the black wings showed white in flight. The back and wings were the same shade of jet black. I called John Robinson in Hayward and we were able to relocate the bird in the afternoon.—*Robbye Johnson, 2602 N. 28th St., Superior, WI 54880.*

14 November 1990, Douglas Co., Wisconsin Point.—Having been informed of the presence of a Great Black-backed Gull on Wisconsin Point, I subsequently searched for it on November 14, 1990 The bird, an adult, was easily found standing amongst Herring Gulls on the ice-covered portion of Allouez Bay. Viewing time was perhaps 15 minutes at approximately 200 yards. The first field mark noticed was the jet-black back and upper wings compared to the slate-gray mantle of the other gulls. It seemed at least 1/4 larger in overall size than the Herring Gulls. The yellow bill, however, was proportionately thicker throughout than that of the Herring Gulls. The head and breast were snow white. It most likely was in winter plumage, and no flecking on the head could be seen at this distance. Ruling out other possibilities was relatively easy. Lesser Black-backed Gulls should appear slightly smaller than Herring Gulls, though they may seem similar in size. Though the field marks are similar to Western Gulls, Western Gulls would be close in size to Herring Gulls and are not known to show much vagrancy away from the Pacific coast area.—*Larry Semo, Rt. 2 Box 435, Superior, WI 54880.*

Northern Hawk-Owl (*Surnia ulula*)

14 December 1990, Douglas Co., near the junction of County Highways A and B.—On December 4, 1990, I was notified by Jay and Rosalie Gallagher of a possible Northern Hawk-Owl they had seen on December 1, just east of Pattison State Park. When arriving at the location that afternoon, the bird was quickly discovered upon an elm snag. It was fairly small, ranging in size between that of a female Merlin, and a Broad-winged Hawk. The general shape, however, excluding the head, was a typical Merlin profile. The tail was exceptionally long and tapered, extending well beyond the tips of the wings. While the wings were not as lengthened as the tail, they were in themselves, long and pointed for those of an owl. The head was very owl-like, however, round and with a large facial disk. The crown and forehead were dotted with small white spots. Dark eyebrows, in a V-shaped pattern, began at the inner base of the yellow eyes and ran towards the rear of the crown. The boundary of the facial disk was strengthened by the 2 dark streaks running through the auricular region. The breast was composed of light, horizontal bars passing posteriorly to include the undertail coverts. The back was a dark brown. The feathers of the back, scapulars, and the distal primaries all had larger white spots throughout. The tail was brown but broken up by 5–6 light bands. While perched, the head was constantly moving in search of prey. It seemed very kestrel-like in both structure and behavior. It would perch on telephone wires and poles, and pump its tail in typical kestrel fashion. In flight, it again portrayed its falcon-like similarities, that is, deep, powerful downward pumping strokes, and very fast. On a number of occasions, hovering was observed, also. Inquiring with local landowners, they informed me that the bird had been present for nearly a month. One particular individual believed it was No-

vember 18 or so when it first appeared. Being conservative, this seems an appropriate date to document its initial arrival.—*Larry Semo, Rt. 2 Box 435, Superior, WI 54880.*

5 December 1990, Douglas Co., near the junction of County Highways A and B.—On December 4th, Larry Semo stopped in to tell me he had seen a hawk owl at "4 corners" just before dark. After I picked my jaw up off the floor I called several people, arranging to meet them in the morning.

I arrived at dawn to find Dave and Kathy a few feet down the road from the intersection of C.T.H. A and B with the bird in the scope. It was sitting on a power pole actively looking for prey. The following are field marks observed on that and subsequent days: It was smaller than a Barred Owl with slightly rusty brown barring across the breast and belly, a bit like an adult sharp-shin. The facial discs are outlined on the sides with a thick black edge, and on the top edge running up from the bill with white. The top of its head is dark with small white spots. The back and wings are mostly dark brown, spotted and flecked white. Its tail is long enough to belong to an accipiter, dark brown on the upper surface with thin light banding. Light patches just behind the facial disc look like large white "ears." The wings are pointed, eyes and bill are yellow.

Aptly named, this bird looks like a heavy boreal owl with an accipiters tail. It acts like a kestrel, hunting by day from tall spruce trees, power poles and lines, shifting its weight and flicking its tail, sometimes hovering. It flies like a falcon, fast and with pointed wings. In straight -away flight, has the gliding posture of a sharp-tailed grouse.—*Robbye Johnson, 2602 N. 28th St., Superior, WI 54880.*

Great Gray Owl (*Strix nebulosa*)

29 September 1990, Douglas Co., C.T.A. "A" bog, at the junction of A and Pioneer Road.—I decided to make a one day run to Superior to try for the Parasitic Jaeger that had been seen at Wisconsin Point. As I drove all Friday night I decided to try the spot along C.T.H. "A" where a Great Gray Owl had been found injured during the summer, and after rehabilitation, was released. Feeling I had no chance I parked the car at the junction and waited for dawn. After a brief sleep I got out of the car and listened. I thought I heard an owl after a few minutes, but a truck started up at a nearby house. As the owner left, the truck temporarily drowned out all sound. When it had moved away, the owl could clearly be heard-very deep single whoos. During the next minute, eight were counted-a calling Great Gray Owl. As dawn broke I walked along "A" and was surprised to find a Black-backed Woodpecker working a spruce tree.—*Daryl D. Tessen, 2 Pioneer Park Place, Elgin, IL 60123.*

22 November 1990, Douglas Co., 10 miles west of Gordon.—While birding along the north side of the upper St. Croix River on November 22, 1990, I observed a Great Gray Owl. It was initially seen in flight, travelling straight away and then landing in a tree 50 yards distant. Vegetatively, it was typical great gray habitat with old, dry beaver ponds surrounded by islands of black spruce/tamarack bogs, and black ash swamps. The very large gray body was slightly larger than a Great Horned Owl and appeared 1/3 larger than a Barred Owl, both in total length, and wingspread. The large, earless head was proportionately much larger than that of the Barred Owl.

The large facial disk was composed of concentric rings radiating out from the bright yellow eyes. A very distinct white "bow tie" beneath the bill was obvious. Beneath the bow tie, dark vertical streaks began and continued posteriorly to the undertail coverts. After viewing the bird for approximately 2 minutes, it flew from sight.—*Larry Semo, Rt. 2 Box 435, Superior, WI 54880.*

Anna's Hummingbird (*Calypte anna*)

29 November 1990, Waukesha Co., Wales—A hummingbird with a red hood, white breast, and grayish sides with some fine line markings. A greenish-gray appeared on the back and wings. It had a small white mark at the rear of the eye, the bill was dark, and it had white undertail coverts. When seen in the sun, the color of the breast and sides of the bird took on a pinkish color. On moving about, the bird flew in a direct and rapid flight. The bird would come and go to the feeder about every 10–15 minutes.

When resting, the bird looked as though it had a black hood and grey breast. When it appeared in the sun, it exploded with a red brilliance. This bird was first observed from early September up to the time of identification (11-29-90). It came to the feeders all of this time.—*Robert Adams, 118 W. Roberta Ave., Waukesha, WI 53186.*

30 November 1990, Waukesha County, Wales.—A typical hummingbird coming to a feeder every fifteen or twenty minutes, feeding, backing of and zooming away. Also seen perched in small trees to the south of the house, maybe 50 feet away. This hummer had a rose-red throat and the red came up the sides of the face and covered the crown. The back was greenish. It was a very active feeder, but would perch also. The belly was lightest, becoming darker below.

I watched the bird for about a two hour period. It seemed larger than the common ruby-throated hummer we are used to seeing in Wisconsin. I also saw the bird in the tropical dome in Milwaukee where it seemed well-adjusted. It came to a feeder of sugar water every 10–15 minutes.—*Mary F. Donald, 6918 N. Belmont Lane, Milwaukee, WI 53217.*

American Crow Captures Adult Starling

10 June 1990, Milwaukee Co., Oak Creek—It is well documented that American Crows are capable of pursuing and killing other birds. Bent (*U.S. Nat. Mus. Bull. No. 191*, 1946) states that "Depredations on poultry have been reported." For example, Mousley states that he saw 16 young chickens carried away by crows. Numerous reports have been published citing instances where crows have killed and eaten various species of small birds, and even birds as large as the partridge have been killed and eaten. In other cases, Long (*Passenger Pigeon* 52:208–209, 1990) reported the attack and killing of an immature Cooper's Hawk by a crow.

The following observation describes the actual sequence of events surrounding the capture of a starling by a crow. While driving east on Oakwood Road (630 East Oakwood Rd.) at approximately 3 P.M., I observed a crow making a rather straight forward and deliberate flight across the road just in front of me. I slowed to see whether it may have been pursuing something and watched as it landed in an oak tree just across the road from my car. The

crow landed about 5 meters up in the tree and immediately poked its head into a aged knot hole. In a matter of just a few seconds, the crow extracted its head from the hole with an adult starling held firmly in its beak. The starling was very much alive and flapped its wings madly. The crow shook its prey back and forth several times and flew off to a nearby wooded fenceline about 60–70 meters away. All during this flight, the starling continued its defiant wing flapping but this didn't seem to adversely affect the crow's ability to fly.

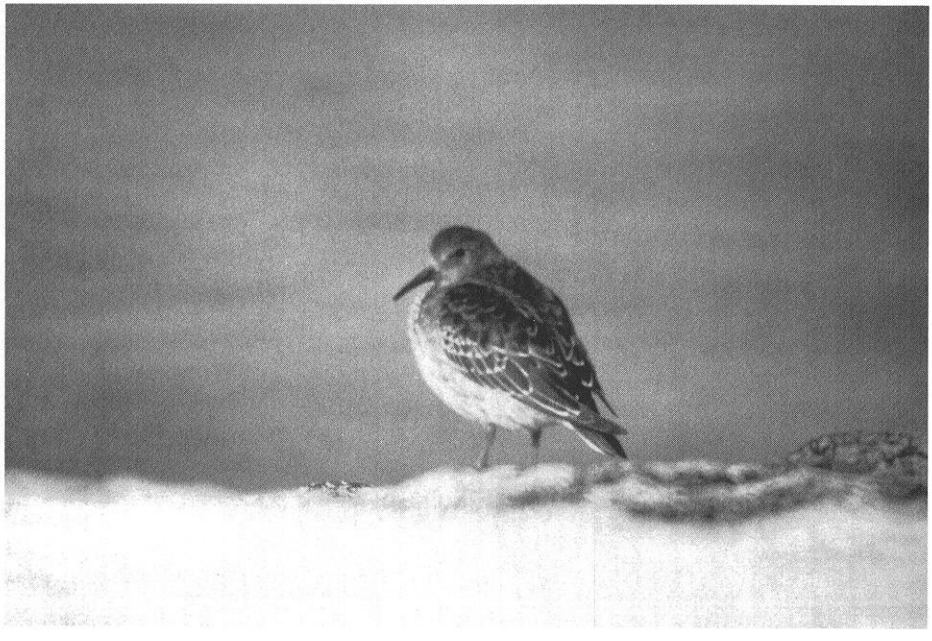
I was not able to climb to the hole in the oak tree to see if the starling had a nest there but the fact that it was early June and that this was a typical nest site, makes it very likely it did. After the fact, I wondered if the crow had initially been after the eggs, the young, or if it was truly in pursuit of the adult starling. If it was only after the eggs or the young the incident must have been a great surprise for both the crow and the starling.—*Greg Septon, Milwaukee Public Museum, 800 W. Wells St., Milwaukee, WI 53233.*

Winter Foraging by American Robins (*Turdus migratorius*)

Winter 1990–91, La Crosse Co., La Crosse—It is fairly common to find wintering robins in La Crosse, often in flocks of about 30 to 50. Frequently, they may be seen foraging for berries in hackberry trees. Because these trees line the boulevards, purple-stained bird droppings are common on parked automobiles. Water foraging by robins may be seen in gutters catching melted snow from rooftops.

Having observed robins vigorously probing the earth along foundations of buildings on the U.W.-La Crosse campus, on January 28, 1991, I gathered a sample of earth along the south side of White Hall, a dormitory separated by narrow strips of lawn on all four sides from streets, parking lots, a ball field, and another dormitory. In these strips are a few small trees and foundation bushes. The sample was from about every five feet of sixty feet of foundation. A simple gardening hand scoop was used. All soil removed was next to the foundation wall. Depth scooped was about three inches. Dr. Stuart McIlraith of the U.W.-La Crosse Biology Department placed the combined samples in four Berlese funnels for about ten days. Organisms from the soil fell into beakers of 70% alcohol. The following organisms wee found in 2.2 kg (dry weight) of soil: 1 Carabidae (Ground Beetle) larva, 7 Aphodiinae (Aphodian Dung Beetle) adults, 4 Diplopoda (millipedes), Acri (mites), Collembola (Springtails), Diplua (diplurans). It is not know how many robins were foraging at this location, nor for how long before or after the sample was taken. No robins were collected for examination of stomach or crop contents. Future sampling may help determine normal numbers of robin food items, but it would seem 12 edible organisms in 2.2 kilograms is minimal. Minimal numbers of food items may reflect intense foraging previously.—*Fred Lesher and Stuart McIlraith, UW-La Crosse, La Crosse, WI 54601.*

Northern Hawk-owl, Douglas Co., December, 1990 (*photo by Larry Semo*).



Purple Sandpiper, Sheboygan Co., November, 1990 (*photo by Charles Sontag*)

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