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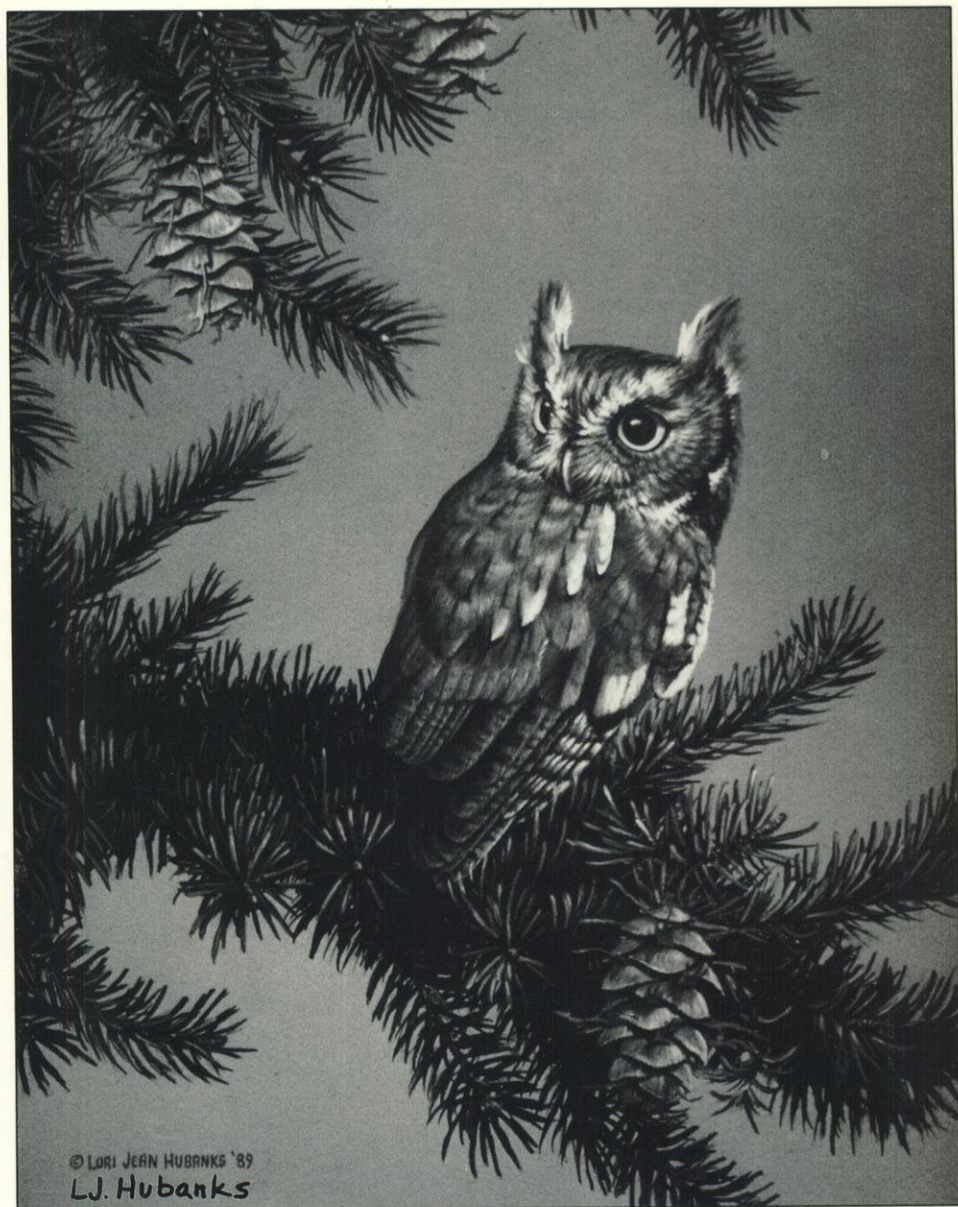


THE PASSENGER PIGEON

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T H E PASSENGER PIGEON

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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.

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WSO: A Collage of Unique Individuals

The 1360 plus members of WSO are the heart and soul of the organization. From this membership base is derived:

- The officers, board members and committee members that manage the organizations year-to year activities;
- The editors, authors, artists and field-note compilers who create and publish *The Passenger Pigeon* and *Badger Birder*;
- The guides who lead, and the individuals who participate in our field trips, both at home and abroad;
- The organizers and hosts of our outstanding annual conventions;
- The ornithologists, both amateur and professional, who through their research and records of observations, contribute the "raw material" for vital scientific, phenological or anecdotal information on Wisconsin bird life;
- The devoted laborers who provide the sweat and muscles needed for the maintenance of the buildings and land at Honey Creek Sanctuary;
- The organizers and participants of the numerous May Day Counts, Christmas Bird Counts, and Big Days; and
- The devoted individuals who staff the WSO hotline phone recorder.

The list could go on extensively, but as you can see, the on-going operation of WSO is maintained by a collage of skills, talents and expertise of the WSO members. The health of WSO has been, is, and likely always will be, tied directly to these "assets" its members voluntarily contribute to the organization. As we approach the end of 1991, I am asking you to consider contributing your unique talents and enthusiasms to WSO in 1992.

What can you do? As you plan out your calendar for 1992, here are some ideas you might consider. You'll be directly contributing to the good "health" of your organization and deriving a great deal of fun and satisfaction as well:

- If you don't already, give serious thought to recording your bird sightings and observations and submitting them to the seasonal field-note compilers; I believe there is a wealth of interesting and valuable information that is being missed simply for lack of record keeping.
- Attend one or more of WSO's field trips, whether near at home, cross-state or cross-country;
- Volunteer to help at the annual Honey Creek Sanctuary work weekend; whether you help for the entire weekend or just an afternoon, your participation would be invaluable.
- Attend one the WSO's Board of Directors' quarterly meetings; the dates and locations are published in the *Badger Birder*. Your attendance and opinions would be welcome.

- Volunteer to participate on one of the Board's committees or submit your name as having an interest in serving as chairperson of one of the committees;
- Attend the WSO's annual convention. They are always excellent, with interesting field trips to unique birding spots, paper sessions on relevant and timely subjects, and outstanding featured speakers;
- Call in your unique or interesting bird observation to the WSO hotline, so that others are given the opportunity to share in your good birding fortune.

These are just a few of the ways you can contribute to WSO and in doing so, making it a stronger and healthier organization. In 1992, consider adding your unique individual talents, interests or just plain old enthusiasm to the WSO.



President

50 years ago in *The Passenger Pigeon* Excerpts from Volume 3 (1941)

N. R. Barger describes a trip to one of our remaining favorite bird haunts—Wyalusing Park—with his wife and Sam Robbins in an article entitled “Quest of the Worm-eating Warbler in Wisconsin.” Birds observed on their May 17–18 trip included the Kentucky Warbler, which “was abundant, really a nuisance with its continuous appearance,” Blue-winged Warbler, Prothonotary Warbler and Mourning Warbler, which “distracted our attention,” Indigo Bunting, which “was undoubtedly seen more often than other small species except perhaps the Redstart,” Acadian Flycatcher, which “are no rarity there,” Yellow-bellied Flycatchers and Olive-sided Flycatchers, which “were there,” Dickcissels, which “must have arrived overnight May 17 to 18. None were observed on the way down, but the wires along the road, held many upon our return the next day.” Turkey Vulture of which “a pair followed the Wisconsin river northward,” Titmouse, which “was not infrequently heard,” and Bell’s Vireo, which was “observed at great length.” They also found their target, the Worm-eating Warbler!

Effects of Human Activities and Lake Characteristics on the Behavior and Breeding Success of Common Loons

Common Loons are more likely to be found on larger lakes with islands, hummocks and no nesting Canada Geese; loons nest more successfully on lakes with islands. The behaviors of loons on lakes with high use by people differed from those on lakes with low use by people. Conservation implications are discussed.

by Robin E. Jung

Populations of the Common Loon (*Gavia immer*) in the United States have been declining over the last half-century (Palmer 1962, McIntyre 1979), and the loon's breeding range is receding northward. Several factors have been suggested as causes for decline in loon populations, including the loss of suitable breeding habitat due to shoreline development and increased harassment of nesting loons as a consequence of greater human development and recreational pressure, especially boating activity (Plunkett 1979, McIntyre 1986, 1988a,b).

The first purpose of this study was to determine (1) what human use and environmental factors affect use of lakes by loons, and (2) how human ac-

tivities might affect loon breeding success. I hypothesized that greater recreational use on a lake and lake-shore development would correlate with loon reproductive success (indexed as the number of chicks raised to 7–8 weeks of age, just 3–4 weeks prior to fledging). I hypothesized that high-use lakes (HU; lakes with motorboats) would tend to have no loons or nonbreeding and unsuccessful loons (lost all chicks), whereas low-use lakes (LU; no motorboats) would tend to have breeding loons.

Common Loons nesting on lakes with motorboats have been shown to suffer reduced hatching success and produce significantly fewer surviving young compared to loons on lakes

where motorboats were not allowed (Hammond and Wood 1976, Titus and Van Druff 1981). Common Loon hatching success was significantly lower on larger, less remote lakes in the Boundary Waters Canoe Area in northeastern Minnesota than on smaller, remote lakes with less recreational use (Titus and Van Druff 1981). Reduced hatching success for Common Loons has been related to increased cottage development on central Ontario lakes (Heimberger et al. 1983). Other studies also report that disturbance may negatively affect Common Loon reproduction (Sawyer 1979, Christenson 1981).

On the other hand, Common Loons might be expected to habituate to humans. Barr (1986) suggested that human disturbance did not influence the low breeding success of loons in Ontario, and Smith (1981) found that canoeing activity did not have a significantly negative impact on reproductive success.

The second purpose of the study was to determine how the recreational use of lakes may affect Common Loon behavior. I hypothesized that loons on HU lakes would show different frequencies of behavior compared to loons on LU lakes (e.g., less time foraging due to disruption by human activity).

The third part of the study focused on whether loons on HU lakes have become habituated to boating activity. I hypothesized that loons on LU lakes would react differently and respond at a different mean distance from an approaching kayak than loons on HU lakes. McIntyre (1979) and Titus and VanDruff (1981) reported that Common Loons on HU lakes are "tighter

sitters" (not easily scared from their nests) and tolerate human presence at a smaller distance. Smith (1981) showed that Common Loons on lakes with canoes respond at lower mean distances when approached by canoe as compared to loons on non-canoe lakes in the Kenai National Wildlife Refuge. The extent and significance of loon habituation to human disturbance has yet to be fully understood. In addition, the apparent curiosity of loons, which often approach humans, remains to be understood.

MATERIALS AND METHODS

Lake Survey—During July 1987, I surveyed 59 lakes in nine counties of the northern Lower and eastern Upper Peninsulas of Michigan for Common Loons (Table 1). Twenty-four of the lakes had historical records of breeding loons (Table 1). For each lake, I recorded numbers of Common Loon adults and chicks, if present, as well as presence or absence of bays, islands, bogs, marsh areas, hummocks, Canada Geese (*Branta canadensis*), and Mute Swans (*Cygnus olor*). If loons were observed on a lake, I roughly estimated, using a rangefinder, the closest distance between the loon(s) and the nearest access road and house. If I did not observe loons on a lake, I interviewed lake residents to ascertain whether breeding or visiting loons used the lake. On four lakes, information on chick mortality was available through the Michigan Loon Registry program or through subsequent observations.

Lake access was categorized as: 1) no access or access by foot path only, 2) private or 3) public. Each lake was as-

signed a highest recreational use range: 1) no use, 2) people on shore or swimmers, 3) non-motorized craft, 4) motorized craft, or 5) motorized craft with waterskiers. Twenty-eight lakes were classified as low-use and 31 lakes as high-use. An estimate of rate of lake use was determined by dividing the total number of boats observed by length of observation period (boats/time).

A 15–45 power zoom spotting scope was used to count numbers of homes, cottages, and campgrounds visible around the circumference of the lake. If a house was not visible, I used docks and pathways as evidence that a house was present. If I could not see the entire shoreline, I drove around the lake, when possible, to estimate number of dwellings. Information on the number of houses around fifteen lakes was available from Gannon and Paddock (1974). H/A (number of homes and campgrounds/lake area) served as a rough index of the extent of lake development. Lake area and water depth data were available from the Michigan United Conservation Clubs (1979).

For analyses, lakes were recorded as having loons present or absent, and as having (1) no loons, (2) nonbreeding or unsuccessful loons, or (3) breeding loons (loon status). Chi-square, Mann-Whitney U tests, and logistic multiple-regression analyses were used to test for relationships between loon presence/absence and loon status and lake characteristics. Logistic multiple regression analyses estimates the probability of an either-or event occurring, such as a lake having loons or not having loons, or having non-breeding or unsuccessful loons versus breeding loons, based on multiple independent variables.

Time-Budget Analysis—To determine whether loon behavior was influenced by human lake-use factors, behavioral time-budgets were collected for breeding Common Loons on four LU (Dingman Marsh, Galloway, Malony, Roberts) and five HU (Frenchman Farm Lake Flooding, Indian River Spreads, Twin, Wycamp, Douglas) lakes in Cheboygan and Emmet counties. Preliminary time budgets, not used in subsequent analyses, were collected on HU and LU lakes to develop a reasonable ethogram and sampling time-frame. I collected 35 time budgets (17 for LU, 18 for HU) between 1–27 July 1987. For most lakes, four time budgets were collected, one in each of the periods from 0700–1000, 1000–1300, 1300–1600, and 1600–dusk. Loons were observed from a distance of at least 100 meters using a 15–45 m zoom spotting scope. Any of thirty-five behaviors (see Sjolander and Agren 1972, McIntyre 1979; Table 2) exhibited by all individuals of a family present on the lake were tallied every fifteen seconds during a one-hour period. These included: swimming, stationary/drifted, flying, surface dive, splash dive, tremolo, wail, hoot, yodel, doze (tuck head), head over back, wings outspread, wiggle tail, hunched posture, head/bill snake, bill open, preening, belly up, flap wings, splash wings in water, bill up, head over back, low in water, eating, adult feeding chick, adult carrying food, peering, bill in water (semi-peer), chick diving, chick foraging, adult absent from lake, adult away from chick, chick on adult's back, chick pokes adult, and touch bills.

The number of loons observed ranged from one adult and one chick

to two adults and two chicks. According to descriptions of chick plumage and behavior (Bent 1919, Olson and Marshall 1952), chicks were two to three weeks old at the beginning of the study. Behaviors were not exclusive, i.e., I assigned more than one behavior on the 15th second to a loon if it was exhibiting more than one behavior. Except for adult absent from lake and total behaviors, frequencies for each behavior in a time budget were figured by summing the number of times a spe-

cific behavior was recorded and dividing by the number of loons observed.

In the text, behaviors and lake use factors preceded by "total" indicates the total number of times this behavior or lake use variable was observed during the hour-long time budget period. The lake use factors recorded during the time budget included the numbers of non-motor boats (sailboats, rowboats, canoes) and motorboats using the lake, as well as numbers of people swimming or on shore.

Table 1. Twenty-three variables measured for 59 lakes in nine counties of Michigan.

County and Lake	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
ALGER																							
Long ¹	47.4	1	2	0	0	0	4.6	1	1	0	1	0	2	2	0	0	0	0	0	X	X	X	0.0
Nevins	111.7	0	0	1	4	2	5.5	1	1	0	1	1	0	0	X	0	0	3	0	X	X	X	1.0
CHARLEVOIX																							
Deer	172.4	0	0	1	3	2	X	0	0	0	1	0	0	0	X	0	0	0	56	X	X	X	6.0
Louise/Thumb ¹	190.6	0	0	1	3	2	X	1	0	0	0	0	0	0	X	1	0	2	46	X	X	X	12.0
Wallow	1728.0	1	1	1	7	2	30.5	1	0	0	1	0	2	0	X	1	1	3	628	X	X	X	20.0
CHEBOYGAN																							
Barite	4.9	0	0	0	0	0	X	0	0	1	0	0	0	0	X	0	0	0	0	X	X	X	0.0
Burt	6758.3	1	1	1	4	2	22.3	1	0	0	0	0	5	0	X	1	1	0	715	X	X	X	X
Cochran	11.3	0	0	0	1	2	4.3	0	0	0	0	0	0	0	X	0	0	0	0	X	X	X	0.0
Devereux	15.4	0	0	0	2	2	X	0	0	0	0	0	0	0	X	0	0	0	26	X	X	X	0.0
Dingman																							
Marsh ¹	303.5	1	2	0	1	1	X	0	1	0	1	1	2	1	X	1	0	0	0	X	X	139	0.0
Doughs ¹	1373.9	1	2	1	3	2	24.1	1	1	0	1	0	4	1	X	1	1	1	270	X	179	100	8.0
Edio	10.1	0	0	0	2	1	X	0	0	0	0	0	0	0	X	0	0	0	1	X	X	X	0.0
Indian																							
River ¹	193.0	1	2	1	4	2	X	1	0	0	1	1	2	2	0	1	1	0	162	X	X	X	20.0
Lake 33 ¹	1.6	0	0	0	0	0	X	0	0	0	0	0	0	0	X	0	0	0	0	X	X	X	0.0
Lance	10.1	0	0	1	3	2	24.4	0	0	0	0	0	0	0	X	0	0	0	228	X	X	X	0.0
Long	159.9	0	0	1	7	2	19.5	0	0	0	1	0	0	0	X	0	1	0	87	X	X	X	18.0
Malony ¹	13.0	1	2	0	0	0	X	1	1	1	0	1	3	1	X	0	0	0	0	0	X	X	0.0
Mud ¹	10.1	1	1	0	0	0	0.9	0	1	1	1	1	2	0	X	0	0	0	0	0	X	X	0.0
Mud Lake																							
2	3.2	0	0	0	0	0	X	0	0	1	0	0	0	0	X	0	0	0	0	0	X	X	0.0
Munro ¹	280.9	1	1	1	7	2	739	1	0	0	0	0	1	0	X	0	0	0	59	X	X	X	15.0
Osman	16.6	1	1	0	2	1	3.1	0	1	0	1	1	1	0	X	0	0	0	1	0	X	X	6.0
Reswell	17.4	1	1	1	3	1	X	0	0	0	1	1	2	0	X	0	0	0	1	1	201	201	0.0
Roberts ¹	21.5	1	2	0	1	1	1.2	0	1	0	1	1	2	2	0	0	0	0	0	0	X	402	0.3
Silver	31.2	0	0	1	4	2	27.4	0	0	0	0	0	0	0	X	0	0	1	44	X	X	X	6.0
Twin ¹	85.0	1	2	1	3	1	X	1	1	0	1	1	2	1	1	1	1	1	110	1	426	402	3.0
Wildwood ¹	89.8	1	2	1	4	2	5.5	0	1	0	1	0	2	1	1	1	1	1	54	X	X	X	2.0
CHIPPEWA																							
Andrus	13.4	0	0	0	2	2	X	0	0	0	1	0	0	0	X	0	0	1	0	X	X	X	0.0
Frenchman ¹	79.7	0	0	1	4	2	8.5	0	1	0	1	1	0	0	X	0	0	1	5	X	X	X	0.0
Johnson	17.4	0	0	1	3	1	4.6	0	0	0	0	0	0	0	X	0	0	0	6	X	X	X	0.0
McNairy	49.0	0	0	1	4	1	7.6	0	0	0	0	0	0	0	X	0	0	0	20	X	X	X	0.0
Piatt	102.0	0	0	1	4	1	18.3	1	0	0	1	0	0	0	X	X	X	0	100	X	X	X	2.0
Walker	6.5	1	1	0	2	2	1.5	0	0	1	0	0	2	0	X	X	X	1	0	0	X	X	0.0
EMMET																							
Arnott	12.0	0	0	0	1	1	X	0	0	0	0	0	0	0	X	0	0	0	1	X	X	X	0.0
Crooked	971.3	0	0	1	4	2	20.7	1	1	0	1	0	0	0	X	0	1	3	317	X	X	X	21.0
French																							
Farm ¹	324.6	1	2	1	3	2	3.1	1	1	0	1	1	3	2	X	0	0	1	0	0	X	304	12.0
Galloway ¹	10.5	1	2	0	0	0	X	0	0	1	0	1	2	1	1	0	0	0	0	0	X	X	0.0
Larks	238.8	0	0	1	4	2	2.4	0	0	0	1	0	0	0	X	0	0	0	36	X	X	X	6.0
Lawrence	13.0	0	0	0	1	1	X	0	1	0	1	1	0	0	X	0	0	0	1	X	X	X	0.0
O'Neal ¹	52.6	1	2	0	1	2	X	1	1	0	1	1	1	2	1	X	0	0	1	0	804	1609	0.0
Paradise	760.0	1	1	1	4	2	4.6	1	0	0	1	0	2	0	X	1	1	7	364	X	X	X	26.0
Pickrel	426.9	0	0	1	4	2	6.4	1	0	0	1	0	0	0	X	0	1	0	122	X	X	X	54.0
Round ¹	133.1	1	2	1	4	2	4.0	1	0	0	0	0	2	1	1	1	1	1	53	4	170	402	8.0
Wycamp ¹	263.1	1	2	1	3	2	2.1	1	1	1	1	1	3	2	X	0	0	1	1	1	402	402	14.0

(continued)

Spearman rank correlations were used to test relationships between behavioral frequencies and number of motorboats and total boats (non-motorized plus motorized craft). Nested ANOVAs, nesting lakes within HU and LU categories, were used to test for significant differences in behavioral frequencies on HU versus LU lakes.

Human-Disturbance Experiment—Between 23–31 July 1987, I approached loons in a kayak on three LU and four HU lakes. The distance at which single and breeding pairs of loons first reacted (for example, by swimming away, diving, or vocalizing) to an approaching kayak was determined using a rangefinder. I recorded the first detectable behavioral re-

Table 1. (Continued)

County and Lake	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
LUCE																							
Bodi	123.8	0	0	1	3	2	X	1	0	0	1	0	0	0	X	X	X	1	2	X	X	X	0.0
Camp & Pool	26.7	0	0	0	2	1	22.6	1	0	0	0	0	0	0	X	0	0	0	3	X	X	X	0.0
Culhane	39.7	1	1	1	3	2	14.9	0	0	0	1	0	1	0	X	0	0	1	2	X	X	X	0.0
Perch	51.0	0	0	1	3	2	15.2	1	0	0	0	0	0	0	X	0	0	1	10	X	X	X	0.0
Pretty MACKINAC	19.0		1	10	1	2	20.7	0	0	0	0	0	1	0	X	0	0	1	0	X	X	X	0.0
Cranberry ¹	9.7	0	0	0	0	0	X	0	0	1	0	0	0	0	X	0	0	0	0	X	X	X	0.0
PRESQUE ISLE																							
Loon ¹	27.1	1	1	0	2	1	X	0	0	0	1	0	1	0	X	0	0	0	2	1	402	402	0.0
Shoepack ¹	18.2	0	0	1	3	2	6.1	1	0	0	1	0	0	0	X	0	0	1	5	X	X	X	18.0
Tomahawk																							
Creek ¹	16.2	1	1	1	3	2	X	0	0	0	0	0	1	0	X	0	0	1	0	X	X	X	44.0
SCHOOLCRAFT																							
A-1 Pool	101.2	0	0	0	0	2	3.1	1	1	1	1	1	0	0	X	X	X	1	0	X	X	X	0.0
C-3 Lake ¹	165.9	1	1	0	0	1	3.1	1	1	0	1	1	2	0	X	1	0	0	0	X	X	X	0.0
Cusino	56.7	1	1	0	1	2	11.0	0	0	0	1	0	4	0	X	0	0	1	0	X	X	X	0.0
F-Pool	109.3	0	0	0	2	2	3.1	1	1	0	1	1	0	0	X	1	0	0	0	X	X	X	0.0
G-Pool ¹	80.9	1	2	0	0	X	3.4	4	4	0	1	1	2	1	X	0	0	0	0	X	X	X	0.0
M-12 Pool	242.8	1	2	0	0	2	3.1	1	1	0	1	1	2	2	0	1	0	0	0	0	X	X	0.0
Ross	7435	1	1	1	3	2	6.1	1	1	0	1	0	2	0	X	0	0	1	6	5	100	402	5.0

¹Historical record of breeding loons on the lake.

X = Missing data.

A = Lake area (ha).

B = Loon: 0 = absent, 1 = present.

C = Loon status: 0 = none, 1 = nonbreeding or unsuccessful, 2 = breeding.

D = LU/HU: Low use = 0, High use = 1.

E = Use Range: 0 = no use, 1 = people on shore or swimmers, 2 = nonmotorized craft, 3 = motorized craft, 4 = motorized craft and waterskiers.

F = Access: 0 = no access or foot path only, 1 = private access, 2 = public access.

G = Water depth (m).

H = Bay: 0 = absent, 1 = present.

I = Island: 0 = absent, 1 = present.

J = Bog: 0 = absent, 1 = present.

K = Marsh: 0 = absent, 1 = present.

L = Hummock: 0 = absent, 1 = present.

M = Number of adult loons.

N = Number of chicks.

O = Number of chicks lost.

P = Canada Geese: 0 = absent, 1 = present.

Q = Mute Swan: 0 = absent, 1 = present.

R = Number of campgrounds.

S = Number of homes.

T = Number of homes within 500 meters of loons.

U = Distance from loons to nearest house (m).

V = Distance of loons to nearest road (m).

W = Boats/time.

sponse and noted whether the loon(s) dove or tremoloed. On two occasions, I measured distance to first response to motorboats. A Wilcoxon rank-sum test was used to compare the loon's mean distance to first response on LU versus HU lakes.

RESULTS

Lake Survey—Lakes which had loons ($n = 30$) were more likely to have islands ($\chi^2 = 5.396$, d.f. = 1, $P = 0.0202$) and hummocks ($\chi^2 = 5.676$, d.f. = 1, $P = 0.0172$) and were less likely to have Canada Geese ($\chi^2 = 5.371$, d.f. = 1, $P = 0.0205$) than were lakes without loons. Loon status was related in a similar way to islands, hummocks and Canada Geese ($\chi^2 = 18.49$, d.f. = 2, $P = 0.0001$; $\chi^2 = 16.27$, d.f. = 2, $P = 0.0003$; $\chi^2 = 7.31$, d.f. = 2, $P = 0.0259$, respectively). The presence or absence of bays, bogs, marsh areas, Mute Swans, as well as HU vs. LU lakes, lake access, and boats/time were not related to loon presence or absence or loon status.

The number of loons on a lake correlated positively with lake area ($r = 0.322$, $n = 59$, $P = 0.013$). Correlations between lake area and distance of loons to nearest house or access road were not significant. Lakes occupied by loons tended ($U = 320$, $n = 59$, $P = 0.081$) to be larger ($173.7 + 223.15$ ha); ($106.4 + 190.98$ ha), and larger lakes were significantly more often HU lakes ($U = 157$, $n = 59$, $P < 0.0001$). Lakes occupied by loons did not differ significantly ($U = 352$, $n = 59$, $P = 0.205$) in lakeshore development (H/A mean + SD = $0.24 + 0.36$) from lakes not occupied by loons ($0.35 + 0.54$).

Loons with one-chick broods were

found on lakes similar in size ($126.9 + 127.24$ ha) to lakes with two-chick broods ($182.1 + 122.15$ ha) ($U = 21$, $P = 0.479$). There also was no difference ($U = 22$, $n = 15$, $P = 0.535$) in lakeshore development for lakes with one- vs. two-chick broods (one-chick broods: $H/A = 0.28 + 0.443$; two-chick broods: $0.14 + 0.342$). Over one-third of the loon pairs with one-chick broods and two-thirds of the loon pairs with two-chick broods were found on lakes with no shoreline development ($H/A = 0.00$). Mean brood size in this study was $1.4 + 0.51$ chicks, which corresponds with results from other Michigan loon reproduction studies (Robinson et al. 1987).

Logistic-multiple regression analyses were conducted to determine lake characteristics associated with loon presence vs. absence as well as breeding vs. nonbreeding or unsuccessful loons. Factors used in the analysis were lake area, LU vs. HU, lake access, use range, presence or absence of bays, islands, bogs, marshes, hummocks, Canada Geese, Mute Swans, H/A, and boats/time. The best predictors of loon presence vs. absence were hummocks and Canada Geese (model $\chi^2 = 13.635$, d.f. = 2, $P = 0.0011$). Nonbreeding or unsuccessful loons were distinguished from breeding loons on the basis of islands (model $\chi^2 = 6.499$, d.f. = 1, $P = 0.0108$).

Time-Budget Analysis—Loons showed significant differences on LU vs. HU lakes in the following behaviors ($n = 35$ in all cases): swimming ($F = 12.55$, $P = 0.002$), stationary ($F = 7.75$, $P = 0.01$), adult carrying food ($F = 5.81$, $P = 0.023$), peering ($F = 6.79$, $P = 0.015$), adult away from chicks ($F = 18.91$, $P < 0.001$), preening ($F =$

10.68, $P = 0.003$), dozing ($F = 4.96$, $P = 0.035$), flapping wings ($F = 11.01$, $P = 0.003$), chick foraging ($F = 68.32$, $P < 0.001$), and total fed chick ($F = 6.10$, $P = 0.02$). Swimming, adult carrying food, peering, preening, flapping wings, and chick foraging showed higher frequencies by loons on the HU lakes, whereas loons showed higher frequencies of stationary, adult away from chicks, dozing, and total fed chick on the LU lakes. Of 40 (including total) behavioral variables analyzed, one could expect at least two behaviors to be significantly different (at $P = 0.05$) between LU and HU lakes by chance alone. Twenty-three of the behaviors also showed significant differences among lakes within the LU and HU categories; this indicates either significant differences among lakes or among loon families, since only one family of loons was observed on each lake.

Several behaviors were positively correlated with total boats (number of non-motor boats plus motorboats) on a lake, including swimming ($r = 0.350$, $P = 0.039$), wailing ($r = 0.394$, $P = 0.019$), splash diving ($r = 0.431$, $P = 0.01$), and preening ($r = 0.364$, $P = 0.031$) ($n = 35$ in all cases). Adult absent from lake ($r = -0.330$, $P = 0.053$) was almost significantly negatively correlated with total boats.

Wailing ($r = 0.430$, $P = 0.01$) and splash diving ($r = 0.363$, $P = 0.032$) were positively correlated with number of motorboats, whereas hunched posture ($r = -0.374$, $P = 0.027$) and eating ($r = -0.352$, $P = 0.038$) were negatively correlated with motorboats. Swimming ($r = 0.329$, $P = 0.053$), preening ($r = 0.305$, $P = 0.075$), total wailing ($r = 0.317$, $P = 0.064$), and bill up ($r = 0.325$, $P = 0.057$) showed a

tendency to be positively related to the number of motorboats.

Loon Response to Approaching Kayak—Loons on LU lakes responded to a kayak at a mean distance approximately twice that of loons on HU lakes (distance at first response for LU: $140 + 40$ m, range = 100–180 m, $n = 3$; HU: $74 + 43$ m, range = 39–180 m, $n = 10$) (Wilcoxon rank sum test, $W = 32.5$, $P = 0.049$). Loons on HU lakes appeared to tremolo less (40% of trials vs. 67%) and dive more frequently (50% vs. 0%) in response to the approaching kayak than loons on the LU lakes, although sample sizes were small. On two occasions on HU lakes, loons first responded to motorboats by swimming away rapidly when motorboats were 180 and 260 m away.

DISCUSSION

Correlates of Loon Presence and Breeding Success—Most historical accounts specify that loons prefer large, deep lakes devoid of emergent vegetation (Bent 1919, Olson and Marshall 1957, Vermeer 1973, Alvo 1981, Yonge 1981). However, Common Loons in northern Michigan are found on a wide range of lake types (bogs, marshes, reservoirs, etc.), which corresponds with McIntyre's (1979) findings for loons in Minnesota.

In Wisconsin, Blair (1990) found that various lake-quality variables—elevation, extractable aluminum, level of ammonia, and surface area—explained 68.2% of the variance in predicting the presence or absence of Common Loons. In the present study, Common Loons were present on lakes with hummocks and Canada Geese, and successfully breeding as compared to non-

breeding or unsuccessful loons were found more frequently on lakes with islands (see also Dahmer 1986).

Many previous studies also show that the majority of loons prefer to nest on islands, where they may be protected from such predators as mink, skunks, and raccoons (Yeates 1950, Olson and Marshall 1952, Vermeer 1973, McIntyre 1975, Titus and VanDruff 1981). Vermeer (1973) found a positive correlation between numbers of breeding loon pairs and islands, and McIntyre (1977) showed that loons had higher nesting success on islands compared to the mainland. Although I did not locate nests, most of the breeding loons in this study probably nested on islands. Although three of 15 pairs of breeding loons were found on a lake without islands, for two of these pairs hummocks were available on which to nest. Loons have also been shown to prefer nesting in marsh (Alvo 1981) and backwater areas (Strong 1985), but marshes were not significantly preferred by breeding loons in this study.

Vermeer (1973) found a negative correlation between numbers of breeding loon pairs and "disturbance ratio," which is similar to my H/A variable. However, in my study, recreational and shoreline development factors (HU vs. LU, H/A) did not significantly predict loon presence or absence or status. McIntyre (1979) also found no relationship between loon presence or absence and amount of recreational use. She did, however, report a surprising positive relationship between proportion of nesting pairs with young and recreational use. McIntyre (1979) also suggested that the probability of raising a two-chick brood was greater on larger lakes; in

the present study, two-chick broods ($n = 6$) were also found on relatively larger lakes than were one-chick broods ($n = 9$), although the difference was not significant.

Two loon pairs which lost their single-chick broods were on relatively small lakes (89.8 and 133.1 ha) which had waterskiiers, as well as extensive shoreline development (H/A ratios of 0.61 and 0.41). Although the exact locations of nests were unknown, they were presumably quite close to homes and human activities. Dahmer (1986) reported that proximity to human activity was the factor most closely related to loon nesting failure.

In contrast, the breeding pairs on two of the large, HU lakes (Indian River Spreads, French Farm Lake Flooding) successfully raised two chicks. Both of these lakes had areas away from boating traffic where loons could raise their chicks with little probability of disturbance. For example, although approximately 20 boats/hr and up to 140 boats/day on weekends passed through a narrow waterway on the Indian River Spreads, the loons stayed within the relatively undisturbed confines of a shallow bay approximately one-half mile from the boating route. It appears, therefore, that the presence of a refuge in a large lake can mask the negative effects of HU and human disturbance (McIntyre 1979).

My results suggest (see also Dahmer 1986) that breeding loons on larger lakes may locate nests further away from areas of human activities than do unsuccessful loons on smaller lakes. I could not determine whether breeding loons were using areas on lakes furthest away from potential human activity. The lack of significant

differences between lake area and distance to nearest house or road access for nonbreeding and unsuccessful loons vs. breeding loons suggested that requirements of Common Loons for nesting, feeding, nursery areas or avoiding predators may override avoidance of human disturbance.

Correlates of Behavior—Ten significant behavioral differences were noted between loons on HU and LU lakes. Loons were less stationary and wailed more on HU than on LU lakes. This difference is presumably due to greater disturbance on HU lakes, since wailing and swimming were significantly positively correlated with total boats on the lake. Wailing, used by a loon if it is separated from a mate or chicks (Barklow 1988), was significantly more common on HU lakes, probably because interactions between loons are more commonly disturbed on HU lakes. Also, chicks on LU lakes were fed more, and chicks on HU lakes foraged significantly more than did chicks on LU lakes. Whether these behavioral differences translate into differences in reproductive success for loons on HU vs. LU lakes is unknown.

My study was conducted when the chicks were already two weeks old, beyond the critical stage of mortality (McIntyre 1988a) and after the point at which adult loons are presumably most sensitive to human disturbance. The results of this study, therefore, do not preclude the possibility that more significant behavioral difference between loons on HU vs. LU lakes may be evident earlier in the breeding season.

The mean distance to first reaction of loons on LU lakes (140 ± 40 m) corresponds with the mean flushing

distance (110 m) reported by Smith (1981) for loons in response to canoes on lakes normally without canoes. As in my study, Titus and Van Druff (1981) approached nesting loons in a canoe and found that loons on lakes with motorboats flushed from their nests at a significantly lower average distance (11.2 m, $n = 6$) than loons on lakes without motorboats (32.7 m, $n = 20$). Titus and VanDruff (1981) concluded that loons on LU lakes tended to flush more frequently and to a further distance from the nest, vocalize more and show a greater degree of agitation than loons on HU lakes. In my study, loons tremoloed in a greater percentage of trials on the LU lakes as compared to HU lakes. The tremolo is the loon alarm call associated with a tendency to flee (Barklow 1979). In contrast, loons on HU lakes tended to dive or to swim away less quickly. On certain occasions, loons on HU lakes actually approached the kayak.

I observed two loons (on Wycamp and Twin lakes) swimming rapidly and running across the water while tremoloing (McIntyre 1988a) when motorboats came within 180 and 260 m, respectively. It appeared that these behavioral responses were much more extreme than any observed in response to non-motorized craft. Although not quantified in the present study or in any other of which I am aware, the noise, number of people in, and size of a motorboat might also influence the reaction of loons to motorboats.

Implications for Conservation—Common Loon population recovery plans have concentrated on public education and protection of existing nest sites (Sutcliffe 1979, Wood 1979). The latter is important, because Strong et al.

(1987, p. 123) report a 78–88% reuse of nesting areas and 57–86% “year-to-year spatial overlap of nurseries in individual territories.” Thus, if records of loon nesting and nursery areas are available, protection of known nesting and nursery areas is an appropriate management strategy. Substantial information has also been compiled to indicate which lake characteristics and human use factors correlate with the presence of breeding loons. In the present study, for example, lakes with islands seem to be preferred by loons for nesting. Thus, lakes with islands might be particularly appropriate for protection efforts.

In my study, loons were sighted a mean distance of 1,200 m from the nearest house, and roads closest to the lake and/or boating ramps were located a mean distance of 1,423 m from loons. Heimberger et al. (1983) found that increasing numbers of cottages within 150 m of a loon nesting site decreased loon hatching and nest success. More information concerning where loons situate their nests in relation to lake developments is needed in order to determine the size of buffer zones.

Loon recovery programs should also consider boating traffic on a lake during the loon reproduction season. Chicks tend to stay in shallow water areas, less than 150 m from shore, and Strong and Bissonette (1989, p. 72) suggest that “near-shore recreation may be more detrimental to loons than man’s activities in deep, open water.” Thus, water depths of less than 3 meters, which constitute chick-rearing habitat, could be designated off-limits to recreational users during the loon breeding season (Strong and Bissonette 1989). Keeping boats 150 m

from shores of lakes or islands would help to ensure that adult loons are not ousted from their nests (potentially damaging eggs or causing parents to abandon nesting efforts), and that chicks are not separated from adults or forced into deep, open waters where they are in danger from pike and other predators, as well as motorboats.

Another population recovery strategy for loons involves artificial islands. Artificial islands have been used successfully as nest sites by loons, increasing nesting success by as much as 59% (McIntyre and Mathisen 1977, Sutcliffe 1979). Therefore, lakes which do not have islands or hummocks, but are low use, have low H/A ratios and favorable lake qualities (i.e., little water fluctuation, high fish numbers, water clarity, pH > 6.0), and are larger than 25 acres (McIntyre 1979) would be good candidates for artificial islands.

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LITERATURE CITED

- Alvo, R. 1981. Marsh nesting of Common Loons (*Gavia immer*). *Canadian Field Naturalist* 95:357.
- Barklow, W. 1979. Graded frequency variations of the tremolo call of the Common Loon (*Gavia immer*). *Condor* 81:53-64.
- Barklow, W. E. 1988. The structure and function of the wail call of the Common Loon. P. 53. In: Paul Strong (ed.), *Papers from the 1987 conference on Common Loon Research and Management*. North American Loon Fund, Meredith, NH 214 pp.
- Barr, J. F. 1986. Population dynamics of the Common Loon (*Gavia immer*) associated with mercury-contaminated waters in northwestern Ontario. *Canadian Wildlife Service, Occasional Paper* 56:3-25.
- Bent, A. C. 1919. Life histories of North American diving birds. *U.S. National Museum Bulletin* 107:47-62.
- Blair, R. B. 1990. Water quality and the summer distribution of Common Loons in Wisconsin. *Passenger Pigeon* 52:119-126.
- Christenson, B. L. 1981. Reproductive ecology of and response to disturbance by common loons in Maine. MS thesis. University of Maine, Orono.
- Dahmer, P. A. 1986. Use of aerial photographs to predict lake selection and reproductive success of common loons in Michigan. MS thesis. University of Michigan, Ann Arbor.
- Dulin, G. 1987. Pre-fledging feeding behavior and sibling rivalry in Common Loons. MS thesis. Central Michigan University, Mt. Pleasant.
- Gannon, J. E. and M. Paddock. 1974. *Investigations into ecological and sociological determinants of land-use decisions: a study of an inland lake watershed in northern Michigan*. The University of Michigan Biological Station, Pellston, Michigan.
- Hammond, D. E. and R. L. Wood. 1976. *New Hampshire and the disappearing loon*. The Loon Preservation Committee, Humiston Building, Main St., Meredith, NH.
- Heimberger, M., D. Euler, and J. Barr. 1983. The impact of cottage development on Common Loon reproductive success in central Ontario. *Wilson Bulletin* 95:431-439.
- McIntyre, J. W. 1975. Biology and behavior of the Common Loon (*Gavia immer*) with reference to its adaptability in a man-altered environment. Ph.D. thesis. University of Minnesota, Minneapolis.
- McIntyre, J. W. 1977. The Common Loon. Part II. Identification of potential predators on common loon nests. *The Loon* 49:96-99.
- McIntyre, J. W. 1979. Status of Common Loons in New York from a historical perspective. *Proceedings of the North American Conference on Common Loon Research and Management* 2:117-122.
- McIntyre, J. W. 1986. The common loon. Pp. 679-695. In: R. L. Di Silvestro (ed.), *Audubon Wildlife Report* 1986. National Audubon Society, New York, NY. 1094 pp.
- McIntyre, J. W. 1988a. *The Common Loon: Spirit of Northern Lakes*. University of Minnesota Press, Minneapolis, MN.
- McIntyre, J. W. 1988b. The Minnesota Report: a 15-year survey comparison. Pp. 118-130. In: P. Strong (ed.), *Papers from the 1987 conference on Common Loon Research and Management*. North American Loon Fund, Meredith, NH. 214 pp.
- McIntyre, J. W. and J. E. Mathisen. 1977. Artificial islands as nest sites for Common Loons. *Journal of Wildlife Management* 41:317-319.
- Michigan United Conservation Clubs. 1979. P.O. Box 30325, Lansing, MI 48909. Base maps prepared by the Michigan Department of Natural Resources.
- Olson, S. T. and W. H. Marshall. 1952. The common loon in Minnesota. *Occasional Papers of the Minnesota Museum of Natural History* 5:1-77.6
- Palmer, R. S. (ed.). 1962. *Handbook of North American birds*. Vol. 1. Yale Univ. Press, New Haven, CT. 567 pp.
- Plunkett, R. L. 1979. Major elements of a five-year comprehensive plan of research and management for the Great Lakes and north-eastern United States populations of the common loon, *Gavia immer*. *Proceedings of the North American Conference on Common Loon Research and Management* 2:145-162.
- Robinson, W. L., T. D. DeBruyn, and R. Sawicki. 1987. *A survey of breeding loons in the eastern Upper Peninsula and northern Lower Peninsula of Michigan*, 1986. N. Michigan Univ., Marquette, MI. 27 pp.
- Sawyer, L. E. 1979. Maine Audubon Society loon survey 1978. *Proceedings of the North American Conference on Common Loon Research and Management* 2:81-100.
- Smith, E. L. 1981. Effects of canoeing on Common Loon production and survival on the Kenai National Wildlife Refuge, Alaska. MS thesis. Colorado State University, Fort Collins.
- Strong, P. I. V. 1985. Habitat selection by Common Loons. PhD thesis. University of Maine, Orono.
- Strong, P. I. V. and J. A. Bissonette. 1989. Feeding and chick-rearing areas of Common Loons. *Journal of Wildlife Management* 53:72-76.
- Strong, P. I. V., J. A. Bissonette, and J. S. Fair. 1987. Reuse of nesting and nursery areas by

- Common Loons. *Journal of Wildlife Management* 51:123-127.
- Sutcliffe, S. A. 1979. Artificial Common Loon nesting site construction, placement and utilization in New Hampshire. *Proceedings of the North American Conference on Common Loon Research and Management* 2:147-152.
- Titus, J. R. and L. W. VanDruff. 1981. Response of the common loon to recreational pressure in the Boundary Waters Canoe Area, Northern Minnesota. *Wildlife Monographs* 79:1-60.
- Vermeer, K. 1973. Some aspects of the nesting requirements of Common Loons in Alberta. *Wilson Bulletin* 85:429-435.
- Wood, R. L. 1979. Management of breeding loon populations in New Hampshire. *Proceedings of the North American Conference on Common Loon Research and Management* 2:141-146.
- Yeates, G. K. 1950. Field notes on the nesting habits of the Great Northern Diver. *British Birds* 43:5-8.
- Yonge, K. S. 1981. The breeding cycle and annual production of the Common Loon (*Gavia immer*) in the boreal forest region. MS thesis. University of Manitoba, Winnipeg.
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Common Loon by Lori Jean Hubanks.

Prey of Breeding American Kestrels in Central Wisconsin During 1991

Analysis of 685 kestrel pellets, collected from April 11 until August 8, showed there were four principal prey groups in the pellet contents. Mammals occurred in 66.8% of all pellets, insects in 66.1%, birds in 22.5%, and snakes in 6.3%. Insects were high throughout the season except in mid June. When insets were scarce a higher proportion of mammals appeared in the pellets and vice versa. The abundance of the birds was correlated with their fledging period. Finally, snakes were represented only from mid May until early August.

by Felix Manuel Guerrero Gonzalez

The early studies of the food habits of the American Kestrel (*Falco sparverius*) were based upon examination of stomach contents (Brodkorb 1928, Knolton and Telford 1947), often to determine whether the kestrel was beneficial or harmful (Fisher 1893, McAtee 1935). However, this technique has no place in modern research. Other investigations have used observations of captures (Bent 1937, Brown and Amadon 1938, Snyder and Wiley 1976), prey remains from nests (Errington 1933, Heintzelman 1964, Young and Blome 1975), and pellet analysis (Heintzelman 1964, Smith and Murphy, 1973).

These studies indicate that the kestrel is primarily insectivorous, eating mainly grasshoppers, and, in small pro-

portions, ground beetles, crickets, spiders, mammals, larvae, reptiles, amphibians, and small birds. These prey are eaten in different proportions that vary according to the locality.

The goal of my study was to determine the principal prey of the American Kestrel on the Buena Vista and Leola Marshes, Wisconsin, and to document seasonal variations during the breeding season, through pellet analysis.

MATERIALS AND METHODS

"The study area is in and on the edges of Buena Vista Marsh in Portage County, and the northern part of the Leola Marsh in Adams County, Wisconsin. It encompasses 52,830 acres

(20732 ha). Farming is common on both the sandy interior islands and edges and on the muck and peat of the two drained marshes. The lowest areas tend to become sedge (*Carex* spp.) and willow (*Salix* spp.) swales" (Hamerstrom 1985).

The pellets were collected at least one a week from 26 active nests and below 11 perches, from 11 April to 8 August 1991. All nests were in kestrel boxes distributed over the study area (Hamerstrom et al. 1973); the kestrel boxes have been monitored by Frances Hamerstrom since 1968. Most of the boxes were attached to tree trunks. Most perches were near the nest boxes. To find pellets at the start of the season, I looked under trees near the boxes. I soon noticed that kestrels preferred to perch on certain dead branches near the nest tree. In areas with few trees they usually perched on the tree supporting the nest box. I avoided searching for pellets in places with many perches near the nest because the kestrel did not show a preference for any one site, making it difficult to find pellets. I limited the search to isolated trees with dead branches.

I analyzed pellets by determining presence or absence of prey items (Village 1990). The relative importance of each item is expressed as the proportion of pellets in which it occurs. This technique is simple, quick, and reflects both the kind of prey and the time span during which it was eaten. This may be "a more ecologically meaningful measure than the actual number of each prey type that survives digestion sufficiently to be counted in pellets" (Village 1990).

The identification of prey was based on feathers, bones, fur, teeth, scales

and, in the case of insects, exoskeletal parts. I used a microscope at 4 \times , and when it was required, at 2 \times magnification.

I divided the contents of the pellets into 4 groups: birds, mammals, snakes, and insects. I subdivided the insects into grasshoppers and beetles because of their high incidence in the pellets.

RESULTS

The results of this study are presented in Table 1 and expressed as a percentage in Table 2. Mammals were present in 68.75% of the 685 pellets. The meadow vole (*Microtus pennsylvanicus*) was the only species positively identified, but I presume that other species were present, possibly *Peromyscus* spp., *Zapus hudsonicus*, *Sorex* spp., and *Blarina brevicauda*. The percentage of occurrence of insects was 66.88%; two types of insects were well represented, grasshoppers (44.37%) and beetles (22.61%). One beetle, *Calosoma calidum*, referred to as *Calosoma* in this manuscript, occurred in 18.24% of the pellets. The residual percentage consisted of unidentified beetles. Other arthropods (ants, dragonflies, larvae, and one spider) occurred in 2.91% of the pellets.

Birds were fairly well represented, occurring in 22.48% of the pellets. The principal birds identified were European Starlings (*Sturnus vulgaris*) and sparrows (Fringillidae). Finally, snakes, mainly the smooth green snake (*Opheodrys vernalis*), represented the lowest percentage of occurrence (6.27%).

During April, May, and early June kestrels preyed mainly on beetles and mice. Beetles were the principal prey at this time because the *Calosoma* population was most abundant and prob-

Table 1. Occurrence of prey in kestrel pellets.

Sample period	Number of pellets	Number of Occurrences of indicated prey:					
		Beetles	Grasshoppers	Total arthropods	Mammals	Birds	Snakes
April 1-15	10	4	1	6	8	0	0
April 16-30	52	26	2	37	18	0	1
May 1-15	52	26	3	38	29	2	0
May 16-31	98	44	8	57	70	22	12
June 1-15	175	13	56	76	147	63	9
June 16-30	100	11	67	78	61	16	5
July 1-15	41	1	28	30	26	13	1
July 16-31	110	0	102	103	79	26	15
August 1-15	47	0	37	37	33	12	0
Total	685						

ably easily available. There seemed to be a critical period in mid-June when insect populations may have been low, and the kestrels compensated by catching more mammals and birds. In July and August the proportion of *Calosoma* in the diet was lowest and gradually disappeared, but the occurrence of grasshoppers increased impressively. This increase in utilization correlated with the peak of the grasshopper population. Mammals still played an important role in the diet. Birds, on the other hand, increased until mid-June. Thereafter, they played a less important role, although they were rather

well represented in the pellets; probably because fledglings were abundant.

The occurrence of snakes in the kestrel's diet was low during the first two months. By June and July they were detected in pellets; however, the frequency was too low to define a pattern. Snakes plainly were not an important part of the kestrel's diet in 1991.

CONCLUSION

This report is preliminary because a single season may not be representative of either the prey kestrels take or seasonal variations. My results could,

Table 2. Occurrence of prey in kestrel pellets, expressed as a percentage of total number of pellets examined per sample period.

Sample period	Percent occurrence of indicated prey:					
	Beetles	Grasshoppers	Other arthropods	Mammals	Birds	Snakes
April 1-15	40	10	1	80	0	0
April 16-30	50	4	21	35	0	2
May 1-15	50	6	23	56	4	0
May 16-31	45	8	7	71	22	12
June 1-15	7	32	10	84	36	5
June 16-30	11	67	8	61	16	5
July 1-15	2	69	5	63	32	2
July 16-31	0	99	2	72	24	14
August 1-15	0	79	0	70	26	0
Total	18	44	9	69	22	6

for example, be biased by the climatic conditions in 1991, an extremely wet year, which may have altered the hunting patterns of the kestrels.

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LITERATURE CITED

- Bent, A. C. 1938. Life histories of North American birds of prey. *U.S. National Museum Bulletin* 170.
- Brodkorb, P. 1928. Notes on the food of some hawks and owls. *Auk* 45:212-213.
- Brown, L. and D. Amadon. 1968. *Eagles, hawks and falcons of the world*. Hamlyn Publishing Group, Ltd., Feltham, Middlesex, Great Britain.
- Errington, P. L. 1930. The pellet analysis method of raptor food habits study. *Condor* 32:292-296.
- Errington, P. L. 1933. Food habits of southern Wisconsin raptors. Part II. Hawks. *Condor* 35:19-29.
- Fisher, A. K. 1893. The hawks and owls of the United States in their relation to agriculture. *U.S. Department of Agriculture. Bulletin* No. 3.
- Hamerstrom, F., F. N. Hamerstrom, and C. J. Burke. 1985. Effect of voles on mating systems in a central Wisconsin population of harrisers. *Wilson Bulletin* 97:332-346.
- Hamerstrom, F., F. N. Hamerstrom, and J. Hart. 1973. Nest boxes: an effective management tool for kestrels. *Journal of Wildlife Management* 37:400-403.
- Heintzelman, D. S. 1964. Spring and summer sparrow hawk food habits. *Wilson Bulletin* 76:323-330.
- Knowlton, G. F. and P. E. Telford. 1947. Insect food of the eastern sparrow hawk in Cache Valley, Utah. *Auk* 64:311.
- Locke, L. N. 1961. Sparrow hawk feeding on dragonflies. *Condor* 63:342.
- McAtee, W. L. 1935. Food habits of common hawks. *U.S. Department of Agriculture Circular* No. 370.
- Sherrod, S. K. 1978. Diets of North American Falconiformes. *Raptor Research* 12:49-121.
- Smith, D. G. and J. R. Murphy. 1973. Breeding ecology of raptors in the eastern Great Basin of Utah. *Brigham Young University. Science Bulletin, Biology Series*. Vol. 28.
- Snyder, N. F. R. and J. W. Wiley. 1976. Sexual dimorphism in hawks and owls of North America. *Ornithological Monograph* No. 20.
- Village, A. 1990. *The kestrel*. T. and A. D. Poyser, London.
- Young, C. M. and C. G. Blome. 1975. Summer feeding habits of kestrels in northern Ontario. *Ontario Field Biologist* 29:44-49.

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Nesting Short-Eared Owls and Voles in St. Croix County

Nesting Short-eared Owls and an unusual concentration of other predators (Northern Harriers, Rough-legged Hawks, red fox, and coyote) were found in an area with a high population of meadow voles.

*by James O. Evrard, DeWayne A. Snobl, Paul B. Doeneir
and Jill A. Dechant*

The Short-eared Owl (*Asio flammeus*) is known as the "gypsy" of the owl world (Hamerstrom 1972). This nomadic bird nests wherever eruptive populations of *Microtus* voles, its nearly exclusive prey, occur (Craighead and Craighead 1956, Hamerstrom 1972, Clark 1975, Korpimäki 1984).

Nesting Short-eared Owls are relatively rare in Wisconsin. There were about 10 nesting records in the state until 1970 when Hamerstrom (1972) found 17 nests on the Buena Vista marsh during a meadow voles (*Microtus pennsylvanicus*) eruption. Only 1 Short-eared Owl nest was reported for the St. Croix River Valley (Faanes 1981). That nest was found in the managed grasslands of the Oakridge Waterfowl Production Area near New Richmond, Wisconsin in 1978.

As part of a long-term waterfowl and pheasant production study in northwestern Wisconsin (Evrard and Lillie 1987), we nest searched 400 ha of re-

tired agricultural fields in 1991. The grassy fields, located in Stanton and Erin Prairie Townships in St. Croix County, were enrolled in the federal Conservation Reserve Program (CRP). A cable-chain drag (Higgins et al. 1969) was used to conduct 3 searches of the nesting cover during May and June.

On 16 May, during the first search of a 96-ha block of CRP fields in Section 9, T30N, R17W, the junior authors flushed a Short-eared Owl. The owl flushed in front of one of the vehicles pulling the cable-chain drag and flew 10 m before landing in the grass. They stopped and searched the area on foot where the owl flushed, finding a nest.

The nest was a round, shallow bowl of dead grass containing 6 cream-colored eggs, slightly smaller than chicken eggs. Vegetation at the nest was dominated by quack grass (*Agropyron repens*) with a maximum height of 90 cm

and a mean Visual Obstruction Reading (VOR) (Robel et al. 1970) of 36 cm. This was the first Short-eared Owl nest found in searching 5400 ha of grassland nesting cover in 10 years!

While returning to the truck, they flushed another Short-eared Owl about 10 m from the nest site. The owl flew in an irregular fashion, alternately soaring and flapping, to the edge of the field where it landed on top of a small tree.

They continued nest searching, flushing a brown Northern Harrier (*Circus cyaneus*) about 250 m from the owl nest. After searching the area where the hen Harrier flushed, they found her nest containing 1 egg. Moving to an adjacent CRP field, they again flushed 2 Short-eared Owls. The birds were about 30 m apart but flushed together. Assuming they were the same birds seen earlier, they did not look for a nest. Shortly thereafter, they discovered a coyote (*Canis latrans*) den containing at least 3 young. This was just the second observation of coyotes in the 10 years of the study.

They flushed Short-eared Owls 2 more times at progressively further distances from their vehicles as they moved back and forth, searching successive strips of grass cover. An adult red fox (*Vulpes fulva*) jumped from the grass in front of the cable-chain drag just before they flushed the owls for the fourth time adjacent to the field boundary. The owls returned to their nest site after being flushed for this final time.

While looking for the owls on 21 May, I observed 3 Rough-legged Hawks (*Buteo lagopus*) hunting over the CRP fields. Rough-legged Hawks normally winter in the area but since this was a late observation, I checked the

fields the following day and again saw the 3 hawks. My last Rough-legged Hawk sighting in the area was on 3 June. Normally, the hawks depart the area for their arctic breeding grounds by mid-May with 12 June 1975 being the latest observation (Faanes 1981).

When I checked the Short-eared Owl nest on 3 June, it had been destroyed by a predator, probably a red fox, based upon the sign at the nest (Rearden 1951, Einarsen 1956). Only a few small fragments of egg shell were found. Two primary feathers were found, not enough to indicate the adult was captured by the predator. The Harrier nest was also destroyed by a predator.

While nest searching the CRP fields for the second time on 5 June, the junior authors again flushed a Short-eared Owl. The owl flew about 20 m and landed in the grass. Another owl flushed from the next strip of cover searched adjacent to area where the first owl flushed. They found a nest containing 7 eggs in the area where the second bird flushed. This vegetation at this nest was also dominated by quack grass having a maximum height of 70 cm and a mean VOR of 47 cm. The VOR measurements at both Short-eared Owl nests were within the range of 30–60 cm for 16 nests examined by Duebbert and Lokemoen (1977).

On the third pass through the same general area, they flushed a Short-eared Owl from the area where the first owl landed. Ten minutes later, they saw 3 Short-eared Owls flying over the nest area! Two birds were tannish-red in color and the other a dull tannish-gray. The tannish-gray owl (a male ?) was flushed once more in the CRP field.

When the nest was revisited on 20

June, 7 young were found. Three adult birds were seen flying over a CRP field immediately south of the field containing the nest. Two adult Short-eared Owls were seen in the same area the following day.

The nest site was again visited on 23 June, flushing an adult from the nest. Three young were found. Another adult flushed from an apparent roost about 50 m from the nest. On 29 June, a freshly-dead owlet, 4–7 days old, was found at the nest. No other young or adult Short-eared Owls were seen.

On 10 July, an adult owl was observed flying over the nest site. The following day, the nest was again visited and an adult was seen but no young were found and the nest showed no sign of being used. This would not be too unusual since Short-eared Owls have been reported to disperse their young throughout an area while feeding them (Clark 1975). The final Short-eared Owl observation was an adult hunting over the nesting area on 31 July.

What was the reason for the concentration of predators, Short-eared Owls, Harriers, Rough-legged Hawks, coyotes and fox, in the CRP fields? Like Short-eared Owls, Harrier nesting is closely linked to *Microtus* abundance (Hecht 1951, Craighead and Craighead 1956, Hamerstrom 1979). Harriers were seen hunting the CRP fields every time we visited them. Rough-legged Hawks are also tied closely to a *Microtus* diet (Craighead and Craighead 1956, Baker 1977), as are Wisconsin red fox and coyotes (Jackson 1961). Suspecting a meadow vole eruption, we sampled the small mammal populations in the CRP fields using the removal method (Zippen 1958, Yang et al. 1970). Two grids of

50 baited snap-traps each (40 mouse, 10 rat size) were set for 10 nights yielding a total of 1,000 trap nights.

A total of 172 meadow voles, representing 95% of the mammals caught, were trapped. The Catch/Effort (CE) ratio (Nelson and Clark 1973), which corrects for sprung traps, was 19.37. This was very high compared to a mean CE of 2.38 (range 0.00–13.58, $n = 61$) for 16 fields during 1982–86 in the same area (Giudice 1986). This truly was a meadow vole population eruption.

Since I had seen Short-eared Owls in the late fall and early winter in earlier years, perhaps migrating owls had detected the large vole population and took advantage of the abundant food resource by remaining to nest.

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LITERATURE CITED

- Baker, J. A. 1977. Numerical and aggregative responses of raptors to abundance of the meadow vole, *Microtus pennsylvanicus*. M.S. Thesis, University of Guelph, Guelph, Ontario.
- Clark, R. J. 1975. A field study of the short-eared owl, *Asio flammeus* (Pontioppidean), in North America. *Wildlife Monograph* 47.
- Craighead, J. J. and F. C. Craighead, Jr. 1956. *Hawks, Owls and Wildlife*. Wildlife Management Institute, Washington, D.C.
- Duebbert, H. F. and J. T. Lokemoen. 1977. Up-land nesting of American bitterns, marsh hawks and short-eared owls. *Prairie Naturalist* 9:33–40.
- Einarsen, A. S. 1956. Determination of some predator species by field signs. *Oregon State College Monograph Studies in Zoology* Vol. 10.
- Evrard, J. O. and R. A. Lillie. 1987. Duck and pheasant management in the pothole region of Wisconsin. *Wisconsin Department of Natural Resources Progress Report*, Madison.

- Faanes, C. A. 1981. Birds of the St. Croix River Valley, Minnesota and Wisconsin. *North American Fauna* 73.
- Giudice, J. H. 1986. Small mammal trapping on waterfowl production areas. Unpublished report, University of Wisconsin-Stevens Point.
- Hamerstrom, F. 1972. *Birds of prey of Wisconsin*. Wisconsin Department Natural Resources, Madison.
- Hamerstrom, F. 1979. Effect of prey on predator: voles and harriers. *Auk* 96:370-374.
- Hecht, W. R. 1951. Nesting of the marsh hawk at Delta, Manitoba. *Wilson Bulletin* 63:167-176.
- Higgins, K. F., L. M. Kirsch, and I. J. Ball, Jr. 1969. A cable-chain device for locating duck nests. *Journal of Wildlife Management* 33:1009-1011.
- Jackson, H. H. T. 1961. *The mammals of Wisconsin*. University Wisconsin Press, Madison.
- Korpimäki, E. 1984. Population dynamics of birds of prey in relation to fluctuations in small mammal populations in western Finland. *Ann. Zool. Fennici* 21:287-293.
- Nelson, L. and F. W. Clark. 1973. Correction for sprung traps in catch/effort calculations of trapping results. *Journal of Mammalogy* 54:295-298.
- Rearden, J. D. 1951. Identification of waterfowl nest predators. *Journal of Wildlife Management* 15:386-395.
- Robel, R. J., J. N. Briggs, A. D. Dayton and L. C. Hubert. 1970. Relationships between visual obstruction measurements and weight of grassland vegetation. *Journal of Range Management* 23:295-297.
- Yang, C. K., C. J. Krebs, and B. L. Keller. 1970. Sequential live-trapping and snap-trapping studies of *Microtus* populations. *Journal of Mammalogy* 51:517-526.
- Zippen, C. 1958. The removal method of population estimation. *Journal of Wildlife Management* 22:82-90.
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Short-eared owl nestlings in St. Croix Co. (photo by James O. Evrard)

Habitat Fragmentation and Forested Wetlands on the Upper Mississippi River: Potential Impacts on Forest-Interior Birds

For birds that require large tracts of forest to nest successfully, the forested wetlands along the Mississippi River provide some of the least fragmented forest habitats in the Midwest. The case for managing these forests to benefit birds is developed and recommendations are made.

by John Grettenberger

The forested wetlands along the Mississippi River and some of its major tributaries contain some of the most significant contiguous tracts of forest remaining in the upper central Midwest (Iowa, Illinois, southwestern Wisconsin, and northeastern Missouri). Generally, other forestland in this region, both upland and lowland, remains only in fragmented woodlots of no more than a few hundred acres, and along narrow riparian corridors. For this reason, bottomland forest along the Mississippi River and some of its major tributaries constitute the last major refugia in this area of the midwestern U.S. for many forest interior species.

Much of the Mississippi River floodplain has been leveed, drained and cleared for agriculture and urban uses. The forested portion that remains is largely in public ownership and unprotected by levees, and is therefore

not greatly threatened by land use changes that result in the large scale loss of habitat. Various activities, however, continue to fragment these remaining forests. These activities include logging, forest regeneration, road and pipeline construction, and to a lesser extent, recreational facility development and levee construction for fish and wildlife management projects.

The impacts of forest fragmentation, particularly on birds, have been well described in recent years. Reductions in forest tract size (Forman et al. 1976, Galli et al. 1976, Whitcomb et al. 1981, Lynch and Whigham 1984) have resulted in declining populations of forest interior birds. Cowbird nest parasitism (Brittingham and Temple 1983, Robinson 1990a) and increased nest predation (Gates and Gysel 1978, Small and Hunter 1988), in particular, have been implicated as the main causes for these declines.

Cowbird parasitism increases where forests are cleared or cut because of the cowbird's preference for open habitats. They typically do not penetrate large forest tracts. Forest interior species are particularly vulnerable to nest parasitism, as they have not evolved mechanisms to reduce or avoid parasitism. Where forests become fragmented, forest interior bird species experience high parasitism rates, particularly in proximity to open habitats. The young cowbirds are raised at the expense of the young or host species, and fledgling success of the host species is greatly reduced.

Nest predation increases because of increases in populations of the many mammalian and avian predators preferring early seral stages and edge habitat. Other factors which may affect forest interior species populations include a lack of species specific habitat components, or a reduced chance of finding mates in small forest tracts.

There has been considerable debate over the relative importance of habitat fragmentation and loss on the breeding grounds, and loss of wintering habitat in the Neotropics (Robbins et al. 1989). However, there is no doubt that the population declines which have been observed in neotropical migrants and woodland nesters (Droege and Sauer 1990) can be at least partially attributed to forest fragmentation on the breeding grounds (Temple and Cary 1988). Population declines have been particularly severe in the Central Region of the U.S. (Droege and Sauer 1990).

BACKGROUND

Although attitudes are changing, there has often been a perception that

bottomland forest along the Upper Mississippi River was less valuable for wildlife than the bottomland forest of the Lower Mississippi. This view originated largely from the fact that mast trees, oaks in particular, are a very minor component of the forest on the Upper Mississippi. The dominant tree species present, such as cottonwood (*Populus deltoides*), silver maple (*Acer saccharinum*) and box elder (*Acer negundo*), are often viewed as "junk" or low value species. This is a result of their low economic value for timber, and perceived low value for wildlife, particularly game species. The ease in regenerating these tree species, versus the difficulty in oak regeneration, has also resulted in less concern for these forests. These attitudes have resulted in a willingness, particularly in the past, to sacrifice bottomland forest for other beneficial uses, such as cropland for waterfowl or dikes for wildlife management projects.

There have also been attempts by land managers to alter forest spatial characteristics to create habitat diversity, change tree species composition, and to regenerate shade-intolerant tree species. These actions often failed to fully consider the possible effect that the resulting fragmentation of these last remaining contiguous stands of forest may have on breeding populations of neotropical migrant forest-interior bird species.

Unfortunately, the impacts of fragmentation on bottomland forests in the Midwest have not been studied, as researchers have concentrated their efforts on upland forests. Subjects such as bird population densities and composition along the Mississippi River have not been investigated to any great extent, and habitat requirements of

bottomland forest bird species have not been well described (Samson 1979). Without this knowledge, the environmental impacts of water resource development projects and Clean Water Act Section 404 permits in forested wetlands cannot be properly evaluated. Neither can land management policies that consider the needs of forest interior birds and fragmentation impacts be developed and implemented.

The purpose of this review, therefore, is to: (1) Stimulate management-oriented research on bottomland forest bird populations on the Mississippi River; (2) focus attention on considering the needs of forest interior species in developing land management objectives and in implementing management actions; and (3) initiate discussion on the development of a consistent mitigation policy for forested wetlands, which would include an evaluation of fragmentation effects.

STUDY AREA

Data and literature concerning the area from Cairo, Illinois (River Mile 0) to Prairie du Chien (River Mile 635) on the Mississippi River were reviewed. This is the portion of the river covered by the U.S. Fish and Wildlife Service Rock Island Fish and Wildlife Enhancement Office. Approximately 58,000 ha (145,000 acres) of bottomland forest are present along this stretch of Upper Mississippi River (USACE 1988). A significant acreage of this forest is found on islands ranging up to several thousand acres in size or in extensive tracts of floodplain forest, up to 3.6 km (1.5 miles) in width. These islands and bottomlands are typically bisected by side channels and

backwaters. At other locations, the bordering floodplain forest has been reduced to a corridor ranging from 800 m (0.5 mile) wide to a few hundred feet.

Typical forested wetlands along the Mississippi River are dominated by silver maple, with cottonwood and black willow (*Salix nigra*) persisting in younger stands. Trees in typical mature stands range from 18–32 m (60–100 ft) in height with average diameters of 25–35 cm (10–14") diameter breast height (DBH) (Emlen et al. 1986, Feavel 1987). As succession occurs and sites tend to become more mesic, shade tolerant species become established as part of the understory and the canopy. These species include slippery elm (*Ulmus rubro*), hackberry (*Celtis occidentalis*), box elder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*) and the American elm (*Ulmus americanus*) (Jahn and Anderson 1986).

The herbaceous layer is dominated by wood nettle (*Laportea canadensis*), false nettle (*Boehmeria cylindrica*) and skullcap (*Scutellaria lateriflora*). Vines such as grape (*Vitis* sp.), greenbriar (*Smilax hispida*) and poison ivy (*Rhus radicans*) also form an important component of the vegetation.

METHODS

A review of the literature identified only two recent studies which assessed bird densities along the Upper Mississippi River (Emlen et al. 1986, Mossman 1988) and none that looked at the effects of fragmentation. A 10-year study evaluating bird population response to logging is also on-going, and preliminary observations have been analyzed (Feavel 1987).

To provide additional data, this

quantitative information was supplemented with Breeding Bird Atlas results. These were obtained from Iowa and Illinois survey-blocks containing bottomland forests along the Mississippi River. Breeding Bird Survey data from Strata 17 (Eastern Piedmont Plateau-Wisconsin Driftless Area), 31 (Great Plains-Till Plains), and 32 (Great Plains-Dissected Till Plains) (USFWS, unpub. data) were also examined to identify population trends for forest interior species in the area. Intensive agriculture characterizes Strata 31 and 32, while Stratum 17 is mixed agriculture/forest.

As no information is available on forest fragmentation effects in lowland forests of the Midwest, this review will: (1) Identify species occurring in the Mississippi River floodplain that have been found to be sensitive to forest fragmentation in other areas; (2) discuss the importance of bottomland forest for these species, and (3) discuss potential impacts of fragmentation based on literature from upland forests.

SPECIES SENSITIVE TO FRAGMENTATION

Species sensitive to fragmentation-induced nest parasitism and predation were selected based on Whitcomb et al. (1981), Bushman and Therres (1988) and Robinson (1990a). Species dependent on extensive lowland forest tracts, but not vulnerable to nest predation and cowbird parasitism, will not be discussed here. Examples of these are resident, cavity-nesting species such as Pileated Woodpeckers (*Dryocopus pileatus*) and Brown Creepers (*Certhia americana*), and raptors such as

Red-shouldered Hawks (*Buteo lineatus*).

Eighteen species sensitive to fragmentation that breed in lowland forests of the Upper Mississippi were identified (Breeding Bird Atlas Surveys, Emlen et al. 1986, Mossman 1988), although some of these species breed more frequently in upland forests. A few of these species only rarely occur in the study area because of their geographic distribution or habitat preferences, but are included for the sake of completeness. The habitat requirements of these 18 species are summarized in Table 1.

The most valuable data are those of Emlen et al. (1986), as they censused bottomland forest at 11 sites in the study area and correlated habitat factors with populations densities. The frequency of occurrence of species of interest, peak counts recorded at 60 data points, and constraints on species populations are summarized in Table 2. Brown-headed Cowbird population data are also included.

These data provide the best picture of forest-interior bird species composition and relative abundance in mature bottomland forest on the Upper Mississippi River, and illustrate the higher value of bottomland forests for a number of warblers, vireos and flycatchers. Those species that were not recorded are generally considered to be upland forest species.

The status of bird species in the area of concern, based on the Breeding Bird Atlas Surveys, is summarized in Table 3. These data are gathered by volunteers or biologists for 3 × 3 mile blocks. Blocks to be censused were subjectively selected in Iowa and systematically selected in Illinois. Typically, an attempt is made within a block

Table 1. Forest-interior bird species which breed in bottomland forests on the Upper Mississippi River.

Common Name	Scientific Name	Habitat Used
Blue-gray Gnatcatcher	(<i>Poliophtila caerulea</i>)	Deciduous forest ¹
Veery	(<i>Catharus fuscenscens</i>)	Deciduous forest
Wood Thrush	(<i>Hylocichla mustelina</i>)	Bottomland forest
Yellow-throated Vireo	(<i>Vireo flavifrons</i>)	Deciduous forest
Warbling Vireo	(<i>Vireo gilvus</i>)	Riparian forest, especially cottonwoods
Red-eyed Vireo	(<i>Vireo olivaceus</i>)	Deciduous forest
Northern Parula	(<i>Parula americana</i>)	Bottomland forest
American Redstart	(<i>Setophaga ruticilla</i>)	Bottomland forest
Prothonotary Warbler	(<i>Protonaria citrea</i>)	Bottomland forest
Yellow-throated Warbler	(<i>Dendroica dominica</i>)	Bottomland forest
Cerulean Warbler	(<i>Dendroica cerulea</i>)	Deciduous forest, esp. bottomlands
Ovenbird	(<i>Seiurus aurocapillus</i>)	Deciduous forest, primarily upland
Louisiana Waterthrush	(<i>Seiurus motacilla</i>)	Ravines in deciduous forest
Kentucky Warbler	(<i>Oporornis agilis</i>)	Moist deciduous forest
Summer Tanager	(<i>Pirangra rubra</i>)	Deciduous forest
Scarlet Tanager	(<i>Pirangra olivacea</i>)	Deciduous forest
Eastern Wood-Pewee	(<i>Contopus virens</i>)	Deciduous forest
Acadian Flycatcher	(<i>Empidonax virescens</i>)	Moist deciduous forest

¹Deciduous forest includes upland and bottomland forest.

to survey the highest quality habitat, as well as a sampling of all habitat types. The reproductive status of species are based on observations of bird behavior and other evidence of reproduction, such as nests or fledged young. These data should be used with some caution, as a breeding block may contain upland forest or other habitat types as well as lowland forest, and the census data do not provide the means to separate different habitats. This may result in an overestimate of the frequency of occurrence of species that occur in both types of forest. There are also limitations related to surveyor expertise and access to forested islands that would result in an underestimation of forest interior species. However, these data again indicate the importance of bottomland forests to a number of neotropical migrant bird species.

Breeding Bird Survey data, which are based on annual censuses along roads, were also reviewed. Population trends based on Breeding Bird Surveys for these species indicate significant long-term declines (1980–1989) (Table 4) in at least one of the three strata for three species and statistically significant increases for four species in one stratum.

DISCUSSION

General trends from the Breeding Bird Survey indicates some problems with populations, particularly on a regional level, although some species show local increases (Table 4). In general, trends are inconclusive. Unfortunately, the Breeding Bird Survey does not adequately sample many of the areas of greatest interest on the Upper Mississippi River, as the survey

Table 2. Summary of maximum species abundance (derived from graphs), frequency of occurrence, and limiting factors for forest-interior species on the Upper Mississippi River (from Emlen et al. 1986).

Species	Number recorded ¹	Frequency ²	Limiting factors
Blue-gray Gnatcatcher	90	75%	Latitude
Veery	0	0%	
Wood Thrush	100	58%	Dense low trees
Yellow-throated Vireo	90	83%	Large forest extent
Warbling Vireo	130	75%	Large basal area
Red-eyed Vireo	100	100%	Good canopy quality
Northern Parula	40	33%	Dense tall trees
American Redstart	120	83%	Large basal area
Prothonotary Warbler	120	92%	Latitude
Yellow-throated Warbler	16	17%	Good canopy quality
Cerulean Warbler	50	38%	None identified
Ovenbird	0	0%	
Louisiana Waterthrush	0	0%	
Kentucky Warbler	70	42%	Latitude
Summer Tanager	20	42%	Dense high shrubs
Scarlet Tanager	10	33%	Many dead trees
Eastern Wood-Pewee	55	92%	Dense tall trees
Acadian Flycatcher	200	58%	Latitude
Brown-headed Cowbird	60	100%	Many high shrubs

¹Maximum number of birds recorded on 4 replications of a 15-point transect.

²Out of 12 transects.

are based on road transects. Statistically significant trends are difficult to obtain, because samples for many species of interest are small.

However, the Breeding Bird Survey is the only indicator available at this time for long term trends in bird populations. The Wisconsin Driftless Area, in general, has the most favorable population trends. Forest cover would be expected to be more contiguous and extensive in this stratum. The lack of negative trends for some species should not be a reason for undue optimism, however, because populations may be maintained by influxes of individuals from other populations. Reproduction in some areas of the Midwest is not adequate to maintain the populations and many forest fragments may be acting as population sinks (Robinson 1990a, in press).

Pertinent information on habitat preference and susceptibility to cowbird parasitism for each species will be reviewed below. No species-specific information on nest predation in a fragmented situation is available. The reader is referred to Bushman and Therres (1988) or the Illinois Bird series (Graber et al., 1971, 1974, 1979, 1983, 1985) for detailed species information.

In general, based on the frequency of occurrence and numbers observed, bottomland forests on the Mississippi River appear to be of particular significance to the Blue-gray Gnatcatcher, Wood Thrush, Warbling Vireo, Yellow-throated Vireo, Northern Parula, American Redstart, Prothonotary Warbler, Yellow-throated Warbler, Cerulean Warbler and Acadian Flycatcher. Bottomland forests

Table 3. Status¹ of forest-interior bird species in Breeding Bird Atlas Survey Blocks on the Mississippi River in Iowa and Illinois.

Survey block	Location	River mile	Blue-gray Gnat-catcher	Veery	Wood Thrush	Yellow-throated Vireo	Warbling Vireo	Red-eyed Vireo	Northern Parula	American Redstart	Prothonotary Warbler	Yellow-throated Warbler	Cerulean Warbler	Ovenbird	Louisiana Water-thrush	Kentucky Warbler	Summer Tanager	Scarlet Tanager	Eastern Wood-Pewee	Acadian Flycatcher
IOWA																				
731	Iowa River Mouth	433	A	A	A	C	C	B	A	B	C					B			B	A
708	Odessa	438	A		A	B	A	A	A	A	B	A	A						B	
684	Kun Lake	444	B	A	A	B	A	A			C							A	A	A
663	Big Sand Mound	449	C		C	C	C	C	B	B	C		A					A	B	
640	Wildcat Den	465	C	A	C	C	C	C	B	C	B			C	C	A		B	C	C
563	Wapsi Wildlife Area	505	C		B	B	B	B		B	C								B	
486	Elk River Green	531	C		C	B	B	B	A	B	B	A	B					A	B	
427	Island	544		A	A			A		B	C		A						C	
400	Bellevue SF/Mill Cr.	554			A	A	A	B		A	C			A	A		B			
ILLINOIS																				
221D3	Madison County	195			A		C	B			B								B	
221B3	Madison County	206			B	B	B	C	B				C	C				B	B	B
222A3	Jersey	217			B	B	B	B	B									B	B	
223A3	Calhoun	225	A		B	B	B	B										B	B	A
195B3	Pike	249	B																	
165D3	Pike	292																C	A	A
165D3	Adams	315			A									A					A	A
134C3	Adams	337																		
134B3	Adams	346																		
139C3	Hancock	357			A		A	B			C							A	B	B
139A3	Hancock	367			A	A	A												B	
101D3	Hancock	379			A			A							A				B	B
102A3	Henderson	395			C	C	B	A	B	B	C								A	A
100D3	Henderson	404	A		B	B	B												A	A
046B3	Whiteide	505			C			A	C	C	A								B	B
041A3	Carroll	525	A		A		C	A	C	C	A		A	A				A	B	B
020B3	Carroll	548	C		C	A	C	B	C	C	A								B	B
018A3	Jo Daviess	574	B		B	B	A	A	A	A									B	B

¹A = possible nesting, B = probable breeding, C = confirmed breeding.

Table 4. Percent annual change in forest-interior bird populations from 1980–89 in Breeding Bird Survey sampling strata that include the Upper Mississippi River.

Species	Percent annual change ¹ in indicated strata:		
	Wisconsin Driftless Area	Till Plain	Dissected Till Plain
Eastern Wood-Pewee	3.3**	-3.5***	-4.1**
Acadian Flycatcher	-14.4	-7.0***	-0.3
Blue-gray Gnatcatcher	5.4	0.7	-4.5
Veery	1.6		
Wood Thrush	10.3	-4.0	
Yellow-throated Vireo	-1.2	0.9	-1.6
Warbling Vireo	-3.0	-3.2**	-0.7
Red-eyed Vireo	-0.3	-1.6	-3.1
Northern Parula		0.7	-1.1
Yellow-throated Warbler		7.6**	
Cerulean Warbler	3.2	-2.2	
American Redstart	0.5	-0.5	-11.4
Prothonotary Warbler		0.5	
Ovenbird	5.0	1.9*	0.5
Louisiana Waterthrush		1.1*	6.8
Kentucky Warbler		-3.4	5.7
Summer Tanager		0.2	-4.2
Scarlet Tanager	9.1	0.1	-1.3
Brown-headed Cowbird	4.3**	6.5**	0.5

¹Significance of these changes is: * = $p < .10$, ** = $p < .05$, *** = $p < .01$.

provide breeding habitat, although probably of secondary importance to upland forest, for the Red-eyed Vireo, Kentucky Warbler, Summer Tanager, Scarlet Tanager and Eastern Wood-Pewee. The Ovenbird, Louisiana Waterthrush, and Veery occur only occasionally in the bottomland forest along the Mississippi.

PRIMARY BOTTOMLAND SPECIES

Blue-Gray Gnatcatcher—Graber et al. (1979) considered riparian woods to be the primary habitat for this species, where it usually occupies the first bench of the floodplain. It is also found in upland forests, although it has very poor nesting success in upland habitat. Gnatcatchers may be heavily parasitized by cowbirds (Friedmann 1963). Based on their observations that populations remained under 15/

40.5 ha when the ratio of cowbirds to gnatcatchers was 1:1, Graber et al. (1979) suggested that the population density of gnatcatchers was influenced by cowbird densities. However, Robinson (personal communication) found little cowbird parasitism of Blue-gray Gnatcatchers in southern Illinois.

Wood Thrush—The Wood Thrush is considered to be a lowland forest species in Illinois (Graber et al. 1971), and it occurs along the entire length of the Upper Mississippi. It is heavily parasitized by cowbirds, with Graber et al. (1971) reporting 48% of the nests parasitized. However, extraordinarily high parasitism rates of over 90% have been recorded recently in southern Illinois (Robinson 1989) and central Illinois (Robinson, *in press*), respectively. This suggests that the Wood Thrush

may be in serious trouble throughout the Midwest.

Warbling Vireo—The Warbling Vireo is generally described as a bottomland forest species, although it occurs in a variety of other forest habitats, including shrubs (Graber et al. 1985) and generally prefers an open canopy. Silver maples, cottonwoods and willows are the tree species of greatest significance for warbling vireos. This vireo is considered a frequent host of cowbirds (Friedmann 1963), but data on nesting success and parasitism are lacking.

Northern Parula—The Northern Parula is considered to be a bottomland forest breeder (Graber et al. 1983), although it is found along smaller streams and in uplands. Emlen et al. (1986) found densities to be correlated with the number of dense tall trees, but Graber et al. (1983) only correlated populations with the "importance" of sycamore, *Platanus occidentalis*. Little information is available on cowbird parasitism of this species, but it was identified as a species thought to be regularly parasitized by cowbirds (Friedmann 1963). It is also a species that tends to be localized in distribution and relatively uncommon.

American Redstart—Significant populations of breeding redstarts are limited almost entirely to bottomland forests in the Midwest. Their populations are correlated with the density of silver maple, both of trees over 10 cm diameter breast height and of shrub understory (Graber et al. 1983). Nests in Illinois from 1900–1983 had a parasitism rate of 37% (Graber et al. 1983), but rates in recent years are

now undoubtedly higher. Both Graber et al. (1983) and Robinson (1989) expressed great concern for this species because of lower than expected population densities and lack of data on reproductive success.

Prothonotary Warbler—Prothonotary Warblers are highly dependent on floodplain forests on larger rivers, although they are not truly a forest interior species. However, prothonotaries may be parasitized by cowbirds, with 15% of a central Illinois nest sample (Graber et al. 1983) and 20% of a nest sample in Tennessee (Petit 1989) being parasitized. Parasitism varies greatly from year to year and geographically. Prothonotaries may also compete unsuccessfully for nest cavities with other species, House Wrens, in particular (Smith and Dumont 1944, Graber et al. 1983, Brush 1990). Creation of brushy and edge habitat would tend to increase numbers of House Wrens.

Yellow-throated Warbler—Yellow-throated Warblers are highly dependent on bottomland forests, with the highest densities being recorded in virgin bottomland forests. As with the Parula Warbler, there seems to be a strong association with sycamores, which seem to be preferred for nesting and song perches (Graber et al. 1983). Due to their low population densities and the lack of research on bottomland species, no data are available on cowbird parasitism rates. However, they are a species which is considered to be regularly parasitized by cowbirds (Friedmann 1963). The Yellow-throated Warbler is an uncommon species on the Upper Mississippi River

and is listed as an endangered species in Wisconsin.

Cerulean Warbler—The Cerulean Warbler is of particular interest to the U.S. Fish and Wildlife Service as it has been identified as one of 30 migratory nongame birds of management concern in the United States. This is based on the fact that Cerulean Warbler populations declined 3.4% annually from 1966 to 1987. The objective of identifying these species was to initiate actions that will prevent them from becoming federally threatened or endangered (Hands et al. 1989). The Cerulean Warbler is presently listed as threatened in Wisconsin.

The status and ecology of the Cerulean Warbler have been thoroughly reviewed by Hands et al. (1989). In the middle Atlantic States it prefers mature bottomland forest, and minimum tract size been estimated at 1,730 acres (Robbins et al. 1989). There may be some preference for sycamore when they are present (Smith in Graber et al. 1983). Cowbird parasitism rates have not been determined, but they are known to accept cowbird eggs (Friedmann 1963).

Acadian Flycatcher—Acadian Flycatchers are often one of the most abundant bottomland forest species. Forested streams of almost all sizes provide habitat for Acadian Flycatchers (Graber et al. 1974), and they favor forests with understory. They may also be found in upland forests, but at lower densities. Cowbird parasitism may be high, ranging from 20–65% (Robinson 1990a), but Graber et al. (1974) suggest that they may resist parasitism to a minor degree through nest abandonment.

SECONDARY BOTTOMLAND SPECIES

Yellow-throated Vireo—The Yellow-throated Vireo does not appear to show any conspicuous preference for upland or bottomland forest, but appears to favor forest with high densities of relatively large trees (Graber et al. 1985). Emlen et al. (1986) identified the forest tract size as the principal constraint on population densities. Little is known about breeding success and cowbird parasitism, but Friedmann (1963) noted that the species was frequently victimized by cowbirds. Robinson (1989) identified it as a species of special concern because of unexpected low densities.

Red-eyed Vireo—The Red-eyed Vireo is a common breeding bird in both upland and bottomland forests. Emlen et al. (1986) found that good canopy quality was the habitat factor that was the principal constraint on population densities. The Red-eyed Vireo is heavily parasitized by cowbirds (Friedmann 1963, Graber et al. 1985, Robinson 1990a), although it does have the capability of raising its young along with the cowbird.

Kentucky Warbler—Upland forests typically support 2–3 times more breeding Kentucky Warblers than do bottomland forests (Graber et al. 1983). Bottomland forest may still support relatively high densities, although flooding may limit their success due to their habit of ground nesting (Graber et al. 1983). Kentucky Warbler nests seem to have lower cowbird parasitism rates than other forest interior species. Robinson (1990a) reported that about 40% were parasitized, compared to a 55% rate for all species. However, pre-

dation rates, which are often higher near edges, are likely to be higher in a ground-nesting species such as the Kentucky Warbler.

Summer Tanager—Summer Tanagers appear to be found in all types of deciduous forests, with more of a preference for edge than Scarlet Tanagers. They are heavily parasitized by cowbirds (Robinson 1990a).

Scarlet Tanager—Scarlet Tanagers prefer upland forests, although low densities are found in bottomland forests (Emlen et al. 1986, Robinson 1990a). They are heavily parasitized by cowbirds (Robinson 1990a).

Eastern Wood-Pewee—Wood-Pewees do not appear to have any preference for upland or bottomland forests, but use both types, as well as the interior and the forest edge. Wood-Pewees accept cowbird eggs (Friedmann 1963, Robinson 1989), but the extent of parasitism and impact on the population are not known in the Midwest.

PERIPHERAL BOTTOMLAND SPECIES

Ovenbird—The Ovenbird is generally considered an upland forest species, although it may occur, sometimes at relatively high densities, on upper benches of floodplains. The high rate of cowbird parasitism on Ovenbird nests has been extensively documented (Hann 1937, Brittingham and Temple 1983).

Louisiana Waterthrush—The Louisiana Waterthrush is primarily a bird of permanently wet areas in upland forest. Bottomland forests appear to support only low population densities

of this species (Graber et al. 1983), although some authors describe it as a bottomland species (Ridgeway 1889 in Graber et al. 1983). Cowbird parasitism rates are variable (20–80%) (Robinson 1989), and predation rates are probably high because of its ground nesting habits.

Veery—The Veery is a rare nesting species at the periphery of its range in the central Upper Mississippi. It has been found nesting in bottomland forests in Illinois (Graber et al. 1971) and Iowa (Dinsmore et al. 1984). Nest parasitism rates are unknown due to its rarity in the area.

CONCLUSIONS

Based on the above review, what are the potential impacts of habitat fragmentation on bottomland forest bird species along the Upper Mississippi River? It would appear that they could be significant. This review substantiates that there are many forest-interior bird species breeding in Upper Mississippi bottomland forests that are sensitive to fragmentation. Predation and cowbird parasitism data from Illinois for many of these species suggest that reproduction is not adequate to maintain existing populations. Population trend data are admittedly sketchy and inconclusive. However, Breeding Bird Survey data do not adequately census many forest interior species in this part of the Midwest and would not necessarily identify any productivity problems that may exist.

The recommended minimum forest tract size for most forest-interior species in the eastern U.S. is 100 ha (250 acres) (Bushman and Therres 1988, Robbins et al. 1989). If these recom-

mendations are applicable on the Upper Mississippi River, bottomland forest tracts along the Upper Mississippi River should be adequate for sustaining forest-interior bird species.

However, Robinson (1990a) found in Illinois that cowbirds were not just parasitizing nests primarily along edges, as found in other studies (Brittingham and Temple 1983, Temple and Cary 1988), but that species such as Wood Thrushes nesting over 400 m from an edge were as likely to be parasitized as those along edges. As a result, Robinson (1990a) documented a 55% rate of cowbird parasitism and 50–80% nest predation rate for all bird nests found, which suggests serious productivity problems with many forest interior species in the Midwest. A comparison of regional cowbird populations indicates that Midwest cowbird abundance is 2.5 times greater than in the east, and increasing (Robbins et al. 1986), which would account for this cowbird parasitism rate.

The same predation and cowbird parasitism pressures documented by Robinson (1990a) may be impacting Upper Mississippi River bird populations. Much of the forest would be less than 400 m from an artificial edge or edge along a large river channel. Most of these forests are also naturally fragmented by oxbows and side channels. However, there are obvious spatial and structural differences between upland and bottomland forests, which may affect how predators and cowbirds behave.

Therefore, there is an urgent need at this time to evaluate the status and productivity of forest interior species in Mississippi River bottomland forests. Many bird species are already extinct, endangered or threatened in this

part of the Midwest. The disappearance of forest interior species would further reduce species diversity of a fauna which is already impoverished due to massive land use changes brought about by intensive agriculture. Man's enjoyment of Mississippi River bottomland, as well as the genetic diversity of forest interior species, would suffer if this were to occur.

RECOMMENDATIONS

1. Initiate research on forest interior species in Upper Mississippi River bottomland forest.—Many questions remain regarding forest fragmentation in bottomland forests in the Midwest that need to be answered as quickly as possible. Well-designed research on breeding bird densities and nesting success and cowbird densities in different forest tract sizes, with varying levels of natural and artificial fragmentation, is of the highest priority. The long term study by the U.S. Army Corps of Engineers (Feavel 1987) attempts to address some of these questions. However, the study is not evaluating reproductive success, and therefore does not address the main problems of cowbird parasitism and nest predation that are associated with fragmentation. Despite the observation that habitat conditions were improved for a majority of species (Feavel 1987), the five-fold observed increase in cowbird numbers suggest that these sites may be ecological traps for forest interior birds.

2. Develop and implement forest management programs that minimize fragmentation effects.—Forest management along the Mississippi River is much more complex than in upland forests.

The altered hydrological regimes resulting from dams along the Mississippi River, and Dutch elm disease, have profoundly affected forest ecology by saturating the bottomland and limiting the species that can survive. Under present conditions, when stands are about 150 years of age, intolerant species such as cottonwood and silver maples are replaced by shade tolerant tree species. This climax community is characterized by hackberry (*Celtis occidentalis*), mulberry (*Morus* sp.) and American elm (*Ulmus americana*), which are overgrown with dense vines. Dutch elm disease limits the age of the elms, however, and the other species do not provide a significant canopy (Feavel 1986, Swenson personal communication). The structure of this forest would not appear to be particularly attractive to forest interior birds. Despite the open conditions, the cottonwood/silver maple will not regenerate because of a lack of soil disturbance and competition with herbaceous plants. Therefore, logging that regenerates the cottonwood/silver maple is desirable in the long-term for forest interior birds, although it would have short-term negative impacts.

Bushman and Therres (1988) and Robbins et al. (1989) have provided a number of guidelines for habitat management for forest interior breeding birds, particularly as they pertain to timber management. These recommendations include the use of selective harvesting, minimizing edge in clearcuts, avoiding daylighting of logging roads, use of long rotations and leaving small trees uncut. Many of these practices have already been incorporated into the Corps of Engineers timber harvest program (Feavel 1987).

The impacts of selective cutting are presently being evaluated by Robinson (1990b) in upland forest.

A review of the floodplain forest management program on publicly-owned land should consider where forest regeneration for timber and wildlife habitat can be carried out with the least impact on forest interior birds. Consideration should be given to maintaining the longest rotations possible in the largest forest tracts, which probably support the best and most successful breeding populations of forest interior birds. Timber cuts could be limited to those areas which have been specifically identified as needing regeneration. Where shorter rotations and conversion of tree species composition to mast-producing species is desirable, sites should be selected that do not have high values for forest interior species.

As Robinson (1989) has noted, the probable severity of problems associated with fragmentation in the Midwest necessitates the elimination of fragmentation, where possible, and not just reduction in edge, as has been suggested by other authors. Existing openings should, therefore, be eliminated where possible. Abandoned crop fields, grasslands and openings present on publicly-owned land could be restored to forest cover, if forests were present historically on the site. This could obviously not be done on all tracts, but should be considered where the reduction in fragmentation would be greatest, where it is compatible with the objectives for which the land was acquired, and where conflicts with other management objectives are not significant. This is already being done to some extent by the Corps of Engineers and the Fish and Wildlife Serv-

ice. The importance of sycamore to Cerulean Warblers, Yellow-throated Warblers and Northern Parula Warblers, which are all relatively uncommon species, should also provide justification for adding a sycamore component to bottomland forest restoration.

3. Develop and implement policy for forested wetland mitigation that includes evaluation of fragmentation effects.—In assessing impacts of development projects on forested wetlands, the effects of forest fragmentation should be considered and mitigated. A clear mitigation policy on forested wetlands also needs to be established. Historically, compensation for losses has often been only for the actual acreage lost and has ignored fragmentation effects. The type of wetland required for compensation has also been inconsistent, and has often been some type of palustrine emergent wetland, rather than a forested wetland.

In reviewing projects, every effort should be made initially to avoid and minimize impacts because it takes many years to replace lost forested wetland values. When unavoidable losses are to occur, compensation should be for in-kind habitat and it should be designed to mitigate for fragmentation effects.

For fish and wildlife projects, fragmentation impacts need to be considered as part of the environmental analysis. Forest disturbance should be kept to a minimum, and project features such as levees should be aligned next to existing edges as much as possible.

These recommendations can be further refined as more research in bot-

tomland forests is completed. However, all indications at this time are that many forest interior species in the Midwest are in serious trouble, and that action is needed immediately to address the situation.

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LITERATURE CITED

- Brittingham, M. C. and S. A. Temple. 1983. Have cowbirds caused forest songbirds to decline? *Bioscience* 33:31–35.
- Brush, T. 1990. Nesting ecology of prothonotary warblers at Big Sand Mound: 1988–1990. Unpubl. rept. to Iowa DNR.
- Bushman, E. S. and G. D. Therres. 1988. Habitat management guidelines for forest interior breeding birds of coastal Maryland. *Maryland Department of Natural Resources, Forest, Park and Wildlife Service Wildlife Technical Publication* 88–1.
- Dinsmore, J. J., T. H. Kent, D. Koenig, P. C. Peterson, and D. M. Roosa. 1984. *Iowa Birds*. Iowa State University Press. Ames, Iowa. 355 pp.
- Droege, S. and J. R. Sauer. 1990. North American Breeding Bird Survey Annual Summary, 1989. *U.S. Fish & Wildlife Service, Biological Report* 90(8). 22 pp.
- Emlen, J. T., M. J. DeJong, M. J. Jaeger, T. C. Moermond, K. A. Rusterholz, and R. P. White. 1986. Density trends and range boundary constraints of forest birds along a latitudinal gradient. *Auk* 103:791–803.
- Feavel, T. 1986. Forest management on the Mississippi. *Iowa Conservationist* 45:29–31.
- Feavel, T. 1987. Breeding bird response to clear cutting hardwoods. Unpublished report. USACE-Rock Island District, Rock Island, Illinois.
- Forman, R. T., A. E. Galli, and C. F. Leck. 1976. Forest size and avian diversity in New Jersey woodlots with some land use implications. *Oecologia* 26:1–8.
- Friedmann, H. 1963. Host relations of the parasitic cowbirds. *U.S. National Museum Bulletin* 233. 276 pp.
- Galli, A. E., C. F. Leck, and R. T. T. Forman. 1976. Avian distribution patterns in forest is-

- lands of different sizes in central New Jersey. *Auk* 93:356-354.
- Gates, J. E. and L. W. Gysel. 1978. Avian dispersion and fledging success in field-forest ecotones. *Ecology* 59:871-883.
- Graber, J. W., R. R. Graber, and E. L. Kirk. 1979. Illinois birds: Sylviidae. *Illinois Natural History Survey, Biological Note* 110.
- Graber, J. W., R. R. Graber, and E. L. Kirk. 1983. Illinois birds: Wood warblers. *Illinois Natural History Survey, Biological Note* 118.
- Graber, J. W., R. R. Graber, and E. L. Kirk. 1985. Illinois birds: Vireos. *Illinois Natural History Survey, Biological Note* 124.
- Graber, R. R., J. W. Graber, and E. L. Kirk. 1971. Illinois birds: Turdidae. *Illinois Natural History Survey, Biological Note* 75.
- Graber, R. R., J. W. Graber, and E. L. Kirk. 1974. Illinois birds: Tyrannidae. *Illinois Natural History Survey, Biological Note* 86.
- Hahn, H. W. 1937. Life history of the oven-bird in southern Michigan. *Wilson Bulletin* 49:145-237.
- Hands, H. M., R. D. Drobney, and M. R. Ryan. 1989. *Status of the cerulean warbler in the north-central United States*. U.S. Fish Wildl. Serv. Rept., Region 3, Fort Snelling, MN. 11 pp.
- Jahn, L. A. and R. V. Anderson. 1986. The ecology of Pools 19 and 20, Upper Mississippi River: A community profile. *U.S. Fish & Wildlife Service Biological Report* 85(7.6)
- Lynch, J. F. and D. F. Whigham. 1984. Effects of forest fragmentation on breeding bird communities in Maryland, USA. *Biological Conservation* 28:287-324.
- Mossman, M. J. 1988. Birds of southern Wisconsin floodplain forest. *Passenger Pigeon* 50:321-337.
- Petit, L. J. 1989. Breeding biology of prothonotary warblers in riverine habitat in Tennessee. *Wilson Bulletin* 101:51-60.
- Robbins, C. S., D. Bystrak, and P. H. Geissler. 1986. The breeding bird survey; its first fifteen years, 1965-1979. *U.S. Fish & Wildlife Service Resource Publ.* 157.
- Robbins, C. S., D. K. Dawson, and B. A. Dowell. 1989. Habitat area requirements of breeding forest birds of the Middle Atlantic States. *Wildlife Monograph* 103. 34 pp.
- Robbins, C. S., J. R. Sauer, R. S. Greenberg, and S. Droege. 1989. Population declines in North American birds that migrate to the neotropics. *Proceedings of the National Academy of Sciences USA* 86:7658-7662.
- Robinson, S. K. 1989. The effects of habitat fragmentation on Illinois birds. *Illinois Natural History Survey Report, Center for Wildlife Ecology, Champaign*.
- Robinson, S. K. 1990a. Effects of forest fragmentation on nesting songbirds. *Illinois Natural History Survey Rept.* 296:1-2.
- Robinson, S. K. 1990b. Impacts of selective logging on bird community composition and nesting success in the Trail of Tears State Forest (Preliminary report). *Illinois Natural History Survey, Center for Wildlife Ecology, Champaign*.
- Robinson, S. K. In press. Population dynamics of breeding neotropical migrants in a fragmented Illinois landscape. In J. M. Hagan and D. W. Johnston (eds.). *Ecology and conservation of neotropical migrant landbirds*. Smithsonian Institution Press, Washington, D.C.
- Samson, F. B. 1979. Low and hardwood bird communities. In *Management of north-central and northeastern forests for non-game birds*. USDA Forest Service General Technical Report NC-1.
- Small, M. F. and M. L. Hunter. 1988. Forest fragmentation in avian nest predation in forested landscapes. *Oecologia* 76:62-64.
- Smith, E. T. and P. A. Dumont. 1944. Middle-western region. *Audubon Magazine* 47:104-106 (Supplement).
- Smith, P. W. 1893. Nesting of the cerulean warbler. *Ornithologist and Oologist* 18:5-6.
- Temple, S. A. and J. R. Cary. 1988. Modelling the dynamics of forest-interior bird populations in a fragmented landscape. *Conservation Biology* 2:341-347.
- U.S. Army Corps of Engineers. 1988. *Final Environmental Impact Statement. Second Lock at Lock and Dam No. 26 (Replacement) Mississippi River, Alton, Illinois and Missouri*. St. Louis District. 289 pp.
- U.S. Fish and Wildlife Service. 1990. *Conservation of avian diversity in North America*. Office of Migratory Bird Management. Washington, D.C. 22 pp.
- Whitcomb, R. F., C. S. Robbins, J. F. Lynch, B. L. Whitcomb, M. K. Klimkiewicz, and D. Bystrak. 1981. Effects of forest fragmentation on avifauna of the eastern deciduous forest. In R. L. Burgess and D. M. Sharpe (eds.). *Forest Island Dynamics in Man-Dominated Landscapes*. Springer-Verlag, New York.

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Henry Rowe Schoolcraft. (*Photograph courtesy of the U.S. Library of Congress.*)

H. R. Schoolcraft and Natural History on the Western Frontier, Part 1: Early Years

by Michael Mossman

In March of 1818 an isolated village of western New York swelled with an influx of uprooted families, adventurers, and drifters ready for the Allegheny River to rid itself of ice and transport them to the western frontier. Among them was 24-year-old Henry Rowe Schoolcraft (1793–1864), an aspiring, self-educated scientist rebounding from bankruptcy, and bound for exploration and possibly fortune in the Missouri Territory. So began a long career on the American frontier, by a remarkable man who would progress from explorer and mineralogist to Indian agent and ethnologist, and who would be intimately involved in the natural and human history of the Mississippi River valley and the upper Great Lakes.

Schoolcraft was tireless, disciplined, and a prolific writer, best known as the discoverer of the source of the Mississippi River, and as an early chronicler of Native American languages, myths, and customs. Yet he was, and remains, a controversial figure, in part from his ethnocentric views of the American Indian, and from self-promotion that sometimes compromised his writings.

The latter is nowhere so obvious as in descriptions of him and his life, which serve well as an introduction to him. Here, first, are excerpts from an approved biography that appeared in one of his books (Schoolcraft 1851):

“He is an example of what early and continued zeal, talent, and diligence, united with energy of character and consistent moral habits, may accomplish in the cause of letters and science, by the force of solitary application, without the advantage of hereditary wealth, the impulse of patronage, or the prestige of early academic honors. Ardent in the pursuit of whatever engaged his attention, quick in the observation of natural phenomena, and assiduous in the accumulation of facts; with an ever present sense of their practical and useful bearing—few men, in our modern history, have accomplished so much, in the lines of research he has chosen, to render science popular and letters honorable. To him we are indebted for our first accounts of the geological constitution, and the mineral wealth and resources of the great valley beyond the Alleghanies, and he is the discoverer of the actual source of the Mississippi River in Itasca Lake. For many years, beginning with

1817, he stirred up a zeal for natural history from one end of the land to the other, and, after his settlement in the West, he was a point of approach for correspondents, as his personal memoirs denote, not only on these topics, but for all that relates to the Indian tribes, in consequence of which he has been emphatically pronounced "The Red Man's FRIEND."

"... Mr Schoolcraft's persevering industry is so indomitable, that he has been known to write from sun to sun almost every day for many consecutive years, taking no recreation, and yet these sedentary habits of untiring application being regulated by system, have not impaired the digestive functions. . .

"... the complete embodiment of temperance in all things. He rises early, eats moderately of simple food, never uses a drop of stimulant, and does not even smoke a cigar. In temperament he is among the happiest of human beings, always looks at the bright side of circumstances—loves to hear of the prosperity of his neighbors, and hopes for favorable turns of character, even in the most depraved. The exaltation of his intellectual pursuits, and his sincere piety, have enabled him to rise above all the petty disquietudes of everyday life."

A recent historian's account is less noble, yet more tantalizing:

"Many of his basic attitudes and ideas—nationalism, manifest destiny, anglophobia, his early model of cultural development, his status anxiety—... mirror widely shared beliefs and moods characteristic of the American society of his time. Nonetheless, the unusual circumstances of his residence on a remote Indian frontier, his marriages—first to a half-Chippewa woman in the far West and later to a neurotic South Carolina slaveowner, and a singular series of family events including sudden deaths, opium addiction, delinquency,

murder and insanity, gave an intensely personal character to his quest for faith and meaning in an uncertain world. If at the beginning of his life his outlook was anything but original, by the end it had become idiosyncratic in the extreme." (Bremer 1987).

Shortcomings aside, Schoolcraft's voluminous writings help illuminate an era in Wisconsin history for which little first-hand information is available, and most of his natural history observations appear accurate. His narratives and memoirs cover several expeditions, primarily to present-day Missouri and Arkansas (1818–1819), Illinois (1821), Wisconsin, Minnesota, and Michigan's Upper Peninsula (1820, 1831, 1832), and miscellaneous travels and experiences during his years as Indian agent at Sault St. Marie, at the eastern end of Lake Superior (1822–1841). In addition is his correspondence with other naturalists, the letters and journals of his associates on these same expeditions, and the miscellaneous scientific literature that resulted. Together, these paint colorful impressions of the unsettled Midwest (especially the upper Great Lakes region), how people experienced it, and the character of natural history study in the early 1800s.

General biographical information on Schoolcraft is presented in several publications, including Anon. (1845), Hough (1935), Marsden (1976) and the introductions to Schoolcraft's (1851) *Personal Memoirs, Expedition to Lake Itasca* (Mason 1958), and *Literary Voyager* (Mason 1962). The most comprehensive information is that provided by Freeman (1969) and Bremer (1982, 1987). In addition, Schorger (1946) briefly summarized many of

Schoolcraft's ornithological observations.

Schoolcraft was born in 1793 of English and German ancestry, near Albany, New York. At an early age he showed a proclivity toward study and writing. By the age of 13 he was working in the glassworks that his father supervised, and at age 14 was an overseer. As the senior Schoolcraft began to establish glassworks of his own, his precocious son assumed responsibility for the design, construction, and supervision of new sites in New York and Vermont. He was a dedicated, talented, and largely self-taught student of chemistry, mineralogy, and engineering. He also formed a short-lived, local literary society and published a newsletter entitled "The Cricket". The development of Schoolcraft's personality during these years is aptly described by Bremer (1987):

"He led the life of a rising young man with a taste for society and the usual gregariousness of youth. . . Doubtless he cut a striking figure with his six foot frame, chestnut hair, and blue eyes set off by a good suit, silk gloves and handkerchief, and gold key. He wrote poetic tributes to a variety of young women. . . Those early years proved critical in shaping the basic village bourgeois outlook that characterized Schoolcraft's thought and behavior throughout his life. [He was among] a small coterie of individuals [who] rather self-consciously sought to emulate cultivated middle class society in the larger towns. . . In such a setting the favorite son of the local factory superintendent could hardly avoid feeling keenly aware of his social position. This sensitivity manifested itself to the end of his life both in his efforts to display the dignified aloofness of the proper gentleman and in his desire to favorably impress his social and official superiors."

The glassworks trade boomed during the War of 1812, but when the Treaty of Ghent re-established trade with superior European markets, the business of manufacturing glass, like many other endeavors inflated by the war years, suffered seriously. Caught in this situation by "a flood of paper money," worthless notes in lieu of salary, and probably some poor business decisions, young Henry went bankrupt.

This was certainly humiliating, for, as portrayed in his later writings, Schoolcraft was extremely sensitive to failure or criticism. Add to this his difficulty in finding work in his trade, the disappointing response to his prospectus for a proposed book on glassmaking, and yet his ambitious and inquiring mind—and it is not strange that he would turn westward. He left home with mineralogical texts, specimens and field equipment, some clothing, and \$60, to investigate and perhaps establish a claim in the poorly-known lead-mining district of Missouri. His experiences en route were probably typical for that period of westward migration into the Ohio and Mississippi valleys, which was urged by economic recession, a burgeoning populace, and the opening of land that followed the War of 1812. Wisconsin, then part of the Illinois Territory, was yet a wilderness belonging to its various native peoples; it would not receive its first major flood of settlers for another 20 years. Schoolcraft (1851) described the beginning of his journey thus:

"I reached Olean, on the source of the Allegheny River, early in 1818, while the snow was yet upon the ground, and had to wait several weeks for the opening of that stream. I was surprised to see the

crowd of persons, from various quarters, who had pressed to this point, waiting the opening of the navigation. . .

"I mingled with this crowd, and, while listening to the anticipations indulged in, it seemed to me that the war had not, in reality, been fought for "free trade and sailors' rights" where it commenced, but to gain knowledge of the world beyond the Alleghanies.

"Many came with their household stuff, which was to be embarked in arks and flat boats. The children of Israel could scarcely have presented a more motley array of men and women, with their "kneading troughs" on their backs, and their "little ones," than were there assembled, on their way to the new land of promise.

"To judge by the tone of general conversation, they meant, in their generation, to plough the Mississippi Valley from its head to its foot. There was not an idea short of it. What a world of golden dreams was there!

"I took passage in the first ark that attempted the descent for the season."

Descending the Allegheny and then the Ohio on various flat boats and keel boats, Schoolcraft took time for local geological explorations, and visits to factories and mines. "Every night we tied our ark to a tree and built a fire on shore. . . I had learned to row a skiff with dexterity . . . and turned this art to account by taking the ladies ashore, as we floated on with our ark, and picked up specimens while they culled shrubs and flowers. . . The river was constantly enlarging. . ."

They reached Louisville late in spring. "It was about this point, or a little above, that we first noticed the gay and noisy parroquet [Carolina Parakeet], flocks of which inhabited the forests. . . At Shawneetown, where we lay a short time, I went out hunting about the mouth of the Wabash with

one Hanlon, a native of Kentucky, who was so expert with the use of the rifle that he brought down single [Passenger] pigeons and squirrels, aiming only at their heads or necks."

Thus, Schoolcraft's first bird notes were cursory. Had he anticipated their value to posterity, we might be graced with more vivid accounts, but we are left wondering. Fortunately, Alexander Wilson, the "Father of American Ornithology" had traveled down the Ohio 8 years before Schoolcraft. His experiences with these same, once-common species can be found in his *American Ornithology* (1803–1814), which was the first scientific text on North American birds, and the only one existent at the time of Schoolcraft's journey. Excerpts from it may help us comprehend the birdlife Schoolcraft encountered that spring. First, regarding the Passenger Pigeon:

"In descending the Ohio by myself, in the month of February, I often rested on my oars to contemplate their aerial manoeuvres. A column, eight or ten miles in length, would appear from Kentucky, high in air, steering across to Indiana. The leaders of this great body would sometimes gradually vary their course, until it formed a large bend, of more than a mile in diameter, those behind tracing the exact route of their predecessors. This would continue sometimes long after both extremities were beyond the reach of sight; so that the whole, with its glittery undulations, marked a space on the face of the heavens resembling the windings of a vast and majestic river. . . . As these vast bodies passed over the river near me, the surface of the water, which was before as smooth as glass, appeared marked with innumerable dimples, occasioned by the dropping of their dung, resembling the commencement of a shower of large drops of rain or hail.

"Happening to go to shore, one charming afternoon, to purchase some milk at a house that stood near the river, and while talking with the people within doors, I was suddenly struck with astonishment at a loud rushing roar, succeeded by instant darkness, which, on the first moment, I took for a tornado, about to overwhelm the house and everything around in destruction. The people, observing my surprise, coolly said, 'It is only the Pigeons;' and, on running out, I beheld a flock, thirty or forty yards in width, sweeping along very low, between the house and the mountain, or height, that formed the second bank of the river. These continued passing for more than a quarter of an hour, and at length varied their bearing so as to pass over the mountain, behind which they disappeared before the rear came up."

Regarding Carolina Parakeets, Wilson found them to be

"particularly and strongly attached [to] low, rich, alluvial bottoms, along the borders of creeks, covered with a gigantic growth of sycamore-trees, or button wood; deep, and almost impenetrable swamps, where the vast and towering cypress lifts its still more majestic head; and those singular salines, or, as they are called, *licks*, so generally interspersed over that country, and which are regularly and eagerly visited by the Paroquets. . . At Big Bone Lick, thirty miles above the mouth of Kentucky River [about 80 miles above Louisville], I saw them in great numbers. They came screaming through the woods in the morning, about an hour after sunrise, to drink the salt water, of which they, as well as the pigeons, are remarkably fond. When they alighted on the ground, it appeared at a distance as if covered with a carpet of the richest green, orange, and yellow: they afterwards settled, in one body, on a neighboring tree, which stood detached from any other, covering almost every twig of it, and the sun, shin-

ing strongly on their gay and glossy plumage, produced a very beautiful and splendid appearance. Here I had an opportunity of observing some very particular traits of their character: Having shot down a number, some of which were only wounded, the whole flock swept repeatedly around their prostrate companions, and again settled on a low tree, within twenty yards of the spot where I stood. At each successive discharge, though showers of them fell, yet the affection of the survivors seemed rather to increase; for, after a few circuits around the place, they again alighted near me, looking down on their slaughtered companions with such manifest symptoms of sympathy and concern, as entirely disarmed me. . . . They fly very much like the Wild Pigeon, in close, compact bodies, and with great rapidity, making a loud and outrageous screaming, not unlike that of the Red-headed Woodpecker. Their flight is sometimes in a direct line; but most usually circuitous, making a great variety of elegant and serpentine meanders, as if for pleasure. They are particularly attached to large sycamores, in the hollow of the trunks and branches of which they generally roost, thirty or forty, sometimes more, entering into the same hole. . . . They are extremely sociable, and fond of each other, often scratching each other's heads and necks, and always, at night, nestling as close as possible to each other. . . ."

Schoolcraft continued downriver from the Louisville area, and reached the Mississippi River on 1 July. His journal (Schoolcraft 1819) for that day reads:

"The dashing of the oars awoke me this morning at an early hour, and on quitting my birth [sic], I found the boat under rapid headway for the mouth of the Ohio, with the Mississippi in full view. The interest excited on approach-

ing the junction of these celebrated rivers, and a wish to survey with attention the physical character of the country, kept me constantly on deck. The morning was calm and serene, scarcely a cloud obscured the atmosphere, and the sun rose majestically above the horizon, clothing in light the most sublime and beautiful scene, which, until that moment, I ever beheld. The novelty of the scenery, the bold geographical outlines presented by the banks of the rivers, the heavy forests which cast their gloomy shadows upon the water, and the low murmur of two mighty streams hastening to mingle their currents, could not fail to present a scene replete with the highest interest, and capable, at once, of exciting our united wonder and admiration. . . . After having pursued the Ohio from Pittsburgh to its mouth, a distance of more than one thousand miles, . . . the traveller is insensibly led to a contemplation of its grandeur and beauty; he feels a mingled emotion of pride and satisfaction in riding down its majestic current, and cannot help feeling something like regret, to find it, at last, merely a tributary to the Mississippi—that mighty stream which draws its waters from a country equal in extent to the Roman Empire in its proudest days; and whose tributaries are rivers surpassing in size the Rhine, the Danube, or the Wolga [sic]. Such at least were my emotions on reaching the Mississippi, which we entered this morning at sunrise, and found ourselves suddenly transported from a gentle current and clear water, to a stream holding so much mud in suspension as to appear perfectly opaque; and a current so rapid that it is with difficulty navigated by ordinary boats.”

During a pause at the confluence, Schoolcraft (1853) “amused myself by angling from the side of the vessel. The only fish I caught was a gar—that almost single variety of the voracious

species in these waters, which has a long bill, with sharp teeth, for arousing its prey, apparently, from a muddy bottom.”

The boat then proceeded up the Mississippi for nearly a month, past forests of cottonwood, sycamore, and elm, almost to St. Louis. He walked much of the way while the barge he accompanied was poled and pulled slowly against the strong current, covering only 3–10 miles per day. The first night, “as evening came on, the mosquitoes were in hordes. It was impossible to perform the offices of eating or drinking without suffering the keenest torture from their stings” (Schoolcraft 1851). One night as the boat lay moored along the river, the crew prepared to defend themselves against what they thought was a grizzly bear: “As I carried nothing more deadly than a silver crucible and some acids, I remained on the upper deck of the barge. From this elevation I soon saw, by the dim moonlight, the whole party return, without having fired a gun. It turned out that the cause of this unusual disturbance was a large white hog, which had been shot in the head and snout with swan-shot, by some cruel fellows. . .” (Schoolcraft 1853).

About halfway to St. Louis he stated:

“We frequently meet the paroquet on the banks of the river, and have passed several large flocks to-day. This is a kind of parrot, a beautiful bird, which is very common in Louisiana, Missouri, and Kentucky. We have also met in this day’s voyage, a large flock of [white] pelicans, but could not approach nigh enough to kill any. This is a bird which frequents the waters of the Mississippi, but never ventures far into the interior. The wild turkey, [Bobwhite] quail, and squirrel, are daily met with on either shore, and

we find no difficulty in killing as many as we have occasion for. . .

"Nothing can equal the beauty of the varying landscape, presented for the last two days. . . There has appeared a succession of the most novel and interesting objects which the face of nature is capable of presenting. Whatever pleasure can be derived from the contemplation of natural objects, presented in surprising and picturesque groupes, can here be enjoyed in the highest degree . . . the bleak and rugged cliff with the verdant forest, the cultivated field, or the wide extended surface of the Mississippi, interspersed with its beautiful islands, and winding majestically through a country, which only requires the improvements of civilized and refined society, to render it one of the most delightful residences of man. Nor is it possible to contemplate the vast extent, fertility, resources, and increasing population of this immeasurable valley, without feeling a desire that our lives could be prolonged to an unusual period, that we might survey, an hundred years hence, the physical and political condition of this country, and live to participate in the advantages, improvements, wealth, glory, and power, which is destined to crown the great basin between the Alleghany and Rocky Mountains. . ." (Schoolcraft 1819)

What might he have thought if he were actually to return in the 20th century, to find the Carolina Parakeet and Passenger Pigeon extinct, other species far reduced in numbers, the river laden not only with what he called the natural "broken-down materials of half a continent," but also with the myriad effluents of "civilized and refined society"; and where contemporary naturalists would yearn for a visit to the year 1818? His was a time of prevailing assumption that natural resources were inexhaustible, before wilderness had become scarce, and before

the writings of even Thoreau and Muir, when it was not so incongruous for a naturalist to extoll the beauty of near-wilderness while advocating its exploitation.

After reaching St. Louis, Schoolcraft returned rapidly downriver by steamboat, appreciating the extended time he had spent on the ascent:

"Had I passed it in a steamer, [upward] bound, as at this day, in forty-eight hours, I should have had none but the vaguest and most general conceptions of its character. But I went to glean facts in its natural history, and I knew these required careful personal inspection of minute as well as general features. There may be a sort of horseback theory of geology; but mineralogy, and the natural sciences generally, must be investigated on foot." (Schoolcraft 1851)

Schoolcraft spent August through October of 1818 investigating the mining district of east-central Missouri near Potosi, where miners and backwoods hunters had lived for decades, but where agricultural society had begun to develop only in the previous 5 years. On his first day there,

"The country lay in its primitive state. For the purpose of obtaining a good road, an elevated arid ridge had been pursued much of the way. In crossing this, I suffered severely from heat and thirst, and the only place where I saw water was in a rut, which I frightened a wild turkey from partaking of, in order to stoop down to it myself." (Schoolcraft 1851)

This work resulted in the book *A View of the Lead Mines of Missouri* (Schoolcraft 1819), which included a wealth of insightful observations not only of the mines, but also the area's geography, soils, geology, vegetation,

agriculture, and society. The text is straightforward, and relatively free of the affectation and self-glorification that often muddled his later works. Yet he still entertained his opinions, especially regarding cultural refinement, or lack thereof. The following selections exemplify his perceptions and concerns, beginning with his belief in careful, first-hand observation:

"A man who merely rides through a country, cannot be expected to publish much valuable information concerning it. The inquiry of a moment, the surmises of ingenuity, and the probability of things, can never atone for sound statistical information, practical remarks, and acknowledged facts. It is necessary to enter into details, before we can arrive at a general result. . . I allude to some works on the western country now generally read at the eastward. . . , where we are served up with surmises instead of facts, with bloated descriptions instead of simple accounts; and the authors of which, in many instances, know not the countries they describe, and have neither admired the beauties, or shrunk at the deformities, which they picture. . .

"The traveller, after he has viewed the rich uplands of Ohio—the heavy forests of Indiana—the woodless barrens of Kentucky—the craggy cliffs of Tennessee—and the unbounded prairies of Illinois, has still something to desire, for he may see them all together in one day's ride in the interior of Missouri . . . to behold at one view, cliffs and prairies, bottoms and barrens, naked hills, heavy forests, rocks, streams, and plains, all succeeding each other with rapidity, and mingled with the most pleasing harmony. I have contemplated such scenes while standing on some lofty bluff in the wilderness of Missouri, with emotions of unmixed delight, while the deer, the elk, and the buffalo, were grazing quietly on the plains below, and if any thing in the natural physiology of the earth, has the

power to turn our thoughts from the pursuit of earthly glory, to the contemplation of celestial bliss, . . . it must be a scene like this, where we are presented with an assemblage of all that is novel, beautiful, or sublime in the face of nature, far removed from the tumult, dangers, and deceptions of life, and encompassed on all sides by silence, tranquility and peace. . .

"Respecting the wild quadrupeds in this part of the country, it may be observed, that they are annually decreasing, both in number and kind, and hunting is every year becoming less an object. Those, therefore, who are attached to this kind of life, are almost imperceptibly withdrawing further into the woods. . .

"Of birds there is an endless variety. The wild turkey is still very common on the bottom lands, and during the heat of the day in the open post oak woods. The wild goose, duck, brant, and swan, are to be found on the streams.¹ The pelican is occasionally seen on coming up the Mississippi, but never ventures into the interior. The prairie hen [Prairie-Chicken] is common, so are quails and pigeons; the latter, in some parts of the interior, are so numerous that the woods seem alive with them. Of singing birds there is a numerous tribe; some of them are strangers to me, and there is a great proportion whose colors are beautiful, and who sing sweetly. I think an ornithologist would find this a very interesting field. The Parrakeet is a beautiful bird; it is a kind of parrot; its colours are green, yellow, and red, all bright col-

¹"Wild goose" and "swan" undoubtedly refer to Canada Goose and Trumpeter Swan, but what Schoolcraft meant by "brant" is uncertain. Then, as now, ornithological texts reserved this name for the strictly coastal *Branta (Anas) bernicla*. However, "brant" has been used colloquially for various small to medium-sized geese, including White-fronted Goose, small races of Canada Goose, and white and blue phases of Snow Goose. The latter species seems most likely in Schoolcraft's situation.

ours, and it is a pleasing sight to see a flock of them suddenly wheel in the atmosphere, and light upon a tree; their gaudy colours are reflected in the sun with the brilliance of the rainbow: they are a noisy bird, but their notes are disagreeable. This bird is first met with on descending the Ohio, about the falls [near Louisville], after which they become plenty; are constantly to be seen on the Kentucky or Indiana shore, and add to the delight a traveller feels in descending that beautiful river. Of birds of prey, the eagle, the turkey buzzard, and the raven, may be noticed; but I forbear to increase the catalogue, for the subject is exhaustless, and to do it justice would require a greater limit than I propose to allow myself in this entire view. . .

"... an atmosphere of unusual dryness, exempts the inhabitants from those pulmonary complaints which are more or less the consequence of an atmosphere surcharged with watery particles. . . Epidemics are unknown. Those diseases which prevail more or less every summer on the *American bottom* [along the Mississippi], and other rich and level tracts of Illinois, Ohio, and Indiana, have not found their way into the interior of Missouri, where there is no stagnant water,—no repositories for mud and slime, brought down by the annual floods, as is the case on the immediate banks of the Mississippi, Ohio, and other great western rivers,—and no pestilential airs from decaying vegetable, and drying ponds. The *fever and ague* is a very rare thing at the mines. Billious complaints are the most common, but they are not fatal. . .

"A country thus situated, cannot fail to prove genial to the vegetable kingdom. It would be difficult to point out a section of country which affords a more interesting field for the botanist. Its prairies and barrens are covered with a profusion of wild flowers, shrubs, and plants, and its cultivated fields yield to the hands of the planter, a great proportion of the useful vegetables of the earth. . .

"[The people] are robust, frank, and daring. Taught by the hardships and dangers incident to a frontier settlement, to depend for security and success upon their own individual exertions, they rely little upon extraneous help, and feel that true independence, flowing from a conviction that their own physical exertions are equal to every call, necessity, and emergency of life. . .

"With the advances in agriculture, a corresponding improvement has been effected in the manners and morals of the people. A large proportion of those formerly engaged in mining were persons of the most abandoned character, refugees from justice in the old States; and the mines were a continued scene of riot and disorder, and many atrocities were committed. Many of those persons have fled, others have been restrained from evil practices by the influence and example of virtuous and intelligent men. . . The French constitute a considerable proportion of the whole population, and it is but repeating a common observation to say, that in morality and intelligence they are far inferior to the American population. . .

"The hunter population in the territory, presents a state of society of which few have any just conception, and of which, indeed, I confess myself to have been wholly ignorant, previous to my tour through those regions where they are located. Composed of the unruly and the vicious from all quarters, insulated by a pathless wilderness, without the pale of civil law, or the restraints upon manners and actions imposed by refined society, this population are an extraordinary instance of retrogression of society. . . composed of persons from various sections of the Union, who have either embraced hunting from the love of ease or singularity, or have fled from society to escape the severity of the laws, and to indulge in unrestrained passion. Learning and religion are like disregarded, and in the existing state of so-

ciety among the Missouri hunters, we are presented with a contradiction of the theories of philosophers of all ages, for we here behold the descendents of enlightened Europeans in a savage state, or at least in a rapid state of advancement towards it. . . .”

Having completed this investigation, Schoolcraft set out southward in early November to explore the Ozark wilderness, with a troublesome packhorse named Butcher, and a companion who “stood stoutly by me [though] he had not much poetry in his soul”. During the ensuing 3 months they covered 900 miles among rugged, unmapped terrain, during which various mishaps brought them to face starvation, exhaustion, injury, and unpredictable backwoodsmen. Schoolcraft’s journal of this trip is captivating and informative. It appeared in a nearly original form (Schoolcraft 1818–1819), an edited publication (Schoolcraft 1821), and a more popularized version (Schoolcraft 1853) that was published long afterward. Here are a few excerpts from the 1853 publication that deal specifically with birds, and, moreover, with the travellers’ starving condition:

“Nov. 27th . . . Much of our way lay through open oak forests, with a thick bed of fallen leaves, and we several times searched under these for sweet acorns; but we uniformly found that the wild turkeys had been too quick for us—every sweet acorn had been scratched up and eaten, and none remained but such as were bitter and distasteful. On descending an eminence, we found the sassafras plentifully, and, breaking off branches of it, chewed them, which took away the astringent and bad taste of the acorns. . .

“Nov. 28th. Daylight was welcome. I built a fire against the stump of a dead tree, which had been broken off by light-

ning at a height of some thirty or forty feet from the ground. We here boiled our tea, and accurately divided about half an ounce of dried meat, being the last morsel we had. While thus engaged, a red-headed woodpecker lit on the tree, some fifteen or twenty feet above our heads, and began pecking. The visit was a most untimely one for the bird. In a few more moments, he lay dead at the foot of the tree, and, being plucked, roasted, and divided, furnished out our repast. . .

“Dec. 3rd . . . We had not a single charge of shot left. We had procured [from rock] lead enough to mould just five bullets. This I carefully did. I then sallied out in search of game, scanning cautiously the neighboring canebrake, and fired, at different times, three balls, unsuccessfully, at turkeys. . . My companion then took *his* gun, and also made an unsuccessful shot. When evening approached, a flock of turkeys came to roost near by. We had now just *one* ball left; everything depended on *that*. I took it to the large and firm stump of an oak, and cut it into exactly thirty-two pieces, with geometrical precision. I then beat the angular edges of each, until they assumed a sufficiently globular shape to admit of their being rolled on a hard surface, under a pressure. This completed their globular form. I then cleansed my companion’s gun, and carefully loaded it with the thirty-two shot. We then proceeded to the roost, which was on some large oaks, in a contiguous valley. I carried a torch, which I had carefully made at the camp. My companion took the loaded gun, and I, holding the torch near the sights at the same time, so that its rays fell directly on the birds, he selected one, and fired. It proved to be one of the largest and heaviest, and fell to the earth with a sound. We now returned to camp, and prepared a part of it for supper, determining to husband the remainder so as to last till we should reach settlements. . . .”

Wild Turkeys were common in the Ozarks, and according to Schoolcraft's account of frontier bartering here, a turkey was worth 25 cents, the same as a raccoon. Three could be traded for a pound of coffee, 4 for a gallon of wild honey, 6 for a bear skin, 8 for an otter skin or a butcher knife, or 32 for a Mackinaw blanket.

Schoolcraft returned to the lead district in February, where he spent 2 months writing his *View of the Lead Mines*:

"The months of February and March had now glided away. Too close a confinement to my room, however, affected my health. The great change of life from camping out, and the rough scenes of the forest, could not fail to disturb the functional secretions. An obstruction of the liver developed itself in a decided case of jaundice. After the usual remedies, I made a journey . . . to the Mississippi River, for the purpose of ascending that stream on a barge, in order that I might be compelled to drink its turbid, but healthy waters. . . I returned in a short time . . . in completely restored health." (Schoolcraft 1851)

Schoolcraft had been more dubious of this practice when he ascended the Mississippi the previous summer:

"An opinion is prevalent throughout this country, that the water of the Mississippi, with every impurity, is healthful as a common drink, and accordingly the boatmen, and many of the inhabitants of the banks of the river, make use of no other water. An expedient resorted to at first, perhaps, from necessity, may be continued from an impression of the benefits resulting from it. I am not well enough acquainted with the chymical properties of the water, or the method in which it operates on the human system, to deny its utility, but to my palate, a glass of cool, clear, spring water is far

preferable to the muddy lukewarm water of the Mississippi. I have seen a simple method pursued for clarifying it. It is done by sprinkling a handful of Indian meal on the surface of a pail of water, which precipitates the mud to the bottom, and the superincumbent water is left in a tolerable state of purity." (Schoolcraft 1819)

Another observer of the time wrote of these "medicinal properties" to the editor of the *American Journal of Science*:

"My health being much enfeebled, necessity compelled me to take a trip to New Orleans for the sake of using the water of the Mississippi river. The effect was salutary and the voyage a pleasant one. The Mississippi water when freely drank, produces powerful effects—when filtrated it is very clear, and may be drunk in large quantities without burthening the stomach. It certainly possesses some properties not common to other waters, but its qualities I believe have never been examined by chemists. (Anon. 1824)

Schoolcraft eventually traveled to New Orleans and then by sea to New York City, where he arrived in August 1819 with his manuscript and new mineralogical specimens. Here he won the attention of "men of science and gentlemen of enlarged minds" (Schoolcraft 1851), such as botanist John Torrey and zoologist Samuel Mitchell, and joined the New York Lyceum of Natural History, the first of several "learned societies" to which he would be elected. As he later recalled (1851), "The natural sciences were then chiefly in the hands of physicians, and there was scarcely a man of note in these departments of inquiry who was not soon numbered among my acquaintances."

Late that fall he published his book on the lead district, which was well-received by the scientific and political communities. One reviewer (Anon. 1821) considered it "entitled to great respect, and we confess ourselves very much indebted to Mr. Schoolcraft for a great mass of valuable information, which, in a connected form, is, we believe, no where else to be found. His statements (as regards the most valuable part) are drawn from his own researches and observations, and have, evidently been the result of much effort, and of no small share of fatigue and personal privation. We trust that so valuable a work will not stop with a single edition. . ." However, the book was evidently too factual for the general public, and sold poorly.

Upon publication, Schoolcraft immediately took copies to Washington, where he impressed President Monroe and other political figures, and lobbied to create a federal position to administer the mineral rights of the West, for which he would be the likely candidate. Instead, Secretary of War Calhoun offered him the position of mineralogist and geologist on an expedition led by General Lewis Cass into the wilds of the Michigan Territory, which then consisted of present-day Michigan, Wisconsin, and that part of Minnesota north of the Mississippi River. According to Schoolcraft (1851), "[Calhoun] tendered me the place, and stated the compensation. The latter was small, but the situation appeared to me to be one which was not to be overlooked. I accepted it. It seemed to be the bottom step in a ladder which I ought to climb." This initiated Schoolcraft's 22-year career in the upper Great Lakes, then considered the northwestern

frontier, and which will be the subject of the next articles of this series.

LITERATURE CITED

- Anonymous. 1821. Notice of "A view of the lead mines of Missouri. . ." by Henry Rowe Schoolcraft. *American Journal of Science* 3:59-72.
- Anonymous. 1824. Medicinal properties of the waters of the Mississippi. . . *American Journal of Science* 8:396-397.
- Anonymous. 1845. The travels and writings of H. R. Schoolcraft. *Democratic Review* 16(84):552-555.
- Bremer, R. G. 1982. Henry Rowe Schoolcraft: Explorer in the Mississippi Valley, 1818-1832. *Wisconsin Magazine of History* 46:40-59.
- Bremer, R. G. 1987. *Indian agent and wilderness scholar: The life of Henry Rowe Schoolcraft*. Central Michigan University, Mt. Pleasant. 445 pp.
- Freeman, J. F. 1959. Henry Rowe Schoolcraft. Ph.D. dissertation, Harvard Univ.
- Hough, W. 1943. Schoolcraft, Henry Rowe. *Dictionary of American Biography* 16:456-457.
- Marsden, M. T. 1976. Henry Rowe Schoolcraft: A reappraisal. *The Old Northwest* 2(2):153-182.
- Mason, P. P. (ed.) 1958. *Schoolcraft's expedition to Lake Itasca*. Michigan State University Press, East Lansing.
- Mason, P. P. (ed.) 1962. *The literary voyager or Muzzeniegun*. Michigan State University Press, East Lansing. 193 pp.
- Schoolcraft, H. R. 1819. *A view of the lead mines of Missouri: Including some observations on the mineralogy, geology, geography, antiquities, soil, climate, population, and productions of Missouri and Arkansas, and other sections of the western country*. Charles Wiley and Company, New York.
- Schoolcraft, H. R. 1820-21. Journal of a tour into the interior of Missouri and Arkansas. . . *New York Literary Journal and Belle-Lettres Repository* 2:256-265, 330-344, 393-408; 3:100-111, 169-183.
- Schoolcraft, H. R. 1821. *Journal of a tour into the interior of Missouri and Arkansas*. R. Phillips, London.
- Schoolcraft, H. R. 1851. *Personal memoirs of a residence of thirty years with the Indian tribes on the American frontiers*. Philadelphia.
- Schoolcraft, H. R. 1853. *Scenes and adventures in the semi-alpine region of the Ozark Mountains of Missouri and Arkansas which were first traversed by Desoto in 1541*. Philadelphia.
- Schorger, A. W. 1946. Henry Rowe Schoolcraft. *Passenger Pigeon* 6:35-37.
- Wilson, A. 1808-1814. *American ornithology*.

Birding and Children

by Scott R. Craven

Birds and bird watching enjoy tremendous popularity, and each of us probably has our own unique set of reasons for being “turned on” by birds. But do you recall how you first became interested? Was it a single event such as finding a dazed fledgling in the backyard, or was it an effort by parents or another adult to get you involved in something they enjoyed by pointing out birds or taking you birding?

If your early exposure to birds came by the latter route, you may now find yourself in a position to pass your interest on to your children or grandchildren. Even with no young children around in your own family, it's quite possible to share your interest in birds with other children through 4H, scouts, nature centers, public schools, and other volunteer opportunities.

The primary purpose of this article is to explore the “how” of kids and birding. The “why” is both personal and practical. Beyond the obvious attraction of the sharing of your own interests with enthusiastic youngsters, you must decide on your own personal agenda. From a practical standpoint,

attracting children to birding is an excellent way to foster personal conservation and environmental ethics. Birding can easily lead to a lifelong hobby. Also, more interest in, and knowledge of, birds in the general population will lead to informed public decisions which may impact the conservation of bird populations.

Most bird enthusiasts have ample factual knowledge to share with children. The trick is attracting and holding a child's interest. Fortunately, there are many excellent sources of help which I will identify. However, first consider some activities or events that would attract the interest of a child. Often the activity, color, or sound of birds is enough. But frequently a so-called “teachable moment” will arise. Such events as a lost fledgling in the backyard, a recovering window-strike victim, an active mixed flock of birds at a feeder on a wintery morning, or a robin nest outside the kitchen window can be used to good advantage. They immediately focus a child's attention and provide a forum for explaining bird identification, behavior, and many concepts such as sur-

Trills, Shrieks, Flutters, and Drummers!
(Birds Speak to Each Other)

Things to Learn

1. Identify bird species by sounds.
2. Reasons birds make different sounds.
3. To describe bird sounds.
4. To distinguish bird songs, calls, and sounds not made by voice.
5. How weather and time of day affects the sounds birds make.

How You Will Learn

1. Listen to birds you can identify by sight.
2. Listen to recorded bird songs (excellent records and tapes are available).
3. Describe sounds birds make with words or phrases.

Things To Do

1. Learn to recognize 20 birds by the sounds they make.
 - Start with the common birds in your area that you can already identify by sight.
 - List the birds you can identify by sound. Describe the sounds they make with combinations of words and phrases (see Bird Sounds Recording Sheet).
 - Use the "Bird Sounds Recording Sheet" as a tool to help you. Duplicate for use in your bird journal.

Caution

Some birds are "mimics." They "steal" the calls and songs of other birds. They can confuse you! (Example: starlings, bluejays).

- Listen to starlings and bluejays. Identify the birds whose sounds they are mimicking.

Going Further

Record some bird sounds with a tape recorder. Share the recording with others--friends, family members, or at a 4H club meeting. Use some of your recordings or sound descriptions for an exhibit at the fair. Try to imitate common calls.

Things to Remember

1. All bird sounds are not songs.
2. Bird "calls" are short one- or several-syllable sounds. They are used to warn of danger, or communicate movement, feeding or flight.
3. Bird songs are musical compositions of notes usually sung by males. They are used to attract a female or to keep away other males.
4. Some birds make sounds without voice (the male ruffed grouse drums his wings).
5. Some birds are silent (examples: pelican, vulture).
6. Spring is the best time of year to learn bird songs. This is when most birds are nesting and migrants are passing through.
7. Birds are most active early in the morning. There is also less noise from people and machinery at this time.

Trills, Shrieks, Flutters, and Drummers
(Recording Sheet)

1. Bird specie's name: _____
2. Sex of bird if known: _____
3. Describe the sound the bird makes. Use letter or word combinations.
Example: Great Horned Owl - whoo whoo who who
Crow - caw caw

4. Describe non-voice sounds this bird makes. _____

5. What time of day does this bird sing the most? _____
6. How many times does this bird repeat the song during 10 minutes of greatest singing activity? _____
7. What happens if another bird of the same species is near? _____

8. How does weather affect this bird's singing or sounds? _____

9. Identify birds whose sounds this bird is mimicking. _____

vival, mortality, competition, and predation.

Activities you are already involved in—bird feeding, maintaining landscape plantings or natural areas to attract birds, building birdhouses, or bird watching—can all be very exciting for children. The key is to be sure that the children are actively included, adequately informed, and given a chance to really do something, even if it's only filling the feeder, or pounding a few nails. The necessary level of involvement will vary with the age, interest level, and prior experience of the children.

Other activities to consider might include:

- (1) A trip to the nearest zoo with special emphasis on the bird collection or aviary. Nature centers may have a few birds on display, especially if they are involved with rehabilitation.
- (2) A quiet reading session with a bird/wildlife oriented magazine such as *Audubon*, *National/International Wildlife*, *Ranger Rick*, or *Your Big Backyard* (the more pictures, the better!).
- (3) Make a contest out of bird or bird song identification with a simple prize like a candy bar for fastest, most, best, etc. In a group, deemphasize the competition aspect and try to have a prize for everyone.
- (4) Take children to see and feed urban waterfowl. Most cities now have "urban" ducks or geese in parks and waterways. Their tameness will fascinate the children and allow you to explain their plumage, behavior, identification, etc. Some cities have too much of a good thing! Waterfowl feeding may be discouraged or illegal as part of a program to control burgeoning urban duck and goose flocks. Please abide by local restrictions.
- (5) Imaginative use of your feeders and birdhouses to involve the children.
- (6) A selection from some of the specific activities that follow.

If you feel uncomfortable dealing with children or don't really know how to present material at the appropriate level, begin by reading *Sharing Nature with Children* by Joseph Bharat Cornell (Ananda publications). It is generally considered THE reference for nature awareness. There are many suggested activities (including birds) and introductory suggestions on teaching/sharing techniques. You will find activities you will want to try with or without children!

A child's interest in art or "coloring" can be put to excellent advantage. One alternative is to have the child draw or color birds or bird parts such as colorful feathers. Children can also try to recreate observations they have made in the field. A better option, especially for older children (up to age 12–14) is the *Field Guide to the Birds Coloring Book* written by Roger Tory Peterson and Peter Alden and illustrated by John Sill (Houghton-Mifflin). The book contains a detailed black-and-white line drawing of most eastern birds along with a description of each bird. There is also a separate section with fully colored illustrations to be used for reference. Each outlined bird can then be "painted" in its actual plumage. It's an excellent way for kids to learn by doing a hands-on activity, and it will provide many hours of fun. Perhaps best of all, the child ends up

with a very nice, personally illustrated field guide. The coloring book is usually available at nature centers, local Audubon Society chapters, Wild Birds Unlimited stores and similar outlets.

Children who show an interest in bird identification, but who may be overwhelmed by the size or terminology of a standard field guide, will enjoy *The Peterson First Guides: Birds*. It is simply a children's version of the popular Peterson Field Guide. The First Guide contains less species and less prose and should be available at the same outlets as the coloring book. Another excellent guide to field marks, identification clues, and basic birding is the brochure *Birdwatching with Roger Tory Peterson* published by the National Wildlife Federation. It is part of the Federation's "Gardening with Wildlife" kit. For single copies or information on ordering the gardening kit contact the NWF at 1412 16th Street NW, Washington, DC 20036-2266.

For activities on birds appropriate for individual children, school classes or youth groups turn to the National Wildlife Federation's Ranger Rick's "Naturescope" series and the "Birds, Birds, Birds" edition. This activity guide contains dozens of hands-on activities divided into preschool, primary (K-2), intermediate (3-5), and advanced (6-7) levels. "Birds, Birds, Birds" also offers an excellent bibliography of children's bird books and general bird related references. The "Naturescope" series includes mam-

mals, insects, dinosaurs, and many other topics. An annual subscription costs \$24.00 or you may contact the NWF at the above address for information on single copies.

Also geared for children, and more readily available, are an array of 4H bird project materials which vary from state to state. Here in Wisconsin the bird projects are consolidated in a booklet entitled "Getting to Know Birds"—Wisconsin 4H Project Manual, 4H-340. Contact your county Extension service office (in any state) for availability of 4H project literature. Several activities from the Wisconsin manual are reprinted here as examples of things you can do with children.

If you have never been involved with children as a 4H leader or nature center volunteer, or have never thought much about getting your own kids "turned on" by birds, maybe it's time to consider it. These suggestions should provide more than enough to keep you and the children busy and entertained! I think it is an excellent way to add a new dimension to your backyard birding and in the long-run it will be good for the kids and the birds. For more information on youth activities or reference availability contact me.

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White-breasted Nuthatch by *Lori Jean Hubanks*

The Winter Season: 1990-91

by *Kenneth I. Lange*

December 1990 began with mild weather and an absence of snow, but on the 2nd it was colder and on the 3rd a snowfall of up to 22 inches, one of Wisconsin's heaviest, covered the state. Despite this storm, snow accumulations were below normal for most of the period. Generally this results in deep frost penetration, but this winter frost depths were also below normal because of above average temperatures. The coldest weather occurred in the fourth week of December and mid February.

A number of contributors regarded this winter as dull and disappointing because bird diversity and numbers were relatively low. "Where are the birds" was a common refrain. Yet finding one or more of the following species might have given a different perspective: Trumpeter Swan, Gyrfalcon, Prairie Falcon, Purple Sandpiper, Northern Hawk-Owl, Great Gray Owl, and, most remarkable, Anna's Hummingbird. Beauty, truly, is in the eye of the beholder.

The hummingbird was especially unusual (how *do* you explain a western hummingbird in Wisconsin in any sea-

son). Whatever its origin, this bird appeared at the David and Susan Schmidt feeder near Wales in Waukesha County in late August and was still there when the blizzard struck on 3 December. Several sympathetic souls netted it during the storm and Barbara and Lee Kranich transported it to Milwaukee's Mitchell Park, where it was released in the tropical dome (*Passenger Pigeon* 53:27-30, 1991). This was Wisconsin's first Anna's Hummingbird. There has been only one other December record for Wisconsin of a wild hummer, namely a female Ruby-throated Hummingbird at a feeder in Door County in 1980.

As Larry Semo mentioned, this could have been called the winter of the Northern Hawk-Owl. This boreal species was reported in Douglas, St. Croix, and Marathon Counties for the first winter records since December 1985. The total number of birds was uncertain, but there were at least 4, and at least 2 were immatures.

Great Gray Owls were found in Douglas and Bayfield Counties, while Snowy Owls were reported from the Ashland area and (including the

Christmas Bird Counts) a total of 11 counties, southwards to Winnebago and Columbia Counties. A concentration of at least 22 Short-eared Owls was reported for southwestern Dane County in December; the birds were in set aside farmland with large hay bales in upland fields.

Other noteworthy raptors were a male and female Gyrfalcon and a Prairie Falcon, all in Portage County.

Several contributors commented on the number or behavior of hawks. Daryl Tessen found "excellent numbers" of Rough-legged Hawk, Red-tailed Hawk, and American Kestrel in the east central part of the state, while Dan Belter reported a "very good season" in Marathon County for hawks, with rough-legs and red-tails being the most commonly seen species. Eric Epstein in Monroe County found adult Goshawks, the first in several years, perhaps heralding the next major invasion of this species; saw Cooper's Hawk and Sharp-shinned Hawk on numerous occasions; and (*Passenger Pigeon* 48:69-73, 1986) observed rough-legs, red-tails, kestrels, and Northern Shrike capturing meadow voles when the average snow depth exceeded 12 inches, early December-mid January. In Douglas County Semo was surprised, because of the scarcity of passerines, to find Sharp-shinned Hawks until 9 January.

The Northern Shrike, although numerous in certain areas, e.g., Monroe County, especially the last 2 weeks of February, and Marathon County, was generally in normal to below normal numbers.

Wisconsin's Trumpeter Swan reintroduction program (*Passenger Pigeon* 50:119-130, 1988) appears to be gaining momentum; birds, not all of Wis-

consin origin, were found in 4 counties.

A Purple Sandpiper lingered in Sheboygan County, Carolina Wrens were in high numbers for the third successive winter, and (Kurt Brownell, Fred Leshner) a Pine Warbler was found in LaCrosse County. Open water at the dam in St. Croix Falls, Polk County, kept Common Goldeneye, Common Merganser, and Bald Eagle in the area (Joe Hudick).

It was a good winter for the Golden-crowned Kinglet. This species, after the Christmas Bird Counts, was found in 5 southern counties plus Shawano, Bayfield, and Douglas Counties. In Douglas County Semo noted it mostly in the Brule River bog, although by the end of the period it could be found in uplands also.

The House Finch continues to increase in numbers. Janine Polk, e.g., reported "noticeable numbers" in the Eau Claire-Chippewa Falls area. Including the Christmas Bird Counts, this species was found in a total of approximately 30 counties, with the northernmost report (Dick Verch) being from the Ashland area.

A number of sparrows, notably Field Sparrows, Fox Sparrows, Song Sparrows, and Swamp Sparrows, remained throughout the period in certain southern counties. The White-throated Sparrow, after the Christmas Bird Counts, was found in 5 counties, including Douglas County (one at a feeder), and the White-crowned Sparrow was found throughout the period in the Ashland area.

The Red-bellied Woodpecker ranged northwards to Douglas, Bayfield, and Marinette Counties, while the Red-headed Woodpecker, after an apparent increase last winter, again

was limited in range, being reported from just 6 counties after the Christmas Bird Counts. Both species bear watching, but for diametrically opposite reasons: the red-belly for range expansion, and the red-head for range contraction and/or population decline.

What other species were scarce? Below normal numbers were generally reported for the Red-breasted Nuthatch, American Tree Sparrow, Dark-eyed Junco, and the winter finches. Contributors were especially in agreement on the finches. "Poor winter finch year" and "numbers way down" were typical comments. There were some local concentrations, e.g., Pine Grosbeak at Maybelle Hardy's feeder in Park Falls, Price County, and Red Crossbill in stands of large red pine in Douglas County, but these were exceptions.

Late fall migration was reported for the Tundra Swan and Canada Goose. Spring migration was reported for the following species: Great Blue Heron, Canada Goose, certain ducks, Turkey Vulture, Bald Eagle, Northern Harrier, Sharp-shinned Hawk, Cooper's Hawk, Red-shouldered Hawk, Rough-legged Hawk, American Kestrel, Common Snipe (?), Ring-billed Gull, Belted Kingfisher, Horned Lark, and Cedar Waxwing (?), Red-winged Blackbird, Eastern Meadowlark, Rusty Blackbird, Common Grackle, Brown-headed Cowbird, Pine Siskin and American Goldfinch. See the species accounts for details.

In addition to migrants, there were these signs of spring. Mourning Doves were singing on 5 February in Dane County (Ellen Hansen) and 13 February in Hayward, Sawyer County (John C. Robinson), while House

Finches were singing on 3 February in Sauk County (Kenneth I. Lange).

A total of 68 people contributed records covering 55 counties. The following 17 counties, scattered throughout the state, were not covered: Adams, Brown, Calumet, Door, Florence, Fond du Lac, Green, Green Lake, Iowa, Iron, Kewaunee, Lafayette, Lincoln, Marquette, Oconto, Racine, and Rusk.

The following common statewide species are not included in the individual species accounts: Ruffed Grouse, Great Horned Owl, Barred Owl, Downy Woodpecker, Hairy Woodpecker, Pileated Woodpecker, Blue Jay, American Crow, and Black-capped Chickadee.

REPORTS (1 DECEMBER 1990-28 FEBRUARY 1991)

Common Loon.—No reports after the Christmas Bird Counts.

Pied-billed Grebe.—After the Christmas Bird Counts, one throughout the period in Eau Claire County (Polk), and one in Shawano County, 7-31 January (Peterson).

Horned Grebe.—Dane County, through 8 December, maximum 2 (Ashman), and one on the Ephraim (Door County) Christmas Bird Count.

Double-crested Cormorant.—One record after the Christmas Bird Counts, an immature on 1 January in Winnebago County (Tessen).

Great Blue Heron.—After the Christmas Bird Counts: one in Jefferson County, 1 February (Hale), throughout the period in Trempealeau County, maximum 2, 5 February (Hunter), and at least 1 throughout the period in Chippewa County (Polk). One in St. Croix County, 24 February (Smiths), possibly a migrant.

Tundra Swan.—Through 1 December in Trempealeau (300), Marathon (1), and Columbia (95) Counties (Hunter; Belter; Martins); Jefferson County, 4 December (Hale); Winnebago County, through 17 December, maximum 50, 16 December (Ziebell); Buffalo County, throughout the period, 3, with Trumpeter Swans (Polk); and on 5 (7) Christmas Bird Counts.

Trumpeter Swan.—A group of 2 adults and 3 immatures was reported by Ziebell in Oshkosh's South Asylum Bay at the end of Nicolet Avenue, Winnebago County, from 5–8 December; just one bird, one of the adults, was tagged, and according to Michael J. Mossman, DNR Non-game Biologist, this bird was from northwestern Minnesota and was paired and raised 3 young in 1990.

Another unbanded bird was captured in a weakened state in Trempealeau County on approximately 1 January; it was taken to the Raptor Rehabilitation Center in St. Paul, where it died following surgery to remove lead pellets (Leshner).

On 4 January a group of 2 adults and 6 immatures with neck collars was discovered at Reed's Landing, Minnesota, just across the Mississippi River from Wisconsin; at times the birds were noted in backwater of the river in Buffalo County, Wisconsin. One adult and the immatures had been released at Crex Meadows, Burnett County, and the other adult came from LaCreek National Wildlife Refuge in South Dakota where Trumpeter Swans have not been released since the early 1960s. Another immature, an unbanded individual, was reported from here later in the period (Polk; Robbins).

Also in Pepin County, 22 February (Hunter); no details.

Mute Swan.—Including the Christmas Bird Counts, a total of approximately 80 birds in 9 counties and the Ashland area, the highest number being 47 on the Waukesha Christmas Bird Count.

Snow Goose.—The Martins reported this species in Columbia County through 2 December, with 180 on the 1st. On 4 (5) Christmas Bird Counts. One in Winnebago County, 1 January (Tessen).

Canada Goose.—Most left just before the 3 December blizzard, although (*Passenger Pigeon* 53:4, 1991) there were still 55 thousand at Horicon Marsh later in December. Throughout the period in Walworth, Waukesha, Milwaukee, Sheboygan, Manitowoc, Winnebago, Taylor, Polk,

and Sawyer Counties. Spring migration from 13–27 February, mainly 20–23 February, north to Dodge, Columbia, and Sauk Counties, and St. Croix County (many observers). Tessen reported 1000+ in Walworth, Rock, and Columbia Counties by 23 February.

Wood Duck.—After the Christmas Bird Counts, 1–2 in Walworth, Waupaca, Trempealeau, St. Croix, and Douglas Counties (many observers); overwintering uncertain.

Green-winged Teal.—A female in Chipewa County, 31 January (Polk).

American Black Duck.—Throughout the period in approximately 20 counties, including Douglas County and the Ashland area; maximum numbers approximately 45–60, mostly 1–10.

Mallard.—Throughout the period in approximately 22 counties, including the Ashland area; maximum numbers after December were 450 in Portage County, 16 February, and 260 in Milwaukee County, 20 January.

Northern Pintail.—After the Christmas Bird Counts, 1–2 in Milwaukee, Sheboygan, and Manitowoc Counties; overwintering uncertain.

Blue-winged Teal.—No reports after the Christmas Bird Counts.

Northern Shoveler.—Dane County, throughout the period, maximum 125, 25 December (many observers), and Milwaukee County, 1 February (Robbins).

Gadwall.—After the Christmas Bird Counts, records for Dane County, throughout the period, maximum 58, 20 January (many observers), Waupaca County, 3 February, 1 (Tessen), and St. Croix County, 27 January, 4 (Smiths).

American Wigeon.—After the Christmas Bird Counts, records for Dane County, throughout the period, maximum 4 (many observers), and Waupaca County, 3 February (Tessen).

Canvasback.—After the Christmas Bird Counts, records for Ozaukee County, 13 January, 1 (Frank), and Walworth County, 18 January (Parsons).

Redhead.—One record after the Christmas Bird Counts: one in Walworth County, 18 January (Parsons).

Ring-necked Duck.—These records after the Christmas Bird Counts: Walworth County, through 10 February, maximum 2 (Parsons), and Portage County, 7 February—end of the period (Berner).

Greater Scaup.—Throughout the period, Milwaukee County, maximum 2000+ (Woodmansee), Ozaukee County, and (Polk) Eau Claire County, 1.

Lesser Scaup.—Throughout the period, Dane County, maximum 2 (many observers), and Eau Claire County, 1 (Polk), also Ozaukee County, 13 February (Frank).

Harlequin Duck.—After the Christmas Bird Counts, noted in Milwaukee County through 31 January, 2 (Frank; Robbins).

Oldsquaw.—Throughout the period (?) in Lake Michigan, Milwaukee-Manitowoc Counties (many observers); maximum 500, Milwaukee County, 31 January (Frank).

Black Scoter.—Ozaukee County, 1 December, 1 (Tessen), and one on the Madison Christmas Bird Count.

Surf Scoter.—Ozaukee County, 1 December (Tessen), and one on the Milwaukee Christmas Bird Count.

White-winged Scoter.—Ozaukee County, 1 December, 40 (Tessen), and one on the Newburg (Ozaukee County) Christmas Bird Count.

Common Goldeneye.—Throughout the period in the following areas: Lake Michigan, Milwaukee to Marinette Counties; Winnebago and Outagamie Counties; Wisconsin River, Dane and Sauk to Marathon Counties; Eau Claire, Chippewa, and Dunn Counties; St. Croix and Polk Counties; and Douglas and probably Bayfield Counties. Possible migrants in LaCrosse County, 16 February, and Trempealeau County, 28 February (many observers).

Barrow's Goldeneye.—Two on the Newburg (Ozaukee County) Christmas Bird Count

for only the second winter record in the last decade.

Bufflehead.—Throughout the period in Milwaukee, Ozaukee, Sheboygan, and probably Manitowoc Counties, also Dane County, 21 January (many observers).

Hooded Merganser.—Berner reported a female subsisting largely on crayfish at Whiting Park in Portage County for the third winter. Also after the Christmas Bird Counts in Waupaca County, throughout the period (Tessen), Winnebago County, 1 January, 3 (Tessen), Sheboygan County, 3 February (Tessen), and Walworth County, 18 January (Parsons). The Smiths reported this species in St. Croix County, 24 February; migrant(s)?

Common Merganser.—Throughout the period in the following areas: Lake Michigan, from Milwaukee to Marinette Counties; Winnebago County; the Wisconsin River in Dane and Sauk Counties; and Polk County. Possible migrants in LaCrosse County, 3 February, and St. Croix County, 24 February (many observers).

Red-breasted Merganser.—After the Christmas Bird Counts, these records: Walworth County, 10 February, 1 (Parsons), Milwaukee County, throughout the period (many observers), Ozaukee County, through 1 February (Frank), Sheboygan County, through 1 January (Berners), and Manitowoc County, throughout the period, maximum 14, 8 December (Sontag).

Ruddy Duck.—No reports after the Christmas Bird Counts.

Turkey Vulture.—One in Walworth County, 23 February (Parsons).

Bald Eagle.—Throughout the period in the following areas; Douglas County and the Ashland area; Price and Taylor Counties; Polk and Pierce Counties; Dunn, Chippewa, and Eau Claire Counties; the Wisconsin River from Dane and Sauk to Portage Counties; and Outagamie County. Baughman found this species in Vilas County until 6 December and then again on 28 February. Other migrants or possible migrants: 15 February, Shawano County (Peterson), 23 February, Dodge County (Haseleu), and 25 February, Sawyer County (Robinson).

Northern Harrier.—After the Christmas

Bird Counts, reported from these counties: Walworth, Dodge, Sheboygan, Winnebago, and St. Croix. Migrants or possible migrants, 22–28 February, north to Marinette, Monroe, and Pierce Counties (many observers).

Sharp-shinned Hawk.—After the Christmas Bird Counts, records for 13 counties, north to Douglas, Taylor, Marathon, Shawano, and Marinette Counties (many observers). Migrants or possible migrants on 18 February in Richland County (Duerksen) and 20 February in Walworth County (Parsons).

Cooper's Hawk.—After the Christmas Bird Counts, records for 12 counties, north to Taylor, Marathon, and Winnebago Counties (many observers). Migrants or possible migrants on 7 February in Marinette County (Lindberg) and 18 February in Walworth County (Parsons).

Northern Goshawk.—After the Christmas Bird Counts, records for 10 counties: Douglas, Burnett, Sawyer, Price, Taylor, Marathon, Shawano, LaCrosse, Monroe, and Walworth. Throughout the period in Douglas, Sawyer, and Taylor Counties (many observers).

Red-shouldered Hawk.—The Smiths found one on 2 December in St. Croix County, and Epstein found one on 14 December in Monroe County. After the Christmas Bird Counts, this species (migrants?) was noted on 23 January in Winnebago County (Ziebell) and 16 February in Dunn County (Polk).

Red-tailed Hawk.—1280 on the Christmas Bird Counts; only last year's record number was higher. For the period, northward to these counties: Douglas, 1 January; Sawyer, throughout the period?; Taylor, throughout the period; Marathon, throughout the period; and Shawano, 7 January (many observers).

Rough-legged Hawk.—514 on the Christmas Bird Counts, exceeded only by last year's record number. The usual late winter migration, with birds still in the following southern counties at the end of the period: Winnebago, Dane, Sauk, Richland, Monroe, and Trempealeau (many observers).

Golden Eagle.—One on the Bridgeport Christmas Bird Count and 3 on the Kickapoo Valley Christmas Bird Count. Also these records: 16 December–25 February, at least 2 adults and

an immature in Monroe County (Epstein); 17 December, an immature in Douglas County (Semo); 29 December, an immature in Washburn County (Semo); 17 February, an adult and an immature in Jackson County (Soulen); and 23 February, an adult in Juneau County (Tessen). On 23 February in Monroe County Epstein observed territorial display: an adult was soaring along a bluff when it broke into a series of steep dives with folded wings, followed by several back-flips and dives.

American Kestrel.—A record number, 563, on the Christmas Bird Counts. Northward to these counties, where at least into January: Polk, Barron, Taylor, Marathon, and Shawano (many observers). Migrants or possible migrants on 22 January in Richland County (Duerksen), 8 February in Rock County (Swengel), 8 and 27 February in St. Croix County (Robinson; Smiths), and 20 February in Pierce County (Carlsen).

Merlin.—1 December, one in the Ashland area (Verch), 6 December and 31 January, Chippewa County (Polk), 17 January, 1, Walworth County (Parsons), and 3 February, 1, Burnett County (Robinson).

Peregrine Falcon.—The Martins reported one in Columbia County, 1 December, Leshar found one in LaCrosse County, 27 December, and one was found on the Madison Christmas Bird Count.

Gyr Falcon.—A male and a female in Portage County, 26 February (Berner).

Prairie Falcon.—One in Portage County, 9 February (Munson); apparently the first record for this species in Wisconsin in winter.

Gray Partridge.—Including the Christmas Bird Counts, reported from 11 counties, north to St. Croix, Taylor, Portage, Shawano, and Outagamie Counties (many observers).

Ring-necked Pheasant.—Northernmost records: Douglas County, throughout the period (Johnson), and Taylor County, through 29 December (Armbrust).

Greater Prairie-Chicken.—Including the Christmas Bird Counts, records for Portage, Marathon, and Taylor Counties (Berner; Belter; Armbrust).

Sharp-tailed Grouse.—Including the Christmas Bird Counts, records for Douglas (Semo), Burnett (Grantsburg Christmas Bird Count), Taylor (Armbrust), and Portage (Berner) Counties.

Wild Turkey.—The numbers and apparently the range of this species continue to increase. Stocked for the first time in Eau Claire County (Polk).

Northern Bobwhite.—Found on 11 (12) Christmas Bird Counts, all in the southern half of the state. Later records: 21 January, Dane County (Cederstrom); Monroe, LaCrosse, Eau Claire, and Dunn Counties (many observers); and a maximum of 61 on 29 December in Richland County, where Duerksen believed that the deep snow caused many coveys to feed in yards and corn cribs.

American Coot.—After the Christmas Bird Counts, records for Milwaukee, Ozaukee, Sheboygan, Dane, and Shawano Counties. Maximum 100, Dane County, where throughout the period (many observers).

Sandhill Crane.—One on the Green Lake Christmas Bird Count.

Baird's Sandpiper.—One in downtown Eau Claire, on a rocky falls in the Chippewa River, 28 November–1 December (Polk), the state's first December record of this species.

Purple Sandpiper.—The individual first reported in November at Sheboygan's North Point, Sheboygan County, was noted and documented 1 December by Robbins, 2 December by Wood, and 3 December by Sontag. The Brasers, who found it in November and documented it for their first two sightings, saw it last on 12 January.

Common Snipe.—After the Christmas Bird Counts, these records: throughout the period, Monroe County (Kuecherer), 6 February–end of the period, maximum 6, 26 February, Trempealeau County (Hunter), and 1 January–24 February, maximum 3, 24 February, St. Croix County (Smiths).

Bonaparte's Gull.—After the Christmas Bird Counts, found in Dane County, 11 January (Robbins).

Ring-billed Gull.—A record number, 6634, on the Christmas Bird Counts. Throughout the period in Walworth, Waukesha, Milwaukee, Ozaukee, Sheboygan, and Winnebago Counties (many observers). Ashman found this species in Dane County through 29 December, with one on 27 January, while Sontag in Manitowoc County found it through 19 January and again on 24 February.

Herring Gull.—Throughout the period in Waukesha, Milwaukee, Ozaukee, Sheboygan, Manitowoc, and Marinette Counties, also Winnebago and Outagamie Counties, and (200 on 19 January; Johnson) Douglas County (many observers).

Thayer's Gull.—One on the Bayfield Christmas Bird Count, and (Tessen) one in Sheboygan County, 26 January and 3 February.

Iceland Gull.—Sheboygan County, 26 January and 3 February (Tessen), and Manitowoc County, 16 February (Sontag).

Glaucous Gull.—Including the Christmas Bird Counts, records for Milwaukee, Ozaukee, Sheboygan, Manitowoc, Fond du Lac, Monroe (first record), and Douglas Counties, and the Ashland area (many observers). A maximum of 19 in Douglas County (Johnson), 6 on 16 February in Manitowoc County (Sontag), and 9 on 8 December in Ozaukee County (Tessen), otherwise single birds.

Great Black-backed Gull.—A subadult in Milwaukee County, 26 January (Peterson; Tessen), at least 3 in Manitowoc County, 10 February (Wood), and one on 15 February (Peterson), and several in Manitowoc County, 17 February–end of the period (Sontag).

Rock Dove.—Northward to the following counties, where throughout the period: Marinette, Vilas, Ashland, Bayfield, and Douglas (many observers).

Mourning Dove.—Northward to Marinette and Vilas Counties, the Ashland area, and Sawyer County, where throughout the period (many observers).

Eastern Screech Owl.—After the Christmas Bird Counts, records for these counties: Milwaukee, Waukesha, Winnebago, Dane, Richland, Monroe, and Taylor (many observers).

Snowy Owl.—Including the Christmas Bird Counts, records for 11 counties and the Ashland area, south to Winnebago and Columbia Counties. Still in Shawano, Clark, and Douglas Counties at the end of the period (many observers).

Northern Hawk-Owl.—Two immatures in Douglas County, 4 December—end of the period, reported and documented by Perala, Semo, Tessen, and Peterson, and at least one Hawk Owl in St. Croix County, 6 January—end of the period, reported and documented by Smith and by Merkel. The Luepkes reported one in Marathon County, which on 20 February was hit and killed by a car 1[bul2] miles west of SH97 on County Highway A—2 miles southwest of Athens; Connie Decker of Dorchester assisted in having the specimen sent to the Milwaukee Public Museum. First winter records since December 1985.

Great Gray Owl.—Douglas, Bayfield and Sawyer Counties, 5 December–19 February (many observers).

Long-eared Owl.—No reports after the Christmas Bird Counts.

Short-eared Owl.—Found on the New Richmond (St. Croix County) Christmas Bird Count and 5 southern Wisconsin Christmas Bird Counts, including Mt. Horeb where 22 were tallied; the Mt. Horeb birds were in set aside farmland in upland fields with scattered hay bales. After the Christmas Bird Counts, records for these counties: Columbia, 26 January, 1 (Tessen), Taylor, throughout the period, 3 (Luepkes), and St. Croix, through 4 February, maximum 3, 1 January (Smiths).

Saw-whet Owl.—One on the Madison Christmas Bird Count; 7 January, one dead on the road, Bayfield County (Ashman); 23 February, at least 7 in Devil's Lake State Park, Sauk County (Swengel); 26 February, 2, Portage County (Munson); and throughout the period, Monroe County (Kuecherer).

Anna's Hummingbird.—As reported by Barbara Kranich (*Passenger Pigeon* 53:29–30, 1991), one at a feeder near Wales, Waukesha County, until 3 December (many observers). This bird appeared in late August; it was captured during the blizzard of 3 December and released in the tropical dome in Milwaukee's Mitchell Park. First record for Wisconsin.

Belted Kingfisher.—Throughout the pe-

riod in Trempealeau, Richland, and Manitowoc Counties (many observers), also through 1 February in Dane County (Hansen), and a male below Lake Hayward in Sawyer County, 10 February (Robinson). Migrants or possible migrants on 19 February in Portage County (Berner) and 24 February in St. Croix County (Smiths).

Red-headed Woodpecker.—After the Christmas Bird Counts, records for these counties: Milwaukee, Sheboygan, Shawano, Portage, Monroe, and Buffalo (many observers).

Red-bellied Woodpecker.—Northernmost reports: Marinette County (Lindberg), the Ashland area, 10 January (Verch), a female at a feeder in Port Wing, Bayfield County, throughout the period (Erickson), and one in Douglas County, 2 February (Johnson).

Yellow-bellied Sapsucker.—After the Christmas Bird Counts, one in Milwaukee County, 6 February (Woodmansee).

Black-backed Woodpecker.—Semo found a maximum of 6 in Douglas County, all in the Brule River valley; Baughman reported a female in Vilas County, 20 December; and Hardy saw 2 pairs in Price County, 10 February.

Northern Flicker.—After the Christmas Bird Counts, records for Ozaukee, Jefferson, Dane, Dodge, Winnebago, Outagamie, Wau-paca, Monroe, and St. Croix Counties (many observers).

Horned Lark.—Throughout the period in Dane, Richland, Portage, and Pierce Counties, with maximum counts mainly from 5–26 February (13–27 January in Dane County). Verch noted this species in the Ashland area, 12 February.

Gray Jay.—Including the Christmas Bird Counts, records for these counties: Douglas, Bayfield, Vilas, Oneida, Forest, Price, and Sawyer (many observers).

Common Raven.—Southernmost records for Portage County, 8 December—end of the period, maximum 3, 8 December (Berner), Monroe County, throughout the period (Kuecherer), and LaCrosse County, 15 December, (LaCrosse Christmas Bird Count).

Boreal Chickadee.—Ashland, Bayfield, and Forest Counties (Robbins; Robinson; Peterson).

Tufted Titmouse.—Grant, Richland, Monroe, Chippewa, Dunn, Eau Claire, and St. Croix Counties (many observers).

Red-breasted Nuthatch.—Throughout the period in northern Wisconsin and south to Waukesha, Walworth, Dane, and LaCrosse Counties; below normal numbers (many observers).

White-breasted Nuthatch.—Northernmost records: Marinette County (Lindberg), Forest County, 29 December (Reardon), Vilas County, throughout the period (Baughman), the Ashland area, throughout the period (Verch), Bayfield County, throughout the period (Erickson), and Douglas County, throughout the period (Semo).

Brown Creeper.—After the Christmas Bird Counts, northernmost reports from these counties: Price, throughout the period, maximum 4, 14 February (Hardy), Sawyer, 15 February, 1 (Robinson), and Washburn County, 10 February, 1 (Robinson).

Carolina Wren.—One each on the Sturgeon Bay, Stevens Point, Beloit, Milwaukee, and Racine Christmas Bird Counts. Later records: Milwaukee County, through 19 February (many observers); Dane County, at a feeder, apparently throughout the period (Hansen, Robbins); and LaCrosse County, throughout the period, 1 (Leshner). Rusch found a dead individual at a feeder in Dane County, 11 December.

House Wren.—One in Madison, Dane County, 20 December (Robbins).

Winter Wren.—No reports after the Christmas Bird Counts.

Golden-crowned Kinglet.—After the Christmas Bird Counts, records for Milwaukee, Jefferson, Dane, Sauk, Winnebago, Shawano, Bayfield, and Douglas Counties (many observers).

Eastern Bluebird.—10 on the Green Bay Christmas Bird Count and 5 on the Baraboo Christmas Bird Count.

Hermit Thrush.—One on the Milwaukee Christmas Bird Count.

American Robin.—After the Christmas Bird Counts, records for Walworth, Waukesha, Milwaukee, Dane, Manitowoc, Winnebago, Shawano, Marathon, LaCrosse, St. Croix, Sawyer, and Douglas Counties. Maximum 52, 5 January, Dane County, and 50, 4 January, LaCrosse County (many observers).

Varied Thrush.—One on the Milwaukee Christmas Bird Count; a first year male at a feeder near Holmen, LaCrosse County, 12 December–early January (Leshner); and a male at a feeder near Washburn, Bayfield County, 29 November–13 January (Verch; Peterson).

Gray Catbird.—One on the Woodland Dunes SE Christmas Bird Count, and one in the University of Wisconsin Arboretum in Madison, Dane County, 5 December–31 January (Ashman; Hansen).

Brown Thrasher.—No reports after the Christmas Bird Counts.

Bohemian Waxwing.—Found on 3 Christmas Bird Counts in northern Wisconsin plus these records: the Ashland area, throughout the period, maximum 37, 15 December (Verch), Oneida County, 17 January, 17 (Peterson), Marathon County, 2–22 December, maximum 13, 22 December (Belter), and Sauk County, 9 February, 4 (Swengel).

Cedar Waxwing.—Scattered throughout the southern $\frac{2}{3}$ of the state, generally normal or above normal numbers (many observers).

Northern Shrike.—January and February records for the Ashland area and 28 counties throughout the state, except for the extreme southern tier of counties. Generally normal to below normal numbers (many observers).

European Starling.—Northward to these localities, where throughout the period: Douglas County, Bayfield County, the Ashland area, Vilas County, and Marinette County (many observers). Reardon reported this species in Forest County, 29 December.

Yellow-rumped Warbler.—One on the Burlington Christmas Bird Count.

Pine Warbler.—Wisconsin's first winter Pine Warbler since the winter of 1980–81 was an individual at a feeder on French Island, LaCrosse County, 15 December–3 February, perhaps later (Brownell, Leshner).

Northern Cardinal.—Northernmost reports: a male visiting a feeder in Port Wing, Bayfield County (Erickson), the Ashland area, throughout the period (Verch), Sawyer County, a male at a feeder in Hayward (Robinson), Price County, 2 at a feeder in Park Falls (Hardy), and Marinette County, throughout the period (Lindberg).

Rufous-sided Towhee.—No reports after the Christmas Bird Count.

American Tree Sparrow.—Northward to the Ashland area, beginning of the period–15 December, maximum 3, 15 December (Verch), and Bayfield County, beginning of the period–20 January (Erickson).

Chipping Sparrow.—One at a feeder in New Richmond, St. Croix County, 29–30 December (Bernier).

Field Sparrow.—After the Christmas Bird Counts, these reports: two at a feeder in Waukesha County, 7 January–4 February (Aune), and one at the University of Wisconsin Arboretum in Madison, Dane County, 31 December–9 February (Ashman; Robbins).

Fox Sparrow.—After the Christmas Bird Counts, one at a feeder in Waukesha County, 23 January–27 February (Aune).

Song Sparrow.—After the Christmas Bird Counts, records for these counties: Rock, 19 February, 1 (Tessen), Waukesha, 3 at a feeder, throughout the period (Aune), Ozaukee, 1 February, 1 (Frank), Columbia, 19 January, 1 (Tessen), and Dane, throughout the period (Ashman).

Swamp Sparrow.—After the Christmas Bird Counts, this record: throughout the period, Dane County (Ashman).

White-throated Sparrow.—After the Christmas Bird Counts, records for these counties, where throughout the period, generally at

feeders: Walworth, Dane, Portage, Dunn, and Douglas (many observers).

White-crowned Sparrow.—After the Christmas Bird Counts, this record: throughout the period, the Ashland area (Verch).

Dark-eyed Junco.—Northward to these counties: Marinette, throughout the period (Lindberg), Taylor, 13 December (Armbrust), and Douglas, 6 December–19 January (Johnson).

Lapland Longspur.—After the Christmas Bird Counts, records for these counties: Marinette, Winnebago, Ozaukee, Columbia, Dane, Monroe and St. Croix (many observers). Most reports for the period, 13–21 January, and 23 February; maximum 200, 13 January, Ozaukee County (Frank).

Snow Bunting.—After the Christmas Bird Counts, records for 18 counties throughout the state. The largest groups (200–400+) were found in Columbia County.

Red-winged Blackbird.—Migrants or possible migrants, 11–28 February, in Walworth (100+ on the 23rd; Tessen), Waukesha, Milwaukee, Ozaukee, Dodge, Dane, and Pierce Counties (many observers).

Eastern Meadowlark.—After the Christmas Bird Counts, this record: 23 February, Sheboygan County (Brassers).

Yellow-headed Blackbird.—One on the Horicon Marsh Christmas Bird Count (*Passenger Pigeon* 53:4, 1991).

Rusty Blackbird.—After the Christmas Bird Counts, these records: 23 February, one with other Icterids, Walworth County (Tessen), and 25 February–end of the period, 1, Trempealeau County (Hunter).

Brewer's Blackbird.—Nine on the Horicon Marsh Christmas Bird Count (*Passenger Pigeon* 53:4, 1991), 4 on the Waukesha Christmas Bird Count, and in the Oshkosh area during the count period but not on the count day.

Common Grackle.—After the Christmas Bird Counts, records for these counties: Dane,

Monroe, Taylor, St. Croix, Polk, and (one at a feeder, throughout the period; Baughman) Vilas. Tessen saw 10 with other Icterids in Walworth County, 23 February, and Hilsenhoff saw 50 in Dane County, 24 February; other migrants or possible migrants were noted in Dodge County, 23 February (Robbins), and Milwaukee County, 28 February (Diehl).

Brown-headed Cowbird.—Migrants or possible migrants, 23–28 February, in Walworth, Milwaukee, Jefferson, and Dane Counties (many observers).

Northern Oriole.—One on the Peshtigo (Marinette County) Christmas Bird Count.

Pine Grosbeak.—Records for the Ashland area plus these counties: Douglas, Bayfield, Vilas, Sawyer, Price, Taylor, Marathon, and Shawano (many observers). The maximum number reported was 43 on 6 January in Price County (Hardy).

Purple Finch.—Apparently absent or in very low numbers in the far northern counties. Generally below normal numbers overall (many observers).

House Finch.—Including the Christmas Bird Counts, reported for approximately 30 counties, north to Manitowoc, Shawano, Marathon, Taylor, and Chippewa Counties, and the Ashland area (many observers).

Red Crossbill.—After the Christmas Bird Counts, records for Dane, Shawano, Portage, Marathon, Sawyer, Vilas, Bayfield, and Douglas Counties (many observers). The maximum number reported was 15 on 7 January in Marathon County (Belter) and on 31 January in Shawano County (Peterson).

White-winged Crossbill.—None on the Christmas Bird Counts for the first time since 1970. Two records for the period: Price County, 1–29 December, maximum 5, 1 December (Hardy), and Douglas County, 4 February, 5 (Semo).

Common Redpoll.—Records for the Ashland area plus 12 counties, south to St. Croix, Portage, and Winnebago Counties (many observers). For January and February, just 1–8 birds per sighting.

Pine Siskin.—Records for 18 counties and the Ashland area (many observers). Other than the Ashland area, generally absent from the far northern counties. Below normal numbers, e.g., maximum numbers usually 1–15.

American Goldfinch.—Approximately normal numbers, scattered throughout the state.

Evening Grosbeak.—Records for 14 counties, south to Monroe, Portage, and Shawano Counties (many observers). Flocks of 40–100 in Burnett, Sawyer, Taylor, and Shawano Counties, otherwise 1–20 for maximum numbers.

House Sparrow.—North to these counties, where throughout the period: Douglas, Bayfield, Vilas, and Marinette (many observers).

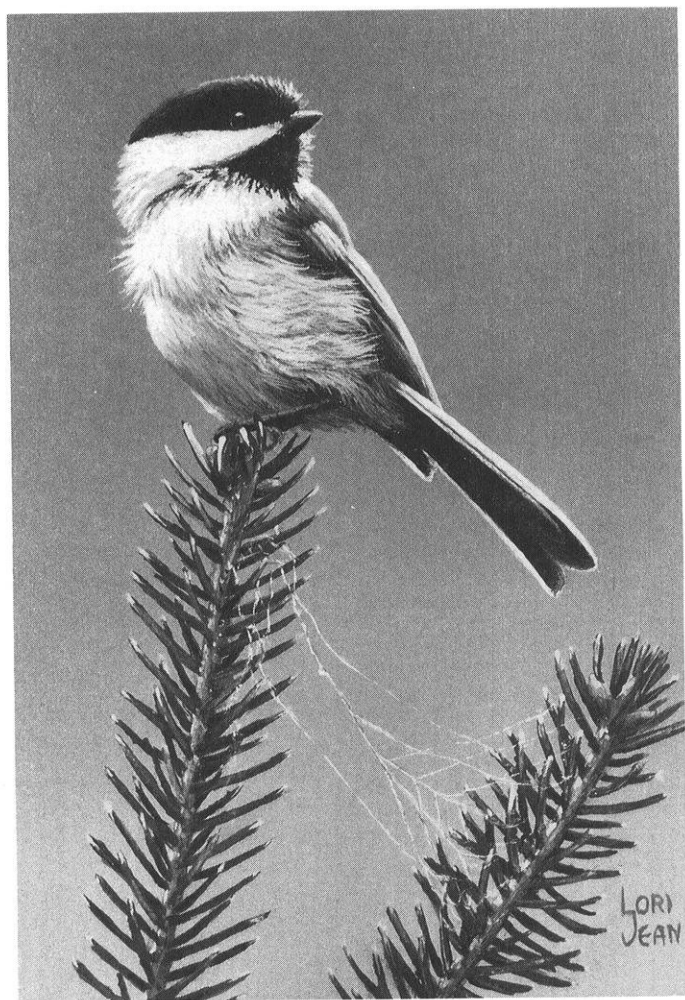
Eurasian Tree Sparrow.—One at the David R. Lindsley feeder on County Highway W in Pierce County for the 4th consecutive winter (Polk).

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Black-capped chickadee by Lori Jean Hubanks.

“By the Wayside”

Reports of Trumpeter Swans, albino Red-tailed Hawks, Gyrfalcons, Prairie Falcon, Purple Sandpiper, Thayer's Gull, Island Gull, Great Black-backed Gull, Northern Hawk-Owls, Great Gray Owls, and Anna's Hummingbird are featured.

TRUMPETER SWAN (*Cygnus buccinator*)

15 January 1991, Buffalo Co., near Read's Landing on the Mississippi River—On January 15, 1991, I observed two adult Trumpeter Swans and three Tundra Swans along the Mississippi River at Read's Landing, Minnesota. One of the Trumpeter Swans (deep yellow neck band #36FA) had previously been identified by Minnesota birders (notably Larry Theismann and Don Mahle) as having come from La Creek NWR in South Dakota, where no Trumpeters have been released since the early '60's. This bird was thus considered wild and “countable.” The other adult Trumpeter (along with six immatures that were not present that day) was from the release program at Crex Meadows. All of these swans, plus another, unbanded immature Trumpeter, spent the winter in the backwater area between Read's Landing and Wabasha.

When I arrived, the two Trumpeters and one adult Tundra Swan were on the river near a small spit of land on the Minnesota side. I walked down onto the spit and approached the

Trumpeters to within about 30 feet. They were considerably bigger birds than the nearby Tundra Swan, larger-bodied and longer-necked, and their all-black bills appeared longer, broader, and, in profile, less concave than the Tundra Swan's bill. The upper edge of the bill between the eyes was pointed in a moderately deep V on the Trumpeter Swans, but shallowly scalloped or U-shaped on the Tundra Swan. On the Trumpeters, the small area of black facial skin immediately in front of the eye was relatively broad; this same area on the Tundra Swan was narrower, isolating the eye to a greater extent. At one point one of the Trumpeter Swans called several times, sounding to my ears a bit like a weak French horn. The low, honking call was quite unlike the higher-pitched, rolling “hoo-hoo” of a Tundra Swan.

After a few minutes I walked back up to the road and was soon joined by a carload of Wabasha birders. As we watched, the pair of Trumpeters slowly swam across the narrow channel to the ice on the other side of the river. At this point they were clearly in Wisconsin (Buffalo Co.), according to maps which show the state line running

down the middle of the channel.—*Janine Polk, 1407 Frederic, Eau Claire, WI 54701.*

5–8 December 1990, Winnebago Co., Oshkosh, South Asylum Bay—Mike Mossman (WDNR) called me on December 5 and asked me to confirm the sighting of 5 Trumpeter Swans by local DNR personnel. Of the 5 swans one was tagged (Mossman said this bird was from NW Minnesota and was paired and raised 3 young in 1990). The other adult and three young were not observed having wing tags. The call of all 5 birds was a rather mellow honk, nothing like a Tundra Swan's call. Their bills were very thick looking and there was no yellow on the lores. Red at the base of the bill was visible on the tagged adult.—*Thomas J. Ziebell, 1322 Ceape Ave., Oshkosh, WI 54901.*

TRUMPETER SWAN DIES OF LEAD POISONING

January 1991, Trempealeau Co., Trempealeau National Wildlife Refuge—Together with Laura Johnson, D.V.M., and others, I examined a live swan at the Hillside Animal Hospital, LaCrosse on January 2, 1991. X-rays showed about 6 lead pellets in the gizzard. The bird was taken, still living, to the Raptor Rehabilitation Center in St. Paul, where it died following surgery to remove the pellets. Inquiry discovered that the bird was captured in a weakened state by a railroad section crew alongside the railroad embankment bordering the west side of the Trempealeau Refuge in Trempealeau County. Date of capture was about January 1, 1991. Presumably the bird was suffering from lead poisoning.

Unless an unmarked bird has been released by any of the groups reintroducing Trumpeters in Minnesota and Wisconsin, this bird was produced in the wild. This bird appeared not long before several Trumpeters and Tundras appeared on the Mississippi River north of Trempealeau at Read's Landing, Minnesota. Most, if not all of the Trumpeters at Read's Landing wore neck collars (personal observation).—*Fred Leshner, UW-LaCrosse, LaCrosse, WI 54601.*

A SECOND ALBINO RED-TAILED HAWK FROM WESTERN WISCONSIN

5 September 1990, Buffalo Co., near Cream—I have previously reported the presence of several near-complete albino Red-tailed Hawks (*Buteo jamaicensis*) from the Winona/Fountain City area of the Minnesota-Wisconsin Border (*Loon* 62:114 and *Passenger Pigeon* 53:190–191. On September 5, 1991 a third was brought to my attention through an unfortunate accident. The bird was probably hit by a car while foraging, since it was found on the shoulder of the road and evidenced injuries consistent with such a scenario. X-rays showed a break in the synsacrum and lack of muscle response for the tail and legs was consistent with damage to the spinal cord.

The hawk, an adult female, was found by Susan Engstrand, of Fountain City, WI, along State Highway 88 at a location described as roughly one mile south of the town of Cream, WI. It was taken to Dr. Laura Johnson, a wildlife rehabilitation specialist and doctor at the Hillside Veterinary Clinic of LaCrosse, WI. Dr. Johnson cared for the bird for several days and knew

of my interest in the albino hawks. She was good enough to call me before she forwarded the bird to the Raptor Rehabilitation center at Minneapolis/St. Paul, MN. The enclosed pictures show that the bird is almost completely white but for a scattering of rufous coloring on several tail feathers. The eyes were brown and the beak and legs were cream to yellow in color. The bird's location when found was roughly 12 air miles from the territory of the other albino Red-tailed Hawk known from

Wisconsin, which resides due east of Fountain City. By coincidence or by virtue of dispersal distance for the species, this is the same distance that separated the two albino Red-tailed Hawks which I had previously reported. Prognosis was uncertain, but recovery seemed unlikely and attempts will be made to gain tissue specimens for genetic analysis if the hawk cannot be saved.—*Philip C. Whitford, Biology Dept., Winona State University, Winona, MN 55987.*



Albino Red-tailed Hawk (photo by Philip C. Whitford)

ALBINISTIC RED-TAILED HAWKS

15 March–6 May 1991, Chippewa and Sawyer Cos.—In the spring of 1991 two individual albinistic Red-tailed Hawks were found. On the 15 March, John Robinson and I were traveling from Madison to Hayward. Along the ride we were keeping count of all the raptors we saw along the highways. It was a very productive time of the year for Red-tailed Hawks. We tallied 49 individuals on the ride.

About 4:00 P.M. we were just north of Eau Claire on highway 53 approaching exit 99. As we passed the exit ramp we scanned the farm fields to the east searching for raptors. Perched on top of a tree was a large white bird. I immediately pulled onto the shoulder. Our first thoughts were Snowy Owl (a nice find) or Gyr Falcon (an excellent find, especially a rare white phase). John set his scope (Bushnell Spacemaster) on the carport. He could see that it was not a Snowy Owl because the head was hawk-like, but he could not identify the bird, except to note that it was a hawk. A closer look was necessary.

We got out of the vehicle and ran down the embankment towards the bird. John brought his scope, I had my binoculars (9×). We got within 100 yards. The bird was pure white. There were no black flecks or spots characteristic of a Snowy Owl or a Gyr Falcon. The tail was mostly white with a tinge of yellowish wash. The cere, legs, and feet were clearly yellow, standing out against the white feathers. The only other field mark was a dark smudge on the nape of the neck. After a few minutes the bird flew from the tree towards another tree 50 yards to the east. The tail was narrow at the base, short,

and fan shaped. The wings were fairly long, broad and rounded at the tips. The flight was slow, almost cumbersome, unlike the swift, powerful flight of a falcon, especially a Gyr Falcon. We decided it was an albinistic Red-tailed Hawk. After a few minutes the bird flew further east towards a powerline right-of-way and flew out of sight.

Approximately two weeks later on 3 April Kathy Castelein and I were again traveling from Madison to Hayward. Late in the afternoon as we passed exit 99 on highway 53 north of Eau Claire we spotted the same bird hunting the same farm fields. The bird was originally perched in a tree on the north end of the field, then it flew to a hay bale. We had pulled onto the shoulder because Kathy had never seen the bird. We noted the same field marks, especially the dark smudge on the nape of the bird.

I emphasize the dark smudge because I would use this field mark in the future to distinguish a second albinistic Red-tailed Hawk a month later. On the 6 May, I went to the Hayward DNR Ranger Station where at the time I was working. Lowell Tesky, the assistant wildlife manager, told me that 2 or 3 days earlier in eastern Sawyer County he had found and photographed an all white hawk hunting along the road. He was not certain whether it was a Red-tailed Hawk or a Broad-winged Hawk, although he felt it was the latter because of its size. Lowell also informed me that as of this morning the bird had apparently been captured and brought to Project H.A.W.K. (Help All Wild Kritters), the local wildlife rehabilitation center run by Dr. John Kubisz.

I drove to Dr. Kubisz's office and was permitted to see the bird. I also was told the story of how it was cap-

tured and brought to Project H.A.W.K. Apparently the bird was captured or picked up by some locals near the location that Lowell Tesky saw the bird. These persons were keeping the bird in a box, force feeding it minnows (they reasoned eagles eat fish, so . . .). They had called Dr Kubisz to ask what they should be feeding it. Mrs. Kubisz, who received the call, became suspicious that these persons were interested in keeping the bird. She notified the conservation officers who went and retrieved the bird and brought it to Project H.A.W.K.

The bird was pure white with some very faint brownish barring on the belly, mostly towards the flanks. The tail was pure white with no hints of a yellowish tinge. The eyes were a bluish-gray. I looked for a dark smudge on the nape, there was none. The bird was not a very large hawk, but it was too large to be a Broad-winged Hawk (there was an injured Broad-winged Hawk there at the time to compare size). We felt certain that the bird was an albinistic Red-tailed Hawk. I felt it was a different bird than the previous bird I have described. Later I received confirmation that it was indeed a different bird.

The hawk was calm, not very afraid of our presence. It was weak and emaciated. The tail feathers were very worn, although this may have occurred because it spent time the previous day or so in a box. There was also no physical evidence of injury nor was there any evidence of internal injury. There was no sign that the bird was sick or diseased except for its weak condition. Later Dr. Kubisz gave the bird some mice, which it immediately consumed.

About a week later John Robinson informed me that during a conversa-

tion he had with Bruce Bacon, Bruce had told John that he had just seen an albinistic Red-tailed Hawk just north of Eau Claire off highway 53. This was the final confirmation that indeed there were two individual albinistic Red-tailed Hawks that I was aware of.

It was finally determined that the hawk at Dr. Kubisz's was infected by lung worms. This caused excessive feather wear and the overall weak condition of the bird. As of the end of September, the bird has apparently been cured of the lung worms. The feathers are now in better condition, and the tail feathers are no longer white but a brownish-red. The body feathers are still mostly white, although darker brownish barring is more evident throughout the breast. There is some concern about the bird's ability to see and hunt because of the albinism, so a permanent home has been found at the Minnesota Zoo. Steve Martin, who works for the zoo, hopes to use the bird in his educational programs on raptors.—*David J. Lauten, 231 S. Main St., Oregon, WI 53575.*

GYRFALCON (*Falco rusticolus*)

26 February 1991, Portage Co., Buena Vista Marsh—The first bird was about 20 feet from the road eating a prairie chicken. It was about the same size as the Rough-legged Hawk perched on a fence post 15 feet away. I approached to within 75 yards and put the scope on the falcon. The bill and cere were bluish-grey, dusky to black at the terminal end. The forehead was whitish. Pale crown with fine dark streaks, becoming thicker and denser at mid-crown and onto the nape and sides of neck. Bold white superciliary that in some postures con-

tinued as a pale band entirely around the head. Dark brown feathering immediately above eye, extending rearward to form distinct eye line. Finely streaked pale lores. Blue-grey eye ring, dark eye. Dark grey-brown malar stripe. Ear patch pale with very fine brownish streaks, palest below eye and behind mustache, becoming darker toward the side of the neck. Nape streaked, with pale area at base forming a U-shape. Chin, throat and upper breast immaculate white. The upperparts were entirely creamy grey. Scapulars, wing coverts, secondaries, primaries and tertials with distinct, entire pale margins, giving a scaled appearance to the wings. Outer primaries not so boldly margined. No pale margins were noted on the back feathers. Upper tail coverts unmarked creamy grey, but with pale ends. The underparts, except for chin, throat and upper breast, were entirely marked with bold vertical streaks. Finest at mid-breast extending to undertail coverts, with the length and width of streaks becoming progressively greater moving down the body, at sides, onto belly and flanks. Streaks appeared brown under certain lights, but most often looked dark grey. Long, heavily streaked white feathering almost completely covered the legs. Legs and feet bluish-grey. The tail was creamy grey above (the bird was of a color) with indistinct horizontal barring. In flight the bird appeared uniformly grey above. Pattern below of pale wings/tail and heavily streaked body. Axillars boldly dark barred blending with streaked body, not extending away from body onto wing. Underwing coverts lightly speckled brown. Primaries and secondaries below appeared unmarked white. Trailing edge of entire

wing dusky. Outer primaries greyish with black wing tips.

Heavy, robust body in flight. Broad wings and tail. Amazingly different than prairie or peregrine. Strange flight style/wing beats as it circled its prey: rapid, chunky fluttery . . .

This individual flew up from the chicken with a screeching squeal as a second Gyrfalcon passed close by. This bird was almost identical, being the same overall creamy grey color above. The feather margins were much paler, however, giving a more pronounced speckled appearance. The tail was more distinctly barred. Head and face also paler than 1st bird with more distinct malar stripe and eye-line. Darkly streaked underparts. Blue-grey bare parts.

Three minutes after the second bird appeared, a dog sled with a team of yelping puppies sledged past. Both falcons panicked, flying away together at great speed until they were out of sight. In direct comparison the second bird was noticeably larger.

The observation lasted from 1300–1330 hours. Weather was overcast; moderate snow; wind west at 10 mph; temp. 15. Closest approach to perched bird was 50 yds; to flying bird about 30 ft. Observed with 30× scope and 8× binoculars.

It was interesting to hear later that day (from UWSP wildlife student) that Gyrfalcon sightings in Buena Vista are preferably hushed up lest one of a number of falconers in the county find out. Apparently it is believed that one or more of them cannot be trusted to allow such a falcon as this to remain in a free-flying state.—*Murray Berner, 547 E. 8th St., New Richmond, WI 54011.*

PRAIRIE FALCON (*Falco mexicanus*)

9 February 1991, Portage Co., Buena Vista Township—I was driving open country in search of winter birds. Bird was perched in distance. Approached falcon, then, to about 40 meters by car. The following field notes were made immediately: Posture was that of a kestrel. Size was very close to that of two crows, which perched nearby, nervously flicking their wings, and silently observed the falcon. Only saw left foot, which was yellow and unbanded. Indicates adult. Wings were uniformly tan-gray dorsal surface. Appeared scaled, with light edges to each feather. Wings extended almost to end of tail at rest. In flight, they swept backward. Beats were rhythmic and even. Pale color. Between the wings, the back was less scaled than the wings were. Tan. Tail had narrow cross-bands. Off-white alternated with dark gray-brown. No prominent band at the terminus. The facial mask was small and dark brown, with 3 extensions. The extension into the malar region was narrow and longest of the 3. Very light supercilium. Nape lighter tan than back below it.—*Erik Munson, 1352 Robin Lane, Stevens Point, WI 54481.*

PURPLE SANDPIPER (*Calidris maritima*)

1 December 1991, Sheboygan Co., Sheboygan—Having heard the WSO hotline report of a Purple Sandpiper at Sheboygan, Bill Foster and I approached the rocky shore at North Point with expectancy. I started scanning from the east, while Bill began from the west. Within two minutes Bill called out "I've got him. Watch him while I get the telescope."

The bird stood still as a statue, 50 yards distant, as Bill et up the scope. We had a magnificent view of a sandpiper whose size and shape reminded us of a Pectoral Sandpiper. Even the very heavy streaking on the breast was pectoral-like. But the overall coloration was grayish-not brown. The head and upper breast were solid grayish. The back and wings were grayish with light brown feather edgings giving the appearance of transverse bars. The belly was light with noticeable gray-brown streaks on the flanks. An area around the eye was lighter, with the faintest suggestion of a light gray line between eye and bill. The bill was moderately long, thin, slightly decurved near the tip. The base of the bill was dull yellowish; the fore part was noticeably dark. The legs were relatively short and conspicuously yellow--almost orange-yellow.

The bird did not fly. Indeed, scarcely a feather moved during our period of observation.—*Sam Robbins, 14 S. Roby Road, Madison, WI 53705.*

2 December 1991, Sheboygan Co., Sheboygan—I was scoping from my car, looking for unusual gulls among the mallards and Black Ducks that frequent the rocky area south of Sheboygan Point. I noticed a squat, round shorebird feeding on the rocks. The head appeared small in proportion to the body, and the neck and legs were short.

The legs were yellow to orange, the downcurved bill yellowish from the base to one-half its length, and dark at the tip. The throat and upper breast were dark grey; the lower breast and flanks were spotted to the white belly. Head, nape and mantle were dark grey. The scapulars and upper wing

coverts had black centers and were edged in brown. Primaries and secondaries were grey but edged in white. The cheek was grey and although there were light areas near the eyes I could not detect a definite eye-ring. After 50 min., the bird flew 100 yds north, but since I was using a scope I was unable to view any flight markings. From the shape, bill and leg color, I conclude the bird was a Purple Sandpiper.—*Thomas C. Wood, 8895E N. 91st Street, Milwaukee, WI 53224.*

**THAYER'S GULL (*Larus thayeri*),
ICELAND GULL (*Larus glaucooides*),
AND GLAUCOUS GULL (*Larus
hyperboreus*)**

26 January and 3 February 1991, Sheboygan Co., Sheboygan—On both occasions a substantial number of gulls were sitting on the ice, shoreline and flying in the Sheboygan harbor. Both times the three species were sitting close to the shore on the ice, eventually flying. The Thayer's were adults, dark eye, more rounded, speckled head, with a grayish mantle and no dark in the primaries. The Iceland were immatures, grayish colored with some white and a light gray appearing in the back, a two-tone bill, slightly larger than adjacent Ring-billeds. The Glaucous were large white birds, larger than the Iceland especially and also larger than adjacent Herrings.—*Daryl D. Tessen, 2 Pioneer Park Place, Elgin, IL 60123.*

ICELAND GULL (*Larus glaucooides*)

16 February 1991, Manitowoc Co., Two Rivers Harbor—A first year Iceland Gull was found standing/sleeping on the ice in the Two Rivers Harbor

with a flock of about 175 Herring Gulls. The bird was slightly smaller than the Herring Gulls standing in the immediate vicinity, and possessed a smaller more rounded head. The general colouration was a mottled bluff produced by a light brown colour of the feathers surrounded by a lighter coloured edge. The wings, when stretched were light coloured to the ends of the primaries without distinct windows or mirrors. The tail gave the appearance of thin, but very light banding. When the bird would awaken, the black extended from the tip to the base. The bill was also thinner and smaller compared to the Herring Gulls. The legs were pink and the iris was dark. This individual briefly exchanged an aggressive encounter from a first year Thayer's Gull but the conflict ended with the Thayer's Gull flying away when the Iceland failed to yield its place on the ice.

The bird was shown to two Oshkosh birders that were in the area looking for the Great Black-backed Gull that had been reported earlier.—*Charles Sontag, 801 North 4th St., Manitowoc, WI 54220.*

**GREAT BLACK-BACKED GULL (*Larus
marinus*)**

26 January 1991, Milwaukee Co., Ju-neau Park Lagoon—I stopped at the Ju-neau Park Lagoon after a couple of stops along the lakeshore. Almost immediately I saw a dark-gray, almost black-backed gull in with the numerous Ring-billed and Herring Gulls. This bird appeared to be a couple of inches larger than a nearby Herring Gull. The bill appeared to be slightly longer, was yellow with a red spot near the tip. The legs and feet were a pink

color. The head was almost pure white. Most of the gulls then flew. The wings of this bird were almost black with a narrow white border on the trailing edge. The tail was pure white. The bird disappeared heading south.—*Mark S. Peterson, Box 53, Caroline, WI 54928.*

10 February 1991, Manitowoc Co., Two Rivers Harbor—Approximately 200 yards north from the northernmost pier among a huge flock of Herring Gulls, I observed, with binoculars, three very dark-backed gulls, larger than Herring Gulls, with white heads and underparts. Due to high wind conditions, details were indiscernible with the scope.

Forty-five minutes later I was scanning the ice on East Twin River from the campground/marina near McDonald's Restaurant and I quickly picked out one large, dark-backed gull among the many Herring and Ring-billed Gulls.

The mantle and wings were black, and the white-tipped primaries were darker than the rest of the wing. The secondaries were edged in white. Some fine dark streaking appeared on the back of the head and nape, but for the most part the head, and all the underparts were white.

Though the gull spent most of the time resting with its bill tucked in, it moved occasionally to reveal a white, unmarked tail, pink legs, and a thick yellow bill which was obviously larger than the bill of the Herring Gulls. The lower mandible of the bill had a red spot which was bisected by a black mark that extended to the upper mandible. My field guides do not show a dark spot on an adult gull; possibly this was a late third-winter bird that had completed its molt into adult plumage

with its bill still in transition. I cannot explain the eye color which appeared brown, since the yellow iris of nearby Herring Gulls was readily apparent. Due to the large size of this gull in comparison to the Herring Gulls, the black plumage, and pink legs, I am certain this was a Great Black-Backed Gull.—*Thomas C. Wood, 8895E North 91st Street, Milwaukee, WI 53224.*

15 February 1991, Manitowoc Co., Two Rivers Harbor—My wife, Mary, and I were looking at a flock of about 100 Herring Gulls when I spotted a very dark-backed, larger gull in among the others. The back was a very dark gray, almost black. This gull appeared to be about 1½ times larger than the nearby Herring Gulls. We moved to a point about 50' away from the gull and noted the following: black back, 1½ times larger than the nearby Herring Gulls, yellow bill-thicker and longer than the Herring Gull's bill, with a red and a black spot near the tip, and pink feet and legs. The head was almost completely white. The bird flew out to about 200' away and the following were noted: black wings with a narrow white trailing edge. A white tail. The bird preened itself, stretching its wings, but did not seem too concerned with our presence. As many as 5000 Herring Gulls and 4 Black-backed Gulls had been reported in Two Rivers several days before, but on this day only about 200 Herring Gulls and 1 Great Black-backed Gull were seen.—*Mark S. Peterson, Box 53, Caroline, WI 54928.*

NORTHERN HAWK-OWL (*Surnia ulula*)

9 December 1990, Douglas Co., Cloverland Township—After seeing a Great

Gray Owl in the morning I decided to go out with my family and see if the bird was still in the area. The trip for the Great Gray proved to be fruitless so we thought we would turn north on Hwy 13 and proceed to the Douglas/Bayfield county line, turn and go back home. On our way back we carefully scrutinized a clearcut area of large size (100+ acres) for owls. To our surprise we noticed an owl (medium size) about $\frac{1}{2}$ mile south of "Buacketts Corner" on the east side of the road (13" high) sitting atop a dead tree about 18' off the ground. I stopped the car and looked at the bird which appeared at first moment to be a Hawk Owl (*Surnia ulula*). Upon peering at the bird (100 feet from road) with my field glasses I noticed pronounced dark borders on the facial disk, the long tail and the barred chest and stomach area. A quick look at the Peterson Field Guide confirmed that it was indeed a Hawk Owl.

I then got out of the car and started to walk towards the bird. After crossing the ditch I would walk 20 feet or so and observe the bird, walk and then observe again. This bird was not the least bit interested in me as I eventually got directly beneath the bird. While I was advancing and observing the bird continually would gaze down and to its left side as if it were looking for mice, no vocalizations were made. After I observed the bird and went back to the car whereby I invited my wife to get out and have a look. She basically repeated the steps that I made while I watched from the car. Again the bird ignored the intrusion even while we had to make excessive movements negotiating the abundant slashings to make way to the bird. At approximately 4:40 P.M. we left, the bird was

still in its perch.--*Ronald R. Perala, Rt. 1, Box 209-A, Brule, WI 54820.*

19 January 1991, St. Croix Co., near Glenwood City—The owl was approximately the same size as an American Crow which perched briefly in the same tree as the owl. Its upperparts were uniformly warm brown, with whitish spotting; underparts whitish, very heavily barred with brown, especially upper breast; wings long, rather pointed; tail very long (approx. $\frac{1}{3}$ total length of bird); eyes, bill yellow; heavy black facial borders framing the "face." Posture when perched was decidedly horizontal, rather than the more characteristic vertical posture of most owls; flight was swift and direct, resembling American Kestrel; flight silhouette was also similar to American Kestrel—long, rather pointed wings, and long tail. The bird was actively hunting during entire observation period, and was seen to catch 3 voles. The owl twice chased off another bird—first a Northern Shrike, then an American Crow. The owl was observed at distances of 3 feet (when it flew over our car) to $\frac{1}{8}$ mile. Was observed for over $\frac{1}{2}$ hour at distances of 18–40 feet.—*Keith J. Merkel, 201 N. Ash Avenue, Marshfield, WI 54449.*

2 March 1991, Douglas Co.—At about 4:00 P.M. Kathy and I were traveling south on Highway 53 from Superior. We were a mile and a quarter south of the junction of Highway 53 and Highway 2. As Kathy was driving she noticed to the west a fairly large bird perched on top of a deciduous tree across a field that bordered the highway. Kathy pointed at the bird so I could get a view of it. At this time of the year most large birds perched in

trees are often American Crows or Common Ravens. This bird was dark, but I could not see a small head and large pointed bill of a Corvid. Knowing that this past winter yielded several Northern Hawk-Owls, I immediately became suspicious and told Kathy to pull over.

It was clear and cold, the sun was low in the sky. This made the lighting extremely poor. I looked at the bird through my binoculars (9×35mm). The bird was perched upright, unlike a corvid (which is often angled), much more like an owl or a hawk. Most noticeable was a large, round head. Having seen Hawk Owls through the course of the winter I immediately had a good idea we were watching one. But field marks were indistinguishable through the binoculars. We focused our Kowa TSN-2 Spotting scope (20×) on the bird. Through the scope we could see the large, round head, eyes facing forward surrounded by facial disks. The dark horizontal barring on a whitish chest and belly were clearly evident. The long tail extended past the folded wings. Detailed field marks were very difficult to obtain due to the distance from the car (approximately 150 yds.) and the very poor lighting. However, it was quite clear we were watching a Northern Hawk-Owl. The bird never flew from its perch. We watched it for 5–10 minutes before the cold temperatures forced us to move on.

Later I looked at a Wisconsin County map and estimated the owl was 8–10 miles from Four Corners, the location of an overwintering Northern Hawk-Owl. The Four Corners bird had been seen as late as the end of February. This bird could possibly have been the same bird, maybe even be-

ginning to move north towards its breeding grounds. Apparently Northern Hawk-Owls will often leave the wintering grounds in February. We believe this may be the only spring record of a Northern Hawk-Owl in Wisconsin.—David J. Lauten and Kathleen Castelein, 231 S. Main St., Oregon, WI 53575.

GREAT GRAY OWL (*Strix nebulosa*)

5 December 1990 and 6 February 1991, Douglas Co., Lake Nebagamon and Brule River—This report documents the sighting of two Great Gray Owls. I observed a Great Gray Owl on December 5, 1990, 2 miles east of Lake Nebagamon, Douglas County. The bird was perched upon an old fence post in a pastured field. Initially, I thought the bird to be injured, as I was able to approach within 6 feet! While trying to grasp the feet and capture it, it took flight and landed approximately 30 yards away. It was very large, seemingly $1\frac{1}{2}\times$ the size of a Barred Owl and dark gray/brown. Features also noted include lack of ear tufts, large head, yellow eyes, yellow bill, concentric rings radiating outwards from the eyes, and a bright white bow-tie. The tail was broken up by a series of bands. After photographing it for about 10 minutes, it flew into the nearby woods out of sight.

The second Great Gray was seen February 6, 1991, between the Brule River and Hwy 13 north of the town of Brule also in Douglas County. While conducting timber reconnaissance, the bird flushed from a large aspen and landed approximately 50 yards out. The same field marks as that of the previous bird were recorded. This owl was only $\frac{1}{2}$ mile south of where Ron

Perala had reported seeing a Great Gray in early winter. It is presumed to be the same bird. I observed neither bird again and have had no other reports of others seeing these birds.—*Laurence S. Semo, Rt. 2, Box 435, Superior, WI 54880.*

9 December 1991, Douglas County, Cloverland Township—While driving to pick up the Sunday paper I noticed a large owl just off of the Brule River Road perched on a lateral limb of an aspen tree. I stopped my car and got out to get a better look at the bird and walk towards it. I approached within 30 feet and immediately noticed the yellow eyes and white chin patches. Its large body size along with its yellow eyes and white chin spots confirmed that it was a Great Gray Owl (*Strix nebulosa*) even with the absence of optical equipment (no vocalizations).

The bird was perched about 25' above the ground and watched me as I left the car. I stopped walking about 30' from the tree to observe and did so for about 3–5 minutes. As I tried to move closer the bird flew to the south-east through some thick cover and I could not see if it landed anywhere.

Compared to other Great Gray Owls that I have observed I would guess it to be a medium-sized representative, estimating its overall height at around 20–21 inches.

After this sighting I made several attempts to relocate the bird all during the late afternoon hours. None of these trips resulted in spotting the bird. However, on route to pick-up the Sunday paper on 12-23-90 I saw what I think was the same bird about 1/8 mile east of the 12-9 sighting on the BR road on a power pole on the north side

of the road. Again I left the car and the bird allowed me some movement but when I got too close the bird flew.

This bird was observed in the same general area where I have seen several Great Gray Owls in the past 1982–1986.—*Ronald R. Perala, Rt. 1, Box 209-A, Brule, WI 54820.*

ANNA'S HUMMINGBIRD (*Calypte anna*)

1 December 1990, Waukesha Co., Wales—Arriving at the Schmidt residence around 8:15 Dennis Gustafson was just leaving after having seen the hummingbird. After a 15 minute wait the Anna's Hummingbird appeared at the feeder for about a minute. Its red crown and throat, green body with a white spot behind the eye were clearly seen. During the next half hour it appeared twice more, spending more time at the feeder affording a more leisurely look at it. As the feeder was still in the shade the breast appeared whitish but all the aforementioned points were again noted.—*Daryl D. Tesen, 2 Pioneer Park Place, Elgin, IL 60123.*

1 December 1990, Waukesha Co., Wales—I arrived at the Schmidt residence at about 11:30 A.M.. Several other cars parked in the street in front of the house indicated that these people had visitors. About 15 minutes after I arrived, the bird made its first appearance. It first landed in some trees near the house, then flew to a small tree about 30' from the feeder, before coming to the feeder where it fed for about 30 sec. before flying off. It came to the feeder 4 or 5 times while I was there. It also perched in small trees either near the house or about

10' from the feeder. It also hovered about 30' above the ground several times.

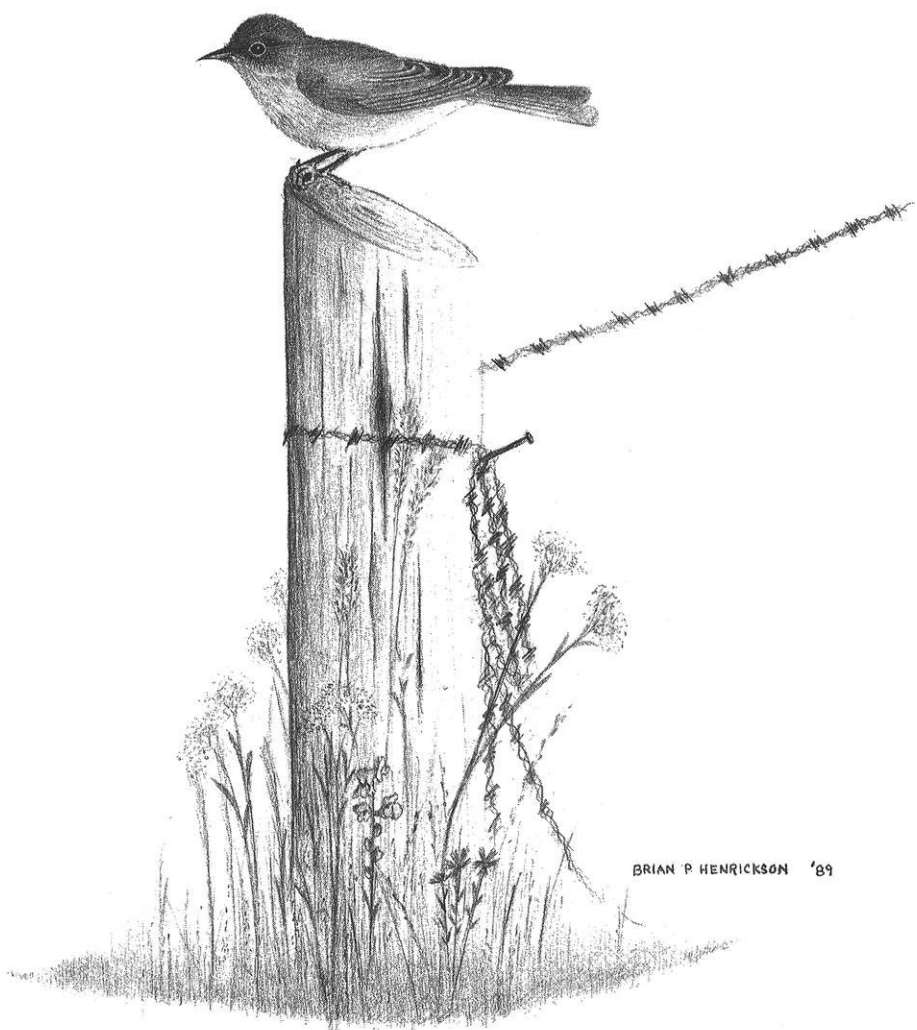
This bird appeared to be slightly larger than a Ruby-throated Hummingbird. Its breast and belly appeared to be almost pure white. Its back appeared to be a grayish color. I did not see any green on this bird. The throat, top of the head, and small areas in back of each eye were a brilliant pinkish-red color. This was especially true when the sunlight hit these areas just right. There were small whitish areas about $\frac{1}{2}$ the size of the eye just posterior to each eye.

The appearance of an Anna's Hummingbird in Wisconsin is one that I do not expect will be repeated in my lifetime.—*Mark S. Peterson, Box 53, Caroline, WI 54928.*

2 December 1990, Waukesha Co., Wales—As predicted by the Schmidt Family, the hummingbird appeared within 15 minutes of our arrival. It appeared to be slightly larger than my memory has of Ruby-throateds, but with similar general coloration, i.e. greenish back, blackish wings, light breast, black throat (in poor lighting),

and a black narrow beak about as long as the head is long—basically straight—at times almost having the suggestion of a slight downward curve. The feet were black. The tail was not observed. The breast was dirty white progressing to black edged green feathering on the flanks and lateral chest. This greenish feathering faded to dirty white through the center part of the lower breast.

The most striking portion of the bird was the head. With full turning toward the sunlight the blackish throat became iridescent rose-red extending quite far back on the lateral neck via some longer feathering on each side of the throat almost 2 flaps of feathers sticking out slightly from the neck. The cranial $\frac{2}{3}$ of the crown also flared rosy red in proper lighting with narrow strips of this color extending caudal to the eyes over what was almost an eye stripe. The eye stripe consisted of a small white patch immediately behind the eye but trailing backwards and slightly down as an eyestripe starting. This trailing disappeared quickly, but left a demarcation between the trailing crown rose coloring and the throat rose coloring.—*James Frank, 4339 W. Laverna Ave., Mequon, WI.*



Eastern Bluebird by *Brian P. Hendrickson*.

WILBUR BROWN
1903-1991



Wilbur Brown, a very caring man, who did so much for WSO, left this earth on April 7, 1991. Wilbur Brown was the man who handled the contracting for, and with very little help, the construction of the Cox Memorial Nature Center and the companion sanitary facility at Honey Creek. In July 1972 Harold Kruse reported to the Board that "Mr. Wilbur D. Brown has practically single-handedly erected the 24' X 30' Nature Center building. He has donated all his time and labor." Mr. Brown was a self-employed carpenter and built many homes in the Madison area.

He was a man who was always on hand for week-end work parties, for fencing, and whatever else was needed during the early days at Honey Creek. He had the first signs made and built the tables and benches in the Nature Center. With his wife of almost 65 years, Eva, and daughter Joyce Ann he was always on hand with a large pan of popcorn at camp outs, field trips, and other events.

Mr. Brown was given the Silver Passenger Pigeon Award in 1973 for his significant contributions to Honey Creek and the Society. As is the tradition of such award winners, he continued to serve the Society as Circulation Manager

from 1973 until 1985. With the help of his family he handled the sizable job of preparing and mailing each issue of *The Passenger Pigeon* for these 12 years.

Organizations like WSO need more selfless volunteers like Mr. Brown. He will be missed.—*Edward Peartree, 36516 Lisbon Rd., Oconomowoc, WI 53066 and Alex Kailing, W330 N8275 West Shore Drive, Hartland, WI 53029.*



Northern Hawk-owl (photo by Keith Merkel)

ABOUT THE AUTHORS AND ARTISTS

Scott R. Craven is Professor and Extension Wildlife Specialist in the UW-Madison's Department of Wildlife Ecology. He is well known to naturalists around the state for his extension publications and radio shows. He is particularly interested in urban wildlife and wildlife damage problems.

Jill A. Dechant, a native of Sparta, has a B.S. degree in biology from UW-River Falls. She is currently doing volunteer research on Imperial Eagles in Spain.

Paul B. Doeneir has a B.S. degree in Biology from UW-River Falls. He is now a graduate student at the University of Minnesota studying Ruffed Grouse.

James O. Evrard is a wildlife habitat management specialist with the Wisconsin DNR's Bureau of Research. His special area of interest is wetland and farmland habitats for waterfowl. He obtained his B.S. and M.S. degrees in Wildlife Ecology from the UW-Madison.

John Grettenberger is a biologist with the U.S. Fish and Wildlife Service. He

is now stationed in Olympia, Washington, but formerly worked in Fish and Wildlife Enhancement in Rock Island, IL.

Felix Manuel Guerrero Gonzalez is a student in the College of Natural Resources at the UW-Stevens Point. He did his work on kestrels under the supervision of Dr. Fran Hamerstrom and he is currently accompanying her on fieldwork in Texas and Mexico.

Brian P. Henrickson is an avid birder, artist, and ornithologist completing his B.S. degree in Zoology at UW-Green Bay, where he has studied with WSO's Research Chairman, Robert Howe.

Lori Jean Hubanks, an accomplished wildlife artist, has studied under Robert Bateman and Joe Milam, an environmentalist. Along with field sketches, she uses her photographs and taxidermy skills to obtain reference material. She lives in Beloit.

Robin E. Jung has her B.A. in biological sciences from Indiana University and her M.S. in Zoology from UW-Madison. She is currently working at the Smithsonian Institution but plans

to return to UW-Madison for a Ph.D. in Wildlife Ecology.

Alex F. Kailing, our Treasurer and Chair of the Membership Committee, has inherited several of the tasks Wilbur Brown once performed for WSO.

Kenneth I. Lange has been the Naturalist at Devil's Lake State Park since 1966. He has a master's degree from the University of Arizona. Ken has been a frequent contributor to WSO publications: as a field-note compiler and author of articles and the book, *Breeding Birds of the Baraboo Hills*. He formerly worked at the Smithsonian Institution's U.S. National Museum.

Keith J. Merkel is a native of Marshfield whose interests are birding and nature photography. After being initiated by Don Follen, he has become a Great Gray Owl enthusiast. He is now the Vice-President of The Wisconsin Foundation for Wildlife Research.

Michael J. Mossman is a nongame biologist with the Wisconsin DNR's Bu-

reau of Research. He has a M.S. degree in Wildlife Ecology from UW-Madison. He is a frequent contributor to *The Passenger Pigeon* and other WSO activities.

Edward Peartree, a Silver Passenger Pigeon Awardee, is well known to WSO members for his long-term banding program at WSO's Honey Creek property, where he and Wilbur Brown spent much time together.

Allen K. Shea is our current President and the Spring Field-Note compiler. He is the Assistant to the Director of the DNR's Bureau of Water Resources. He has his M.S. degree in Water Resources Management from the UW-Madison's Institute for Environmental Studies.

DeWayne A. Snobl, a native of Rice Lake, has a B.S. degree in natural resources from UW-Stevens Point. He has worked for the Wisconsin DNR on a number of projects in fisheries and wildlife management.

NOTICES AND ADVERTISEMENTS

1991 CONVENTION REPORT

The 52nd annual WSO convention was attended by 190 members during the weekend of June 6–9 at the University of Wisconsin-Green Bay. The Richter Museum of Natural History and the Cofrin Arboretum sponsored the event along with co-hosts the Green Bay Bird Club and the Northeastern Wisconsin Audubon Society. Activities began early Thursday with a preconvention trip to the Door County Peninsula led by naturalists Roy and Charlotte Lukes. The 49 participants on the coach tour visited Cave Point County Park, Whitefish Dunes State Park, the Ridges Sanctuary and Toft Point Natural Area. Overnight lodging was at the Wagon Trail Resort on Rowley's Bay. Fine food and company led to a pleasant evening in scenic surroundings. Early Friday morning the group ferried to Washington Island and then to Rock Island State Park. Weather and scenery were spectacular. Flocks of several hundred broad-winged hawks were noted over Rock Island. It was a preconvention trip that will be long remembered.

Friday evening activities began at UWGB's Rose Hall with a welcome reception by Dean of Sciences Dr. Donald Larmouth and a splendid lecture by Dr. Jerome Jackson on the "Plight of the Red-cockaded Woodpecker." The planned introduction of *Wisconsin Birdlife* and book signing was canceled due to Sam Robbins' sudden illness.

Dr. Charles Kemper presented his remarkable introduction for Sam anyway, and certainly made us all aware of the many years of labor and dedication endured by Sam during preparation of the book. Sam has since recovered and made a special trip to sign copies of the books ordered through the WSO bookstore. The bookstore did a lively business and many members also enjoyed the displays in the Richter Museum of Natural History both Friday and Saturday. Considerable interest was shown in the array of rare and unusual bird skins on display.

The early morning field trips on Saturday found 109 species in the lower bay area. The 70 participants in boat trips to the nesting islands on the bay enjoyed colonies of cormorants, cattle and snowy egrets, black-crowned night herons, Common and Forster's terns, and herring and ring-billed gulls. We were grateful for the calm weather and use of boats and operators donated by the Department of Natural Resources, U.S. Fish & Wildlife Service, and UW-Green Bay. The late date of this year's convention precluded finding many migrants, but the local west shore marshes did produce nesting bitterns, rails, moorhens, waterfowl, terns, and egrets.

The paper sessions in Rose Hall were very well attended. Thirteen fine presentations followed the convention theme of "Endangered and Threatened Species—Their Habitat and Management." Dr. David Brinker presided over the morning sessions, and after a

noon lunch in the Nicolet Room of the UWGB commons, Dr. Robert Howe presided over the afternoon session. The papers presented are listed below. Abstracts can be obtained from the Richter Museum.

POPULATION TRENDS AND PROPOSED MANAGEMENT PLANS FOR FOURMILE ISLAND HERON ROOKERY, HORICON MARSH, by William Volkert, Wisconsin DNR, Horicon, WI 53032.

WISCONSIN'S WESTERN GREBES, by Tom Ziebell, 1322 Ceape Avenue, Oshkosh, WI 54901

STATUS AND MANAGEMENT OF BREEDING BALD EAGLES AND OSPREY IN WISCONSIN, by Ron Eckstein, DNR, Rhinelander, WI 54501

BREEDING GRASSLAND BIRD COMMUNITIES OF THE CONSERVATION RESERVE PROGRAM (CRP) AND THE AGRICULTURAL SET ASIDE FIELDS IN SOUTHERN WISCONSIN by David Sample, Wisconsin DNR, Monona, WI 53716

REPRODUCTIVE LIMITS OF FORSTER'S TERNS AT LAKE POYGAN IN 1990 by Jeff Pritzl, Wisconsin DNR, Madison, WI 53707

STATE ENDANGERED SPECIES: ARE WE AIMING AT THE RIGHT TARGETS? by Robert Howe, UW-Green Bay, WI 54311

WISCONSIN'S TRUMPETER SWAN REINTRODUCTION by Stanley Temple and Becky Abel, University of Wisconsin-Madison, WI 53706

FACTORS INFLUENCING NEXT HABITAT PREFERENCE OF THE EASTERN TAIGA MERLIN by Thomas Doolittle, RR 1, Box 271 A, Washburn, WI 54891

AN ENDANGERED SPECIES IN AN ENDANGERED HABITAT: COPING WITH UNSTEADY-STATE CONDITIONS by H. J. Harris and T. C. Erdman, Euchring Bay, WI 54311

USE OF PLAYBACKS TO MONITOR THE BREEDING DISTRIBUTION AND STATUS OF RARE BIRD SPECIES IN MARYLAND by David Brinker and Glenn Therres, Maryland DNR, Wye Mills, MD 21043.

NESTING ECOLOGY OF RED-SHOULDERED HAWKS IN MICHIGAN AND CENTRAL WISCONSIN by John Jacobs, Neville Public Museum, Green Bay, WI 54303, Eugene Jacobs, Stevens Point, WI 54481, and Thomas Erdman, UW-Green Bay, WI 54311

SAVING ENDANGERED SPECIES by Fran Hamerstrom, RR 1, Box 448, Plainfield, WI 54966

PEREGRINE RECOVERY IN WISCONSIN by

Greg Septon, Milwaukee Public Museum, Milwaukee, WI 54532

The banquet was held in the Nicolet Room of the Student Union. Carl Scholz served as Master of Ceremonies and introduced the newly elected officers and honored guests. Following the banquet about 200 people congregated in Rose Hall for Dr. Jerome Jackson's illustrated lecture, "Politics and Preservation: the History and Status of the Ivory-billed Woodpecker in the U.S. and Cuba." The participants were treated to a wonderful lecture filled not only with past and current scientific information on the Ivory-billed Woodpecker, but also with many personal anecdotes of Jackson's adventures searching for this rare bird in Cuba and southern United States. His great candor made the lecture the highlight of the convention.

The extended field trips on Sunday morning were attended by more than 100 birders. Robert Howe led a group to the Lakewood District of the Nicolet National Forest. John Jacobs and Tom Erdman toured the west shore marshes from Green Bay to Peshtigo Point. Charles Sontag led a group to Collin's Marsh Wildlife Area and then to Woodland Dunes and the Manitowoc Harbor. Ron Akley took a small group to the Navarino Wildlife Area and Nature Center, while Joel Trick and others visited wetlands and forests in the vicinity of Green Bay. The latter group achieved the distinction of documenting the first zebra mussels in lower Green Bay. In all, nearly 140 species were recorded.

Credit for the success of this convention goes to the local committee and the many volunteers who helped lead field trips, take care of registra-

tion, and prepare and serve refreshments. Denise Friedrich was convention treasurer and was in charge of registration. John Jacobs was field trip chairman. Ginney Amen was in charge of refreshments and helped with the registration. Roy and Charlotte Lukes helped plan and led the preconvention field trip to Door County. Others who should be acknowledged are: Kim Mello, Ken Stromberg, Jon Braastad, H. J. Harris, Robert and Terrie Howe, Ron Eichhorn, Joel Trick, Mike Reed, Edward Weidner, Ron Akley, Joel Whitehouse, Charles Sontag, Bob Mead, Ty and Ida Bauman, Charlie Frisk, Margaret Mullen, Dorothy Gjesdahl, Cindy Bayless, Jerry Lemerond, Dennis Prusik and Carl Hujet.—*Thomas C. Erdman, Convention Chairman.*

MINUTES OF THE ANNUAL MEETING (JUNE 8, 1991, GREEN BAY, WISCONSIN)

The 52nd annual business meeting of the Wisconsin Society for Ornithology was called to order at 1:15 P.M. at the University of Wisconsin, Green Bay, by President Randy Hoffman with approximately 92 people present.

President Hoffman opened the meeting noting the absence of Sam Robbins who is in the hospital in Madison and, therefore, will not be here to autograph copies of his new book, *Wisconsin Birdlife*.

Randy suggested that we continue the practice of having WSO presidents serve a two-year term, one year not being enough time to become familiar with the job.

Written reports by the officers and committee chairmen were made available to all present. Copies of the re-

ports will be filed with the minutes of this meeting and will become an integral part thereof.

Secretary's Report—Included minutes of the 1990 annual meeting at La Crosse. A motion was made by Alex Kailing, seconded by Fran Hamerstrom to accept the minutes of the May 1990 annual meeting. Motion carried.

Treasurer's Report—Included in the packet, was explained by treasurer Alex Kailing. The report consisted of an income statement for 1990, and a balance sheet as of December 31, 1990. The balance sheet for year end 1990 showed total assets of \$141,055. This breaks down as follows:

Cash	\$ 2,707
Savings	
General	11,829
Endowment	9,672
Investments	
Endowment	20,000
Scholarship	14,340
Inventories	
Slides	2,679
Slides cash	2,788
Book Store	41,200
Cash	3,259
Equipment	687
Land and Buildings	
Prairie Chicken land	1,491
Honey Creek land	21,476
Nature Center	8,929
Total	\$141,055

This total compares with \$79,226 ten years ago.

Alex said that because of a lack of understanding by our previous treasurer, no income tax forms were filed in 1988 or 89. We weren't required to pay any tax but we were obligated to file. The IRS has fined WSO for 1989 but Alex is working with them to recover the fine and clear our record. Al Shea moved acceptance of the report,

seconded by Ed Peartree. Motion passed.

New Articles of Incorporation for WSO prepared by WSO legal counsel Carlo Balistireiri were brought up for discussion. These are to replace the current "Second Restated Articles of Incorporation." (These were drafted by Robert W. Lutz, legal counsel, signed by Rockne Knuth, president and Mrs. David Cox, secretary and were adopted at the annual meeting of May 23, 1971, when William Pugh was president. See *Passenger Pigeon* 33:196.) New articles were needed to meet requirements of the IRS for non-profit status. After a brief discussion it was moved by Al Shea, seconded by Bettie Harriman that the articles be adopted. The motion passed 92 for, none against.

To meet the growing expenses of WSO and the effects of inflation treasurer Kailing presented a list of proposed dues increases for the various classes of membership. The proposed changes are as follows:

Category	Current	Proposed
Senior	\$4	\$5
Single	\$12	\$15
Family	\$15	\$20
Sustaining	\$25	\$35
Life (single)	\$200	\$300
	or \$50/year	or \$75/year
Life Husband	\$200	\$400
& Wife	or \$50/year	or \$100/year
Patron	\$750	\$750
Library	\$18	\$18

Individuals already paying for Life Memberships on the four-year plan will be eligible to complete quarterly payments at the current rate.

On motion of Jim Gorton, seconded by Bettie Harriman, the dues increases, effective with 1992 membership payments, were approved.

1992 Convention Committee—Vice President Al Shea announced that by an invitation from Dick Verch, Northland College in Ashland has offered to host the 1992 WSO convention, the weekend of May 15, 1992. On motion by Alex Kailing, seconded by Fran Hamerstrom the invitation was accepted.

Passenger Pigeon Editor's Report—Editor Stan Temple, besides giving an interesting summary of the Pigeon reminded the membership that he has volunteered to be editor for five years. The fifth year will be 1992. A new editor must be selected to assume responsibility for Volume 55 in 1993.

Badger Birder Editor's Report—Editor Mary Donald said she wants more news.

Grants and Awards Committee—John Idzikowski said response for grants was poor this year in part for lack of adequate publicity. No applications were received until well after the deadline. In the future we should publicize the existence of these awards through mailings to universities and colleges and have announcements in Wisconsin scientific and semi-scientific publications.

Two Steenbock Awards were given: Brian P. Henrickson for "Population Dynamics of Bird Communities in the Southern Portion of the Kettle Moraine State Forest." and Michael L. Dilger for work associated with the use of artificial nests to study predation of nests of passerine birds and the biases inherent in the use of such research design.

Supply Department Committee—Chuck Gilmore was complimented by

President Hoffman for his work as head of the supply department. He received a round of applause from the members. A supply department financial report for 1990 was in the hands. It showed receipts of \$20,221 and an inventory of \$14,286. In addition there were receipts of \$9,174 for WSO publications and an inventory, at cost, of \$25,833 at year end. Chuck announced that the U of W Press is now allowing WSO the normal 40% dealer discount on Sam Robbins' *Wisconsin Birdlife*, so he will now sell them to WSO members for \$60.00 plus tax and shipping.

Field Trips Committee—Again this year, Tom Schultz and Jeff Baughman have lead excellent field trips which have been well attended. Working with Arete Tours of Madison the committee offered 1991 birding tours to southern Texas and to Venezuela. The Texas trip was filled and the November 2–10, 1991, Venezuela trip was oversubscribed. They may decide to offer a second trip to Venezuela if there are enough to warrant it. Suggestions for next year are Churchill and South-eastern Arizona. John Idzikowski may lead a trip to Costa Rica.

Conservation Committee—Sam Robbins' report shows that he has been very active this past year mainly in sharing WSO-gathered information with research and conservation-minded organizations and individuals. He has had President Hoffman send out a questionnaire to WSO members seeking opinions about the type of involvement WSO should show on conservation issues.

Publicity Committee—Noel Cutright gave over eight talks on birds this past year, advertising WSO at each. Bill Volkert and Stan Temple have also plugged WSO during radio shows and other presentations. Bettie Harriman has sent notices to area newspapers on upcoming field trips. WSO had its booth at the Sentinel Sport Show again this year.

The birdathon was a success. \$1900 has been received and this may go over \$2000.

Last year Eleanore Kratzat suggested WSO publish a list of the bird clubs of the state. Noel Cutright and Alex Kailing have compiled such a list. A copy can be obtained by writing Alex. His address is inside the back of each Pigeon. The hard part is to keep current on the contacts.

Membership Committee—See treasurer's report.

Nominating Committee—Daryl Tesen, Carl Hayssen and Sam Robbins presented the following slate in nomination for 1991–92: President (Allen Shea), Vice president (Charles Sontag), Secretary (Carl Hayssen), Treasurer (Alex Kailing), Editor (Stan Temple). Mary Donald moved that the nominations be closed and that the secretary be instructed to cast a unanimous ballot in favor of the slate presented. Motion seconded by Lisa Decker and passed.

The meeting was adjourned at 2:14 P.M.

Respectfully submitted,
Carl G. Hayssen, Jr., Secretary

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CONTENTS

Volume 53

Fall 1991

Number 3

Cover Artwork (Eastern Screech-owl)

Lori Jean Hubanks

WSO: A Collage of Unique Individuals

Allen K. Shea

205

Effects of Human Activities and Lake Characteristics on the Behavior
and Breeding Success of Common Loons

Robin E. Jung

207

Prey of Breeding American Kestrels in Central Wisconsin during 1991

Felix Manuel Guerrero Gonzalez

219

Nesting Short-eared Owls and Voles in St. Croix County

*James D. Evrard, DeWayne A. Snobl, Paul B. Doeneir and Jill A.
Dechant*

223

Habitat Fragmentation and Forested Wetlands on the Upper Mississippi
River: Potential Impacts on Forest-Interior Birds

John Grettenberger

227

H. R. Schoolcraft and Natural History on the Western Frontier, Part 1:
Early Years

Michael Mossman

243

Birding and Children

Scott R. Craven

255

The Winter Season: 1990-1991

Kenneth I. Lange

261

"By the Wayside"

*Janine Polk, Thomas Ziebell, Fred Leshner, Philip Whitford, David
Lauten, Murray Berner, Erik Munson, Sam Robbins, Thomas Wood,
Daryl Tessen, Charles Sontag, Mark Peterson, Ronald Peralá, Keith
Merkel, Kathleen Castelein, Laurence Semo, Ronald Peralá, James
Frank*

273

In Memoriam: Wilbur Brown

Edward Peartree and Alex Kailing

287

About the Authors and Artists

289

Notices and Advertisements

291
