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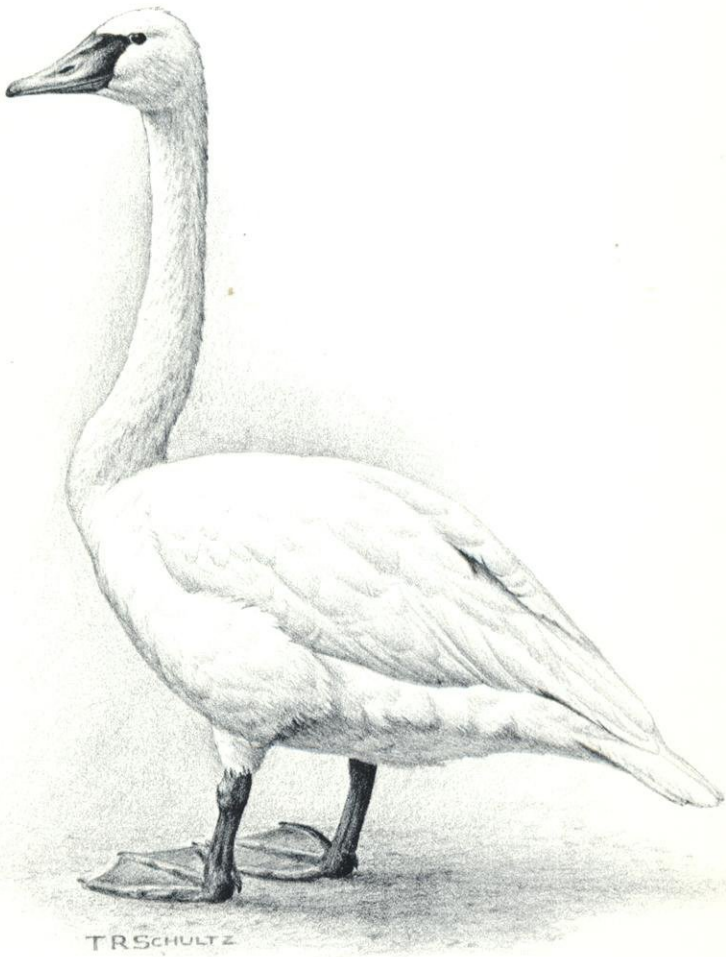

THE PASSENGER PIGEON
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Send all manuscripts and correspondence to the Editor; information for "Seasonal Field-notes" should be sent to the Associate Editor or the appropriate field-note compiler. Manuscripts that deal with information on birds in the 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 Volume 50, Number 1, as a general guide to style.

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A Societal Potpourri

As we approach the long, steamy days of summer and leave behind the excitement of the spring migration, the annual convention, and a redesigned *Passenger Pigeon*, it's a good time to catch up on a potpourri of societal news.

Many thanks are due to the Benjamin F. Goss Bird Club of Waukesha and the S. Paul Jones Naturalists Club of Oconomowoc for organizing this year's fine convention. Remember that next year's convention in Madison is our 50th. The golden anniversary events will be held at the University of Wisconsin on May 12–14; plan for a special time. WSO now has tentative convention plans through 1992. Please inform Vice-President Hoffman in writing if your group wishes to host a convention in the 90's.

Your response to Stanton and Lee's print offer, the first in Owen Gromme's "Endangered Species Series," has already earned WSO over $1000, which will be placed in WSO's "Endangered and Non-Game Species Fund." Discussions on the use of this money will commence later this summer. Our deepest thanks go to Owen Gromme and to Stanton and Lee Publishers for offering this innovative opportunity to environmental groups throughout the state.

WSO's popular publication, *Wisconsin Birds: A Checklist with Migration Graphs*, better known as the "yellow checklist," is now available in a new updated and expanded edition recently prepared by Norv Barger, Sam Robbins, and Stan Temple. The new cover will, no doubt, earn it the nickname of the "red checklist." At $.75 plus postage, this booklet remains a real bargain among publications on Wisconsin's birds; it can be ordered from the WSO Supply Department.

Sam Robbins has recently been appointed Chairman of the WSO Conservation Committee. His strategic location in the Madison area places WSO "where the action is" on conservation issues related to birds. Through letters and occasional testimony, WSO will continue to represent the interests of Wisconsin's birdlife in discussions of policies of both the private and public sectors. Sam would appreciate being notified of bird conservation issues that may arise throughout the state. The Board of WSO and its members thank Ray Anderson for his past contributions to this effort.

At the April Board Meeting it was decided that WSO would accept, for perpetual stewardship, a twenty-acre tract of wetland adjacent to our Honey Creek property. Donated by the Wisconsin Chapter of The Nature Conservancy, this area has been identified by the DNR Bureau of Endangered Resources as one of only a few dozen areas in the state where the endangered Bog Bluegrass (*Poa paludigena*) is still found. Vice-President Randy Hoffman, also of the BER, has been active in providing the Board with valuable advice on this matter.

Please remember the Honey Creek Sanctuary is open for your use. Also, remember that we need volunteers for the occasional work weekends at Honey Creek; simple maintenance activities, such as fencing, are needed to keep fragile

areas, like the marsh where the Bog Bluegrass grows, from being trampled by livestock.

Steve Lang continues to update the very popular WSO Slide Set with better slides. Do you know a school or library nearby that could benefit from a gift of this excellent slide/tape set? Write to Steve for more information; his address is on the back cover.

Those of us in southern Wisconsin have become aware of an increasing interest in Wisconsin from Illinois birders, especially those from the northern Chicago and Rockford area. Many of these Illinois birders participate in our field trips and contribute to our seasonal reports. I would also like to encourage more Minnesota birders to submit their records from western Wisconsin and especially from the Superior area.

Daryl Tessen is planning the third edition of *Wisconsin's Favorite Bird Haunts*. He would like to include at least one contribution from each county. If you know of a good birding area, especially in some of the less frequented counties, give Daryl a brief description of the site. Articles are not due until late 1988.

Finally, WSO has been asked to prepare a presentation on the WSO Records Committee's activities for the American Birding Association's convention in Duluth on June 27–July 3. WSO is not alone in its struggles to help observers write better documentations and to form better relationships between observers and committees. The results of that meeting, which will include presentations from many states, should help us to solve persistent problems of obtaining good records. WSO is always on the lookout for new candidates to serve on the Records Committee. We need individuals who have a wide range of experiences with Wisconsin birds and who have seen at least 300 of the 381 species found in the state. A familiarity with the problems associated with "white-winged gulls" is a decided advantage! Please write me if you're interested.

As always please write me with your concerns and comments about WSO.

John Idzikowski

President

Bald Eagles Wintering at the Petenwell Dam, Wisconsin

Petenwell Dam provides open-water habitat that attracts large numbers of wintering eagles. This important area has been monitored annually since 1958, revealing trends in the environment and the wintering eagle populations.

by David A. Ross and Donald G. Follen, Sr.

Bald Eagles (*Haliaeetus leucocephalus*) wintering in the midwestern United States have been associated with hydroelectric dams since the 1940's and 1950's (Ingram 1965, Lish and Lewis 1975, Spencer 1976, Steenhof 1978, Fisher and Hartman 1983, Swenson 1983). This association is related to increased availability of open water and prey (fish and waterfowl) at these dams (Lish and Lewis 1975, Steenhof 1978, Fitzner and Hanson 1979, Griffin *et al.* 1980, Griffin *et al.* 1982). Following the ban of DDT in 1972, there has been a subsequent nationwide increase in Bald Eagle reproductive success (Grier 1982). Recent information suggests that Bald Eagle populations are presently increasing nationwide (Gerrard 1983, Swenson 1983, Millsap 1986).

The Petenwell Dam area near Necedah in central Wisconsin is one of the more important wintering areas for eagles along the Wisconsin River. In the upper midwest, the Wisconsin River is second only to the Mississippi River in the number of wintering eagles it supports. This article provides an overview of the wintering population of Bald Eagles at the Petenwell Dam from 1958–87. We discuss annual counts of wintering birds, possible explanations for recent declines in eagle numbers, and management goals.

Study Area

The Petenwell Dam is located on the Wisconsin River just east of Necedah at the border of Adams and Juneau counties (T18N, R4E, Section 4). The dam was completed in 1950 and created the Petenwell Flowage, about 9,216 ha of surface water. Immediately downstream from Petenwell is Castle Rock Flowage (6,656 ha of surface water). Petenwell Dam is owned and operated by the Wisconsin River Power Company (WRPC). The northern end of Castle Rock Flowage has numerous backwaters, sloughs, and sandbars, providing additional feeding areas for Bald Eagles. Large cotton-

woods (*Populus deltoides*), river birch (*Betula nigra*), white pine (*Pinus strobus*), oak (*Quercus* spp.), and elm (*Ulmus americanus*) provide abundant perch sites along the Wisconsin River. The Petenwell Wildlife Area (PWA), managed by WRPC and located immediately southeast of the Petenwell Dam, provides about 290 ha of undisturbed wintering habitat for Bald Eagles and other wildlife. The PWA is a mosaic of small ponds, creeks, alder (*Alnus rugosa*) swamps and marshes and uplands, including oak and aspen (*Populus* spp.) woods and grasslands. Many of the ponds and creeks remain open during the winter due to seepage from the East Petenwell Dike and springs. The Petenwell Dam is located at the southern boundary of the Tension Zone, an area of transition between northern and southern plants (Curtis 1959). The riparian habitat is similar to the southern lowland forest as described by Curtis (1959:156). This area lies near the center of former glacial Lake Wisconsin and thus possesses sandy soils of relatively low productivity (Martin 1965).

Methods

Counts of wintering Bald Eagles were solicited from various sources. These persons and groups included: the Wisconsin Society for Ornithology (WSO), Frances Hamerstrom (1984:60), George Knudsen (former state naturalist), The Aldo Leopold Audubon Society, The Eagle Foundation (TEF) (formerly Eagle Valley Environmentalists), Sergej Postupalsky (raptor biologist), WRPC, and the University of Wisconsin-Stevens Point (UWSP). We also conducted eagle counts. The number of counts per year varied widely, ranging from one to 36 (mean = 5.6 counts).

These counts were conducted from the Petenwell Dam south 1.5 km to the Petenwell Rock; many counts extended south an additional 0.5 km along the Wisconsin River. Counts by D. Follen did not include backwater areas or the PWA. Only that portion immediately along the Wisconsin River was checked. Counts by TEF, UWSP, and WRPC frequently included the PWA, but not consistently. Most of the early (pre-1980) counts were conducted by WSO or D. Follen. The post-1980 counts were conducted by UWSP, WRPC, or TEF. S. Postupalsky contributed nine counts conducted during 1969 to 1983. Annual counts were conducted during January, February, March, and early April, although population analysis is based solely on January and February counts in an attempt to census wintering rather than migrating birds. No counts were available for 1959, 1960, 1984, and 1985. Daily (December–February) snow depths and maximum air temperatures (from Necedah Weather Station) were compared with the highest daily Bald Eagle counts to determine if these variables influenced those counts; only counts of ≥ 1 eagle were used. Multiple correlation was performed using SPSS (Nie *et al.* 1975).

Results and Discussion

Fluctuations in Numbers.—Peak counts fluctuated widely among years (Figure 1), and most of these year-to-year fluctuations were probably related to vagaries of weather or food availability (Grier 1977, Newton 1979). Large fluctuations in eagle populations have also been observed at other wintering areas (Steenhof 1978, Griffin *et al.* 1982). Maximum daily snow depths and maximum daily air temperatures were only weakly cor-

related to numbers of eagles ($R = 0.57$; $F = 21.02$; n = 96). Counts by UWSP and WRPC revealed that during period of snowfall, strong winds (> 15 kph) and cold temperatures (usually < −9°C), small numbers (< 8 eagles) were observed at the dam. Perhaps during periods of prolonged harsh weather, eagles on the Wisconsin River migrate either further south along the river or to the Mississippi River to locate open water and milder weather conditions.

Although the number of counts per year varied considerably (Figure 1), and daily variations in counts can be great (Table 1), there is a conspicuous declining trend in the wintering population. Numerous counts (n = 53) during later years (post–1980) failed to locate more than 11 eagles, whereas over 20 birds were typical of most counts in the 1960's and 70's (Figure 1). Counts conducted by UWSP (1982–1984) and WRPC (1985–1987), east of the Wisconsin River, within the PWA never revealed more than 5 eagles.

Fluctuations in water levels and water surface-areas may be related to changes in eagle numbers on the flowage. Fisher and Hartman (1983) found that fluctuating water levels negatively impacted wintering eagles in Kansas and Nebraska. They found that when drops in water level caused decreasing water surface-area, eagle numbers declined. The reservoirs they studied were large (often > 1,600 ha) and shallow, and changes in water surface-area were often great (up to 400 ha or 25% of the area). Could the Petenwell Bald Eagle wintering population be affected by fluctuating water levels? Water levels at Petenwell and

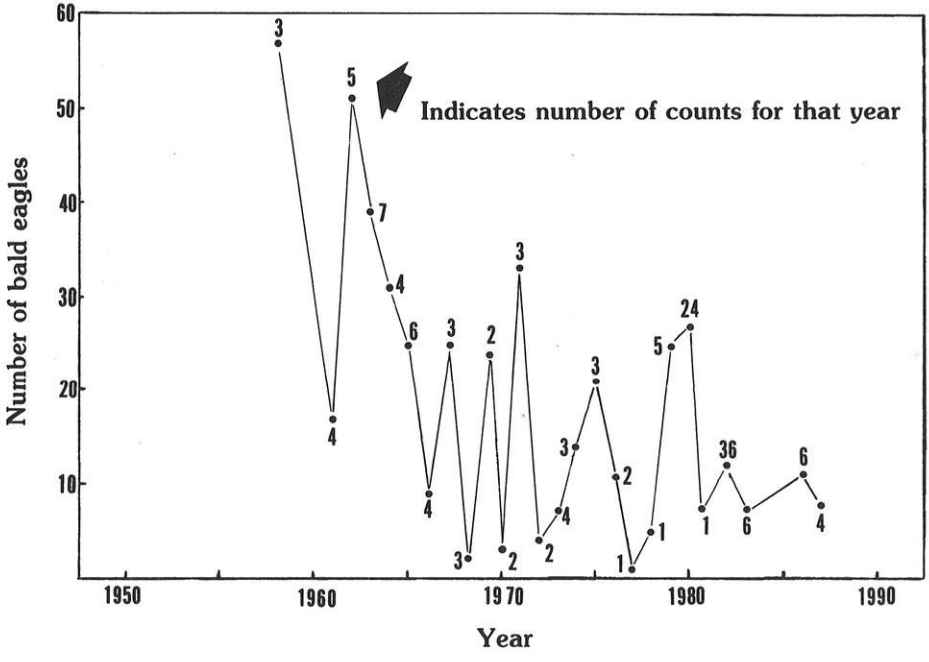


Figure 1. Highest number of Bald Eagles counted on a single day each winter from 1958–87 at Petenwell Dam.

Table 1. Daily fluctuations in the number of Bald Eagles at the Petenwell Dam, 4 January–5 April 1982.

Date	No. of adults	No. of immatures	Total numbers
1/4/82	9	2	11
1/18/82	10	1	11
1/19/82	9	1	10
1/20/82	8	1	9
1/30/82	3	2	5
2/2/82	2	0	2
2/3/82	8	2	10
2/4/82	3	2	5
2/5/82	2	1	3
2/7/82	3	2	5
2/9/82	5	1	6
2/10/82	9	2	11
2/11/82	7	4	11
2/14/82	4	1	5
2/19/82	3	2	5
2/23/82	1	0	1
2/24/82	4	1	5
2/27/82	1	1	2
3/5/82	2	2	4
3/13/82	2	1	3
3/19/82	2	2	4
3/26/82	2	1	3
4/5/82	0	0	0

Castle Rock flowages are regulated and fluctuate a maximum of 0.5 m during hydroelectric operations from 15 June to 31 December. From 1 January to 1 May, water levels may drop no more than 1.2 m. These operating regimes are mandated by the Federal Energy Regulatory Commission (FERC). These fluctuations in water level have little impact on water surface-area of the flowage and, hence, are not likely to affect wintering eagles. In addition, these operating regimes have not changed dramatically over the years.

Human disturbance patterns (mostly fishermen and Bald Eagle observers) may be affecting the wintering eagle population at Petenwell. Human recreation along the Wisconsin River in Adams and Juneau counties has increased since 1970, and this increase is expected to continue (Wisconsin Department of Natural Resources 1972, 1985). Human disturbance is known to have adverse effects on wintering Bald Eagles (Stalmaster and Newman 1978), but public use of the Petenwell area during winter appears minimal. Steenhof (1978) provides guidelines to reduce the chances of human disturbance to wintering eagles.

Wintering eagles may be affected by changes in the fish productivity in the flowage. New impoundments are known to hold high populations of fish following their construction (Ellis 1941, Baxter 1977), and this food source can support populations higher on the food chain (e.g., Bald Eagles). The productivity of fish populations within impoundments usually declines after a few years (Baxter 1977). The Petenwell Flowage is now a relatively "old" impoundment (37 years), and its productivity has probably declined.

Eagles were most abundant at Petenwell from November to March, similar to findings in other studies (Ingram 1965, Griffin *et al.* 1982, Fisher and Hartman 1983). During spring breakup in April, eagles concentrate on ice floes, presumably feeding on fish. Both immatures and adults were observed infrequently from May through October in recent years. The last probable nesting of Bald Eagles in the Petenwell vicinity during the 1950's and 1960's within an area that is now the PWA (C. Sindelar, pers. comm.). The nearest occupied nesting territories, on Meadow Valley flowage in Juneau County and Ten Mile Creek in Wood County, are both about 19 km from the Petenwell Dam (Anonymous 1965; Besadny 1955; C. Sindelar, pers. comm.). Little information is available on how far eagles will range from their nest site (S. Postupalsky, pers. comm.) so we cannot conclude

that these birds are nonbreeders. In any event, major changes in the number of eagles breeding near the flowage do not seem to account for declines in winter counts.

Feeding Ecology.—Bald Eagles wintering at Petenwell appear to be feeding primarily on fish below the dam. Other studies have shown that wintering eagles feed mainly on fish (Southern 1963, 1964; Lish and Lewis 1975), except in areas with high waterfowl concentrations, where waterfowl become a primary food source (Wright 1953, Swisher 1964, Griffin *et al.* 1982). Fish species in the vicinity of the Petenwell tailwaters are, in descending order of abundance: carp (*Cyprinus carpio*), walleye (*Stizostedion vitreum*), and crappie (*Pomoxis* spp.) (DNR records). Carp and crappie are known to be components in eagle diet (Griffin *et al.* 1982), and Ospreys (*Pandion haliaetus*) in the Petenwell area also feed on these species (D. Ross, pers. observ.). Gizzard shad (*Dorosoma cepedianum*) are a major component of the diet of Bald Eagles in the Mississippi River (S. Postupalsky, pers. comm.), and their abundance may partially explain the higher number of eagles observed there (Southern 1966). In the Wisconsin River, gizzard shad are only found south of the Portage area (Becker 1983:273). Eagles at Petenwell were observed feeding on squirrel, cottontail rabbit (*Sylvilagus floridanus*), deer (*Odocoileus virginianus*), and livestock carcasses. This behavior was observed primarily during the coldest weather when ice covered much of the surrounding water. Several eagles often fed on one deer carcass simultaneously. Eagles frequently displaced American Crows (*Corvus brachyrhynchos*) that were feeding on the carcasses. Adams County is heavily hunted during gun deer season and probably provides many hunter-killed carcasses. Eagles also fed on Mallards (*Anas platyrhynchos*) and Canada Geese (*Branta canadensis*). Attacks on Common Mergansers (*Mergus merganser*), a common wintering species at Petenwell, were noted, but none were successful.

Feeding activity generally coincided with hydrogenerator start-up (0700 hours). Eagles either perched in riparian trees or circled above the Petenwell tailwaters. Feeding activity generally decreased during the day but began to increase again around 1500 to 1700 hours. Strong winds often caused feeding activity to decrease. Steenhof *et al.* (1980) noted similar behavior in South Dakota.

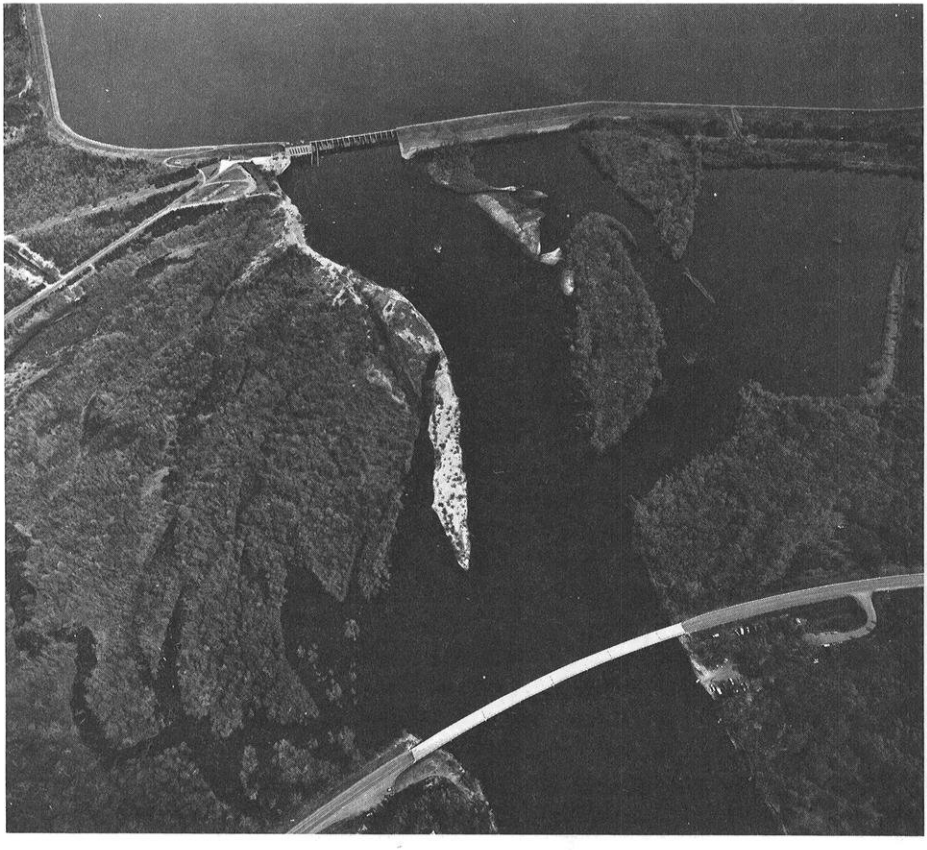
Perch sites during feeding periods were usually cottonwoods, white pines, or dead trees (probably cottonwoods). Stalmaster and Newman (1979) and Steenhof *et al.* (1980) found similar perch sites characteristics. Often these sites at Petenwell were within 200 m of State Highway 21. During periods of strong west winds, eagles obtained shelter by roosting in large white pines on the leeward side of Petenwell Rock, which is on the west side of the Wisconsin River immediately south of State Highway 21. Night roosts were located in stands of large cottonwoods that were protected from human disturbance and from westerly winds. This is similar to roost characteristics reported by Steenhof (1978).

Conclusions

We believe that the primary factors influencing the eagle population at Petenwell are food availability and flowage productivity. Food shortages have been shown to be a major factor in determining how far eagles will migrate south

for overwintering (Brown and Amadon 1968, Griffin *et al.* 1982). The importance of fish in the diet of eagles is well-known and studies (Wright 1953, Steenhof 1978, Griffin *et al.* 1982) have shown that eagles will change their diet according to that available. During periods of extreme cold (< −12°C), eagles concentrate at the dam when many surrounding waterways are frozen. This behavior often occurred during blizzard periods when eagles remain near their night roost (Griffin *et al.* 1982). Human disturbances near the dam infrequently occurs as both bank and boat fishermen use the Wisconsin River during the winter except for the coldest periods. Eagle observers frequently use the riverbank and the Highway 21 bridge area. This activity usually flushes eagles nearby.

Weather patterns and observer effort have been variable during the study period and have undoubtedly influenced accuracy of eagle counts. The greater number of post–1980 counts revealing low eagle numbers suggests that an adequate number of counts were conducted to detect changes in population numbers (Figure 1). Water levels since the completion of the dam have been maintained with minimal fluctuations, according to FERC regulations, and thus



Petenwell Dam, Wisconsin (*photo: Wisconsin River Power Co.*)

probably have had little influence on the eagle population. Open water is always present below the dam; therefore, it is assumed that fish are available throughout the winter.

Management Implications

WRPC has developed a land classification system for its properties surrounding Castle Rock and Petenwell flowages. This includes such designations as managed open space and protected open space. Using this system and related land management policies, WRPC plans to provide for wintering Bald Eagles and their habitat at the Petenwell Dam. Some of WRPC's Bald Eagle management goals include:

1. Retaining large (> 30 cm DBH) riverbank trees, snags, and mature white pine.
2. Protecting roost sites from disturbance.
3. Banning logging along the river from October to March.
4. Erecting an observation platform to facilitate and control public visits (future).
5. Excluding hunting from eagle wintering areas. 6. Providing interpretive displays and informational signs for public education (future).
7. Restricting vehicular access to WRPC lands, except on designated trails and only during the period 1 May–1 October.

The Petenwell Dam is an important wintering area for the Bald Eagle in Wisconsin. Due to the statewide importance of this wintering site and the value of the Bald Eagle to the public, we recommend that this site be protected from excessive disturbance and that public education efforts at this site be increased. Because of concern over the status of Bald Eagle populations, we further recommend that systematic censuses be conducted annually during the period December–February to monitor the status of this population and identify factors influencing populations trends.

Acknowledgments

We thank S. Postupalsky for editing and providing data for this paper, and C. Carroll for statistical analysis. We thank D. Gawlik and K. Kozie for comments on drafts of this papers. We thank S. Temple and an anonymous reviewer for editing the final draft.

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Nesting Gulls and Terns of Winnebago Pool and Rush Lake, Wisconsin

These lakes contain important nesting populations of five species of gulls and terns. We recommend ways to ensure that these populations are preserved.

by Michael J. Mossman, Arthur F. Techlow III, Thomas J. Ziebell, Sumner W. Matteson, and Kathleen J. Fruth

Winnebago and northern Fond du Lac Counties contain Wisconsin's largest nesting population of Forster's Terns (*Sterna forsteri*) and a smaller population of Common Terns (*S. hirundo*)—both considered endangered in the state—as well as nesting Black Terns (*Chlidonias niger*)—a Wisconsin "special concern" species. The area also contains the largest inland population of Herring Gulls (*Larus argentatus*) and the only known inland colony of Ring-billed Gulls (*L. delawarensis*) in the state. The latter species is a common nest-site competitor with Common Terns in Wisconsin. Winnebago County has also been the site of intensive nest-site management for Forster's Terns since 1977 (Techlow, in press). This paper summarizes our surveys of these nesting populations primarily from 1984 through 1987, and compares our results with earlier records. Details of individual years' work were reported by Mossman *et al.* (1984), Techlow and Mossman (1985), and Ziebell and Mossman (1988). Information on recent and historic populations of Common and Forster's Terns was summarized by Matteson (1988) and Mossman (1988).

Study Area

The Winnebago Pool covers about 640 km^2 in Winnebago, Waushara, and Fond du Lac counties, and includes 4 lakes: Winnebago, Butte des Morts, Winneconne, and Poygan. The latter 3 lakes (Figure 1) are referred to as the upriver lakes. A vast majority of the Winnebago Pool consists of open water. Although most of the former beds of emergent and submergent vegetation have gradually disappeared since the construction of dams at the outlet of Lake Winnebago, several marshes still occur along the shores of the upriver lakes, and a few isolated islands of phragmites (*Phragmites australis*) persist in shallow sites of open water areas. All 4 lakes contain riprap islands, varying in size from about 1–4,000 m^2, most of which con-

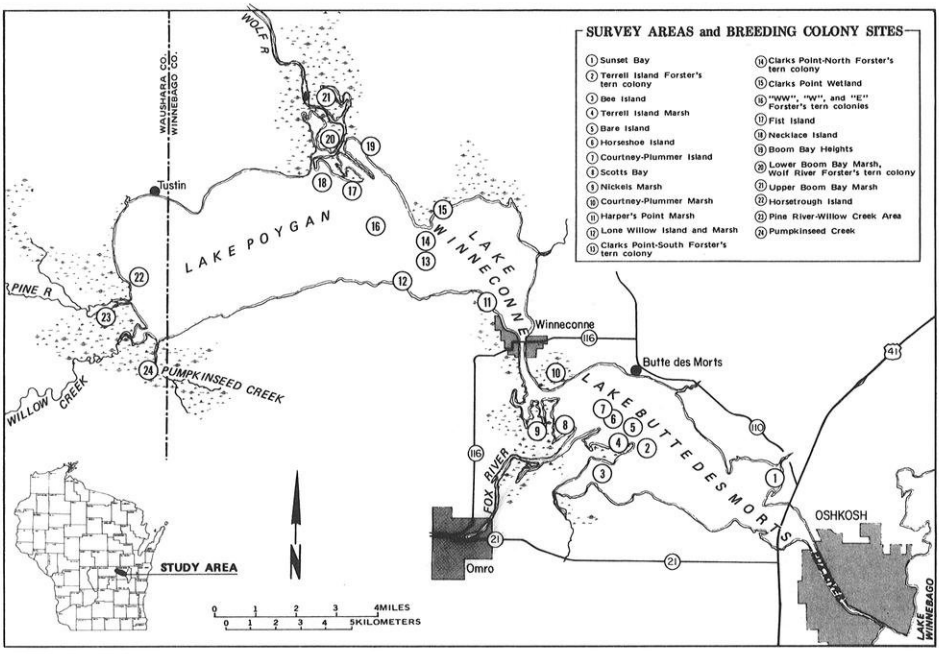

Figure 1. Lake Poygan-Winneconne-Butte des Morts study area.

tain at least one duck hunting blind. This study area is further described by Mossman *et al.* (1984).

Rush Lake is a shallow 12-km^2 lake in southwest Winnebago County and northwest Fond du Lac County. A "prairie pothole" lake with scattered beds of hardstem bulrush (*Scirpus acutus*) and cattail (*Typha* sp.), the lake has lost much of its emergent vegetation since construction of a dam at its outlet in 1953. By mid-summer the lake becomes choked with dense beds of submergents, mostly the alga *Chara*. In 1987 water levels were low due to drought and to maintaining the dam at its lowest feasible level.

Methods and Materials

Each year in late April we installed between 78 and 220 artificial, floating nest-platforms (60×64cm) for Forster's Terns (Figure 2) in phragmites beds in lakes Poygan ("W", "WW", "E" sites) and Winneconne ("CP" sites). At Rush Lake we installed 18–44 platforms in various bulrush stands in April, May or June. We generally visited the colonies every 5–10 days during May and June,

Figure 2. Artificial, floating nest-platforms for Forster's Terns.

then approximately biweekly until early August. We retrieved all nest platforms in the fall.

We conducted an aerial survey of the entire study area on 10 May 1984. We visited all potential nest sites looking for Forster's Tern, Common Tern and both gull species in the upriver lakes and Rush Lake during May and June of 1984, 1985, and 1986. This included all marshes, riprap islands, duck blinds, and breakwaters, including the Wolf River upstream from Lake Poygan, as far as the mouth of the Rat River. After extensive surveys in 1983–84, monitoring of Lake Winnebago was limited to the 2 riprap islands (Fraction and Willow Tree) of the "Friendship" site on the north edge of Fond du Lac County. Aerial and ground surveys in 1983–84 revealed only one other larid nest site on Lake Winnebago—a Herring Gull colony on Blackbird Island, north of Oshkosh. This site was monitored in 1984 and 1986. In 1987 we monitored colony sites of Forster's and Common Terns only. The most thorough survey for Black Terns occurred in the Winnebago Pool in 1984, when we visited at least 90% of all potential breeding sites. Although we visited Rush Lake several times each breeding season, most data on Black Terns came from Ziebell's annual daylong survey in mid June, during which he followed a fairly standard route by unmotorized skiff. We also conducted some earlier surveys and management in the study area during 1980–83.

In 1985 we spent 14 person-hours in blinds observing Forster's Tern behavior and platform use in the "WW" and "CP" platform colonies. Paul Kivlin (pers. comm.) spent several days in a blind at the Poygan "W" Forster's Tern subcolony, photographing and noting behavior of nesting birds.

Results

Ring-billed Gull.—The only nesting colony of Ring-billed Gulls was on Courtney-Plummer (Benedict's) Island on Lake Butte des Morts (Figure 3). This tightly packed colony contained 327 nesting pairs in 1984, 133 pairs in 1985, and 584 pairs in 1986. In 1986 we found 14 adults that had apparently been preyed upon by Great Horned Owl (*Bubo virginianus*).

Herring Gull.—The number of pairs nesting on the upriver lakes varied from 85 to 106 during the period 1984–86 (Table 1). Most nests were on the ground on riprap islands, which were as small as 1×3 m, and most of which contained at least 1 duck blind. A few nests occurred on other substrates. For example, of the 94 nests found in 1984, 78 were on island riprap, 10 were on or in duck blinds made of stone, 2 were on hay bales used for duck blinds, and 1 nest each was on the following substrates: muskrat lodge, islet of mud and emergent vegetation, riprap breakwater connected to the mainland; and atop the roots of a blown-over willow tree, 2 m above water.

Figure 3. Ring-billed Gull colony on Courtney-Plummer Island.

Table 1. Herring Gull nests on Lakes Poygan, Winneconne, and Butte des Morts, Wisconsin.

Site	Island dimensions (m)	Number of nests		
		1984	1985	1986
Lake Butte des Morts				
Bee Island	4×8	1	1	4
Unnamed Island	4×9	0	1	1
Exposed Riprap	1×3	0	1	0
Bare Island	14×20	1	0	1
Courtney-Plummer Is.	20×200	33	25	37
Horseshoe Island	20×30	7	7	10
Unnamed Island	2×3	1	0	1
Unnamed Island	1×9	0	1	1
Muskrat House	2×2	1	0	0
Unnamed Island	16×18	1	0	0
Lake Winneconne				
Unnamed Island	2×4	1	1	1
Lake Poygan				
Lone Willow Island	20×150	1	0	0
Unnamed Island	3×7	2	2	2
Fist Island	25×40	8	8	9
Unnamed Island	3×6	1	2	2
Unnamed Island	4×4	1	1	1
Necklace Island	15×20	33	33	34
Tree Tip-up	—	1	1	1
Horsetrough Island	9×16	1	1	0
Riprap Barrier	—	1	0	1
Total		95	85	106

Blackbird Island is a 7×20 m riprapped site on Lake Winnebago. It had an active herring gull colony in 1983, 1984, and 1986, which were the only years we visited it. We counted 24 nests in 1983 and 34 nests in 1986. A colony also occurred throughout the survey period on Lake Winnebago's Fraction Island, a 8×100 m riprap island managed for duck hunting. We found at least 18 nests, and 50 chicks and fledglings here in 1986. This colony had been active for many years (Robert Abraham, pers. comm.). Approximately 700 m from this site is Willow Tree Island, which held 1–2 Herring Gull nests each year, as well as a Common Tern colony.

Although Herring Gulls nested on Rush Lake, mainly on duck blinds, until about 1981 (pers. obs. and McAsey 1979), none nested during our survey period.

Common Tern.—Between 1948 and the early 1960's, Common Terns nested in at least 4 sites in the Winnebago Pool (Jack Kaspar, in litt.; Robbins 1949). Kaspar recorded an active colony at Fraction Island and possibly at adjacent Willow Tree Island in 1948 (at least 59 nests), 1949, and again in the early 1960's (up to 100 pairs). He found 40 pairs nesting on Blackbird Island in Lake Winnebago in 1948. In the early 1960's he found 20–25 pairs nesting at either Courtney-Plummer Island or Bare (White's) Island, and at least 20 pairs nesting on a rocky island on the south shore of Lake Winneconne. The latter site decreased in size during the ensuing 20 years—in 1984 it was only 2×4 m in size, and contained a single Herring Gull nest.

After the early 1960's, Common Tern

colonies were not reported again from the Winnebago Pool until our survey, although local residents told us that the Willow Tree or Fraction Island colony had been active for many years. During the period 1984–87, Common Terns nested at only 2 sites (Table 2), while the former colony sites at Blackbird Island, Lake Winneconne, and Fraction Island contained only Herring Gull nests.

In 1983 we discovered a colony containing 28 Common Tern nests on Willow Tree Island, which is 8×60 m in size, located approximately 700 m from Fraction Island. Because the colony was threatened by the rank growth of shrubs and forbs, we applied herbicide to a segment of the island in April 1984. Although the tern population increased to 34 pairs that year, it declined thereafter (Table 2) for unknown reasons. Each year, there appeared to be considerable renesting after unsuccessful early attempts. Although we did not visit the site frequently enough to measure productivity, it appeared that an average of less than 0.5 young were fledged per pair each year. This colony continues to be threatened by the growth of dense vegetation. Nests at this colony have been built on the ground, on the riprap perimeter, atop hay bales, and atop the tin roof of a duck blind.

Common Terns began nesting in 1985 on Bare Island, 14×20 m in size. This island had been cleared and refurbished with gravel since the previous breeding season. Although there were unsuccessful early nesting attempts, apparently followed by renesting, production here appeared to be higher than at Willow Tree Island. At least 10 young fledged in 1986. The island is managed for duck hunting and is threatened by further development of hunting blinds and vegetation.

Forster's Tern at Winnebago Pool.— Forster's Terns evidently nested in the upriver lakes of the Winnebago Pool for many years prior to the Wisconsin Department of Natural Resources' (WDNR) discovery in 1977 of an unsuccessful colony of 20–25 pairs at Sunset Bay in Lake Butte des Morts. Since 1977, the number of pairs nesting in the upriver lakes has grown considerably as a result of WDNR's artificial nest-platform program (Techlow, in press). A total of over 200 pairs has nested each year, 1982–87, among several sites in the area, mostly on artificial nest-platforms (Mossman 1988) (Tables 3, 4).

In our study, many nests were on natural substrates (Table 4), and most of these were unsuccessful. The 1984 Scotts Bay colony was on an island dominated by burreed (*Sparganium* sp.) 150 m from shore. It was abandoned due to unknown causes. We suspected mammalian predation as the cause of abandonment here in 1983. The Wolf River colony was on an island dominated by cattail within 50 m of the mainland,

Table 2. Common Tern breeding population at Winnebago Pool, Wisconsin.

	Number of nesting pairs			
Site	1984	1985	1986	1987
Bare Is., Lake Butte des Morts	0	5	11	13
Willow Tree Is., Lake Winnebago	34	5	10	7
Total	34	10	21	20

Table 3. Forster's Tern nesting population at Winnebago Pool and Rush Lake, Wisconsin, 1984–87.

Site	Number of nesting pairs			
	1984	1985	1986	1987
Winnebago Pool	312	260	214	439
Rush Lake	1	43	47	18
Total	313	303	261	457

near the inlet to Lake Poygan. It was abandoned after suffering severe predation probably by mink (*Mustela vison*).

The Lake Poygan colony sites were among stands of phragmites isolated from shore by 1 km of open water. No natural nest-substrate was available at these sites in 1984 or 1986. In 1985, nests occurred on the mudbar at site "W", on windrowed, residual stems of phragmites beside the mudbar, and on floating phragmites stems at site "WW". Carp spawning activity, wind, and waves destroyed the "WW" subcolony before any young fledged. Wave action also destroyed many nests on the mudbar, where apparently very few young fledged. Many young apparently fledged from the "W" phragmites mat. In 1987, windrowed phragmites stems supported 178 nests at the Poygan sites. Many of these nests were unsuccessful due to the eventual breakup of the phragmites mats.

At Clarks Point, natural nest-substrate was available only in 1987, when 52 pairs of Forster's Terns nested on mats of phragmites stems. This site is approximately 600 m from shore, and was aban-

Table 4. Information on Forster's Terns nesting at Winnebago Pool and Rush Lake, Wisconsin, 1984–87.

Site	Year	Substrate[1]	Number of pairs	Mean clutch size (n)
Poygan: E,W,WW	1984	103 platforms	103	3.2 (101)
	1985	110 platforms	111	3.1 (109)
		natural	59	2.0 (59)
	1986	148 platforms	149	3.1 (146)
	1987	78 platforms	78	—
		natural	203	—
Winneconne: Clarks Point	1984	97 platforms	96	3.0 (96)
	1985	90 platforms	90	3.0 (90)
	1986	65 platforms	65	2.8 (61)
	1987	108 platforms	106	—
		natural	52	—
Butte des Morts: Scotts Bay	1984	natural	70	2.0 (22)
Terrell Is.	1984	20 platforms	20	—
		natural	2	—
Wolf River	1984	natural	21	2.8 (21)
Rush Lake	1984	18 platforms	1	—
	1985	844 platforms	41	3.2 (41)
		natural	2	2.0 (2)
	1986	43 platforms	41	2.8 (41)
		natural	6	1.8 (9)
	1987	35 platforms	14	—
		natural	4	—

[1]Number of platforms installed at site or natural substrates.

doned evidently as a result of disturbance by Great Horned Owl. A muskrat (*Ondatra zibethicus*) lodge held 2 nests at Terrell Island in 1984 and another held 1 nest at Lake Poygan site "E" in 1987.

In the upriver lakes, all 3 nest-platform colonies (Poygan, Clarks Point, Terrell Island) were in stands of phragmites located 0.5–1 km from shore. Except for the Clarks Point colony that was largely abandoned in 1987, evidently as a result of owl predation, all platform colonies in the upriver lakes were successful. On the average, nests on artificial nest-platforms had larger clutches (Table 4), were initiated earlier, and were more successful than nests on natural substrates.

We did not attempt to estimate production at most colonies, because of the wide span of fledging dates, the ability of chicks and young fledglings to hide from intruders among emergent vegetation within the colony site, and rapid dispersal of fledglings. However, from a distance and from blinds we often noted young birds of approximate fledging age standing on nest platforms—usually 2 young per platform—and we feel that overall production from platform nests was very good, probably averaging at least 1 fledgling per nest. In 1984 we made a thorough search of the southern portion of the Clarks Point colony at the time when most young were fledging, and we found 17 fledglings from 11 platform nests, an average of 1.5 young per nest. In 1983, Harris *et al.* (1985) also documented that 17 young fledged from 11 closely monitored platform nests on Lake Poygan.

During each year of our study, some platforms were used for nesting more than once during the season, and it is possible that broods were fledged by 2 successive pairs on some of these. On at least 2 occasions a single platform contained 2 simultaneously active Forster's Tern nests.

Our observations from blinds showed that chicks older than about 1 week readily swam from nest platforms at the approach of humans, and hid in emergent vegetation. We watched this on 8 occasions, and in all cases after the intruder left or entered the blind, the chicks returned to the floating platforms, climbing up the hardware cloth strips attached to the platforms for this purpose. Younger chicks stayed on the platforms as intruders arrived, but often hid under hardboard chick shelters if the platform included these shelters. Forster's Tern behavior at platform and natural nest sites is further discussed by Techlow (in press).

Forster's Terns undoubtedly nested at one time among the extensive marshes that formerly bordered Lake Winnebago. However, all Forster's Tern nesting habitat has disappeared over the past century, and we found no nesting activity on Lake Winnebago. We did observe nonbreeding birds in adult and immature plumage during the 1984–87 breeding seasons, most noticeably at the Miller's Bay settling basin in Oshkosh.

Forster's Tern at Rush Lake.—Forster's Terns probably bred at Rush Lake for many years prior to the first definite nest records obtained in 1971 by David Strohmeyer (in litt.) and E. B. Prins (North American Nest Records Program). From 1 to 40 nests were found by various observers each year during the period 1971–83 (Mossman 1988). Emergent vegetation has steadily disappeared from this lake over the past 30 years, due to artificially high water levels maintained by a small dam at the lake's outlet. Consequently, Forster's Terns

have nested increasingly on tenuous substrates such as mats of *Chara* and small mats of bulrush rhizomes, which are vulnerable to the action of wind, waves, and rising water.

The decline of nesting habitat prompted us to install 6 artificial nest-platforms in 1982, which were immediately usurped by Black Terns. We installed 18–44 platforms each year during 1984–87 (Table 4), and although they received good use by Forster's and Black Terns, very few Forster's Tern young were produced from nests on either platforms or natural substrates.

In 1984, the single active nest on a platform was apparently washed out by severe wave action. In 1985 one subcolony of 21 platform nests was abandoned as a result of Great Horned Owl predation. A second subcolony on bulrush rhizome mats and artificial nest-platforms was abandoned for unknown reasons. No young were fledged anywhere on the lake. The 1986 colony comprised nests on rhizome mats and nest-platforms: all but 2 nests were abandoned, and only 3 young fledged.

In 1987, a dry spring and a lowered level of the outlet dam combined to produce shallow water and relatively abundant natural nest substrate in the form of exposed mats of *Chara*. Three of 4 nests found on these mats were eventually washed out. Production was not estimated for Rush Lake in 1987.

Black Tern.—In 1984 we surveyed approximately 90% of the potential Black Tern nesting habitat on the Winnebago Pool, and found a total of 145 pairs nesting in 9 colonies (Table 5). Mean clutch size was 2.56 (n = 44). In 1986 we located a colony of 14 pairs at a new site on Lake Butte des Morts. Black Terns avoided the thick cattail stands that dominated most of the remnant marshes of the Winnebago Pool. Instead, they nested in marshes with a mixture of emergent vegetation, mud flats, and shallow, open water. Burreed was characteristic of nearly all colony sites.

Table 5. Black Terns encountered on annual 1-day survey of Rush Lake, Wisconsin.

Year	Number of adults	Number of nests
1980	200	40
1981	256	57
1982	246	63
1983	60	6
1984	22	6
1985	63	10
1986	28	6
1987	142	32

We found no Black Terns nesting on Lake Winnebago, even in Supple Marsh, which we surveyed in 1983. This site is on the outskirts of the city of Fond du Lac, and was frequented during the early 1900's by Owen Gromme. His field notes, now at the Milwaukee Public Museum, document the Black Tern colonies that occurred in this wetland before it was degraded and partially filled. In June 1930, for example, he visited a Black Tern colony in which the calls of adult birds were "deafening."

Rush Lake has been known as a major Black Tern breeding site since at least 1901 (D. H. Hillman, Milwaukee Public Museum records), and we found nests each year during 1980–87. Of 173 nests recorded during this period, 127 were on rhizomes of hardstem bulrush or (less commonly) cattail, 15 were on Forster's Tern nest-platforms, 15 were on mats of residual bulrush or cattail stems, 13 were on floating boards, 5 were on mats of *Chara*, and 3 were built on inactive nest structures of Red-necked or Pied-billed Grebes (*Podiceps grisegana*, *Podylimbus*

podiceps). Results of our annual 1-day survey of Rush Lake (Table 5) serve as an index to the size of the breeding population, and show the species' general decline during 1980–86, and its positive response to low water levels in 1987.

Discussion

Forster's Tern colonies on artificial nest-platforms in the upriver lakes have been consistently successful since 1979 (Techlow, in press). During 1984–87 these colonies represented 12–53% of the statewide nesting population, and may have been the only colonies consistently producing enough young to maintain a stable population (Mossman 1988). More young could certainly be produced if the platform program were expanded on these lakes. Platforms must be placed in shallow water where beds of emergent vegetation such as phragmites mitigate wind and wave action. To avoid predation, these sites should be isolated by large expanses of open water. Predation frequently caused abandonment of colonies that were less than 200 m from shore, whereas it was a serious problem only 1 of 4 years at the Clarks Point and Terrell Island colonies, which are approximately 400–500 m from shore, and it has never been recorded at the Lake Poygan colony, which is 1 km from land.

The relatively low, summer water-levels on the upriver lakes in 1985 and 1987 further improved Forster's Tern nesting habitat by providing exposed and shallow mudbars in these isolated phragmites beds on which additional terns could nest. These natural sites sometimes suffer from wind and wave action, but they are generally safer than similar natural sites near shore where Forster's Tern colonies in recent years have suffered rampant predation. The WDNR is currently investigating potential management alternatives—such as reduced water levels and the construction of breakwaters—to reverse the decline of aquatic habitats in the Winnebago Pool. This could have positive effects on the Forster's Tern population by maintaining or creating isolated nesting habitat and possibly improving food sources. It might also reverse the decline in habitat for the substantial population of Black Terns that nests here. We encourage it.

Our observations from blinds documented the utility and the necessity of chick ramps on nest platforms. However, a more durable and manageable material should be substituted for hardware cloth in the future. The chick shelters, although apparently not necessary, also appeared useful to young chicks and should be retained in the platform design.

Although our installation of artificial platforms at Rush Lake attracted the largest numbers of nesting Forster's Terns at the site since at least 1978, success was low. The susceptibility of species such as Forster's Terns and state-threatened Red-necked Grebes (Eichhorst 1985) to predation on this lake may be related to the continuing disappearance of emergent vegetation which reduces the number of nesting birds and increases exposure of those that remain. Almost no potential natural nesting sites remain for Forster's Terns on this lake. Several other species, including Herring Gull (McAsey 1979), Black-crowned Night-heron (*Nycticorax nycticorax*) (Ziebell 1985), and Black Tern have declined or disappeared with the deterioration of habitat. A management project is urgently needed to return the lake to its former condition—a large "prairie" wetland with an interspersion

of open water and extensive beds of emergents such as hardstem bulrush and cattail. Until then we recommend continued experimentation with platform group size and site of placement.

Willow Tree Island and Bare Island are 2 of only 5 recent colony sites for Common Terns in Wisconsin (Matteson 1988), and their uncertain future is cause for concern. Cooperative management programs are needed for these privately-owned sites, so that Common Terns are not eliminated by shrub and weed growth, unwitting management for duck hunting, and nest-site competition from Ring-billed Gulls and Herring Gulls. A large colony of the former occurs within 700 m of Bare Island, and a large colony of the latter exists on Fraction Island, about 700 m from Willow Tree Island. The potential for nest-site management was indicated by the positive response by Common Terns to herbicide treatment of Willow Tree Island in 1984, and to the spreading of gravel on Bare Island in 1985. In both cases, management was compatible with duck hunting.

Conclusions

The Forster's Tern nest platform program continues to be a successful and important one in the upriver lakes and could be expanded; however, nest-site and feeding habitat may be limiting. The future of both Forster's and Black Terns at Rush Lake appears grim, even with the use of artificial nest platforms, unless habitat is improved. The rediscovery of small colonies of Common Terns on Lakes Winnebago and Butte des Morts is encouraging, but management of both sites will be required to maintain or expand these populations. The discovery of the state's only inland colony of Ring-billed Gulls apprises managers of the possibility of nest-site competition with Common Terns. Herring Gull populations appear relatively stable in the upriver lakes but may have increased since 1960, while the Rush Lake population declined. Further surveys are needed to monitor long-term population trends for nesting gulls and terns in East Central Wisconsin.

We recommend: an expansion of the Forster's Tern nesting platform program in the upriver lakes; continued experimentation with platforms at Rush Lake; annual monitoring of gull and tern nests on all islands in the Winnebago Pool, and of former and potential Forster's Tern colony sites in the Winnebago Pool and Rush Lake; less intensive monitoring of Black Terns in the Winnebago Pool and Rush Lake; development of management programs for Bare and Willow Tree Island, between WDNR and private landowners; completion of the comprehensive and multidisciplinary study by WDNR's Bureau of Research regarding management alternatives for the Winnebago Pool, which considers the needs of Forster's Terns and other endangered, threatened, and nongame species; and the initiation of a management program between WDNR, landowners and local units of government to return Rush Lake to a "prairie" marsh more suitable for successful nesting by Forster's terns and other bird species.

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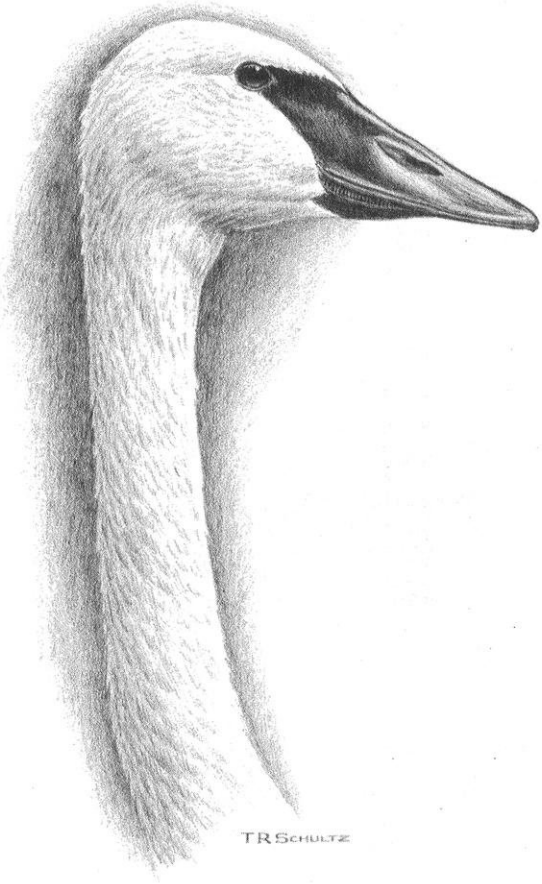

Trumpeter Swan *by Thomas R. Schultz*

Wisconsin Trumpeter Swan Recovery Plan

The Wisconsin Trumpeter Swan Recovery Plan outlines the activities that are needed to restore the extirpated Trumpeter Swan as a self-sustaining, breeding, and migratory bird in the state, with a minimum nesting population of 20 pairs.

by Sumner W. Matteson, Timothy A. Andryk, and John Wetzel

The Trumpeter Swan (*Cygnus buccinator*), first described in 1805–06 by Lewis and Clark (Coues 1903), was once a fairly common breeding bird throughout most of the northern United States and Canada (Figure 1). Lumsden (1984b) speculated that the species' former breeding range east of the Rocky Mountains included 2.6 million km^2 of suitable prairie and boreal habitat. Applying a density figure of one swan per 20 km^2 recorded in Alaska in 1968, he calculated that there may have been as many as 130,000 Trumpeter Swans east of the Rockies in the 1600s. Baird *et al.* (1884), Coues (1903), and Forbush (1912) suggest that the Trumpeter Swan was common or fairly common across the northern interior of North America, with Baird *et al.* stating that the species was common "in all the valley of the Mississippi."

Market gunning and the millinery trade almost led to the extinction of the Trumpeter Swan. Birds were hunted for their highly valued plumage and for food. Baird *et al.* (1884) compared the taste of a Trumpeter Swan to that of a steer. Citing London fur trade records, Banko and MacKay (1964) reported 108,000 swan skins sold from 1823 to 1877, with an average of 3,000 sold per year between 1823 and 1853. About 5,000 were sold in 1828 (Banko 1960). Despite the onslaught, Trumpeter Swans survived, though in very low numbers. By 1932 only 69 Trumpeter Swans were known to exist in the entire continental United States south of Canada. A nonmigratory population existed in the remote mountain valleys of Montana, Idaho, and Wyoming (Hansen 1973). Another remnant population existed in Alberta, Canada (USFWS and CWS 1984).

Concern about possible extinction led to concerted conservation efforts that included protection from hunting, intensive management of remnant populations, and transplanting of wild stock (Hansen 1973). In 1935, the U.S. government established the Red Rock Lakes National Wildlife Refuge (NWR) in southwestern Montana solely for the protection of Trumpeter Swans (Han-

sen 1973). With protection there and in the adjacent Yellowstone National Park, the Trumpeter Swan population grew until it saturated available habitat within a 100-mile radius (Hansen 1973). This led to the initiation of a transplanting program in other states utilizing swans from Red Rock Lakes Refuge. Trumpeter Swans are slow to pioneer new areas, and transplanting offered a means to reintroduce the species more quickly to its former range (Hansen 1973).

The transplant technique that has proved successful has involved translocating cygnets prior to flight in September, clipping their wings to preclude flight during winter and until the next molt, and placing the birds in semi-captivity in spring-fed enclosures where food is provided as needed. Once the birds regain flight the following summer they have become familiar with their immediate marsh environment, can explore a wider area, and slowly develop a traditional attachment to the area (Hansen 1973).

Independent of management efforts was the discovery of a separate population in Alaska in 1954 (Bergman 1985) and along the North Pacific Coast (Hansen 1973). Surveys of Alaskan Trumpeter Swans in 1968, 1975, 1980, and 1985 produced population counts of 2,847, 4,170, 7,696, and 9,459, respectively (Conant *et al.* 1986).

After the 1968 Alaska count, Trumpeter Swans were removed from a list of species considered for federal endangered status. The species' current federal status is "rare." In 1984, the North American population was reportedly estimated at about 10,000, with about 8,000 Trumpeter Swans in Alaska alone (North American Management Plan For Trumpeter Swans 1984).

The North American Management Plan For Trumpeter Swans (USFWS and CWS 1984) recognizes for management purposes 3 Trumpeter Swan populations: (1) The Pacific Coast Population—swans that breed mainly within Alaska and winter mainly in coastal British Columbia. This population also includes restoration flocks (of Red Rock Lakes NWR origin) at Turnbull, Malheur, and Ruby Lake NWRs; (2) The Rocky Mountain Population—a nonmigratory tristate (Wyoming, Montana, Idaho) subpopulation and a migratory interior Canadian subpopulation that winters in the tristate area; and (3) The Interior Population—restoration flocks east of the Rocky Mountains consisting primarily of transplants (during 1938–66) from Red Rock Lakes NWR and from the Peace River (Grande Prairie) region of Alberta (Figure 2). Restored flocks of Wisconsin Trumpeter Swans would comprise part of the Interior Population.

Trumpeter Swans in Wisconsin

Trumpeter Swans occurred as breeding birds in both Wisconsin and Minnesota until the mid-to-late nineteenth century (Schorger 1968, Hansen 1973, Henderson 1981). Hoy (1852) reported the Trumpeter Swan as "frequently seen, and occasionally shot in our vicinity (Racine, Racine County)." Grundtvig (1895) commented that Trumpeter Swans were seen during migration and indicated that the species bred in northwestern Wisconsin. King (1883) reported it as a "rather rare migrant." McCollum (1884) reported the Trumpeter Swan as rare in central and eastern portions of the state apparently during 1879–84. Cantwell (1890) sighted the swans at various times on October 3, 1889, at Lake Mills in western Jefferson County. Cory (1909) described the Trumpeter Swan as oc-

Figure 1. Historical breeding range of the Trumpeter Swan.

curring "sparingly" in Wisconsin during migration. He added: "It is fast becoming a very rare bird, at least east of the Mississippi."

Schorger (1968) found no information on specific Wisconsin nest locations, but based on a thorough research of the literature believed that the species bred on or near Lakes Waubesa and Kegonsa ("the Madison lakes") different years during the period 1839–87. Parmalee (1960, 1963) reported excavated remains of Trumpeter Swans from Jefferson and Winnebago counties. Regarding the Jefferson County site, he documented the remains of 7 Trumpeter Swans located approximately 8 km northwest of Jefferson. From the Winnebago County site he noted the remains of 8 Trumpeter Swans found along the south shore of Lake Butte des Morts. Both Schorger's and Parmalee's findings support the reported former breeding of the species in Dane and Jefferson counties in the early 1840s (Kumlien and Hollister 1903).

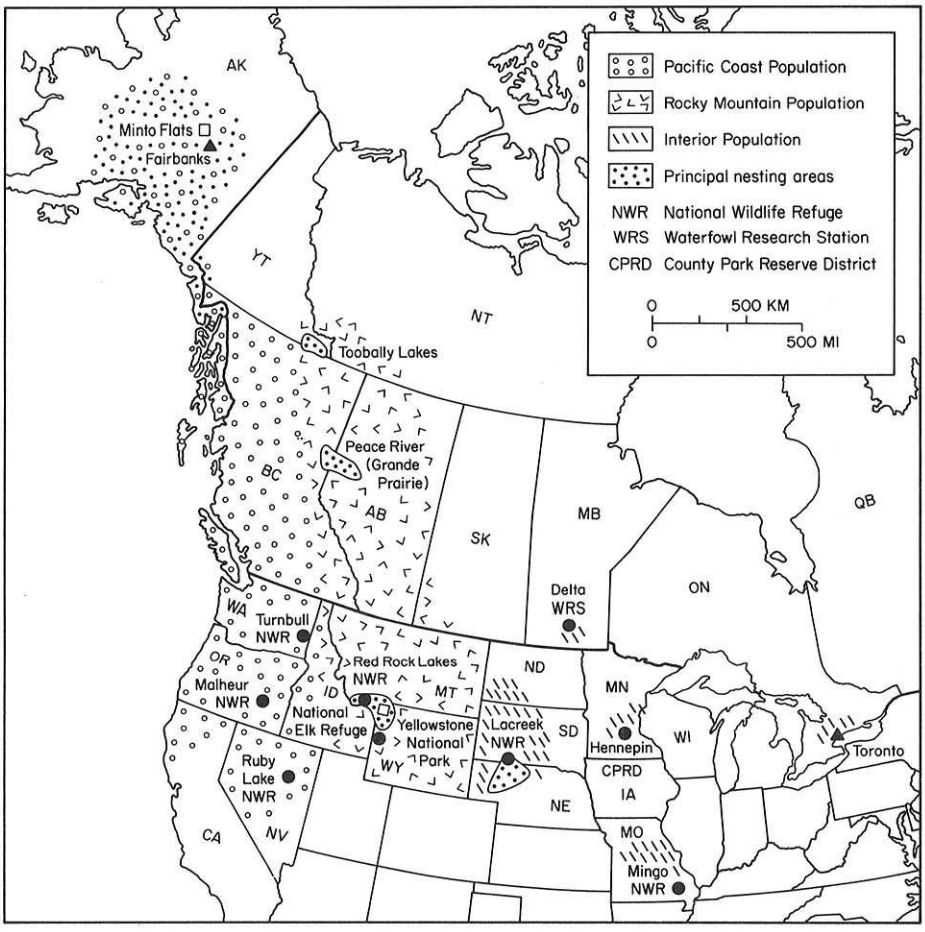

Figure 2. Management populations delineated in the North American Management Plan for Trumpeter Swans.

Kumlien and Hollister (1903) described the status of the bird as "very rare" in the state during the early part of this century. Thure Kumlien obtained a juvenile between 1842–45 in Jefferson County, procured 6 birds from a large flock on a prairie east of Stoughton in 1857, and collected an adult male at Lake Koshkonong on April 20, 1880 (Kumlien and Hollister 1903, Coale 1915). Kumlien and Hollister (1903) also reported a flock of 3 Trumpeter Swans on Lake Koshkonong on May 6, 1893, and a "large, fine male" killed by Ludwig Kumlien on the Rock River in March, 1892. They commented that the species "doubtless [occurred] more frequently along the Mississippi River than in other parts of the state."

Other Wisconsin records include: an adult male shot in Waukesha County in February 1904 (Coale 1915); a single specimen sent to the Milwaukee Public Museum by the Wisconsin Natural His-

tory Society (no date given but prior to 1915) (Coale 1915); two mounted specimens, presumably from Wisconsin, at Lawrence College, Appleton; photos of these specimens were sent to Coale (1915); and 2–3 Trumpeter Swans shot in the early 1880s near Columbus in southeastern Columbia County (vos Burgh 1939).

Until 1985, when a pair of Trumpeter Swans displaced a pair of Mute Swans on the Gordon Flowage in Douglas County (Fred Strand, pers. comm.), the only other reported sightings of Trumpeter Swans in the state occurred in October 1937, when Richter (1939) observed 4 birds at Pecor's Point, 4 miles south of the City of Oconto near Green Bay; during the winter of 1981–82 when 1 propagated Trumpeter Swan appeared near Baraboo; and on March 19, 1983, when 2 neck-collared birds from the Hennepin County flock appeared at the Crex Meadows Wildlife Area (James Huntoon *in litt.*). In 1986 and 1987, lone individuals from the Hennepin County flock appeared in western and northwestern Wisconsin (Figure 3).

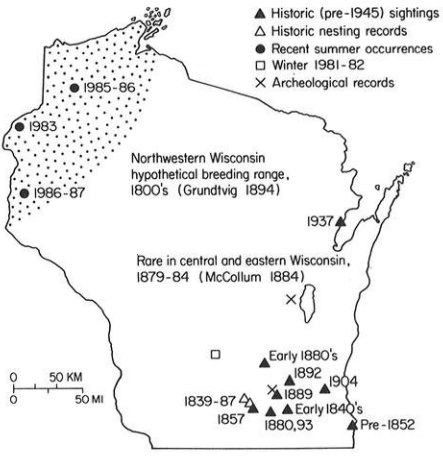

Figure 3. Historical and recent occurrences of Trumpeter Swans in Wisconsin.

Breeding Habitat Requirements

Hansen (1973) pointed out that for marsh habitat to be suitable for swans it must be stable with no marked fluctuations in water levels. Hansen indicated that large breeding territories are important, citing the Lacreek NWR where 20 km^2 (7.7 mi^2) of marsh successfully supported no more than 10 Trumpeter Swan territories. Marshall (1968) stated that no more than about 50 Trumpeter Swans could be supported on the 180,000-acre (72,846-ha) Malheur NWR. Banko (1960) found that at Red Rock Lakes NWR a 200-ha (494-acres) shallow lake with an irregular shoreline and numerous sedge islands provided a diverse interspersion of water and marsh habitat that supported the highest concentration of nests: 7 nests, about 30 ha (74 acres) per nesting pair. Banko also noted that "a certain amount" of water space was also necessary within each territory, apparently for departures. Hansen (1973) found that territorial requirements in Alaska were "generally larger" than at Red Rock Lakes NWR and at other refuges.

Discussing the design of water developments required for optimum Trumpeter Swan habitat, Robinson (1974) reported that large areas of shallow water (1–2.5 feet deep) were necessary for the production of emergent vegetation essential for Trumpeter Swan nesting and food cover. He also stated that an area of open water about 300 feet long was necessary for initial departures and landings of cygnets.

Despite most data supporting the requirement of a large nesting territory, Hansen *et al.* (1971) found that territories of 6–150 acres (2.5–61 ha) sup-

ported nesting pairs at Red Rock Lakes NWR.

Swan Habitat in Wisconsin

There is an estimated total of 4.4 million acres (1.78 million ha) ± 10% of wetlands in Wisconsin (Steve Fix, pers. comm.). The southeastern, predominantly agricultural, shallow marsh region, the western-southwestern Mississippi pool area, and the northwest-northcentral high density lake region of Wisconsin support large, shallow marshes considered suitable Trumpeter Swan nesting habitat. During spring waterfowl surveys in 1986, the southeastern region averaged 3.5 and the northern region averaged 1.9 deep fresh marsh and open wetland areas per square mile (Fendry *et al.* 1986).

Locations that offer potentially suitable Trumpeter Swan nesting habitat include, but are not limited to, the Kakagon River-Bad River Slough complex and Fish Creek Slough in Ashland County, the Gordon Flowage in Douglas County, Crex Meadows Wildlife Area in Burnett County, the Necedah Wildlife Refuge in Juneau County, Horicon Marsh in Dodge County, Grand River Marsh in Marquette and Green Lake counties, an integrated complex of marshes and lakes in southeastern counties, and the Mississippi River pool marshes in Buffalo, Trempealeau, and La Crosse counties.

Food Required by Swans

Trumpeter Swan diets consist mostly of tubers and stems from a variety of aquatic plants; consumption per day is about 20 pounds, (Henderson 1981) including arrowhead (*Sagittaria latifolia*), pondweeds (*Potamogeton* spp.), and bulrush (*Scirpus* spp.). Seeds of yellow pond lily (*Nuphar variegatum*) and sedges (*Carex* spp.) are also important (Banko 1960, Bellrose 1976). During summer, submergents comprise most of the Trumpeter Swan's diet (Larry Gillette, pers. comm.). Lumsden (1986) observed that Trumpeter Swans fed predominantly on pondweeds in 1983, and when less pondweeds were available in 1984–86 they moved to marsh edges to feed on duckweed (*Lemna* sp.), alga (*Spirogyra* sp.), arrowhead, and occasionally bur reed (*Sparganium americanum*). Beggartick (*Bidens cernua*) was also taken near the center of the marsh.

During the first few days of a cygnet's life, aquatic insects, crustaceans, and duckweed (*Lemna minor*) are eaten. After a few weeks the diet includes more aquatic vegetation, and at 2–3 weeks of age it is similar to that of the vegetative diet of the parents (Banko 1960, Hansen *et al.* 1971).

Limiting Factors for Trumpeter Swans

Habitat.—The size and suitability of potential Trumpeter Swan breeding habitat in Wisconsin needs to be determined through careful field investigations. One element affecting habitat suitability is the presence of lead (discussed below) in the food chain at breeding or wintering sites. Generally, breeding habitat does not appear to be limiting in the state, but only a systematic field survey of potential habitat will determine quantity and quality. Isolation, as indicated by Hansen *et al.* (1971), is an important criterion when identifying suitable habitat. The presence of abundant submergent plants, particularly pondweeds, is important also.

Related to habitat suitability is the absence of carp. At the Malheur NWR,

peaks in swan production in 1963, 1971, and 1979 occurred 2 years after drought conditions. Remaining water areas were treated with rotenone to eradicate carp. Production of sago pondweed (*Potamogeton pectinatus*) and other submergent aquatics increased dramatically as water availability increased (Cornely 1982).

At Cranberry Marsh in Ontario, where most cross-fostering of Trumpeter Swan eggs involving Mute Swans as foster parents has occurred, the absence of carp has resulted in a "luxurient growth of submergent aquatic plants, not seen in adjacent marshes where carp are present" (Lumsden *et al.* 1986).

Illegal Harvest.—Trumpeter Swans are protected from hunting in the United States, but they present a large, low-flying target and thus are susceptible to illegal shooting. Tundra Swans are not hunted in the Mississippi Flyway; it is unlikely that waterfowl hunters would mistake Trumpeter Swans for other legal game species. Nevertheless, at Grand River Marsh in eastern Wisconsin, Tundra Swans have been mistaken for snow geese and shot (William Wheeler, pers. comm.). Illegally shot Trumpeter Swans in Minnesota were not mistaken for snow geese; they were intentionally shot (Larry Gillette, pers. comm.). Illegal shooting of Trumpeter Swans should not pose a significant problem in Wisconsin because of the public interest in swans and the expected heightened public awareness of a Trumpeter Swan reintroduction program. Occasional intentional shooting, however, may occur.

Lead Poisoning.—Lead poisoning (mostly from lead fishing sinkers) is a major cause of Mute Swan mortality in England (Eltringham 1963). Trumpeter Swans occupy the same ecological niche as Mute Swans and available evidence suggests that Trumpeter Swans are at least as susceptible to lead poisoning as Mute Swans (Carrol Henderson, pers. comm.). Elevated levels of lead in the blood were found in one-fifth of 25 Mute Swans banded in northern Wisconsin in January 1986. At least 2 adult Mute Swans, and possibly as many as 5, died of lead poisoning (from fishing sinkers) in the Mercer area during the 1985–86 winter (Amundson and Marcquenski 1986). At a potential release site in Chequamegon Bay, however, lead levels were below detection levels (0.1 ppm) in Mute Swans sampled on August 1, 1986 (Amundson 1986).

Lead deposition from fishing sinkers and spent lead shot could pose a significant risk to the successful reintroduction of Trumpeter Swans locally if birds nest or overwinter in areas where lead levels in sediments are high. Bottom sampling in potential nesting habitat will be conducted to determine lead levels in sediments. Periodic monitoring of lead levels in Mute Swans from areas intended as reintroduction locations for Trumpeter Swans will indicate the extent of lead ingestion and will help determine whether these locations are suitable as release sites.

Power Lines.—Power lines present a potentially major source of mortality for Minnesota Trumpeter Swans. The Hennepin County Park Reserve District is in the vicinity of the heavily populated Minneapolis-St. Paul area (Larry Gillette, pers. comm.). Monitoring the movements and survival of reintroduced Trumpeter Swans will reveal the extent to which power lines limit the birds. Wisconsin restoration efforts will occur in wetland areas of low power-line density,

which should help minimize the potential threat of this limiting factor.

Snapping Turtles.—Snapping turtles have been a major source of Trumpeter Swan cygnet mortality during foster rearing in Ontario and Michigan and have limited the success of restoration efforts (Lumsden 1984a, Joe Johnson, pers. comm.). Four foster parent Mute Swan pairs lost 4 and may have lost 12 Trumpeter Swan cygnets to snapping turtle predation during 1983–86 (Lumsden *et al.* 1986). Consequently, the Ontario Ministry of Natural Resources instituted turtle control measures. Michigan's entire 1986 hatch (7 Trumpeter Swan cygnets) was eradicated by snapping turtles during the first year of cross-fostering under Mute Swans (Joe Johnson, pers. comm.).

Only one suspected snapping turtle-related Mute Swan cygnet mortality was observed in 1985 at Fish Creek Slough, a northern Wisconsin marsh on Lake Superior. Here, 15 Mute Swan cygnets successfully hatched, with 14 surviving to flight stage in 1985. Snapping turtles are suspected to have taken cygnets and caused poor nesting success for some Mute Swan pairs in the Eagle-Palmyra area of southeastern Wisconsin during 1986 (Tom Bintz, pers. comm.).

Mute Swans.—Mute Swans are native to Eurasia and were brought to North America by European immigrants as estate or park birds in the 1800s (Hindman 1982). They escaped from captivity and first bred as wild birds in 1910 on the Hudson River near the Atlantic Coast (Hindman 1982). Mute Swans have spread to 11 states on the Atlantic Coast, where there are now 4,900 birds, plus 1,500 in Michigan, 100 plus in Ontario, (Lumsden 1984a), and about 150 in Wisconsin.

A pair of Mute Swans began to nest successfully in northwestern Wisconsin in Prentice Park (city of Ashland) adjacent to Chequamegon Bay during 1973 when park employees built a nesting platform for them. Since then, this single pair has been responsible for a free-flying, summer population of about 35 on Chequamegon Bay and roughly another 15 on inland lakes and marshes in Ashland, Bayfield, and Douglas counties. Another free-flying, summer population of about 100 Mute Swans exists in southeastern Wisconsin.

Mute Swans typically nest in high densities, with breeding territories of 4 to 10 acres (1.5–4 ha) (Bellrose 1976). These birds may detrimentally affect surrounding aquatic vegetation. They consume large quantities of aquatic vegetation, predominantly submerged aquatics (Hindman 1982), averaging about 3.8 kg (8.4 lbs, wet weight) a day (Willey 1968). Also, while feeding and nest building large amounts of aquatic vegetation are uprooted but not utilized (Gillham 1956, Willey 1968).

Regarding interspecific interactions, Mute Swans generally may out-compete Trumpeter Swans for nesting sites and feeding territories (James Cooper, pers. comm., Sublett 1981). In the Gordon Flowage in 1985, however, a pair of Trumpeter Swans displaced at least 1 Mute Swan pair (Fred Strand, pers. comm). Larry Gillette (pers. comm.) believes that in most cases wild nesting Trumpeter Swans will dominate nesting Mute Swans when individuals of both species are the same age.

Most of the states that have feral Mute Swan populations have Mute Swan control programs (5 states) or are contemplating control. A desirable effect of

reintroduction efforts with Trumpeter Swans would be to replace exotic Mute Swans. Trumpeter Swans are ecologically compatible with native waterfowl and do not damage aquatic vegetation because they occur in low breeding densities, with breeding territories seldom smaller than 23 ha (Banko 1960). Trumpeter Swans also are less aggressive towards other waterfowl species and are more tolerant of waterfowl species nesting within their breeding territories (Henderson 1981).

Recovery Plan Objectives and Strategies

The Wisconsin Trumpeter Swan Recovery Plan establishes objectives and reintroduction strategies for restoring a self-sustaining, migratory, and breeding population of Trumpeter Swans in the state by the year 2000. The program goal is to establish a minimum nesting population of at least 20 pairs in the state.

The plan lists eight primary objectives:

(1) identify and maintain suitable Trumpeter Swan breeding habitat;

(2) cross-foster Trumpeter Swan eggs using selected pairs of nesting Mute Swans;

(3) document hatching, development, behavior, health, and survivorship of fostered Trumpeter Swan cygnets;

(4) raise Trumpeter Swans in captivity and release as subadults (23 months of age) at selected sites;

(5) purchase and place single adult Trumpeter Swans of the appropriate sex in marshes that are used by single adult Trumpeter Swans of known sex that have dispersed from the Hennepin County (MN) Trumpeter Swan restoration flock. Determine if nesting occurs and document nesting success;

(6) establish a Wisconsin Department of Natural Resources' (WDNR) Swan Committee to address control of Wisconsin's feral Mute Swan population and to evaluate Trumpeter Swan reintroduction strategies and recovery objectives;

(7) develop public support for a Trumpeter Swan reintroduction program and provide the public opportunities to observe this species; and

(8) determine nesting locations and nesting success of Trumpeter Swan pairs constituting a restored Wisconsin flock.

Two major techniques will be utilized in the reintroduction effort: (1) cross-fostering Trumpeter Swan eggs using selected pairs of Mute Swans as foster parents; and (2) captive-rearing of Trumpeter Swan cygnets hatched from artificially incubated eggs. Cygnets will be reared in captivity following the techniques described by Gillette and Dyhr (1977). They will be placed in separate groups in large outdoor enclosed pens, with siblings confined within individual groups since it has been determined that captive Canada Geese outbreed by mating with individuals with whom they were not reared (Henderson 1985). At the age of about 4 months, wing-clipped cygnets will be transferred to overwintering sites and maintained until they are subadults (23 months of age). The birds will be recaptured and wing-clipped once again during the summer preceding the following spring release at 23 months of age. Unrelated birds will be paired and released at selected sites.

Criteria for selecting release sites include: (1) shallow marshes with extensive areas of emergent vegetation and a muskrat population to provide nest sites; (2) abundant aquatic macrophytes as a food source for cygnets and adults; (3) plentiful invertebrates as a food source for cygnets less than 3 weeks of age; (4)

absence of lead shot or lead sinkers; (5) few snapping turtles (small population); (6) control of public access; and (7) a frost-free period of over 140 days.

According to a model for Trumpeter Swan survivorship developed by Turner (1981), 43% of first-year Trumpeter Swans survive to age 1 year. Trumpeter Swans may begin to develop pair bonds at 20 months of age and some birds may nest for the first time at age 3 years (Monnie 1966). Most birds do not nest until they are 4–6 years old (Banko 1960). By releasing birds at age 23 months, the Wisconsin DNR will enhance the probability of survival and future breeding. Released birds, however, will not be encouraged to overwinter, and winter feeding by the public will be actively discouraged.

A third technique that will be employed in the restoration effort involves overwintering and rearing of cygnets produced by captive Trumpeter Swan pairs held at the Milwaukee County Zoo and at other sites to be determined. Trumpeter Swan cygnets would be removed from their parents at age 4 months and transferred to an overwintering site for eventual release at age 23 months.

Cross-fostering of 20 Trumpeter Swan eggs is planned from 1987 through 1996 and will occur initially in southeastern Wisconsin marshes. Live-trapping and translocation of snapping turtles will occur from designated cross-fostering sites to minimize risks of predation on cygnets. All Trumpeter Swan cygnets produced will be radio-tagged to determine survival and movements. The effectiveness of cross-fostering as a reintroduction technique will be carefully evaluated annually.

In 1987 and 1988, the Minnesota DNR will earmark 10 Alaskan Trumpeter Swan eggs for Wisconsin among 50 they will collect each year from nests in the Minto Flats area near Fairbanks. Based on hatching success of the 50 eggs at the Carlos Avery Game Farm in Forest Lake, Minnesota, Wisconsin will receive a prorated number of cygnets. The Alaskan cygnets allocated to Wisconsin's program will be raised by the Minnesota DNR to age 15 months, at which time the cygnets will be transferred to a Wisconsin overwintering site. The following spring these birds will be paired with unrelated swans and released at selected marsh sites.

Beginning in 1989, the Wisconsin DNR will attempt to secure a minimum of 50 Trumpeter Swan eggs annually through 1996. It is hoped that at least 30 eggs will be obtained from Alaska (or alternate sources of wild stock). The remaining 20 eggs will come from private propagators or wild lower-48-state stock.

Since most Trumpeter Swans do not breed until 4–6 years of age, and it could take at least 4 years for the population to begin to replace itself, a minimum 10-year commitment to reintroduction efforts will be necessary if a viable population is to be established in the state.

One of the objectives of this plan is to control Wisconsin's feral Mute Swan population and to replace gradually selected pairs of nesting Mute Swans with nesting Trumpeter Swans. For the purposes of this plan a separate WDNR Swan Committee is created to address the issue of Mute Swan control.

A major information and education program, coordinated with key phases of the recovery effort, will be developed; this is essential and critical to program success.

A major assessment of reintroduction techniques and recovery objectives is called for after the 1991 and 1996 field

seasons. Implementation of the recovery program will require the cooperation and integrated efforts of the WDNR Bureaus of Research, Wildlife Management, Endangered Resources, and Information and Education. Other cooperating government agencies, organizations, and institutions in Wisconsin include the Great Lakes Indian Fish and Wildlife Commission, the Milwaukee County Zoo, the United States Fish and Wildlife Service, and the University of Wisconsin.

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A Review of the "Songscope 1" Sound-amplifying Device

This miniature, super-sensitive, sound-amplification system can be attached to binoculars and should help birders with hearing impairment detect high frequency or low volume bird calls.

by Charles A. Kemper

A great many bird watchers, students of bird populations, and bird census-takers will be interested in the new "Songscope 1." As one of many bird lovers who has hearing impairment, the subject of sound amplification, particularly high frequency sounds, has been of particular interest to me. I have written on this subject before (Kemper 1981) and, as a result, have had many inquiries.

The "Songscope 1" is truly an amazing instrument (Figure 1). It is light, portable, very inexpensive—especially when compared to the parabolic microphones available—and surprisingly effective. I have been using one now for the past 4 months and am quite happy with it. It has a high quality miniature condenser microphone, is operated by a single UM-4 battery, which is easily replaced and readily available everywhere. It has adjustable sound levels with a volume knob and mounting hardware for use with binoculars or video camera. There is an attachable directional tube with a wind screen, and stereo ear phones.

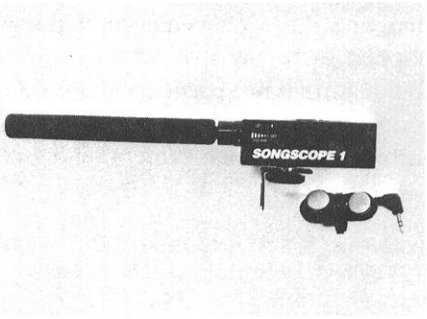

Figure 1. The "songscope 1" sound-amplifying device.

The instrument is small enough to carry in a glove compartment or coat pocket. I've not yet had to put in a new battery. The frequency response is 200–15 KHz, which should be adequate for picking up most calls except those with the highest frequencies, like Bay-breasted Warblers, Cape May Warblers or similar species. I am waiting to try it out when the warblers return, but for most species it works beautifully. I recommend it to

just about anyone—even those with normal hearing—because even they would want to enhance their natural ability to detect low volume sounds.

There are a few minor annoyances. First the ear pieces do not fit well in the ear canal. They easily fall out unless you improvise with headphones, adhesive tape to strap in the microphones, or something else. One neat way I have found is to put on a head sweatband and pass it over the ears. In very cold weather I did encounter a little temporary static that cleared up spontaneously after warming up the set in my coat pocket for a few minutes.

There is a small accessory device to attach the "Songscope 1" to a binoculars so that one can listen to the bird being watched with the glasses. Some may find this a convenience; it doesn't happen to be my style of birding, and that feature is not particularly appealing to me. The same device would allow attachment to a video camera, and I can see where this might be a very desirable enhancement.

I can see a lot of advantages to using this device on Big Day counts, Christmas counts, bird transects, and ordinary nature walks. It is convenient, relatively inexpensive, easy to maintain, very effective and if you are frustrated because you can no longer hear what your younger friends hear, this may be just what you need. I wouldn't want to lose mine. The price originally was $64.95. It may have gone up slightly since its introduction. You can obtain information on ordering the "Songscope 1" from: BPA Group, 3519 Bigelow Blvd., Pittsburgh, PA 15213 (telephone 412–621–7370).

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Black Tern *by Thomas R. Schultz*

What's Behind Long-term Declines in Some Breeding Bird Populations?

by Stanley A. Temple

Anyone who has kept track of the results of annual bird censuses, like the Breeding Bird Surveys (Robbins *et al.*), or perused "Seasonal Field-notes" in *The Passenger Pigeon*, knows that bird populations typically fluctuate from year to year. For most species, these year-to-year ups and downs tend to balance each other out over the long run. The years of population increases compensate for the years of population declines so that long-term stability results. An example of this type of year-to-year fluctuation around a long-term average is shown in Figure 1.

The vast majority of birds show population fluctuations of this type, but some species show long-term population declines in which year after year there are fewer and fewer birds in the breeding population (Figure 2). Conservationists soon become concerned about these declining populations, and once the decline has been verified, there is usually a search for the underlying cause. Although there are innumerable specific causes for the various declines in bird populations, the specific causes all fall into three general categories that I shall review: insufficient breeding habitat, inadequate reproduction, or excessive annual mortality. To understand these three general causes of population declines, it is important to understand the typical changes in bird populations within a given year.

The Annual Population Cycle

Let's begin the year as the birds are settling onto their breeding territories. For most healthy bird populations, there are more individuals than there are potential breeding territories. In ecological parlance, the number of potential breeders has exceeded the environment's carrying capacity for breeding territories. This disparity results in a limited number of individuals being able to breed and the existence of a nonbreeding, surplus population of individuals that are ready to fill in any territories that become available through the death of an established territory holder. If all goes well, the birds that have acquired territories reproduce successfully, and the bird population swells to its annual peak numbers as the breeding season ends.

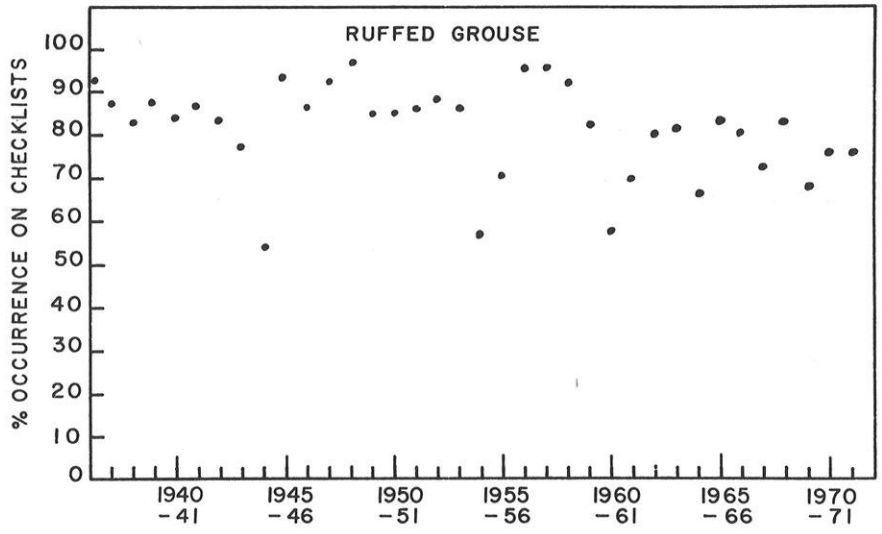

Figure 1. Year-to-year fluctuations in abundance of Ruffed Grouse in the Cayuga Lake Basin of central New York state, based on data from Temple and Temple (1976).

From this yearly peak in numbers the population gradually diminishes as mortality claims a portion of the birds. Overwinter rigors and the hazards of migration are two of the major factors that contribute to the losses between breeding seasons. Despite these losses, by the time the next breeding season rolls around there are usually enough survivors so that numbers still exceed the carrying capacity for breeders, and again a surplus of birds exists. The cycle then repeats itself, and the overall result is an annual breeding population that is stable and at the environment's carrying capacity. Reproduction is good, and a surplus of breeders exists.

There are three major points in this normal annual cycle at which the population can experience a problem that will reduce the size of the breeding population in the next year. First, there might not be enough habitat to accommodate an adequate proportion of the potential breeders. The result would be a population that produces an inadequate number of offspring per capita because so many potential breeders have been unable to find a place to breed.

A second possible problem might be poor reproductive success. Here there is sufficient habitat to accommodate an ample proportion of the potential breeders, but these breeders, for some reason, have a poor reproductive output. Again, the result is that the number of offspring produced per capita is unable to offset annual losses.

A final possibility is for there to be sufficient habitat to accommodate potential breeders and for those breeders to produce offspring at a normal per capita rate but for overwinter mortality to be excessive. If losses from one breeding season to the next are excessively high, there will eventually be too few breeders to occupy the available breeding habitat. One result is for there

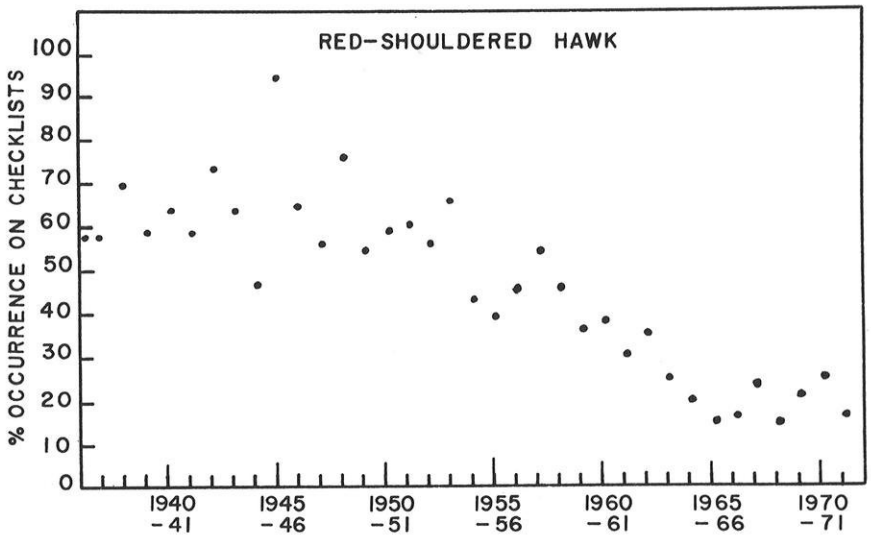

Figure 2. Year-to-year fluctuations in abundance of the Red-shouldered Hawk in the Cayuga Lake Basin of central New York state based on data from Temple and Temple (1976).

to be conspicuously vacant habitat and for there to be no nonbreeding individuals, every bird can have a territory. These three scenarios are graphically illustrated in Figure 3.

Problems of Habitat Availability

We are all aware of the threats that habitat loss and alteration pose for breeding birds. This is probably the single most prevalent cause of bird population declines in the world today. It makes no difference how well the population reproduces or how well they survive the nonbreeding season. If there is insufficient habitat to accommodate an adequate portion of the potential breeders, the population will decline until it comes into equilibrium with the carrying capacity of the remaining habitat. Perhaps the classic cases of massive population declines caused by habitat loss in the midwest are the prairie birds (Graber and Graber 1963). As agricultural development rapidly destroyed the grassland nesting habitats of these birds, it was inevitable that their populations declined (Hoffman and Sample 1988).

Problems of Inadequate Reproduction

Sometimes birds have problems reproducing successfully, even when there is sufficient habitat available to them. There are many causes for poor reproductive success, but two that occur frequently are nest predation and toxic chemicals. Bird nests are always subject to some losses to predators, but if, for some reason, predators become overabundant, they can substantially reduce the normal nest success of birds. Raccoons and foxes, for example, have greatly increased in numbers in the midwest, and one result has been a dramatic failure of nesting waterfowl to

be able to raise enough young (Duebbert and Kantrud 1978). Even in good quality habitat, overabundant predators can overwhelm nesting ducks so that too few young are reared and populations dwindle.

The story of reproductive failures of predatory birds when their food chains were contaminated with toxic chemicals, like DDT, is well known. In this case, chemical contamination interfered with the female birds' ability to produce normal eggshells, and few of the thin-shelled eggs hatched, even though the birds were living in an otherwise hospitable environment. Populations of raptors like the Peregrine Falcon and Osprey, crashed as a result of one problem: they were rearing too few young.

Problems of Excessive Mortality

Despite having sufficient breeding habitat and an adequate reproductive rate, populations can still decline if they suffer excessively high rates of mortality between breeding seasons. Causes of excessive overwinter mortality are varied. In some cases, losses may be caused by human exploitation, such as was the case with declining Wild Turkey population in the past (Schorger 1966), but more often the losses today are caused by habitat loss or alteration on wintering areas. An interesting case is the Kirtland's Warbler. The U.S. Forest Service and other natural resource agencies have created large tracts of the warbler's preferred jack pine forest habitat, and habitat availability is now apparently in excess of demands by the birds. Intensive trapping of Brown-headed Cowbirds on the nesting range has resulted in a dramatic rise in warbler reproductive success, and the birds are now producing about as many young as seems possible (Mayfield 1978). But, Kirtland's Warblers have still been declining, even though conditions on their breeding range seem to be adequate.

It appears that Kirtland's Warbler numbers are not being limited by events on the breeding range, but instead by events on the winter range, where they spend over half of the year. Habitat losses in the Bahamas, where the birds are known to winter, has resulted in a reduced carrying capacity on the winter range. It may matter little how many birds are produced in Michigan each summer; if the winter range can only accommodate a smaller number of birds, overwinter mortality will be high among the birds that don't find good winter habitat.

How to Separate Causes

Although these three causes of population declines seem to be distinct, when faced with a declining bird population it is often difficult to pinpoint which type of problem is responsible. Nonetheless, it is important to be able to identify the right cause so that conservation action can be directed appropriately. It would not, for example, help Kirtland's Warblers to invest in the large-scale expansion of jack pine forests in Michigan. Likewise, it did not help Peregrine Falcons to protect them from egg collectors, gunners, or falconers. These are just a few cases where misdirected conservation efforts are doomed to failure because they do not correct the real limitations faced by the population.

So, how does an ornithologist decide what is responsible for a declining population? A process-of-elimination ap-

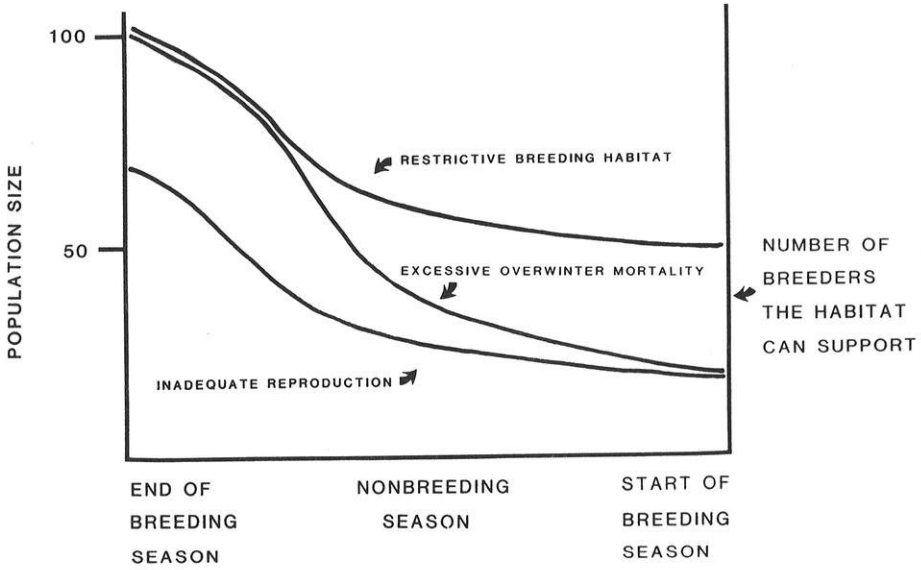

Figure 3. A graphical representation of the three ways in which the size of a breeding population might be determined.

proach has merit. One approach is to first examine reproduction to see if the birds are producing offspring at the normally expected rate. This is usually a straightforward task. If the results show that reproduction is unusually low, then management should be directed towards increasing it.

But, if reproduction is adequate, attention should turn to the possibility of habitat limitations on the breeding range. Is there any conspicuously vacant, but suitable, habitat? Are there any nonbreeders in the population? If all the potential habitat is filled, there are surplus nonbreeders, and the population is still declining, then a habitat limitation should be suspected. The creation or management of habitat on the breeding range should be a conservation priority.

If reproduction is adequate but there is evidence of vacant breeding habitat and few, if any, nonbreeders, a problem with excessive overwinter mortality should be suspected. This process-of-elimination approach should be sufficient to identify most problems, except the difficult ones in which more than one problem is affecting the population, such as a population that is experiencing both reproductive failures *and* excessive overwinter mortality. In such cases, all possible causes must be investigated.

Implications for Currently Declining Species

There are many Wisconsin birds that are now undergoing population declines and for which the underlying causes are not known with certainty. Could the guidelines described above help resolve the causes? Consider an example of one declining species.

One of my students, Bonnie L. Brooks, has been studying Loggerhead

Shrikes, a species that is declining in the upper Midwest and has become endangered as a result. There has been much speculation about why shrikes are declining but surprising little evidence to support these guesses. We found that shrikes in Minnesota are reproducing at a normal vigorous rate, with no obvious problems. A search of available grassland areas with the proper features to be suitable as breeding habitat revealed that there was suitable but vacant habitat. Furthermore, there was no evidence of any nonbreeding shrikes; all birds appeared to be paired and breeding. This evidence points strongly to a limitation on the shrike's wintering range in the Gulf Coast states where changes in agricultural practices have reduced the availability of good quality shrike habitat. In this case, it may be futile for conservationists in the upper midwest to engage in extensive habitat management or intensive protection, specifically for shrikes. Their problems seem to lie elsewhere.

It is clear that careful study should precede conservation action to be sure that management addresses the real needs of a declining species. Without such careful research, scarce conservation funds and personnel can be wasted on futile efforts that do little to reverse population declines.

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Hummingbirds in the Backyard

by Scott R. Craven

When the heat of mid-summer rolls around, bird feeding is a distant memory for most people. But for those who enjoy our tiniest yet, perhaps, most spectacular bird, summer presents a wonderful opportunity—a time to attract and feed hummingbirds.

Hummingbirds are best known for their small size, iridescent beauty, and amazing flight. Their name comes from the distinctive "humming" sound created in flight. Upon first observing a hummingbird, most people exclaim "I can't believe it's a bird." However, identification should be no problem here in Wisconsin. Except for a rare visit by a Rufous Hummingbird, we have only one species, the Ruby-throated Hummingbird (*Archilochus colubris*). About the only creature it can be mistaken for is a hawk moth, which at a distance is very similar in appearance and behavior around flowers.

If you are, or become, a hummingbird enthusiast, you must head southwest or south to enjoy the wide diversity of hummingbird species. The entire hummingbird family is found in the New World, and most species are tropical. There are about 330 species, only 19 of which occur in the continental United States. Many of those barely reach into the American southwest. The real hotspot for hummingbirds is the northwestern part of South America. Ecuador alone contains 163 species!

A lack of diversity in Wisconsin does not mean a lack of interest. Hummingbirds are among the most popular species to attract to backyard habitats. Before I discuss the best ways to accomplish this and describe our species in more detail, consider these "hummingbird facts" assembled from a National Wildlife Federation factsheet and Paul A. Johnsgard's (1983) excellent reference, *The Hummingbirds of North America.*

- an unusual rotational movement of the entire wing allows hummingbirds to fly forward, backward, and hover like a helicopter.
- wingbeats have been measured at up to 200 per second during courtship and 80 per second in normal forward flight! (How many times can you blink your eyes in a second?)
- heart size relative to body size is the largest of all warm-blooded animals,

and their heart rate can reach 1260 beats per minute.

- individual birds may drink up to 8 times their body weight in water per day and eat half their total weight in food.
- their plumage is dense and highly specialized, but they have fewer total feathers than any other bird (less than 1000).
- normal body temperature is about 103°F, but it may drop to about 70°F overnight as the bird becomes torpid to survive the night.

The Ruby-throated Hummingbird breeds throughout the eastern half of North America including all of Wisconsin. According to Temple and Cary (1987), ruby-throats are more abundant in the northern half of the state. Their main arrival occurs statewide in early May, and departure occurs during September as frost eliminates their food supply. They are gone by mid-October. Mexico and Central America are the primary wintering areas. It's hard to imagine a 3-gram bird making a round trip from Madison to Mexico, but they do. In fact, they fly across the Gulf of Mexico, a 600-mile flight that requires the fuel contained in about 2.1 grams of fat.

Everything about a ruby-throat is tiny. A male weighs 3 grams, about as much as a penny. Females are a whopping 0.3 gram heavier. The slender bill is 16–18 mm long (about ¾″). Eggs average 8×13 mm (about ¼″ × ½″) or about the size of a jelly belly. The color of a ruby-throat is dominated by the metallic bronze-green back and brilliant metallic red throat of the male from which the species gets its name. The female is less iridescent with no red throat. Young birds of both sexes resemble adult females.

Ruby-throats are rather general in their selection of habitats throughout their broad range. Deciduous and mixed woodlands, clearings, edges, parks, orchards, and suburban areas with adequate plantings and gardens are all utilized. Male ruby-throats establish a territory soon after arrival. Males are promiscuous and attract prospective mates with a pendulum-like aerial display. Nests may be within 60 or 70 yards of each other. So your backyard could be within the home range of several pairs of hummingbirds.

A hummingbird nest is a marvel of construction, soft to the touch and very resilient. Nests are usually made of bud scales and plant down covered with lichens and fastened with spider silk. Only two eggs are laid and then incubated for about 16 days. Young nestlings are fed with the adults tubular tongue—much the same way as you pump gas into your tank! The young are ready to fledge and augment your local ruby-throat population in about three weeks.

Because of the broad range of suitable nesting habitats, a reasonable diversity of vegetation in your yard is all you need to accommodate hummingbirds. Efforts at attracting hummingbirds are best focused on providing a food source, either natural or artificial.

There are several styles of artificial feeders on the market. All consist of a glass or plastic storage bottle with one or more tubular nectar dispensers, often terminating in a perch or plastic "flower." The feeders should be filled with a boiled solution of 4 parts water to 1 part white sugar. Commercial "nectar" mixes are also available for convenience but with added expense. Formulations using honey should not

Table 1. Some plants that have flowers particularly attractive to hummingbirds.

Plant name	Type of plant	Color of flowers
Scarlet Morning-Glory	annual	red
Spotted Jewelweed	annual	orange
Scarlet-Runner Bush-Bean	annual	red
Sander Tobacco	annual	red
Red Petunia	annual	red
Scarlet Sage (Salvia)	annual	red
Hollyhock	perennial/biennial	red, orange, yellow
Hosta	perennial/biennial	red
Columbine	perennial/biennial	red, orange
Red Phlox	perennial/biennial	red
Coral Bells	perennial/biennial	red
Cardinal Flower	perennial/biennial	red
Scarlet Bergamot	perennial/biennial	red
Scarlet-Trumpet Vine	tree/shrub	red
Weigela	tree/shrub	red
Scarlet-Trumpet Honeysuckle	tree/shrub	red

be used because of potential mold or fungal disease problems.

Hummingbirds key in on red flowers (more on that later) thus most commercial feeders incorporate red perches, "flowers," or other parts. This is enough red to attract the bird's attention and it's not necessary to dye the sugar solutions red. A homemade feeder without red parts could benefit from a red adornments. The color red is so attractive that hummingbirds were making the fatal error of investigating red plastic insulators on electric fences. Once that problem was recognized the manufacturers readily changed the insulator color.

There are certain precautions to follow when feeding hummingbirds. As with all bird feeders, hummingbird feeders should be kept clean. An active feeder will be emptied rapidly. If the sugar solution is not used up in a few days, the feeder should be emptied and cleaned weekly using a brush and a mild solution of laundry bleach and detergent. Concern over holding hummingbirds dangerously late in the fall by keeping feeders filled is unwarranted. The bird's departure is cued by changes in daylength and climate, not the availability of food. Don't hang your feeder in front of a large window, however. That does represent a safety hazard.

An active feeder is a great source of pleasure. Hummingbirds forage at artificial feeders throughout the day with no apparent peak in activity. Birds may arrive as early as 30 minutes after sunrise and stay as late as an hour after sunset. Don't be discouraged if birds don't respond immediately to a newly placed feeder. It may take awhile or require some attractive flowers nearby. Don't be concerned about yellow jackets (hornets) sharing the sugar solution. They are more of a problem for you than the birds, but many feeders incorporate "bee guards" to keep the insects from crawling up the nectar tubes. With any luck this winter's cold weather froze out many yellow-jacket queens in their underground nests, and they won't be as numerous this summer as they were last year.

A natural food supply is also very

attractive to Ruby-throated Hummingbirds. Red, tubular flowers are considered best, but several orange or yellow species will also work. Carol Henderson (1988) in his new book, *Landscaping for Wildlife*, presents several garden planting diagrams and an exhaustive list of plants attractive to hummingbirds. Some of the better choices are included in Table 1. This list is not complete, but it does represent an assortment of vines, shrubs, and annual and perennial flowers that can be worked into your landscape and gardening plans.

If you don't have a hummingbird feeder, give one a try. Also, consider planting some hummingbird flowers in your garden during next springs planting. Even a glimpse of one of these marvelous birds is well worth the effort.

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Ruby-throated Hummingbird (*photo by Stephen J. Lange*)

Birds of Wet-Mesic and Wet Prairies in Wisconsin

by Randy M. Hoffman and David Sample

This second in a series of articles on the birds of various habitats in Wisconsin (Mossman and Matthiae 1988) focuses on wet-mesic and wet prairies and fens. These ecological communities are preferred by certain grassland species and, in some cases, essential to their long-term survival. We hope that an understanding of the ecology of birds of these grassland habitats will foster a greater appreciation and concern for the urgent need to manage these rare community types.

Wet-mesic and wet prairies and the closely related fens are today mere shadows of their former grandeur. They have been highly fragmented as a result of conversion to agriculture. Wisconsin, at the time of settlement, had an estimated 420,000 acres of wet-mesic prairie, 105,000 acres of wet prairie, and a few thousand acres of fen (Curtis 1959). Current estimates by the Wisconsin Natural Heritage Inventory identify about 3,000 remaining acres of wet-mesic prairie, 500 acres of wet prairie, and 500 acres of fen. In most cases, they are small isolated remnants separated by vast expanses of agricultural, forested, and urban lands. In most remnant prairies, invasion by woody species is causing further habitat deterioration for both native plants and birds.

Even in their pristine condition these communities naturally had a lower diversity of bird species than more complex vegetation communities, such as oak or maple forests (Wiens 1973). But of greater concern, they have lost some area-sensitive bird species that require large patches of prairie habitat. They are not depauperate communities, however. While the number of bird species is relatively small, prairie plant life, insects (especially Lepidoptera and Orthoptera) and mammals are quite species-rich.

What are wet-mesic and wet prairies and fens? Where are they found? How can they be recognized? Wet-mesic prairies, wet prairies, and fens are terms not well understood by many people. The word "prairie" has taken on varied meanings, ranging from grassy pastures, to weedy fields, to any level, nearly treeless landscape. Fens are even more poorly understood. Much of the confusion stems from the rapid conversion of presettlement

Figure 1. A view of a typical wet-mesic prairie formed on a glacial outwash plain.

prairie to agriculture. This conversion, combined with the passing of those who could remember

what an intact prairie looked like, gradually removed the mental picture of prairie from most of the populace. Local place names such as Sun Prairie and Prairie du Chien help perpetuate confusion by leading to inappropriate correlations between "prairie" place names and non-prairie landscapes.

Wet-mesic and wet prairies are found in low relatively flat areas. They are characterized by a lush cover of tall grasses and forbs. They occur mostly in the southeastern quarter of Wisconsin, primarily in the beds of extinct glacial lakes, glacial outwash plains, large riverine floodplains, and gently sloping stream valleys. They are formed on alluvial soils, poorly drained mineral soils, and peat and muck. Since they occur in low areas, these prairies are subjected to early fall and late spring frosts, to heavy fog and dew, and to the threat of inundation during spring runoff or summer rains.

Curtis (1959) detailed the plant species composition of wet-mesic prairies, wet prairies, and fens. His species lists, compiled from several prairie stands, are useful in developing a mental picture of the vegetation of these communities. Table 1 compares the 10 most common species for the two prairie communities. The total number of plant species found in wet-mesic prairies is over 100; for wet prairies it is over 60. Curtis (1955) emphasized the continuum of prairie species and communities, that is the gradual change in plant species composition from one prairie type to another. Prairies are not discrete nor can they be exactly defined. This continuum aspect can still be observed by visiting different remnant prairies and noticing the differences in species composition.

Due to their growth patterns, prairie plant species are not always evenly distributed. One can observe a patchwork arrangement of different species aggregated within undisturbed prairie remnants. For the prairie enthusiast, this patchy nature is often an indicator of a prairie's quality.

Wet-mesic prairies are characterized by tall grasses such as big bluestem (*Andropogon gerardi*), blue joint grass (*Calamagrostis canadensis*), cordgrass (*Spartina pectinata*) and wild rye (*Elymus canadensis*), and showy flowers, especially representatives from the composite, legume, mint, and parsley families. In addition to the dominant species in Table 1, the following species are found more often in wet-mesic prairies than anywhere else: New England aster (*Aster novae-angliae*), waterhemlock (*Cicuta maculata*), showy ticktrefoil (*Desmodium canadense*), shooting star (*Dodecatheon meadia*), bottle gentian (*Gentiana andrewsii*), veiny pea (*Lathyrus venosus*), prairie blazing star (*Liatris pycnostachya*), prairie phlox (*Phlox pilosa*), smooth rattlesnake plantain (*Prenanthes racemosa*), black-eyed

Table 1. The ten most prevalent plant species in wet-mesic and wet prairies in descending order (adapted from Curtis 1959).

Plant Species	Present in Wet-Mesic Prairie	Present in Wet Prairie
Big bluestem (*Andropogon gerardi*)	X	
Yellow coneflower (*Ratibida pinnata*)	X	
Purple meadow-rue (*Thalictrum dasyscarpum*)	X	
Mountain mint (*Pycnanthemum virginianum*)	X	
Common milkweed (*Asclepias syriaca*)	X	
Wild strawberry (*Fragaria virginiana*)	X	
Saw-tooth sunflower (*Helianthus grosseserratus*)	X	
Rose (*Rosa* sp.)	X	
Wild bergamot (*Monarda fistulosa*)	X	
Stiff goldenrod (*Solidago rigida*)	X	
Blue joint grass (*Calamagrostis canadense*)		X
Cord grass (*Spartina pectinata*)		X
Purple meadow-rue (*Thalictrum dasyscarpum*)		X
Mountain mint (*Pycnanthemum virginianum*)		X
Wild strawberry (*Fragaria virginiana*)		X
Golden-alexanders (*Zizia aurea*)		X
Culver's root (*Veronicastrum virginicum*)		X
Late goldenrod (*Solidago gigantea*)		X
Cowbane (*Oxypolis rigidior*)		X
Northern bedstraw (*Galium boreale*)		X

Susan (*Rudbeckia hirta*), compass plant (*Silphium laciniatum*) and prairie dock (*Silphium terebinthinaceum*).

Wet prairies occur on wetter soils and have a higher ratio of grasses to forbs, than wet-mesic prairies. The common grasses include blue joint grass, cordgrass, big bluestem, and upland wild timothy (*Muhlenbergia racemosa*). Forbs are less conspicuous than in wet-mesic prairies, with very few early bloomers. In addition to the dominant species in Table 1, Curtis found the following species more often in wet prairies than anywhere else: swamp thistle (*Cirsium muticum*), field horsetail (*Equisteum arvense*), yellow-eyed grass (*Hypoxis hirsuta*), prairie willow (*Salix humilis*) and swamp saxifrage (*Saxifraga pennsylvanica*).

The fens of Wisconsin have not yet been completely categorized. Moran (1981) separates fens into sedge dominated fens, prairie grass dominated fens, and marl flats. There may be even more separation with future studies. By definition, fens always have an internal water flow rich in calcium or magnesium bicarbonates. This water source can be in the form of bubbling springs which over time form mounds of peat, seepage slopes, marl flats with formations of tufa or peat saturated with bicarbonate water. These areas can have very unusual floras, containing rare calciphiles and boreal disjunct species. Due to their extremely fragile nature and concentrations of rare species, fens are an important part of the Wisconsin Natural Areas Program. Fens are typically small and found so close to other plant communities, that it may be quite difficult to specify animal communities unique to them (Reed 1985). However, Common Snipe, a species not found on wet-mesic and wet prairies, could be the most commonly occurring calcareous fen

species (Reed 1985). Because they are so fragile and small, the site descriptions which follow will not contain any fen locations.

The immense reduction of prairie acreage has been accompanied by changes in bird life. Kumlien and Hollister (1903) identified a group of prairie birds that no longer nested in Wisconsin by the turn of the century. These included Long-billed Curlew, Swallow-tailed Kite, and Whooping Crane. At Faville Grove, a wet-mesic prairie area near Lake Mills, Greater Prairie Chickens were the most abundant game bird in 1838, but they were nearly extirpated by 1940 (Hawkins 1940). In 1941, only 38 acres of prairie remained at Faville, out of the nearly 3000 acres originally present. Another group of formerly common nesting species has since been nearly extirpated in Wisconsin's wet-mesic and wet prairies: Sharp-tailed Grouse, Short-eared Owl and Northern Harrier.

Today the avifauna of wet-mesic and wet prairies consists of small birds able to maintain themselves on small remnants and those able to adapt to agricultural grasslands. In 1985, the Wisconsin Department of Natural Resource's (WDNR) Bureaus of Research and Endangered Resources began a study of grassland birds in Wisconsin, with the purpose of discovering the breeding bird abundance, distribution, habitat preference, and population trends on all major grassland habitat types, from row crops to old fields to pastures to native prairies. As a part of this study, 17 100m × 200m study plots in wet-mesic and wet prairies were censused for breeding birds in the summers of 1985–1987 in south-central Wisconsin. Fens were included in the same habitat type with wet prairies.

Of the 21 grassland habitats included in the study, wet-mesic and wet prairies were found to be among the most species-rich, measured as the average number of species per study plot. A total of 26 bird species were found in these prairie types (Table 2). They were also above average in the mean number of individual birds present per study plot. Even though many of the less common species occurred in only one prairie type or the other, these two habitats can be regarded as similar in bird species composition.

In the WDNR study, 21 species were found on wet prairies. Seven of these were common, and can be seen on most wet prairie sites (Table 2). Common Yellowthroat and Willow Flycatcher were more common in wet prairies than in any other grassland habitat. Three of the most common species—Common Yellowthroat, Swamp Sparrow, and Sedge Wren—prefer habitats with tall and dense vegetation, which is characteristic of wet prairies. Two of the common species, Song Sparrow and American Goldfinch, are often associated with woody vegetation, which is almost always present in wet prairie remnants in southern Wisconsin.

Seventeen species were found on wet-mesic prairie sites in the WDNR study. Six of these were common (Table 2). Five of these were also common in wet prairies. Song Sparrows and Brown-headed Cowbirds reached their peak abundance in wet-mesic prairies. Three of the most common species—and 9 out of the total 17 species—prefer habitats with woody vegetation, which has become more prevalent in wet-mesic prairie fragments because of the cessation of natural fires.

A number of grassland bird species, including some that breed in wet-mesic

Table 2. Birds Found on WDNR Grassland Bird Study Plots.

Species	Status on Study Plots[c]	
	Wet-Mesic Prairies	Wet Prairies
Common Yellowthroat	common	common
Red-winged Blackbird	common	common
Swamp Sparrow	uncommon	common
Sedge Wren	—	common
Song Sparrow[a]	common	common
American Goldfinch	common	common
Bobolink[ab]	common	common
Savannah Sparrow[a]	common	rare
Brown-headed Cowbird[a]	uncommon	uncommon
Eastern Kingbird	uncommon	rare
Willow Flycatcher	uncommon	uncommon
Henslow's Sparrow[b]	—	uncommon
Field Sparrow[ab]	uncommon	—
Vesper Sparrow[ab]	uncommon	—
Upland Sandpiper[b]	—	uncommon
Eastern Meadowlark[a]	uncommon	uncommon
Western Meadowlark[ab]	—	uncommon
American Robin	uncommon	—
Mallard	—	uncommon
Blue-winged Teal	—	uncommon
Yellow Warbler	rare	uncommon
Sandhill Crane	—	uncommon
Black-billed Cuckoo[a]	—	uncommon
Northern Oriole	—	rare
Ring-necked Pheasant	rare	—
American Woodcock	rare	—

[a]Federal Breeding Bird Survey declining species.
[b]WDNR species of special concern list.
[c]Common: greater than 32 birds per 100 acres; uncommon: between 4 and 32 birds per 100 acres; rare: less than 4 birds per 100 acres; — = did not occur.

and wet prairies, are thought to be declining in numbers in Wisconsin. Results of the Federal Breeding Bird Survey in Wisconsin show that 35% of the 26 wet-mesic or wet prairie species in Table 2 have declined significantly in Wisconsin since 1966 (USFWS 1988). Only 4 of the 26 species—Red-winged Blackbird, Mallard, Sandhill Crane, and American Robin—have shown significant increases since 1966. Six wet-mesic or wet species are currently on the WDNR "special concern" list: Bobolink, Henslow's Sparrow, Vesper Sparrow, Field Sparrow, Western Meadowlark, and Upland Sandpiper; these are species thought to be declining, precariously rare, or of unknown status by experienced field biologists in Wisconsin.

The causes of the declines are not exactly known. Recent research has shown that many grassland species have a certain minimum habitat size that is required to maintain a viable breeding population. Among the wet-mesic and wet prairie species, goldfinch and Savannah Sparrow require a minimum habitat size of 2.5 to 25 acres; Upland Sandpiper, Sedge Wren, Vesper Sparrow, and Henslow's Sparrow require minimum habitat size of 25 to 250 acres (Samson 1980a). The Greater Prairie Chicken requires a minimum habitat

size of greater than 250 acres. Prairie Chicken populations are more likely to succeed when prairie remnants are close together than when they are far apart (Samson 1980b). Thus, the small size and isolation of many wet-mesic and wet prairie fragments may be contributing to the decline or extirpation of some species. Large-bodied and wide-ranging species may suffer the highest losses. Of the nearly one hundred wet-mesic and wet prairie remnants presently known in Wisconsin, only 9, including the 3 described here, are larger than 25 acres.

The fact that many prairie fragments are adjacent to or being invaded by woods may also be contributing to the decline of some prairie birds. Johnson and Temple (1986) found that grassland birds (including 4 species found in wet-mesic or wet prairies) nesting within 45 meters of a forest edge on Minnesota tallgrass prairie fragments had significantly lower nest productivity than did those nesting far from a forest edge. Management of prairie areas with such techniques as prescribed burning can inhibit woody growth and promote the health of native grasses and forbs. These techniques can also improve both nesting habitat and nest success for some prairie bird species (Huber and Steuter 1984, Kruse and Piehl 1986).

Description of Sites

Three sites, which exemplify the wet-mesic and wet prairies in Wisconsin, were chosen because they are large and relatively intact examples of remaining prairies. They also have an extensive history of breeding bird surveys upon which the bird lists and abundance indices were based. These surveys are usually single-visit surveys using standard methods and routes that are repeated each survey. Due to the nature of these surveys, some nocturnal species such as owls, Common Snipe, Whip-poor-will, and Common Nighthawks may be present but unrecorded.

Avoca Prairie-Savanna

Size.—This site totals about 1500 acres, with about 1000 acres of prairie. The remainder is classified as sedge meadow, shrub-carr, and oak-opening.

Location.—Northern Iowa County.

Access.—From Avoca, take State Highway 133 east 1.5 miles, then turn north on Hay Lane Road. Follow Hay Lane Road beyond Marsh Creek about 1/3 mile to a parking area at the southeast corner of the prairie. During wet weather or for those vehicles with low road clearance, park in the lot just south of Marsh Creek, then walk into the area.

Site Description.—Avoca Prairie-Savanna is the largest native tallgrass

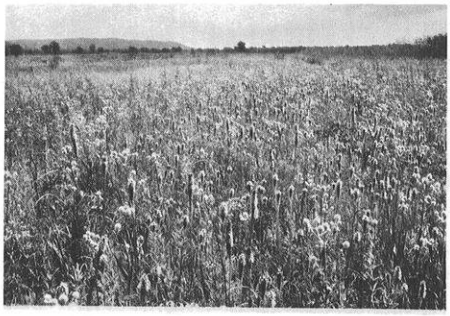

Figure 2. A view of the broad expanse of prairie at Avoca.

prairie east of the Mississippi River. It is located on a huge outwash sand terrace along the Wisconsin River. A braided stream topography dominates with a local relief of 4 feet. Annual flooding has patterned depositional sandbars interspersed with small linear wetland swales. The moist prairie and wetland swales contain over 200 species of vascular plants. Little bluestem (*Schizachyrium scoparius*), northern dropseed (*Sporobolus heterolepis*) and June grass (*Koeleria cristata*) dominate the sand areas, while cordgrass, big bluestem and blue joint grass dominate the wetter areas. Many species of showy forbs add a continuous flow of color throughout the summer months. Avoca Prairie-Savanna is probably the only place in the eastern United States where, no matter where one stands, one sees only natural prairie and savanna features, with the imprint of man's work substantially unnoticeable.

Birds.—The bird life is somewhat different from that in other wet to wet-mesic prairies (Table 3). This is due mainly to the interspersion of the linear wetland swales throughout the prairie. Many wetland species find enough suitable habitat to occur throughout most of the prairie-savanna. In addition, there are enough willows and other shrubs growing along these wetland swale-prairie edges to permit establishment of shrub-carr species. This combination of different factors results in a prairie which has a more diverse avifauna than most.

Table 3. Breeding species of Avoca Prairie-Savanna.

Species	Status[a]
Great Blue Heron	uncommon
Wood Duck	uncommon
Mallard	uncommon
Northern Harrier	rare
Red-shouldered Hawk	uncommon
Virginia Rail	rare
Sora	rare
Sandhill Crane	uncommon
American Woodcock	rare
Mourning Dove	common
Black-billed Cuckoo	rare
Yellow-billed Cuckoo	rare
Barred Owl	rare
Ruby-throated Hummingbird	rare
Belted Kingfisher	rare
Red-headed Woodpecker	uncommon
Red-bellied Woodpecker	rare
Yellow-bellied Sapsucker	rare
Downy Woodpecker	uncommon
Common Flicker	rare
Eastern Wood Pewee	rare
Willow Flycatcher	common
Least Flycatcher	rare
Tree Swallow	common
Bank Swallow	rare
Barn Swallow	rare
Blue Jay	rare
American Crow	uncommon
Black-capped Chickadee	rare
Brown Creeper	rare
Sedge Wren	common
Marsh Wren	uncommon
American Robin	common
Gray Catbird	uncommon
Brown Thrasher	uncommon
Cedar Waxwing	rare
Warbling Vireo	rare
Yellow Warbler	common
Common Yellowthroat	abundant
Rose-breasted Grosbeak	rare
Indigo Bunting	rare
Vesper Sparrow	rare
Savannah Sparrow	rare
Henslow's Sparrow	rare
Song Sparrow	abundant
Swamp Sparrow	common
Bobolink	rare (formerly common)
Red-winged Blackbird	abundant
Eastern Meadowlark	common
Common Grackle	common
Brown-headed Cowbird	common
Northern Oriole	rare
American Goldfinch	common

[a]Abundant: more than 100 breeding pairs; common: 20–100 breeding pairs; uncommon: 3–20 breeding pairs; rare: less than 3 breeding pairs or irregular visitor.

Kettle Moraine Low Prairie

Size.—This site covers 280 acres, but it is adjacent to the nearly 3,000-acre Scuppernong marsh, a sedge meadow.

Location.—Southwestern Waukesha County.

Access.—From Eagle, go north 2.25 miles on State Highway 67 to a gated access road. From the parking area follow the service road west 0.5 miles to the east boundary. The Ice Age Hiking Trail follows the southern boundary.

Site Description.—The prairie has been subjected to grazing and mowing in the past, but it is the largest and a quite representative portion of the once extensive Scuppernong Prairie. The prairie varies in quality and composition. Many portions are in near presettlement condition, while others are in the process of recovering from past disturbance. South of the service road is an area of very rich low prairie with Indian grass (*Sorghastrum nutans*), big and little bluestem, rattlesnake master (*Eryngium yuccifolium*), prairie blazing star, wood betony (*Peducularis canadensis*), prairie dock, and several goldenrods and asters. North of the service road is an area of prairie that also contains several fen elements such as valerian (*Valeriana ciliata*), grass of parnassus (*Parnassia glauca*), Ohio goldenrod (*Solidago ohioensis*) and golden-alexanders. Also within the site are two sandy knolls rising about 2 feet above the surrounding low prairie; these recovering prairies are much drier and are dominated by little bluestem.

Birds.—The bird life is quite indicative of wet-mesic and wet prairie. However, there are several ditches and disturbed areas containing large woody vegetation, which affects the bird life on the prairie. These areas are going to be reduced in extent and content through Natural Area management. This management should open areas to a presettlement prairie aspect. It is

Table 4. The breeding bird species of Kettle Moraine Low Prairie.

Species	Status[a]
Turkey Vulture	rare
Northern Harrier	rare
Red-tailed Hawk	rare
Ring-necked Pheasant	uncommon
Sandhill Crane	uncommon
Mourning Dove	uncommon
Yellow-billed Cuckoo	rare
Red-headed Woodpecker	rare
Downy Woodpecker	uncommon
Common Flicker	rare
Crested Flycatcher	rare
Purple Martin	rare
Tree Swallow	rare
Barn Swallow	rare
Blue Jay	rare
Black-capped Chickadee	rare
White-breasted Nuthatch	rare
House Wren	rare
Sedge Wren	uncommon
American Robin	uncommon
Gray Catbird	rare
Brown Thrasher	rare
Veery	rare
Cedar Waxwing	uncommon
Blue-winged Warbler	rare
Yellow Warbler	uncommon
Common Yellowthroat	common
Cardinal	uncommon
Rose-breasted Grosbeak	rare
Indigo Bunting	uncommon
Rufous-sided Towhee	uncommon
Chipping Sparrow	uncommon
Field Sparrow	uncommon
Savannah Sparrow	uncommon
Grasshopper Sparrow	uncommon
Henslow's Sparrow	uncommon
Song Sparrow	common
Swamp Sparrow	common
Bobolink	uncommon
Red-winged Blackbird	common
Eastern Meadowlark	uncommon
Common Grackle	uncommon
Brown-headed Cowbird	common
Northern Oriole	rare
American Goldfinch	common

[a]Common: more than 20 breeding pairs; uncommon: 3–20 breeding pairs; rare: less than 3 breeding pairs or irregular visitor.

hoped that an even more representative and viable prairie bird population will develop. Table 4 lists the breeding birds of the Kettle Moraine Low Prairie.

Fountain Creek Prairie

Size.—This site covers 100 acres, within the Grand River Marsh Wildlife Area.

Location.—Southwestern Green Lake County.

Access.—From the intersection of Highways 22 and B in southern Marquette County, go east on County Highway B 5.4 miles, then turn north on an access road to a parking lot. The prairie is found northwest of the parking lot on both sides of Belle Fountain Creek.

Site Description.—Fountain Creek Prairie is a wet prairie, one of the rarest communities in Wisconsin. The prairie is situated on a very gradual slope, descending from uplands to dense stands of nearly pure cordgrass near the Grand River Marsh Flowage. Common grass species of this wet prairie include big and little bluestem, blue joint grass, upland wild timothy, northern dropseed and cordgrass. Some of the more showy forbs are prairie blazing star, turtlehead (*Chelone glabra*), bottle gentian, New England aster, sneezeweed (*Helenium autumnale*), sawtooth sunflower, prairie phlox, and prairie lily (*Lilium philadelphicium*).

Birds.—Being adjacent to the Grand River Marsh Flowage, Fountain Creek Prairie receives heavy use from migrating waterfowl and other wetland birds. Table 5 lists those birds primarily using the prairie and additional species whose primary summer range is in wetter portions of the marsh but may use the prairie.

Table 5. The breeding bird species of Fountain Creek Prairie.

Species	Status[a]
Least Bittern	summer visitor
Great Blue Heron	summer visitor
Wood Duck	summer visitor
Blue-winged Teal	summer visitor
Mallard	summer visitor
Gadwall	summer visitor
Virginia Rail	summer visitor
Sora	summer visitor
Common Moorhen	summer visitor
American Coot	summer visitor
Sandhill Crane	uncommon
Black Tern	summer visitor
Downy Woodpecker	rare
Tree Swallow	summer visitor
Barn Swallow	summer visitor
Sedge Wren	common
Marsh Wren	rare
Yellow Warbler	rare
Common Yellowthroat	common
Savannah Sparrow	uncommon
Henslow's Sparrow	rare
Song Sparrow	common
Swamp Sparrow	common
Bobolink	uncommon
Red-winged Blackbird	common
Eastern Meadowlark	rare
Yellow-headed Blackbird	summer visitor
American Goldfinch	uncommon

[a]Common: more than 20 breeding pairs; uncommon: 3–20 breeding pairs; rare: less than 3 pairs or irregular.

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Introducing "In the Words of Ornithologists Past . . ."

by Michael J. Mossman and Sumner W. Matteson

Today's world changes quickly, encouraging our preoccupation with the steady outpouring of new information and new technology. But change does not antiquate the past. Rather, it makes a careful look backward all the more vital, if only to remind us that past decisions have shaped the present as surely as our own acts will affect the future.

Historical perspectives are as important to bird study and conservation as they are to other endeavors. A perspective on the past encourages wise land stewardship and provides a foundation for practical work on resource management problems. For example, endangered species management is often guided by historical information on the nature and causes of a species' decline, and recovery goals are suggested by former population levels.

In a less practical but equally important sense, historical perspectives deepen our understanding of, and therefore our pleasure in, Wisconsin's wildlife and landscapes. We hope this series of articles will foster such an understanding, through a review of the actual words and experiences of former Wisconsin explorers, naturalists, hunters, and conservationists. Facts and figures will not be emphasized. We feel that an eyewitness account of Wisconsin's great Passenger Pigeon flocks is a history lesson just as valuable as knowing the numbers of birds or the date at which the species was lost.

What's more, an appreciation of today's bird conservation laws and public attitudes is incomplete without some feeling for the controversies and occurrences of the late 19th century, without seeing the wasted life in the photos of market gunning, or sensing the fervor in editorials by the blossoming protectionist movement. It is enlightening to read the words of a young egg collector a century ago, and sense the same excitement and joy that many of us find in today's "nonconsumptive" pursuits of bird watching, photography, or research.

Another purpose of this series is to demonstrate the lasting value of recording field observations. By caring enough to write about our own observations and experiences, we provide future generations a window into our

world, as the ornithologists past have done for us.

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John Muir (1838–1914), (*photo: State Historical Society of Wisconsin*)

John Muir: Reveling in the Wisconsin Frontier

by Michael J. Mossman

John Muir (1838–1914) was the foremost champion of American wilderness, and his influence on conservation has been inestimable (Fox 1988). This year is the 150th anniversary of his birth—an appropriate time to commemorate this "wildest of all American naturalists," particularly in Wisconsin where many of his formative years were spent.

Although Muir is perhaps most often remembered for his role in protecting California wilderness and initiating the National Park system and the Sierra Club, his legacy also includes a collection of writings that relate colorful experiences, keen skills of observation, and a philosophy that remains as important today as it was a century ago.

Some of Muir's most fascinating writing is found in *The Story of My Boyhood and Youth*, originally issued in 1913 and republished in 1965 by the University of Wisconsin Press (Muir 1965). Completed by Muir at the age of 72, just 4 years before his death, it chronicles the evolution of his indomitable commitment to wildness as it developed from a childlike love of nature, an "ancient inherited belligerence," a Scottish culture that prepared boys for battle, and a tyrannical father.

In 1849, at the age of 11, Muir emigrated from Scotland with his family, full of anticipation from the accounts of Wilson, Audubon, an others of a new world where there would be "no more grammar, but boundless woods full of mysterious good things; trees full of sugar growing in ground full of gold; hawks, eagles, [passenger] pigeons filling the sky; millions of birds' nests and no game keepers to stop us in all the wild, happy land."

They settled among the virgin savanna-like "oak openings" of Marquette County, 4–5 miles from the nearest neighbor, beside what Muir's father called Fountain Lake—now Ennis Lake. They later moved to a second tract 6 miles to the southeast and established their Hickory Hill farm which still stands today. From the age of 11 until he left for the University of Wisconsin at the age of 2, John was kept busy cutting and grubbing out oaks and working the land to produce whet, corn, and potatoes. But, he also stole time to develop ingenious inventions

and to observe and revel in "that glorious Wisconsin wilderness" around him. It is his vivid account of that wilderness in *The Story of My Boyhood and Youth* that holds special interest in Wisconsin, for it is one of the best descriptions of southern Wisconsin at the tie when the oak openings were rapidly giving way to settlement. Except for a few minor inaccuracies such as the story of a "copperhead" snake (probably a fox snake, *Elaphe vulpina*) and of pasque flowers that grew to a height of 2–3 feet, Muir's reminiscences are consistent with current knowledge of Wisconsin landscapes and wildlife in the 1850's.

Apparently, Muir did not wander far from home during this period. The most distant places he mentions visiting are Portage, Lake Puckaway, and Kingston, all within 12 miles of either Fountain Lake or Hickory Hill. But, at that time even so small an area embraced a wildness and richness that today seems priceless. The area between Kingston and Fountain Lake was "trackless carex swamps and low rolling hills sparsely dotted with round-headed oaks . . . The wild rice-marshes along the Fox River and around Puckaway Lake were the summer homes of millions of ducks, and in the Indian summer, when the rice was ripe, they grew very fat . . . often as a half dozen [mallards] were killed at a shot . . ."

This landscape changed rapidly during Muir's youth, for within "3–4 years almost every quarter section of government land was taken up . . . and in a very short time the new country began to look like an old one." As the land came under cultivation, prairie fires ceased. "As soon as the oak openings in our neighborhood were settled, and the farmers prevented running grassfires, the grubs grew up into trees, and formed tall thickets so dense that it was difficult to walk through them and every trace of the sunny 'openings' vanished." So began the demise of wisconsin's 5.5 million acres of oak opening, of which but a very few small remnants have survived.

The nearly total disappearance of this once common community makes *My Boyhood and Youth* all the more valuable. It is fortunate that although Muir described many experiences with the flora and fauna at Fountain Lake, some of his most vivid memories were of birds. He gives us some idea of the native avifauna of the presettlement oak openings, and the response of some species to settlement.

According to Muir, Black-capped Chickadees and White-breasted Nuthatches were common year-round residents both before and after the country became settled. Robins adapted readily to the invasion by settlers. Blue Jays were apparently common nesters, but did not winter in considerable numbers until the country became settled. The openings and early agricultural landscape also included Eastern Bluebird, Brown Thrasher, Common Nighthawk, Eastern Kingbird, Whip-poor-will, Northern Oriole and Red-headed Woodpecker. Song Sparrows apparently occurred in shrubby areas, while the Scarlet Tanagers that Muir recalled may have nested in areas where oaks great fairly close to one another. Meadowlarks were present, probably in both the more open savannas and in the agricultural fields that followed. According to Muir's mnemonic rendition of the meadowlark's song, it was the eastern species he found. This is consistent with other sources that doc-

ument the rarity of Western Meadowlarks in Wisconsin until the early 1900's

Common Snipe winnowed over the wet meadows of Fountain Lake. Bobolinks, "gushing, gurgling, in exhaustible fountains of song . . . lived far out on the broad Fox River meadows," but apparently not among either the openings or the agricultural uplands.

Think of it, that "paradise of birds," as Muir called it, in which he received his "baptism in Nature's warm heart." It was a world without House Sparrows, European Starlings, or Rock Doves. Prairie Chickens and Bobwhites were common, and benefited from the early agricultural changes.

> "Prairie chickens came strolling in family flocks about the shanty, picking seeds and grasshoppers like domestic fowls, and they became still more abundant as wheat and corn fields were multiplied, but also wilder, of course, when every shotgun in the country was aimed at them. The booming of the males during the mating season was one of the loudest and strangest of the early spring sounds, being easily heard on calm mornings at a distance of a half or three fourths of a mile. As soon as the snow was off the ground, they assembled in flocks of a dozen or two on an open spot, usually on the side of a plowed field, ruffled up their feathers, inflated the curious colored sacks on the sides of their necks, and strutted about with queer gestures something like turkey gobblers, uttering strange loud, rounded, drumming calls, *boom*! *boom*! *boom*! interrupted by choking sounds. . . . In winter . . . they assemble in large flocks, fly about sundown to selected roosting places on tall trees, and to feeding places in the morning,—unhusked corn fields, if any are to be found in the neighborhood, or thickets of dwarf birch and willows, the bunds of which furnish a considerable part of their food when snow covers the ground."

Trumpeter Swans probably nested in Wisconsin in those days, though not in the Fountain Lake vicinity. They certainly migrated through the state, and Muir "admired their clear bugle notes" as they passed overhead. Within 50 years they would be extirpated from Wisconsin, most of the midwest, and adjacent parts of Canada (Matteson et al. 1988).

Passenger Pigeons, too, were part of Muir's landscape. Although no nesting colonies occurred near Fountain Lake, large ones were still active not far away (Schorger 1965). Muir's description is thrilling:

> "It was a great memorable day when the first flock of passenger pigeons came to our farm, calling to mind the story we had read about them when we were at school in Scotland. Of all God's feathered people that sailed the Wisconsin sky, no other bird seemed to us so wonderful. The beautiful wanderers flew like the winds in flocks of millions from climate to climate in accord with the weather, finding their food—acorns, beechnuts, pine-nuts, cranberries, strawberries, huckleberries, juniper berries, hackberries, buckwheat, rice, wheat, oats, corn—in fields and forests thousands of miles apart. I have seen flocks streaming south in the fall so large that they were flowing over from horizon to horizon in an almost continuous stream all day long, at the rate of forty or fifty miles an hour, like a mighty river in the sky, widening, contracting, descending like falls and cataracts, and rising suddenly here and there in huge ragged masses like high-plashing spray. How wonderful the distances they flew in a day—in a year—in a lifetime! They arrived in Wisconsin in the spring just after the sun had cleared away the snow, and alighted in the woods to feed on the fallen acorns that they had missed the previous autumn. A comparatively small flock swept thousands of

acres perfectly clean of acorns in a few minutes, by moving straight ahead with a broad front. All got their share, for the rear constantly became the van by flying over the flock and alightening in front, the entire flock constantly changing from rear to front, revolving something like a wheel with a low buzzing wing roar that could be heard a long way off. In summer they feasted on wheat and oats and were easily approached as they rested on the trees along the sides of the field after a good full meal, displaying beautiful iridescent colors as they moved their necks backward and forward when we went very near them. Every shotgun was aimed at them and everybody feasted on pigeon pies, and not a few of the settlers feasted also on the beauty of the wonderful birds . . . 'Oh, what bonnie, bonnie birds!' we exclaimed over the first that fell into our hands."

If you have not read *The Story of My Boyhood and Youth*, please be sure to do so. It is a view of a vanished world that is part of our Wisconsin heritage. And it is an inspiration for all who hope to absorb and celebrate the simple an sometimes fleeting glories of an ever changing natural world.

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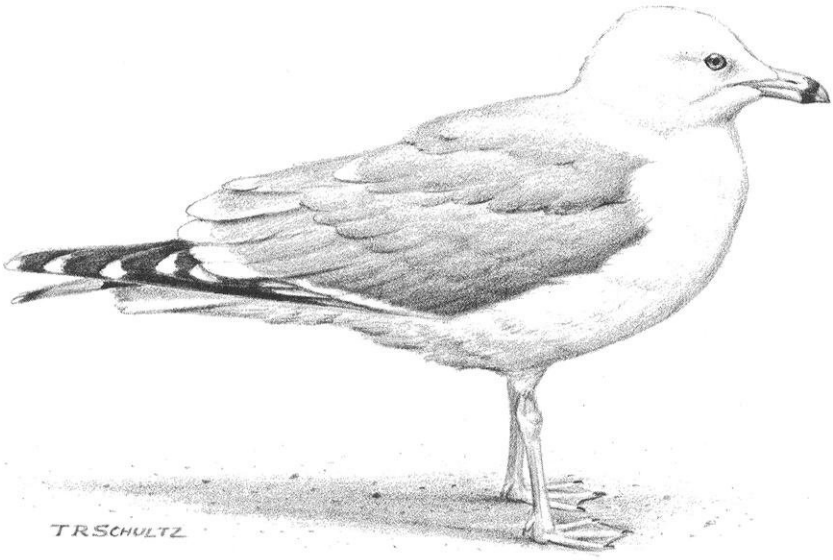

Ring-billed Gull *by Thomas R. Schultz*

The Summer Season: 1987

by Thomas K. Soulen

Hot weather began with a bang, with the summer's maximum of 102° being recorded at Iola on June 7. In only one week of the season did the temperature not reach at least the upper 90's somewhere in the state. What few periods of cooler, more comfortable conditions there were lasted only a few days.

Farmers in many parts of the state, especially in the north, complained about the overall dry conditions. There were very few periods of widespread, sustained precipitation. Although some areas received little rainfall, some were deluged: spots in the central third of the state received 8–10 inches just after the middle of June, and the Hudson area was on the edge of one of the Twin Cities' worst ever downpours, receiving 5 inches during a week near the end of July. There were relatively few reports of really damaging winds and hail, and no one commented on the effects of either temperature or wet or violent weather on birds.

Observers reported a total of 254 species during the season. Of these, 66 were common and widespread enough so as to be noted in more than 25 counties; they are not included in the listings below. An additional 47 species were reported from 10–25 counties; each species is followed by the number of counties in which it was observed: Pied-billed Grebe (24), Double-crested Cormorant (22), Blue-winged Teal (23), Bald Eagle (15), Northern Harrier (18), Cooper's (14) and Broad-winged (21) Hawks, Ring-necked Pheasant (17), Ruffed Grouse (19), Northern Bobwhite (13), Virginia Rail (11), Sora (15), American Coot (14), Sandhill Crane (18), Upland Sandpiper (13), Common Snipe (15), American Woodcock (13), Ring-billed (21) and Herring (19) Gulls, Common (11), Forster's (10) and Black (24) Terns, Black-billed (20) and Yellow-billed (19) Cuckoos, Great Horned (18) and Barred (21) Owls, Whip-poor-will (16), Yellow-bellied Sapsucker (22), Pileated Woodpecker (25), Alder (24) and Least (25) Flycatchers, Horned Lark (20), Bank Swallow (24), Winter (15) and Marsh (21) Wrens, Blue-gray Gnatcatcher (17), Hermit Thrush (16), Golden-winged (17), Blackburnian (10), and Black-and-White (19) Warblers, Northern Waterthrush (12), Scarlet Tanager (23), Clay-colored (21), Ves-

per (23), and Grasshopper (23) Sparrows, and Yellow-headed (22) and Brewer's (21) Blackbirds. The remaining 141 species are discussed below.

Manitowoc again accounted for several of the summer's rarities. This year's unusual sightings included an Arctic Tern observed there the first week in June and a Laughing Gull that spent over 3 weeks there. A Mississippi Kite made a brief appearance in Sheboygan Co. on June 7, the second report in 3 summers. A Ruff visited the sewage ponds in Madison for the second time in 4 summers. Other unusual sightings included a Swainson's Hawk in Dunn Co., American Avocets in Manitowoc and Shawano Counties, a Carolina Wren in Madison, Yellow-throated and Prairie Warblers in Rock and Ozaukee Counties, respectively, another Prairie Warbler in Waupaca Co., and increasingly widespread House Finches.

It was heartening to receive information on changes in abundance from increasing numbers of contributors. At least 3 observers stated that each of these species was present in lower numbers this year than last: Great Blue Heron, Green-backed Heron, Northern Harrier, Wood Thrush, Brown Thrasher, Yellow Warbler, and Scarlet Tanager. A larger than usual number of species appeared to have increased compared to last year. A number of observers reported encouraging increases in Eastern Bluebirds for the second year in a row, and this season's Dickcissel population was one of the best in years. Ring-billed Gulls, Caspian Terns, Yellow-headed Blackbirds, Purple Finches and Evening Grosbeaks also were said to be more common this year by at least 3 observers.

This year's 61 contributors are about 10 fewer than the highs of the past few years. In addition, several individuals who have done fairly extensive multi-county birding in recent years did much less or none this season. The resulting reduced coverage of the state means that our picture of the season is even more imperfect than usual. It would be helpful if more individuals would submit reports from their home counties, especially individuals who live in areas not often visited by other birders. As many of us are aware, much of the western and central part of the state receives spotty coverage at best, and much of what we learn about northern areas comes from individuals who live further south and bird actively while vacationing in those areas. Adding even a relatively few regular contributors from less well covered regions could give us a much better balanced picture of our summer avifauna. If you've been reluctant to submit your reports up until now, it's never too late to begin!

One final, related comment. Examining the records submitted revealed that quite a number of species were found in significantly fewer counties this season than in recent years. That fact is mentioned in some of the species accounts below. It is very difficult to judge whether the reduced number of localities reporting a species reflects real differences in distribution or numbers compared to previous years. While that scenario is possible, it also may be simply the result of the different numbers, distribution, and activity of contributors.

Reports (June 1–July 31, 1987)

Common Loon.—Observed in Jackson Co. (Swengel), as well as
in 14 more northern counties.

Horned Grebe.—A bird that remained in the Ashland/Bayfield Co. area until June 29 was unusual (Verch).

Red-necked Grebe.—A pair raised 2 young in Columbia Co. (many observers). Ziebell counted 94 birds in Winnebago Co. June 14, with high counts of 38 eggs and 22 young during the season. Also noted in Burnett (nested, *fide* Hoffman) and St. Croix (Jim Evrard, fide Hoffman) Counties.

Western Grebe.—A single bird was present June 14–28 in Winnebago Co. (Ziebell).

American White Pelican.—The only report was from Douglas Co. June 11 (Johnson).

American Bittern.—Only 4 of the 17 counties from which this species was reported were in the southern half of the state.

Least Bittern.—Noted in 11 counties, with 16 in Winnebago Co. June 14 (Ziebell).

Great Egret.—Observed in only 9 counties this season, compared to 13–17 in the preceding 4 summers.

Little Blue Heron.—Noted in Green Co. July 30 (N. R. Barger, Robbins).

Black-crowned Night Heron.—Observed in only 7 counties, all eastern except for Trempealeau (Hoffman).

Yellow-crowned Night Heron.—Up to 4 birds were observed in Green Co. June 6–13 (several observers). Noted also in Outagamie (Anderson, Gill; July 11) and Dane (Thiessen, July 25) Counties.

Trumpeter Swan.—Probably a product of recent years' releases in the Twin Cities area, Wisconsin's first summer record in many years came from St. Croix Co. June 19 (Jim Evrard and DNR personnel, *fide* Hoffman).

Tundra Swan.—Noted in Douglas Co. June 7–8 (Semo).

Mute Swan.—This species is now established in several areas. This season's reports came from Ashland, Bayfield, Douglas, Racine and Walworth Counties.

Green-winged Teal.—Observed in these 10 counties: Barron, Bayfield, Columbia, Dane, Door, Dunn, Eau Claire, Iron, Manitowoc, and Winnebago.

American Black Duck.—The 9 counties in which this species was found were Ashland, Bayfield, Columbia, Dane, Douglas, Iron, Manitowoc, Milwaukee and Vilas.

Northern Pintail.—The only reports were of pairs in Columbia Co. June 12 (Hansen) and Winnebago Co. June 14 (Ziebell).

Northern Shoveler.—Noted in Barron, Brown, Chippewa and Dane Counties.

Gadwall.—This year's reporting counties were Columbia, Dane, Dunn, Manitowoc, Milwaukee and Winnebago.

American Wigeon.—Observed in 5

counties: Bayfield, Columbia, Dane, Douglas and Dunn.

Canvasback.—The summer's only observation was in Dunn Co. (Polk).

Redhead.—Recorded in Columbia, Dunn, Kewaunee, Manitowoc, Milwaukee, Vilas and Winnebago Counties.

Ring-necked Duck.—Observers found this species in 10 counties: Ashland, Barron, Bayfield, Burnett, Dane, Douglas, Dunn, Kewaunee, Oconto and Price.

Greater Scaup.—One remained in Manitowoc Co. until June 8 (Sontag).

Lesser Scaup.—Noted in Bayfield, Columbia, Dane and Dunn Counties.

Common Goldeneye.—Semo provided this season's only reports, from Ashland (July 3) and Douglas (June 17) Counties.

Bufflehead.—Observed in Douglas Co. June 3 (Semo) and in Manitowoc Co. until July 14 (Tessen).

Hooded Merganser.—Found in 11 counties overall: Barron, Chippewa, Dane, Douglas, Dunn, Manitowoc, Outagamie, Pepin, Racine, Shawano and Vilas.

Common Merganser.—Noted in Ashland, Douglas, Forest, Iron, Oneida and Vilas Counties.

Red-breasted Merganser.—Ashland, Bayfield, Manitowoc and Vilas Counties provided the only reports.

Ruddy Duck.—Found in Chippewa, Columbia, Dane, Dunn, Jefferson, Taylor, Waukesha and Winnebago Counties.

Osprey.—An attempted nesting in Manitowoc Co. was of interest (Tessen). Noted in 14 counties overall, the southernmost other one being Juneau (Richter).

Mississippi Kite.—The second summer report in 3 years came from Sheboygan Co. June 7 (Donald). Accepted by the Records Committee. See "By the Wayside."

Sharp-shinned Hawk.—Reported from Dane Co. June 20 (Robbins) and from 10 additional, more northern counties.

Northern Goshawk.—Reports from Rocky Run, Columbia Co., on several dates in June are very unusual (Mark Marten, Allen Holzhueter et al. *fide* Hoffman). More northern observations were in Ashland, Bayfield, Douglas, Forest, Iron and Vilas Counties.

Red-shouldered Hawk.—It would be interesting to know just how far north this species summers regularly in the state. There are a few reports some years from northern counties in the eastern part of the state. This season they came from 4 locations between Shawano and Forest Counties, as well as from 10 more southern counties.

Swainson's Hawk.—A bird seen June 1 in Dunn Co. was most unusual (Polk).

Merlin.—Nested in Ashland Co., with 5 birds seen July 25 (Verch).

Gray Partridge.—As has been the

case in recent years, this species was recorded in very few counties: Grant (the Sheas), Lafayette (Hoffman; 25 on July 25) and Winnebago (Ziebell).

Spruce Grouse.—The only report was of a female and 4 young in Vilas Co. July 7 (Spahn).

Wild Turkey.—With continued spreading, this species is appearing in an increasing number of counties: Crawford, Grant, Iowa, Jackson, Juneau, Lafayette, Pepin and Walworth.

King Rail.—The only 2 reports were from Columbia Co. June 6 (Hansen) and Waupaca Co. July 23 (Hoffman).

Common Moorhen.—Noted in these counties: Brown, Columbia, Dane, Jefferson, Manitowoc, Racine, Waukesha and Winnebago.

Black-bellied Plover.—Departed very late (June 27) from Douglas Co. (Johnson).

Lesser Golden-Plover.—Two different early fall migrants appeared in Dane Co. July 4–7 (Hansen, Sutton, Thiessen).

Semipalmated Plover.—Departed June 11 from Dane (Thiessen) and Manitowoc (Sontag) Counties and from Douglas Co. June 27 (Johnson). The earliest returning birds were seen in Manitiwoc Co. July 7 (Sontag).

Piping Plover.—The only observations were in Manitowoc Co. July 19–25 (Sontag, Cowart, Tessen) and Milwaukee Co. July 26 (De Boer, Frank).

American Avocet.—This infrequent summer visitor was seen in Manitowoc Co. June 1 (Cowart) and Shawano Co. July 17 (Peterson, 2 birds).

Greater Yellowlegs.—After a June 3 report from Dane Co. (Sutton), none were noted until June 23 in Vilas Co. (Thiessen) and June 26 in Manitowoc Co. (Sontag, Soulen).

Lesser Yellowlegs.—Observed in Chippewa Co. June 9 (Polk). Reported from 4 counties June 21–22.

Solitary Sandpiper.—Remained in Dane Co. until June 6 (Thiessen). Had returned to Chippewa Co. by June 22 (Polk) and Dane Co. by the next day (Sutton).

Willet.—Birds were seen in Manitowoc for the fifth straight summer, on June 19 (Sontag) and July 23–25 (Sontag, Cowart, Tessen).

Whimbrel.—Also being noted now fairly regularly as a June migrant in Manitowoc; this year's last report was June 2 (Sontag).

Hudsonian Godwit.—Noted last in Dane Co. June 6 (Thiessen).

Marbled Godwit.—Observed July 24–26 in Manitowoc Co. (Sontag, DeBoer, Tessen).

Ruddy Turnstone.—Present throughout the period in Manitowoc Co., with a peak of nearly a thousand there June 1 (Sontag). Remained in Douglas Co. through June 11 (Johnson), with birds returning there by July 19 (Semo) and to Milwaukee Co. by July 26 (Mueller).

Red Knot.—Remained in Douglas Co.

until June 11 (Johnson) and in Manitowoc Co. until June 16 (Sontag).

Sanderling.—Still present in Douglas Co. June 11 (Johnson) and in Manitowoc Co. June 12 (Tessen). The earliest return date was July 14 in Brown Co. (Tessen).

Semipalmated Sandpiper.—Most spring migrants had left by early to mid June, but some remained until June 29 in Manitowoc Co., and it was to that county that birds had returned by July 10 (Sontag). Other fall migrants appeared in 5 additional locations within the next week.

Western Sandpiper.—Noted June 6 in Dane Co. (Thiessen) and July 25 in Manitowoc Co. (Tessen).

Least Sandpiper.—Remained until June 9 in Dane Co. (Hansen). The first fall migrants appeared June 26 in Chippewa (Polk) and Manitowoc (Sontag) Counties, with others appearing in several additional locations within the next few days.

White-rumped Sandpiper.—Most spring migrants had left before mid June, but some lingered until July 3 in Manitowoc Co. (Sontag).

Baird's Sandpiper.—Noted June 6 in Columbia Co. (Tessen), July 15 in Pierce Co. (Hoffman), and July 24–26 in Douglas (Johnson), Manitowoc (Tessen) and Dane (Ashman) Counties.

Pectoral Sandpiper.—Birds remained in Dane Co. until June 15 (Hansen) and returned to Chippewa Co. by June 29 (Polk). Most observers did not note fall migrants until the last week in July.

Dunlin.—Lingered in Manitowoc Co. until June 20 (Sontag) and returned there by July 12 (Sontag, Tessen).

Stilt Sandpiper.—Fall migrants had arrived in Manitowoc Co. by June 20 (Sontag) and in Dane Co. by June 24 (Hansen). Reports from 7 additional counties were scattered through the rest of the period.

Ruff.—A bird was present June 22–23 at the Madison sludge lagoons (Hansen, the Sheas, Sutton, Frank Freese), the same place where one appeared 4 summers ago.

Short-billed Dowitcher.—There was little time between the last spring migrant (Manitowoc Co. June 13, Sontag) and the first fall migrant (Dane Co. June 23, Sutton). A number of counties reported returning birds July 8–14. Frank noted 53 birds in Milwaukee Co. July 26.

Long-billed Dowitcher.—The only report came from Columbia Co. June 6 (Tessen).

Wilson's Phalarope.—Remained in Manitowoc Co. until June 9 (Sontag). Present throughout the period in Dane (several observers) and Douglas (Johnson, Semo) Counties. A male and 4 young were seen in Chippewa Co. June 26 (Polk).

Laughing Gull.—A bird was present in Manitowoc from June 18 through July 9 (Sontag). Accepted by the Records Committee. See "By the Wayside."

Franklin's Gull.—Present in Manitowoc Co. until June 17 (Robbins, Tessen), with 16 birds on June 4 (Sontag); had returned there by July 26 (Sontag). Noted also in Chippewa Co. June 2–7 (Polk), Columbia Co. June 25 (the Sheas), Pierce Co. July 15 (Hoffman), and Milwaukee Co. July 25–26 (Mueller, Frank).

Little Gull.—Normally present in Manitowoc Co. throughout the period, this species disappeared this year after June 1, not reappearing until June 17 (Robbins, Tessen). The high count was 6 birds on July 25 (Sontag). Also noted in Milwaukee Co. July 26 (Frank, Mueller; 4 birds).

Bonaparte's Gull.—Present throughout the period in 3 counties bordering Lake Michigan. Had disappeared from 3 counties bordering Lake Superior between June 27 and July 6.

Caspian Tern.—Reported throughout the season only in Manitowoc (Sontag) and Sheboygan (the Brassers) Counties, with scattered observations at various times in 8 additional counties.

July counts along Lake Michigan reached 200.

Arctic Tern.—The first Wisconsin summer reports accepted by the Records Committee came this season from Manitowoc Co. June 1 (Cowart) and June 7 (Landing, Monday). See By the Wayside.

Eastern Screech Owl.—The only records came from Ashland, Barron, Chippewa, Dane, Dunn, Eau Claire, Jefferson and Racine Counties.

Short-eared Owl.—A single report: Sheboygan Co. June 3 (the Brassers).

Northern Saw-whet Owl.—Noted in Ashland and Bayfield Counties (Verch).

Red-bellied Woodpecker.—The northernmost reports came from Ashland (Tedards), Barron (Goff), Forest (Nicolet National Forest Bird Survey) and Price (Hardy) Counties. Noted also in 21 more southern counties.

Black-backed Woodpecker.—Nested again at Stone's Bridge, Douglas Co. (Johnson, Semo). Noted also in Burnett (Evrard) and Vilas (Spahn) Counties.

Olive-sided Flycatcher.—Late migrants were in Dane Co. June 2 (Hansen) and Green Co. June 6 (Tessen). Other reports came from 8 northern counties within range.

Yellow-bellied Flycatcher.—Lingered until June 6–8 in Milwaukee (Frank), Sauk (Tessen), Clark (Robbins) and Manitowoc (Sontag) Counties. Noted in Door Co. June 20 (Howe) and later in the season in 3 far northern counties.

Acadian Flycatcher.—Noted in these counties: Dane, Iowa, Lafayette, Manitowoc, Pepin, Pierce, Rock, Sauk and Waukesha.

Willow Flycatcher.—Noted in Taylor Co. July 19 (N. Risch) and in 20 more southern counties.

Western Kingbird.—Noted in Green Co. June 6 (Tessen) and 14 (Hoffman).

Gray Jay.—Reported from 7 far northern counties.

Common Raven.—The most southern of the 17 reporting counties was Jackson (T. Risch).

Boreal Chickadee.—The only records came from Oneida Co. June 21 (Thiessen) and Vilas Co. July 7 (Spahn).

Tufted Titmouse.—Lafayette Co. yielded a count of 28 birds June 4–July 25 (Hoffman). Noted in 9 additional southern and western counties.

Red-breasted Nuthatch.—Rather unusual were reports from Grant Co. June 28 (N. Risch) and Lafayette Co. June 24 (Hoffman). Present again in the mature pines in the Kettle Moraine State Forest in Waukesha Co. June 28 (Soulen). Noted also in 18 northern counties.

Brown Creeper.—Recorded in Douglas, Forest, Iron, Kewaunee, Outagamie, Pierce, Shawano, Sheboygan and Vilas Counties.

Carolina Wren.—One was present in Dane Co. July 19 (Ashman).

Golden-crowned Kinglet.—Observed in these northern counties: Ashland, Douglas, Forest, Iron, Langlade, Oneida, Taylor and Vilas.

Ruby-crowned Kinglet.—The only observations came from Ashland, Bayfield, Douglas, Forest, Iron and Price Counties.

Swainson's Thrush.—Still present in Milwaukee Co. June 8 (Frank). Noted in Ashland, Forest and Iron Counties early in the season. Several reports July 24 suggest the possibility of migratory movement then.

Loggerhead Shrike.—Six nests were recorded in the state (*fide* Hoffman). One in Pepin Co. fledged 5 young (Polk); 4 attempts in St. Croix Co. yielded 10 young; and one in Dane Co. fledged 2 young on June 16. Other reports came from Rock Co. June 6 (Tessen) and Sauk Co. June 19 (Swengel).

White-eyed Vireo.—There were reports from Grant Co. June 27 (N. Risch), Green Co. June 6–13 (Tessen, Cowart), Iowa Co. July 21 (Swengel) and Lafayette Co. June 11–July 5 (Hoffman, 4 birds).

Bell's Vireo.—Observed in 9 counties, more than in recent summers, with high counts of 8 in Iowa Co. (Baughman) and 11 in Lafayette Co. (Hoffman).

Solitary Vireo.—Noted in Jackson Co. July 8 (Swengel) and in 8 northern counties.

Blue-winged Warbler.—Considerably fewer reports than usual, from these counties: Dunn, Eau Claire, Lafayette, Pepin, Sauk and Waukesha.

Tennessee Warbler.—A silent female was in Sam Robbins' yard in Madison, Dane Co. June 12, and a singing male was in Robbye Johnson's yard in Superior, Douglas Co. July 2–4. A migrant was in Rock Co. July 30 (Robbins).

Nashville Warbler.—A bird in Fond du Lac Co. was south of the usual range

of this species (Baughman). Noted also in 17 more northern counties.

Northern Parula.—The southernmost of the 9 counties in which this species was observed were Oconto (Nicolet National Forest Bird Survey) and Taylor (Risch).

Chestnut-sided Warbler.—There usually are a few reports from southern counties, but observations in Grant Co. June 13 (the Sheas) and 28 (N. Risch) and in La Crosse Co. June 19 (Tessen) were unusual. Noted in 23 counties overall.

Magnolia Warbler.—Of the 11 counties from which reports were received, Sauk was the only southern one (Robbins, June 13).

Cape May Warbler.—Noted only in Ashland (Tedards), Bayfield (Swengel), Forest (Nicolet National Forest Bird Survey) and Iron (Butterbrodt) Counties during the breeding season. A migrant was in Outagamie Co. July 31 (Mrs. Fred Tessen).

Black-throated Blue Warbler.—Reported from Ashland, Bayfield, Forest, Iron, Langlade, Oconto and Vilas Counties.

Yellow-rumped Warbler.—Noted again in Jackson Co. (T. Risch). Other observations were in 13 more northern counties.

Black-throated Green Warbler.—Still present in Waukesha Co. June 4 (Cederstrom) and Milwaukee Co. June 11 (Frank). The other 12 reporting counties were northern.

Yellow-throated Warbler.—Still present June 6 at the Avon Bottoms, Rock Co. (Tessen).

Pine Warbler.—A bird noted in Grant Co. June 27 is surprising (N. Risch). Present again in mature pines in the Kettle Moraine State Forest, Waukesha Co. (Soulen). Observed also in 13 northern counties.

Prairie Warbler.—Present for the third year in a row near the Cedarburg Bog in Ozaukee Co.; reported there last on June 27 (Sontag, Soulen). Noted also in Waupaca Co. July 23 (Hoffman).

Palm Warbler.—Observed in Bayfield Co. at least through June 24 (Swengel), Oneida Co. June 21 (Thiessen), Iron Co. June 28 (Neil Niemuth *fide* Hoffman), and Vilas Co. June 30 (Reardon, carrying food) and July 19 (Spahn).

Cerulean Warbler.—Farthest north among the 11 reporting counties was Outagamie (Robbins, June 18).

Prothonotary Warbler.—Noted in Dane Co. (nested in the UW Arboretum, Hansen) and in Grant, Jefferson, La Crosse, Lafayette and Rock Counties.

Worm-eating Warbler.—The only reports came from Grant Co. June 27 (N. Risch) and Sauk Co. June 6 (Tessen).

Louisiana Waterthrush.—An observation in Fond du Lac Co. was unusual (Baughman). Also noted in Pierce Co. July 15 (Hoffman) and Sauk Co. at least through July 9 (several observers).

Kentucky Warbler.—Reported from Grant Co. June 28 (N. Risch) and July 22 (Swengel), Waukesha Co. June 28 (Soulen) and Sauk Co. through July 9, with at least 3 present there June 29 (several observers).

Connecticut Warbler.—Observers found this in Douglas (Johnson, Semo, Soulen), Forest (Spahn) and Price (Hardy) Counties.

Hooded Warbler.—Noted in Crawford (Merz, 2 birds), Fond du Lac (Baughman, 2 males), Grant (N. Risch), Sauk (Robbins) and Waukesha (Cederstrom, Soulen) Counties.

Canada Warbler.—Two pair were located in Fond du Lac Co. (Baughman). Also observed in 6 more northern counties.

Yellow-breasted Chat.—Noted in Grant (N. Risch), Green (Tessen, 3 birds), Lafayette (Hoffman) and Rock (many observers, at least 5 birds) Counties.

Northern Cardinal.—Among the 34 counties from which this species was reported, the most northern were Barron, Oconto, Price, Sawyer and Taylor.

Dickcissel.—The best season in a number of years produced reports from no less than 23 counties; the most northern of these were Sawyer and Taylor. Hoffman counted 48 in Green Co. June 14 and almost 500 in Lafayette Co. during the season.

Field Sparrow.—The northernmost counties in which this species was observed were Barron, Douglas, Oconto, Price and Taylor.

Lark Sparrow.—Noted in Dunn, Lafayette, Pepin, Rock (16 males on June 8, Hoffman), Sauk and Trempeauleau Counties.

Henslow's Sparrow.—Reported from Shawano (Peterson) and Taylor (N. Risch) Counties, as well as 8 more southern ones.

LeConte's Sparrow.—Recorded in these 7 counties: Ashland, Bayfield, Burnett, Douglas, Forest, Price and Taylor.

Sharp-tailed Sparrow.—Noted only in Burnett Co. June 10 (Polk) and 16 (Cowart).

Lincoln's Sparrow.—Fewer reports than usual, from Ashland (Swengel), Douglas (Johnson, Semo), Iron (Neil Niemuth *fide* Hoffman) and Vilas (Spahn) Counties.

White-throated Sparrow.—The southernmost reports came from Jackson (T. Risch), Kewaunee (Howe), Outagamie (Anderson, Gill; through June 18) and Pepin (Hoffman, July 2) Counties.

Dark-eyed Junco.—Noted in Ashland, Forest, Iron and Vilas Counties.

Meadowlarks.—Hoffman located almost equal numbers of the 2 species in Lafayette Co. during the first part of the summer: 480 Eastern before July 10 and 446 Western before July 21.

Purple Finch.—A report from Manitowoc Co. through July 6 was somewhat south of the usual range of this species (Sontag).

House Finch.—This summer's reports came from Dane (Robbins), Lafayette (Hoffman), Manitowoc (Sontag), Racine (De Boer) and Sheboygan (the Brassers) Counties.

Red Crossbill.—Noted in these counties: Ashland/Bayfield (Verch), Douglas July 4 (Soulen), Price June 5 (Robbins), Taylor June 6–July 12 (N. Risch) and Vilas June 20 (Reardon) and July 8 (Spahn).

White-winged Crossbill.—Appeared in Douglas Co. June 30 (Johnson) and Kewaunee Co. July 1 (Howe). Also noted in Washburn Co. (Semo). The Douglas Co. birds, present in several locations, remained the rest of the season; the males were very vocal and were noted to be displaying actively on a number of occasions.

Pine Siskin.—Although most of the 15 reporting counties were northern, birds were observed in Manitowoc, Sauk, Trempealeau and Winnebago Counties.

Evening Grosbeak.—Noted in Kewaunee Co. (Howe), as well as in 9 more northern counties.

CONTRIBUTORS

Jim Anderson, Philip Ashman, Jeff Baughman, David and Margaret Brasser, Mary E. Butterbrodt, David Cederstrom, Bill Cowart, Jerry DeBoer, Mary Donald, Louise and Paul Engberg, Jim Evrard, Jim Frank, Jeff Gill, Alta Goff, Karen Etter Hale, Ellen Hansen, Maybelle Hardy, Dorothy Harmer, Randy Hoffman, Bob Howe, Thomas Hunter, Robbye Johnson, Ada Karow, Cheryl, Eleanor, Frederic, Hans, Roland and Weldon Kuhn, James Landing, Laura and Steve LaValley, Gyda Mahlum, Ed Merz, Catherine Monday, William Mueller, Mark Peterson, Janine Polk, Bill Reardon, Carol Richter, Nick Risch, Tim Risch, Sam Robbins, Albert Roy, Larry Semo, Al and Sue Shea, Charles Sontag, Tom Soulen, Robert Spahn, Jon Sutton, Scott Swengel, Mrs. A.M. Tedards, Daryl Tessen, Steve Thiessen, Dick Verch, Melvin Wierzbicki, Norma Zehner, Tom Ziebell

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Black-crowned Night-heron *by William R. Stott, Jr.*

"By the Wayside"

Ruff, Laughing Gull, Arctic Tern, Mississippi Kite, and Swainson's Hawk were the highlights of the summer season.

LAUGHING GULL (*Larus atricilla*)

18 June–9 July 1987, Manitowoc County.—Several different birds appeared in the time from 18 June to 9 July 1987 with at least 2 different adult birds and one second-year bird making appearances. This report will only describe the observation of the first, an adult summer-plumaged bird, which appeared on 18 June. This bird was observed in the company of Ring-billed and Bonaparte's Gulls which easily facilitated comparisons. This bird was observed in detail and under optimal lighting conditions (sun at back). The dark mantle and large size (about half way between Ring-billed and Bonaparte's Gulls) initially attracted my attention. This bird was larger than a Bonaparte's Gull. The large, dark, reddish gull-like bill with evident gonys gave the appearance of being slightly drooped, a characteristic I have noticed of other Laughing Gulls that I have seen. The black hood was complete to the throat and nape, which revealed prominant crescents above and below the eye. The wing, in flight, revealed that the unmarked (no mirror) dark primaries 1–5 formed a contrasting "triangle" on the leading edge of the wings. The remainder of the wings and mantle was dark gray. The trailing edge of the wing was white extending into the last of the primaries as white tips. The white tail and rump were unmarked. The legs were dark. The bird was harassed by the Bonaparte's Gulls and was often displaced by them. *Charles Sontag, 801 North 4th Street, Manitowoc, WI 54220.*

ARCTIC TERN (*Sterna paradisaea*)

1 June 1987, Manitowoc County.—This tern was observed at a distance of about 40–50 m. and in very good light (bright sun to my back). There were many Common Terns on the mud flats in the Manitowoc impoundment, but this one "stuck out" immediately because of its basic build. As they stood and walked around, the extreme "short-leggedness" and "no-necked" look of this tern was outstanding. As I studied the bird with a 15–60× scope, I noted these characteristics: bill (deep red, slightly darker near tip); legs (extremely short and deep red); head (black cap from bill through eye, but not quite as far down back of neck as Common Terns, black dipped down slightly, just behind eye, white area from bill and below cap continued up around back of

neck, pale gray from throat down, emphasizing, slightly, the white area below the black cap); wings at rest (darker gray markings in primaries, with very slight "smudginess" at shoulder, approximately same length as tail); wings in flight both surfaces virtually white with dark only on very outer edges of primaries).

This bird could be re-located consistently, as it was nearly a head shorter than the other terns, owing to its very short tarsi and no-necked build. These features, along with the much more completely red bill indicated Arctic Tern. The carpal smudge, remainder of black "drop" from cap behind the eye, the light area continuing up around to back of neck, and dark area just at the tip of bill identify this as a second summer bird. *William Cowart, 4034 North 45th Street, Milwaukee, WI 53216.*

Mississippi Kite (*Ictinia mississippiensis*)

7 June 1987, Sheboygan County.—I was driving west on Highway A in Sheboygan County when this falcon-like bird flew over the road right in front of me pursued by a Red-winged Blackbird. It dipped and glided like a large swallow. It flew north, landed briefly on a tree sat straight up, and then continued flying north.

The long, pointed wings and the long tail made me conclude that it had to be a Mississippi Kite. It was dark grayish on top and somewhat darker below with a pale head. It was about the size of a small Peregrine Falcon. It did not hover but flew about like a big swallow apparently catching insects. The time I watched it was very short but having just seen what we used to call a "White-tailed Kite" the black tail and the flight made me conclude that it was, indeed, a Mississippi Kite. *Mary Donald, 6918 Belmont Lane, Milwaukee, WI 53217.*

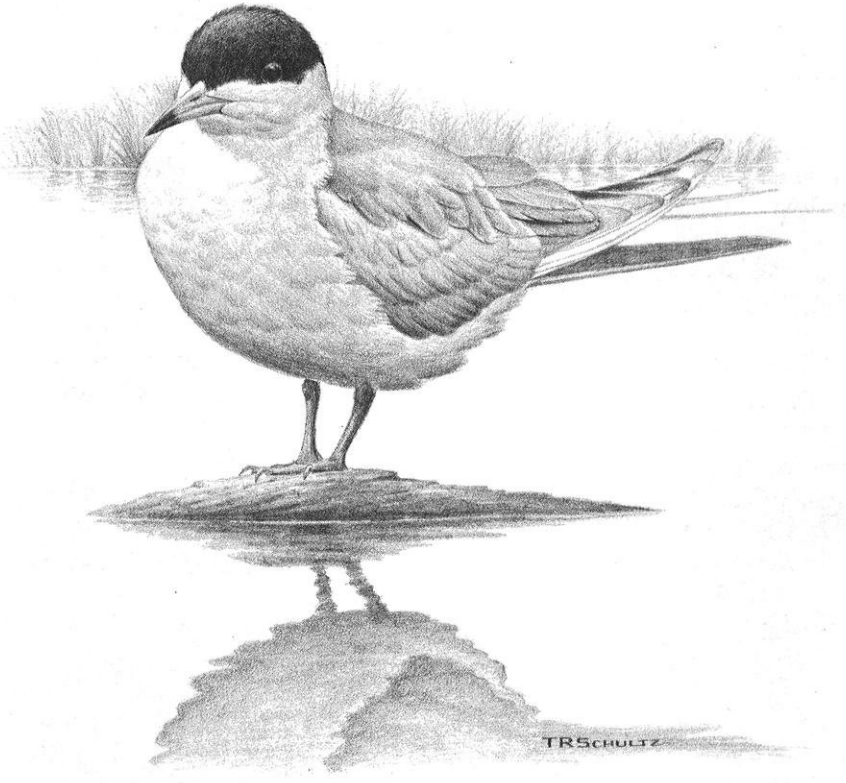
Ruff (*Philomachus pugnax*)

22–23 June 1987, Dane County, Madison Sewage Plant.—I noticed a very dark shorebird feeding among several Lesser Yellowlegs at the Madison Sewage Plant. It was shaped like the yellowlegs but was slightly larger and heavier. It had greenish legs and a dark bill. Its face appeared to be lighter than the body and was buffy-brown with a slight rusty tinge above the eye. It was dark brown over the top of the head. Its neck was dark brownish black and the color extended through the back. The breast and side of the belly were also brownish black and the flank area was light tan colored. When preening, the tail was dark brown with a white patch at the side of the base of the tail. The wings were brownish and were light underneath when it raised them. Chris Rodemacher observed the bird with me and we consulted Peterson's field guide to determine it was a Ruff.

I returned on June 23 to see the bird in morning sunlight. I was accompanied by Betsy Bartelt and Jon Sutton and we spotted it at 7 A.M. from 900 yards. It had a mottled, dark, brown-black appearance. Standing between a Lesser Yellowlegs and a Common Snipe, it appeared larger and taller than the yellowlegs. It was aggressive toward nearby birds. The bill appeared slightly curved. In flight it was larger than the Lesser Yellowlegs flying near it. It had strong slow wing beats and a white wing stripe. The dark tail had white patches separated by a medial strip. *Ellen Hansen, 630 West Badger Road, Madison, WI 53713.*

SWAINSON'S HAWK (*Buteo swainsoni*)

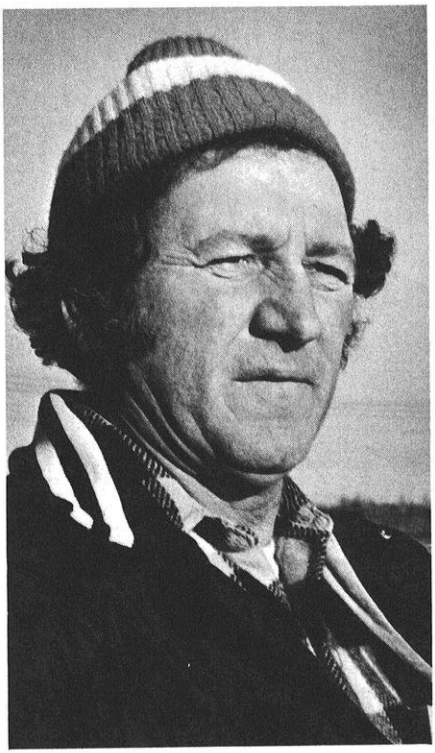
1 June 1987, Dunn County.—A Swainson's Hawk was seen at the junction of I-4 and Highway 12 in eastern Dunn Co. on June 1. It was an unusual-appearing bird with a very light head and breast, but otherwise it looked undistinctive: a buteo roughly the size of a Red-tailed Hawk, wings slightly longer and more pointed than that species, brown above, light rump, tail brownish and brown-gray with fine barring, underparts (including wing coverts) whitish, underside of flight feathers charcoal gray, wings with stiff dihedral as seen when bird sailing. I observed the bird at about 7:30 A.M. for about 15 minutes and got quite a few pictures as the bird was very cooperative (closest distance about 50 feet). *Janine Polk, 1407 Frederic, Eau Claire, WI 54701.*



Forster's Tern *by Thomas R. Schultz*

Great Gray Owl *by Thomas R. Schultz*

DONALD G. FOLLEN, SR.
1939–1988



Donald G. Follen, Sr. (*photo: The Country Today*)

Don Follen, 48, of Arpin, Wisconsin, died on February 9, 1988. Don's early passing leaves a void in the lives of those who knew him as an enthusiastic and dedicated naturalist. He was a WSO member since 1962, and he frequently shared his ornithological experiences with us all. He was prolific in publishing articles and lecturing for other's enjoyment and education, and he had much more to give and share.

Don Follen—known as "Fuzz" by his many friends—was an avid naturalist with keen interests in plants, wildlife, and especially birds. He became a Master Bird Bander in 1965, and since then he relentlessly pursued every species of bird of prey in Wisconsin, many of which he succeeded in trapping and banding. Don's purpose in life was to find out about the world of nature and to share his discoveries with others.

Don graduated from Wisconsin Rapids Teachers College and the University of Wisconsin-Stevens Point, receiving a degree in Biology. He served 2 years in the Army, and he taught for a time before entering the construction business.

In 1986, Don founded the Wisconsin Foundation for Wildlife Research and served as its President and Chief Naturalist. Designed to assemble and distribute information and to promote public education and awareness, the foundation will continue to pursue the goals that he established with the enthusiasm that he instilled in his every venture.

One of Don's passionate interests was the Great Gray Owl. He studied them in Wisconsin and Minnesota. This involved many hours of installing nesting platforms and resulted in an accumulation of information and many enriching personal contacts. The Osprey project, headed by Don and coordinated through the Bureau of Endangered Resources, covered essentially the entire central and northern sections of the state. This resulted in the banding of hundreds of nestlings, monitoring of nesting success, and tracking of population fluctuations. Bluebird trails and an ambitious American Kestrel banding program thrived under Don's attention. By studying Snowy Owls for many years, Don discovered many interesting facts about this bird in the central Wisconsin area.

A list of his banding accomplishments includes the only Northern Hawk Owls ever banded in Wisconsin, as well as the only Great Gray Owls, a Boreal Owl, and a Barn Owl near Marshfield. These are only a few of the thousands of hawks, owls, shrikes, and other species banded by Don. Many of his birds were recovered as far away as Central and South America. The birds Don banded will continue to provide information for many years. This is the best tribute we can pay him, to use his information to build upon and continue spreading the knowledge gained from it.

Don is survived by his wife Mary, sons Ira, living at home, Don Jr., of Marshfield, Kevin of Alaska, and Eric of Virginia, three grand-daughters, his father, two brothers, and five sisters. His ashes were spread over his land in Arpin, and a memorial will be established there.

Of our many memories of Don, a lasting one is of Fuzz standing by a yellow volkswagen with his scope on the roof, watching in wonder as 23 cars loaded with 65 people, arrived from the 1987 WSO Convention to view the Black-Shouldered Kite he had spent the day locating.

I hope all our memories, whatever they are, remain vivid. Memorials should be sent to the Wisconsin Foundation for Wildlife Research, 9201 Rock Inn Road, Arpin, WI 54410.—*Ken and Jan Luepke, B–894 Eau Pleine Road, Spencer, WI 54479.*

1988 Silver Passenger Pigeon Award

John Bielefeldt

This year's recipient made his debut in *The Passenger Pigeon* in 1970 with a cogent critique of Christmas Bird Counts. His interest and expertise in field census work has been demonstrated by additional contributions on this and other topics.

A keen observer, he has been a valued participant in Christmas Bird Counts and in Breeding Bird Surveys. His extensive field work in Waukesha County has made important contributions to our knowledge of Wisconsin ornithology.

In addition, he has made direct contributions to the functioning of the Wisconsin Society for Ornithology. He helped organize the successful 1976 convention in Waukesha, and he was the coordinator of the paper session for the 1988 convention. Furthermore, he served as Winter Field-notes Compiler for the years 1975 to 1979. Finally, he served as Chair of the important Records Committee for the years 1982 to 1985.

In recognition of this diligent and valuable service, the Wisconsin Society for Ornithology takes great pleasure in awarding the Silver Passenger Pigeon Award to John Bielefeldt.—*Howard F. Young, Awards Committee.*

ABOUT THE AUTHORS AND ARTISTS

Timothy A. Andryk is a wildlife ecologist who just recently completed his law degree at the UW-Madison. He plans to put his wildlife degree and law degree to work in the field of environmental law. He worked on swans while employed by The Great Lakes Indian Fish and Wildlife Commission.

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

Donald G. Follen, Sr., whose obituary appears in this issue, was well known to WSO members. In recent years he devoted his energies to creating and running the Wisconsin Foundation for Wildlife Research. His lifelong interest in raptors is reflected in his work with eagles.

Kathleen J. Fruth works for the DNR's Bureau of Endangered Resources. She recently completed an undergraduate degree in Wildlife Ecology at the UW-Madison. Her interests are in the ecology and management of endangered wildlife species.

Randy M. Hoffman is currently the Vice-President of WSO. He works for the DNR's Bureau of Endangered Resources where he is involved in the management of the state's Natural Areas Program.

John H. Idzikowski is the current President of our society. He has been a past Field-note Compiler and Chairman of the Records Committee. He is a Laboratory Manager and Lecturer in Ornithology at the UW-Milwaukee.

Charles A. Kemper is the past Editor of *The Passenger Pigeon* and a well known figure in Wisconsin ornithology. He has discovered a novel way to cope with the frustration of hearing impairment that many older birders face.

Stephen J. Lang is one of Wisconsin's top wildlife photographers. He has been responsible for developing WSO's slide program into a highly successful audiovisual program that is widely used

by educators and naturalists around the state. He has contributed many photographs to *The Passenger Pigeon* over the years.

Ken and Jan Leupke are long-standing members of WSO and were the hosts of the successful 1987 convention in Marshfield. They knew Don Follen well and served on the board of directors of his Wisconsin Foundation for Wildlife Research.

Sumner W. Matteson works for the DNR's Bureau of Endangered Resources and is a central figure in the recovery program for the Trumpeter Swan. He is a graduate of the UW-Madison and has a Master's degree in Agricultural Journalism and Environmental Studies.

Michael J. Mossman is the Nongame Biologist with the DNR's Bureau of Research. He has a Master's degree in Wildlife Ecology from the UW-Madison and is well known to WSO members with whom he has carried out many cooperative research efforts. He is coauthor of *Breeding Birds of the Baraboo Hills, Wisconsin.*

David A. Ross works as an environmental scientist with the Wisconsin River Power Company. He is a graduate of UW-Stevens Point and has worked on a variety of aquatic organisms ranging from Blanding's Turtles to Bald Eagles.

David Sample has worked for the DNR's Bureau of Endangered Resources where his special area of interest is grassland birds. He is completing a Master's degree at the UW-Madison, and his thesis topic deals with grassland bird communities.

Thomas R. Schultz is one of Wisconsin's top wildlife artists. He is well known to WSO members as co-chairman of the Field Trip Committee and Assistant Editor for Art. Tom's work has appeared in many premier art shows, including the prestigious "Birds in Art" exhibition in Wausau.

Thomas K. Soulen is one of WSO's hard working field-note compilers and a frequent contributor to WSO activities. An expatriate Wisconsinite, now a professor in University of Minnesota's botany department, Tom has remained active in Wisconsin ornithology.

William R. Stott, Jr. is President of Rippon College and an active birder who has taught ornithology and is a Master Bird Bander. He is also a talented artist, as his drawings reveal.

Arthur F. Techlow III has worked for the DNR's Bureau of Endangered Resources and now works for the DNR in Oshkosh. He earned a Master's Degree from the UW-Oshkosh; the topic of his thesis was Forster's Terns and using nest platforms to manage them.

Stanley A. Temple is Editor of *The Passenger Pigeon* and chairman of WSO's Research Committee. He is a Professor in the UW-Madison's Department of Wildlife Ecology. He is coauthor of *Birds of the Apostle Islands*, *Wisconsin Birds: A Seasonal and Geographical Guide*, and *Wisconsin Birds: A Checklist with Migration Charts*.

Howard F. Young is a long-time participant in WSO activities and has held an impressive list of offices and committee chairs. He is currently chairman of the Awards Committee. Howie is a graduate of the UW-Madison and an emeritus professor at the UW-La-Crosse.

John Wetzel has been a migratory bird specialist with the DNR's Bureau of Wildlife Management. He is now the wildlife manager in the LaCrosse area. He is a graduate of the University of Minnesota and specializes in waterfowl.

Thomas J. Ziebell has worked for the DNR's Bureau of Endangered Resources. He has a Master's degree from UW-Oshkosh; the topic of his thesis was Black-crowned Night-herons at Rush Lake. He is preparing a publication on birds of Winnebago County.

Bald Eagle *by Thomas R. Schultz*

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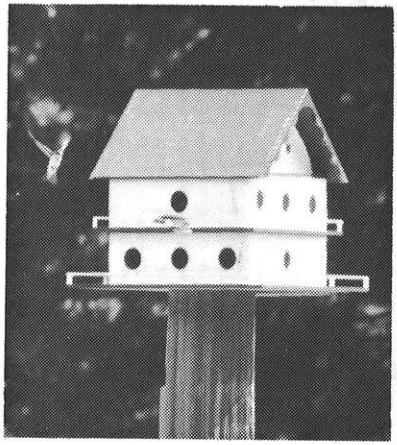

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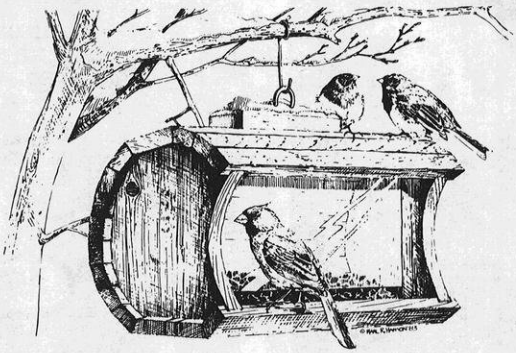

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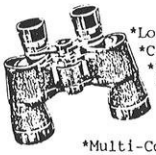

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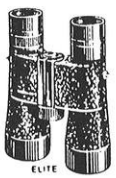

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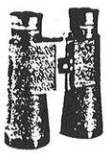

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