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STATUS OF BARN OWLS IN WISCONSIN, 1979

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ABSTRACT

The geographic distribution and relative abundance of barn owls (*Tyto alba*) in Wisconsin was investigated during 1976-79. Status of barn owls was determined from questionnaires, public appeals for observations, and rewards for nest locations. A total of 217, unverified barn owl sightings were reported from all sources. Telephone contacts were believed to be the best verification technique; 96 respondents were questioned in depth on sightings reported. Projecting the 96 interviews to the 217 reported sightings, only 7 of the 217 reported observations appear "likely", with another 32 sightings judged as a "possible". Reliable barn owl sightings were judged to average only 5 per year despite our intensive solicitations. Barn owl observations from 1973-79 suggest no recent changes in distribution in Wisconsin. However, a change in the frequency of sightings from 1950 suggests a declining population. Management considerations include listing the barn owl as an endangered species in Wisconsin, intensified efforts to locate and protect nesting pairs, continued public education, and a continued monitoring of environmental contaminants.

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INTRODUCTION

The Wisconsin Endangered Species Law (Chap. 29.415 Wis. Stats.) gives responsibility to the Department of Natural Resources for implementing programs directed at conserving, protecting, and restoring endangered and threatened species. Although some information about such species is known, the preparation of recovery plans and subsequent management are enhanced by obtaining additional information on population trends and distribution.

During the mid-70's, barn owl (Tyto alba pratincola) populations in Wisconsin were listed by Hine et al. (1975:6-7) under "watch status", i.e., "species or subspecies that may or may not be holding their own at the present time". The barn owl is included on the National Audubon Society's "Blue List" for avian species that are ". . . more common and often more widespread which for any number of reasons, known or unknown, appear to be suffering in all or part of their range from noncyclical decline . . ." (Arbib 1972: 932). The barn owl appears to be doing well in the southwest and the Pacific Coast (Arbib 1978:1111), although its true status is probably still little known (Arbib 1979: 833). In the Great Lakes region, however, the barn owl appears to be declining in Minnesota (Green and Janssen 1975:107), and is suspected to be in serious trouble in Michigan (Mich. Dep. Nat. Resour. 1978). Formerly a common species in Ohio, the barn owl has become quite rare since 1964 (Dexter 1978). The barn owl is, by state laws, endangered in Illinois (Becker 1978) and Iowa (Roosa 1977), and threatened in Michigan (Taylor 1978).

Factors suspected to be involved in the decline of barn owls in the Great Lakes region include: (1) their inability to withstand the severity of winter weather; (2) destruction of old farm buildings which has reduced available nesting sites; (3) modern farming that has reduced hunting habitat (noncropped areas such as pastures, fencerows, wetlands, etc.) resulting in fewer prey species; (4) environmental contaminants that may affect the barn owl's reproductive potential; and (5) a high loss of nestlings from mammalian predators.

Of these factors environmental contaminants in birds have received considerable attention in recent years, particularly for raptors or other avian species with high trophic levels (Cooke 1973, Snyder and Snyder 1975). Persistent organochlorines, accumulated and magnified in the lipids of higher trophic raptors appear to reduce the reproductive potential of these species (Blue et al. 1974, Gilbertson 1974, Hickey and Anderson 1968, Snyder et al. 1973). While not much is known regarding the effect of organochlorines on owls, recent work on a wild population of

barn owls by Klaas et al. (1978) concluded that high concentrations of DDE and dieldrin in 15% of the breeding owl pairs may have adversely affected reproduction on the lower Potomac River in Maryland. Karalus and Eckert (1974:8) also reported that the indiscriminate use of rodent poison kills many barn owls. Warfarin (an anticoagulant rodent poison) was linked to the death of barn owls in Ontario (Quilliam 1973:102). The USFWS recently tested the effects of 6 different anticoagulant rodenticides on barn owls; results indicated the chemicals differed widely in their ability to cause secondary poisoning of owls (Scott et al. 1979).

This study was designed to provide base data on the current (1976-79) status of barn owls in Wisconsin through determination of present geographic distribution and relative abundance of this species. Documentation of barn owl status will facilitate an appraisal of the management alternatives for maintaining or increasing current populations.

A second study objective had been to examine the level of contamination in tissue and eggs by some common environmental pollutants. However, due to the scarcity of recent confirmed observations of barn owls, nests and/or dead birds during the study, no tissues or eggs were collected for analysis of environmental pollutants. Consequently, planned procedures for this phase of the study will not be discussed.

PROCEDURES

Procedures used to determine the geographic distribution of Wisconsin barn owls involved several different appeals for and sources of observations including:

1. "Wanted" posters (App. A). A formal appeal, including a colored poster, for barn owl sightings appeared in the "Wisconsin Natural Resources" magazine, a bimonthly publication with a circulation of 68,000 (Wis. Dep. Nat. Resour. 1977). This request was similar to the "Wanted" poster found to be effective for gathering public observations of several other uncommon species by Petersen et al. (1976) and Petersen (1977a, b).

Colored reprints of the barn owl poster (22 x 29 cm) were sent to 269 high school Future Farmers of America (FFA) Chapters. Each chapter was asked to display the poster and submit observations to the DNR. Colored posters were also publicly displayed in U.S. Soil Conservation Service offices, in U.S. Forest Service field stations, and at 24 nature centers around the state. Observations were solicited from members of the Wisconsin Society for Ornithology (WSO). A black and white reproduction of the poster was printed

in "The Passenger Pigeon" (winter 1977, 39(4):349) and a written appeal also appeared in "The Badger Birder" (February 1978, No. 167), both WSO publications. A black and white version of the poster was also printed in "The Wisconsin Sportsman" (a Wisconsin-oriented bimonthly magazine for outdoor enthusiasts; January-February 1978, 6(1):51).

2. "Reward" posters (App. B). A news release offering a \$25.00 reward for the location of any Wisconsin barn owl nest seen during 1973-79 was sent to 171 Wisconsin newspapers in October 1978. The release included a reproduction of a scratchboard by wildlife artist Deann de La Ronde Wilde of barn owls and 2 other owl species with which barn owls might be confused. Burden of proof for any reward claim was the respondent's. Photographs, physical evidence (feather, pellets, actual presence of the adult, young or eggs), or reliable witnesses were accepted as proof. Rewards were not paid for barn owl nests already recorded by the WSO. Each respondent received a letter indicating the conditions under which a reward would be paid, and a stamped, self-addressed postcard to be returned indicating the type of evidence available. Nonrespondents were contacted by telephone if necessary.

3. The Wisconsin DNR's records of endangered and threatened animal observations. Compiled observations from 1975-79 were examined. Agencies cooperating with DNR personnel in collecting field observations were the U.S. Forest Service, U.S. Soil Conservation Service, U.S. Fish and Wildlife Service, and college and university personnel.

4. News releases. One news release was prepared: this was an appeal with accompanying photographs that was sent to 75 daily and selected weekly newspapers in agricultural areas of Wisconsin (App. C). In addition, 4 newspapers requested additional information and expanded the appeal into feature articles complete with several photographs (some in color), life history information, and range maps.

A pen-and-ink drawing with an appeal for observations was printed in the "Natural Resources Notes" (a bimonthly, outdoor newsletter published by the Wisconsin Department of Natural Resources, a circulation of 8,000; March-April 1979, 3(2):1). Several newspapers either printed the same appeal, printed it using a different drawing, or printed it without any accompanying graphics (App. D).

5. Special magazine article. A brief article on barn owls, including a photograph, was printed in the "Wisconsin Agriculturist" (February 1978, 105(3):78) (App. E). This monthly agriculturally oriented magazine reaches 90 percent of all active farmers in Wisconsin.

6. Radio and television. Appeals for barn owl observations were broadcast by the state's educational radio channel (WHA) and by two private radio stations. The WHA broadcast was a 15-minute discussion of barn owls, their habits, and the reasons for this study. The other radio broadcasts were of shorter duration during news breaks. A single television appeal was made in February 1979 over WISC-TV (Madison) during its farm-oriented "Noon Show".

Requests for barn owl observations were directed primarily toward farmers. Farmers were thought to have the greatest potential knowledge of barn owl occurrence because of the owl's propensity to nest and roost in old farm buildings. However, farmers do not normally report their owl sightings to governmental or bird-watching organizations.

Follow-up contacts of presumed barn owls reported in Michigan indicated a high rate of misidentification by the general public (A. Maley, pers. comm.). To avoid these errors, a verification process had to be developed for all our reported owl sightings. Efforts were made to contact each respondent either by telephone or letter in an attempt to verify reported barn owl sightings. Initially, a letter including a stamped, self-addressed postcard (App. F) was mailed to each respondent along with a copy of "Wisconsin Birds of Prey" (Hamerstrom 1972). The booklet was enclosed as a token of our appreciation for the respondent's effort in reporting the observations and to provide the respondent with an additional means of verifying his or her sighting. A follow-up letter, plus another return postcard, was sent 3 weeks later to nonrespondents. When "Wisconsin Birds of Prey" became unavailable in late 1977, telephone calls became the prime method of contacting respondents. Telephone calls provided greater flexibility in judging validity of the respondent's observation. Each owl report was eventually classified as either a "likely", "possible", "doubtful" or definitely incorrect observation of a barn owl.

DISTRIBUTION AND ABUNDANCE

Historical Perspective

Wisconsin is on the northern edge of the barn owl's breeding range in North America (Hamerstrom 1972:50, Karalus & Eckert 1974:18). While observations and breeding records were not common, Kumlien and Hollister (1903, with revisions by Schorger 1951:56) observed a continuous occurrence of barn owls within the state. Gromme (1963:85) using sight records to map the seasonal occurrence of barn owls, found them throughout southern Wisconsin during the summer, with year-round occurrence in the southeastern portion of the state (Fig. 1). Observations submitted to WSO



The lack of secure nesting sites may limit barn owl nesting success in Wisconsin. Effective management would include providing greater security for nesting barn owls by erecting nesting boxes at active or potentially active sites.

during 1939-78 (Fig. 2) show a more northerly distribution in the state than shown by Gromme (1963). However, actual WSO barn owl nesting records (Fig. 3) indicate that breeding birds were confined to extreme southern and southeastern Wisconsin.

Schorger (1951:56) stated that barn owls remain uncommon in Wisconsin because they were unable to cope with our severe winters. Errington (1931) concluded from his autopsies of barn owls found near Madison, Wisconsin, that the deaths resulted from starvation. His conclusion was based on the lack of body fat and the low number of prey items per pellet (Errington 1931). Stewart (1952) suggested that the amount of snow cover rather than low temperatures was the decisive factor in the survival of barn owls in the northern portion of their range. Snow cover 10 cm or more in depth protects small mammals from owl predation in southern Wisconsin (Petersen 1979). Midwest food habit studies indicate a high occurrence of small mammals in the barn owl's diet (Errington 1932, Wallace 1948, Phillips 1951, Petersen and Petersen 1975). The logical conclusion would be that barn owls are highly dependent on these prey species. Birds make up less than 2% of the diet of midwestern barn owls. Piechocki (1960) found that the barn owl has the lowest fat reserves (5.5%) of any owl examined. The difference between the normal (healthy) and starvation weight of barn owls is around 21% of total body weight, compared to 24-36% for other species of owls. Stewart (1952) felt that barn owls could not survive more than 3 to 4 days without food. Barn owls that winter in Wisconsin could therefore suffer high mortality, particularly during severe winters.

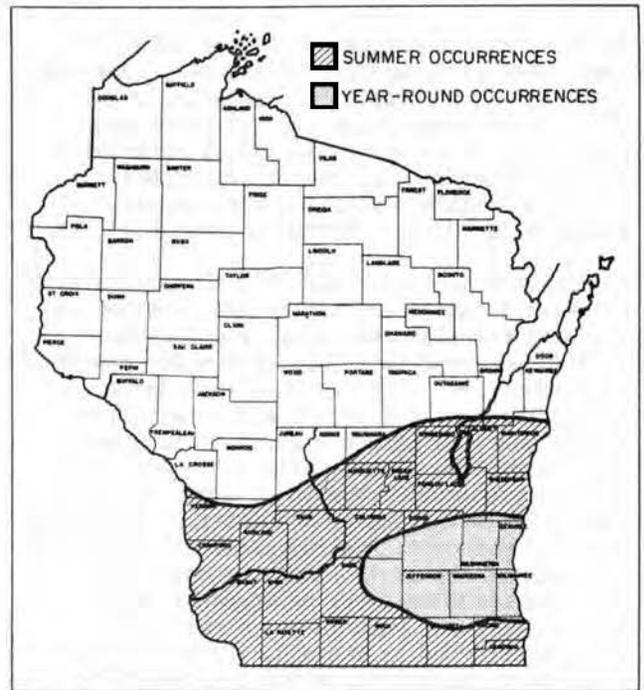


FIGURE 1. Distribution of barn owls in Wisconsin, 1963 (Gromme 1963).

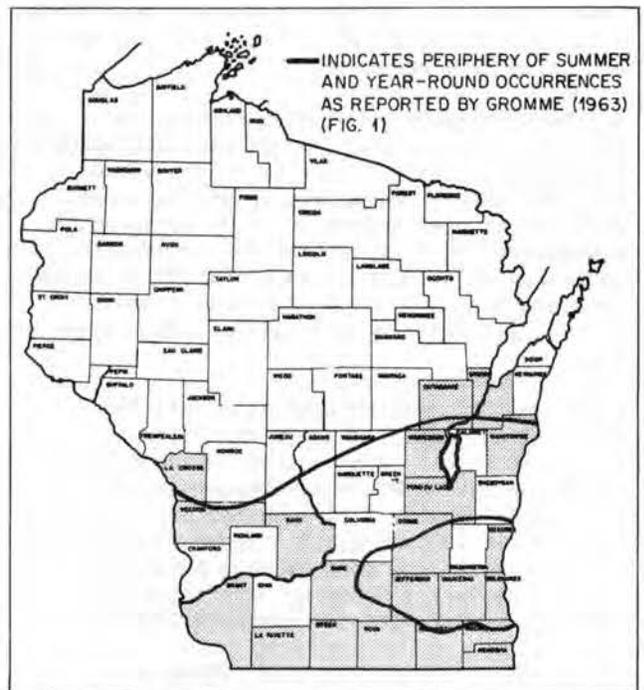


FIGURE 2. Plotted barn owl observations from WSO records, 1939-78. (Solid lines indicate periphery of summer and year-round occurrences as reported by Gromme 1963, Fig. 1.)

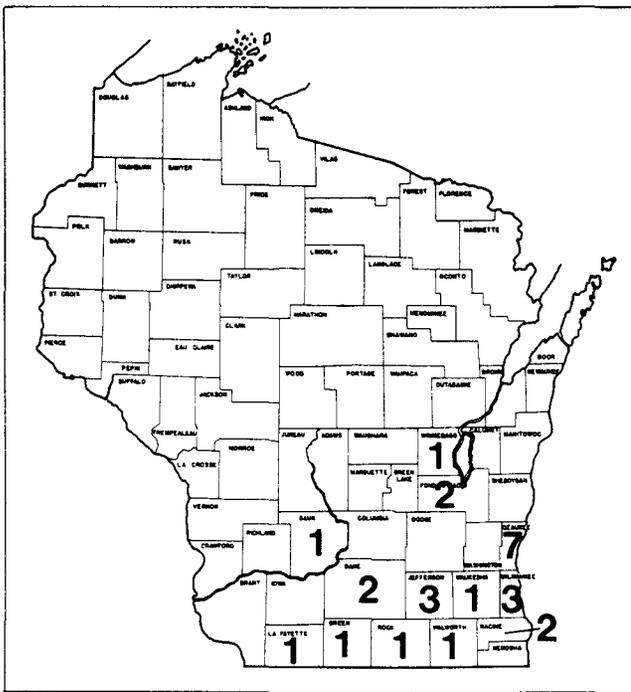


FIGURE 3. Barn owl nesting sites from WSO records, 1939-78. Earliest nest reported in 1942, latest in 1977.

Barn owls from the northern portion of their breeding range are "partly migratory" (Stewart 1952) as compared to relatively sedentary birds south of 35°N latitude. Stewart (1952) also theorized that barn owls actually expanded their breeding range following the removal of forests and settlement in the late 1800's. The nonsedentary behavior of barn owls may be associated with the "newer" northerly portion of the barn owl's range (Stewart 1952). Banding returns indicate that some breeding barn owls winter in Wisconsin, while others (mostly juveniles) wander or migrate southward (Bent 1938:152, Stewart 1952).

Henny (1969) estimated a first year mortality rate of 67% for midwest barn owls; adult

mortality rate was 36%. In order to maintain population stability in Wisconsin, 44-53% of the barn owls must breed successfully, with 1.86 to 2.18 young produced per breeding age female, assuming that barn owls breed at the end of their first year of life (Henny 1969). The high first-year mortality is offset by a high biotic potential. During years of prey abundance, barn owls are known to produce at least 2 broods; Wallace (1948:16) found active nests in the northern breeding range for every month of the year except February.

Survey Results

Potential barn owl sightings reported from all solicitations totalled 217 (Table 1). While a direct response to several of the appeals could be demonstrated (i.e., FFA contacts), the approach that produced the most responses was difficult to determine. A breakdown of responses by year, plus information provided in the responses, suggested that the "Wanted" poster in the DNR magazine and the news release in the "Natural Resources Notes" (subsequently reprinted in the Sunday, April 1 Milwaukee Journal newspaper) were the most successful. Excluding FFA members, approximately 90% of all other respondents resided in urban or suburban areas. Apparently, our success in soliciting barn owl observations from rural dwellers was poor.

Verification of the reported barn owl sightings was more difficult than expected. Some subjective evaluations were possible by examining the circumstances describing the owl observations; however, most of the reported descriptions of sightings contained little useful information. Attempts at verification by using the "Wisconsin Birds of Prey" booklet proved unsatisfactory. Only 55% of those individuals who were mailed the booklets (29 of 53), returned the verification postcard. Approximately 30% of these 29

TABLE 1. Summary of reported observations of barn owls in Wisconsin, 1973-79.

Source	Date of Appeal	Reported Sightings	Year of Sighting						
			1979	1978	1977	1976	1975	1974	1973
FFA	1-1-78	57		5	37	11	4		
Endangered species	1973-78	11		1			4		3
Public appeals	1977	53		6	28	11	5		1
	1979	96	38	39	15	2	1	1	
Total		217	38	51	80	24	14	6	4



Barn owls often nest in close association with man. This nest of young owlets was found in a silage burrow, inside a silo near Dayton in August 1974.

respondents admitted an error in their sighting and indicated that they observed a different species of owl. Direct telephone contacts with the observers seemed to be the most efficient verification technique. Telephone conversations provided a means to make an in-depth probe of the sighting, allowing a realistic judgment of the reported "barn owl" observations.

All 96 respondents in 1979 were telephoned and questioned on their owl sightings, and nearly 68% of them had seen a different species of owl. Fourteen percent of the sightings were judged as "doubtful" and another 14% were considered as "possible". Only 3% (3 observations) of the sightings were judged as "likely". Because telephone contacts were believed to be the most reliable verification technique, these results were projected to evaluate all 217 sightings. This projection suggests that of the 217 reported barn owl sightings, only 7 observations are "likely", and another 32 sightings were "possible". Realistically, the "possible" sightings have only a 50-50 chance of being correct; therefore, reliable barn owl sightings obtained during 1975-79 probably average less than 5 per year. The 95% confidence limit of this estimate is 2 to 11.

The \$25 reward for information on barn owl nest locations generated only 4 responses. Only one of the four respondents replied to our verification letter. Information with this reply, plus a telephone contact, indicated the respondent had seen a different species of owl. Thus, no verified record of a barn owl nest in Wisconsin during 1975-79 was obtained.



Except for some residual down, barn owl fledglings gain adult plumage in their first year. The older fledgling in this photo is the dominant owlet, and has assumed a defensive posture.

Current Distribution and Abundance

A current distribution map of the barn owl in Wisconsin based on all FFA reports, plus selected endangered species records and public-solicited owl observations is shown in Figure 4. FFA sightings could not be objectively verified and were, therefore, plotted separately.

"Likely" or "possible" sightings from all sources, plus all FFA and Endangered Species records totalled 107 from 82 different townships. The FFA chapters provided 57 of these observations from 39 townships. The remaining 50 observations from 45 townships were derived from the endangered species records and public-solicited sightings.

The current range of barn owls in Wisconsin appears more extensive than indicated by observations reported to WSO (Fig. 2) and is somewhat larger than the distribution mapped by Gromme (1963:85) (Fig. 1). Differences between Figures 2 and 3 may only reflect differences in methods of obtaining information, potential inaccurate identification of species, or inadequate data in WSO files. Overall, the geographic distribution of barn owls has apparently remained unchanged or has expanded over the past 40 years. However, the relative abundance of this owl has declined over the same period. The failure to verify the presence of a barn owl nest during the past 5 years and the reporting of only an estimated 5 reliable sightings per year during this survey certainly indicates a low barn owl population. WSO records averaged 2.0 barn owl sightings and 0.7 nests annually for 1939-78. Apparently, 1970 was the turning point in WSO barn owl observations, since annual sightings fell from 2.2 per year in 1950-69, to 1.0 per year in 1970-78.

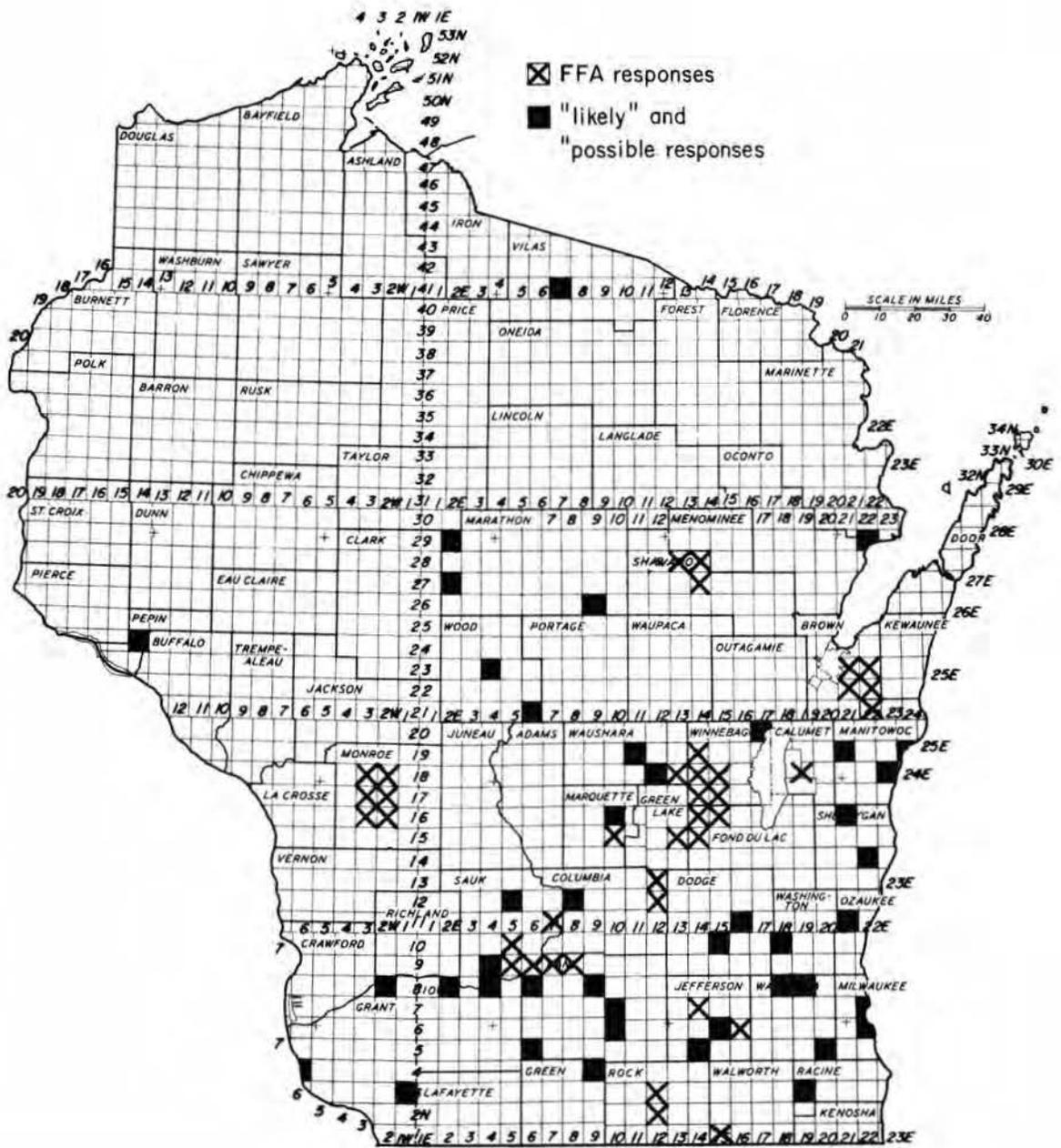


FIGURE 4. Occurrence of barn owls in Wisconsin, 1973-79. (Cross-hatched areas refer to 557 FFA responses and solid areas refer to 50 "likely" and "possible" public responses.)

TABLE 2. Summary of winter hardness indices for southern Wisconsin, 1950-79.¹

Quarter	Overall Mean	1950-59	1960-69	1970-79
West central	1,158	1,000	1,018	1,455
East central	869	773	747	1,088
Southeast	732	610	665	922
Southwest	941	816	833	1,173

¹Data compiled from monthly summaries from the National Oceanic and Atmospheric Administration (NOAA).

LIMITING FACTORS AND MANAGEMENT IMPLICATIONS

Factors responsible for the recent decline of barn owls in Wisconsin were not determined. There seems to be little doubt that winter weather limits barn owls in northern portions of their breeding range. Even under the most optimal conditions, the barn owl will remain rare in Wisconsin.

The severity of winter weather, as measured by annual "hardness indices", was compared to the frequency of owls observed. Hardness indices were computed by combining average minimum monthly temperatures and snow depths from December 1 to March 31. Theoretically, the higher the hardness index, the greater the stress on barn owls, and consequently, the higher the barn owl mortality. The southern half of Wisconsin was arbitrarily divided into quarters, with 10-year hardness means determined for each quarter since 1950 (Table 2).

It is evident that the more "mild" winters occurred in the southeastern quarter where barn owls are more consistently observed. Winter severity increased in each quarter from 1950 through 1979, suggesting that the decline in barn owls may be due to more severe winters. Winter weather, however, cannot entirely explain the declining frequency of barn owl observations that has occurred in the Midwest during the past decade (Green and Janssen 1975:107, Dexter 1978, Mich. Dep. Nat. Resour. 1978). Such declines in barn owl sightings are found in regions where winter weather is normally mild (e.g., southern Illinois).

While the influence on barn owls of organochlorine pesticides has been documented in Maryland (Klaas et al. 1978) and Europe (Cooke 1973), Maley (pers. comm.) feels that neither pesticides nor rodenticides have

affected barn owls in Michigan. PCB concentrations in adult barn owls and eggs have not as yet been linked to eggshell thickness (Klaas et al. 1978). Additional testing for biocides and related compounds may help to clarify their influence on midwestern barn owls.

Food and nesting sites were not believed to be limiting factors for barn owls in Utah, which is also on the northern fringe of the species' continental breeding range (Smith and Marti 1976). Food supply has, however, been suggested as a possible factor in declining barn owl numbers in Michigan (Mich. Dep. Nat. Resour. 1978). Intensified farming has eliminated fencerows and hedges, modern harvesting methods leave little waste grain, wetlands have been drained, pastures and meadows have been converted to cash crops, and rodent-resistant storage facilities have



Nesting boxes for barn owls can be of simple construction. The box should have plenty of room for the brood and the adults, ease of access to the young, and a platform where the adults can land or roost.

been built. The cumulative impact on prey species is suggested as affecting barn owls to a point where barn owl reproduction and survival are reduced.

While similar modern farming practices have probably reduced rodent populations in Wisconsin, the question remains if such reduction has yet reached a threshold level. The barn owl does have the ability to take locally abundant prey (Smith and Marti 1976) and is more of an opportunistic predator than previous studies have suggested.

Modern farm management and architectural changes may also reduce nesting sites. Contemporary farm buildings and control efforts on pigeons have limited barn owl access to many potential nesting sites. Heintzelman (1966) found that 15% of the former nesting and roosting sites in Northampton County, Pennsylvania, were eliminated by the screening of church towers. Artificial nest boxes are believed to be a sound management technique for maintaining or increasing barn owls in areas where nest sites are scarce (Marti et al. 1979). In Michigan, suitable nesting sites are not a limiting factor, although secure nesting sites are another matter (A. Maley pers. comm.).

Raccoons inhabiting old farm buildings are also suspected to have a serious impact on nesting barn owls (A. Maley pers. comm.). Raccoons have increased in Wisconsin during the past few decades (Wis. Dep. Nat. Resour. 1976) and are commonly found in farm buildings. In some instances, trappers even purchase trapping privileges for individual barns in southern Wisconsin.

Direct human-caused, barn owl mortality is another possible limiting factor. Heintzelman (1966) found that shooting accounted for 9% of the banding recoveries in parts of Pennsylvania, with 4% due to road kills. The limited bandings of barn owls in Wisconsin do not permit any assessment of this factor. But there is no strong evidence to suggest that such human-caused mortality is a factor for barn owls in Wisconsin.

No one factor has been clearly identified as the major cause for declining barn owl numbers in Wisconsin or elsewhere in the Midwest. It is more logical that the barn owl decline has been caused by a combination of factors. The absence of clearly identified reasons for the decline in barn owls make management difficult.

The barn owl was added to Wisconsin's list of endangered species on 1 October 1979, primarily

on the basis of our survey. Endangered animals are species whose continued existence as a part of the state's wild fauna is in jeopardy and without help they may become extirpated. Such action provides full legal protection and accelerates urgency of some management action.

The manipulation or preservation of barn owl habitat is not a feasible or necessary alternative. Bent (1938:148) defines barn owl habitat as open country near the haunts of man, where hunting is primarily over open fields and meadows, and near farm buildings, granaries, and other buildings in villages, towns or even cities. Such a definition of barn owl habitat would encompass most of the agricultural portion of Wisconsin - a rather substantial area. Habitat, per se, does not appear to limit barn owl numbers. Suitable nesting locations may be in short supply, however.

An educational program to increase public awareness on the identification and plight of the barn owl in Wisconsin is a feasible management consideration. One goal of an educational program could be to locate breeding pairs of barn owls. Once nests are located, additional steps to protect the pairs or improve reproduction can be initiated. Nesting boxes, for example, can protect the nesting owls from raccoons and domestic cats and dogs. Landowners, once aware of the significance of barn owls on their land, may be much more willing to assist the owls.

Nesting barn owls are known to return to the same general locations for a number of years, especially if the previous year's nesting attempt is successful. Established breeding pairs should act as source-nuclei for increasing the number of breeding pairs in a localized area through nest boxes and farmer appreciation. A \$100 reward for the location of active breeding pairs might accelerate the search for nesting birds.

Efforts should also be made to collect addled eggs from known nests or salvage dead barn owls for pesticide-PCB analysis. Such specimens are too valuable and scarce to be discarded.

The decline of barn owls in Wisconsin is undoubtedly directly related to the general decline of barn owls throughout the Midwest. Until the factors causing this general decline are clearly identified and corrective action taken, every effort should be made to protect the remaining Wisconsin breeding pairs through nurturing public appreciation.

LITERATURE CITED

- Arbib, R.
1972. The blue list of 1973. *Am. Birds* 26(6):932-33.
1978. The blue list of 1979. *Am. Birds* 32(6):1106-13.
1979. The blue list of 1980. *Am. Birds* 33(6):830-35.
- Becker, C.
1978. Endangered and threatened wildlife. Ill. Dep. Conserv. 4 pp.
- Bent, A. C.
1938. Life histories of North American birds of prey (Part II). U.S. Natl. Mus. Bull. 167. 482 pp.
- Blue, L. J., A. A. Belisle, and R. M. Prouty
1974. Relationships of the brown pelican to certain environmental pollutants. *Pestic. Monit. J.* 7:181-94.
- Cooke, A. S.
1973. Shell thinning in avian eggs by environmental pollutants. *Environ. Pollut.* 4:85-152.
- Dexter, R. W.
1978. Mammals utilized as food by owls in reference to the local fauna of northeastern Ohio. *Kirtlandia* 24:1-6.
- Errington, P. L.
1931. Winter-killing of barn owls in Wisconsin. *Wilson Bull.* 43(1):60.
1932. Food habits of southern Wisconsin raptors, Part I -- Owls. *Condor* 34(4):176-86.
- Gilbertson, M.
1974. Pollutants in breeding gulls in the lower Great Lakes. *Can. Field-Nat.* 88(3):273-80.
- Green, J. C., and R. B. Janssen
1975. Minnesota birds, where, when, and how many. Univ. Minn. Press, Minneapolis. 217 pp.
- Gromme, O. J.
1963. Birds of Wisconsin. Univ. Wis. Press., Madison. 220 pp.
- Hamerstrom, F.
1972. Birds of prey of Wisconsin. Wisconsin Dep. Nat. Resour. 64 pp.
- Heintzelman, D. S.
1966. Distribution and population density of barn owls in Lehigh and Northampton Counties, Pennsylvania. *Cassinia* 49:1-19.
- Henny, C. J.
1969. Geographic variation in mortality rates and production requirements of the barn owl (*Tyto alba* spp.). *Bird-Banding* 40(4):277-90.
- Hickey, J. J., and D. W. Anderson
1968. Chlorinated hydrocarbons and egg-shell changes in raptorial and fish eating birds. *Science* 162:271-73.
- Hine, R. L., R. F. Nicotera, L. M. Christenson, C. E. Germain, J. B. Hale, H. E. Hettrick, B. Les, and L. A. Posekany
1975. Endangered animals in Wisconsin. Wisconsin Dep. Nat. Resour. 10 pp.
- Karalus, K. E., and A. W. Eckert
1974. The owls of North America north of Mexico. Doubleday & Co., Garden City, NY. 278 pp.
- Klaas, E. E., S. N. Wiemeyer, H. M. Ohlendorf, and D. M. Swinefood
1978. Organochlorine residues, egg-shell thickness and nest success in barn owls from the Chesapeake Bay. *Estuaries* 1(1):46-53.
- Kumlien, L., and N. Hollister
1903. The birds of Wisconsin. *Wis. Nat. Hist. Soc.* 3(1-3). 143 pp.
- Marti, C. D., P. W. Wagner, and K. W. Denne
1979. Nest boxes for the management of barn owls. *Wildl. Soc. Bull.* 7(3):145-48.
- Michigan Department of Natural Resources
1978. Michigan's barn owl. 4 pp.
- Petersen, L. R.
1977a. Status of fishers in Wisconsin, 1975. *Wis. Dep. Nat. Resour. Res. Rep.* 92. 14pp.
1977b. Status of gray foxes in Wisconsin, 1975. *Wis. Dep. Nat. Resour. Res. Rep.* 94. 17 pp.
1979. Ecology of great horned owls and red-tailed hawks in Wisconsin. *Wis. Dep. Nat. Resour. Tech. Bull.* 111. 95 pp.
- Petersen, L. R., M. A. Martin, and C. M. Pils
1976. Status of badgers in Wisconsin, 1975. Wisconsin Dep. Nat. Resour. Res. Rep. 90. 12 pp.
- Petersen, U. C., and L. R. Petersen
1975. A case study of barn owls in Wisconsin. *Passenger Pigeon* 37(4):153-57.

- Phillips, R. S.
1951. Food of the barn owl (Tyto alba pratincola) in Hancock County, Ohio. Auk 68(2):239-41.
- Piechocki, R.
1960. Über die Winterverluste bei Schleiereulen (Tyto alba). Vogelwarte 20:274-80.
- Quilliam, H. R.
1973. History of the birds of Kingston, Ontario. Nat. Mus. Can., Ottawa. 209 pp.
- Roosa, D. M.
1977. Endangered Iowa birds (an annotated list of endangered, threatened, extirpated or 'status undetermined' birds of Iowa). Iowa Conserv. Comm. Spec. Rep. of the Preserves Board, no. 4. 24 pp.
- Schorger, A. W.
1951. The birds of Wisconsin (rev. ed.). Wis. Soc. Ornithol. 122 pp.
- Scott, T. G., P. H. Eschmeyer, and H. C. Schultz.
1979. Fisheries and wildlife research, 1978. U. S. Fish Wildl. Serv., U.S. Government Printing Office, Washington, D. C. 151 pp.
- Smith, D. G., and C. D. Marti
1976. Distributional status and ecology of barn owls in Utah. Raptor Res. 10(2):33-44.
- Snyder, N. F. R. and H. A. Snyder
1975. Raptors in range management. Proc. Symp. For. & Range Habitat for Nongame Birds 1:190-209.
- Snyder, N. F. R., H. A. Snyder, J. L. Lincer, and R. T. Reynolds
1973. Organochlorines, heavy metals, and the biology of North American accipiters. Bio Science 23:300-5.
- Stewart, P. A.
1952. Dispersal, breeding behavior, and longevity of banded barn owls in North America. Auk 69:227-45.
- Taylor, S. M.
1978. Michigan's endangered and threatened species program. Mich. Dep. Nat. Resour. 35 pp.
- Wallace, G. J.
1948. The barn owl in Michigan. Mich. State Coll. Agric. Exp. Stn. Tech. Bull. 208. 61 pp.
- Wisconsin Department of Natural Resources
1976. Wisconsin game and fur harvests, a summary 1930-75. 25 pp.

APPENDIX A. Barn owl "wanted" poster.

WANTED: Barn Owls

Nestings
Rarely Obs.

Has been known to use the alias:
"Monkey-Faced Owl."

Are frequently found in farm buildings, silos,
church steeples, attics, abandoned houses,
and sometimes, tree hollows.

Known to be ruthless killers of mice and
other rodents.

Information needed to update barn owl
distribution and abundance in Wisconsin.

If observed during the past five years, report
date seen (month and year), and location (at
least township and county.) Of particular
interest are nesting observations.

Send reports to: LeRoy R. Petersen,
Wisconsin Department of Natural Resources,
3911 Fish Hatchery Road, Madison,
Wisconsin 53711.

Photos by Harold & LeRoy Petersen, Geneva, Wisconsin.

APPENDIX B. Reward poster sent to newspapers.



APPENDIX C. Newspaper public appeal.



UPDATE SOUGHT — Barn owls are frequently found in farm buildings, church steeples, attics, abandoned houses and sometimes, tree hollows. Often called "Monkey-faced owls," they are ruthless killers of mice and other rodents. The Department of Natural Resources is seeking

to update information on barn owl distribution and abundance in Wisconsin. Those who have observed any barn owls during the past five years should report the date and place where seen to LeRoy Petersen, DNR, 3911 Fish Hatchery Road, Madison.

APPENDIX D. Pen and ink appeal from the "Natural Resources Notes."



Who Gives a Hoot?

We do! One of our native species that may be declining is the barn owl. To learn more about distribution and abundance of this bird in Wisconsin, the Department of Natural Resources is asking you for observations. The barn owl is a long-legged owl with a white, heart-shaped face. You might have seen one in a farm building, church steeple, or abandoned house.

If you have seen any barn owl during the past five years, please write and tell us the date seen (month and year) and location (at least township and county). Send this information to LeRoy Petersen, DNR, 3911 Fish Hatchery Road, Madison, WI 53711.

Do barn owls live on your farm?



You can help find ways to save this valuable bird by reporting if it's been on your farm.

A valuable friend whom you've never seen might be roosting in your barn, silo, or other farm buildings. It only comes out at night and is considered by many the best killer of mice and rodents around.

Barn owl numbers are decreasing in Wisconsin and throughout most of North America at the hands of its greatest enemy - man. Although the barn owl is calm-natured, it still is a rather large and fearsome-appearing bird. Therefore, many are shot or clubbed to death when encountered by frightened people.

Man's extensive use of rodent poisons has also taken its toll on the barn owl, either through direct contact or by eating a rodent which has recently consumed poison.

The Wisconsin Endangered Species Committee has now placed barn owls under special observation to identify conditions causing this decline in numbers and to help insure their survival in the state.

You can help the committee determine the distribution and abundance of barn owls in Wisconsin. Persons who have observed them during the past five years are asked to report the date seen (month and year), and location (at least township and county). Nesting observations

are of particular interest to the committee.

Send reports to: LeRoy R. Petersen, Wisconsin Department of Natural Resources, 3911 Fish Hatchery Road, Madison, Wis. 53711. Include address and phone number so a followup contact can be made.

More people might know the barn owl as the monkey-faced owl because of its distinctive monkey-like face and small, dark, and beady eyes. The owl is usually light gold in color with a white underside which makes it look all white when in flight and at night. The body is covered with small brown spots.

Its average weight is 13 oz. Average wingspan is 42 in.

Since barn owls only leave their roosts after sunset, their presence is often detected by the signs they leave at their roosts. They are messy birds and will live in one roost for years with many feet of accumulated excrement and compact waste pellets. The excrement leaves a "whitewash" stain as it dries. Pellets are a mixture of bones, fur, and feathers which the owl regurgitates after eating its prey whole.

Barn owls are expert hunters using sound alone. The DNR says the barn owl may have the most acutely developed sense of hearing of all owl species.



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Madison Area Headquarters
3911 Fish Hatchery Road
Madison, WI 53711

Anthony S. Earl
Secretary

August 3, 1978

IN REPLY REFER TO: 8100

Dear :

I appreciate receiving your barn owl observation. This owl is currently listed on our "watch" list which calls for special observation to identify conditions that could cause future decline, or factors that could help to insure their survival in the state. The barn owl appears to be suffering uniform decline throughout the Great Lakes Region. The objective of my study is to determine the present geographic distribution, relative abundance, and status of barn owls in Wisconsin.

I would like you to have a copy of "Wisconsin Birds of Prey" for taking the initiative in reporting your owl sighting. This publication contains a great deal of interesting information on other owl species, as well as many hawks all found in Wisconsin. One additional task I would like to have you do is to check over the description of the barn owl (pages 39, 49-50) to verify your sighting and return the enclosed postcard to me. So few barn owls have been sighted that I want to recheck all observations to make sure I have the facts straight.

Thank you again for your assistance.

Sincerely,
Bureau of Research

LeRoy R. Petersen
Wildlife Biologist

LRP:cs
Enc.

After checking with the barn owl description in "Birds of Prey of Wisconsin", I would like to:

verify my observation.

report my sighting may have been a different species of owl.

Thank you again!

Your name: _____

ACKNOWLEDGMENTS

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