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Recoveries of Great Horned Owls Banded in Central Minnesota

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ABSTRACT — Although great horned owls (*Bubo virginianus*) are often considered permanent residents, data from band returns have shown that movements by this species do occur. In banding activities conducted in central Minnesota from 1967 through 1983, 329 great horned owls were banded and 24 (7.3 percent) recoveries were reported. Twelve of the 24 recoveries (50.0 percent) were made 15 kilometers or more from where the individuals were banded. Five of these recoveries (41.7 percent) were to the southeast. Of 23 owls recovered dead, eight (34.8 percent) were reported only as "found dead," seven (30.4 percent) were found near highways or railroad tracks, and five (21.7 percent) were caught in traps. Difficulties in interpreting movements and causes of mortalities from information provided by band returns, and difficulties in determining whether great horned owl movements are due to juvenile dispersal or to declining prey populations, are discussed.

Introduction

Although great horned owls (*Bubo virginianus*) are considered permanent residents throughout most of North America, data from band returns have shown that movements by this species do occur (1,2,3). Stewart (1) found that great horned owls from North America's northern latitudes move farther and more often than those from more southerly latitudes. In Minnesota, Green and Janssen (4) state that great horned owls from the northern third of the state are more mobile than individuals from the central and southern parts. In central Minnesota, from 1967 through 1983, 329 great horned owls were banded in various research projects conducted at St. Cloud State University. Twenty-four (7.3 percent) recoveries have been reported to date. This paper presents information about movements and mortality of the recovered owls.

Materials and Methods

Most owls were banded when four to five weeks old and while still in their nests. Banding in central Minnesota occurred within 80 km of St. Cloud; most was completed in late April and early May. Some owls were banded at other times of the year, often after being brought to the St. Cloud State University rehabilitation lab. Banding data were taken from personal banding records, U.S. Fish and Wildlife Service Bird Banding Laboratory cards, and, when possible, by contacting individuals who had recovered dead owls. In a few cases recovered owls were available and examined at the rehabilitation lab.

Results and Discussion

Movements

Because great horned owls do not take part in predictable annual migrations, movements by this species are generally attributed to juvenile dispersal or to declines in regional prey populations (1,2,3,5,8). Directionally random movements over short distances are typically categorized as juvenile dispersal. Long-distance movements which, as in the case of northern owls, often show a directional pattern, are frequently correlated with fluctuations of prey populations.

Juvenile dispersal occurs in the fall, when resident adults are establishing territories. In South Dakota, Dunstan (5) found that radio-marked juveniles made short-distance flights in and out of their natal territories in November. The juveniles could no longer be located by February, however, when resident adult owls were incubating. Juvenile dispersal presumably consists of flights by a young owl from one area to another, and is influenced by encounters with resident owls, the availability of prey, and general habitat suitability. Dispersal ends when and if the juvenile finds suitable unoccupied habitat where it may eventually establish residence.

Because of possible inaccuracies in determining exact banding and recovery sites, it was felt that an error of even a few kilometers might significantly affect the interpretation of some movements, especially short ones. For this reason, a distance of 15 km was arbitrarily selected to separate shorter movements from longer ones.

Of the 24 central Minnesota recoveries, 12 (50 percent) were reportedly made less than 15 km from where the birds were banded (Table 1). The ages of ten of these birds were known; eight were less than two years old. Movements such as these are often, and probably correctly, attributed to juvenile dispersal. However, these individuals were not necessarily sedentary all of their lives simply because they were recovered a short distance from where they were banded. They may have actually made a significant movement and merely happened to be recovered in an area close to their site of origin. Also, the longer an individual lives, the more opportunities for movements it has. A four-year-old, for example, could have made several movements, perhaps involving considerable distances, during its lifetime. Other factors should also be considered when interpreting recovery location data. As mentioned, although a bird may be found in a particular location, it may not have actually died there. It may have been

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Table 1. Banding and recovery data of great horned owls from central Minnesota.

Banding Date/Location		Recovery Date/Location		Movement Direction/Distance (km)	Age[a]	Recovery Cause
9 May 72	St. Cloud	12 Oct 72	St. Augusta	S-13	0-6	found dead
spring 72	Holdingford	fall 72	Rockville	SE-32	0-7	captured alive
11 May 73	Opole	12 Dec 73	St. Cloud	SE-26	0-8	found dead
5 Nov 73	St. Cloud	9 Jan 74	Sauk Rapids	E-8	b	found dead
spring 74	Five Points	winter 78	Sauk Rapids	E-13	4-0	vehicle
26 Apr 74	Cold Spring	19 Oct 74	Rockville	NE-10	0-7	trapped
5 May 74	Excelsior	2 Aug 74	Eden Prairie	SE-7	0-4	found dead
15 May 74	Avon	4 Nov 74	Avon	N-5	0-7	trapped
4 May 75	Manannah	7 Sep 75	Eden Valley	NE-18	0-5	found dead
18 Apr 76	Lake Lillian	16 Mar 77	Gay Twp., Iowa	S-518	1-0	found dead
29 Apr 76	Fairhaven	Dec 77	Luxemburg	S-1.5	1-9	shot in trap
26 Apr 76	Luxemburg	13 Dec 77	Big Lake	SE-41	1-9	vehicle
1 May 76	Foley	10 Nov 76	Cambridge	E-45	0-6	trapped
1 May 77	Sartell	19 Jul 77	Sartell	W-0.5	0-4	train
1 May 77	Sartell	15 Sep 77	Sartell	W-0.5	0-6	train
6 May 77	St. Cloud	23 Oct 78	Golden Valley	SE-84	1-7	found dead
16 Apr 78	Lake Lillian	26 Dec 80	Olivia	SW-41	2-9	shot
16 Apr 78	Lake Lillian	— Dec 78	Spicer	N-28	0-9	vehicle
29 Apr 78	Rice	18 Jan 80	Durand, Illinois	SE-567	1-10	vehicle
29 Apr 78	Sauk Rapids	30 Dec 80	Sauk Rapids	c	2-9	confiscated
6 May 78	Rice	— Jun 82	Sartell	S-24	4-2	vehicle
15 Apr 80	Melrose	7 Oct 83	Brainerd	NE-89	3-7	found dead
21 Apr 80	Lake Lillian	27 Dec 80	Big Kandiyohi Lake	W-8	0-9	trapped
20 May 82	Sartell	30 May 83	Sartell	E-1.5	d	found dead

[a] given in years and months; most owls were about one month old when banded

[b] banded during fall, age unknown

[c] confiscated by warden, site of recovery unknown

[d] brought to St. Cloud State University at unknown age

deposited there, intentionally or unintentionally, by an animal, a human, or even a vehicle.

The directional movements of the 12 central Minnesota owls recovered 15 km or farther from where they were banded are shown in Figure 1. Five (41.7 percent) of these moved to the southeast, two (16.7 percent) moved south, two (16.7 percent) moved northeast, one (8.3 percent) moved east, one (8.3 percent) moved north, and one (8.3 percent) moved southwest. The two most distant recoveries were made approximately 518 km to the south and 567 km to the southeast, in southern Iowa and northwestern Illinois, respectively. Even though these 12 movements showed a fairly consistent south-southeast directional pattern, and were not directionally random as in short dispersal flights, the majority could still have been dispersing juveniles, since nine were less than two years old (Table 1). Adamcik and Keith (3), who analyzed band returns from Alberta, Saskatchewan, and Manitoba, found that nearly three-fourths of all movements farther than 25 km were to the south and east. In Saskatchewan, Houston (2) found that of 36 great horned owls which moved farther than 250 km, 35 (97 percent) moved southeastward. He attributed this to several factors, including normal bird migration routes in the area, the pattern of woodlot distribution, and the direction of prevailing winds. The reason for this directional pattern could also be evolutionary. Long-distance wanderings through unfamiliar territory are no doubt hazardous and are most likely to be successful if made into areas where conditions are less stressful, for example, where weather conditions are less severe and where a greater diversity of prey might be encountered. Such conditions, in northern North America, would most likely be found by moving southward.

Long-distance movements by great horned owls are often associated with declines in regional prey populations. This is particularly true of owls from more northerly latitudes, which

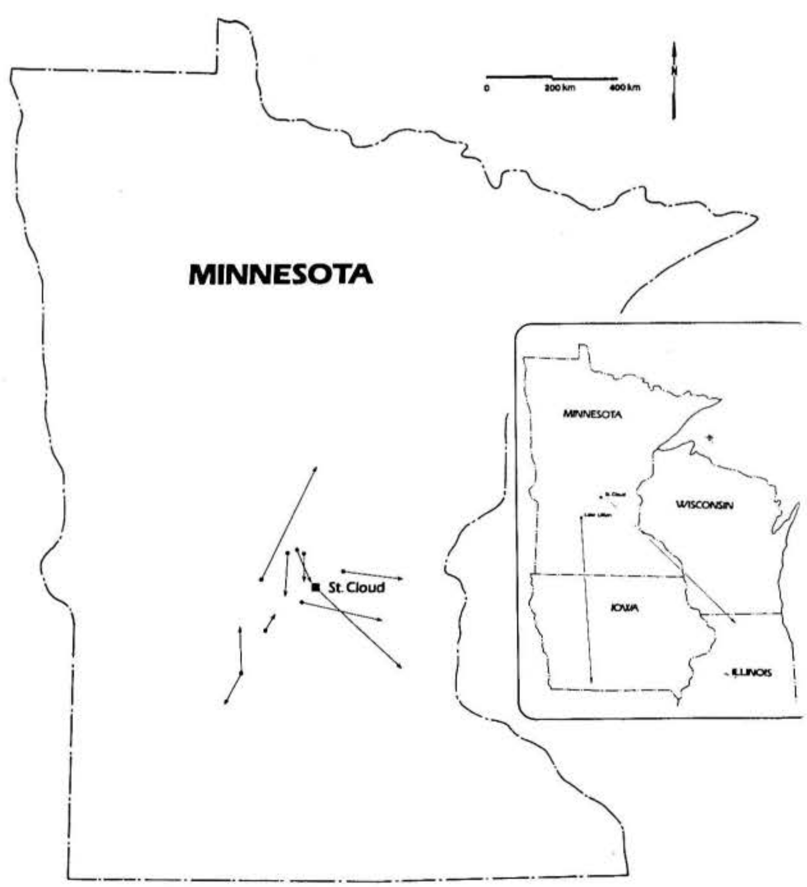

Figure 1. Directional movements of 15 kilometers or more by great horned owls banded in central Minnesota from 1967 through 1983.

have more specialized feeding habits than southern great horned owls. Adamcik et al., (8) correlated great horned owl movements with snowshoe hare cycles in Canada and found that owl numbers declined about a year after hare numbers did. In a related study, Adamcik and Keith (3) found that in years when hare and owl numbers were decreasing, 50 percent of owl movements were farther than 100 km while only 10 percent of owl movements were farther than 100 km when hares were abundant. Houston (6) found additional evidence correlating hare cycles and the frequency and distance of great horned owl movements. He discovered that, of 36 movements farther than 240 km, 31 (86.1 percent) occurred in years when owl numbers were declining. The reproductive success of great horned owls may also decrease during the low point of hare cycles, and resident pairs may even fail to initiate nesting (6,7,8).

The relationship between prey abundance and owl movements seems logical in regions were great horned owls are extremely dependent upon the availability of a single prey species. In central Minnesota, however, great horned owls prey upon a wide variety of species, and the categorization of long-distance movements as either dispersal or prey population-influenced is more difficult. The movements farther than 500 km by the two central Minnesota owls may have been induced by simultaneous low populations of several prey species, or they may simply have been dispersing juveniles. Such movements probably should not be attributed to either explanation without data which could show both prey and owl population trends in the region from where the emigration occurred.

Mortality

It is usually difficult to accurately determine causes of mortality from information provided by band returns. In most cases it is not possible to recover the carcass and personally inspect it, and one must often rely on information provided by the person who found it. Such information may be inaccurate, incomplete, or falsified. Even when a carcass is available, its condition may preclude an accurate diagnosis of the cause of its death. For these reasons, causes of mortality should, in most cases, be considered probable. In some instances owls, perhaps already in a weakened condition, may be predisposed to a certain type of mortality.

Twenty-three of the 24 band recoveries from central Minnesota involved owl mortalities. The only recapture was a banded juvenile caught by a suburban St. Cloud homeowner. The owl, preoccupied with subduing a pet cat it had attacked in a driveway, allowed itself to be approached by the pet's owner and caught with a fish net. The owl was taken to the St. Cloud State University biology lab and then released.

Of the remaining 23 recoveries, seven (30.4 percent) owls were found on or near highways or railroad tracks and apparently either flew into vehicles or were struck by them. Two of these owls were nestmates, banded in 1977, and were recovered along railroad tracks about a kilometer from their nest. One was recovered in mid-July at the age of 3½ months; the second was recovered in mid-September at the age of 5½ months. Five (21.7 percent) owls were caught in traps. At least one of these was also shot while in a trap. This individual had reportedly raided a chicken coop for a period of about a week before it was killed. Of the three remaining recoveries for which the cause of mortality was "known," one (4.3 percent) bird was shot, one (4.3 percent) was found in an emaciated condition and one may have starved or succumbed to an undetermined injury or illness, and one (4.3 percent) was confiscated by a conservation officer who was making a vehicle check. This bird was reportedly put in the car after it had been "caught and killed by a dog."

Eight (34.8 percent) of the 23 recovered owls were reported simply as "found dead," and it is not known what actually happened to them. A partial history of one of these eight individuals prior to its final recovery is known. This particular bird was turned in and kept for a time at the rehabilitation lab prior to banding and release. When it was brought to the lab, the owl was missing the outer layers of its talons, and was in a weakened condition from being caged and fed an improper diet. It eventually regrew its talons and recovered to the point that it could be released. It was released during the spring of 1982 and was found dead the next spring about a kilometer from the release point. The condition of the frozen carcass indicated that it had probably died during late fall or winter.

Of the 23 recoveries, 14 (60.9 percent) could be attributed directly to the activities of humans. The emaciated individual may or may not have died of natural causes. It seems likely that some of the owls "found dead" also died from unnatural causes, so the actual percent mortality due to the activities of man could be considerably higher than 60.9. In other studies, Steward (1) estimated that 96 percent of his recovered owls were intentionally killed by man, primarily by shooting and trapping. Included in the figure were 27 percent "found dead" which he also ultimately attributed to the activities of man. Two percent of his returns were found on highways or involved vehicles. Houston (2) categorized the mortality of his recovered great horned owls as follows: 46 percent shot or trapped, 20 percent found dead, and 14 percent involving vehicles or found on highways. Other owl mortalities have reportedly been caused by electrocutions, entanglements in wire or string, collisions with various objects, starvation, and natural predation (1,2).

Conclusion

Although the great horned owl is often considered a sedentary species, results from banding studies have shown that, at least in the northern portion of its North American range, considerable movements sometimes occur. Most longer movements by banded central Minnesota great horned owls appear to be to the south and southeast. Although movements by this species are often labelled as either juvenile dispersal or prey population-influenced, it is often difficult to accurately categorize them. Interpretations about mortality of great horned owls, based on band recovery data, also have limitations which should be considered. In central Minnesota, most great horned owl mortality appeared to be related to the activities of humans, with collisions with vehicles and trapping the two leading factors. Data from many recoveries, however, are not available, as a large number of owls are reported only as "found dead."

Acknowledgements

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References

1. Steward, P.A. 1969. Movements, population fluctuations, and mortality among great horned owls. *The Wilson Bulletin* 81(2): 155-162.
2. Houston, C.S. 1978. Recoveries of Saskatchewan-banded great horned owls. *Canadian Field Naturalist* 92(1): 61-66.
3. Adamcik, R.S. and Keith, L.B. 1978. Regional movements and mortality of great horned owls in relation to snowshoe hare fluctuations. *Canadian Field Naturalist* 92(3): 228-234.
4. Green, J.C. and Janssen, R.B. 1975. Minnesota Birds — Where, When, and How Many. Minneapolis: University of Minnesota Press.
5. Dunstan, T.C. 1970. Post-Fledging Activities of Juvenile Great Horned Owls as Determined By Radio-Telemetry. Ph.D. Thesis, Univ. S. Dakota.
6. Houston, C.S. 1971. Brood size of the great horned owl in Saskatchewan. *Bird-Banding* 42(2): 103-105.
7. Houston, C.S. 1975. Reproductive performance of great horned owls in Saskatchewan. *Bird-Banding* 46(4): 302-304.
8. Adamcik, R.S., Todd, A.W. and Keith, L.B. 1978. Demographic and dietary responses of great horned owls during a snowshoe hare cycle. *Canadian Field Naturalist* 92(2): 156-166.

BOOK REVIEW

ADVANCES IN BIOTECHNOLOGICAL PROCESSES
Avshalom Mizrahi and Antonius L. vanWezel, eds. Alan R. Liss, Inc., New York Vol. 1 1983; Vol. 2 1983; Vol. 3 1984

About fifteen years ago I was employed by an insecticide manufacturer to develop a process to produce microbial insecticides for commercial use. At the time the only large fermenter tanks were for food production or alcohol production and were not suitable for our uses. After countless burned-out motors and ruined batches the project was halted. Had we known then what is known now, and largely contained in these volumes, we would have been successful, I'm sure.

Editors Mizrahi and vanWezel have assembled here a wide variety of review articles pertaining to *commercial* (not research) applications of biotechnology. The topics covered include fermenter design, purification of proteins produced, purification of cells produced, bacterial products, use of plant cells, desulfurization of coal, virus production, cancer therapeutic agents and ore recovery.

Much of the information should be useful to the industrial engineer faced with the task of designing a working bioreactor and to the research and development staffs of companies involved in these fields. The style of the books is technical, as befits a useful reference, and a bit uneven from author to author. Much of the material is narrowly specialized and as such will have a limited audience, but there is enough here to justify the books to anyone in biotechnology. Of particular interest to those interested in the development of new processes are the chapters devoted to possible uses of biotechnology, e.g., Miltenburger and Krieg's article on bioinsecticides in Volume 3, or Fowler and Stepan-Sarkissians's article on plant cell culture products in Volume 2. These books would be a welcome addition to anyone's biotechnology library.

Reviewed by Keith K. Klein, Hamline University

CALENDAR OF EVENTS

Editor's note: This calendar is intended to inform MAS members and others about scientific meetings and symposia of interest in Minnesota and surrounding states. Please send notices of upcoming events to The Editor, Minnesota Academy of Science Journal, Suite 916 Pioneer Building, St. Paul, MN 55101.

April
18-20: 48th Annual State Science Fair and Research Paper Program, Kahler Hotel and Clinic View Inn, Rochester, MN

26-27: Minnesota Academy of Science 53rd Annual Meeting, College of St. Catherine, St. Paul, MN

May
8-9: Symposium: The Effects of Air Pollutants on Forest Ecosystems, University of Minnesota, St. Paul, MN. Contact: The Acid Rain Foundation, 1630 Blackhawk Hills, St. Paul, MN 55122

June
26-29: Annual Meeting: National Association of Advisors for the Health Professions, Snowbird, Utah

November
14-16: 18th Annual North Central Regional Junior Science, Engineering and Humanities Symposium, Cragun's Conference Center, Gull Lake, MN