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Artificial Cavity Box Use by Eastern Screech Owl,

Otus asio

(TITLE)

BY

Lori A. Davis

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

Masters of Science in Zoology

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

1994

YEAR

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**ARTIFICIAL CAVITY BOX USE BY EASTERN SCREECH OWLS,
OTUS ASIO**

ABSTRACT: Screech owl use of 29 artificial cavity boxes placed in wooded habitat on a 14.6 hectare study area in east central Illinois was monitored from 1975 through 1993. A total of 28 screech owls were captured a total of 155 times. Two to 4 adults were usually present and 3 broods were reared in the boxes. The time between first and last capture of birds taken 4 or more times ranged from 270 to 2589 days (average 1740 days). Home range of 5 owls captured 8 to 17 times ranged from 0.45 to 6.0 ha. Cavity boxes were used more in the winter. There was little preference for boxes in any wooded habitat and variations in cavity box size, height of placement, and orientation were of little or no importance.

INTRODUCTION

The eastern screech owl, Otus asio naevius, is the most common raptor in urban, suburban (Lynch and Smith, 1984), and rural open woodland habitats (VanCamp and Henny, 1975) in states east of the Rocky mountains. Screech owls are seldom seen due to their nocturnal activity patterns and habit of resting in concealed areas during the day. During the summer, screech owls rest on open limbs, in tangles of vegetation, or in cavities (Belthoff and Ritchison, 1990b). Cavity use increases during fall and winter, and especially during harsh weather (Merson et al., 1983; VanCamp and Henny, 1975).

Screech owls are secondary-cavity users (McComb and Noble, 1981). They rely on naturally formed cavities or those excavated by woodpeckers. The availability of cavities as well as a suitable prey base probably are primary limiting factors for this species (Brush, 1983; Belthoff and Ritchison, 1990a). Screech owls, like many other cavity users, readily use artificial cavities such as wood duck nest boxes (VanCamp and Henny, 1975) and may select such boxes over natural cavities (VanCamp and Henny, 1975; McComb and Noble, 1981). This is the report of screech owls use of such artificial cavities over a 19 year period in east central Illinois. Dr. Richard Andrews initiated the study in 1975 and monitored the boxes or supervised students working with them since then. Interim reports of some aspects of this work were prepared by Debra Hughes and Kathleen Andrews-Wright. I worked on the project from October, 1991 through May, 1993. Data on home range, movement, longevity, reproduction, and habitat use of screech owls using the cavity boxes are presented in this thesis.

STUDY AREA

The study was conducted on and adjacent to a 36 acre (14.6 ha) tract 8 miles southeast of Charleston, Illinois (NE1/4, NE1/4, Sec. 4, T11N, R10E, Coles County, Illinois). The north half was pasture and hayfield divided by a narrow wooded waterway running north to south. The southwest quarter was wooded pasture, barns, and a small pond. The

southeast quarter was primarily woodland. In 1974, a 100 foot (30.5 m) quadrat system was established within this woodland, a tract of about 4 ha (Dyer, 1977). The grid points of the quadrat system were identified as follows: North-South lines were numbered 1 through 14 from south to north; East-West lines were identified from A through M starting at the east side. In this way, a cavity box or any event observed could be recorded in relationship to specific points, such as A-3, C-5, M-14, etc.

The 4 ha woodland was divided into lowland and upland regions. The lowland portion of the forest was 4.5-6.0 m lower than the upland and bordered an intermittent stream that ran along the north edge of the woods. The upland portion comprised 85% of the plot. Dyer (1977) evaluated the woodland in 1977 and found 25 tree species dominated by sugar maple, white oak, and hickory on the upland. Sugar maple, elm, and ash were found along the stream.

North of the study area was a road and agricultural fields, to the west was about 1 ha of open woods surrounded by agricultural fields, to the south was agricultural fields, and on the east of the area were buildings, barn lots, and woodlands of an adjacent farm.

MATERIALS AND METHODS

In September 1975, 12 cavity boxes made from rough cut cottonwood were placed at specific grid points in the 4 ha woodland. The original boxes were all 25.4 cm X 25.4 cm square and 45.7 cm high with a 7.6 X 7.6 cm opening at the

top of one side. One side was hinged so the contents of the box could be examined. Additional cavity boxes were constructed from available lumber, so sizes varied slightly from the original. The grid coordinates were extended over the entire 14.6 ha study area in December, 1978 and cavity boxes were placed in all wooded parts of the area. Each cavity box was hung on the largest tree near the grid point of the quadrat system. Height was dictated by the length of the ladder used and the slope of the land; most boxes were 3.5 to 4.5 m above the ground. The majority of the boxes were hung on the south side of the tree with the entrance to the east to protect them from winter winds.

Cavity boxes were monitored using a ladder to reach the box. The entrance opening was covered with a gloved hand or by placing a cloth in the hole and the door was eased open to observe the contents. Screech owls found in cavity boxes were removed and banded with a numbered, aluminum band (U.S. Fish and Wildlife Service, permit number 06858, L. B. Hunt, Charleston, IL). The owl was then returned to the box and the door was closed. Data recorded each time the boxes were checked included: date, box number (grid point), band number, color of the owl, and the presence of other owl sign (pellets, feathers, droppings, uneaten food, or food remains). The use of the cavity boxes by other species was also recorded and the contents of the box were cleaned out unless doing so would disturb animals in the box.

The cavity boxes were hung in three habitat categories: woodland edge, wooded fencerow, and woodland interior. A goodness-of-fit chi-square distribution test (Scheffler, 1988) was used to determine if there was significant difference in owl use of cavity boxes in each habitat or of owl activity and capture rates each season.

Additional attempts to locate screech owls included the use of Bal-chatri traps baited with house mice (Berger and Mueller, 1959) and mist nets. Owls were also located by triangulating their calls in response to an audio tape from 1991 to 1993. Five call stations were established in December of 1991 on and near the study area. An audio tape of a 30 second repeated sequences of a bounce and 3 whinnies was played at each station once each minute for 5 minutes. The number of owls responding and location (determined by triangulation) was recorded. Mist nets (1.5 X 10 m) were positioned, at grid points C-9 and D-10 in 1978 and at M-1 and M-14 in 1993, while the taped calls of owls were played.

Natural cavities on the 4 ha woodland were estimated by walking transects from A-1 to A-10, C-1 to C-10, and E-1 to E-10. All trees with a DBH of 45 cm or more within 3 m to either side of the transect line were identified. All cavities in these trees were recorded as well as height of cavity, number of cavities per tree, and orientation of each cavity.

RESULTS

Artificial cavity boxes were placed at grid coordinates on wooded parts of the 14.6 ha study area. Boxes were placed at 29 points (Figure 1) and monitored for 19 years for screech owl use (Table 1). The number of boxes available to owls varied each year and even each week depending on the number of new installations and on the number down for repair. The effort of checking the boxes, likewise, was not uniform over the 19 years. Usually all of the cavity boxes present were checked on a given day, but 25 times over the 19 years single boxes were checked (Table 1). Single boxes were examined when an owl was seen looking from the opening in the box. Cavity boxes were checked 191 times for a total of 2859 cavity box examinations. Sixty-five percent of the times checked were in 8 of the 19 years (1976, 1977, 1978, 1979, 1980, 1991, 1992, and 1993). Cavity box examinations also varied monthly (Table 2). The boxes were checked only once in August (19 boxes) and as often as 29 times in December. The winter months (December, January, and February) accounted for 44.8% of all the cavity box examinations; spring (March, April, and May) was 25.5%, fall (September, October, and November) was 22.7%, while summer (June, July, and August) was only 7.1%.

Screech owl use of the cavity boxes was based on the presence of an owl in a box or a sign indicating the owl had used it (eggs, young owls, owl pellets, owl feathers, owl droppings, food caches, or food remains). The number of

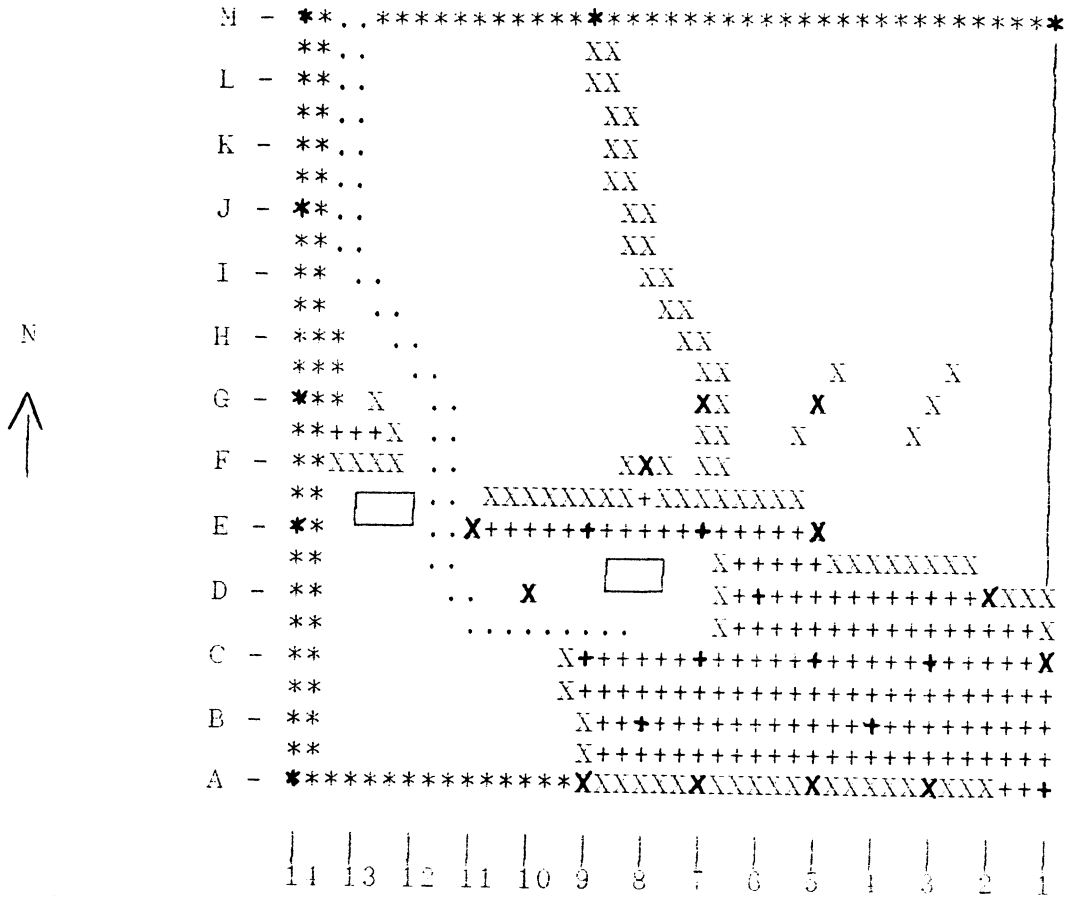


Figure 1. Grid coordinates of cavity boxes monitored for screech owl use on a 14.6 ha study area. Boxes (bold face) were located in wooded fencerow (*), woodland edge (X), and woodland interior (+). Other items on the area which are identified here are the house, barn, and driveway (..).

Table 1. Cavity boxes available for screech owl use on a 14.6 ha study area in east central Illinois.

Year	Boxes Available		Times Checked		Boxes Checked	Months Checked	
	mean	range	All Boxes	Single Boxes		Total	Range (*)
1975	12.2	12-13	9	0	110	3	10-12
1976	12.7	9-13	27	4	297	10	1-12
1977	13.0	12-13	20	0	259	9	1-12
1978	13.6	11-20	11	3	112	7	1-12
1979	19.8	19-20	12	0	238	10	1-12
1980	17.9	16-19	10	2	145	7	1-9
1981	15.7	15-16	3	0	47	2	3-12
1982	18.5	15-20	8	0	148	8	2-12
1983	21.3	20-22	9	0	192	8	1-12
1984	20.6	20-21	7	0	143	5	2-12
1985	17.5	15-20	2	0	35	2	3-12
1986	13.5	12-15	0	1	1	1	11
1987	17.4	7-26	5	2	89	5	1-12
1988	22.3	21-24	3	0	67	3	5-12
1989	22.0	22-23	5	3	98	6	2-12
1990	20.0	12-23	4	1	81	5	1-10
1991	17.0	16-23	14	2	278	6	1-12
1992	21.7	19-23	19	0	409	10	1-12
1993	20.0	19-21	7	7	128	5	1-6

* Months numbered from January (1) to December (12).

boxes used each year (right hand column of Table 3) ranged from 1 to 15 and averaged 9. Since individual boxes were often used more than once, the number of box uses (either owls or sign of owls) ranged from 1 to 48. Of more importance the percentage of boxes with evidence of owls was 10.0% or more for 15 of the 19 years (Table 3). Those data show a distinct drop for 3 of the last 4 years of the study in which the percentage of boxes with owl activity did not exceed 6.1%, except in 1993 which was due to a brood.

Twenty-eight owls were captured a total of 155 times (Table 2). All captures were in cavity boxes; none were captured with mist nets or bal-chatri traps. Owl capture data in table 2 were inflated by the number of individual boxes checked (Table 1). Individual boxes were checked either when an owl was seen looking from the box (11 of 25 times individual boxes were checked) or when a known brood was checked (14 of 25 times). In either case a capture was assured when the cavity box was examined. The percentage of boxes with some evidence of owl use was significantly greater in the winter (chi-square = 15.83, 0.05) and in the spring (14.76, 0.05) (Table 2).

The density of screech owls on the area could not be determined absolutely from the birds taken in the boxes but some trends were evident. Usually 2 or 3 adults were present at any time (Figure 2). Nesting data showed owls number 495-83740 and 495-83739 with a brood in 1976. In 1978, 495-83740 was again with a brood but now with 495-

Table 2. Seasonal owl activity in cavity boxes monitored for 19 years on 14.6 ha area in east central Illinois.

Season/ Month	Cavity Boxes		Screech-Owls		
	Times checked	Number checked	Owls and owl signs	Total number of owl captures	Maximum of owls per day
Winter					
Dec.	29	465	68 (17.6%)	21 (13.5%)	2
Jan.	23	389	62 (16.0%)	16 (10.3%)	3
Feb.	26	426	79 (20.4%)	21 (13.5%)	5
	78	1280	209 (57.4%)	58 (37.4%)	
Spring					
Mar.	22	389	56 (14.5%)	15 (9.7%)	2
Apr.	12	166	21 (5.4%)	7 (4.5%)	2
May	17	174	20 (5.2%)	31 (20.0%)	6
	51	729	97 (25.1%)	53 (34.2%)	
Summer					
Jun.	10	70	15 (3.9%)	28 (18.1%)	1
Jul.	6	113	4 (1.0%)	0 (0.0%)	0
Aug.	1	19	1 (0.3%)	0 (0.0%)	0
	17	202	20 (5.2%)	28 (18.1%)	
Fall					
Sep.	13	208	11 (2.8%)	0 (0.0%)	0
Oct.	13	185	17 (4.4%)	6 (3.9%)	2
Nov.	16	255	33 (8.5%)	10 (6.5%)	3
	42	648	61 (16.8%)	16 (10.3%)	

Table 3. Owl activity in cavity boxes on a 14.6 ha study area in east central Illinois.

Year	Owls Captured	Owl Sign					Box with Owl & Signs	Individual Boxes Used
		Nests	Pellets	Feathers	Droppings	Foods		
1975	9	0	11	0	0	4	19 (19.1%)	10
1976	14	1	12	16	14	7	48 (16.2%)	10
1977	8	0	9	0	12	10	26 (10.0%)	9
1978	8	1	9	2	4	9	24 (21.4%)	12
1979	10	0	11	2	23	15	40 (16.8%)	14
1980	3	0	12	3	16	12	26 (17.9%)	15
1981	3	0	7	0	3	10	12 (25.5%)	6
1982	6	0	23	0	4	14	33 (22.3%)	15
1983	12	0	22	0	11	11	33 (17.2%)	13
1984	2	0	13	0	8	12	21 (14.7%)	13
1985	2	0	1	0	0	2	3 (8.6%)	3
1986	1	0	0	0	0	0	1 (100.0%)	1
1987	9	0	9	0	0	9	18 (20.2%)	11
1988	5	0	3	0	2	8	13 (19.4%)	8
1989	8	0	7	5	5	5	15 (15.3%)	9
1990	1	0	2	0	1	2	4 (4.9%)	3
1991	9	0	6	3	2	3	17 (6.1%)	11
1992	1	0	5	1	5	9	18 (4.4%)	9
1993	8	1	2	1	3	2	15 (11.7%)	5

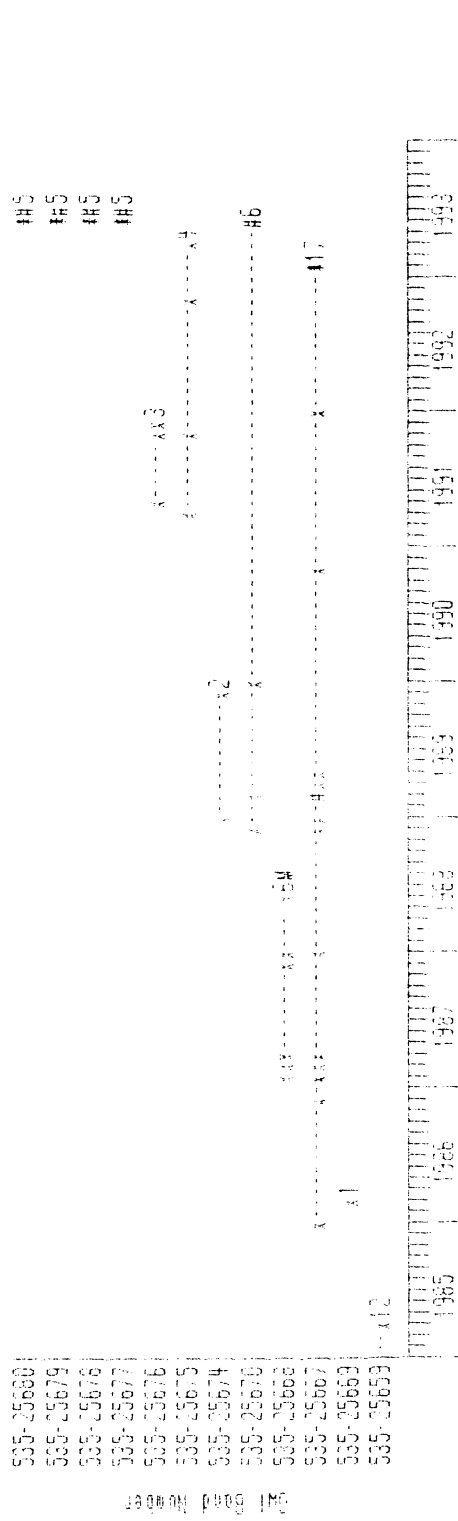
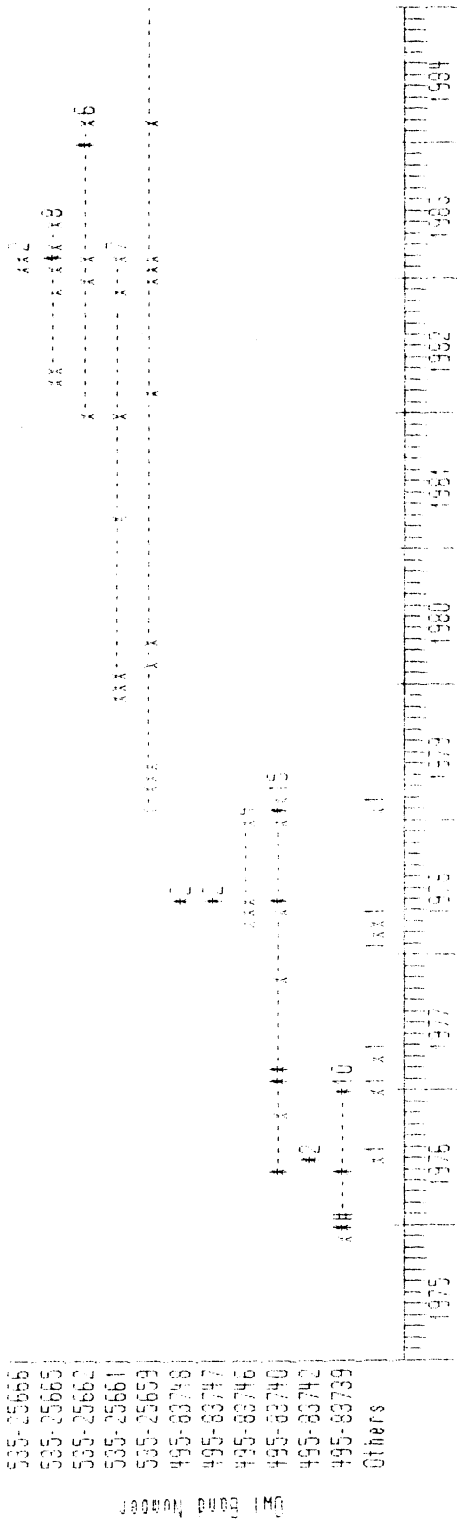


Figure 2. Screen owls captured and banded on a 19.5 ha study area in east central Illinois from 1975 through 1993. The number of captures each month is designated as A-1, A-2, and A-3. The total number of captures is at the right of each line. Band number of owls captured only once in 1975-1979 were in order of capture: 495-83746, 495-83748, 495-83749, 495-83745, 495-83750, and 535-25666.

83746. The birds were not sexed, but these data suggest that 12 pair were supported on the area over the 19 years and that pair bonds changed over time. A maximum of 5 adult owls were captured on February 6, 1983. Four adult birds (probably 2 pair) remained on the area during 1982-83 and again in 1991.

The temporal distribution of the 28 owls is shown in figure 2. The longest period of known presence was an owl number 535-25667 which was captured 17 times over an 8 year period (2588 days). The only known mortality of a banded owl was a bird number 525-25668 which was found dead in a cavity box on May 7, 1988. A single egg was also in the box.

Screech owls nested in artificial cavity boxes three times. Two banded adults (495-83740 and 495-83739) and 4 eggs were found in box C-7 on May 13, 1976. Four young were hatched by May 26, but 2 of the young had fledged and were not banded on June 16, when 2 of the young were banded (495-83741 and 495-83742). An adult (495-83740) and 5 eggs were found in cavity box B-8 on April 30, 1978. That adult and another banded adult (495-83746) were in the box with 4 young on May 13. The 2 largest young were banded (495-83747 and 495-83748) on May 22; a third was banded (495-83750) on May 27. The fourth young owl was gone on May 27 and was not banded. A third nest was found in cavity box E-14 on May 10, 1993. A banded adult (535-25670) and 4 young were observed 2 times until May 25 when the young were banded

(535-25677, 535-25678, 535-25679, and 535-25680). At that time a fifth young owl, a very small runt, was found. The runt was gone 4 days later. No banded young were ever recaptured after leaving the nest.

Audio calls were used in an attempt to locate screech owls not using cavity boxes. An audio tape of screech owl calls was played at C-9 18 times, at M-1 and M-14 22 times and at points 402 m east of M-1 and A-1 15 times (Table 4). Owls responded 27 of 92 times (29%) that calling attempts were made. Six calling trials were made after checking the cavity boxes; owls were captured in the boxes on 2 of these days. On December 29, 1991, an owl was captured in M-14 and later a response was heard to the northeast of C-9; this is not in the direction of M-14. Also on January 31, 1993, an owl was located in the box at G-5 and a response was heard to the southwest of M-14, which again is not the direction of the box (G-5) in which the owl was caught. Calling birds were not identified since none were captured in mist nets set for them. During the time owls were called (1991-1993), 3 banded birds were using the cavity boxes (Figure 2). Triangulation of the owl calls suggested that each of these 3 birds was calling (Table 4). In addition, another owl was located in the woods about 400 m north of M-1.

The incidence of cavity trees in the wooded southeast quarter of the study area was determined by walking transects on grid lines A, C, and E (Table 5). Sugar maple

Table 4. Response of screech owls to a taped screech owl calls.

Call Stations	Times Called	Times Answered	Times Owl Seen	Tentative Location	Possible Identification
C-9	18	11 (61%)	0 (0%)	5 - M-14 1 - E-14 2 - NE 2 - C-1 1 - C-9	535-25667 535-25670 New bird #1 535-25675 535-25670
M-14	22	11 (50%)	1 (8%)	7 - E-14 3 - NW 1 - C-9	535-25670 535-25667 535-25670
M-1	22	3 (14%)	2 (66%)	2 - N 1 - A-1	New bird # 1 535-25675
402 m E. of M-1	15	2 (13%)	0 (0%)	2 - A-1	535-25675
402 m E. of A-1	15	0 (0%)	0 (0%)		
	--	-----	-----		
	92	27 (29%)	3 (11%)		

Table 5. Natural cavities in trees on 3 transects through a 4 ha wooded area in east central Illinois.

Species	A		C		E		Total	
	Trees	Cavities	Trees	Cavities	Trees	Cavities	Trees	Cavities
Ash	4	0	4	0	4	0	16	0
Sugar Maple	35	1	65	6	62	4	162	11
White Oak	10	1	10	1	1	0	21	2
Elm	3	0	11	0	6	0	20	0
Hack- berry	5	0	0	0	4	0	9	0
Hickory	47	1	5	0	1	0	53	1
Red Oak	3	1	1	0	0	0	4	1
Buckeye	0	0	4	0	0	0	4	0
Honey Locust	0	0	0	0	1	0	1	0
Sycamore	0	0	0	0	4	1	4	1
Basswood	0	0	3	0	0	0	3	0
Osage Orange	0	0	1	0	0	0	1	0

(Acer saccharum) was found to make up 55% of the trees. Natural cavities were found in 20 (6.8%) of the trees (Table 5). None of the cavities was over 30 m from the woodland edge. Cavities were 3 to 15 m (average 11 m) above the ground and the number of cavities per tree ranged from 1 to 14 (average 3.5). Eleven of the 20 trees with natural cavities were sugar maple (55%) with the others located in 2 white oaks (Quercus alba)(10%), 1 red oak (Quercus rubra)(5%), 1 hickory (Carya ovata)(5%), 1 sycamore (Platanus occidentalis)(5%), and 2 dead trees (10%).

Owl captures on the study area involved all but 4 cavity boxes, and all but 1 box had some evidence of owl use (Table 6). There were differences in the number of owl captures and number of owl signs found in each habitat category (Table 6), but the difference was not significant (chi-square = 5.19 and 0.048 respectively, 0.05). Certain boxes within each habitat category seemed to be preferred; that is they were used more than others (Table 6). This preference can be seen in the number of owl captures and total owl activity in cavity boxes: E-14, M-14, A-9, E-5, G-7, B-8, C-7, D-6, and E-9. However, E-14, C-7, and B-8 have inflated numbers for both the number of owls captures and total owl activity due to the individual box checks because of known broods. Furthermore, E-9 and M-14 were located in trees easily seen from the house or the driveway. Thus when owls were looking from the box, they were seen and that box was checked. If these 5 boxes are not counted the

Table 6. Number of owl captures and total owl activity for each wooded habitat category on the 14.6 ha study area in east central Illinois.

Box Location	Times Checked	Owl Captures	Total Owl Activity
Wooded fencerow			
A-14	101	5 (5.0%)	21 (20.8%)
E-14	102	29 (28.4%)	19 (11.8%)
G-14	68	4 (5.9%)	13 (19.1%)
J-14	30	0	0
M-1	107	2 (1.9%)	6 (11.3%)
M-9	87	2 (2.3%)	12 (13.8%)
M-14	107	11 (10.3%)	27 (25.2%)
	---	---	---
	602	53 (8.8%)	98 (16.3%)
Woodland interior			
A-1	152	5 (3.3%)	15 (9.9%)
B-4	58	0	1 (1.7%)
B-8	61	5 (8.2%)	8 (13.1%)
C-3	153	5 (3.3%)	10 (6.5%)
C-5	85	0	2 (2.4%)
C-7	166	11 (6.6%)	30 (18.1%)
C-9	97	3 (3.1%)	11 (11.3%)
D-6	58	3 (5.2%)	13 (22.4%)
E-7	96	6 (6.3%)	11 (11.5%)
E-9	156	8 (5.1%)	32 (20.5%)
	---	---	---
	1082	46 (4.3%)	133 (12.3%)
Woodland edge			
A-3	102	3 (7.9%)	10 (6.4%)
A-5	151	3 (7.9%)	11 (7.1%)
A-7	104	1 (2.6%)	9 (5.8%)
A-9	157	9 (23.7%)	31 (19.9%)
C-1	105	0	5 (3.2%)
D-2	57	2 (5.3%)	12 (7.7%)
D-10	58	2 (5.3%)	6 (3.8%)
E-5	163	6 (15.8%)	26 (16.7%)
E-11	104	0	2 (1.3%)
F-8	48	1 (2.6%)	6 (3.8%)
G-5	96	3 (7.9%)	16 (10.3%)
G-7	106	8 (21.1%)	22 (14.1%)
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	1251	38 (3.0%)	156 (12.5%)

screech owls seemed to prefer woodland edge (A-9, E-5, and G-7) and woodland interior (D-6).

Home range of 5 screech owls captured 8 or more times was measured as the area encompassed by all capture points (Figure 3). The home range were 0.05, 1.4, 5.3, 5.5, and 6.0 ha. The greatest distance between capture points was 503 m for screech owl 535-25667.

DISCUSSION

Cavity boxes provide access to screech owls that would be difficult to obtain by other means. While screech owls are commonly reported in nest boxes (McComb and Noble, 1981; De La Torre, 1990; VanCamp and Henny, 1975) it is only through long term studies that data on longevity, density, and population turnover (Figure 2) can be obtained. The owls remained on the study area for a considerable period; 11 birds averaged 1740 days (4.8 years) between first and last capture. Density, in general, fluctuated between 1 and 2 pair even when there were declines in the use of cavity boxes in 1990-1993.

Three broods of 4 young were raised on the study area. Young owls disperse from their parents home range after fledging (Belthoff and Ritchison, 1989). According to Belthoff and Ritchison (1989), the young remain on the area for around 55 days before dispersal. I had no recaptures of banded young; in part, because screech owl use of cavities in summer is less (Merson et al., 1983) and in part, because our effort at searching cavity boxes was less in the summer.

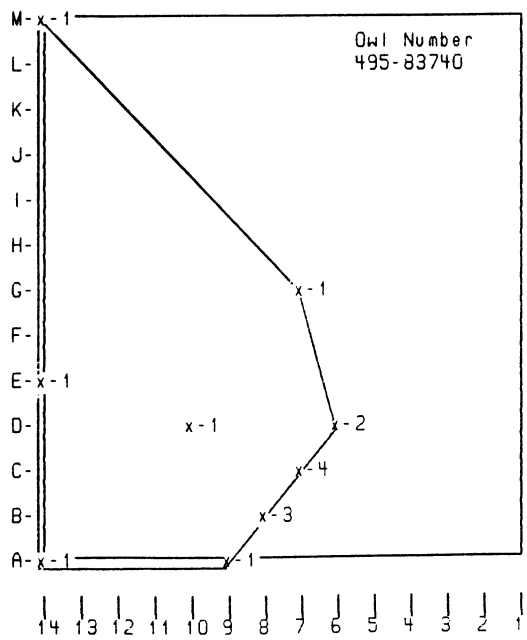
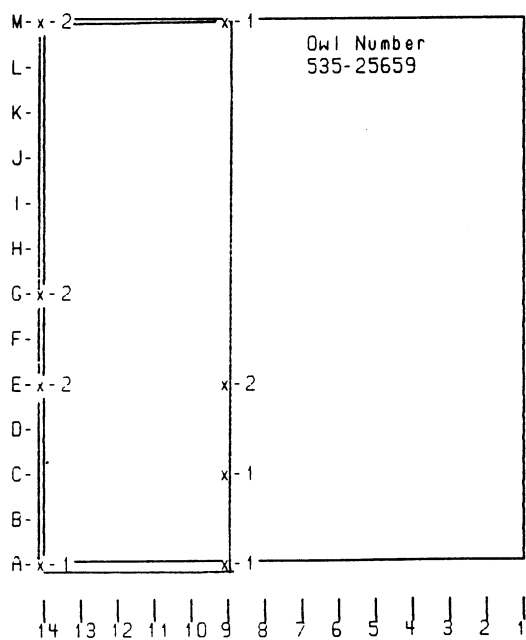
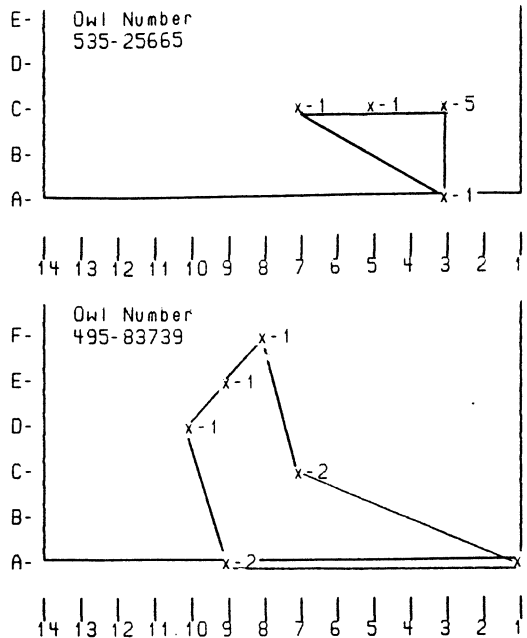
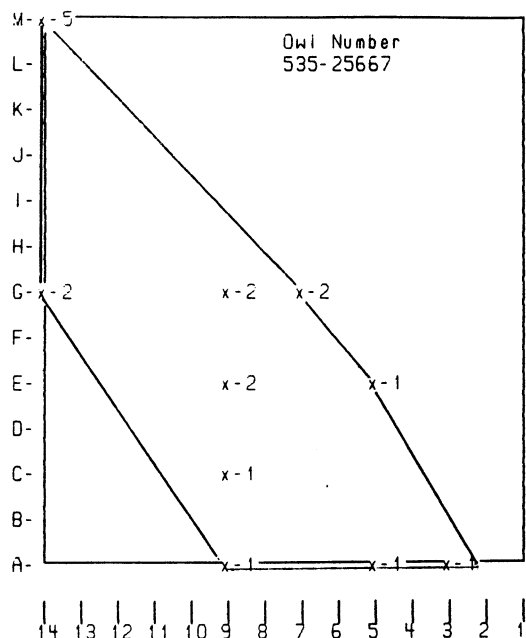


Figure 3. Home range of screech owls captured 8 or more times on a 14.6 ha study area in east central Illinois. Grid coordinates are identified on both axes. Capture points (x) and the number of captures are shown.

Audio calls have been used to determine screech owl density in various habitats (Lynch and Smith, 1984). In this study, the owls responded to taped calls only 29% of the time, despite the fact that 3 banded owls were known to be on the area. It has been noted that screech owls have a variety of specific calls (Ritchison et al., 1988) and specific calling periods (Hough, 1960). The two calls used in this investigation may have limited the response. They did provide evidence of one bird not known to be present by cavity box examinations.

Raptors may produce more eggs and young than they can support to fledging, if the food supply is limiting (Gill, 1990). I found no evidence of this phenomenon in screech owl literature. VanCamp and Henny (1975) reported low juvenile mortality, while Duley (1979) showed no mortality of young. Four young were found in cavity box E-14 in 1993. They were checked 3 times before they were removed for banding. Upon removal for banding (May 25), a fifth owl, which was half the size of the others, was noticed. Within 4 days, it was gone, while the 4 banded young remained in the box for over 12 more days. Therefore, I concluded that the runt was killed and/or eaten by its siblings.

Habitat has been described as being a critical element in determining roosting and nesting locations (Swallow et al., 1986) and cavities are an essential element in the habitat (VanCamp and Henny, 1975; De La Torre, 1990). This study area was dominated by cavity prone sugar maples, Acer

saccharum, when the study was initiated (Dyer, 1977) and at the present time. Despite the presence of natural cavities, screech owls readily used the artificial cavity boxes. McComb and Noble (1981) defined the ideal artificial cavity as a north facing box under a limb in a living tree with lianas. They had a 0.65% box use compared to my 97% use. The majority of my boxes were on the south side of the trees. There were some differences in use of cavity boxes in this study but, in general, my data indicate that screech owls use cavity boxes in any wooded habitat and that variations in size, height of placement, and orientation are of little importance.

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LITERATURE CITED

- Belthoff, J.R., & G. Ritchison. 1989. Natal dispersal of eastern screech-owls. *Condor* 91:254-265.
- Belthoff, J.R., & G. Ritchison. 1990a. Nest-site selection by eastern screech-owls in central Kentucky. *Condor* 92:982-990.
- Belthoff, J.R., & G. Ritchison. 1990b. Roosting behavior of post fledging eastern screech-owls. *Auk* 107:567-579.
- Berger, D.D., & H.C. Mueller. 1959. The Bal-chatri: a trap for the birds of prey. *Bird-Banding* 18-26.
- Brush, T. 1983. Cavity use by secondary cavity-nesting birds and response to manipulations. *Condor* 85:461-466.
- De La Torre. 1990. Owls their life and behavior. Crown Publishers, Inc. New York. 214 pp.
- Duley, L. 1979. Life history aspects of the screech owls (*Otus asio*) in Tennessee. M.S. thesis, University of Tennessee, Knoxville, TN. 85 pp.
- Dyer, S. 1977. Home range and movements of fox squirrels (*Sciurus niger*) in east central Illinois. M.S. thesis, Eastern Illinois University, Charleston, IL. 32 pp.
- Gill, F. 1990. Ornithology. W.H. Freeman and Co. New York. 661 pp.

- Hough, F. 1960. Two significant calling periods of the screech owl. *Auk* 77(2):227-228.
- Lynch, P.J., & D.G. Smith. 1984. Census of eastern screech-owls (*Otus asio*) in urban open-space areas using tape-recorded song. *Am. Birds* 38:388-391.
- McComb, W.C., & R.E. Noble. 1981. Nest-box and natural-cavity use in three mid-south forest habitats. *J. Wildl. Manage.* 45(1):93-101.
- Merson, M.H., L.D. Leta, & R.E. Byers. 1983. Observations on roosting sites of screech owls. *J. Field Ornith.* 54:419-421.
- Ritchison, G., P.M. Cavanagh, J.R. Belthoff, & E.J. Sparks. 1988. The singing behavior of eastern screech-owls: seasonal timing and response to playback of conspecific song. *Condor* 90:648-652.
- Scheffler, W.C. 1988. *Statistics concepts and applications.* The Benjamin/Cummings Publishing Co., Inc. Menlo Park, CA. 590 pp.
- Smith, D.G., & R. Gilbert. 1984. Eastern screech-owl home range and use of suburban habitats in southern Connecticut. *J. Field Ornithol.* 55(3):322-329.
- Swallow, S.K., R.J. Gutierrez, & R.A. Howard Jr. 1986. Primary cavity-site selection by birds. *J. Wildl. Manage.* 50(4):576-583.
- VanCamp, L.F.; Henny, C.J. 1975. *The Screech Owl: its life history and population ecology in northern Ohio.* U.S. Fish Wildl. Serv. N. Am. Fauna 71.