A ROADSIDE SURVEY OF SCREECH OWLS USING PLAYBACK TECHNIQUES

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The Screech Owl (Otus asio) is almost certainly the most numerous and widespread bird of prey in Massachusetts. But because of its nocturnal habits and retiring nature, it is seldom seen by the casual observer. Furthermore, it is severely underrepresented on conventional bird surveys such as Christmas Bird Counts and breeding bird surveys. During the spring of 1982 the Bird Observer Field Studies Committee attempted to capitalize upon the general high level of interest in owls among ornithological enthusiasts by organizing a roadside survey of Screech Owls in eastern Massachusetts. The study was designed to provide insight into the habitat types in which breeding owls occurred and to provide an indication of the relative population densities in these habitats.

In their classic study of raptors during the 1940's, the Craigheads (1956) evaluated Screech Owl populations by a painstaking inspection of all likely roosting cavities for feathers, pellets, or roosting owls. Today we are fortunate to have a much less laborious means of detecting Screech Owls: the use of playback recordings. It has been found that Screech Owls readily respond to tape recordings (or good vocal imitations) of their vocalizations. A brief review of previous work using playback techniques will place the BOEM effort in perspective.

Nowicki (1974) used tape-recorded calls to census Screech Owls in Deerfield Township, Michigan. His census work was done during October and November between 6:00PM and 9:00PM. He found Screech Owls in 10 of 29 randomly selected plots of 0.25 sq. mi. in area. This produced a density of owls of 1.4 per sq. mi. overall or 6.1 per sq. mi. when only wooded habitat was considered.

In West Virginia, Beatty (1977) reported on a survey undertaken as part of a Christmas Bird Count. He covered a route of approximately 24 miles in length between midnight and 6:00 A.M. Screech Owls were found at 24 separate locations along this route. Beatty concluded that good Screech Owl habitat is "any place where we can safely pull off the road."

Playback techniques were used by Johnson et al. (1981) in riparian mesquite groves in Arizona to detect the highest breeding densities yet discovered for Screech Owls in North America. In the most productive habitat censused, Screech Owls were found at intervals of 50 meters and the density of breeding pairs was sometimes 1 pair for each 1.4 hectares (3.5 acres). Johnson reported that occasionally as many as

Eastern Screech-Owl *Illustration by Denise Braunhardt*

twelve pairs of Screech Owls were heard simultaneously responding to the playback. This data indicates that Screech Owl territories can be very small in optimum habitat.

The objective of the BOEM study was to advance our knowledge of population density and habitat preferences for breeding Screech Owls in eastern Massachusetts. In order to do this, survey techniques were devised which could be applied by conscientious non-professional observers using no special equipment or training. The study was designed so that the data it produced would have true ornithological value and so that the study could be repeated in a consistent manner in subsequent years.

Surveys were conducted between March 27 and April 4 along various routes in eastern Massachusetts. Surveys began no earlier than 2:00 A.M. and terminated no later than sunrise, approximately 5:30 A.M. Participants made stops along the route at roadside stations located no closer than 0.4 miles (644 meters) apart. This separation was imposed in order to insure independent results at each station. An attempt to elicit a response from a Screech Owl was carried out at each station using either a playback of recorded Screech Owl vocalizations or a human imitation of the typical Screech Owl calls. If no response was detected after three minutes of effort, then the attempt was terminated.

For each station participants completed a data form which included a breakdown of the proportion of various habitat types found within a circle of radius 0.1 mile (161 meters) around the station. Habitat types were defined largely according to vegetative cover and land use types employed in the Massachusetts Map Down Project, a state-wide mapping project based upon aerial photographs. Observers were asked to note the presence of open water within the 0.1 mile circle. Additional notes on the color phase of the detected birds and their behavior were requested.

A total of eleven data sets for ten different routes was submitted. Nine of these routes were located within the Greater Boston area and one was located on Cape Cod. Extremely windy weather during the first half of the survey period delayed the start of survey work for most participants. The one survey route covered under conditions of high wind was repeated on a calm night and produced an identical number of detections (two). In addition to Screech Owls, Great Horned Owls (Bubo virginianus) and Barred Owls (Strix varia) were heard calling on several routes. Most participants felt that the habitat data was readily determined with a single nighttime stop. However, at least one participant retraced his route during daytime to verify his habitat data.

Detection rate. Screech Owls were detected at 16 stations out of a total of 120. Thus the rate of detections was 13.2% (approximately one detection for each eight attempts).

Most observers were disappointed with this detection rate. In several cases no Screech Owls were found at sites where the owls had been encountered in previous years. Field work in the same areas eleven weeks later (in mid-June) was conducted in support of breeding bird projects and seemed to yield a higher level of response. For this reason, it is suspected that the survey was scheduled at a phase of the breeding cycle which was sub-optimal for owl response. In Southern New England, the Screech Owl incubation period is 21 to 25 days. The eggs hatch between April 7 and May 5 (Forbush, 1927). Since the survey began on March 27, many owls would have been incubating and may have been reluctant to respond.

Single versus pair detections. Participants recorded single owls at 14 of the 16 locations where detections occurred. This indicates that the breeding density is insufficient to produce a high incidence of conflicts between neighboring territories. It may also indicate that only one member of a breeding pair responds to territorial intrusions at this stage of the breeding cycle.

Non-vocal responses. In this survey, owls did not fly in and sit quietly, as has been reported in other studies. One explanation for this is that the survey took place during the breeding season when responding owls were adults on ter-

ritory. Differences in response behavior are to be looked for in autumn/winter surveys.

Duration of attempt. The three-minute time period allowed for each attempt appeared to be more than adequate. Some owls responded immediately to the tape, and almost all replies occurred within two minutes.

Vocal imitation versus tape. Vocal imitations and tape recordings appeared to be equally effective in eliciting responses (the success rates were 13.0% and 13.4% respectively). This is consistent with Beatty (1977) who also reported no difference in success rates between the two techniques.

Effect of time of day. Beatty (1977) indicated that owls were detected more frequently after 3:00 A.M. For the BOEM survey an analysis of the success rate as a function of time reveals an apparent increase in the rate of detections at about one hour before sunrise. However, the quantity of data is insufficient for drawing statistically significant conclusions in this regard.

Vocalizations. There was considerable individual variation in the vocalizations of responding owls. Four owls were reported to give only the monotone tremolo. Two gave only the descending "whinny." Three birds gave both calls. The pitch of the tremolo seemed to vary considerably from individual to individual. The "scream" call, which the authors (O.K. and N.K.) have heard twice in mid-June, was not reported during the survey.

Color phase. Participants were asked to provide the color phase of each owl when color could be determined. The results were 2 red-phase, 3 gray-phase, 13 undetermined. In future surveys it is hoped that the percentage of undetermined cases can be reduced by asking each survey team to carry a spotlight to illuminate responding owls.

Response distance. If survey data is to be used to estimate population densities (birds per unit area), then it is important to know the distance at which an owl will respond to the vocal imitation. The area which is effectively sampled by each playback attempt increases as the square of the response distance. Nowicki (1974) estimated that Screech Owls did not respond to his tape beyond a distance of approximately ¼ mile (402 meters). Several observers in the BOEM survey commented that most responses seemed to come immediately from owls within 100 yards. Often the promptness of the response implied that the owl could not have first flown in from a more distant location. Further experimentation designed to measure response distance would greatly enhance the usefulness of the survey data.

Habitat factors. Twenty-seven habitat types were defined for the survey. Table 1 lists the number of times each type of habitat was reported within the 0.1 mile circle surrounding each survey station. Also listed is the number of times Screech Owls occurred in association with each habitat type.

The quantity of data produced by this initial survey was insufficient to allow statistically significant conclusions to be drawn concerning Screech Owl occurrence in most habitat types. However, there was a statistically significant excess of detections for stations which included small hardwood

Table 1. Correspondence between Occurrence of Screech Owls and Habitat Types at the 120 Survey Stations

Habitat Type	Stations with Habitat Type	Stations with Owls
Low Density Residential	54	4
Large Hardwood Forest	33	7
Small Mixed Forest	28	4
Shallow Freshwater Marsh	27	4
Large Mixed Forest	23	5
Mown/Grazed Fields	19	3
Open Water	18	1
Dense Residential	17	4
Open Hardwood Forest	17	2
Abandoned Fields	17	5
Short Hardwood Forest	16	6
Urban Open (incl. cemeteries)	16	4
Large Softwood Forest	14	2
Urban Commercial	9	0
Open Mixed Forest	9	2
Short Softwood Forest	6	1
Recreation (incl. drive-ins, theaters, race tracks)	6	2
Orchards and nurseries	6	0
Tilled Fields	4	0
Highway/runways	3	0
Deep Freshwater Marsh	3	0
Dumps/Landfills	2	0
Open Softwood Forest	2	0
Softwater Wetland	1	0
Urban Industrial	1	0
Mining (incl. gravel pits)	1	0

Notes: 1) A habitat was recorded only if it comprised 10% or more of the area within o.1 mile of the station.

2) Open forests were forests with canopy closure of 60% or less. Mixed forests were forests in which neither hardwoods nor softwoods comprised more than 80% of the canopy.

forest (6 detections were recorded in 16 attempts). Other habitat types which exhibited a tendency for a greater rate of detection were abandoned fields, open urban land (playgrounds and cemeteries), and larger hardwood forest. More detailed conclusions are anticipated should future survey work add to the quantity of available data.

Presence of open water. An inspection of the effect of open water on Screech Owl detections produced some intriguing results. For stations at which open water was more than 10% of the area within the 0.1 mile circle, no increase in Screech Owl occurrence was noted. These stations were usually located beside lakes or reservoirs. Of the 34 stations with open water constituting 10% or less of the habitat, 9 produced Screech Owls (1 owl for every 4 stations). These were usually stations with small brooks. For stations with no open water, one owl was found for every 11 stations.

This survey has confirmed the abundance of the Screech Owl in our region and has demonstrated that it occurs in a variety of habitats in suburban areas. The survey techniques were well within the capabilities of the participants and the data which was produced was amenable to meaningful analysis.

Further advancement in our knowledge requires work in two areas. First, we must learn more about the probability that an owl at a given distance will hear the playback and the probability that it will respond once the playback is heard. This will allow us to correct for undetected owls and to convert the detection frequencies into a measure of area density. Second, a greater quantity of data must be obtained to produce a more definitive picture of habitat preferences. The enthusiasm for the study on the part of the participants seems to guarantee that the survey will be continued until some of these additional questions are answered.

ACKNOWLEDGMENTS

The Field Studies Committee gratefully acknowledges the contributions of the following participants: Chris Floyd, John Hines, Karen Elaine Holmes, Craig Jackson, Michael Greenwald, Blair Nikula, Leif Robinson, Lee Taylor, and Soheil Zendeh.

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