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BARRED OWL RESPONSES TO RECORDED VOCALIZATIONS

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Owls are difficult to detect and count because they occur at low densities, are nocturnal, and move rapidly over large areas (Fuller and Mosher 1981). Because many owls nest in inconspicuous cavities, standard survey techniques such as nest searches and aerial counts are of limited value.

The Barred Owl (*Strix varia*) has recently been selected as a management indicator species for several national forests. Thus, an efficient means of monitoring Barred Owl populations is required. Fuller and Mosher (1981) suggested a standardized technique for detecting owls by using playback recordings. Recorded vocalizations have been used to detect birds for more than two decades (Johnson et al. 1981), but have only recently been used to survey owls (Nowicki 1974, Smith 1975, Beatty 1977, Forsman et al. 1977). This potentially valuable method of monitoring Barred Owl populations requires knowledge of the likely time between broadcast and response, and of behavior elicited by tape-recorded vocalizations. We report here response rates, response times, and behavior of Barred Owls exposed to recorded owl calls.

STUDY AREA AND METHODS

Our study was conducted on the Blacksburg Ranger District of the Jefferson National Forest, near Blacksburg in southwestern Virginia. The district encompasses 450 km² of the Ridge and Valley Province (Smith and Linnartz 1981); elevation ranges from 600 to 1,200 m. Private inholdings, mostly farmland, occur throughout the valleys; mixed oaks (*Quercus* spp.) predominate on the slopes.

We randomly selected 40 stands from a list of all stands in the district, following procedures described elsewhere (McGarigal and Fraser 1984). We entered stands between 18:00–22:00 from 13 March to 22 April 1983, and played owl calls from the approximate center of the stand by using a tape recorder (Sony VCM-111), a 35-watt amplifier, and an 8-ohm speaker (Perma Power Electronics, Inc.). These recordings were copied from those in the Kellog and Allen (1959) and Hardy (1980) record series. To fulfill additional study objectives (McGarigal and Fraser 1984), we also played recordings of Great Horned Owl (*Bubo virginianus*) vocalizations. Each sampling period consisted of a 7-min Barred Owl broadcast followed by a 10-min post-broadcast period, a 5-min Great Horned Owl broadcast, and another 10-min post-broadcast period. The Barred Owl broadcast period included eight sets of calls that were played at 50-s intervals, with the speaker facing each cardinal direction for two sets of calls. The Great Horned Owl broadcast period was similar, but consisted of only six sets of calls. Samples were not collected on nights with precipitation, fog, or winds exceeding 15 km/h.

RESULTS AND DISCUSSION

Forty Barred Owls responded at 25 of 40 stands (62.5%; 1.0 contact/station). In extensive studies throughout the northeastern United States, Mosher and Fuller (pers. comm.) received a nearly identical response rate (1.1 contacts/station) to recorded Barred Owl vocalizations. We used a 32-min sampling period, whereas they used a 20-min sampling period. In Connecticut and New Hampshire, Barred Owls responded at 49 of 139 stations (35%; Smith 1975). Smith also used a 20-min sampling period. The higher response rate in our study may have reflected either the longer sampling period (Fig. 1) or a greater abundance of Barred Owls in our area.

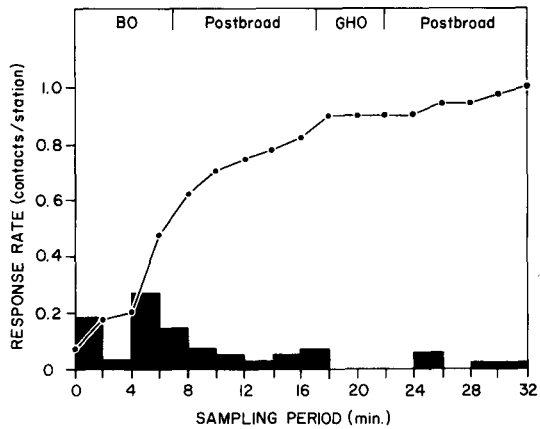

FIGURE 1. Cumulative Barred Owl response rate (contacts/station; line) and incremental Barred Owl response rate (contacts/station at 2-min increments; bars), in relation to sample period on the Blacksburg Ranger District, Jefferson National Forest, 1983. Responses at $t = 0$ are cases in which we contacted Barred Owls before the start of the broadcast period. (BO = Barred Owl, GHO = Great Horned Owl, Postbroad = post-broadcast period).

The response rate increased rapidly during the first 15 min of the sampling period and leveled off thereafter (Fig. 1). This is consistent with Mosher and Fuller (pers. comm.), who received 77% of their responses in the first 10 min of their sample period.

We detected owls by hearing ($n = 34$), seeing ($n = 1$), or by both hearing and seeing them ($n = 5$). Females were distinguished from males by their higher pitched calls. We heard both members of a possible pair in nine of 25 (36%) cases, and both members of two adjacent pairs in two of 25 (8%) cases. We further categorized owl responses as follows: (1) owls visited the broadcast site but did not call ($n = 1$, 2.5%); (2) owls responded from within 100 m of the broadcast site ($n = 22$, 55%); (3) owls first called from a distance, then flew to within 100 m of the broadcast site and continued calling ($n = 5$, 12.5%); and (4) owls called from a distance only, never approaching within 100 m of the broadcast site ($n = 12$, 30%). In Connecticut, 23 of 49 (47%) owls flew to the sample site before vocalizing, and six of 49 (12%) owls vocalized from a distance first (Smith 1975). The similarity in results suggests that response behavior may be consistent over large geographic areas.

Barred Owls vocalize in a variety of ways (Brewster and Chapman 1891, Bent 1938, Saunders 1951, Smith 1975). We recognized six distinct vocalizations during our study. A single response usually included two to four different vocalizations. The most familiar call, heard at 20 stands (80%), was the nine-syllable hoot, commonly phoneticized as "who cooks for you, who cooks for you all." A similar call, heard at 14 stands (56%), consisted of six to nine regularly spaced and evenly accentuated, ascending hoots, followed by "hoo-aw," ending in a downward inflection. Both calls were given by both sexes and perhaps served as general location calls between paired birds, and as territorial challenges among adjacent pairs. A third call, heard at nine stands (36%), consisted of a two-syllable "hoo-aw," as in the previous call. We noted a fourth vocalization at seven stands (28%), only when both members of a pair vocalized simultaneously. A single duet often lasted 1–2

min. Smith (1975) described this vocalization as a "raucous jumble of cackles, hoots, caws, and gurgles." A one-syllable, sharply ascending wail, only given by one owl when both members of a pair were near one another, was heard at two stands (8%). The Spotted Owl (*Strix occidentalis*) emits a similar "contact call" that is usually given by the female (Forsman et al. 1984). The last vocalization, heard at a single stand, consisted of an irregular and patternless assemblage of hoots.

Fuller (1979) supported earlier suggestions that Great Horned Owls may influence the habitat use, distribution, and movement of Barred Owls. Furthermore, Fuller and Mosher (1981) cautioned that the behavior of a target raptor species responding to playback recordings may be inhibited by the presence of a larger competitor or predator. We found no evidence of this in our study. At seven stands (28%), Barred Owls continued calling during the Great Horned Owl broadcast. At six stands (24%) Barred Owls stopped calling before the Great Horned Owl broadcast, and at six stands Barred Owls stopped calling before or during the Great Horned Owl broadcast, but resumed calling after it was over. At four stands (16%), Barred Owls did not begin calling until after the Great Horned Owl broadcast period. In only one case did the Barred Owl permanently cease calling after the Great Horned Owl broadcast began.

CONCLUSIONS

Our results suggest that playback recordings effectively elicit Barred Owl vocalizations and, thus, may offer an efficient means of increasing Barred Owl detectability compared to nest searches or stop-and-listen road counts. Where detection of most individuals is important, the sampling period should not be less than 15 min. Additional research is required to estimate the proportion of total populations that will be detected by such sampling. Response behavior appears to be consistent over large geographic areas but may vary from place to place, depending on sampling methods. As response behavior is better understood, more efficient sampling techniques can be developed to satisfy a wide variety of management and research needs.

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LITERATURE CITED

BEATTY, W. H. 1977. Attracting Screech Owls. Redstart 44:102–104.

BENT, A. C. 1938. Life histories of North American birds of prey: part 2. U.S. Natl. Mus. Bull. 170.

BREWSTER, W., AND F. M. CHAPMAN. 1891. Notes on the birds of the lower Suwanee River. Auk 8:125–138.

FORSMAN, E. D., E. C. MESLOW, AND M. J. STRUB. 1977. Spotted Owl abundance in young versus old-growth forest. Oreg. Wildl. Soc. Bull. 5:43–47.

FORSMAN, E. D., E. C. MESLOW, AND A. M.WIGHT. 1984. Biology and management of the Spotted Owl in Oregon. Wildl. Monogr. 87.

FULLER, M. R. 1979. Spatio-temporal ecology of four sympatric raptor species. Ph.D. diss., Univ. of Minnesota, Minneapolis.

FULLER, M. R., AND J. A. MOSHER. 1981. Methods of detecting and counting raptors: a review, p. 235–246. *In* C. J. Ralph and J. M. Scott [eds.], Estimating the numbers of terrestrial birds. Stud. Avian Biol. 6.

HARDY, J. W. 1980. Voices of New World night birds: owls, nightjars and their allies. ARA Records, Gainesville, FL.

JOHNSON, R. R., B. T. BROWN, L. T. HAIGHT, AND J. M. SIMPSON. 1981. Playback recordings as a special avian censusing technique, p. 68–75. *In* C. J. Ralph and J. M. Scott [eds.], Estimating the numbers of terrestrial birds. Stud. Avian Biol. 6.

KELLOG, P. P., AND A. A. ALLEN. 1959. Field guide to bird songs of eastern and central North America. (Record). 11th impression. Houghton-Mifflin, Boston.

MCGARIGAL, K., AND J. D. FRASER. 1984. The effect of forest stand age on owl distribution in SW Virginia. J. Wildl. Manage. 48:1393–1398.

NOWICKI, T. 1974. A census of Screech Owls using tape-recorded calls. Jack-Pine Warbler 52:98–101.

SAUNDERS, A. A. 1951. A guide to bird songs. Doubleday, Garden City, NY.

SMITH, C. F. 1975. Distributional ecology of Barred and Great Horned owls in relation to human distribution. Unpubl. M.Sc. thesis, Univ. of Connecticut, Storrs.

SMITH, D. W., AND N. E. LINNARTZ. 1981. The southern hardwood region, p. 145–225. *In* J. W. Barrett [ed.], Regional silviculture of the United States. Wiley and Sons, New York.

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