

NESTING BY BARN OWLS IN INDIANA

Allen R. Parker and John S. Castrale
Indiana Department of Natural Resources
Division of Fish and Wildlife
Nongame and Endangered Species Program
553 East Miller Drive
Bloomington, Indiana 47401

ABSTRACT: Indiana nesting records for the barn owl (*Tyto alba*) indicate a statewide distribution before the population decline of the last thirty years. To document recent nestings, a program of advertising for public sightings, interviewing observers, and inspecting sites was conducted from 1983 to 1993. A total of 112 barn owls (19% of the 588 reports received) and 61 nest sites were confirmed. All nests were found south of 40 degrees latitude. Nest attempts were found in nest boxes (43%), tree cavities (38%), silos (9%), and other sites (10%). Success to banding age was most probable for nest boxes (78%). The average number of young per successful nest peaked every third year and was 4.0 overall. Between 1984 and 1991, the loss of known nest sites was 19.6%. The number of banding age young per nest attempt (2.74) exceeded the normal range of young per breeding female for a stable population (1.86-2.18).

KEYWORDS: Banding age young, barn owls, distribution, nest boxes, productivity.

INTRODUCTION

The barn owl was first noted in Indiana after 1879 (Butler, 1898; Mumford and Keller, 1984), following settlement and forest clearing. Nest records from historical times to 1986 (Whitaker and Gammon, 1988) indicate a statewide distribution. Declines in barn owl numbers in the last 30 years have resulted in the species being considered endangered by the Indiana Department of Natural Resources (IDNR). By 1980, the only known active nest site was the royal paulownia tree (*Paulownia tomentosa*) at Madison's Lanier Mansion.

Foraging habitat for barn owls in Indiana consists of grasslands, fallow fields, and overgrown pastures, where their primary prey are voles (*Microtus* spp.; Parker, 1994). Barn owls use tree cavities and a variety of man-made structures for nesting. Land-use changes played a role in both the colonization of the Midwest by barn owls and in their later disappearance (Colvin, 1985). The purpose of this study was to document recent nesting by barn owls and to assess the current status of barn owl populations in Indiana.

MATERIALS AND METHODS

In the fall of 1983, the IDNR began an effort to locate barn owls in Indiana. Primary land use is rowcrops throughout the glacial till plain of the northern half and the riverine plain in the southwest and southeast. Timber, hay, and livestock production are more prevalent on the irregular terrain of the unglaciated, south-central region and major drainages. Historical sightings and nest records of barn owls were gleaned from the literature. Barn owl sightings

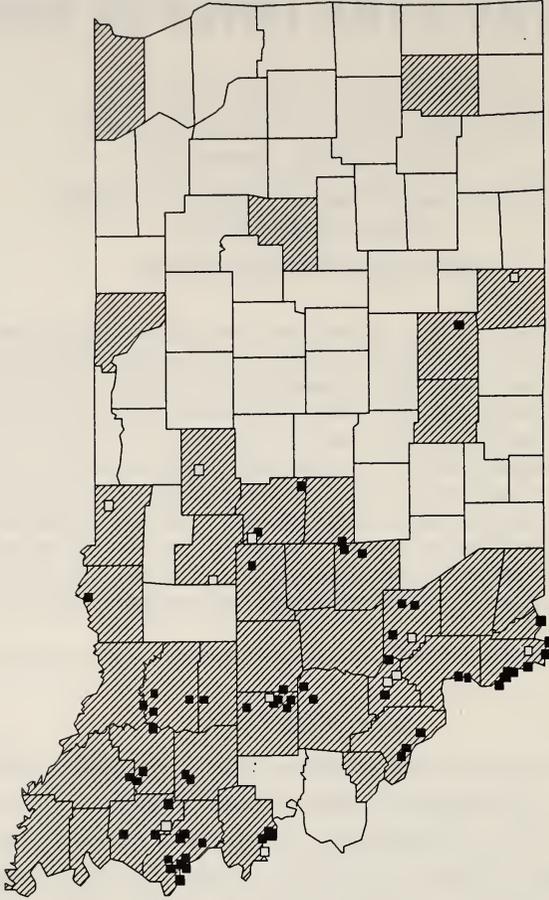


Figure 1. Nest sites (squares) and counties (shaded) where barn owl evidence was found in Indiana between 1981 and 1995. Hollow squares are recent nest locations (1993-1995).

were elicited from the public through notices posted in farm stores and articles in rural periodicals. Report credibility was determined by telephone interview, and field inspections were conducted on valid sites. Because the ejected pellets of barn owls are distinctive (Parker, 1993), confirmation of barn owl occurrence was made by finding pellets. Nest boxes (16" x 16" x 36") were placed at all confirmed sites on barn beams, in silos, trees, and other locales. To reduce raccoon predation, all boxes were remounted in 1985 as barn interior boxes with a 7" x 7" entrance hole in the upper barn wall. As suitable foraging habitat was discovered, nest boxes were mounted in those areas as well. A total of 22 experimental boxes were mounted on utility poles over reclaimed, strip-mine grasslands. Through 1995, nest boxes were checked at least biannually.

RESULTS

Of a total of 588 owl reports, 19% were confirmed as barn owls, while 39% were lacking locations, details, or contacts and were, therefore, of no value (often second-hand reports). Misidentified birds made up the remainder: 16% were eastern screech owls (*Otus asio*), 14% great horned owls (*Bubo virginianus*), 9% barred owls (*Strix varia*), 2% short-eared owls (*Asio flammeus*), and 1% rock doves (*Columba livia*). As reports accumulated, concentrations of barn owl activity were evident as duplicate or clustered reports. Field inspections were made at 236 sites, and pellets were found at 87 (Figure 1). The probability of finding pellets was greater for sites where a structure (barn, tree cavity, etc.) was mentioned by the reporter (42%) than for sites without such mention (28%).

Barn owls were verified by carcass recovery on ten areas. Five were automobile kills. Three barn owls were killed by silo auger operation, one by barbed wire impact, and one by hanging inverted from a barn wall. The latter occurrence was unusual in that the owl apparently snagged his tarsus in the gap between two planks on his way through the peak vent of the barn wall. In his struggle to free himself, he slid down the planks where his foot prevented him from pulling free. Three incidental mortalities noted on known areas included one poisoning, one collision in a barn, and one batting with a broom handle by a startled landowner.

Nesting occurred at a total of 73 sites in 27 counties (Figure 1). Twelve new sites (1993-95) are included in this total, which did not enter into the analysis because they were checked too late in the season to ascertain production. Although barn owl occurrence was verified by pellets in the northern counties of Indiana, all nests were found in the lower two thirds of the State (below approximately 40 degrees latitude). Of 106 nesting attempts, 68% were successful, 9% were failures, and the outcome of the rest was undetermined. Between 1981 and 1992, known outcome nests produced 290 young ($\bar{X} = 4.0$ young/successful nest) to banding age (approximately 5 weeks). Peaks greater than 4.5 in number of banding age young per successful nest occurred in 1983, '86, '89, and '92 (Figure 2). Banding age young per successful nest was greatest in southwestern Indiana ($\bar{X} = 4.9$), lowest in southeastern Indiana ($\bar{X} = 3.6$), and intermediate in central and northern Indiana ($\bar{X} = 3.9$). Nest failures were attributed to human-induced abandonment (5); predator-induced abandonment (2), capture of the young by humans (2), and destruction by silo auger (1).

Nest attempts were primarily in nest boxes (43%) and tree cavities (38%), but silos were also used (9%). Only 1 out of 22 nest boxes mounted on a pole over a strip-mined grassland was used by barn owls. Miscellaneous sites (10%) included haystacks, a hayhook landing, a lumber kiln, a railroad roundhouse, a church steeple, a strip-mine highwall ledge, and a mine dragline. The mean number of young produced per nesting attempt was greatest in nest boxes (3.41), intermediate in trees and silos (2.35 and 2.33, respectively), and lowest at other sites (1.18). The probability that a nesting attempt would successfully

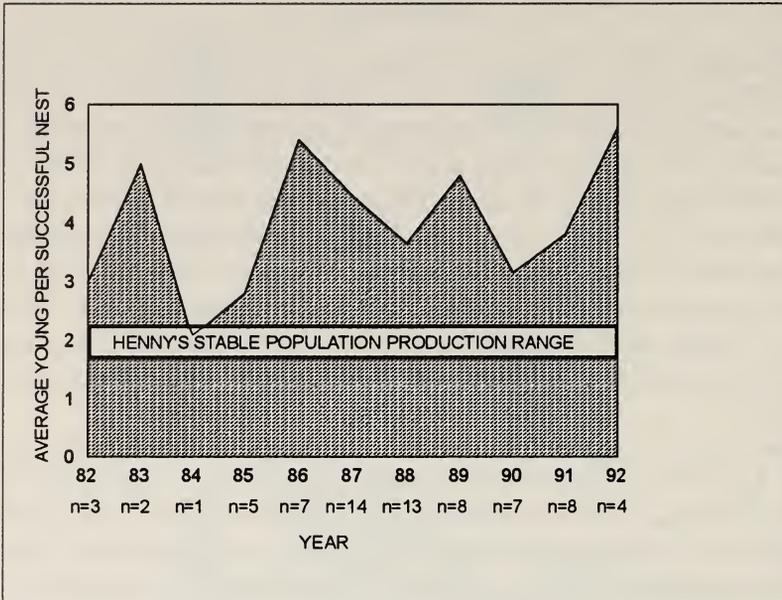


Figure 2. Mean number of banding-age barn owls per successful nest in Indiana between 1982 and 1992 (n is the number of successful nests).

produce banding-age young was highest when the owls used nest boxes (78%) and lower when using tress (63%), silos (44%), and other sites (45%).

The use of roost and nest sites by barn owls is sporadic in Indiana. Year-to-year site reuse was examined as a percentage of the first year for nest sites and nest/roost sites combined. Among nest sites, nest boxes had higher initial reuse rates, but the percent reuse declined more quickly for boxes than for tree cavities (Figure 3). Similarly, combined nest/roost site results showed a tendency for boxes to initially be reused more, but for the long term, tree cavities have a higher reuse (Figure 4). Tree cavities were known to have been used for nest/roost sites for seven years in a row.

Tree, nest box, and barn sites disappeared from year-to-year as well. Between 1984 and 1991, the annual loss of roost and nest sites was 4.1% (23 total sites). Of 51 known nest sites during this same period, 19.6% (10) were lost. Most of these sites were demolished by landowners.

DISCUSSION

The primary range of the barn owl in Indiana is in the southern third of the State. Although formerly common north of this line, the barn owl appears limited in range due its preferred foraging habitat. Colvin (1985) suggested that the 1940-50 era change to intensive farming practices greatly reduced grasslands that supported the key prey of the barn owl — meadow voles (*Microtus pennsylvanicus*) and prairie voles (*M. ochrogaster*). Some researchers have

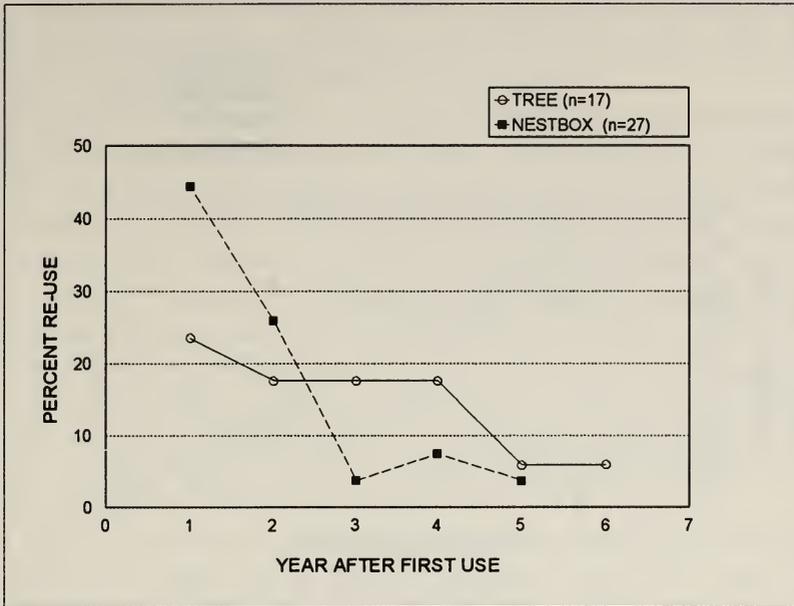


Figure 3. Percent reuse of barn owl nest sites in Indiana between 1984 and 1992.

suggested that barn owls specialize on these two species, while ignoring other potential prey (Marti, 1974; Colvin and McLean, 1986). If this is true, then grasslands would be of vital importance to barn owls in the northern limits of their range, where winter mortality is high (Henny, 1969). The terrain of southern Indiana limits the intensity of agriculture so that old field, grassland, and pasture are more prevalent there. The current Indiana range of the barn owl may be a reflection of this land use pattern.

Long-range dispersal from their natal area (Stewart, 1952; Bunn, *et al.*, 1982) may explain the occurrences of barn owls in northern Indiana, but the lack of nesting records suggests that a northern population is not as viable as it once was. A recent northern nest site is in Summit Lake State Park, where a large area of rowcrop farms has reverted to old field growth. Although nest boxes have been available in many northern roost areas where intensive agriculture is prevalent, no nesting has been documented. This further supports the hypothesis that foraging habitat is the primary limiting factor for barn owl distribution.

Peaks in the average number of young produced per successful nest suggest that barn owl reproduction may correspond to a three-year cycle of vole abundance (Krebs, *et al.*, 1969); however, prey availability data were not collected for comparison during this study. The number of active barn owl nests drastically declined in 1989 in all areas except southeastern Indiana. The sus-

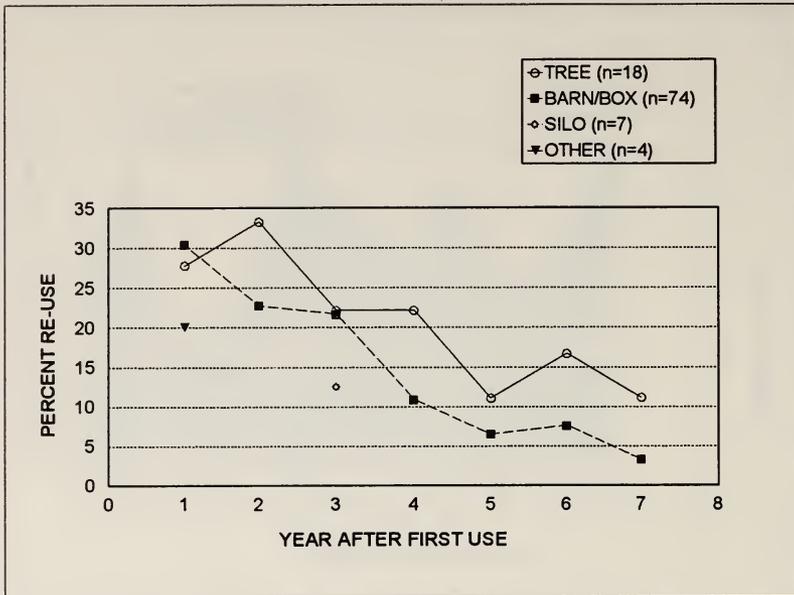


Figure 4. Percent reuse of barn owl nest and roost sites (combined) in Indiana between 1984 and 1992.

pected cause of this failure was a statewide drought that was least severe in the southeast.

Mortality factors were not measured for barn owls in this study, but predation on nests and adults by raccoons (*Procyon lotor*) and great horned owls (*Bubo virginianus*) was suspected. In this study, at least one abandoned nest (and possibly adult mortality) is attributed to each of these predators. Rosenberg (1986) reported nestling losses to raccoons and adult losses to great horned owls in Virginia. Indiana raccoon populations are inversely correlated with fur prices (Machan, 1986), and raccoon value has been low since the late '70s. Barns were rarely encountered in this study in which raccoon sign was not found. The abundance of raccoons may explain the lower productivity of barn owl nests in trees as opposed to the more raccoon-proof nest boxes. Cade, *et al.* (1989) suggested that the niche expansion and population increase of great horned owls due to raptor protection laws has enabled this predator to limit peregrine falcons (*Falco peregrinus*) from nesting at historic cliff sites. These same factors may explain the status of the barn owl. Although the known annual population of barn owls in Indiana has not exceeded 17 nesting pairs, the population appears to be stable. The number of young produced per nesting attempt in Indiana (2.74) exceeds the normal range of young per breeding age female (1.86-2.18) as established by Henny (1969). However, this study does not take into consideration possible non-breeding females. Banding-aged

young per successful nest in Indiana (4.0) is comparable to the range reported by Henny for Ohio and the northeastern U.S. (4.1-4.2) as well as the number reported by Scott and Shipley (1991) for Ohio (4.1).

Because of the difficulty of checking tree cavities on a statewide basis, the importance of trees to the barn owl is likely underestimated. The long-term reuse of tree cavities may suggest a preference for trees over nest boxes, and the tendency of barn owls to use trees in small towns, yards, etc., may be to avoid the raccoon problems of rural sites. Interestingly, a number of tree cavity nests were over occupied doghouses. Loss of nesting and roosting sites is to some degree a function of nest site selection. Barns that are used by owls tend to be those less frequented by people; that is, abandoned and decaying structures. In the same way, nest trees are often the very large, and partially dead, monarchs of small towns and farmsteads, which have a limited life expectancy. Most of these sites are eventually demolished by landowners due to the liability they pose.

In spite of the ability of the barn owl to produce large broods (13 eggs at one Indiana nest site) and to quickly recolonize areas, the small size of Indiana's barn owl population makes their future tenuous. Lack of foraging habitat and secure nest sites will continue to be major limiting factors. Large cavity trees and old barns should be preserved and attempts should be made to place nest boxes in newer structures near areas of stable grassland in order to provide barn owls with usable nesting sites. Public lands should be managed for grassland/prairie habitats where possible, and set-aside programs for wildlife should be developed so that private landowners will be encouraged to furnish foraging areas for barn owls and associated species.

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