Male Eastern Screech-owl (*Otus asio*) Roosting Behavior: Possible Effects from Nesting Stage and Nest Type

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Abstract.—This study examined the diurnal roosting behavior of male Eastern Screech-owls (*Otus asio*) and proposed some possible functions for this behavior. As part of a nest defense study, male diurnal roost locations were marked and, later, the distance to the corresponding nest was measured. Male screech-owls roosted significantly closer to their nests during the nestling stage than during the egg stage. Additionally, males associated with nests in natural cavities roosted significantly closer to their nests than did males with nests in nest boxes. Comparison of nest sites showed significantly fewer trees in front of occupied nest boxes, compared to nests in natural cavities. Although the exact function of reducing roost distance is not known, male screech-owls may shift daytime roost locations closer to their nests for anti-predator purposes.

Avian roosting behavior may be influenced by an individual's own risk of depredation (Hayward and Garton 1984) or as a means to reduce heat-stress (Barrows 1981). Under other circumstances, roost site selection may allow owls to better defend or utilize foraging territories. Additionally, owl roost site selection may allow owls to defend against potential nest predators.

Avian nesting success and productivity may be influenced by a parent's ability to defend its eggs or young. Sentinel behavior in the American Crow (*Corvus brachyrhynchos*) has been shown to be a form of parental care in that adults guard the nest against potential predators (D'Agostino *et al.* 1981).

Male Eastern Screech-owls (*Otus asio*) will often perch near or in the nest while the female is brooding the young (Karalus and Eckert 1973). Is this roost-site selection influenced by stage in the nesting cycle or nest type?

METHODS AND MATERIALS

These results are from a post-hoc study taken from an Eastern Screech-owl nest defense study (Sproat 1992). The study was conducted at the Central Kentucky Wildlife Management Area, located 17 km southeast of Richmond, Madison County, Kentucky, USA. The area encompasses about 680 ha and consists of small deciduous woodlots and thickets interspersed with cultivated fields and old fields (see Belthoff 1987).

Screech-owls were captured either by taking them from artificial nest boxes and natural tree cavities or by luring them into mist nets. Owls were fitted with a U.S. Fish and Wildlife Service aluminum leg band and a radio-transmitter (Wildlife Materials Inc., Carbondale, IL). Transmitters were attached backpack style (Smith and Gilbert 1981) with woven nylon cord.

Male daytime roosts were located at 3 to 5 day intervals. Roost trees were marked with aluminum forestry tags and plotted on aerial photos to allow relocation.

Fledgling screech-owls typically left the nest area in mid- to late May, at which time the distances from adult male daytime roosts to the nest tree were measured. In addition, the number of trees within 8 m of each nest tree was recorded. Trees were recorded as either in front of the nest opening (i.e., within 90° of the nest opening) or behind the nest opening. Mean roost distances during two nest stage (egg versus nestling) and two nest types (natural cavity versus nest box) were compared

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using the Wilcoxon test. The number of trees were compared between nest types using the Mann-Whitney U-test (SAS Institute 1989).

RESULTS

Of the eight pairs of nesting Eastern Screech-owls monitored, four nested in natural cavities while four others utilized artificial nest boxes. All pairs successfully fledged from one to five nestlings and no mortality was observed in any nest. Male screech-owls roosted significantly closer ($p < 0.001$) to their nest sites during the nestling stage than during the egg stage (nestling = 21.4 ± 3.3 m; egg = 73.1 ± 7.4 m). Male screech-owls associated with natural cavity nest sites roosted significantly closer ($p < 0.01$) to their nests than males associated with nest boxes (cavity = 39.0 ± 5.4 m; nest box = 56.7 ± 5.4 m). Nest boxes used by screech-owls had significantly fewer trees ($P = 0.029$) in front of the nest opening (i.e., within 90° of the nest opening) than natural cavities used for nesting (nest box = 9.8 ± 1.7; cavity = 20.3 ± 3.5). There were no significant differences in the number of trees surrounding nest trees or behind nest trees between nest types (Sproat, unpubl. data).

DISCUSSION

During this study, I observed male Eastern Screech-owls roosting closer to their nests during the nestling stage than during the egg stage. In addition, I documented that males with nests in natural cavities roosted closer than males with nests in nest boxes. There were more trees in front of nests in natural cavities, compared to occupied nest boxes. Several possible explanations may account for these differences.

Roosting closer to the nest during the nestling stage may be related to antipredator nest defense. As the nesting season progresses and vegetation growth provides more cover for potential predators, male screech-owls may reduce their roost distance to better defend their nest. In central Kentucky, screech-owls begin egg-laying in mid- to late March and young typically leave the nest in mid- to late May (Belthoff 1987). During the egg stage of the nesting cycle tree growth is typically dormant and there is no significant understory plant growth. During the nestling stage, trees have leafed out and there is extensive growth of understory vegetation (pers. observ.). Concurrently, as the young grow older they may represent a greater investment to the parents and thus warrant increased defensiveness (Montgomerie and Weatherhead 1988).

Closer roosting by males in natural cavities, compared to their counterparts with nests in artificial nest boxes, may also be a manifestation of antipredator defenses. With more trees in front of natural cavities, males may be able to roost closer to these nests than to nest boxes. Alternatively, the greater number of trees may actually present a greater vulnerability to nest predators and, thus, require greater defensiveness.

The fact that fewer trees were found in front of nest boxes used by nesting screech-owls may be the result of human bias. When placing nest boxes, often at heights over 7 m, biologists may have, inadvertently, selected trees in relatively open areas of the forest. This theory is further supported by the fact that no significant difference was found between nest types in the number of trees either behind or surrounding nest trees. Nest boxes in relatively open areas would be easier to monitor and maintain by biologists but may also influence the roosting behavior of the male screech-owls.

Differences in roost distances may be the result of factors besides antipredator defenses and number of trees near the nest. Male screech-owls may have altered their roost sites in order to reduce their heat stress. As the nesting season progressed and temperatures rose, male owls may have sought cooler roost sites. Alternatively, males may have reduced their roost distance from the nest as a result of increased foraging rate. With the increased demand of feeding nestlings in addition to the brooding female, male screech-owls may have selected closer roost sites as a result of greater foraging activity near the nest. Unfortunately, there were no data from this study regarding either of these hypotheses.

Regardless of the reasons, male Eastern Screech-owls in this study showed distinct differences in their roosting behavior with regard to nest type and stage in the nest cycle. Wildlife personnel should be aware of these factors when making decisions about habitat conservation and nest-site augmentation. While roosting behavior may not significantly influence owl population levels over the short-term, the placement of artificial nest sites may affect owl behavior and thus productivity.

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