BIRDS

NORTHERN SAW-WHET OWL NEST BOX MONITORING

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Introduction

Many studies have been conducted on secondary cavity nesting species using nest boxes. Most of these studies, however, have involved songbirds. We found only nine published accounts on nest box monitoring of Northern Saw-whet Owl (hereafter referred to as Saw-whet) and none of these studies was conducted north of Naramata (49°35.9'N, 119°35.6'W), British Columbia.[1,2,4,6,7,8,9,12,13] Information on the breeding biology of the Saw-whet at the northern part of its range is essentially unknown.

Nest boxes are used to monitor wildlife populations because they are easy and

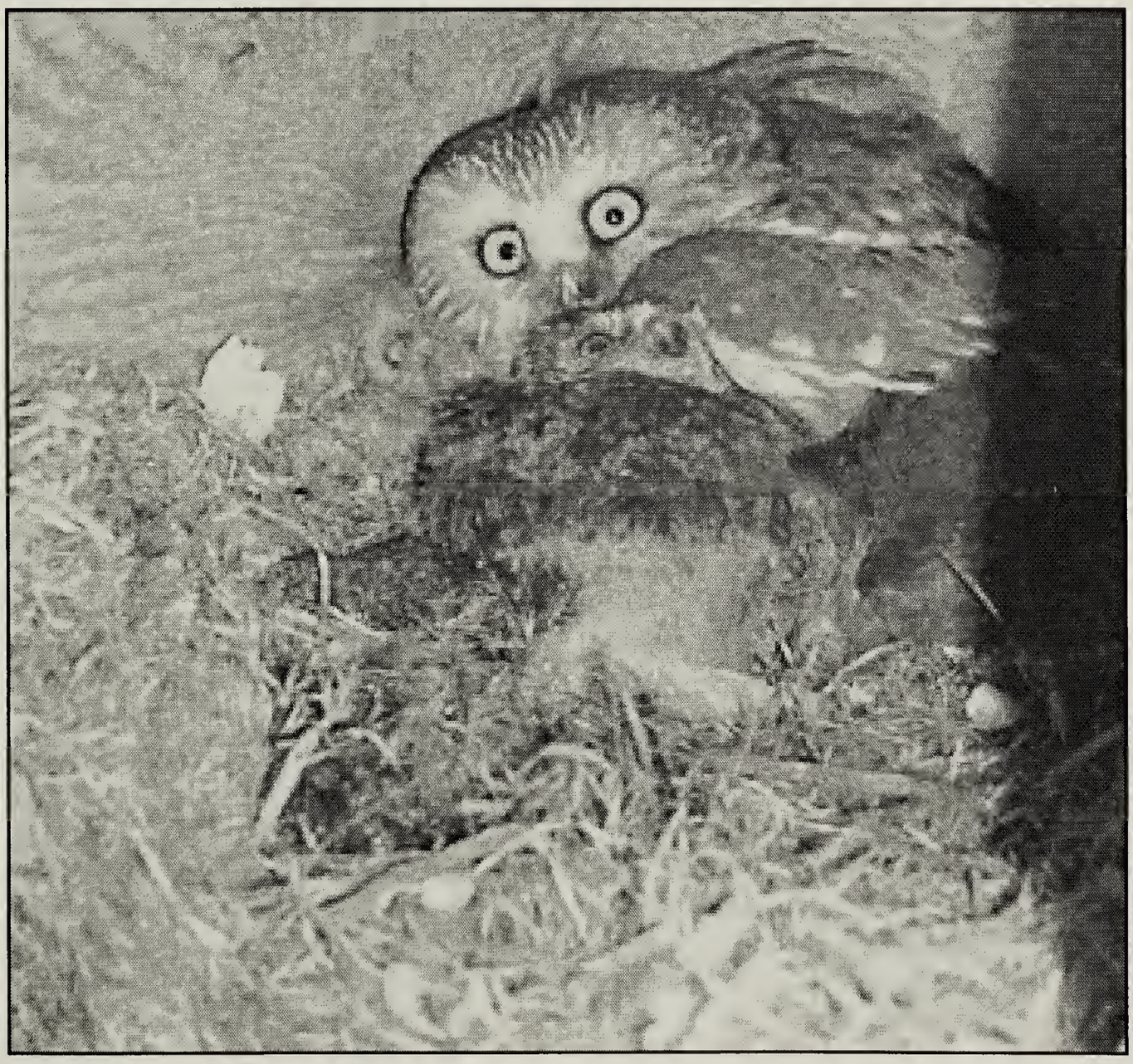

Figure 1. Northern Saw-whet Owl in nest box ***Lisa Priestley***

relatively inexpensive to construct. In addition, when analyzing nest box occupancy rates to determine population abundance trends, researchers are able to factor out monitored nest presence, size, shape and condition when considering reproductive output variables.[14,17] A nest box project also provides insight about other variables that limit reproductive success such as prey and roosting habitat availability.

Saw-whets are suitable subjects for a nest box monitoring program because they are at a high trophic level and therefore changes in their abundance could indicate changes to the larger ecosystem. Secondly, the Saw-whet is one of the most common raptor species in Canada[3] and can therefore provide the large sample size that makes it possible to detect population abundance trends with statistical significance. Finally, Saw-whet projects garner a great deal of public interest and financial support which increases the likelihood that they will receive the long-term support essential to the implementation of community and environment-based management policies, practices and programs.[10] In order to understand how Saw-whet populations change, nest box monitoring and nocturnal calling surveys have to be considered in conjunction with surveys done for this species during migration and winter monitoring efforts.[16]

The intention of this paper is to report on the first year of our nest box monitoring project. We also provide a detailed nest box design for people interested in building Saw-whet nest boxes and participating in Saw-whet nest box monitoring projects.

Methods

We put up 50 nest boxes in the study area, a 1,965km^2 rectangle with Edmonton (53°32.7'N, 113°29.4'W), Tofield, Camrose and Millet at the four corners.

Twenty boxes were put up in Ministik Lakes Game Bird Sanctuary in the middle of the study area. The Ministik area consists of forest interspersed with lakes and ponds. Thirty boxes were put up outside Ministik in an area dominated by agricultural and acreage developments interspersed with residual forest patches.

Boxes were numbered and put up in mixedwood forests of Trembling Aspen (*Populus tremuloides*) and White Spruce (*Picea glauca*). Boxes were placed only in areas where natural Saw-whet nests could occur as indicated by Pileated Woodpecker holes in large-diameter trees.

Nest boxes were put up between 25 January and 19 February 2004. GPS coordinates for each nest were recorded when boxes were put up. Boxes were placed 12ft above the ground and a 10-foot ladder was used to put up and check boxes. Nest hole orientation was southeast so that it was on the leeward side of the prevailing wind. Boxes were put up in pairs. The distance between each box in a pair was 30-60m.

Boxes were checked for occupancy in early April, early May and early July.[3] Boxes were always opened when they were checked to ensure that owls would be detected even if they were reluctant to emerge from the nest. When checking boxes or visiting occupied boxes the following information was recorded: box number, visit number, date, time, purpose of visit, distance of the observer from the nest before owl emergence, number of eggs, number of juveniles and prey items in the nest.

Information on sex (based on presence or absence of a brood patch or cloacal protuberance[11]), age[11], unflattened wing chord, tail length and weight was recorded for all Saw-whets at occupied nests. Females were caught in a small fishing net on the end of a painting pole held over the nest hole and males were caught using a modified version of the Saurola trap.[15] The Saurola trap is a box with a trap door at one end. This trap,

which is placed in front of the nest hole, intercepts the male when he is delivering prey to the female. In addition, when trapping males with the Saurola trap, we noted any prey items that were delivered.

Results

During 2004, Saw-whets attempted to breed at five nest boxes. For the purposes of this study, we considered a Saw-whet nesting attempt to be the laying of at least one egg. A breeding attempt was considered successful when young fledged. Four of the five Saw-whet nesting attempts were successful. The young in the fifth nest box hatched but died prior to fledging. Seven young fledged from one nest box and five fledged from each of the other three. The average number of Saw-whet young produced per nesting attempt was 4.4 (n=5, SE=1.17) and the number of Saw-whet young that fledged per successful breeding attempt was 5.5 (n=4, SE=0.500).

There were two occasions when Saw-whet presence in a nest box did not lead to a nesting attempt. In the first case, a Saw-whet stuck its head out of a nest box while two observers approached. When researchers returned to the nest, the box was empty. In the second case, two Deer Mice and two Red-backed Voles were found in a nest box. We assumed that these prey items were brought by a male Saw-whet to entice a female to use the nest box.

Fifteen of the 50 nest boxes were used by squirrels. Red Squirrels were found at eight nest boxes. Northern Flying Squirrels were found at one nest box. Squirrel nesting material was found at an additional six nest boxes but we were unable to identify the species of squirrel that brought in the material. Four Red Squirrel kits were produced in one nest and three Northern Flying Squirrel kits in another.

Twenty-one individual prey items, of six species, were identified at active nests. Sixteen of these were found when nest boxes were opened and five when males were trapped during prey delivery bouts. Nineteen mammals were found: Red-backed Vole (8), Meadow Vole (7), Deer Mouse (3) and shrew species (1). Two birds were found: Yellow Warbler and Eastern Phoebe.

Discussion

Cannings[3] reported that in southern British Columbia the average number of young produced per nesting attempt at nest boxes was 2.68 (n=22, SE=0.423) and the average number of young produced per successful nesting attempt was 3.47 (n=17, SE=0.365). These figures are low compared to what we found in central Alberta. The reason for the difference could be explained by our lower sample size, or by geographic or yearly variation. More data will have to be obtained before the cause for this difference can be addressed.

All published accounts from non-coastal areas report that small mammals are the primary prey of the Saw-whet.[3,5] Our findings concur with these reports. Owl prey is often identified by analyzing the contents of regurgitated pellets. Mammal species are easy to identify when owl pellets are analyzed because mammal dentition is well described and recognizable.[6]

Birds have been reported in Saw-whet diet studies, however, in many cases the species is not reported because it is often not possible to identify bird remains to species. In addition, Whalen and Watts reported that the remains of soft bodied invertebrates are unlikely to be found in pellets.[18] For this reason, pellet analysis may under-represent the importance of invertebrate biomass consumed by owls. Identifying prey items before they are digested would remove this bias. Our method of obtaining prey data allowed us to identify prey before they were consumed. Hence, we were able to identify two previously unreported prey species (Yellow Warbler and Eastern Phoebe).

Conclusion

We have been delighted that various people have expressed interest in building nest boxes so that they can assist our research efforts. For this reason, we have provided a detailed description of our nest box design below. We strongly encourage volunteers to undertake similar projects because study and sharing results will enable us to learn more about Saw-whets. This will be especially true if people from a wide geographic area get involved. If you want more information on this project, please contact us.

Nest boxes instructions

Materials

Use plywood (5/8" thick) for the walls, roof and floor. Four pieces of plywood 8" x16" are used for the box sides, back and front. One piece of plywood 9 1/2" x 11 1/2" is used for the roof of the box. The floor is made from a piece of plywood cut to 6 1/2" x 7 7/8". Twenty-four inch lengths of 3" x1" boards (we used fence boards) are attached to the center of the back of the box and are used to attach the box to the tree. Twenty-two 6 x 1 5/8 screws are used for assembly. One 6 x 1 5/8 screw is used to close the door. Two 8 x 2 1/2 screws are used for hinging the door. Six 8 x 3 screws are used to attach the nest box to the tree. In all cases, use external decking screws.

Pre-Assembly Steps

1. Cut a 3-inch round hole in the door piece for the entrance. The hole is centered 4" from the edge and 3 1/2" from the top.

2. Cut six grooves (1/8" deep) under the nest hole on the backside of the door using a circular saw (grooves cut to saw blade thickness). These grooves are intended to help the owls get in and out of the box.

3. Drill four 1/2" holes in the floor piece for drainage.

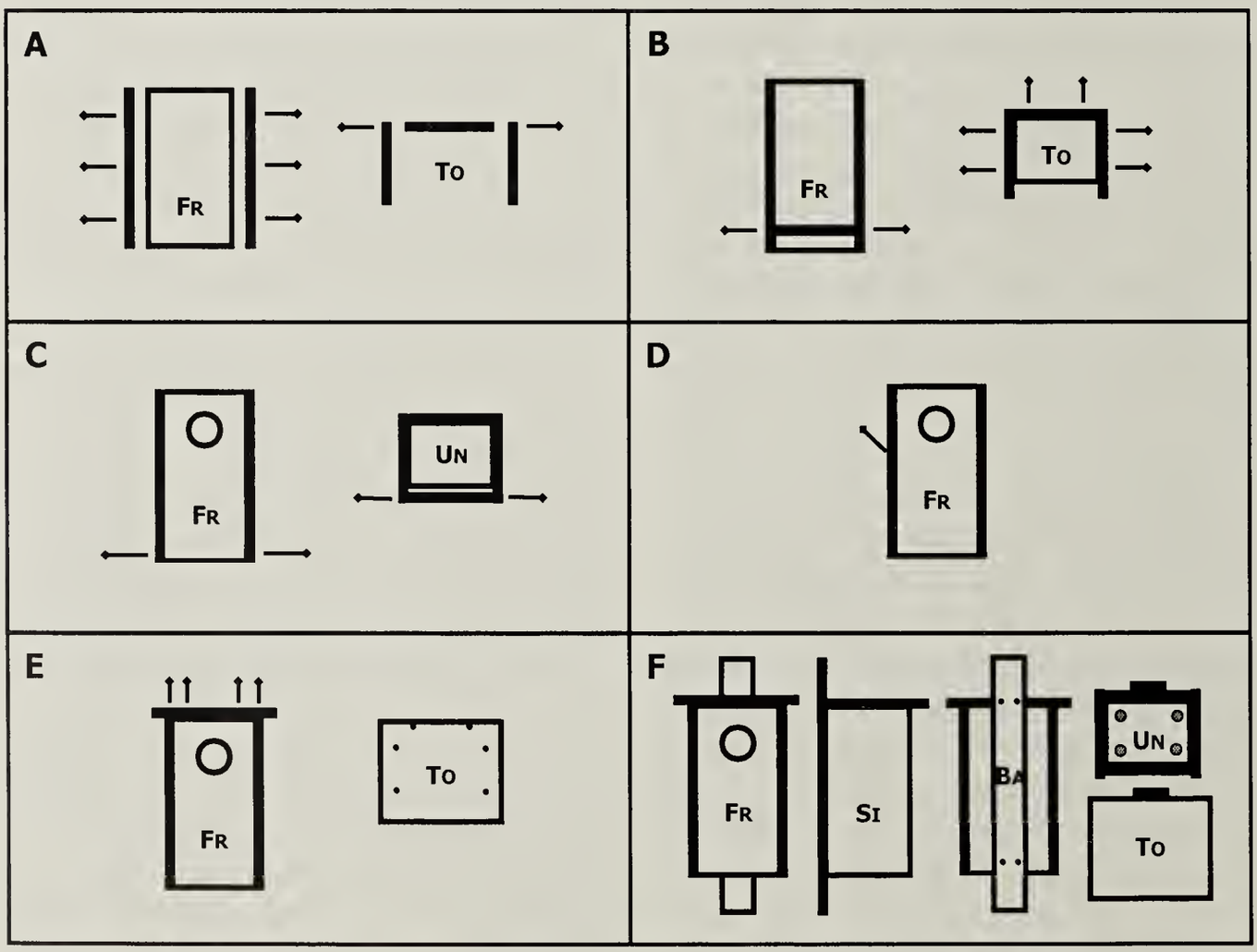

Figure 2: Steps for building Northern Saw-whet Owl nest boxes. Abbreviations indicate the vantage point of each diagram. FR, TO, UN, BA and SI denote: front, top, underneath, back and side respectively.

Assembly Steps (see Figure 2)

A. ATTACH SIDES TO BACK. Attach the two side pieces to the back of the box using three 6 x 1 5/8 screws per side.

B. ATTACH FLOOR TO SIDES. Attach the floor of the box so that the base of the floor is 1 1/2" from the bottom of the sides and back. The floor is secured with two 6 x 1 5/8 screws on each side and on the back of the box.

C. ATTACH DOOR. Attach the front of the box using one 8 x 2 1/2 screw on each side 1/2" from the bottom of each side. The box is designed to open and close using the two screws as a hinge. This saves money that would have been spent on traditional hinges and makes a door that is easy to replace as needed.

D. ATTACH LOCK FOR THE DOOR. Put a 6 x 1 5/8 screw in one side of the box so that the screw goes through the side and into the door at a 45-degree angle. This is intended to keep the door closed.

E. ATTACH ROOF. The roof of the box is attached using two 6 x 1 5/8 screws into the back piece and each side piece.

Figure 3. Northern Saw-whet Owl in nest box ***Lisa Priestley***

F. ATTACH TREE MOUNT. The strip of wood used to secure the nest box to the tree is attached with two 6 x 1 5/8 screws through the roof and two through the base.

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