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ROOSTING BEHAVIOR OF POSTFLEDGING VAUX'S SWIFTS IN NORTHEASTERN OREGON

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Abstract.—In the first 3 wk after young Vaux's Swifts (*Chaetura vauxi*) in northeastern Oregon left the nest, 64% of adult swifts and 44% of juvenile swifts roosted in the nest tree. The remainder of the time they roosted in trees up to 9.2 km from the nest. Juveniles used more roost trees ($\bar{x}$ = 2.0) than did adults ($\bar{x}$ = 1.5), and went farther from the nest to a roost ($\bar{x}$ = 3.3 km) than did adults ($\bar{x}$ = 1.5 km). Some radio-tagged swifts left their nesting areas in Oregon in late August and early September and were found at large communal roosts sheltering more than 500 swifts. These large roosts were used until mid-September when swifts left the study areas.

CONDUCTA DE PERNOCTAR DE *CHAETURA VAUXI* EN EL NORESTE DE OREGÓN

Sinopsis.—Tres semanas después de haber dejado el nido, el 44% de los pichones de vencejo (*Chaetura vauxi*) y el 64% de los adultos, que fueron estudiados en el noreste de Oregón, pernoctaron en el árbol en donde anidaron. El resto del tiempo pernoctaron en árboles que quedaban hasta 9.2 km. de distancia del lugar en donde anidaron. Los juveniles utilizaron más árboles para pernoctar ($\bar{x}$ = 2.0) que los adultos ($\bar{x}$ = 1.5) y se movieron mayor distancia ($\bar{x}$ = 3.3 km) que éstos ($\bar{x}$ = 1.5 km). Algunos de los vencejos con radiotransmisores dejaron sus áreas de anidamiento en Oregón tarde en agosto y temprano en septiembre. Luego se encontraron en grandes concentraciones de pernoctación en donde se cobijaron más de 500 adultos. Estos lugares fueron utilizados hasta mediados de septiembre; luego las aves dejaron el lugar.

Vaux's Swifts (*Chaetura vauxi*) are known for their spectacular concentrations at chimney roosts on their long migration from the Pacific Northwest to Central America. Their nest and roost sites during the breeding season are less obvious and rarely found. Nest sites in natural conditions, namely in hollow trees, have been reported by Bull and Cooper (1991). While nesting, the adult swifts roost in the nest tree at night. After the young leave the nest tree, it is unknown where the swifts roost at night and when they begin their southward migration. The objectives of this study were to determine where adults and juveniles roost after the juveniles leave the nest and to determine when the swifts leave the nesting area in the fall.

METHODS

We monitored swift activity from 1992–1994 in four study areas in northeastern Oregon: (1) Frog Heaven (42 km southwest of La Grande; 45°12′N, 118°36′W), (2) Syrup (35 km southwest of La Grande, 45°17′N, 118°31′W), (3) Goose Creek (42 km southeast of Union, 44°57′N, 117°25′W), and (4) Sugarbowl (16 km west of Ukiah, 45°08′N, 119°07′W).

All study areas were in mixed coniferous forests and were 1200–1500 m in elevation.

Swift roosting activity was monitored using radio-tagged birds. Swifts were captured at their nest cavities within a week of when the young first left the nest tree. A transmitter weighing 0.7 g (about 3% of body mass) was glued to the interscapular region. Two or three spinal tract feathers were trimmed with a scissors to provide a bare patch of skin. The transmitter was covered with Skin-Bond Cement (Smith & Nephew United, Inc., Largo, Florida 34643) and placed on the bare spot; feathers were layered over and glued to the transmitter. The antenna extended down the back and beyond the rectrices. Transmitter life was 3–4 wk, and range was 1–2 km. Transmitters fell off the birds in 2–4 wk.

In 1992, three adults were radio-tagged from 27–29 July. In 1993, seven adults and six juveniles were radio-tagged from 21 July–12 August. In 1994, eight adults and six juveniles were radio-tagged from 1–10 August. The tracking period was 2–4 wk after swifts first left their nests. Swifts were located with telemetry 2–3 times each week at night (between dark and midnight) to find roost trees. If a bird was not located near the nest, all roads within a 5–8 km radius of the nest tree were driven to search for the bird. Once a bird was located, the tree was flagged, and we recorded tree species, condition (live or dead), diameter at breast height (DBH), and the heights of the tree and roost hole.

Two of the roosts used by a large number of swifts were watched twice a week in the evening to record the number of birds going in to roost and to determine the date at which the swifts left the area. Fifteen of the 18 roost trees were checked one evening in August to determine the number of swifts roosting in each tree. The number of birds using a roost was estimated by counting the swifts as they dropped into the tree.

The distance traveled from the nest to a roost was calculated on a topographic map and compared between adults and juveniles using a two-sample Median test (Normal Approximation) (SAS Institute Inc. 1990). A nonparametric test was used because of the small sample size and the non-normal distribution of the data.

RESULTS

Juvenile swifts used more roost trees and moved greater distances ($z = 2.00$, $P = 0.045$ using 15 distances for 10 adults and 14 distances for 9 juveniles) from the nest tree to roost trees than did adults. Distances were not recorded for eight adults and three juveniles because we always found them roosting in the nest tree.

During the three years, 18 adult swifts were located 90 times (1–11 locations/adult) within 3 wk after their young first left the nest tree. Sixty-four percent of the roost locations were in the nest tree; 36% were in other trees. The adults roosted in an average of 1.5 trees (range = 1–3) if we included the nest tree and an average of 0.8 tree (range = 0–2) if we excluded the nest tree. Adults roosted an average of 1.5 km (range = 0.1–9.2) from the nest tree when they used roosts other than the nest.

Twelve juvenile swifts were located 61 times (1–10 locations/juvenile) within 3 wk of when they left the nest. Fifty-four percent of the roost locations were away from the nest tree, and 46% were in the nest tree. The juveniles roosted in an average of 2 trees (range = 1–4) if we included the nest tree and in an average of 1.5 trees (range = 0–4) if we excluded the nest tree. Juveniles roosted an average of 3.3 km (range = 0.3–9.2) from the nest tree when using roosts other than the nest.

Radio-tagged swifts used 18 trees for roosting. At least ten of these trees had been used by other individuals for nesting. Two of the trees were used by >50 swifts for roosting while nestlings were still present in the tree.

Seven radio-tagged swifts were found 5–9 km away at communal roosts used by 100–600 swifts. When we watched 15 of the 18 roost trees one evening in August, we observed that 47% of the trees had <25 swifts, 13% had 25–100 swifts, and 40% had >100 swifts roosting in them.

The two roosts with >500 swifts were checked twice a week until swifts quit using them. One of these roosts was located on 4 Aug. 1992 with about 50 swifts using it. The numbers peaked at 586 swifts on 15 September, and all but a few swifts had left by 21 September. The second roost was located on 20 Aug. 1994, and on 24 August had a peak of 462 swifts using it. The swifts quit using this roost between 11 and 18 September.

Roost trees were 94% grand fir (*Abies grandis*) and 6% ponderosa pine (*Pinus ponderosa*); 56% of the trees were alive and the remainder dead. Eight of the trees were climbed and were hollow inside. The remainder were observed from the ground and had fruiting bodies of the heart-rot fungi and Indian paint fungus (*Echinodontium tinctorium*), which indicates extensive decay in the heartwood. Average DBH and height were 77 cm (range = 47–110 cm) and 26 m (range = 9–40 m), respectively. Swifts entered the roosts (n = 18) through Pileated Woodpecker (*Dryocopus pileatus*) cavities (45%), cavities made by smaller woodpeckers (33%), and broken-off trunks (22%). Height of the entrance holes averaged 17 m (range = 9–33 m).

DISCUSSION

Juvenile swifts used more roost trees and traveled farther from the nest tree to roost trees than did adults. We suspect the juveniles were trying to learn the area, locate potential nest trees for the following year, and locate alternate roost sites.

A variety of roosts are used by individual swifts; four different roosts were used by two juveniles over the 6 and 8 nights that we located them. A number of roosts may be necessary because some of the trees' chambers are not big enough to contain a large number of swifts. In addition, if a predator is at one roost, the swifts may need an alternate site. Cooper's Hawks (*Accipiter cooperii*) have preyed on swifts at nests and roosts (Bull and Collins 1993).

If land managers wish to provide a large number of roosts in a particular area, it can be difficult because only large-diameter, hollow trees can

accommodate swifts. In northeastern Oregon, grand fir is the species most susceptible to the type of decay that creates the hollow interior required by swifts. Only large-diameter trees have a heartwood layer thick enough to create a chamber large enough for a swift to fly up and down.

Adults and young of the Chimney Swift (*Chaetura pelagica*) returned to the nest tree for the first week after fledging; after that week, young seldom returned to their nest sites (Fischer 1958). As we observed with Vaux's Swifts, Chimney Swifts also may roost in a tree where nestlings are still present (James 1950; Zammuto and Franks 1978). Lack and Lack (1952) speculated that Common Swifts (*Apus apus*) start migration on the day they leave the nest, although Cutcliffe (1951) believed that juveniles returned to the nest for several days after young fledged.

The majority of the swifts stayed within 9 km of the study areas until late August or early September, either roosting in small groups or in large communal groups. It appears that most of the swifts using a particular roost leave on migration at the same time. They continue to roost in trees and chimneys throughout their southward migration (Bull and Collins 1993).

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