

# VAUX'S SWIFT NESTS IN HOLLOW TREES

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The Vaux's Swift (*Chaetura vauxi*) is a little known and uncommon bird in northeastern Oregon. These migratory birds arrive there in early May and leave in September (Gabrielson and Jewett 1970) and are often seen in forests or towns during migration. Nests of this species most often have been reported to be in chimneys (Finley and Finley 1924, Davis 1937, Bent 1940, Griffiee 1961, Baldwin and Hunter 1963, Thompson 1977), probably because such nests are more conspicuous and more easily located than those in hollow trees. Only four Vaux's Swift nests in natural conditions in hollow trees have been reported in the literature (Taylor 1905, Baldwin and Zaczkowski 1963). Baldwin and Zaczkowski (1963) located three nests in hollow live Western Hemlocks (*Tsuga heterophylla*) with broken tops in Glacier National Park. Manuwal and Huff (1987) found Vaux's Swifts in spring associated most strongly with old-growth stands in Douglas-fir (*Pseudotsuga menziesii*) forests of the Washington Cascade Range.

Virtually nothing is known of how Vaux's Swifts use forests. The purpose of this study was to identify Vaux's Swift habitat used for nesting and to study some aspects of the species' breeding biology in northeastern Oregon forests (Baker, Umatilla, and Union counties).

## METHODS

In May and June 1990, we noticed large numbers of Vaux's Swifts circling eight forested stands used by radio-tagged Pileated Woodpeckers (*Dyrocopus pileatus*) that we were following. All eight stands consisted of old-growth Grand Fir (*Abies grandis*) and contained hollow trees used by Pileated Woodpeckers for roosting at night. The woodpeckers had excavated one or more holes in such trees to reach the hollow interiors. The old-growth stands had a dominant overstory of trees >50 cm dbh (diameter at breast height), at least two canopy layers (canopy closure >50%), and standing dead trees.

To locate nests, we watched 74 potential nest trees in July for 10–15 minutes each in five of the eight stands. We considered a tree a potential nest site if it had a hollow interior and a Pileated Woodpecker entrance hole or a broken-off top.

If a swift was seen entering a tree, we climbed the tree to determine if there was a nest. We used a periscope to look for nests in trees with intact tops. If we could see a nest, we recorded the number and size of young and the distance from the entrance hole to the nest. We measured diameter, depth, and height of the hollow chamber (both up and down) from the entrance hole, as well as the height, width, and exposure of the entrance hole, the outside tree diameter at the entrance hole, and the thickness of the shell at the entrance. For the nest tree, species, condition (live or dead),

dbh, tree height, height of entrance hole above ground, number of entrance holes, presence of decay, and condition of the tree top (intact or broken) also were recorded.

In the 1 hectare surrounding the tree, we recorded forest type, successional stage, logging activity, canopy closure, and slope gradient and exposure. Successional stage was classified as mature or old growth. Old-growth stands were multi-layered, had >50% canopy closure, and had >10 trees/ha that were >50 cm dbh. Stands that contained trees >30 cm dbh but did not have any trees >50 cm dbh or did not have enough to qualify as old growth were considered mature. Logging activity was classified as (1) no logging or high-graded stands logged >20 yrs ago when only the valuable large-diameter seral species Ponderosa Pine (*Pinus ponderosa*), Western Larch (*Larix occidentalis*), and Douglas-fir were harvested, (2) partial overstory removal where 20–40% of the basal area had been removed within the last 20 years, or (3) shelterwood cut, which is the gradual removal of an entire stand in a series of cuts. Canopy closure was determined in percentage with a densiometer. Slope gradient was measured in percentage with a clinometer.

We recorded feeding interval by sitting below nest trees and recording the time an adult entered and left the entrance hole during the day.

## RESULTS

Twenty-one Vaux's Swift nests were located in 20 trees; one tree contained two nests. All the nests were in trees with their heartwood cores decayed and hollowed out by Indian paint fungus (*Echinodontium tinctorium*), and all had entrance holes excavated by Pileated Woodpeckers for roosts (Figure 1).

We located the first nest on 20 June when we saw a swift breaking tiny branches off a small (15 cm dbh) dead Douglas-fir and flying into a hole excavated by a Pileated Woodpecker in a large (94 cm dbh) dead Grand Fir. The second nest was located 12 July and contained 6 or 7 eggs; on 17 July this nest contained 5 or 6 young. The nest was a semicircle of small sticks cemented together with saliva (Figure 2). The other 19 nests were located between 20 July and 2 August, and all contained young. Young swifts were observed out of the nest but clinging to the wall of the nest cavity at three nests on 1, 2, and 6 August. Adults were still entering one of the nest trees on 20 August.

We observed Vaux's Swifts apparently copulating in the air on 11 June 200 m from a nest. On 27 June we observed one of a pair of Vaux's Swift in the V-glide aerial display described by Stokes (1983) as part of the courtship of the Chimney Swift (*Chaetura pelagica*). This behavior has not been previously reported for the Vaux's Swift.

To record foraging intervals, we watched seven nests from 20 July to 3 August for a total of 7.2 hours. The average interval between trips to feed young at a nest was 12.1 minutes (SD = 16.61, range = 0.5–90 minutes,  $N = 27$ ): The amount of time the adult stayed in the nest averaged 178 seconds (SD = 340.47, range = 30–1800 sec,  $N = 28$ ).

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All the swifts entered their nest trees through the woodpecker holes. Three of the 20 nest trees had their tops broken off, and we observed swifts



Figure 1. Live Grand Fir with Pileated Woodpecker holes used by Vaux's Swifts as a nest tree.

*Photo by Evelyn L. Bull*

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leave the tree through the hollow top at two of them. We never saw them enter the trees through the top.

Nineteen of the holes excavated by Pileated Woodpeckers and used by the swifts were full-sized (approximately  $11 \times 8$  cm, Table 1), while two of



Figure 2. Vaux's Swift nest constructed on the inside of a hollow tree.

*Photo by Evelyn L. Bull*

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them were only partially completed. One of the incomplete holes must have been about the minimum size (5.1 × 4.4 cm) the swifts could use, because we saw an adult swift get stuck in the hole on its way out. After about 2 minutes of struggling, it got a wing out of the hole, then the second, and used the wings as leverage to pull the rest of the body through. This happened only once in seven observed feedings at this nest.

Sixty-five percent of the swifts' nest chambers were accessible through one hole made by a Pileated Woodpecker; the remainder were accessible through two. Typically the swifts went into the lower of the two holes. Forty-three percent of the holes faced north, 34% faced east, 14% faced south, and 10% faced west.

Nineteen of the nests were an average of 2.05 m below the entrance hole used for access and 1.6 m up from the bottom of the chamber. Two nests were 0.4 and 2.5 m above the entrance hole. The tree containing the two swift nests had a partition separating them, so each pair had its own entrance and its own chamber. The pair in the lower hole had their nest below the entrance hole, whereas the pair in the upper hole had their nest above the hole.

All of the nests were in Grand Firs, of which 17 were live and 3 were dead. Trees used by the swifts for nesting were large in diameter (mean = 67 cm dbh). The entrance hole averaged 12 m above the ground and ranged in height from 8 to 18.3 m (Table 1).

The forest type surrounding all nest trees was Grand Fir. Seventeen of the nests were in old-growth stands that had no cutting or had been high-graded, two were in mature stands that had been high-graded, and one was in a shelterwood cut where large-diameter (>80 cm dbh) dead Grand Fir had been retained. Seventy-five percent of the nests were on slopes gentler

**Table 1** Characteristics of 21 Vaux's Swift Nests in Hollow Trees in Northeastern Oregon, 1990

Characteristic	Mean	Standard Deviation	Range
Tree characteristics			
Diameter at breast height (cm)	67.5	14.6	45-96
Height (m)	25.4	6.7	15-37
Canopy closure (%)	70.8	18.7	5-91
Height of hole			
above ground (m)	12.0	2.6	8-18
Cavity characteristics			
Entrance hole height (cm)	10.9	2.0	5.1-12.7
Entrance hole width (cm)	8.1	1.2	9.8-4.4
Diameter inside cavity (cm)	28.4	5.1	19.7-39.1
Outside diameter at hole (cm)	48.8	10.2	32-66
Width of surrounding wood (cm)	7.8	2.9	3.2-13.7
Cavity depth below hole (m)	3.6	2.5	0.6-7.7
Cavity depth above hole (m)	2.1	1.7	0.1-7.6

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than 10%; the remainder were on steeper slopes. Slope aspect was north-facing or east-facing at 80% of the nests.

Several nests were in close proximity in three of the stands. Eight nests were found within 2 ha in an old-growth stand in Umatilla County; the distance between these nests ranged from 30 to 94 m. Four nests were within 8 ha in an old-growth stand in Union County; distance between these nests ranged from 200 to 350 m. Another four nests were situated 70–400 m apart in another stand in Union County. The last four nests were all in separate stands. We doubt that we located all the Vaux's Swift nests in any of these stands.

## DISCUSSION

In northeastern Oregon, the chronology of the Vaux's Swift nesting appeared to be nest building and incubation in June, nestlings from mid-July to mid-August, and fledglings (out of nest but in tree) from early to late August. These dates compare with other nesting dates reported in the literature for Oregon (Griffie 1961, Thompson 1977) and Montana (Baldwin and Hunter 1963, Baldwin and Zaczkowski 1963).

Davis (1937) reported feeding trips to the nest every 1–21 minutes; Finley and Finley (1924) observed feeding every 15–20 minutes at a nest. Our average foraging interval fell within these times; however, we observed a wider range of intervals than reported previously. The longest foraging interval (90 minutes) was recorded on a very hot afternoon. Both adults fed the young and remained in the cavity for 30 minutes or more.

Vaux's Swift nests were in old-growth Grand Fir and in trees used by Pileated Woodpeckers for roosting. Eighty-five percent of the nests were in old growth, and all nests were in Pileated Woodpecker roosts. We do not know if the association resulted because the potential nest sites were in old growth or because the swifts selected the old-growth habitat and then searched for nest sites there. Pileated Woodpeckers typically roost in old-growth Grand Fir because the large diameter of these trees accommodates a hollow chamber large enough for the woodpeckers to enter, 8–18 meters above the ground. In addition, the larger and older trees typically have more decay, which creates the hollow interior. In northeast Oregon, the majority of hollow trees are Grand Fir because of the prevalence of the Indian paint fungus that decays the heartwood.

The swifts cannot enter these hollow trees unless the top is broken off or there is a hole in them. For this reason, we suspect Pileated Woodpeckers create the majority of nest sites for Vaux's Swifts, because broken-topped hollow trees are scarce in most stands. Broken-topped trees are, however, important communal roost sites for Vaux's Swifts (Bull, unpublished data). Hofslund (1958) reported a Chimney Swift nest in an abandoned nesting hole of a Pileated Woodpecker.

In northeastern Oregon, it appears that Vaux's Swifts depend on Pileated Woodpeckers to provide access to suitable nest sites, and Pileated Woodpeckers, in turn, depend on old-growth forests to provide large-diameter trees with hollow interiors for their roost sites. These important habitat components need to be considered in habitat management decisions and to

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be maintained in forests if nesting habitat for these birds is to be conserved. Our hypothesis that Vaux's Swifts require old-growth forests now needs testing to determine if the species is also found in second growth or logged stands with appropriate nest trees retained.

### SUMMARY

Twenty-one Vaux's Swift nests were found in 20 hollow Grand Fir trees; one tree contained two nests. All 20 trees were Pileated Woodpecker roost trees, and the swifts entered these trees through holes created by the woodpeckers. Eighty-five percent of the nest trees were in old-growth forests. Nest building was observed in June; young were in the nest from mid-July to early August; young were out of the nest but in the tree from early to late August. Foraging interval at nests averaged 12 minutes. Eight nests were found within a 2-ha area.

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