USE OF ARTIFICIAL NESTING SITES BY VIOLET-GREEN AND TREE SWALLOWS

BY GORDON W. GULLION

THIS study was started in the summer of 1939 and continued through 1942; it was interrupted by my entrance into the armed services in 1943. It has not been resumed due to my moving from the locality in which it began.

I owe grateful thanks to Mrs. Helen Kilpatrick of this city for her work in banding many of the breeding birds and most of the nestlings.

GENERAL NOTES

This study was conducted on the property of my parents on the eastern outskirts of Eugene, Oregon. The property, consisting of about one acre, was in lawn with many ornamental shrubs clustered about. The larger trees were mostly white oak, *Quercus Garryana,* and broad-leaf maple, *Acer macrophyllum;* with smaller numbers of black oak, *Quercus Kelloggi;* Douglas fir, *Pseudotsuga taxifolia* (transplanted); Sitka spruce, *Picea sitchensis* (transplanted); and incense cedar, *Libocedrus decurrens.*

The eastern and northern sides of the property are bounded by a cliff of about twenty-five feet in height. Immediately north of the property is a millrace and about 100 yards farther north is the sluggish Willamette River. The whole area is in the humid Transition Zone of western Oregon. Our elevation is about 425 feet above sea level. The wind during the summer months is usually from the northwest, but all storms come with a southwest wind.

The artificial nesting boxes used in this study were fully enclosed, with a 5 x 5-inch floor and ten inches height from the lowest part of the roof to the floor. An interior space of 250 cubic inches was thus provided. A round hole, one and one-half inches in diameter, was centered in the front of the box five inches above the floor. All but two boxes had forward-sloping roofs. Two placed under the eaves of the garage had flat roofs but the same dimensions otherwise. All had removable tops or fronts by which examination of the interior could be made. All boxes were made of rough-cut Douglas fir lumber and were stained or painted to match their background as nearly as possible.

Twenty-three boxes were used. They were from ten to fifteen feet above the ground. All but six of these were placed on white oak trees. One was on a black oak, one on a broad-leaf maple, one on a power pole and three on the residence. Most of the boxes faced from northwest to east. Only five faced in a southerly direction.

All boxes were free of obstructions for at least ten feet directly in front, and most were free for several feet on both sides, top and bottom. Eleven boxes faced on open areas at least fifty feet across, with no overhanging trees, and the rest of the boxes had obstructions, of one nature or another, to vertical approach.

NESTING BEHAVIOR

Both species of swallows concerned in this study are quite common throughout western Oregon from April until September. The Violet-green Swallows, *Tachycineta thalassina lepida,* arrive first in this area (my earliest date is March 10) and the Tree Swallows, *Iridoprocne bicolor,* come about two weeks later (my earliest date is March 17).

The Violet-green Swallows at first seemed to be less concerned with serious nesting than the later-arriving Tree Swallows. The Violet-greens came into the nesting area a week or so after their arrival in the general vicinity and began to bicker lightly about nesting sites. This continued without serious attention until about the middle of April when they finally paired off, selected one or two suitable boxes and began to fill them with various assorted nesting materials.

The Tree Swallows, on the other hand, were generally first seen every year when a pair was found warbling over a desirable site. They apparently came into the nesting area almost immediately upon their arrival from the south and began seeking a favorable site.

The Tree Swallows did not fill boxes with such an abundance of material as did the Violet-greens, nor did they fill two boxes at once. When they had selected their box, they would set about earnestly building a nest from the bottom up. The Violet-greens, on the other hand, usually filled two adjacent boxes about one-quarter full and not until after copulation did they settle down to one box.

The Violet-green Swallows' habit of partially filling two boxes was not, however, a wasted effort. This species quite frequently nested twice in one season, and the second nest would be in the unused, partially filled box left during the first period. Often a second set of five or six eggs would be in the second box before the first brood had left its nest. I further suspected, but never proved, that the second box was used by the non-incubating mate during the nesting period as a shelter and resting place.

Though both species frequently reared two broods a year, I do not recall one pair using the same box twice in one season. Sometimes a box used by one pair early in the season would be used by another pair, or even the other species, later, but this was rare.

Favorite bulk nesting material of both species was the lawn trimmings left by the lawnmower, with an interior finish of down feathers from domestic chickens, which I provided for them.

The Violet-green Swallows, though reluctant to begin nesting, were more serious about it once they began. They would usually flutter about the box while I examined it, and sometimes the females would not leave the box even when it was opened. The Tree Swallows usually left the nest on the least suspicion of danger or any disturbance. In both species the males were least concerned with the protection of the nest.

SELECTION OF NESTING SITES

This behavior was most interesting to watch. It was very similar to the international politics of that period and also of the present day. In areas where roomy vertical approach was not possible, each pair of swallows had to have a certain definite flyway from their nest to the open sky, and one pair would not tolerate the use of this flyway by another breeding pair. This seemed to be an interspecific requirement. This flyway requirement apparently had more to do with the choice of nest boxes than any other condition. The matter of facing into the weather or a local obstruction near the box seemed to be no hindrance to use if there were free access to the open air spaces. In cases where more than one nest box faced on one flyway, only one of those boxes would be used if a pair of Tree Swallows took possession first. At most, only two were used if the Violet-green Swallows were first in possession. For that reason, seldom more than eleven of the twenty-three boxes were occupied at one time by swallows. Slender-billed Nuthatches, *Sitta carolinensis aculeata,* and Western House Wrens, *Troglodytes aëdon parkmanii,* would use empty boxes without regard to flyway rights.

The flyway requirements of a pair seemed to be that the flyway be not more than fifty feet long nor less than eight feet wide and that there be no limbs or obstructions as low as or lower than the site of the nesting box. Furthermore, the flyway had to open into a large area from which the birds could climb into the sky in any direction.

These flyway requirements were more important than the proximity of nesting sites. In several places two boxes would be close together (five to ten feet) on the same tree but facing into different flyways. On several occasions both boxes were occupied by different pairs or species simultaneously without dispute.

The fact that a pair claimed one flyway for one brood was not assurance that they would not claim another for the second brood that same season. This was especially true of the Tree Swallows.

The second brood of a pair of Tree Swallows might be raised three flyways from the first or on the opposite end of the area. Nor were there certain boxes occupied by the same species each year except in the single case cited later in this paper. I stated earlier that one box might be used by both species in one season.

RETURN OF BANDED BIRDS

Mrs. Helen Kilpatrick, who banded the birds, has not reported returns on any of the birds. Nor did I find any during the succeeding year's work, with one notable exception. One female Violet-green Swallow returned each of the three succeeding seasons after being banded in 1939. The first two years she had the same mate and the second two years another steady mate. In all four years she used the same two boxes, producing two broods of four, five or six young, a season. I shall discuss this behavior in more detail in a later paper.

NESTING FAILURES

For the most part, nesting attempts were fully successful. Failure came more often to the Tree Swallows, but even there in less than ten per cent of the attempts. Only three times were nests containing live young deserted—twice by Tree Swallows and once by a pair of Violet-greens. One pair of Tree Swallows deserted a nest containing three newly hatched young and immediately set to work building another nest in which they were successful. Their reason for deserting the first was never understood. The second Tree Swallow nest was broken up by a male English Sparrow, *Passer domesticus domesticus,* shortly after the young hatched. The Violet-green Swallow nest, which was deserted after the four nestlings had begun to get their feathers, proved to be black, inside and out, with bird lice.

We were at fault in three or four cases in that we banded Tree Swallows at night. They immediately abandoned their nests under those conditions, and in all cases, nests of eggs were deserted. Violet-green Swallows did not abandon nests after being banded at night.

Throughout the nesting period I made strenuous efforts to protect the nests against stray cats, squirrels and English Sparrows. To the best of my knowledge, only the one Tree Swallow nest was broken up by any of those marauders.

Between nesting periods and between seasons all boxes were thoroughly cleaned, washed and disinfected. Despite this, all boxes contained lice by the time the nestlings were two or three days old. In addition to these lice, I commonly found an ectoparasitic larva on the Violet-green Swallows, a week or so after hatching. This para-

site caused a large number of the deaths among two-week-old nestlings. I removed them whenever I would find them, but I often missed a few. This parasite did not seem to bother the young Tree Swallows. I believe the use of DDT in future experiments of this type might free the nests of all parasites.

SUMMARY

1. The use of artificial nesting sites in the humid Transition Zone of western Oregon by Violet-green Swallows, *Tachycineta thalassina lepida,* and Tree Swallows, *Iridoprocne bicolor,* was studied over a period of four summers (1939 to 1942).

2. Twenty-three nesting boxes in various sites in close proximity were used.

3. Tree Swallows begin nesting sooner after arrival in the breeding area than the Violet-greens but are not as persistent.

4. Both species frequently rear two broods a season.

5. Pairs of both species require a certain amount of living space and will not tolerate intruders into their area. This is an interspecific requirement.

6. Most pairs do not use the same nesting site or locality in succeeding seasons.

7. Young birds do not seem to return to their natal homes.

8. The use of artificial nesting sites is highly successful for both species (80–85%).

9. Most nestling deaths are caused by invertebrate parasites (directly or indirectly) and predacious vertebrate marauders. (The use of DDT might eliminate the former.)

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BIRDS OF AGRIHAN

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BECAUSE of the scarcity of bird records from the northern Marianas, this brief account of the birds observed at Agrihan from July 27 to August 14, 1945, may be of some interest. The writer's visit to Agrihan was for the purpose of making a survey of the island; this survey was terminated rather abruptly, ahead of schedule, by the surrender of Japan and the writer's recall to his base at Saipan on August 14.