

NESTING OF THE AMERICAN REDSTART¹

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FROM late June to early August, 1942, I studied five nests of the American Redstart (*Setophaga ruticilla*) at the University of Michigan Biological Station, Douglas Lake, Michigan. Since the early part of the Redstart nesting season was not covered in this study, the results reported here may differ somewhat from those obtained by other observers.² The nesting season in the Douglas Lake region starts in May. In 1939, at Wilderness Park, about 15 miles north of Douglas Lake, I found a nest about half finished on May 31. The season reaches its peak in June and ends in late July.

Most of the observations were made from a green canvas blind on a tower platform raised slightly above the level of the nest; some were made from the ground. Each young was marked with a daub of colored nail polish on the upper mandible, and both adults and young were banded. The net for catching the adults was made of three fine hairnets, sewn together, and attached to a wire loop. This was placed over the nest at a 45° angle and held in place by strings. When flushed, the bird would fly directly into the net and thus was easily caught and banded.

NESTING HABITAT

The preferred habitat of the American Redstart at Douglas Lake was second growth maple (*Acer saccharum*), 15 to 30 feet high, situated on low-lying ground. This preference of the Redstart has been noted also by E. H. Short in New York (1893:197). Nests are found, however, in every kind of forest, from mixed birch, poplar, coniferous cedar forests, to ash lowlands, hemlock and tamarack. Nests 1, 2, and 5 of this study were in maple, Nest 3 in hornbeam (*Ostrya virginiana*), and Nest 4 in black ash (*Fraxinus sambucifolia*.)

TERRITORIAL BEHAVIOR

In the last days of June and the first week of July, 1942, I found seven singing males and two nests with young (Nests 1 and 3) on an area of about one acre on Grapevine Point, about ¼ mile from the Biological Station buildings. The forest here was mostly a thick stand of young maples with a scattering of other deciduous trees.

The two nests were approximately 20 meters apart, and the seven males perched at intervals of from 10 to 20 meters in an area about 100 meters square. Hickey (1940:256) found that "the size of territories

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was usually about one acre or less, but in one instance was compressed to about half an acre." He described the species as "highly territorial," and its intolerance of trespass by other Redstarts has also been noted by Short (1893:199) and Wood (1904:34). Wood, however, recorded one instance of a nest peaceably shared by two pairs.

I observed little territorial defense—possibly because my observations were made so late in the nesting season. At Nest 1, on July 4 and 6, the male drove off another male that entered the nest tree and came within two or three meters of the nest. But from two to four males sang all through the day within 100 yards of the nest tree, and occasionally two males sang at the same time within 40 feet of the nest. A strange male once (on July 14, when the young were six and seven days old) stayed near Nest 2 for 30 seconds without being chased away. The female scolded and then left the nest, returning after two minutes with two insects which she fed to the nestlings. Also a strange male perched within two meters of Nest 5 on July 15, and remained about 30 seconds; he was not driven off. The males of Nests 2 and 5 were both yearlings. The male of Nest 2 was observed at his nest only three times in 36 hours of observation, but he once displayed for two minutes near the nest (on July 12, two days before the young left the nest). Hickey (1940:255) has described the display as "short, horizontal, semi-circular flights made with stiffened wings and out-spread tails."

SONG

The varied song of the Redstart has been adequately described by Frank M. Chapman (1907:293) and others. American Redstarts were singing in large numbers the last week of June and the first two weeks of July; song then gradually decreased, stopping altogether early in August. On Grapevine Point six and seven males sang during June and early July. On July 22, only three males were singing, and on July 28, only two (from the treetops instead of from the lower branches as before). July 29 and 30, I heard only one male sing each day. August 2, 3, and 4, I heard no singing at all in the area.

Singing was strongest during the morning hours. Mousley (1924:286) states that it is unusual for the males of American warblers to sing in the nesting tree. At Nest 1, the male (a second-year or mature) often sang from the nest tree, sometimes when perched only a few feet from the nest. At Nest 2, the male (a yearling) was never observed singing in the nest tree. The males usually sang from a favorite tree near the nest, perched 4 to 15 feet from the ground, a habit also noted by Mousley (1924:285). Hickey (1940:255), however, did not observe the use of singing perches; he noted one male singing only one or two feet from the ground. Though both yearlings and second-year birds sing, the second-year Redstarts seem to have the stronger song.

I heard the yearling male at Nest 2, which was about 40 feet from my cabin, singing constantly while the nest was being built and during

the first days of the incubation period, but I never heard him sing during the latter part of incubation or at any time during the nestling period.

The female often chips softly at the nest, even when not disturbed or (apparently) calling her mate. I did not observe the females singing, though Jones (1900:36) said that the female "sings at least the more simple of the variations." Short (1893:197) said that the female utters a "sweet trill" during the mating period, but later, except for the warning call, becomes silent.

The last two days of nest life the nestlings make soft noises and flutter their wings when being fed.



Figure 1. Female Redstart on Nest 4. One nestling has worked its way through the side of the nest and strangled itself.

NESTS

Nests were placed in an upright three- or four-prong crotch from 4 to 20 feet from the ground. Materials used in building the nests were birch bark, grapevine bark, milkweed fibre, feathers, grasses, and deer hair. Four were lined with deer hair, the fifth with grasses and fibres. Some nests had pieces of birch bark woven into the outside and the

bottom of the nest; the outside of one nest was mostly milkweed fibre, with no birch bark. Spider web was used in binding the outside of Nest 2 together. Chicken feathers were used in Nests 1, 4, and 5. Wood (1904:33) and Short (1893:198) found similar structure and placement to be typical of Redstart nests. Table 1 shows the measurements of five nests.

TABLE 1
MEASUREMENTS OF REDSTART NESTS

Nest	Total Width	Cup Width	Total Depth	Cup Depth	Height From Ground
1	65 mm.	48 mm.	60 mm.	25 mm.	6.00 m.
2	65	40	60	33	3.00
3	70	46	80	39	2.50
4	66	45	62	34	1.25
5	67	45	53	29	3.50
Av.	66.6	44.5	63	32	3.25

INCUBATION AND BROODING

Nest 2 (found July 2) contained a Cowbird egg (which I destroyed) and three Redstart eggs; Nest 4 (found July 13) had three Redstart eggs; Nests 1, 3, and 5 (found June 30, July 5, and July 15) contained four, two, and three young, respectively. The usual clutch is four eggs, but Wood (1904:34) found that a second set "rarely exceeds three eggs." Victor Kehrer, Jr. (MS), found the incubation period of Redstarts to be 13 days; A. L. Sears (Chapman, 1907:292) reported about 12 days for one nest.

Only the female was observed to incubate or to brood. At Nest 2, the female spent 144 of 180 minutes observation time (morning hours) on the eggs; the seven intervals on the nest varied from 6 to 44 minutes (average, 22.1 minutes); the seven intervals away from the nest varied from 2 to 10 minutes (average, 5 minutes). After the first egg hatched (between 8:00 and 10:00 A.M., July 7) the female spent 227 of 294 minutes observation time on the nest. The young was not fed the first day; the second egg hatched early on the morning of July 8; the third egg in this nest did not hatch. The female was very uneasy during the hatching of the young and would spend 30 seconds at a time inspecting the eggs and young and picking around in the bottom of the nest.

For the first few days nestlings are brooded most of the time. At Nest 1, during the first few days of brooding, the female left the nest only long enough for the male to feed the young. Brooding intervals, however, are shorter than incubation intervals, averaging 9.1 minutes; the longest brooding interval I recorded was 18 minutes. At Nest 2, the female remained on the nest on July 7, the day the first egg hatched,

77 per cent of the observation time; on July 8, 73 per cent of the observation time; on July 12, 31 per cent; and on July 14, 27 per cent. (Observation periods ranged from 204 to 394 minutes in length.) On July 15, the day before the young left the nest, she brooded only 13 of 120 minutes observation (11 per cent). The day before nest-leaving, at Nest 1 (July 5) the young were brooded only 18 minutes (during rain) of 115 minutes observation time, and at Nest 5 (July 15) not at all during 119 minutes observation.

During rain the female extends her wings over the sides of the nest, with the head held straight into the air. The female at Nest 2 always continued to brood in the empty nest during the time (about five minutes each day) that I was photographing and weighing the young.



Figure 2. Mature male Redstart feeding young at Nest 4.

The two young left Nest 2 on July 15 and 16, at the ages of eight days, and (about) eight days nine hours. Mousley (1924:285) also recorded young leaving a nest at eight days of age.

FEEDING

At Nest 2, the female took complete care of the young. I saw the male near this nest only three times, and saw him attempt to feed the young only once (on the first day). At the other nests the male and female shared in feeding the young. The male of Nest 1 did most of the feeding during the first days while the female brooded; later she increased her part in the feeding. At the nest observed by Mousley (1924:287) the female fed the young 32 times, the male 12 times, in 10 hours observation; he found the average feeding interval to be 13.6



Figure 3. Mature male Redstart feeding young at Nest 1.

minutes. At the nests I observed, feeding intervals varied from 2 to 24 minutes. During the morning, nestlings were fed at average intervals of 11.1 minutes, in the afternoons, at average intervals of 13.6 minutes. The male at Nest 1 was once observed to feed the female on the nest (during heavy rain, in the afternoon of July 3, when the young were about six days old); at the same time he fed one of the young that had its head stuck out from under the female's wing. The male at Nest 2 likewise once fed the female, also during rain, during the early part of the incubation. Feedings increased in number during the last days of the nestling period. At Nest 2 the female fed the nestlings 24 times

in 290 minutes observation on July 9 (young, one and two days old), 44 times in 204 minutes observation on July 14 (young, six and seven days old).

Various kinds of insects and larvae were fed to the young—Mayfly (*Ephemera*), Rosy Maple Moth larvae (*Dryocampa rubicunda*), House Fly (*Musca domestica*), and many others I could not identify. During a Mayfly hatch 90 per cent of the insects brought to the nests were Mayflies. It was not unusual for the male to bring in two or three Mayflies and feed two young on one trip. On one occasion a male brought four Mayflies at once and fed three young. Very small insects were fed the young the first day or two, larger insects later. The male at Nest 1 brought in more insects per load and fed more young than the female.

TABLE 2
WEIGHTS AND MEASUREMENTS OF REDSTART NESTLINGS

Date	Nestling	Age	Weight	Culmen	Tarsus
July 7	1	Hatched	1.10 gm.	6 mm.
8	2	Hatched	1.20	2.0 mm.	5
8	1	1 day	1.80	3.0	7
9	2	1	1.80	2.0	6
9	1	2 days	2.64	3.5	9
10	2	2	3.00	2.5	8
10	1	3	3.95	3.5	10
11	2	3	4.20	3.0	11
11	1	4	5.30	3.5	13
12	2	4	5.50	3.0	12
12	1	5	6.10	4.0	15
13	2	5	6.56	4.0	14
13	1	6	6.93	4.0	16
14	2	6	7.15	4.0	16
14	1	7	7.50	4.0	17
15	2	7	7.84	4.0	16
15	1—Left nest 9:44 a.m. aged about 8 days, 1 hour.				
16	2—Left nest 2:05 p.m. aged about 8 days, 9 hours				

Nests were kept clean all through nestling life. During the first part of the nestling period the fecal sacs were eaten, but from the fourth day they were usually carried away. At Nest 2, on July 8, 9, and 10 (when the young were one to three days old), the female was observed to eat the sacs 20 times in just under 19 hours observation. On July 12 she carried away sacs six times and ate one sac in 261 minutes observation. On the following days she was observed to clean the nest eight times (in about five hours observation), and each time she carried the sacs away.

GROWTH OF NESTLINGS

The young are very helpless the first day. They are naked except for some natal down on the dorsal feather tracts and on the head. Their eyes open on the fourth day. Primary feathers begin to grow on the

third day, to unsheath on the sixth day. At seven days the young began to preen their wing-feathers, and on the eighth day spent much of the time picking and preening. The four nestlings in Nest 1 weighed 7.90; 7.95; 7.70; 8.10 grams, respectively, on the day before they left the nest, when they were about eight days old. Table 2 shows the daily weight and growth of the nestlings in Nest 2. They were weighed and measured about 6:00 P.M. (E.S.T.) each day.

NESTING SUCCESS

Five of the six eggs found (Nests 2 and 4) hatched. The two young in Nest 2 reached at least nest-leaving age. One of the three young in Nest 4 worked its way through the side of the nest and was strangled. This was a poorly constructed nest and in bad condition due to rain. I did not visit this nest after July 19, so I do not know whether the other two young reached maturity. All 10 young found in Nests 1, 3, and 5 reached at least nest-leaving age.

SUMMARY

Five nests of the Redstart (*Setophaga ruticilla*) were studied at Douglas Lake, Michigan, in late June, July, and August, 1942.

The preferred habitat was second-growth maple, but nests were found in every kind of forest.

Little territorial defense was observed.

The males were in full song until mid-July, when song gradually decreased, stopping in early August.

Only the female was observed to incubate or brood. Except at one nest, male and female shared in feeding the young.

Incubation intervals averaged 22.1 minutes, brooding intervals, 9.1 minutes; intervals between feedings, 12.3 minutes.

Fecal sacs were eaten during the early part of the nestling period; later they were carried away.

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