

BIRD-BANDING

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SOME YELLOW WARBLER OBSERVATIONS

By WENDELL P. SMITH

THE following notes are accumulated from twenty-nine years' observations for migration, for a shorter period in the case of breeding activities with three years of more detailed study of nesting habits.

The Eastern Yellow Warbler (*Dendroica a. aestiva*) in Vermont is confined almost entirely to the lower altitudes and can be considered common only in the Connecticut Valley. The average date of arrival in spring at Wells River is May 10, with the earliest May 3, 1942 and the latest May 17, in 1907 and again in 1931. Fall records are less numerous. The breeding population evidently leaves soon after the young are able to care for themselves and during many seasons, the species is not seen later than July. Departure dates for local summer residents range from July 15 to the 30th. Later records occur between August 18 and September 9th. Few data have been secured regarding difference in time of arrival of the sexes. In 1941 a male was first seen on May 8, while the first female was observed on the 14th.

Courtship begins soon after arrival of the species. Within a period of from four to six days greatly increased singing is noted which marks its inception. Persistent and lively pursuit of the female by the male was observed, taking place within a restricted area (once within a radius of thirty feet). From one to four days elapsed before courtship was completed. Sexual union may not take place until nest building begins as the following observations in 1938 tend to show. Pursuit of the female began on May 23, continued on the 24th but frequent attempts at intercourse on the part of the male were unsuccessful. On the 26th copulation was seen to take place and on that date the nest was completed.

Nest-building begins usually in from fifteen to twenty days after the arrival date but 1942 furnished an exception with but nine days intervening. The date was May 12, an unusually early one for nest building. An unusually early season with the leaves of the

Spiraea developing several days ahead of the average seems the most likely factor. The beginning of nest construction has ranged from May 12 to the 26th. Little time has been spent in watching the actual work. Only the female was seen to take part, the male, meanwhile, perched alternately in one of two trees on opposite sides of the nesting site and distant fifty and twenty-five feet respectively. He scolded some and sang twice during the half hour's observation. During the thirty minutes the female made five trips with material. The shortest interval between them being two minutes and the longest ten minutes. The longest time spent in arranging materials in nest was three minutes. Fifteen minutes' observation of nest construction on the 14th of May from 9:44 to 9:59 A.M. showed the following schedule: Material brought for structure at 9:49; 9:50; 9:54.30; 9:56.45; 9:57.15. Five trips with pauses at the nest varying from fifteen to thirty seconds. Twenty minutes of watching from 1:56 to 2:16 P.M. of the same day gave a total of three trips.

The nesting site was an upright fork in a *Spiraea*, three feet from the ground. Materials used were dried grass and plant down, the latter being brought from some trembling aspens, 150 feet distant. From three to five days were consumed in nest building. Method of construction was to lay the foundation in the forked limb, build up the sides and then strengthen the whole structure by increasing its thickness from the inside. The plant down was used throughout the structure and not merely as a lining.

A period of several days intervened between nest completion and egg laying. During two seasons of rather intensive observation, this was two days. May 16, 1942 was the earliest date of egg laying, May 31, the latest. Clutches varied in number from four to six. Not always was laying a matter of successive days. In May, 1942, with the laying of the first egg on the 16th, the second was laid on the 18th, the third on the 20th, and thereafter on consecutive days until the completion of the clutch on the 23rd with the sixth. Other clutches have been laid on consecutive days. Laying occurred early in the day and usually between 4:00 and 5:00 A.M., standard time, although once the egg was cold at 4:10 A.M. but many times the female would leave the nest at five o'clock when we came to investigate. Few egg measurements were taken but the longer axis ranged from sixteen to sixteen and one-half mms. and the shorter axis was thirteen mms. The ground color was white spotted with Saccardo's umber and burnt umber with a greater concentration about the larger end. Some had fewer spots than others.

Frequently in clutches of four, incubation began with the laying

of the third egg but in the case of the clutch of six, the complement was finished before sitting began. Some time was spent in observing the time table of sitting, resting and feeding and the part taken in these activities by the sexes. Sample periods follow: 9:50 A.M. to 12:50 P.M., female on nest. At 10:26 male began singing in shrubbery, twenty feet from nest. Sang eleven times to 10:27.30 when female left, slipping unobtrusively out of the structure and flying through shrubbery. Scolding began a few seconds later, apparently by the male. The latter encountered the female fifteen feet from the nest. The male uttered several times a slow trill like that of the hungry young and probably sexual union took place but thick shrubbery prevented observation. Afterward the male was seen in pursuit of his mate across an open space. The female returned scolding at 10:33.30 accompanied by the male. They moved through the shrubbery to approach the nest from the opposite direction, coming within two feet of the structure. Meanwhile the alarm notes were becoming softer and less frequent, finally ceasing. At 10:40.30 the female entered the nest after a previous approach, a second's pause on the rim, a retreat and a new advance. The approach was made by hopping from branch to branch. Immediately following the return of the female to the nest, the male sang six times from shrubbery, twenty feet distant. At 10:45 the male again began singing in a tall maple across a garden, forty feet away and continued for four minutes intermittently. The female's position on the nest was opposite to that preceding the last rest period and at 11:10 she assumed an upright position and changed again by a half circle. At 11:48 the male came to the same perch in shrubbery near nest and sang once whereupon the female left with a quick leap and swift flight through thick shrubbery. She returned eight minutes later accompanied by the male. The female entered the nest but remained for only a second, hopping out on the opposite side. The male entered a few seconds later but paused only for an instant, leaving to join his scolding mate, fifteen feet away. They began to approach the nest soon, her scolding becoming softer and less frequent until it ceased when they were within a foot of the nest. The female hopped into the nest with a gliding motion at 12:00 M. and the male began singing within a few seconds, continuing after the observations ceased at 12:06 P.M. Observation during another season yielded somewhat different results. This is of additional interest because two of the eggs hatched during the interval. It was for a three-hour period from 2:25 to 5:25 P.M., war time. May 31, 1942. The female was off the nest at beginning of observations and was seen feeding, twenty-five feet away. The male was not near the nest, for our approach to look in elicited no alarm.

The female flew to a shrub close to and beneath nest at 2:29, hopped in, rolled eggs and settled herself within thirty seconds. She preened her feathers at 2:37 and changed position by a more than ninety degree angle at 2:41 but shifted back again one minute later. Preening and rolling eggs occurred again at 2:44 and another ninety degree change in position at 2:45. The male sang within ten feet of the nest at 2:47.30. A thirty seconds interval followed and two more songs were given. With the second, the female left and the male hopped onto the rim but did not enter and was heard singing again, thirty feet distant, four minutes later. The female returned at 2:56.30, alighting higher in shrub and hopping in after an absence of eight and one-half minutes. Almost at once the male hopped past and paused on edge of nest to feed his mate. He came again for this purpose at 2:58, stopping only long enough to place the food in the female's bill. So quickly was the feeding done that hardly an appreciable pause in the male's ambulatory movement could be detected. The male sang at 2:59 at ten feet distance and one-half minute later, thirty feet away. At 3:03, the female rolled the eggs and again at 3:05. She then stood up in nest and at 3:07 and continuing to 3:11.30, sat on the rim. Some preening was done during this interval and toward its close, part of the egg shell was eaten with some difficulty. From 3:11.30 to 3:13 the female sat on the eggs but with body held high. Then followed forty-five seconds on rim of nest. Back in nest but in the high position at 3:13.45 she remained quiet until 3:15 when she stood up and settled down again in same position. Changed position slightly with one rolling movement at 3:16.15. Rolled eggs at 3:23, 3:25 and 3:27.30, using both feet in kicking movement. At 3:29.30 the female ate the second egg shell. She left the nest at 3:30, slipping over the edge and dropping out of sight in the shrubbery but returned at 3:31 and settled on the nest. At 3:32 the eggs were turned and the female left at 3:36, flying from edge of nest. She was back on the rim at 3:37 but left one minute later and did not return until 3:43. Left thirty seconds later and returned at 3:49. Returning at 3:52 she paused on nest rim for forty-five seconds, then entered and after rolling eggs, settled low at 3:53. Position was changed thirty degrees and eggs rolled at 3:55. A possible cause of the bird's uneasiness at this time was the sun's shining directly into the nest. The female left again at 4:08 returning at 4:13.30. She fed the young as she had upon returning since hatching of the second egg and settled on the nest at 4:15. At 4:17 the female stood up and settled again, and at 4:20 again arose and preened. Another portion of egg shell was eaten at 4:21 and left by dropping through shrubbery before taking wing. Back in three and one-half minutes.

and fed from nest edge. Another departure at 4:25.30 with return three minutes later, feeding again and settling low. Standing and rolling eggs were next observed at 4:30 followed by a change of position. Standing and resettling at 4:38 was followed by similar movement and sitting in the high position fifty seconds. Rolled eggs and a ninety degree change in position at 4:40. Another change in position at 4:41.30. The female left at 4:45. Each departure was taken in a somewhat different direction so that at the end of the period the bird had flown toward every point of the compass. Return came four and one-half minutes later and young were fed. Three and one-half minutes on nest was followed by departure at 4:53. Female came back at 4:56, fed and left again at 4:58.30. She returned to brood without feeding at 5:03, changing position slightly at 5:07 and again at 5:08.30 and still again at 5:13.30. Other movements were rising up and settling at 5:14 and 5:15 and rolling eggs at 5:22.30 and again thirty seconds later. Her body was held high during the last ten minutes of the observation period. At no time was the male seen after the two eggs hatched. Three were still unhatched when we left. It is difficult to determine the incubation period for the 1942 clutch. Egg-laying was prolonged over an eight-day interval and hatching was spread over three days, May 31-June 2, inclusive. The eggs were not kept continuously warm until completion of the clutch on May 23, but there may have been intermittent incubation, for presumably the last to hatch was the last laid which would mean ten days of incubation. The period was ten days for two other broods.

Few observations in detail of feeding and care of the young were carried out. Measurements and changes in color of the soft parts were noted as were certain other developments. One brood was measured daily for eight days but because of differences in the time of hatching, extending at least over thirty-six hours, the results are not entirely satisfactory. Differences throughout the period, however, seemed to remain apparent so we feel that the daily growth records are approximately correct. These are as follows:

	<i>Length</i>	<i>Wing</i>	<i>Tarsus</i>	<i>Culmen</i>	<i>Primaries</i>
1st day.....	32.	5.	4.	4.	..
2nd day	40.	5.5	4.5	4.	..
3rd day	46.	6.5	6.5	5.	..
4th day	50.	8.	9.	6.	..
5th day	54.	11.	11.5	6.5	3.
6th day	60.	13.	14.	7.	11.5
7th day	70.	14.	16.5	7.	17.
8th day	75.	16.	16.5	8.	21.

Eyes were beginning to open on the fifth day and primaries to

appear.

The natal down was light smoke gray of Ridgway's "Color Standards and Color Nomenclature." By the second day all pterylae were visible, the alar tract most noticeable, the crural and caudal least apparent. On the third day the bill was Isabella color with the commissure olive ocher. At eight days the plumage is described as follows: Head and back, citrine drab; wings, dark olive; wing bars, dark olive buff; throat, citrine drab; breast and belly, olive ocher. The eggs in this clutch hatched between May 31 and June 2, inclusive, and the young left the nest on June 10, a period of eleven days for one, ten days for three, and nine days for one fledgling, respectively, and similar periods of time have been observed with other broods. The actual process of nest-leaving was not seen. The last individual left before 10:30 A.M.

Nothing was seen of either parents or young until the fourth day after nest-leaving but presumably they were present in the thick shrubbery near the nest for they were seen within fifteen feet of the structure on the 14th. Early on the 15th, they were in the same locality but no more was heard or seen of adults or young until dusk of the 19th, when the male was singing about forty feet from the nest. On the 21st, the male was heard singing repeatedly during the afternoon in the shrubbery where the nest was located. At nightfall on the 22d, the family, including at least four young, was in tall trees, forty feet from the former nest. The last feeding observed, occurred at 8:35 P.M. The young were heard calling in a thick growth of Canada plums within twenty feet of the old nest until 8:46 P.M., while one remained in an arbor-vitae near where they were last fed, forty feet distant. Apparently the young spent the night in these locations, the last calls being heard at 8:49. The male sang from one or two phrases to eight or ten, interspersed with periods of silence, until 9:14. During last four minutes only four groups of only a phrase or two were uttered and the day's activity ended at 9:14 P.M., war time. The male's roosting place was in tall shrubbery near the former nest and mid-way between those occupied by the young. Sunset on the 23rd found the family in tall trees bordering a roadway, 350 feet from the nest. The male and one juvenile were seen 500 feet distant on the 26th. The 27th saw at least the male and three young and perhaps the female and one additional young back within twenty feet of the nest. The male on July 1 was singing in the locality of the nest and at distances as far as 500 feet away. After twenty minutes of watching, a number of teasing calls were heard but lacking the importunity of previous days. Only one young bird could be seen and it made no

attempt to follow its parent. On the 2d, the male was heard singing in the same range but no evidence of the young could be found. The species disappeared from the immediate vicinity on July 7th.

Perhaps a few additional observations regarding the activities of the male. Habits of singing were noted. On June 8, 1940, the male began singing at 4:56, daylight time, continuing until 4:58 A.M. at the rate of one song a minute. Then an increase to four during the next minute and from three to eight per minute, with thirty-five and forty second intervals of silence, respectively, until 5:16.30. During these twenty-two and one-half minutes 101 songs were given. Apparently this was the first activity of the day and was resumed shortly after 5:26 following nearly eight minutes of silence. Singing took place from several locations all within thirty-five feet of the nest. On June 9, singing began at 4:05 A.M. but with only one song until 4:08 when seven were given during the space of one minute. During the song period of fifty minutes, 197 songs were given. Two intervals of silence were interspersed; one of thirty seconds, the other of five minutes. Fluttering wings, ruffled breast feathers and heaving diaphragm accompanied the singing. Singing was interspersed with feeding, seven songs per minute being the most rapid schedule and four or five the usual. Singing was indulged in with a search for food, snatching an insect morsel alternating with an outpouring of song. The first song period observed occurred while egg laying was in progress, the second during incubation.

Territorial exclusiveness scarcely existed. In one season a Chestnut-sided Warbler's nest was located within five feet of that of the Yellow Warbler. The following species were represented by one nesting pair within a radius of thirty feet: House Wren, Catbird, Black and White Warbler, Chestnut-sided Warbler, Northern Yellow-throat and Indigo Bunting. Unless another individual came very close to the nest, no hostility was shown by either male or female. Too close an approach would bring a swift attack by one or the other, however, but only for a short distance when the pursuer would give up the chase.

Wells River, Vermont