

AVERAGE LENGTH OF STAY

Warblers	4.4 days
Eastern Hermit Thrush	5.2 days
Olive-backed Thrush	3.75 days
Gray-checked Thrush	4. days
Bicknell's Thrush	3.5 days
Veery	2.5 days
Eastern Ruby-crowned Kinglet	3.75 days
Eastern Winter Wren	4.5 days
Red-eyed Towhee	4.66 days
Lincoln's Sparrow	2.33 days
Swamp Sparrow	5.4 days
Eastern Fox Sparrow	Spring 7.75 days
Eastern Fox Sparrow	Fall 5.5 days
White-crowned Sparrow	3.8 days
White-throated Sparrow	Spring 3.8 days
White-throated Sparrow	Fall 6.25 days

Norristown, Pennsylvania.

NESTING OF THE FIELD SPARROW AND
SURVIVAL OF THE YOUNG

By LAWRENCE H. WALKINSHAW

(Continued from page 114)

THE YOUNG

THE natal down of the Field Sparrow is "mouse-gray." (Dwight, 1900, p. 199.) This down is located as follows:

<i>Region</i>	<i>Length of down in mm.</i>	<i>Number of tufts</i>
Coronal	5	4-6
Occipital	5	5-7
Mid-dorsal	6-7	10-12
Scapular	6	4-5
Humeral	4	2
Femoral	5-6	6
On femur	4	2
Abdominal	5	10-12

The color of the skin and legs is pinkish, the bill pinkish, grayed near the tomia. The lining of the mouth is yellowish, pinker near the side. The small egg tooth, near the tip of the maxilla, is white and soon disappears. The eyes show in large gray areas beneath the skin and are closed. No suggestions of feather tracts are visible.

The weight of the young bird which hatched in my hand was 1.5 grams. His wing measured from the bend to the tip, 6 mm. The tarsus measured 5 mm. and the culmen 3 mm. Some young weighed when first observed as low as 1.1 grams. The average weight of 47 individuals before they were one day old was 1.71 grams.

By the second day the primaries showed in dark lines through the skin. The dorsal feather tracts were discernible. The ventral

regions showed merely as lines but were easily seen on the third day. The occipital regions were dotted black at two and one-half days. The description of the plumage has been given admirably by Sutton (1935, pp. 29-31) and he has presented a beautiful portrait of an eight and one-half day old young, just after it left the nest (Plate VII).

Following is a table of weights of young Field Sparrows, showing the morning and evening weights, then the average of both:

Age in days . . .	MORNING									
	At birth	1	2	3	4	5	6	7	13	14
Number of birds	33	27	29	20	22	15	13	4	1	
Weight in grams	1.72	2.75	3.51	5.25	6.99	8.79	9.7	10.17	12.2	
	EVENING									
Number of birds	14	12	11	12	15	11	10	5		1
Weight in grams	1.69	2.75	4.36	6.32	7.6	8.96	9.82	10.6		12.4
Total number of birds	47	39	40	32	37	26	23	9	1	1
Average weight in grams	1.71	2.75	3.74	5.65	7.24	8.86	9.75	10.4	12.2	12.4

The oldest young left the nest when eight days old. Some left at seven and many, if disturbed, left when only six, showing a perceptible amount of fear then for the first time. During 1938, 17 young left the nest without being disturbed. One left at six days of age, seven on the seventh day and nine on the eighth day. The average was 7.5 days. Of 18 young disturbed during late nestling life, one left when five days old, eight when six days and nine when seven, averaging 6.4 days.

When leaving the nest they hopped to the edge then to the ground, often tumbling awkwardly. From there they hopped unsteadily a little distance from the nest. If I was near, the parent slowly walked ahead of the young, leading it carefully to a more distant spot where she finally left it. The female was noted to do this in nearly all cases.

At nest 6, 1938, the young were carefully observed and two were found when 13 days old. They were able to fly very well but by slowly approaching one in a small tree, I was able to catch it. Similarly a young from nest 11 was captured when 14 days old. Both parents were noted to feed young at 15 days of age if there was not a later nesting.

In the region of nest 8, 1938, an empty nest was found on July 8 and a pair of birds observed feeding young about eight or nine days old which could not fly. On July 12 a new nest was found 15 feet from the old one and the first egg was laid July 16 about nine days

after the young left the previous nest. When nests were destroyed, the female laid the first egg in the succeeding nest five days later.

The female brooded the young a great deal during the early nestling life. Out of 27 recorded visits during the early morning when the young were first born, she was found brooding 100 per cent of them. The same held true during the early morning when the young were one and two days old. By the third day she was found brooding on only 87.5 per cent of visits in the early morning decreasing to 60 per cent on the fourth then to 20 per cent on the sixth and not at all on the seventh and eighth. She was found brooding the young at night time in all cases until they were six days old. When young were six days old she was found at night in about 50 per cent of cases, then 25 per cent when they were seven days old. No young remained in the nest on their eighth night.

At nest 22, on August 11 when the young were seven and eight days old I arrived at the blind before daylight. The first male was heard to sing at 5 A.M., just at daylight. By 5.10 the parents appeared near the nest, both chipping softly. They soon left and did not feed the young until 5.42. At this nest and at nest 21, the females were noted to approach and examine the nest about five minutes prior to the first feeding of the young. After that feeding progressed regularly throughout the day. The young were fed oftener when they became older and one notes in the following chart that the female did not stay on the nest very much during the day even when the young were very small. The records were made at nests between July 21 and August 14:

<i>Age of young</i>	<i>Minutes in blind</i>	<i>♀ Off nest time in minutes</i>	<i>Average length of time off</i>	<i>No. of times ♀ fed young</i>	<i>No. of times ♂ fed young</i>	<i>Average period between feedings</i>	<i>No. of times excreta removed</i>
From birth to 3 days.....	312	234	7.8 min.	18	5	13.5	3
5 to 6 days.....	100	100		11	0	9.1	1
7 to 8 days.....	253	253		17	8	10.1	4
Total.....	665	587		46	13	11.3	8

The shortest time between feedings was one minute and the longest 23 minutes. Since there were usually three young in the nests the average for the three divisions would be about the same. If the young were fed in rotation each received food every 34 minutes during their entire nestling life, except that it was not always possible to tell if one or more young were fed on each trip. Lynds Jones (1913, p. 68) spent 19 hours and 12 minutes watching a pair of Field Sparrows feed four young at a nest and noted that the young were fed every ten minutes varying from one to 21 minutes. Figuring each received food in rotation he estimated each individual received food every 40 minutes. These young were probably about six to eight days old. The food consisted of "154

Geometrid larvae (104 green, 37 brown, 13 white), 45 grasshoppers, 24 moths, 3 scattering, and 11 unknown." I have never observed the young Field Sparrows fed anything but insects, grasshoppers, larvae, etc.

The young were fed oftener during the late hours of day as noted at nest 26 on August 7. From 7.50 p.m. until 8.20 both parents fed the three young, seven times or once every 4.2 minutes. The young were about six days old. The parents disappeared into low dense bushes at 8.20 just prior to the appearance of a Screech Owl a short distance up the hill.

SURVIVAL OF YOUNG

On the 100 acres studied during 1938, of the 83 eggs known to have been laid, 67 hatched and 50 young left the nest, a percentage of 80.72 of the eggs hatching and 60.23 per cent young leaving. Of the 29 nests, 18 were completely or partially successful for a percentage of 62.06. There were 14, 100 per cent successful nests, every egg being fledged. There were five broods of two, 12 of three and one of four produced.

Of the 33 eggs which failed to produce young, 16 hatched. Of these, two were deserted (parent probably killed); three others were deserted because of Cowbirds; two eggs were tipped out of a nest by some bird, one of the eggs having a small bill puncture in it; two eggs failed to hatch; one was found beneath a nest; six were taken from the nests by some predator.

Of the 17 young which hatched but were not fledged, one nest of three was tipped over by dogs and the young died; one nest with three was deserted because I caused too much disturbance in its vicinity; seven young were drowned or destroyed by hard storms; another young disappeared from its nest and the other three were taken by some predator.

Following is a summary of the success of nests of the Field Sparrow from 1919 through 1938 and of 46 known nests of the Chipping Sparrow from 1918 through 1938, all of the records being made in southern Michigan:

Species	No. of nests	Suc-cessful nests	Eggs laid	Eggs hatched	Young leaving nest	% Suc-cessful nests	Eggs
Field Sparrow	97	49	252	165	145	50.51%	57.5%
Chipping Sparrow	46	21	111	—	62	45.65%	55.85%

Some of the possible enemies of the Field Sparrow observed on the area were the house cat, dogs, Skunk (*Mephitis nigra*), Screech Owl (*Otus asio naevius*), Blue Jay (*Cyanocitta c. cristata*) and Garter Snakes (*Thamnophis s. sirtalis*).

Nest no. 1, 1938 was found on a vacant lot between two houses. Each residence housed a cat and I found the nest when the adults were scolding one of the cats only eight feet away. Evidently he

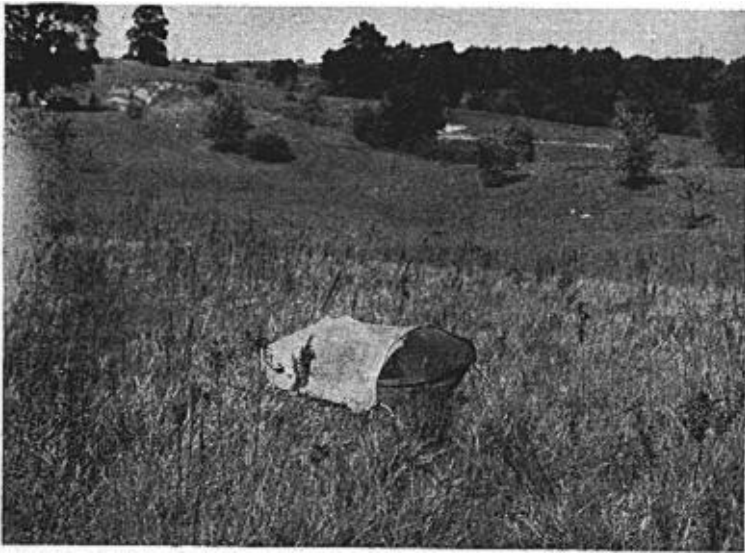
just happened to be there showing no evidence of interest in the birds. If they should find young however I realize how soon they would capture them. In the above case three young and one Cowbird left the nest unmolested. Cats were often seen foraging over the entire area.

Young of both Chipping and Field Sparrows are evidently occasionally taken by the Garter Snake. Once I observed a snake which had captured a young Chipping Sparrow from a nest of four which were about eight days old. The snake was reported to have eaten all four of the young but when dissected only one could be found.

BANDING

In the banding of nestling Field Sparrows, the best age was six or seven days. A case of banding earlier proved costly to one young when his mother tried continuously to remove it, finally fracturing the tarsus. Some parents paid little attention to bands but others, like the one mentioned above, tried to remove them whenever they were at the nest. After the young were older they would not allow the parents to spend much time pecking at the bands, and after they left the nest, the parents paid no attention to the bands at all.

The best method for capturing adult Field Sparrows at the nest proved to be a net, the open side of which was placed in contact with the bush or nest site. By approaching from the opposite di-



NET AT NEST OF FIELD SPARROW

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rection very quickly, the female invariably flew into the net. The males were not so easily caught by this means, but after the young had hatched and they occasionally helped feed them, by the combined use of a blind and the net, each on opposite sides of the nest, I was able to catch three. Seventeen females were banded. Only one bird deserted the nest, and probably she would not have but I placed a blind at the nest the same day that I caught her in the net.

The net was made by using a 4 x 10 foot minnow seine, sewing the four foot sides together. At both ends of this circular net, two strong wire loops were placed then one in the center. Then one end was tapered off with a smaller net to form a point leaving the opposite end open. The net was fastened erect by three wire braces stuck into the ground, two fastened to the front and one at the point in the rear. If the net was left for a period of time at the nest some females soon learned how to get out in a hurry. By placing some material over the lower half of the opening then surprising the bird suddenly, very few escaped.

In addition to the Biological Survey bands, adults were marked with colored bands. Nestlings were marked on the right leg only with Survey bands.

WEIGHTS

The weights of young have already been given. The weights of 14 adult females ranged between 11.8 and 14.5 grams, and for three adult males between 12.9 and 13.5 grams all taken between July 23 and August 13, 1938. Following are the average weights and measurements of these adults:

<i>Sex</i>	<i>Weight in grams</i>	<i>Tail in mm.</i>	<i>Wing in mm.</i>
Female.....	12.65	60.92	61.86
Male.....	13.23	66.3	66.6

With what meagre data I have, it is my belief that males can be told from females usually by the length of the wing and often by the tail. The measurements of the wings of 15 females varied between 59 and 65 mm. while the measurements of three males varied between 65 and 68 mm. Measurements were taken with a straight edge ruler from the bend to the tip of the longest primary.

Weatherbee (1934, p. 61) recorded the weights of 22 adult Field Sparrows ranging from 10.6 to 14.4 grams and averaging 12.57 grams. Esten and Van Gorder (1931, p. 574) recorded the weights of four ranging between 11.8 and 13.75 grams. Stewart (1937, p. 326) recorded the weights of 201 adult Field Sparrows averaging 10.89 grams and varying from 9.75 to 15.0 grams. Baldwin and Kendeigh (1938, pp. 422, 436, 437) recorded the weights of 87 adult male Field Sparrows during the months of April, May, August and

September, averaging 12.66 grams and 18 females during the months of April, May, June, July and August averaging 12.43 grams.

SUMMARY

On an area of approximately 100 acres in and adjacent to Battle Creek, Michigan, the author studied the Field Sparrow during July and August, 1938. Twenty-seven pairs of birds nested on the area or one pair to each 3.7 acres. Nests of 24 pairs were actually found.

During the earlier part of the season Field Sparrow nests were closer to the ground and became progressively farther from the ground as the season advanced. From 1935 through 1938 five May nests averaged 58 mm. to the rim from the ground; ten nests during June, averaged 151 mm.; 43 nests during July averaged 340 mm.; six August nests 432 mm. During 1938 on the area studied one May nest was on the ground; two June nests averaged 289 mm.; 20 nests constructed between July 1 and 25, 337 mm. and six nests after July 26, 354 mm.

Blackberry bushes have proved the favorite nesting shrub, followed by New Jersey tea, small oaks and hawthorns. Any low dense shrub in a open or semi-open location may prove satisfactory to the species.

Nesting material was procured, usually, within 100 yards of the nest site. The outer parts of the nest consisted of coarse grass, changing to finer grasses then lined with fine grasses, horse-hair or fine rootlets. The female constructed the nest but was accompanied by the male on her trips for material. The exterior diameter of 25 nests during 1938 averaged 105 mm.; the interior diameter, 53 mm.; interior depth 42 mm.; depth overall, 75 mm. and the average weight 5.32 grams. It required three or four days to construct the nest. The first egg was laid either the day after the nest was completed or the following day.

The breeding season started on April 25 lasting until September 10. One female during 1938 was known to lay eight eggs, in three different nests and reared two broods of three young. Between one deserted nest and the next she rested five days, the average at other nests also, before laying the first egg. Her breeding season started about May 20 lasting until July 28, when the young left the third nest, or 70 days.

The second pair studied during several nests, laid nine eggs, produced three young, and remained mated through two nestings and probably the third. Nesting, as far as studied, started about July 15 lasting until the three young left the third nest, September 10 or a breeding season of about 59 days.

The average measurements of 68 eggs were 18.3 x 13.9 mm. and the average weight 1.67 grams, when fresh. The number laid

averaged for 71 sets, 3.39. During May the average was 3.77 eggs; June, 3.69 eggs; July, 3.14 and August, 3.0.

Incubation performed by the female required 11 days at four nests with marked eggs. The young averaged in weight 1.71 grams the day of hatching and remained in the nest until seven or eight days of age if not disturbed. At seven days of age they averaged 10.4 grams in weight. When leaving they were unable to fly but could fly well at 13 and 14 days of age.

An August day is a busy one for Field Sparrows after the young have hatched, the female brooding small young during the early morning but feeding them from 45 minutes after daylight until late in the evening. She brooded the young at night until they were six or seven days old. Both she and the male helped feed them, but the female did a good percentage of the work.

During 665 minutes in the blind the female was noted to feed young 46 times and the male fed them 13. The average period between feedings was 11.3 minutes varying from one to 23 minutes. The young were fed entirely on insects.

On the 100 acres studied during 1938, 83 eggs were known to have been laid of which 67 hatched and 50 young left the nest, a percentage of 60.23 success. Of the 29 nests found, 18 produced young, a percentage of 62.06. From 1919 through 1938, 97 nests the outcome of which was known, fledged 49 broods, a percentage of 50.51 and of the 252 eggs laid, 165 hatched and 145 young left the nest, a percentage of 57.5.

In the banding of young it was found best to band them at six or seven days of age. Most of the parents were captured by the use of a net placed in contact with the nesting bush.

The average weights of 14 female Field Sparrows was 12.65 grams, the average wing measurement, 61.86 mm. and that for the male, weight, 13.23 grams and wing measurement, 66.6 mm. for three individuals.

REFERENCES CITED

- Baldwin, S. Prentiss, and S. Charles Kendeigh. 1938. Variations in the Weight of Birds. *Auk*, 55 : 416-467.
- Baumgartner, A. Marguerite. 1937. Nesting Habits of the Tree Sparrow at Churchill, Manitoba. *Bird-Banding*, 8 : 99-108. 1 fig.
- Dwight, Jonathan. 1900. The Sequence of Plumages and Moults of the Passerine Birds of New York. *Annals N. Y. Acad. Sci.*, 13 : 73-360. Plates 1-7.
- Esten, Sidney R. 1931. Bird Weights of 52 Species of Birds (Taken from Notes of Wm. Van Gorder). *Auk*, 48 : 572-574.
- Jones, Lynds. 1913. Some Records of the Feeding of Nestlings. *Wilson Bulletin*, 25 (old series) : 67-71.
- Stewart, Paul A. 1937. A Preliminary List of Bird Weights. *Auk*, 54 : 324-332.
- Sutton, George Miksch. 1935. The Juvenal Plumage and Postjuvenal Molt in Several Species of Michigan Sparrows. *Cranbrook Institute of Science, Bull.* No. 3, pp. 1-36. 8 plates.

- Van Tyne, Josselyn. 1938. Check List of the Birds of Michigan. *Occ. Papers of the Museum of Zoology, University of Michigan*, No. 379, pp. 1-44.
- Walkinshaw, Lawrence H. 1936. Notes on the Field Sparrow in Michigan. *Wilson Bulletin*, 48: 94-101.
- Wetherbee, Mrs. Kenneth B. 1934. Some Measurements and Weights of Live Birds. *Bird-Banding*, 5: 55-64.
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AN IMPROVED DROP TRAP MECHANISM

By MARIE V. BEALS

Most banders who use a drop trap employ the type with a prop release or folding trip stick. This gives no control over the falling trap after a pull of the string snatches the support from the open side of the trap. Even with the greatest of care in using the pull string drop traps, occasionally a bird is killed. When the stick is pulled, the snap of the stick alarms the bird and in trying to escape it might be caught under the edge of the trap.

After experimenting with several plans, I have adopted the method shown in the photographs which is a distinct improvement over the old type. This consists of a heavy cord fastened to the center of the open side of the trap (see photograph no. 1). The cord is put up and over a three inch pulley (A) which is supported at a height of three feet from the ground on a one inch iron pipe driven into the ground to a depth of about three feet. The cord (C) goes from the pulley to the control window, through a hole in the lower part of the window frame, over a small pulley (see photograph no. 2) and is then fastened to a short length of sprocket chain. From the control window the drop trap is raised to the proper height and a link of the sprocket chain is placed over a stout pin of suitable diameter driven into the wall board below the window.

When a bird has entered the trap and is near the pan of water (pan put in the center of the trap) the sprocket link is removed from the pin and as the operator now has control of the trap, it can be lowered without much apparent movement so that the bird is not alarmed. Often the bird does not realize that it is caught and will continue to feed or bathe while the birds feeding near the trap that was lowered are not disturbed. Sometimes a bird, even though it may be near the pan of water, will attempt to fly under the falling edges of the trap, but now the operator has control of the trap so that it can be kept raised and the bird escapes with its life.

From 1929 to 1933 I caught 2200 birds in folding trip stick type drop traps. During this time nine birds were killed because of the uncontrolled action of the traps. In 1934 I changed the mechanism of the drop traps to the controlled method described. From 1934 to 1938 inclusive, 6000 birds were captured in the controlled drop traps without a single fatality.

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