

# BIRD-BANDING

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## STUDIES OF A TREE SWALLOW COLONY

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SEVEN years ago the writer started to encourage a few Tree Swallows (*Iridoprocne bicolor*) to nest at his summer home in Princeton, Massachusetts. The number of breeding birds has increased each year, until now a good-sized colony has been established. During the past three years practically all of the breeding adults and fledglings have been banded and data kept on each bird-box in the colony.

This Tree Swallow colony is located on a small area of open farmland that is very unfavorable for a nesting-site for this species. Most writers mention the need of meadows, marsh-land, and water areas for furnishing the proper food for Tree Swallows (*cf.* Whittle, '26). This nesting area has no ponds of any size nearer than two miles and very little open marsh or swamp land in the vicinity. The water in the immediate vicinity consists of a few small brooks, largely grown up with alders, and a small pond with an area of less than fifty square feet. The small amount of swamp-land near the nesting-site is grown over with brush.

In addition to the absence of natural feeding areas, the elevation of the land is 1100 feet, and the colony is in an exposed situation where the cold northwest winds sweep across it during the spring months.

A large number of bayberry bushes grew on land adjacent to the nesting area and these may have been of some attraction in the early spring. These bushes, however, were all destroyed by a brush fire in May, 1933.

A plan of the colony, showing the location of the various numbered nest-boxes, is given in the accompanying map. The area is approximately twelve acres. Several hundred acres of open farm-land which is mostly in hay lie to the south and southwest; belts of brush pasture and gray birch and white pine woods adjoin on the north, northwest, and east; brush pastures lie to the southeast. It will be observed that certain nest-box numbers are missing on the plan of the colony. These missing numbers (6, 16, 23-28, 30, 40, 41, 45, 46) are on boxes in the adjoining woodland which are not suitable for Tree Swallows.

The bird-boxes are approximately five inches square and six inches deep and are built of seven-eighths stock. The entrance holes are all one and one-half inches in diameter and are fitted with shutters. The boxes are placed on poles six to eight feet from the ground and face to the southwest.

When the Swallows arrive in early April, they spend the mornings flying about the nest-box area and inspecting the boxes. In the afternoons the birds completely disappear, and on cold and windy days most of the birds are absent all day. This behavior keeps up well into May, until after egg-laying has begun. It apparently indicates that the birds find better feeding elsewhere and the only attraction on the writer's farm is the nest-boxes. Some attempts have been made to find where the Swallows go on afternoons and windy days but without success.

In 1926, when the farm was acquired, no colonies of Swallows were known to be breeding in Princeton, although they were breeding in a number of isolated boxes in the town and two nest-boxes on a farm one mile away were occupied by Tree Swallows. In 1927 a few nest-boxes suitable for this species were put up on poles in the mowings surrounding the house, and each year more boxes have been added, until in the spring of 1934 forty-one boxes were available (see line 1 in Table 1). In 1928 four pairs nested, and in 1930 five pairs were occupying the boxes. Little attention was paid to the birds for the first few years, but in 1931, when it became evident that a colony was forming, banding operations were begun and systematic data were recorded concerning the colony.

The colony has grown slowly, as shown by the data in Table 1, until there were 31 pairs breeding during the spring of 1934. In 1931 a few of the adults and fledglings were banded, but during the three following years practically every breeding adult was trapped, and, with very few exceptions, every adult and fledgling leaving at the end of the breeding-seasons of 1932, 1933, and 1934 carried a band.

#### SEASON OF 1932

In 1932 all but two of the fledglings were banded and all the adults were banded with the exception of two males which disappeared early in the breeding-season. A careful watch was kept for these two males, but they were not seen after incubation began. The two deserted females (boxes 10 and 18) attempted to incubate and raise their young alone. In one nest (No. 10) all the young died, and in the other (No. 18) only one fledgling lived to leave the nest. At the end of the 1932 breeding-season 74 birds left the nesting area, and of this number 72 were banded. The fledglings in box No. 9 flew before they could be banded. Three of the birds breeding in 1932 were returns, having been banded in 1931 (lines 9 and 13, Table 1).

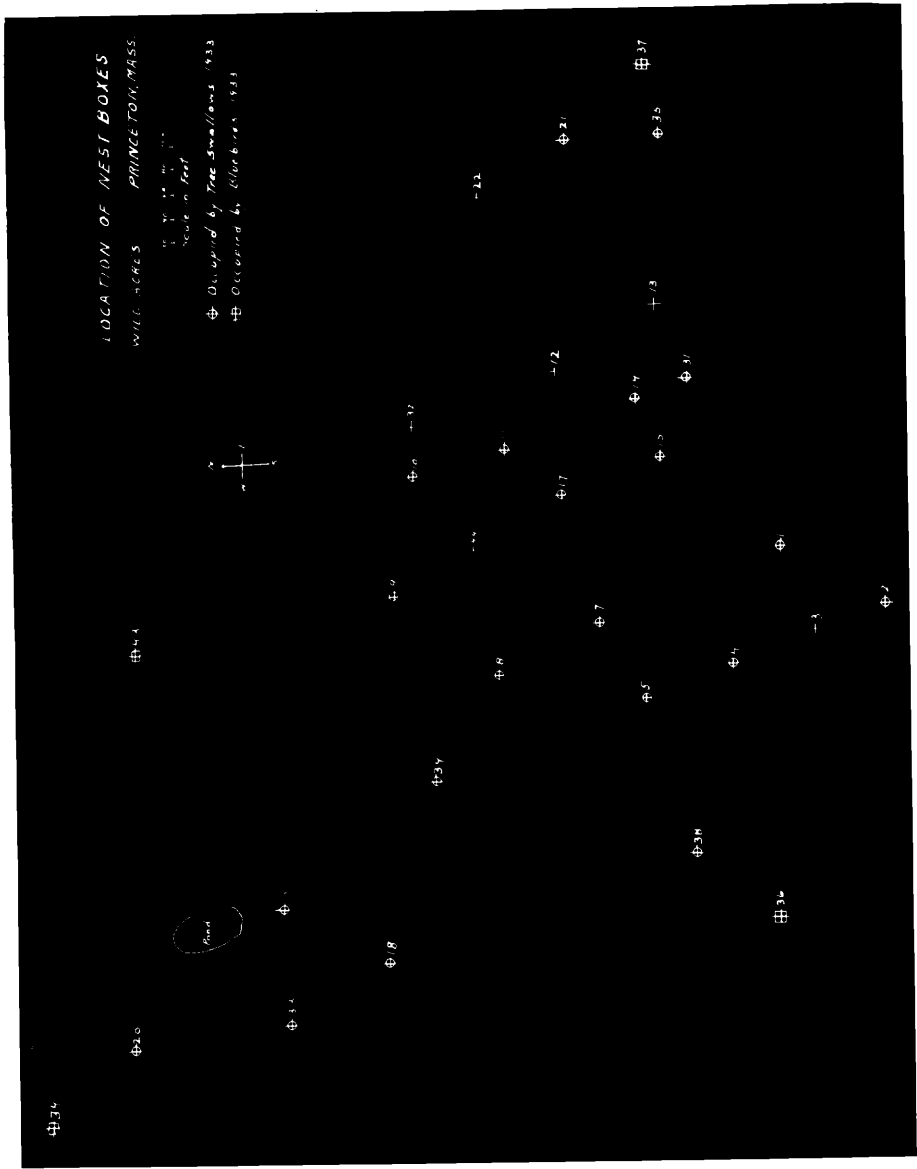


TABLE 1  
SUMMARY OF TREE SWALLOW DATA

	1931	1932	1933	1934
1. Number of boxes available for Tree Swallows and Bluebirds.....	8	19	31	41 + 6 <sup>3</sup>
2. Number of boxes occupied by Tree Swallows	4	13	21	31 + 3
3. Number of boxes occupied by Bluebirds....	1	3	3 <sup>2</sup>	1
4. Percentage of boxes occupied by Tree Swallows and Bluebirds.....	62.5	84.5	77.5	78.0 <sup>4</sup>
5. Number of adults banded.....	2	21	28	43
6. Number of fledglings banded.....	7	48	61	148
7. Number of breeding birds of previous year which returned.....	..	..	12	20
8. Percentage of breeding birds of previous year which returned.....	..	..	50.0	47.6
9. Number of adults banded previous year which returned (Return-1).....	..	2	11	11
10. Percentage of adults banded previous year which returned (Return-1).....	..	..	52.5	39.4
11. Number of adults and fledglings banded 2 years ago which returned (Return-2).....	..	..	1	9
12. Number of adults and fledglings banded 3 years ago which returned (Return-3).....	..	..	0	1
13. Number of fledglings banded previous year which returned to colony.....	..	1	1 <sup>5</sup>	2
14. Percentage of fledglings banded previous year which returned to colony.....	..	..	2.1 <sup>5</sup>	3.3
15. Number of adults not banded.....	6	2 <sup>1</sup>	1	3
16. Number of fledglings not banded.....	0	2	0	0 <sup>6</sup>
17. Number of birds leaving at end of breeding period.....	15	74	103	216
18. Number of banded birds leaving at end of breeding period.....	9	72	102	213
19. Number of eggs laid.....	..	..	118	176 <sup>4</sup>
20. Number of eggs hatched.....	..	..	108	158 <sup>4</sup>
21. Percentage of eggs hatched.....	..	..	92	89.8
22. Fledgling mortality.....	..	..	47	10
23. Percentage of fledgling mortality.....	..	..	43.5	6.3
24. Number of nest failures.....	2	1	7	2
25. Percentage of nest failures.....	..	7.7	33.3	5.9
26. Number of fledglings leaving boxes.....	7	48	61	148
27. Reproductive efficiency.....	..	67.5% <sup>7</sup>	51.5%	84%

During 1932 and all succeeding years the females were banded while incubating and the males were generally trapped later when feeding the young. In some cases the males were trapped in the nest during the incubation period.

<sup>1</sup>These adults ♂ (boxes 10 and 18) were not seen after incubation began.

<sup>2</sup>A fourth box (36) was occupied by Bluebirds for second nest after Tree Swallows had left but was available for Swallows in May and June.

<sup>3</sup>First figure refers to boxes in or near colony; second figure to outlying boxes (more than one mile from colony).

<sup>4</sup>Excluding outlying boxes.

<sup>5</sup>In 1934 two fledglings banded in 1932 were trapped for the first time. If they were breeding here in 1933, the number of fledgling returns for 1933 would be 3 and the percentage 6.25.

<sup>6</sup>Fledglings in the 3 outlying boxes were not banded.

<sup>7</sup>Based on 9 nest-boxes for which accurate data was kept.

## SEASON OF 1933

In 1933 the number of boxes had been increased to thirty-one. Twenty-one of these were occupied by Tree Swallows. This represents an increase of eight pairs, or 61.5 per cent, over the thirteen pairs breeding in 1932.

The season of 1933 was the first one in which any reliable data on the return of banded birds could be recorded. As noted in lines 9 and 10 of Table 1, eleven, or 52.5 per cent, of the adults banded in 1932 returned to the colony. One bird banded as an adult in 1931 also returned to the colony for the second time. Only one of the 48 fledglings banded in 1932 was trapped in the colony in 1933, but in 1934 three of the 1932 fledglings were taken in or near the colony and in all probability they were breeding close by in 1933.

Of the 12 adults of the previous year which returned, none had the same mate. Only one 1932 mated pair returned, and each of these birds had a new (unbanded) mate. Three birds nested in the same house as the year before. Complete data for 1933 returns is given in Table 2.

TABLE 2  
TREE SWALLOW RETURNS—1933

Band No.	Sex	1933	1933	1932	1932	Remarks
		House	Mate	House	Mate	
F31864	♀	11	F96733	21	F81854	Banded as adult in 1931 in Box 13. Return-2.
F96733	♂	11 <sup>3</sup>	F31864	11	F96741	....
F68996	♀	5	H80128*	3	F96727	....
F76381	♂	17	H69726*	21	Fledgling	1932 fledgling
F76376	♀	2	H80105*	18	..	No mate seen in 1932
F81849	♂	8	F96736	4	F31858	....
F96736	♀	8 <sup>3</sup>	F81849	8	F31856	....
F81853 <sup>1</sup>	♂	1 <sup>2</sup>	H80104*	15	F96739	See note (1)
F81855	♂	20	H80110*	9	F96738	....
F96734	♂	31 <sup>2</sup>	H80101*	13	F96742	....
F96737	♀	7 <sup>3</sup>	H80117*	7	F96732	....
F96739 <sup>1</sup>	♀	14 <sup>2</sup>	H80120*	15	F81853	See note (1)
F96740	♂	18 <sup>2</sup>	H80127*	19	F96735	....

## FLEDGLING MORTALITY

In 1932 most of the fledglings were successfully raised and left their nests. The only exceptions were those of the two nests previously mentioned which were deserted by the males. In 1933 everything went along nicely until within about a week of the time that the fledglings were due to leave the nests. Most of the birds were hatched between June 4th and 9th, and on June 17th all the

\*New bird; banded in 1933.

<sup>1</sup>F81853 and F96739 were a mated pair in 1932. Both returned in 1933, but each took a new mate and each returned to a new box.

<sup>2</sup>Returned in 1933 to house adjacent to one occupied in 1932.

<sup>3</sup>Returned to house occupied in 1932.

boxes were inspected and the fledglings were found in excellent condition. Larvæ of *Protocalliphora* were found in a few nests and removed. There were several showers on June 17th, and it rained rather steadily all day on June 18th. Monday, June 19th, was clear and rather cold. The writer was absent from the nesting-site from June 19th to the 24th, and unfortunately no data on the weather during this period are available. When the nests were inspected again on June 24th, 39, or approximately 38 per cent, of the 104 fledglings were found dead. In six of the nest-boxes all the nestlings were dead, and in two others about half the birds were dead.

The only conclusion that can be drawn, after a careful investigation of all possible causes, is that the fledglings died of starvation brought about by the large number of nests in a small area. During good weather, when there are plenty of insects flying, the large number of birds apparently find no difficulty in securing sufficient food for their young within ordinary flying distance from their nests. When there is a cold rain, the number of flying insects is greatly reduced and the competition for the few available insects becomes very keen and there is apparently not sufficient food for the large number of adults and fledglings in the colony.

While a few of the nestlings may have been killed by parasites, a careful inspection of the nests before and after the deaths indicates that mortality from this cause must have been very small. The writer is very familiar with conditions about the breeding area and there is nothing to indicate that the parent birds were killed by predatory enemies.

While no exact time data were taken on the feeding of the young birds, it was observed during the rain on the 18th that the time between feeding periods was very long and the adult birds were ranging over a much wider area than usual in search of food. In addition to the 42 adult and 108 fledgling Tree Swallows in the colony, there were also a pair of Barn Swallows, (*Hirundo erythrogastris*) a pair of King Birds, (*Tyrannus tyrannus*) a pair of Phœbes, (*Sayornis phœbe*) a pair of Least Flycatchers, (*Empidonax minimus*) and two pairs of Chimney Swifts (*Chaetura pelagica*) nesting in the same area and hence competing for the same type of food. On the 24th of June, remains of many dead dragon-flies were found in the nests. These have not been found in the nests before or since, nor have Tree Swallows been observed catching them. It is believed that dragon-flies are not a regular food for this species, and the large number found in the boxes on June 24th would indicate a shortage of other food and tend further to confirm the above conclusion.

The heavy mortality recorded by Low for 1932 and especially for 1933 apparently indicates that the colony at the Austin station is also suffering from overcrowding.

From the behavior of the birds at Princeton, it is evident that pairs of Tree Swallows do not establish and protect a territory to

insure a food-supply for their young, as is known to be the habit with some other species. The feeding radius of Tree Swallows is of course very large compared to that of most other birds; yet this radius must be rather restricted when there are fledglings to be fed. Several writers have mentioned that this species will drive away other swallows attempting to nest close by (*cf.* Whittle, '26; Speck, '17, and Norton, '17). There was no indication that birds of this colony attempted to drive away other Tree Swallows, and there was no fighting among them except in a few cases when nest-boxes were being selected. The Tree Swallows, however, did drive away nesting Bluebirds, as discussed later. No doubt, if there are only a few nest-boxes, and a pair of swallows can secure a box before other pairs arrive, the first pair can drive others away from nearby boxes. This may be the situation in the references cited. However, when a large number of boxes are available and a great many birds arrive almost simultaneously, as is the case in the Princeton colony, it is impossible for any pair of birds to dominate the area or part of the area.

Apparently the great need for Tree Swallows at the present time is more nesting-sites in favorable locations, as this colony in an unfavorable location seems to indicate.

#### SEASON OF 1934

After the disastrous results in the colony in 1933, it was deemed best not to increase the number of bird-boxes, as had been done each year previously. In 1934 only one box was added to the colony to replace one lost in the fire in 1933. This one (42) was located close by box 43. However, as more information was desired regarding the distribution of fledglings, and in order to learn if fledglings might be able to secure boxes on the edge of the colony, new boxes were put up surrounding the colony as follows: two boxes (29 and 58) about half a mile to the south of the colony; two boxes (47 and 48) about a quarter of a mile to the north of the colony; two boxes (50 and 51) a quarter-mile to the east; and three boxes (52, 53, and 59) about three quarters of a mile to the southwest. In addition to these a new banding station of 19 boxes was established by Douglas Kraus four miles to the southeast, and three pairs of boxes (49 and 60, 55 and 57, and 54 and 56) were placed in Princeton at distances varying between one mile and three and a half miles from the colony. A few Tree Swallows had been nesting at the site of the Kraus station previous to 1934. It was hoped that these surrounding and outlying boxes might give some information regarding the distribution of the fledglings banded at the main colony.

TABLE 3  
TREE SWALLOW RETURNS—1934

No.	Sex	1934		1933		1932		Remarks
		House	Mate	House	Mate	House	Mate	
F31864 <sup>1</sup>	♀	11	F96733	11	F96733	21	F81854	1931-Box 13 (mate not banded).
F76381§	♂	17	H69718	17	H69726	21	Fledgling	Returned to same box.
F96736 <sup>4</sup>	♀	35	F76398	8	F81849	8	F31856	.....
H69718 <sup>4</sup>	♀	17	F76381	15	H80119	..	..	Returned to adjacent box.
H80101 <sup>3</sup>	♀	31	F96734	31	F96734	..	..	Returned to same box.
H80104 <sup>2</sup>	♀	1	F81853	1	F81853	..	..	Returned to same box.
H80117	♂	8	L42731*	7	F96737	..	..	Returned to adjacent box.
H80122	♀	15	H80119	17	Fledgling	..	..	Returned to adjacent box.
H80102§	♀	39	L42716	39	H80149	..	..	Returned to same box.
H80126§	♂	19	L42715*	19	H80107	..	..	Returned to same box.
F81853 <sup>2</sup>	♂	1	H80104	1	H80104	15	F96739	Returned to same box.
F96733 <sup>1</sup>	♂	11	F31864	11	F31864	11	F96741	Returned to same box.
H69725	♀	12	L42749*	10	H80114	..	..	Returned to adjacent box.
F96734 <sup>3</sup>	♂	31	H80101	31	H80101	13	F96742	Returned to same box.
H80120§	♂	14	L60703*	14	F96739	..	..	Returned to same box.
H80129§	♂	33	H69735*	33	H80108	..	..	Returned to same box.
H80119 <sup>4</sup>	♂	15	H80122	15	H69718	..	..	Returned to same box.
F76398	♂	35	F96736	35	..	13	Fledgling	No return for 1933. <sup>5</sup>
F81844	♂	59	L42733*	..	..	15	Fledgling	No return for 1933.
H80150§	♂	38	L42714*	38	H80111	..	..	Returned to same box.
F81849 <sup>4</sup>	♂	10	L42736*	8	F96736	4	F31858	..
H69730	♂	48	L42734*	1	Fledgling	..	..	..

22 Returns: 20 adults and 2 fledglings.

The results for 1934 are given in Tables 1 and 3. Thirty-one of the boxes in or near the colony were occupied, and three of the six outlying boxes. Data for the Kraus banding station are given in Table 4. All of the boxes shown on the plan were occupied by Tree Swallows in 1934, with the exception of numbers 7, 13, 20, 22, 32, 36, 37, and 43. In addition, the new box 42 was also occupied. The nearby boxes: 47, 48, 51, 29, 58, 53, and 59 and outlying boxes 54, 56, and 60, were also occupied. Box 20 was taken by a pair of Blue-birds.

\*Banded 1934.

§Same box for 2 years, but different mate. 1933 mate did not return.

<sup>1</sup>Mated pair for 2 years in same house.

<sup>2</sup>Mated pair for 2 years in same house.

<sup>3</sup>Mated pair for 2 years in same house.

<sup>4</sup>1933 mate returned but mated with another bird.

<sup>5</sup>Male in Box 35 not captured in 1933. Nest a failure.



TABLE 4  
KRAUS BANDING STATION

Bird-boxes available.....	19
Boxes occupied by Tree Swallows.....	11
Boxes occupied by Bluebirds.....	1
Nest failures.....	0
Adults banded.....	13
Recoveries.....	1
Fledglings banded.....	31
Adults not trapped.....	8

In 1934 the percentage of returns of the previous year's breeding birds was about the same as in 1933 (see line 8, Table 1) but only two of the sixty-one fledglings banded in 1933 returned. One of these fledglings returned to breed in the box next to the one in which she was hatched, and the other returned to a new box on the edge of the colony. The only other 1933 fledgling taken was recovered breeding at the Kraus station, four miles to the southeast.

Two of the 1932 fledglings not previously trapped were taken in 1934, one in the colony (box 35) and one in a box three quarters of a mile away (59). In 1932 the male in box 35 was not trapped, as the nest was deserted just as the eggs were hatching. The probability is that this male (F76398) was breeding in box 35 in 1933.

One of the most interesting and important facts secured from the banding was that concerning the returns of the 1933 breeding birds. If we assume that bird F76398 was breeding in box 35 in 1933, the results for the twenty 1933 breeding adults which returned are as follows:

Birds returning to same house as the preceding year.....	14,	70 per cent
Birds returning to an adjacent or nearby house.....	5,	25 per cent
Birds returning to a house (59) three quarters of a mile away..	1,	5 per cent
Total adults returning.....	20	

The adult which returned to the distant box was a 1932 fledgling not trapped in 1933.

Three pairs of birds which were mated pairs in 1933 were found in 1934 breeding in the same boxes and with the same mates. Two other 1933 mated pairs also returned but did not remate.

One bird (F31864) returned for a third time in 1934. This was banded as an adult in 1931, and hence was at least four years old.

#### BLUEBIRDS NESTING IN THE COLONY

Each year several pairs of Bluebirds (*Sialia s. sialis*) were seen around the farm, and after considerable fighting between them and Tree Swallows, a few pairs were able to secure nest-boxes and breed successfully. The Bluebirds as a rule selected a nest-box early in the season and began breeding before the Tree Swallows came. The Tree Swallows, however, were constantly fighting with them, and

at times eight or ten Swallows would attack a pair of Bluebirds, which were occupying or attempting to secure a bird-box. In several cases where the Bluebirds secured a box and succeeded in building a nest and laying a clutch of eggs, the Tree Swallows would drive them out and then build a new nest on top of the Bluebirds' nest. The ousted Bluebirds in each instance secured another box on the edge of the colony and were able to raise a brood successfully. On the plan of the nest-boxes, the houses occupied by Tree Swallows and Bluebirds have been marked for 1933 to show the position of the Bluebirds relative to the swallows. It will be noted that the three Bluebird nests (34, 37, 43) are well separated from one another and are on the edge of the colony. The birds in boxes 37 and 34, raised their broods successfully, but nest 43 was deserted and the fledglings were found dead shortly after the male bird had been banded. The female, mated with a new male, was trapped nineteen days later incubating in box 36.

On May 6, 1934, a Bluebird's nest with six eggs was found in box 15, and the female was banded; on May 19th, when the box was inspected again, a pair of Tree Swallows was in possession, and a new nest had been built on top of the bluebird's nest. The Bluebird was located again later on in box 20 on the edge of the Tree Swallow colony, where she raised a brood successfully.

#### FLEDGLING RETURNS

The most interesting result from the banding in this colony was the absence of fledgling returns. (See lines 13, 14, Table 1.) This fact is observed by most bird-banders, and the disappearance of the fledglings is one of the most interesting of the unsolved problems in ornithology. It was in the hope of locating some of the fledglings banded in the colony that the nearby and outlying boxes, referred to above, were put up in 1934. The net result from these boxes outside of the colony was the finding of two 1933 fledglings and one 1932 fledgling not previously trapped. Thus, with 65 boxes under observation, only three of the 61 fledglings banded in 1933 were trapped in 1934. The fledgling returns for 1932 birds were somewhat better, as three out of 48 returned, or 6.25 per cent, for the fledglings, compared to an average return of adults of 45.9 per cent for two years.

The number of Tree Swallows in North America is certainly not decreasing and is probably increasing with the added number of artificial nesting-sites now available. An average two-year return of around 49 per cent for the breeding adults would suggest a loss of about half the adults between breeding seasons.<sup>1</sup> This loss must be made up by fledglings, and an average of at least one fledgling from

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<sup>1</sup>It is interesting to note that Low's data for 1932 indicate a return of adults of about 52 per cent and Uchida's three-year average for adult returns is 46 per cent.

each brood should be alive the next season. The number of fledglings raised averages about three per box; hence about 33 per cent of them should be alive the next season. The only conclusion that can be drawn is that the fledglings have gone elsewhere to breed, either to distant places or in surrounding territory.

The following possibilities are suggested to account for the disappearance of the banded fledglings:

(1) Some of the fledglings may return the next season to the place of hatching later than the older birds and, finding nearly all of the nesting-boxes occupied, may be forced to go elsewhere in the vicinity to breed.

In 1933 at Princeton 77.5 per cent of the boxes were occupied and the fledgling returns were 6 per cent. Low's data for 1933 show only 31 per cent of the boxes occupied, and the fledgling returns to the main station were considerably higher than recorded at Princeton. The difference in these figures might indicate a lack of nesting-boxes for late fledglings at Princeton.

It was hoped that the nine new boxes put up in 1934 in the nearby surrounding territory might throw some light on this point. Two of these boxes were unoccupied, and in the seven that were occupied eleven unbanded birds and two fledglings of previous years were trapped. One fledgling return was a 1933 bird and the other a 1932 fledgling trapped for the first time.

(2) Some of the fledglings may return to the general neighborhood and be found nesting in the same or neighboring towns. Low (1934) records data for 48 fledglings of the previous year that were recovered breeding at the following distances from the point of hatching: 10 within 1000 feet; 22 from 1000 feet to 1 mile; 15 from 1 to 11 miles; and one at a distance of 31 miles.

Stoner (1926, 1928), who carried on banding operations with Bank Swallows (*Riparia riparia riparia*) over a twelve-mile radius records data for 18 fledgling recoveries. Five of these recoveries (returns) were in the same gravel-pit in which they were hatched or in the adjoining pit; four were within fifty to two hundred yards, and the remaining nine were taken at a distance varying between two and one-half and nine miles. Six outlying boxes put up in Princeton in 1934 were at distances varying from one and one-half to three and one-half miles, and the new colony (Kraus Banding Station) was four miles away. Three of these six outlying boxes were occupied, but no returns were taken. At the Kraus station 11 of the 19 boxes were occupied, but unfortunately only 14 of the 22 adults were trapped here. As already recorded, one of the writer's 1933 fledglings was taken at the Kraus station. Intensive banding of all the Tree Swallows breeding within five or ten miles of the Princeton colony might give some interesting results.

(3) Some of the fledglings may stop off *en route* during their return, to breed at some favorable site. There have been no re-

coveries of Princeton fledglings from southern points to indicate whether or not this occurs.

(4) The fledglings may spread indiscriminately throughout their natural range and only by chance return to their natal area, as suggested by Lincoln (1934). Thomson (1926) gives data on recoveries of European Swallows (*Hirundo rustica rustica*) that were banded as fledglings. His data indicate a wide dispersal of the nestlings. Twenty-one marked as fledglings returned to their "native districts" to breed. Some of these returns were very exact; other birds were taken several miles from the point of hatching. Six other birds were recovered at distances varying from eighteen to one hundred seventy miles from the place of banding.

The fall dispersal recorded for fledglings of Black-crowned Night Herons (*Nycticorax n. hoactli*), Grackles, and Terns might indicate a search for new territory by the immature birds previous to migrating. During the summer of 1932, long after my swallows had left the territory, a flock of about ten Tree Swallows appeared on the farm and spent two days visiting and inspecting the various bird-boxes. Could these have been migrating immature birds from other territory, inspecting possible sites for next year? It will be noted that 28 (68 per cent) of the breeding birds in 1933 were unbanded birds, and 43 (66 per cent) in 1934. The question naturally arises, where did these birds come from? If the adults generally return to the nesting-site, as the data recorded here might indicate, most of these new birds must be last year's fledglings from other areas.

Of the four suggestions given above, Lincoln's conclusion is seemingly the nearest to the correct solution. However, Low's data, showing a return for fledglings in and about the Austin station of about 11 per cent, would appear to indicate that there are factors other than chance which are influencing the return of fledglings to their natal area. It may be that some of the young birds migrate south with the older birds, remain with them all through the winter, and return with them in the spring.

A systematic study of the data now on file at Washington on recoveries of fledglings breeding at places remote from the place of banding might throw some light on this problem.

#### RECOVERIES

Two Princeton fledglings have been recovered at distant points. One banded June 22, 1932, was recovered (dead) sometime during the first five days of August at Lodi, New Jersey, 175 miles from the place of banding. The second birds, banded June 16, 1933, was recovered (dead) in Uncasville, Connecticut, August 14, 1933, about 75 miles south of place of banding.

All the Tree Swallows go away from the vicinity of Princeton a few days after the young leave the nest, and all have disappeared

by July 1st. These two records might indicate that the birds fly south to the shore of Long Island Sound and then work along the Sound to the vicinity of New York as they migrate southward.

The banding work carried out in Japan with two species of Swallow and reported by Uchida (1932) shows results that are similar to those obtained at the Princeton colony. The three-year average for returns of adults banded the previous year in Japan was 46 per cent, and at Princeton the two-year average was 46 per cent. The return of fledglings in each case was very small, but somewhat better at Princeton than in Japan. In both places the data show similar tendencies for consistency of mating and returns to the same building or bird-box.

Newton Highlands, Massachusetts.

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