

stantly when no adult was present, and changing to a more plaintive "kwee-uh" or "kwee-a" when answering the adult.

SUMMARY

The Whip-poor-will lays two eggs which are incubated during the day by the female and at night by both birds. The incubation period is about twenty days. The young are fed by both adults and move to new locations after a few days. The pair studied raised two broods in 1937 and the male returned to nest in the same location in 1939. A description is given of the development of the eggs and young, of the habits of the adults about the nest and of the various notes given by the birds.

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HOMING INSTINCT IN THE BANK SWALLOW

By DAYTON STONER

THE rather remarkable development of "homing instinct" among birds is perhaps illustrated in no other family of Passeriformes better than in the Bank Swallow (*Riparia r. riparia*: Hirundinidae). Foundation for this statement is based upon our recoveries of individuals from one to five years after banding. To date we have recovered as returns 221 banded Bank Swallows. Of these, 152 or 68.7 per cent have been retaken in the same colony as banded and most of them from the same sector of the colony in which they had before nested or were reared. This situation appears to be more than mere coincidence.

For the purpose of this discussion every return for each individual, that is the first, second and third, if any, is counted as an entity. The records have been obtained from the Lake Okoboji, Iowa, region (1923-27) and the Oneida Lake (1928-40) and Albany (1933-40), New York regions. For the most part the period covered is about May 20 to June 20. This encompasses the height of the egg-laying and incubating activities in the localities mentioned. None of our banded Bank Swallows have been recovered elsewhere by other workers and all our return recoveries have been from our own bandings.

In my recent paper dealing with longevity in the Bank Swallow (BIRD-BANDING, 9 (4): 173-177, 1938) as well as in earlier papers, I have indicated that "At least eight months must have intervened between the time of banding and subsequent recovery or between two or more successive recoveries for a bird to be included in the present category of returns." That criterion obtains also in this

narration. During each eight-month interval the return swallow presumably made a round-trip journey between its breeding territory and its winter abode in South America.

In both the Lake Okoboji and Oneida Lake areas several colonies, mostly within a radius of ten miles, were worked consistently for four or more consecutive seasons. While the advantages of thus circumscribing one's range of banding activity are at once apparent, on first thought, the disadvantage of not knowing anything about conditions outside this range is just as evident. Theoretically, however, by way of offsetting this disadvantage, is the fact that only one of the 221 returns here reported was obtained at as great a distance as nine miles from the point of banding; and all the others save seven were recovered at a distance of less than four miles from the banding point.

In the Oneida Lake area extensive Bank Swallow nestings occur in the banks of Fish Creek. The waters of this stream eventually find their way into the east end of Oneida Lake by way of Wood Creek. For a linear distance of approximately eight miles Fish Creek follows a tortuous course through low, flat terrain. The sandy soil and the comparatively swift current of the stream combine to provide many square feet of precipitous banks in which burrows can be easily excavated. Thousands of Bank Swallows find suitable nesting situations here within the radius of a few square miles. While burrows are more or less generally distributed along the banks, groups of from 10 to 20 to 200 or more frequently occur. Our banding work in New York has been done chiefly in six of these colonies and the following discussion relates principally to them.

Now, it would appear that even if the Bank Swallows within our working territory in a given season returned to it at all in a subsequent season, almost any section of creek bank would meet their requirements; and further, that almost any sector of any colony would satisfy their inclinations. In addition, mortality factors incident to migration and other activities would appear to hold the possible or probable number of banded individuals so in check that in any one season the inhabitants of a colony would comprise very few banded birds. Moreover, essentially similar and possibly equally attractive nesting places are available in contiguous territory as well as throughout a large part of the breeding range of this species. It would appear, therefore, that many of the swallows banded by us might well find homes beyond the geographical range of our activities. Nor should it be overlooked that, each year in the single week that we have allotted to intensive banding at Oneida Lake since 1933, the number of swallows that we are able to capture in any of the six colonies worked is insignificant in comparison with the actual total population of those colonies.

Tabular summary showing the number of Bank Swallows banded, also number recovered as returns and the approximate air-line distance between the point of recovery and the point of banding. Lake Okoboji, Iowa and Oneida Lake and Albany, New York, 1923-1940, inclusive.

Locality	Number Banded	Number Returns	Point of Recovery as Returns				
			Same Colony	Not Over $\frac{1}{4}$ Mile from Banding Place	$\frac{1}{4}$ Mile to 1 Mile from Banding Place	1 Mile to 4 Miles from Banding Place	5 to 9 Miles from Banding Place
Lake Okoboji, Iowa, (1923-1927)	Adults 507	11	3	1	2	3	2
	Young 1925	18	2	7	0	3	6
Oneida Lake, New York, (1928-1940)	Adults 2720	164	132	1	19	12	0
	Young 970	14	5	0	2	7	0
Albany, New York, (1933-1940)	Adults 988	11	9	0	0	2	0
	Young 208	3	1	0	0	2	0
Totals	7318	221	152	9	23	29	8

In consequence of all this the recovery of *any* returns is rather surprising. Nevertheless, an apparently well developed degree of homing ability on the part of the Bank Swallow renders possible the recapture of a reasonable proportion of individuals under the conditions cited. Condensed numerical results of our findings are set forth in the following table.

In addition to the points already presented in this discussion, our figures show that of the 221 individuals recovered as returns, 186 were banded as *adults*: of these, 144 (77.3 per cent) made up the lot captured as returns in the same colony as banded. On the other hand, of the 35 returns banded as *young*, 8 (22.7 per cent) were recovered as such in the colony of their nativity.

This indication of preference for the home colony, particularly on the part of individuals banded as adults, suggests that some bond of social union may be formed between the members of a nesting colony or adjacent nesting colonies which may continue to function after the close of the breeding season and so serve as a foundation for the continuation of a given colony. Although circumstantial evidence for this assumption is scattered throughout our records, two or three outstanding illustrations will serve present requirements until more conclusive results have accumulated.

The most compelling available piece of evidence is furnished by five Bank Swallows all banded as laying or incubating adults, three of them in colony E on Fish Creek, May 24, 1938 with nesting burrows a few yards from one another, one from the same sector of that colony, May 21, 1937 and another from Colony F, about one-half mile from colony E, May 25, 1938. On May 24, 1939 all five of these birds were recovered as returns in colony E from a section of bank nine feet long and six feet high and not more than a few yards from the point of original capture of three of the individuals a year earlier. This is the greatest concentration of return Bank Swallows that I have observed to date. The question naturally arises as to whether these swallows returned as a *group*. Such group returns have been noted recently for the White-throated Sparrow (Parks, G. H., BIRD-BANDING, 11, (4): 174, 1940).

Again, by way of illustrating the contribution to the population of a colony by reassembled birds, we have notable illustrations from the two occasions on which we have recovered two returns from the same burrow.

On May 24, 1935 an adult Bank Swallow was banded as No. 34-48561 from a burrow at the south end of colony E. Its mate also was banded; on May 27, 1936, No. 34-48561 was recaptured from a burrow a few yards from the point of original banding (Return 2). Its mate on this occasion was No. 35-59216 (Return 1), banded in the same sector of this colony on May 27, 1936. So, these two birds, banded in different seasons from different burrows

in the same sector of the same colony, were mates in that sector of that colony two years after one of them was banded and one year after the other was banded. Incidentally it is of interest to know that No. 35-59216 was recovered on May 24, 1940 as a Return 2 in the exact sector of the colony it occupied in 1937. Its unbanded mate also was captured.

On May 25, 1939 two adults were banded from different but proximate burrows in colony H, a female as No. 139-35865 and a male as No. 139-35868. On May 24, 1940 these two swallows were captured from the same burrow not more than a few feet from the domiciles occupied by them the preceding year.

Of the 221 return records obtained to date, 13 have been for birds recovered as such two times (Return 2s). Twelve of these were banded as adults and all save one were recovered both as Return 1 and Return 2 in the same colony and in or near the same sector as that from which they were banded. The single adult exception was recovered in successive seasons (Returns 1 and 2) in a colony about one-half mile from that in which it was banded. The single Return 2 which was banded as a nestling was recovered both times in the colony of its nativity.

Our single Return 3 also furnishes strong evidence for a marked degree of homing ability. It was banded as an incubating bird in colony H, June 2, 1932. On May 26, 1934 it was recovered as an incubating individual in the same colony and from a burrow a few yards north of the one it occupied in 1932; on May 21, 1935 the swallow was again recovered in the same sector of the colony it had occupied in 1932 and 1934; and on May 22, 1936 it was recovered, dead, from a burrow in the exact sector of the colony occupied by it on the occasion of its three preceding captures. The known age of this Bank Swallow at the time of its death—it had been partially eaten in its burrow by a Brown Rat—was approximately five years and, presumably, it had made at least five round-trip journeys between its nesting colony and its winter abode as well as nested four seasons, at least three of which were successive, in the same sector of the same colony.

SUMMARY

The data set forth in this article furnish tangible, quantitative evidence on the homing characteristics of the Bank Swallow as demonstrated over a period of years through the recoveries of banded birds in a few intensively worked breeding colonies. From the records it appears that homing instinct is not developed to a pronounced degree in the young and does not become dominant or function to fullest extent in the individual until it has once nested. Circumstantial evidence also is presented to indicate that the majority of the breeding members of a colony may remain more or

less together during the non-breeding season and, with additions to and subtractions from the group, reassemble in the same colony season after season. This aggregation is little or not at all dependent upon family relationship.

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NOTES ON THE MIGRATION OF BLUE JAYS

By GEOFFREY GILL

A CERTAIN amount of doubt obscures the movements of Blue Jays, (*Cyanocitta cristata*), particularly in the states bordering the Atlantic Coast. In an endeavor to shed some light on the question, twenty members of the Eastern Bird Banding Association have submitted to the writer for compilation, their records of 2,830 Blue Jays banded during two to twenty-six years previous to 1941.¹

In analyzing records of such volume, collected from different localities, each with their different respective factors, it is freely admitted that the records cannot always be listed in strictly comparable categories. Nevertheless, trends, pointing to certain conclusions, appear so persistently throughout the entire analysis as to make this summary of interest.

Inasmuch as these operators banded Blue Jays as a part of their usual catch and none of them specialized in such banding, certain rules must be observed in interpreting the data. With few exceptions, no records of the probable age of the birds, at the time they were banded, were made by these banders. This handicaps conclusions to a degree as it is the writer's belief that age has a direct bearing on the migration of this species. In lieu of definite data in this respect the writer has imposed a rule whereby it is assumed that the Blue Jays banded in Eastern Pennsylvania, New Jersey and southern New York, previous to June 15th were at least one year old when banded, and all birds banded between this date and the 15th of October were birds of the year, unless the bander specified otherwise. Individual birds caught after the 15th of October are assumed to be either older residents or migrants from a northern area of unknown age.

One of the most interesting facts about this collection of data is the paucity of recoveries of such a showy, noisy and well-known bird. Only 51 recoveries are reported by the twenty collaborators. These recoveries can be divided into three classifications, those

¹The writer wishes to express his appreciation to the members of the Eastern Bird Banding Association who have so kindly co-operated with him in the preparation of this paper.