

postage. For biology teachers such a Bluebird project creates great interest, and an outline for an entire project will be forwarded with the above working outline.

For the 1936 season I have enlisted a number of scientists and bird-banders, which include Mr. and Mrs. William Gerdes, who have helped me for the past two years in handling the projects above described; also two Quincy High School seniors who live in neighboring towns will have charge of units of twelve and fifteen boxes. Three other boys living in Liberty, Columbus, and Marblehead, Illinois, will handle units of boxes which run as laterals through their towns. I suggest that other banders and conservationists carry on similar experiments.

There is a lot of work connected with an experiment of this sort, but it is worth the trouble. For the first time in twenty years, Bluebirds are a common sight along the country roads of Adams County, and I believe that any other enthusiast can duplicate this experiment.

Quincy, Illinois.

SURVIVAL AS INDICATED BY RETURNS TO SUMMERVILLE, SOUTH CAROLINA

BY WILLIAM P. WHARTON

THE results of continued banding work at my station at Summerville, South Carolina, during the winters of 1931-1934, inclusive, are here given in summary form as they relate to true returns-W of White-throated and Eastern Chipping Sparrows and Red-eyed Towhees handled in numbers.¹ This is done by means of tables and graphs. Tables I, II, and III show by species the numbers banded each year, the returns from these which were taken in each subsequent year, and the numbers of such returns surviving each year as indicated by subsequent returns. The percentages of each year's returns are given following the number taken in such year, and the percentages of survival following the figures showing the number known to be alive in the same year. The three graphs are based on the survival data of the tables, and show by means of columns of varying lengths the average relative shrinkage in survival following the first year of returning. Detailed tables of individual returns, such as have been given in full in previous articles, are here omitted because of their bulk.

Comparing the three species, it is noteworthy that the Chipping Sparrow continues to show, as it did in tables given in my previous

¹See "*Bird-Banding*" for July, 1931, page 116, for data previously published on this subject.

TABLE I
 WHITE-THROATED SPARROW
 (*Zonotrichia albicollis*)
 RETURNING AND SURVIVAL RATIOS²

Year Banded	Number Banded	YEARS FROM BANDING					Total Number of Individuals Returning Out of Original Number Banded
		1	2	3	4	5	
		%	%	%	%	%	
1926	94	7, 7.44 12, 12.76*	6, 6.38 8, 8.51*	2, 2.13 2, 2.13*	1, 1.06 2, 2.13*	1, 1.06 1, 1.06*	12 ³ , 12.76%
1927	104	21, 20.19 25, 24.03*	5, 4.80 9, 8.65*	4, 3.84 6, 5.76*	1, 0.961 1, 0.961*	0 0	25, 24.03%
1928	145	28, 19.31 36, 24.82*	10, 6.89 14, 9.65*	9, 6.20 10, 6.89*	0 1, 0.689*	1, 0.689 1, 0.689*	36, 24.82%
1929	169	20, 11.83 30, 17.75*	12, 7.10 18, 10.65*	5, 2.95 7, 4.14*	2, 1.18 2, 1.18*	0 0	30, 17.75%
1930	274	46, 16.78 55, 20.07*	16, 5.83 21, 7.70*	9, 3.28 9, 3.28*	6, 2.189 6, 2.189*		55, 20.07%
1931	321	29, 9.03 43, 13.39*	18, 5.60 21, 6.54*	8, 2.409 8, 2.409*			43, 13.39%
1932	94	16, 17.02 20, 21.27*	5, 5.32 5, 5.32*				20, 21.27%
1933	477	42, 8.80					42, 8.80%
							Ave. 17.86%

Average total survival of these four years from which further returns are not to be expected. 19.84%

² Survival percentages in Tables I, II and III are indicated by asterisks placed after figures.

³ The apparent discrepancy between the total number of returns and the annual returns is due to fact that some of the birds return more than once.

article, returning and survival ratios somewhat lower than the White-throated Sparrow and the Red-eyed Towhee in the first two years after banding, whereas the two latter species show considerable similarity in both those years. That this does not necessarily mean a shorter life-span for individual Chipping Sparrows is shown by the fact that three individuals of this species have returned in the fifth year after banding, as compared with two White-throated Sparrows and no Red-eyed Towhees. The failure of the last-named

TABLE II
EASTERN CHIPPING SPARROW
(*Spizella p. passerina*)
RETURNING AND SURVIVAL RATIOS

Year Banded	Number Banded	YEARS FROM BANDING					Total Number of Individuals Returning Out of Original Number Banded
		1	2	3	4	5	
		%	%	%	%	%	
1926	191	10, 5.23 17, 8.90*	6, 3.15 8, 4.18*	3, 1.57 3, 1.57*	1, 0.523 1, 0.523*	0 0	17, 8.90%
1927	167	6, 3.59 12, 7.18*	5, 2.99 7, 4.19*	1, 0.598 3, 1.79*	2, 1.19 2, 1.19*	0 0	12, 7.18%
1928	313	46, 14.69 58, 18.53*	30, 9.58 31, 9.90*	13, 4.15 13, 4.15*	4, 1.24 4, 1.24*	1, 0.319 1, 0.319*	58, 18.53%
1929	232	42, 18.10 49, 21.12*	14, 6.03 19, 8.18*	10, 4.31 11, 4.74*	6, 2.58 6, 2.58*	2, 0.862 2, 0.862*	49, 21.12%
1930	255	29, 11.37 39, 15.29*	14, 5.49 18, 9.05*	7, 2.74 8, 3.13*	3, 1.17 3, 1.17*		39, 15.29%
1931	332	29, 8.76 43, 12.95*	21, 6.32 28, 8.43*	12, 3.61 12, 3.61*			43, 12.95%
1932	237	30, 12.65 37, 15.61*	17, 7.17 17, 1.17*				37, 15.61%
1933	714	88, 12.32					88, 12.32%
							Ave. 13.987%

Average total survival of these four years from which further returns are not to be expected. 13.93%

to return the fifth year may perhaps be due to the much smaller number banded than of either of the others, but a fair assumption is that its natural span is at least no longer.

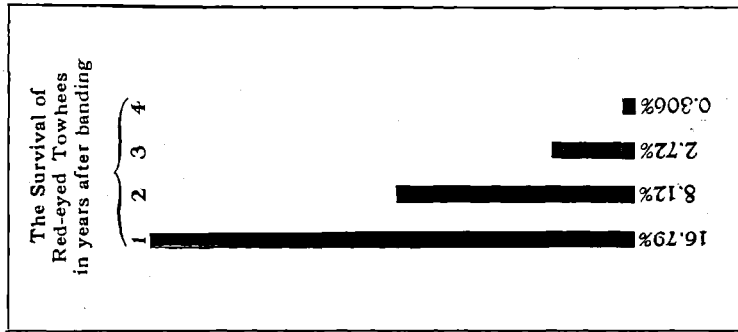
The very large loss in numbers during the first year after banding is striking in all three species—well over 80 per cent. This would not be surprising if the banding had been done on the nesting-grounds, because of the normally large mortality among inexperienced young birds. But in the present instance the individuals of the youngest generation of birds doubtless average fully seven months of age when banded, are vigorous, and have experienced the

TABLE III
RED-EYED TOWHEE
(*Pipilo e. erythrophthalmus*)
RETURNING AND SURVIVAL RATIOS

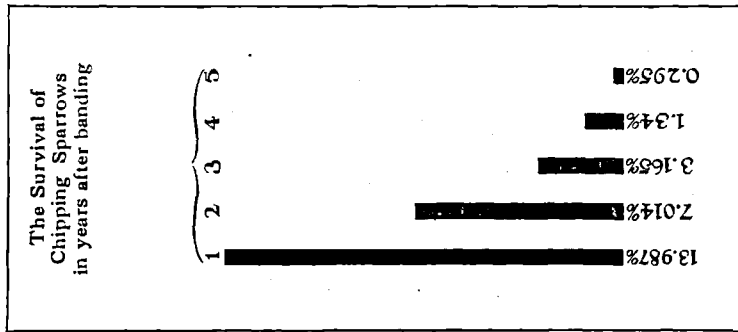
Year Banded	Number Banded	YEARS FROM BANDING				Total Number of Individuals Returning Out of Original Number Banded
		1	2	3	4	
		%	%	%	%	
1926	18	0 1, 5.53*	1, 5.55 1, 5.55*	0 0	0 0	1, 5.55%
1927	13	1, 7.69 3, 23.08*	1, 7.69 2, 15.38*	1, 7.69 1, 7.69*	0 0	3, 23.08%
1928	36	7, 19.44 9, 25.00*	2, 5.55 2, 5.55*	2, 5.55 2, 5.55*	0 0	9, 25.00%
1929	34	7, 20.59 8, 23.52*	3, 8.82 3, 8.82*	0 0	0 0	8, 23.52%
1930	65	9, 13.84 11, 16.92*	4, 6.15 5, 7.69*	2, 3.07 2, 3.07*	1, 1.53 1, 1.53*	11, 16.92%
1931	48	2, 4.16 3, 6.25*	1, 2.08 1, 2.08*	0 0		3, 6.25%
1932	34	4, 11.76 6, 17.64*	4, 11.76 4, 11.76*			6, 17.64%
1933	61	10, 16.39				10, 16.39%
						Ave. 16.79%

Average total survival of these four years from which further returns are not to be expected. 18.81%

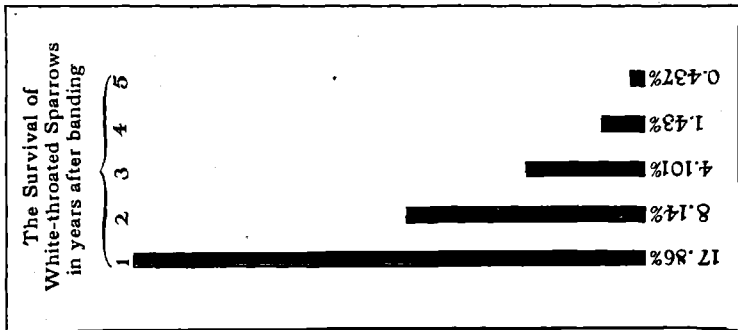
vicissitudes of their first migration. It is, therefore, a question in my mind whether the heavy shrinkage in first-year returns is mostly due to mortality. It is to be remembered that during the interval between banding and returning the birds of this generation first become sexually mature, take mates, and rear their first young. If, as seems probable, there often persists an attachment between mates over more than one nesting season, it is not unreasonable to suppose that in many cases banded birds follow their mates to the latter's accustomed wintering-grounds, instead of returning to those of their unattached youth. If, on the other hand, the banded mate dominates the pair, it may bring its presumably unbanded mate



Based on data contained in
TABLE III



Based on data contained in
TABLE II



Based on data contained in
TABLE I

with it back to its first winter home. Thus it seems not improbable that a wintering flock at Summerville may be chiefly composed of (1) young birds of the year, in many cases progeny of one or more old birds accustomed to winter here; (2) birds which have experienced one or more nesting seasons, and of which some are individuals which spent their first winter here and others are their mates which spent their first winter in other localities. If these assumptions are correct, there are presumably a number of banded birds, roughly comparable to the number of returns, which are scattered about in wintering flocks in other parts of the winter range of the species. This is a theory difficult of proof because of the probably wide distribution of these banded birds which have changed their winter residence after their first nesting season. In my own case, but two White-throated Sparrows banded by me at Summerville have been recovered elsewhere in the South, one too early (November 6, 1933) to be sure that it had then reached its wintering-ground, although the locality seems well off the northeast and southwest migration route usually followed. The other was shot on December 22, 1933, at Four Oaks, North Carolina, and may be presumed to have been wintering there, although Four Oaks is almost directly on a normal flight-line to Summerville. One Chipping Sparrow was taken at Plantersville, South Carolina, in February, 1932, the year after it was banded—evidently a wintering record. Thus there are no sufficient data at hand even to indicate that my theory is correct. For the present it must rest upon an almost purely conjectural basis, reinforced by trapping observations of many cases of apparent attachment of free birds to those temporarily in captivity. The fact that plumage and other external changes do not seem dependably to indicate relative ages of the species under consideration—with the exception of the iris-color of the Towhee—makes all the more difficult the accumulation of evidence to support my theory.

BLOOD-PARASITES OF BIRDS AND THEIR RELATION TO MIGRATORY AND OTHER HABITS OF THE HOST

By REGINALD D. MANWELL and CARLTON M. HERMAN¹

SINCE the earliest discovery of blood-parasites in birds by Danilewsky in 1885, a number of surveys have been made of the incidence of these microscopic "animalcules" in the avian hosts. A vast amount of research has been done on these parasites, particularly those closely related to human disease, such as the organism which causes malaria. Almost always the main concern has been the

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