

Through bird banding it is found that this is also true of their wintering habitat.

Birds of passage, however, seldom stop in the same restricted trapping areas and do not appear to use the same feeding places enroute year after year or they would be more often retaken.

This has been my experience with other species also that true migrants are seldom seen after leaving a station. It is the summer or winter residents that come back.

Rochester, New York, June 14, 1926.

RETURN RATIOS IN THEIR RELATION TO ANNUAL MORTALITY AMONG BIRDS

BY CHARLES L. WHITTLE AND HELEN G. WHITTLE

It is quite generally agreed among ornithologists that the annual bird mortality normally takes place largely among those less than a year old. If we assume in the case of a New England species just holding its own that the number of birds on August 1st is twice that on May 1st, i.e. half adults and half birds-of-the-year, and further assume that 20% of the young and 80% of the adults survive until the following year, we can say by this token that the number of surviving young just equals the annual loss of adults. Of course these percentages are purely fanciful, but they seem to be useful at this time, and if they are not too far wrong, then at banding stations operated during the nesting season we should expect in case of the Purple Finch (*Carpodacus p. Purpureus*), for example, say on May 1st, a return ratio of four adults to one immature bird (bird born the preceding year).

As it happens, the proportion of birds-of-the-year among our returns of this species at Peterboro, New Hampshire, for two years approximates this assumed ratio of four adults to one bird-of-the-year. In the case of a third year's records (to June 5th) the ratio is nine adults to one bird-of-the-year. The figures are: returns in 1924, 25, of which seven were young birds when banded; in 1925, 64, of which 13 were young when banded; returns in 1926, 44, of which 5 were young when banded.

On account of the fact that our banding station in Cohasset, Massachusetts, is operated all the year round, Purple Finches

being banded every month, returns of this species, which are an admixture of returning nesting birds and returning wintering birds, are only in part comparable with those already given for Peterboro. However, since 1925 yielded practically all the birds-of-the-year (33 in number) banded at Cohasset, the return records for 1926 (for birds arriving just before or during the nesting season) furnish a parallel to those in Peterboro, and are accordingly added, as follows: Total number of Purple Finches banded in 1925, 322. Of these 33 were birds-of-the-year. Between March 16th and June 1, 1926, twenty returns¹ of 1925 birds were recorded, and of these six were young-of-the-year when banded; 18.18% of the young banded in 1925. Here again is an approach to the 4-1 ratio—, 20-6. It should be stated that no Purple Finches are banded in the nest at either station, all coming to traps by following the old birds.

In the matter of the increasing survival ratio of mature over the ratio of those less mature, the records are of great interest as will be seen from the following table which gives the Peterboro station return records of the Purple Finch up to June 5, 1926:

PURPLE FINCH RETURNING RATIOS

1924 to June 5, 1926

Year of banding	No. banded	Returns ¹	Percent	Returns ²	Percent	Returns ³	Percent
1923	166	25 (1924)	15.06	17 (1925)	68.00	10 (1926)	58.82
1924	242	64 (1925)	26.50	23 (1926)	35.93		
1925	174	44 (1926)	25.28				

It will be noted that ten birds banded in 1923, have survived until the spring of 1926, and have been taken as returns¹, returns² and returns³. Of 166 birds banded in 1923, 25 were returns in 1924. Of these returns in 1924, 17 were returns² in 1925, and of the 17 returns² in 1925, 10 were returns³ in 1926, that is, the percentage of returns¹ in 1924, based on the total number banded in 1923, was 15.06, but 68.00% of these 1924 returns¹ again returned in 1925, and 58.82% of the 1925 returns² returned in 1926. In the case of the 242 birds banded in 1924, 64, or 26.50%, returned in 1925, and of these returns¹ 35.93% were returns² in 1926. Again, of the 174 birds banded in 1925, 44, or 25.28%, returned in 1926.

We do not assume that these figures show that all of the birds banded in 1923, which were alive and could have done so, reappeared at the Peterboro station in May or June of 1924.

It is certainly clear that such is not the case, for some birds skip a year and reappear as returns after a seeming absence of two years, or even three years, and no doubt others for one reason or another fail to come back to their places of birth at any time, even though alive.

It should be stated that thus far our records have had to do only with that portion of the young Purple Finches born each year which have escaped annihilation in the nest and during, say, the first two weeks out of the nest, at which time they begin to appear at our stations.

It is to be hoped that bird-banding will in time help to establish the survival ratio of birds of varying age year by year from the young up to the average life of the individuals making up a species. Until information of this character is in hand, particularly in the case of the percentage of young birds which survive a year, it is difficult properly to pass on the question: To what extent do young birds return to their place of birth the next nesting season? A good deal has been written on this subject, the common view being that they do not do so, or only negligibly so. For example, there has been some speculation regarding the young House Wren's failure to return to the place of its nativity, but until more is known about this species' average length of life and the mortality taking place the first year among the young birds, it seems too early to form an opinion on the matter. Before a conclusion can be safely reached it should be ascertained what percentage of the young banded in and out of the nests (the mortality is doubtless much greater among birds banded in the nest than among those sufficiently old to come to traps) are alive the following nesting season and *could* return. The House Wren is a prolific breeder and yet it appears not to be more than holding its own in numbers,—a circumstance which seems to indicate that the annual death rate is enormous, or that the birds are very short lived, or both.

In premising that on August 1st the bird population is made up of 50% adults and 50% young birds, the ratio is based on our estimate of the measure of seasonal success attained in raising young by the species nesting in several localities for a series of years.

Cohasset, Massachusetts