Catbird. 41-127698. Minimum age at repeat of July 17, 1948, four years, 1 month.

Eastern Tree Sparrow. C-761. This first bird banded by author. On 5th return accidentally killed. Skin (per Dr. A. Rand) added to collection National Museum of Canada, Ottawa, Ont. Minimum age at death four years, eight months.

41-83662. 4th return minimum age probably more than four years, six months.

41-83668. Last record prior to 1st return Feb. 26, 1945. Thought to have been three years at date banding; if correct, age at 1st return more than six years.

45-58012. After 1st return remained at station to April 16, 1947 recording 53 repeats. After 2nd return remained to March 17, 1948 recording 10 repeats. The last repeat recorded after 3rd return was Jan. 12, 1949.

Eastern Song Sparrow. C-771. At 5th return minimum age four years, nine months.

Hudson Heights, Quebec.

LENGTH OF STAY OF MIGRANTS

By CHARLES H. BLAKE

The available evidence (Blake 1948; Borror 1948) appears to show that the distribution of elapsed time to first repeat and the length of stay of banded migrant birds approaches a geometric progression. In any event, the best representative value for such times will be taken, in what follows, to be the geometric mean. I show below how the desired means can be calculated.

Formally the geometric mean is obtained from the equation

$$g = \text{antilog } (\Sigma \log d/n) \qquad [\text{Eq. } 1]$$

where g = geometric mean
d = time in days
n = number of birds

Σ is an operator meaning "the sum of," i.e. add together all log d's. In words, the logarithm of the geometric mean is the quotient obtained by dividing the sum of the logarithms of the elapsed times by the number of birds. For repeats, the day of banding would be recorded as zero elapsed days, but as a practical matter we use ½ day as the numerical value. This could be further refined by using ¼ day for repeats in the same forenoon or afternoon as original banding. No problem arises with length of stay since the least recorded time would be one day.

Now, let G = mean length of stay of all birds
G_r = geometric mean of time to first repeat
s = known stay, in days, of a repeater
n_o = number of non-repeating birds
n = total number of birds = n_o + no. of repeaters

Assume that the mean length of stay of non-repeaters is G_r. It is clear that if the stay were longer the birds would repeat.

Then, $G = \text{antilog } [(\Sigma \log s + n_o \log G_r)/n]$ [Eq. 2].

Properly we should use some figure less than G_r, say $G_r - a$. Then Eq. 2 becomes:

$$G' = \text{antilog } \{[\Sigma \log s + n_o \log (G_r - a)]/n\} \quad \text{[Eq. 3]}$$

The relation between [Eq. 2] and [Eq. 3] is given by the equation $G/G' = (G/G_r - a) \exp n_o/n$. It is obvious that the left hand side approaches unity as a approaches zero. However, if a value less than G_r is used in [Eq. 2] the value of G is diminished and yet the chances are that, using G_r, G comes out less than its true value, so the best solution is to use G_r. This also avoids an arbitrary assumption of a value for a.

I give three illustrations of the results of computing lengths of stay for Lincoln, Massachusetts. In the falls of 1946-1948, 279 Slate-colored Juncos appear to have departed on or before 20 Dec. For these birds G_r was 3.2 days and G was 3.7 days. In this case, if we assume $G_r - a$ to be 2.7 days, G becomes 3.3 days. For the same species there were 135 examples appearing on or after 1 Mar. in the springs of 1947-1949. These showed a G_r of 2.2 days and a G of 2.5 days. Similarly, for the same springs, a rather small Eastern Fox Sparrow sample of 40 birds shows $G_r = 0.9$ days and $G = 1.1$ days. At all events, one can say that qualitatively these figures agree with what one sees just by watching the relative numbers of banded and unbanded birds each day.

From Borror's (1948) Figure 1 for White-throated Sparrows at Columbus, Ohio, in the fall of 1946, I find $G_r = 2.8$ days and $G = 4.4$ days.

That there can be a great discrepancy between occurrence and trapping is well shown by a color-banded Junco (46-73017) which was seen, as a return, 9 Jan. 1949, again 11, 14, 18 Jan. It was trapped once 29 Mar., and seen finally 31 Mar. It is probably a bird of exceptional wisdom. It remains to be seen how frequent such cases are.

Although we cannot say what the precision of these figures may be, they have the merit of being arrived at by a definite and repeatable method. There is, therefore, a basis for comparison with any other figures obtained by the same method. Mean length of stay can be used in estimating the number of migrants passing a given point and the velocity of migration.

LITERATURE CITED

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GENERAL NOTES

Adapting Pliers for Closing Aluminum Bird Bands. The softness and flexibility of the numbered aluminum bands used for banding birds enables one often to apply them by squeezing the bands with the fingers. Close inspection of bands applied in this manner often shows that the band is poorly adjusted and on this account injury to the bird can occur. Many banders use pliers of various designs to make the final adjustment, but in so doing the band can easily be overlapped. This makes it necessary to remove the band, reform it on some