should the system be adopted, that the description of it be accompanied by the following summary code:

(1) Identify the bird to species, or to the subspecies if the subspecies is determinable by the appearance of the bird. If specific identification is uncertain, the bird should not be banded.

(2) Determine and record the sex. If it is underterminable or *uncertain*, sex should be indicated by a question mark.

(3) Determine whether the plumage is *natal*, *juvenal*, or a later plumage. If the bander is unable to ascertain to which of the plumage groups the bird belongs, age (or plumage) should be indicated by a question mark unless the age is determinable in some other way.

(4) Few, if any, birds are banded in natal plumage. Although natal down may be present on some which are banded, there will usually be enough juvenal feathers present to designate them as *juvenal* (juv. n., if still in nest, etc.).

(5) Precocial (nidifugous) young, when large enough to band, are designated as *fledgling-juvenal* (juv. fl.) or *independent-juvenal* (juv. ind.).

(6) The altricial (nidicolous) young, when in the nest and large enough to band, are always *nestling-juvenal* (juv. n.).

(7) Birds in plumages later than the juvenal should be designated as *adult* (ad.) unless they can be definitely identified more precisely (such as *first-winter*, *first-nuptial*, etc.).

(8) Only the terms *fledgling-juvenal* (juv. fl.), *independent-juvenal* (juv. ind.), and *adult* (ad.) will be required for the vast majority of non-nestling birds at the time of banding.

(9) Brief notes, such as "streaked breast," "spotted breast," etc., indicating a basis for age designation are desirable.

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THE SPACING OF REPEATS

BY CHARLES H. BLAKE

Since the determination of lengths of stay of banded migrating birds depends on a knowledge of the length of time to, at least, the first repeat after banding, it will be useful to indicate the sort of distribution which repeats show and to call to the attention of banders with extensive records the desirability of analysing their records with this item in view.

The ensuing table shows the time in days for the Slate-colored Junco from the preceding capture to the repeat noted. Time is taken only to the day and when both captures occur on the same day, the elapsed time is counted as zero.

I have set out the raw data in Table I in detail because it exhibits clearly the essential point that the distribution of repeats in time is

not one of the familiar distributions and cannot be statistically treated as such [1].

TABLE I. SLATE-COLORED JUNCO

Elapsed days	First repeat	Second repeat	Third repeat	Elapsed days	First repeat	Second repeat	Third repeat
0	13	7	3	19	0	0	0
1	11	17	7	20	0	0	0
2	12	9	1	21	0	0	1
3	10	5	4	22	1	0	1
4	7	1	3	23	0	0	1
5	5	2	2	..			—
6	4	0	0	26	1	1	
7	1	1	1	27	1	0	
8	3	1	0	..			
9	1	0	0	36	1	0	
10	5	0	3	37	1	0	
11	2	0	0	..			
12	2	1	1	44	2	1	
						—	
13	1	2	0	..			
14	1	0	1	46	1		
15	2	0	0	47	1		
16	0	0	0	..			
17	1	0	0	53	1		
18	1	0	0	..			
				59	1		

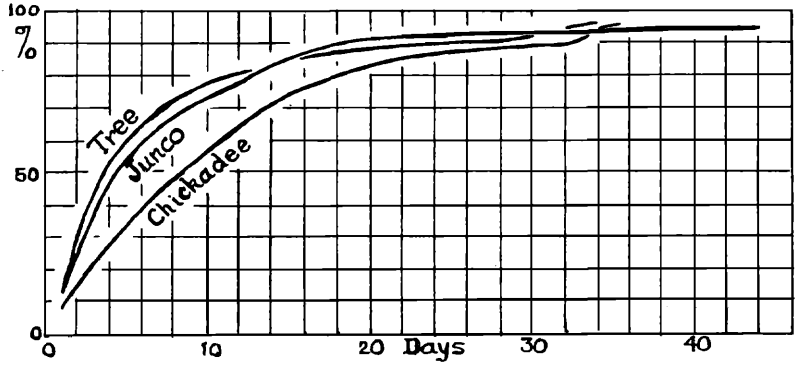
Table II illustrates the problem of obtaining the best representative value for the elapsed time. This can be viewed as a practical problem and the choice lies between the median (50% point) and the geometric mean. In calculating the latter I have simplified the computation by reckoning all repeats on the same day as preceding capture as repeating in one-half day. The arithmetic mean gives undue weight to the upper tail of the distribution. The extension of this tail varies with the number of repeating birds. On the whole, I prefer the geometric mean. The present figures for 90 per cent and 95 per cent have very little value.

TABLE II. SLATE-COLORED JUNCO

	First repeat	Second repeat	Third repeat
No. of birds repeating	93	48	28
Arithmetic mean of elapsed time	8.7 days	3.3 days	5.4 days
Geometric mean of elapsed time	3.6 days	2.0 days	3.0 days
25% of repeaters repeat in	1.9 days	1.3 days	1.5 days
50% " " "	4.1 days	2.0 days	3.4 days
75% " " "	10.6 days	3.6 days	8.0 days
90% " " "	18. days	12. days	12. days
95% " " "	44. days	13. days	21. days
Birds repeating at given repeat relative to preceding capture	33%	52%	58%

[1] It is evident that the distribution cannot be Gaussian (normal) but it may be an approximation to a Poisson distribution. However, the repeats are not fully random, either individually or collectively.

The graph (Fig. 1) of percentages of first repeats against elapsed days, compares the three species for which I have reasonably good data. On the whole the first repeats for junco and Tree Sparrow are the same except that the former is a little less likely to repeat in the first two days. Chickadee first repeats, on the other hand, are more uniformly distributed relative to elapsed time and are slower than those of either sparrow. This species appears to have a markedly persistent memory for traps and the details of their construction.



Graph of percentage of first repeats vs. elapsed time for Black-capped Chickadee, Slate-colored Junco, and Tree Sparrow.

I consider that the period between trappings depends on the interaction of at least eight factors.

(1) The rate at which the bird makes the rounds of food sources within the area it inhabits. Obviously a bird cannot be trapped unless it comes within the zone of attraction of the trap and it is easily observed, even at feeding stations that are not trapped, that the same birds do not appear each day although some individuals may appear several days running.

(2) The length of time the bird tends to avoid traps after being trapped. This time varies with the number of times the individual has been trapped and would eventually approach zero as a limit.

(3) The time pattern of trap operation. A bird cannot be trapped before it returns to the vicinity of the trap but it can be missed if the trap is not in operation. Stations operated infrequently will give faulty spacing of repeats. For example a station operated only on Saturday and Sunday would lump repeats on days 0, 1, 6-8, 13-15, 20-22, 27-29, etc. Even operating traps only in the early morning of the intervening days seems to remove most of the bias.

(4) Season. I do not yet have a sufficient body of data to determine the effect of this factor.

(5) Weather. It seems reasonable to suppose that weather which interferes with feeding will tend on the whole to postpone repeats. Weather which only interferes with migration would permit repeats to occur without altering their spacing.

(6) Decoying. I apply this term to the tendency of birds to approach, and even to enter, a trap in which there is already a bird. The effect is non-specific to a large degree. It may tend to cause a bird to repeat a little sooner than it otherwise would.

(7) Aggregation. It is well known that some birds occur in groups which maintain their composition for an appreciable period. Birds prone to trap may serve as decoys for others of their group. Aggregation will also tend to bring all the members back to the trapping station collectively rather than individually.

(8) Accidental Factors. An occasional bird escapes during handling or squirrel, jay or hawk frightens off a group which might yield some repeats. We expect the response on the part of the bird to be as though it had repeated.

Evidently the time between repeats tends to be lengthened by the factors of trap avoidance, unfavorable weather, and accidental factors. It tends to be shortened by decoying and aggregation. The remaining factors including favorable weather would not appear to have any biased effect on elapsed time. The direction of their effects will vary with the individual bird, with the operator, and with the time of year. It cannot be assumed that the two groups of biased effects will cancel one another.

In spite of the fact that the effects and the discrimination of these factors are not yet certain, it seems useful to put these ideas on record so that banders generally will be stimulated to make and analyze the needed detailed records which will finally clarify the matter so that we will have a basis for the solution of further problems such as length of stay of migrants and the mid-winter wanderings of winter visitants.

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BANDING DATA FROM WILTON, NORTH DAKOTA

By HANNAH R. GRAY

My station was started in 1931 and up to the end of 1946 approximately 28,066 birds of 118 species had been banded. These were nearly all small birds trapped in our yard. Wilton is a town of 1,000