was made such as an accidental tapping of a paddle on the side of the boat. However, on bright moonlight nights the birds were quite restless throughout the roost.

In order of relative abundance, blackbirds occupying the roost were the redwing, bronzed grackle *(Quiscalus quiscula)*, cowbird *(Molothrus ater)*, and rusty blackbird *(Euphagus carolinus)*. Starlings *(Sturnus vulgaris)* also were present. Brewer's blackbird *(Euphagus cyanocephalus)*, a common winter resident in the area, roosted in rice stubbles out on the open prairie.

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DIFFERENTIAL CONTRIBUTIONS OF YEAR CLASSES

By Charles H. Blake

It has long been known that, among certain marine fishes, those individuals hatched in certain years dominate the age structure of the population for a period. Those hatched in a given year constitute the year class designated by that calendar year. Hjort (1926) showed that North Sea herrings of the year class of 1904 were the largest single class represented in the commercial catch from 1907 to 1918, being 60 per cent or more of the catch from 1910 to 1915. The only other classes that became at all conspicuous in the period 1907 to 1919 were the classes of 1899, 1911, and 1914. The year class of 1916 first became prominent in 1922.

It is evident that the age structure of such animal populations will undergo great changes from year to year. Where these variations in production and survival of young are large and the animals are long lived, there is no great difficulty in identifying dominant year classes. It is necessary, of course, that individuals be assignable to age classes either by applied markings (bands) or by intrinsic characters (annual rings on fish scales).

On the other hand, if the species is short-lived the contribution to the population of age class 1 and perhaps age class 2 tends, even when production is low, to overshadow the contributions of all older age classes of earlier year classes. Some more precise method is needed to determine whether a year class is making more or less than the average contribution.

There are two ways of looking at this problem. We may consider how much of the initial population survives in each subsequent year (or other period). This really means the construction of a life table and the measurement of departures from it. The second method involves the proportionate contribution of each year class to the living stock in any subsequent year and ignores the initial size of the year class.

These two methods may be illustrated by the figures for Blackcapped Chickadees banded at Lincoln, Mass., in 1946 to 1952. It must be emphasized at the outset that this is not an attempt to prove anything about chickadees because the length of time is insufficient. However, an easily trapped and largely resident species will yield results more readily than a migratory or difficultly trapped one.

The methods as carried out below involve certain assumptions. The first is that any bird banded after 1 July in any year and known immatures banded in June can be referred to the year class whose year contains that 1 July. It is probably true that 70 or 80 per cent and perhaps more of the newly banded birds fulfill this requirement. The second assumption is that the last year in which a bird is taken is the year of its death. Age class 1 refers to a bird taken after the assumed second 1 July of its life and similarly for older classes. Obviously the results will increase in accuracy by the extent to which the above assumptions can be replaced by definite knowledge.

METHOD I

The total number assigned to each year class is counted and also those attaining each age class. From these figures the percentage of the year class surviving in each age class is computed. The tally in each age class includes those living into later age classes. A table may be arranged as below (Table I).

TABLE I. METHOD I.

Year classes	No. banded	1 No.	1 %	2 No.	2 %	3 No.	3 %	4 No.	4 %	5 No.	5 %	6 No.	6 %	7 No.	7 %
1946	48	12	26	4	9	1	2	0	0	0	0	0	0	0	0
1947	48	8	14	2	4	1	2	1	2	1	2	1	2		
1948	30	9	30	6	20	5	17	5	17	4	13				
1949	57	6	11	5	9	1	2	0	0	[0]	[0]				
1950	34	9	26	2	6	1	3								
1951	74	11	15	6	8										
1952	79	7	9												
Averages			19		8		5		5		[4]		1		

(Age Classes 1–7)

The bracketed figures in Table I are assumed. The percentages are referred to the numbers banded as bases.

It will be seen that, on this showing, only 19 per cent of birds that become independent attain age class 1 and, by implication, their first breeding season. If we take the figures at face value, year class 1948 makes a notable contribution to the breeding stock for the five years available. Similarly 1949 is an unduly small contributor except at age 2.

METHOD II

This method relates the contributions of the year classes to calendar years and hence shows the proportion of survivors in any year assignable to a given year class.

TABLE II. FIRST PART OF METHOD II.

Year classes	1947 No.	1947 %	1948 No.	1948 %	1949 No.	1949 %	1950 No.	1950 %	1951 No.	1951 %	1952 No.	1952 %	1953 No.	1953 %
1946	12	100	4	33	1	8								
1947			8	67	2	17	1	6	1	5	1	5	1	5
1948					9	75	6	47	5	25	5	25	4	21
1949							6	47	5	25	1	5	0	0
1950									9	45	2	10	1	5
1951											11	55	6	31
1952													7	36
Totals	12		12		12		13		20		20		19	

(Years 1947–1953)

The tallies opposite the year classes are the same as those in Table 1 beginning with age class 1 but are referred to calendar years. The bases for the percentages are the given column totals which, therefore, are the numbers of breeding birds in the population, assuming all living birds to breed at one year of age and annually thereafter as long as they live. The next step is to arrange the percentages in age class columns and average each column as in Table III. Bracketed figures are assumed.

TABLE III. SECOND PART OF METHOD II.

Percentage by age classes

Year classes	1	2	3	4	5	6	7
1946	100	33	8	0	0	0	0
1947	67	17	6	5	5	5	
1948	75	47	25	25	21		
1949	47	25	5	0	[0]		
1950	45	10	5				
1951	55	31					
1952	36						
Averages	61	27	10	7.5	[6.5]	2.5	

The two methods agree in assigning a major role to year class 1948. Method II indicates a smaller contribution by the classes of 1949 and 1950 than does Method I. Since the banding began in 1946 that year class must include some carry-over from earlier years. The 100 per cent figure is too high and the average for age 1 is likely to be nearer 55 per cent.

It will be noted from the totals in Table II that the assumed size of the breeding stock rose noticeably in 1951. No reason is known for this. If we compare, as in Table IV, the size of the supposed immature population that can be assigned to a given breeding season we find no evident proportionality. It is, of course, an assumption that the number of immatures trapped is the same as the number of independent young produced by the adults assumed to be present in the same area during the given breeding season. On the other hand, it would not be surprising if the number of independent young per breeding pair should vary somewhat from year to year.

TABLE IV.

Year	Assumed breeding population	Assumed no. of independent young	Ratio
1947	12	48	4.0
1948	12	30	2.5
1949	12	57	4.7
1950	13	34	2.6
1951	20	74	3.7
1952	20	79	4.0
1953	19	33	1.7

There are some reasons for preferring Method II to Method I. The contributions obtained for any one year class reflect to some degree the survival history and the initial size of that year class but relate these to other classes living at the same time. More available information is used than in Method I. Also Method II gives the same type of result as is already in use for the study of fish populations.

REFERENCE

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SOME BIRD WEIGHTS FROM JAMAICA

By Charles H. Blake

In the course of my stay in Jamaica in 1955-56 as a Fulbright Fellow, I handled not only a good many birds during banding operations but also a number of specimens that came into the Institute of Jamaica in the flesh. It was possible to weigh some of these birds and I here submit the results. The average weights, grouped as far as possible by age and sex, are shown in Table I. In some cases comparison material is available either from the United States or from tropical America. I have not tried to search out every recorded weight.