

but as two-thirds of the birds were spring migrants, it is believed that the average is as nearly true as can be. Then, too, no measurements of nesting males with noticeably worn plumage were given, as stated above.

The measurements of migrants very likely include some individuals nesting only a little way to the north and thus the averages would be too low for a northern race if it exists.

THE OPPORTUNITY OF BIRD-BANDING

By MARGARET MORSE NICE

WE now have a means of studying wild birds undreamed of a few years ago. In the first place we can actually handle our subjects. In the second place by means of both colored and aluminum bands we can follow the activity of known individuals in freedom throughout a season or perhaps for years.

Yet too many bird-banders have not progressed beyond the earliest stage—before the invention of traps or colored bands—apparently believing that banding is merely a means of studying migration. So they capture as many birds as they possibly can, simply attaching the numbered band and that is the last they see or hear of the vast majority of their subjects.

Important as banding a large number of birds is, banders could add greatly to our knowledge of bird-life if they would also study a few birds carefully.

Two things are necessary if we are going to make adequate use of our opportunities: first, a clear idea of problems to be studied; second, a knowledge of what others are doing.

THE BIRD IN THE HAND

Every bird captured should be carefully examined and its sex and age determined if possible. Wing and tail measurements often serve as indices of sex (Nice, '32). In the nesting season the incubation patch should be looked for; its presence or absence may tell the bird's sex, or perhaps give us new information as to the habits of the species, since the share of the sexes in incubation is not certainly known with many even of our common birds. The gradual appearance of these bare spots should be studied in relation to the laying of the eggs.

Sometimes young birds have pointed tail-feathers in contrast to rounded feathers in adults. In the Song Sparrow

(*Melospiza melodia beata*) this has proved true with the males, but in the females the feathers are more or less pointed regardless of age.

Every bird should be weighed at every capture, the time of day being noted, and temperature also, as it has been found that some birds weigh more during a cold spell than in a warm one. Some species gain in fall, some in winter, and some in spring, while others remain practically stationary throughout the year. In some species females average higher than males during the nesting season. Is this merely a matter of the developing eggs, or do the birds put on fat in anticipation of the incubation period? When one finds during the nesting season a female Song Sparrow weighing 24 grams instead of the usual 20, or a female Cowbird (*Molothrus ater ater*) weighing 45 instead of 38 grams, then one knows that this particular bird is in the midst of laying a clutch of eggs.

There are many interesting questions in regard to molt: the weight of the bird during this time; the duration of the process; its relation to breeding and migration; the time of its onset in relation to sex, climatic conditions, the individuality of the bird, etc., etc.

"The colors of the eyes, bill, legs, and feet, and also cere, lores, and eyelids, which are naked in some species, change frequently in color from youth to maturity or with the seasons," wrote Forbush ('27). The color of the lining of the mouth and tongue should be noted, especially in young birds.

In much of this detailed work indoors the significance of the observations made depends on a recognition of the individual outdoors, also on a full knowledge of the status of its family affairs.

FIELD STUDY OF BIRDS

For the field study of birds it is essential to use colored bands. The results of much good work in the past have been vitiated by the impossibility of absolute identification of the individual bird. Now at last we are ready to proceed on sure ground.

To catalog the different problems under life-history studies would demand a long treatise. Every bird-bander should diligently peruse the excellent list at the end of the "Manual" (Lincoln and Baldwin, '29). I shall confine myself to a few suggestions along lines which I have found particularly fruitful.

The question of territory is very much to the fore at present. Which birds are true territory-holders and which are not?

What is the purpose of territory? (See reviews in this number of *Bird-Banding*.)

The matter of song can be satisfactorily studied only in birds individually known. The relation of song to weather, time of year, nesting cycle, age of the singer—all these are important questions. Little has been done on studying the development of song, or the subject of the singing of the female. In which species does the male stop singing on the arrival of a mate, and when does he begin to sing again?

There are many important problems connected with the study of eggs which can only be answered with birds that are marked. Some of these questions concern: the time of beginning to lay; number of eggs in a set; number of sets ordinarily laid and greatest number possible; color in a set and in different individuals; size of eggs in different individuals, in the same set, in succeeding sets, in succeeding years; shape of the eggs; inheritance of color, size, and shape.

How are these phenomena influenced by the following factors?

(1) Factors in the bird herself: age, inheritance, individuality.

(2) External factors: increasing and decreasing light, temperature, precipitation; food; disturbances of all kinds, in the territory, or through Cowbird activities.

THE LITERATURE

The most fruitful source of suggestions for our own problems lies in the well-planned, well-organized researches of other investigators. It is impossible to do the best work without a fair idea of what others have done. Yet the task of keeping abreast of the literature of one's subject grows increasingly difficult with the ever-growing array of articles that appear.

There are two major attempts to catalog the zoölogical articles of the world—the "Zoölogical Record" in England and "Biological Abstracts" in this country.

The "Zoölogical Record," now in its sixty-ninth year, lists the articles by authors, giving title and reference. For 1932 there are 1385 entries under "Aves." Next there is a subject-index where the articles are arranged under all sorts of topics—migration, nidification, courtship, physiology, geography, etc., etc. Finally there is the systematic index with the articles arranged under each species. It will be seen that the "Zoölogical Record" is a reference-source of great importance. It should be available in every large library. The section on

Aves may be purchased separately for seven shillings, six pence.

"Biological Abstracts" is a much more recent enterprise, having just completed its eighth year. As its name denotes, a brief account of the contents of each article is given. The papers under "Aves" are arranged under the following topics: General or Popular; Systematic; Life History; and Local or Faunistic. References are also given to other bird papers abstracted under "Ecology" and other subjects. There is much valuable material in "Biological Abstracts," but owing to lack of funds it is not up to date, articles of 1930 and 1931 being in the majority at the end of 1933. It should be found in all colleges and in large general libraries.

Those bird-students who read German will find good reviews in *Vogelzug*, a quarterly journal with an excellent index at the end of each year, covering both original and reviewed material in the fields of banding, migration, and life-history.

Beiträge zur Fortpflanzungsbiologie der Vögel—a bi-monthly devoted entirely to life history studies—also carries good reviews and abstracts of books and articles in this field.

The problem, of course, after one has found a reference, is to get hold of the article. If the journal is not in the library, it may be that the library will borrow it for the investigator. Or perhaps a reprint may be obtained from the author.

It has been planned in *Bird-Banding* to review the literature with the purpose of giving the greatest possible help to banders—to suggest problems and to give some definite facts that have been found by others. The usefulness of this department will depend on the support given to this journal. The larger the subscription list, the more space can be allotted to reviews.

COÖPERATIVE STUDY

Although much good work is being done individually in life-history studies, there are many general problems in bird biology that can be better handled coöperatively.

Stevens ('32) after suggesting a number of subjects for research connected with "The problem of the return of the young birds," hopes "that such material can be brought together from many sources and combined into a few comprehensive reports rather than be published in a large number of short notes by individual workers. Coöperative effort should result in better work as well as better presentation for those who may wish to read of it during later years."

The fine results of "Coöperative Ornithology" are sum-

marized by McCabe (33b), who describes the "Report of Bird Migration in the Mississippi Valley," and nesting and wild-fowl censuses in this country, and the "Census of British Heronries" and the "Great Crested Grebe Inquiry" in Great Britain. The Indiana Audubon Society organizes the efforts of banders in that State and has published reports on the migration of several Indiana-breeding birds (Perkins, '32; Test '33).

Fields in which coöperation is especially called for are population and migration studies, studies on particular species, and keeping track of the literature.

Under population studies a number of problems suggest themselves: censuses; return of adults to breeding place; return of young to birthplace; percentage of immature birds in the fall; percentage of first-year birds in the breeding population; success of nests; sex ratio; longevity, etc., etc.

Under migration problems there are the questions of the winter quarters, the migration route, the migratory or stationary status of each population of breeding birds, the great and difficult questions of migration and weather, and many, many other subjects of importance.

As to the study of species, could not people that are specializing on a particular bird club together to help one another—possibly one of them going to Washington to work up the data in the files of the Biological Survey—and then finally write a joint report?

As to the means of working out this scheme of coöperative research, I would suggest a central committee composed of Mr. Lincoln, Mr. Whittle, and representatives from the four regional bird-banding associations, with subcommittees each with a rather definite problem to solve.

In conclusion, let me quote from McCabe's ('33a) discussion of banding: "The most delightful of occupations, with a world of human and scientific good to its credit, its ultimate justification lies in its concrete scientific value and nothing else."

We have a great opportunity and a definite responsibility. There is nothing in the world so rewarding as the discovery of truth. Let us plan our efforts so as to make the most of our opportunity.

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