NOTES AND NEWS

The Condor for September will contain the membership roster. Members are urged to send in recent address changes and zone numbers to John McB. Robertson or to the editorial office so that the roster may be as accurate as possible.

The printing of the leading article in this issue of the Condor was made possible through a cooperative financing arrangement with the Missouri Conservation Commission. This extensive and valuable report on wild turkeys is thus made available to all Club members.

PUBLICATIONS REVIEWED

Within the past forty years, the quantitative study of bird populations has become an important and promising field of research. While the results have provided data of but a few general types, great variation in details of methods has led to complications obvious to anyone attempting to compare any of the available data, and for some years a general evaluation of methods has been needed. A recent paper by S. C. Kendeigh (Measurement of bird populations, Ecol. Mono., 14, 1944:67-106) provides a substantial contribution toward this end.

Following an account of the historical development of the study of bird populations, Kendeigh defines two main points of view manifest in attempts to determine and analyze abundance of birds: In the first, an index is obtained, yielding a measure of relative abundance only; in the second, actual numbers of birds per unit area are obtained, yielding a measure of absolute abundance. As basis for his analysis of methods, Kendeigh combines a survey of the extensive literature with original data, representing several different techniques of population analysis, from his studies of birds in Ohio, Illinois, New York, and Tennessee. There is a bibliography of 241 titles.

In analyses of relative abundance, one of the most generally used measures is the frequency index. Kendeigh points out that apart from the fact that such indices do not indicate true numerical status, they are subject to corrections for differences in conspicuousness of various species, for differences in behavior, and for varying amounts of time spent by the observer in different habitats. He does not mention the fact that in some studies of relative abundance indices have been prepared without regard for seasonal status; thus, the weight of records over a limited portion of a year is spread over an entire year, leading to an erroneous placement of the species. The author would have been justified in criticizing frequency indices more emphatically from the standpoint of variation in results due to differences in time spent in different habitats by the investigator. Such indices as are obtained seem to me to be only slightly better than the usual subjective evaluations as "abundant" or "uncommon." Moreover, attempts to compare indices without the corrections mentioned above lead only to a mere toying with figures.

Other measures of relative abundance described by Kendeigh are based on numbers of birds per unit of time or unit of linear distance. Here again there is need for determining suitable units and for computing certain corrections. Investigators using this method have calculated "coefficients of conspicuousness," of "song persistence," and of "song intensity." These coefficients must of course be based on calculations using actual numbers of birds per unit area; that is, the studies of relative abundance must be preceded by determinations of absolute abundance on plots representative of the habitats to be sampled. "To the extent that these corrections are made, the more reliable the data become, but if all corrections are made as much time and energy will be involved as in the determination of absolute abundance . . ." (p. 71).

Kendeigh presents and discusses fully frequency indices based on field lists accumulated by numerous observers near Cleveland, Ohio. The significant part of this discussion is a comparison of two sets of figures from different parts of Ohio (p. 74) treated in the same manner, one set yielding indices over four times greater than the other. "There is no reason to believe that birds are over four times more abundant in Zanesville than in Cleveland, as the figures indicate"! Measures of relative abundance must appear futile when such discrepancies are obtained, no matter what factors may explain them. At the close of his discussion of relative abundance, Kendeigh states (p. 78): "It appears that ornithology must start almost, but not quite, anew and gather exact quantitative data on the abundance of birds by development of improved census methods [based on actual numbers]." Considering the quantity of ornithological literature dealing with measures of relative abundance, this is indeed a significant conclusion. In many instances, measurements of relative abundance have seemed adequate for the purposes of the investigator, who probably did not concern himself with the usefulness of his data to others. Certain types of data, as for instance the figures available in the Christmas Bird Counts of Audubon Magazine, can be used safely only by methods yielding measures of relative abundance. Thus, under certain circumstances, such methods may be employed with good reason,

and Kendeigh makes this clear; but in general it is advisable to discourage their use.

To obtain figures on actual numbers of single species, different methods have been devised, employing such techniques as sample-block counting, strip counting, ratios of banded to nonbanded birds in traps or hunters' bags, and counts of calling birds. Certain estimates of large populations dealing with extensive areas, though expressed in terms of absolute numbers, are perhaps no more accurate or useful than indices of relative abundance. Unquestionably the most satisfactory results are obtained in studies of local populations over a period of years, as Kendeigh has done with the House Wren. His data, based on banded birds, demonstrate percentages of nonbreeding birds and shifts in a population of House Wrens as between the first and second broods; fluctuations in the total population are summarized over a period of twenty-six years, as are changes in age-composition and sex ratios.

The chief methods used in counting total populations of all species are the strip census and the plot census. Strip censuses yield numbers of birds per unit of distance over an elongate plot of definite width; from these data, densities of birds per unit area can be calculated. Such censuses are taken but once; they involve determination of suitable width of strips and of corrections at least for conspicuousness of birds and habitat variation. Thus, there are several aspects of the strip census which open results to some doubt. The caution necessary in drawing conclusions from such results is evident in Kendeigh's discussion. For counts of total populations, the strip-census method should be used only when plot censuses cannot be made.

Plot censuses, based on repeated coverage of a selected area, whether of single species or total populations, have thus far provided the only data satisfactory for sound comparative studies of species, populations, or communities. Here Kendeigh's discussions are best, and understandably so, since there is more promise in this method than in any other, and the author is able to discuss results thus far obtained with some confidence and to make recommendations with some assurance that these will lead to better results. Space limitations allow me only to mention that there are valuable discussions of counts of singing males, territory mapping, frequency of population counts, survey and designation of communities, size of sample plots, and nest counts. Population figures are tabulated from wintering- and breeding-bird censuses on an isolated tract of woods, 55 acres in size, near Urbana, Illinois. With these data Kendeigh illustrates certain problematical aspects of computing population densities. Forest-interior species should be separated from forest-edge species in order to arrive at a truer picture of the forest population. For plots surrounded by narrow edge communities, Kendeigh advises expressing densities as forest-interior birds per 100 acres plus forest-edge birds per mile. In areas where edge communities are broad, counts should be made on an areal basis. For species whose activities extend over several scattered habitats, as certain fringillids, blackbirds, corvids, and hawks, Kendeigh recommended that "sample plots . . . be large enough to include all the activities of all the species except possibly the larger predators." Kendeigh does not put this recommendation to use in any of his own calculations of total populations (see, for example, the Crow, Goldfinch, and Starling among breeding birds of the forest tract mentioned above, p. 93). I am somewhat doubtful about the practicability of this recommendation when one deals with total populations. As Kendeigh himself states (p. 71), "a single observer can usually census only a limited area during one season"; confined to a limited area, the investigator can do no more than segregate species using the area for all their activities from those using it only in part. In woodland areas of the Berkeley Hills near the University of California campus, for example, six species of finches (*Carpodacus* and *Spinus*) feed over scattered habitats even at the height of the breeding season; the area covered by activities of these species within a selected population, if determinable, would be altogether too large for a survey of the total population by one investigator. In the case of plot censuses of a single species, the problem is of course simpler; the size of the sample area can be adjusted according to the habits of the species.

There are a number of minor points of comment which might be added: Kendeigh presents a table (p. 89) of annual totals of nests on a 15-acre country estate in Ohio but does not indicate that any of these are second-brood nests, of which there is an appreciable percentage. The Woodcock, males of which use clearings as display territories, is listed (pp. 96, 98) as a "species known to confine all [its] activities to the forest." Ecological succession is again defined (p. 95) even though this concept is now discussed in most modern texts of elementary biology. But to dwell on such detail might lead to a wholly false impression. The volume of valuable data, the relatively brief, but in the main well-considered discussions, and the many sound recommendations make this an important paper. For all students of bird populations, Dr. Kendeigh's work will serve as a source of guidance and aid.—FRANK A. PITELKA.

Growing interest in the natural history of Pacific islands is furthered by a useful compilation of the avifauna of the Hawaiian Islands by E. H.

Bryan, Jr., and J. C. Greenway, Jr. (Contribution to the Ornithology of the Hawaiian Islands, Bull. Mus. Comp. Zool., 94, 1944:77-142). This paper consists of three parts: An introduction by Bryan deals with historical, faunal, and ecological aspects of Hawaiian bird-life. The main portion consists of a check-list including, beside the standard citations of original descriptions, vernacular names, and brief statements of general range, recorded range in the Hawaiian archipelago, synonyms in sources dealing with the South Pacific and Australian fauna, and occasional annotations. The last part is a commentary by Greenway on the genera of Drepanididae or honey-creepers; "no new facts are presented here," but the conclusions of earlier workers are examined critically in the light of their anatomical data and brief studies by the author. A new linear arrangement of drepanidine genera is suggested.

The Hawaiian avifauna now totals 232 species of which 104 are native, 94 introduced, and 34 vagrant. Of the native species, 77 are endemic, including about 45 species of honey-creepers. Many of the introduced species have not become established; 41 are so listed by Bryan. "So little field work has been done during the past 30 years that it is not wise to state what species are really extinct." The problem of foreign introductions is a serious one in Hawaii, and it is to be hoped that Bryan and Greenway's list will serve to focus more attention on this problem, directly and indirectly, by encouraging study of the present avifauna.—FRANK A. PITELKA.

MINUTES OF COOPER CLUB MEETINGS

NORTHERN DIVISION

APRIL.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, April 27, 1944, at 8:00 p.m., in Room 2503, Life Sciences Building, University of California, Berkeley, California, with President R. C. Miller in the chair and about 35 members and guests present. Minutes of the Northern Division were read and approved. Mr. Richard E. Genelly, 24 Morrill Court, Oakland, California, was proposed for membership by Mrs. Ruth Wheeler. Nominations were opened for the unexpired term of office of the recording secretary for the Northern Division. The name of Miss Alice Mulford was proposed by Alden H. Miller, seconded by Mrs. H. W. Grinnell. No other nominations were made, and Miss Mulford was elected to the office by vote of members present. Mrs. Kelly reported the following observations: at Bay Farm Island, Knots on April 16, Hudsonian Curlew on April 5, and Semipalmated Plover on April 26; at Ross Valley, Marin County, Black-headed Grosbeak on April 7; Gambel Sparrows last heard at Alameda on April 22. Frank Pitelka reported a single Vaux Swift present among Cliff Swallows near Life Sciences Building, Berkeley, on April 27.

The speaker of the evening, Mr. Ben Glading of the California Division of Fish and Game, discussed ecology and management of the California Quail. In the main, Mr. Glading's talk consisted of an enumeration, with comment, of problems presented by the complex interrelations of an animal such as the quail with its associates and general environment. Among the problems discussed at some length were methods of censusing and of analyzing quail populations.

Adjourned.—FRANK A. PITELKA, *Acting Secretary.*

MAY.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, May 25, 1944, at 8:00 p.m. in Room 2503 Life Sciences Building, University of California, Berkeley, with President Robert C. Minard in the chair and about 35 members and guests present. Minutes of the Northern Division were read and approved. Brother Andrew, F.S.C., Mont LaSalle Novitiate, Napa, California, and Fred G. Evenden, Jr., 521 Hayes St., Woodburn, Oregon, were proposed for membership by Alden H. Miller.

Alden Miller reviewed "The censory basis of bird navigation," by Donald R. Griffin (Quarterly Review of Biology for March, 1944, pp. 15-31). Walter Donaghho of Honolulu reviewed George C. Munro's "Birds of Hawaii" with illustrations by Y. Oda.

Mrs. Kelly reported a Ruddy Turnstone and two Wandering Tattlers at the Cliff House, May 7; at St. Charles St., Alameda, one Western Tanager, May 3, many, May 21; a Hooded Oriole, April 28-29 and again two weeks later; an Ash-throated Flycatcher, April 28; and on May 2 a Long-tailed Chat seen by Dr. and Mrs. Hamilton. Mr. Brighton Cain reported two Tanagers and a good view of a male Cowbird at Mosswood Park, May 20. Mr. Walter Donaghho told about and imitated birds he had seen on Guadalcanal.

The speaker of the evening, Dr. Robert T. Orr, Associate Curator of Ornithology and Mammalogy at the California Academy of Sciences, discussed "Some Observations on the Habits of the Sooty Grouse in California." After mention of the taxonomy and distribution of gallinaceous birds, Dr. Orr described the habitat of the Sooty Grouse in clearings, brush patches, and open conifer forests of localized mountain slopes and ridges in the Tahoe, Tuolumne, and Sonora regions. The seasonal variation in food habits, from the winter diet of conifer buds, needles, and seeds to the adult summer diet of fern fronds, grass seed, berries, and fruits was discussed.

Adjourned.—ALICE S. MULFORD, *Recording Secretary.*