REVIEWS

INTRODUCTION TO THE STUDY OF ANIMAL POPULATIONS. *By H. G. Andrewartha. University of Chicago Press, Chicago. 1961. 281 pp., figs., tables. $5.00.*

The title of this book is slightly misleading; one expects to learn about the structure and dynamics of populations, but instead is treated to a well-written, but rather disorganized, series of lecture notes on ecology. Unfortunately, most of the examples discussed are invertebrates, chiefly terrestrial forms. Possibly because of this fact, the methods given for estimating density and population size rely heavily on the use of quadrats, which are only occasionally useful for measuring fish populations. The author also discusses mark-recapture experiments, but the methods of analyses shown are not of the latest vintage.

The book contains many mathematical formulae which presuppose a high level of statistical training on the part of his readers. Despite this the author states: "If the 'patchiness' of the population follows a particular pattern it may be necessary to recognize this in placing the quadrats. The statisticians have developed a special technique which is called 'stratified sampling' to meet these requirements. But this is outside the scope of this book."

After discussing the Poisson series and the negative binomial for use when the variances are correlated with the means of the samples, he states that, "Larger samples will be needed for the same degree of accuracy when the variance is large than when it is small." This is in contradiction to the findings of Clyde C. Taylor (U. S. Fish and Wildl. Serv., Fish. Bull., 54(83): 145–166, 1953), who demonstrated in sampling heterogeneously distributed fish populations that: ". . . the variance may be reduced and the amount of information increased by decreasing the size of the observed mean, and it is suggested that this may be accomplished by reducing the length of tow and by reducing the size of the trawl net."

In the discussion of the dispersal of oyster and barnacle larvae he confuses turbulence with a laminar flow, saying (p. 51): "Certain barnacles and oysters that live in tidal rivers and estuaries have planktonic larvae whose behavior shows special adaptations which allow the population to persist in these places despite the fact that the net flow of water is outwards towards the ocean. Like the aphids, they make use of turbulence. The denser water near the bottom tends to have a net flow inland."

A strong attack is made on the theory of "density-dependent factors" in controlling population size. This is almost a mania with the author, yet surprisingly enough he has failed to cite much of the recent literature in support of the theory. He states (p. 169): "The 'theory' of 'density-dependent factors' has been the subject of a controversy in recent years. I shall suggest in section 9.34 that it should not be regarded as a scientific theory at all because its authors have underrated the empirical part of scientific method. This 'theory' is indeed more like dogma because it rests primarily on insight and deductive logic." He goes on (p. 181) with: "Scientific theory cannot be built directly from the conclusions of conceptual models. This is the chief mistake made by the adherents to the 'theory' of 'density-dependent factors.'" The proponents of the existence of density-dependent factors (for instance, Ricker, W. E., Stock and recruitment, J. Fish. Res. Bd. Canada, 11(5), 1954) will hardly be moved by the author's rather sweeping criticisms. Concerning experimental proof, the model of Ricker's reproduction curve has been shown to apply, for instance, to several decades of sockeye populations in the Karluk River system of Alaska (Rounsefell, G. A., U. S. Fish and Wildl. Serv., Fish. Bull., 58(130), 1958). Several "density-dependent" factors are shown to operate on this population.

The latter third of the book is a manual of experiments to be run by students as part of a laboratory course.

Because of the charming style, this book is well worth reading as an example of how usually boring details may be presented without losing the reader's attention.

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DESIGN OF FISHWAYS AND OTHER FISH FACILITIES. *By C. H. Clay. The Queen's Printer, Ottawa. 1961. 301 pp., figs., tables. $5.00.*

As a text for the university student studying advanced fishery techniques and for the advanced fishery worker who may have only occasional fish passage problems, this book is an excellent reference. It is of considerable value to the professional in this field as a compact, ready reference to details and dimensions of facilities with which it is assumed he is already familiar, since it covers a large proportion of existing water projects involving fish passage.

As would be the case with any book written currently in this rapidly developing field, some of the premises and formulae, such as that for computing fishway capacity, are already obsolete. The book is written in a straightforward fashion by an engineer closely associated with biologists in this field. The writer occasionally editorializes, reflecting popular opinions among biologists, but in general the book is quite factual. The author treats facilities for upstream-migrant fish in general, at natural obstructions, and at dams; discussing vertical-slot, denil, weir-and-pool, and lock-types of fishways. He discusses the problems involved: History, legal considerations, biological data, engineering surveys and field work, effects of dam operation, the importance of fishway entrances, various types of collection systems, and fishway exits. Also treated are weirs and barrier dams for counting upstream- and downstream-migrant fish, fish screens for the protection of downstream migrants, diverters of various types, artificial outlets for downstream migrants, artificial spawning channels, and devices for the capture of migrating adult and juvenile salmonids for experimental purposes, such as fish wheels and inclined-plane traps. What could be considered an omission is the lack of any reference to facilities, techniques, or devices for the electrical, mechanical, or photographic enumera-