

STOCHASTIC MODELS IN ANIMAL POPULATION ECOLOGY

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1. Introduction

A fundamental problem of animal ecology is the distribution and abundance of animals, the title that Andrewartha and Birch [1] chose for their important textbook on the subject.

At the outset Andrewartha and Birch specify that an animal ecologist needs to be a careful naturalist, an able experimenter and have "a sound working knowledge of statistical methods." This order is in fact suggestive of the evolutionary development of ecology—beginning with description, moving on to experiments mostly though not entirely in the laboratory and now turning more and more to statistical methods to analyze experimental results and to evaluate field data.

Statistics might be thought to include the development of mathematical models. Andrewartha and Birch presumably do not—they seem more hesitant about such models and stress the possibilities of their being misused. On the other hand, one should not interpret their warnings as an injunction against the use of mathematical models for they open their second chapter with a quotation from Plato to wit "He who would be truly initiated should pass from the concrete to the abstract, from the individual to the universal."

An even more pessimistic view of the use of mathematical models particularly in the social sciences but also in the biological sciences is expressed by Hajnal [18]. For some contrary views reference is made to some of the discussants of this paper (particularly Skellam and Scott). Scott particularly points out the distinction between interpolation and structural models.

Nevertheless, structural models are the abstraction which may lead us to a more complete understanding of our universe. Even the pessimists who point to the large gap between the simplicity of most mathematical models and the complexity of the real world must admit that this is the long run solution to the problem of understanding. But the simpler models of the present time are a necessary stage in the building up of more complicated models. Furthermore, the models that we are constructing are of great value in clarifying basic concepts and assumptions for a structural model can be constructed only when there is a clear understanding of the fundamental elements and a clear formu-

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