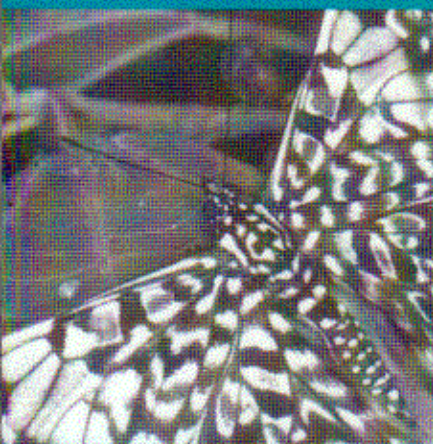


Oxford Series in Ecology and Evolution
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Random population fluctuations have fundamental consequences in both pure and applied ecology. This book introduces demographic and environmental stochasticity, and illustrates statistical methods for estimating them, using field data from bird and mammal populations and insect communities. The long-run growth rate of a population is explained and extended to age-structured populations. Diffusion approximations show how stochastic factors affect extinction in single populations and metapopulations. In populations with discrete annual reproduction, delayed density dependence can be estimated from time series of adult numbers combined with basic life history data. The spatial scale of population fluctuations and local extinction risk depends on the scales of spatial environmental autocorrelation and individual dispersal, and the strength of density dependence. Stochastic dynamics and statistical uncertainty in population parameters are incorporated in population viability analysis and sustainable harvesting. Statistics of species diversity measures and species abundance distributions are described, with implications for rapid assessment of biodiversity. Methods are developed for partitioning species diversity into additive components. Analysis of stochastic community dynamics in space and time indicates that real communities are far from neutral.

Cover photograph: The widespread Neotropical fruit-feeding butterfly, *Hamadryas amphinome* (Nymphalidae) basking along a forest edge. Photograph courtesy of Philip DeVries.

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