

black 3135C

Oxford Series in Ecology and Evolution  
Edited by Paul H. Harvey and Robert M. May



**Russell Lande** is Professor of Biology at the University of California San Diego

**Steinar Engen** is Professor of Biostatistics at the Norwegian University of Science & Technology, Trondheim, Norway.

**Bernt-Erik Sæther** is Professor of Biology at the Norwegian University of Science & Technology, Trondheim, Norway

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: Courtesy of Philip J. DeVries

**OXFORD**  
UNIVERSITY PRESS

[www.oup.com](http://www.oup.com)



O S E E

Lande  
Engen  
Sæther

Stochastic Population Dynamics in  
Ecology and Conservation

OXFORD

# Stochastic Population Dynamics in Ecology and Conservation

Russell Lande  
Steinar Engen  
Bernt-Erik Sæther



OSEE

OSEE

Oxford Series in Ecology and Evolution