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Introduction to Modeling in Wildlife and Resource Conservation

BY NORMAN OWEN-SMITH

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This book outlines how to build, test, revise and apply models for wildlife management. It is conceived around a course for postgraduate students with no previous experience in modelling. It represents a continuation of the philosophy of model building begun by Tony Starfield and his collaborators. In that vein, it emphasizes how to build effective models with a minimum of fuss.

The book's pedigree as a teaching manual is evident in the structure and organization. It takes the reader from very simple models, through increasing levels of detail, finishing with applications that illustrate some relatively complicated real-world problems and their solutions. Throughout the book, Owen-Smith asks the reader to question and test assumptions. Guidance on implementation of ideas and other insights are provided in appendices that accompany most of the chapters. The book also comes with software that implements the functions and case studies.

After a brief introduction outlining the philosophy of the book, Owen-Smith poses an innovative challenge, asking the reader to solve a problem without using equations or computers. The first half of the book then covers standard population biology topics including exponential growth, various forms of density dependence, age and stage structured models, consumer–resource models and harvesting. The approach is to build plausible dynamic, deterministic versions and then to add variability and other nuances that illustrate pertinent features.

The second half of the book is devoted to population viability, metapopulation dynamics, infectious disease models, scenarios, vegetation and community dynamics, and species responses to habitat variation (termed habitat suitability models). The book finishes with a short treatment of model evaluation including qualitative assessment of pattern, statistical fit of explanatory variables and AIC.

Overall it is a very good book, but I have a few minor complaints. The treatment of uncertainty is superficial, compared to the thoughtful and insightful treatment given to the dynamic equations. The software interface is not pretty, it is easy to specify unreasonable values (for example survivorships > 1) without the error being trapped, it is easy to generate run-time errors and several of the graphs seem to plot oddly. I was left wondering if perhaps it would have been sufficient to rely on the spreadsheet examples described in the appendices.

These are minor issues that do not detract substantially from the book's value as the basis for a course on models for conservation. The book is nicely produced and well written. It is well organized and the progression of material is generally very good. Owen-Smith's enthusiasm for the material and his skill as a teacher make it accessible and interesting. It is a worthy addition to the conservation literature.

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Noninvasive Survey Methods for Carnivores

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Mammalian carnivores are a difficult group of species to study, as they tend to be rare and secretive. Traditionally most studies of carnivore ecology used methodologies that required physically capturing individuals (so called 'invasive' techniques), with additional data deriving from either radiotelemetry or recapture events. Problematically, such approaches often resulted in studies that focused on just a few individuals or on relatively small spatial scales. Gaining a better understanding of these species and their role in the broader community was often hindered by a lack of financial resources to study more animals over a broader spatial scale. Furthermore, even when researchers have mustered these financial resources, in many parts of the world legal, social and moral norms made studies that require the physical capture of carnivores difficult, if not outright impossible, to conduct.

In an attempt to overcome these limitations, carnivore biologists have been at the forefront of efforts to develop new techniques to study these animals without having to physically capture them. These 'non-invasive' techniques derive from modifications to ancient methods, such as spoor identification and animal tracking, as well as adaptations of the latest molecular genetic fingerprinting technology. Because of the increased opportunities to gain novel insights on an enigmatic group of species, there has been an exponential growth in the refinement and use of non-invasive techniques. Yet with this growth has come concerns, voiced especially by those who are more attuned to the strengths and limitations of noninvasive techniques. As these methods are being increasingly used, many researchers are at fault for either using the techniques inappropriately and drawing flawed conclusions, or failing to gain the most from their datasets.

It is such concerns that are an important driver for this edited volume, which brings together carnivore researchers from the USA and Canada to discuss the nuances of non-invasive techniques from a field and data analysis perspective. Twelve chapters focus on such topics as survey design, specific non-invasive methods (such as track stations, remote cameras, hair collection, snow tracking, scat surveys and scat detecting dogs), laboratory techniques and approaches to data analysis. Discussions of the individual techniques make up the bulk of the volume and the detailed explanation of both the theoretical underpinnings as well as practical field considerations in the use of the techniques will be much appreciated by researchers who consider using these methods. However, an important drawback of this book is that the focus is limited to North American carnivores. This is unfortunate, as much of the early development and scientifically rigorous application of non-invasive techniques for carnivore population surveys and density estimates stem from work in Asia, Europe and Africa. Furthermore, it is in some of these developing countries that non-invasive techniques for monitoring carnivores are most crucially needed because of the difficulties in conducting invasive research. Although the theoretical aspect of the survey techniques may remain the same, the practical application in some of these regions may differ vastly due to differences in local field considerations.