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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.

This volume derives from a conference held in mid-2005. Given that three years have passed, and given that techniques rapidly evolve, is the work up-to-date? If the goal of a reader is to gain a basic feeling for how to conduct a non-invasive study and to better understand the problems that are intrinsic to non-invasive work, then yes, this book is a good place to start. However, if the reader is searching for the best technique, a trip to the primary literature and conversations with researchers already applying these techniques would be well advised. For example, researchers new to the field would be hard pressed to find film cameras that generated much of the insights discussed in several chapters. Furthermore, readers will still have to think long and hard about how to analyse the non-invasively generated data. Sophisticated approaches are often necessary, especially where multiple techniques are used, since different techniques result in different detection efficiencies and biases that need to be treated as covariates when modelling the response variable of interest. While the editors and authors recognize the changing nature of these techniques, and go to great effort to emphasize what the future might bring, readers must nonetheless recognize that the application of these techniques and the assessment of the non-invasively generated data are becoming increasingly sophisticated, and as such a reliance on this book alone is not a good idea. Rather, this volume should be treated by readers as a good first step to gaining an overview of the use of these non-invasive techniques.

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Oil, Water, and Climate: An Introduction

BY CATHERINE GAUTIER

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 paperback, GB£ 24.99/US\$ 49.00, Cambridge, UK: Cambridge
 University Press, 2008

Catherine Gautier offers an encompassing and integrative text on climate change suitable for a variety of undergraduate courses and non-academic audiences. The first chapters provide a general overview of global warming, its causes and some of the more significant anticipated consequences, particularly those related to water resources. The first chapter ('Understanding Earth's temperature') provides a very good account, not only of the data supporting the conclusions drawn by climate scientists, but also how the data are analysed and the frameworks with which those scientists interpret those data.

Gautier then moves on to more substantive chapters, beginning with population growth and its relationship to environmental wellbeing. This is followed by a detailed descriptive account of the global carbon cycle. Gautier then devotes a set of chapters to global fossil fuel supply and demand, and the implications of a likely peak in oil production for both climate change and society, including a closer look at the transportation sector, the primary consumer of oil. With the exception of a few misnomers, such as the prediction that oil prices will increase dramatically in direct response to Peak Oil (in reality commodity prices of petrochemicals fluctuate wildly, only in

part as a response to supply signals), this section provides a very well-informed discussion of oil. This set of chapters then concludes with the obligatory comparative analysis of energy alternatives, which is refreshingly critical and realistic, and lacking in the normative undertones that can infiltrate similar analyses.

The book then moves into a detailed account of the water cycle and its integral relationship with climate, including a valuable overview of global consumption, the distribution of fresh water access and a lengthy discussion of the role of dams in energy production and climate. Gautier's passion for water issues emerges here, with an entire chapter devoted to water pollution, health and treatment mechanisms, followed by an encouraging account of international water governance and opportunities for conservation and efficiency.

The final section of the book returns to climate change and global warming, providing a synthesis of the evidence accumulated to date, and then turning to climate modelling and feedback mechanisms. The author is careful to delineate, and differentiate, areas of confidence, as well as complexity and uncertainty in climate science. The concluding chapter should come as no surprise. Gautier urges immediate action, emphasizes that even under the most optimistic of mitigation scenarios adaptation will still be needed, technology alone will not be sufficient, and calls for leadership and education.

I commend the author's effort to integrate several coincident, but inevitably inter-related factors into climate change analysis, such as, for example, Peak Oil, poverty and fresh water access. The chapters on oil supplies and politics and their relationships with climate change are particularly insightful, drawing links between human addiction to oil and, for example, resource dependence, security, violence and poverty. In other places, however, extensive descriptions of, for example, pollution abatement and water treatment plants have a tendency to be diversionary, with perhaps a paragraph or two at the end on their relevance to climate change. The inclusiveness of the book also means that a number of complex concepts tend to be treated superficially, such as gender, justice and governance. Ultimately, population is given a central place in the analysis, to the detriment of equally relevant causal mechanisms such as emission disproportionality, culture and political process; these are mechanisms that are acknowledged throughout the text but are ultimately treated as secondary to Malthusian drivers.

Oil, Water, and Climate is far more integrative than most texts on global warming, without sacrificing approachability, and for this reason, I would recommend it as a useful read. The writing is a bit clumsy in places, and some graphics are not well integrated with the text, but overall Gautier has a talent for breaking down complex scientific subjects for the non-scientific reader. There is an evident frustration expressed by the author, who is joined by many others, regarding the lack of political response to what is a growing sense of urgency among the scientific community. Rather than simply additional calls for leadership, however, this frustration should inspire greater levels of attention to processes of political decision-making, which I hope defines the future direction of climate scholarship.

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