

Monitoring Animal Populations and Their Habitats: A Practitioner's Guide.

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BOOK REVIEWS

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Monitoring Animal Populations and Their Habitats: A Practitioner's Guide.—Brenda C. McComb, Benjamin Zuckerberg, David G. Vesely, and Christopher A. Jordan. 2010. CRC Press, Boca Raton, FL. 296 pp. ISBN-978-1-420-07055-2. \$89.95 (hard cover).

Monitoring Animal Populations and Their Habitats: A Practitioner's Guide is a must-read for any wildlife professional or student engaged in avian conservation and monitoring. The authors attempt to address a suite of vertebrate populations in upland habitats, but they tend to emphasize bird populations within forested habitats. Throughout the 15 chapters, the authors regularly prod the reader to consider the decision context within which any monitoring program must be embedded. They repeatedly urge readers to place monitoring into an adaptive framework (thereby treating management actions as hypotheses) to incorporate learning into management processes and reduce uncertainty when detecting an ecosystem's or indicator species' responses to management.

The introduction provides a thorough context for the rest of the book and makes great use of timely and relevant examples to illustrate the importance of developing a detailed monitoring program that clearly outlines cost and resource needs. The authors recommend that readers incorporate monitoring into adaptive resource planning and management processes up front rather than treating it as an afterthought. They also recommend that the reader use monitoring data to develop hypotheses for more in-depth research to inform strategic management decisions with a predicted likelihood of success. Interestingly, they also suggest that the buck ultimately stops with societal values, since society “grant[s] us social license to manage animals and their habitats.” So often we think of bird-population objectives as the overarching goal for conservation and monitoring, but it's useful to be reminded that we have bird-population objectives because bird biodiversity has social value. Certainly we should be mindful of this important context when developing products and messages from well-executed monitoring programs (such as the U.S. State of the Birds Report; <http://www.stateofthebirds.org/>).

In Chapter 2, “Lessons Learned from Current Monitoring Programs,” the authors illustrate the strengths and shortcomings of several well-known monitoring programs and citizen-scientist activities such as the North American Breeding Bird Survey and New York Breeding Bird Atlas. Although their examples vary from monitoring contaminants to monitoring elephant populations in remote African forests, they illustrate the need for “careful planning, committed individuals, and thoughtful sampling design and analysis... [to] answer critical questions and thereby advance conservation goals” (p. 34). Chapter 3, “Community-based Monitoring,” left me with an indelible impression about the importance of engaging community members or citizen scientists early and often when they

are the target audience of a monitoring program or the intended recipients of key messages. The authors thoughtfully anticipate concerns about maintaining statistical rigor in data collected by community members and suggest that mandating the collection of excellent metadata throughout can reduce bias or at least allow researchers to account for variation within the data. However, I would have benefited from further discussion about we can avoid overtapping citizen scientists by increasingly relying on them to accomplish our monitoring needs or suggestions for improving retention of volunteers beyond three to five years in a given program.

Because “the objectives serve as the foundation of the monitoring program” (p. 64), I recommend a thorough read and re-read of Chapter 4, “Goals and Objectives Now and into the Future,” before development or revision of any monitoring plan. After distinguishing between targeted and surveillance monitoring, the authors recommend incorporation of stakeholders' objectives and information needs (along with a willingness to share existing data) at the very beginning of a monitoring program's development. In order to develop adequate statistical rigor, agree on the types of analyses to be used, and ensure sampling at the appropriate scale, a conceptual model is needed to ensure that monitors and conservation practitioners understand population persistence, influences of scale, and potential effects of any management. One of the most important take-home messages can be found on pages 74–75, where the authors provide excellent guidance for selecting which species to monitor.

Chapter 5, “Designing a Monitoring Plan,” outlines processes for designing monitoring plans that range from incidental observations to monitoring of status and trends and of cause and effect. They provide recommendations and cautionary notes for each type of monitoring program, in addition to appropriate questions to address with each approach. They also provide excellent step-by-step guidelines for ensuring a random sample, selecting indicator species, selecting sample sites, incorporating detectability, and consulting with a statistician to determine both the effect size and appropriate statistical analyses. Chapter 6, “Factors to Consider When Designing the Monitoring Plan,” includes aspects of future analysis and data interpretation. The authors provide further detail about the importance of understanding detectability, estimating variance and sample size, cost, stratification, and peer review.

The authors then use Chapters 7–9 to move from planning to implementation of a monitoring program. Chapter 7, “Putting Monitoring to Work on the Ground,” should serve as a handy checklist to help the reader avoid missteps when selecting a sampling scheme; planning for safety, adequate resource acquisition, and compliance with permits and regulations; scheduling and training personnel; and developing standard operating procedures to ensure data quality control, standardization of

critical data fields, and reducing likelihood for observer error. Although not mentioned in their text, the Birder Certification Online program (<http://www.birdercertification.org/>) provides a rigorous method for verifying observers' audio and visual field identification skills. Chapter 8, "Field Techniques for Population Sampling and Estimation," provides a comprehensive review with case studies balanced among herps, birds and mammals. Chapter 9, "Techniques for Sampling Habitat," rounds out the implementation section of the text by detailing techniques for habitat sampling, with particular attention paid to metrics for forests. Regardless of the technique, readers are repeatedly reminded to standardize approaches and minimize bias in any method of sampling.

Chapters 10–13 blend database management, data analysis, reporting, and use of data in decision making. Database management can be a nuisance afterthought, but neglecting this step can undermine the entire monitoring program. Although it is not discussed in this text, I would refer readers to also review a guide to data management developed through the North American Bird Conservation Initiative's Monitoring Subcommittee (Martin and Ballard 2010). Chapter 11, "Data Analysis in Monitoring," serves as a great overview or refresher for understanding different data distributions, visualization techniques, modeling approaches, and methods for inference. Readers may be inclined to skim over Chapters 12 and 13 ("Reporting" and "Uses of the Data," respectively), but I encourage all to read these chapters thoroughly, even if they participate in collection of field data only. Monitoring is not only about the collection of data in a standardized, objective-driven, and ethical way, it is about thoughtful and timely delivery of the information in a readily digestible manner. Personally, I would have preferred that Chapters 12 and 13 be combined under a heading "Informing Decisions with Monitoring Data," to help bridge the gap between science and implementation that is so often encountered in wildlife conservation. The authors provided an adequate overview of uses for monitoring data (i.e., forecasting trends over space and time, parameterizing models, identifying triggers for changes in management), but these topics should have received greater emphasis earlier and throughout the text.

In keeping with their recommendations for maintaining the context of adaptive management, the authors conclude with recommendations for changing the monitoring approach as needed. Unfortunately, monitoring-program coordinators can fall into the trap of continuing a monitoring program as is, even if its objectives are no longer being met. The authors provide helpful guidance for making necessary changes in a thoughtful manner. In the final chapter, they forecast the future of monitoring, which may include such efforts as more genetic monitoring, increased reliance on remote sensing and the Internet, better quantification of uncertainty, and integration with economic, social, and mathematical systems.

Monitoring Animal Populations and Their Habitats: A Practitioner's Guide nicely complements other contemporary guides to bird monitoring (NABCI 2007, Northeast Coordinated Bird Monitoring Partnership). While my vested interest in reading this text was to help me guide partnerships for informing bird conservation through monitoring, this text is also well-crafted to be relevant to undergraduate and graduate students in wildlife biology at the onset of their careers. I really appreciated the opportunity to review this well-thought-out text, and I will keep it within easy reach throughout the rest of my career!—KATIE KOCH, U.S. Fish and Wildlife Service Division of Migratory Birds, Marquette Biological Station, 3090 Wright Street, Marquette, MI 49855. E-mail: katie_koch@fws.gov.

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Energy Development and Wildlife Conservation in Western North America.—David E. Naugle, editor. 2011. Island Press, Washington, DC. 305 pp. ISBN-13: 978-1-59726-658-1. \$40.00 (paperback).

Second only to agriculture, energy development affects more wildlife than does any other human activity, so it is ironic that few volumes have focused on the results of the development of coal, natural gas, oil, wind, hydro, biofuels, and other energy sources. *Energy Development and Wildlife Conservation in Western North America* (hereafter *Energy Development*) is one of the first efforts to review the effects on wildlife of energy development, as well as to examine the approaches used to study, assess, and mitigate those effects. Rather than being a comprehensive review, this compendium is a readable and informative overview of the topic and provides a solid foundation for future research.

Energy Development was written by authors from a diversity of federal and state wildlife agencies, nonprofit conservation organizations, and a very few consulting groups. These include the U.S. Fish and Wildlife Service, Environment Canada/Canadian Wildlife Service, The Nature Conservancy, Partners in Flight, Colorado Department of Wildlife, Ducks Unlimited, and the universities of Northern British Columbia, Alberta, Montana, Wisconsin, New Mexico and Quebec. Consultants from companies working in the energy industry came primarily from Wyoming Wildlife Consultants and Western EcoSystem Technology. What is just as impressive is the variety of disciplines represented among the authors, including zoology, ecology, plant ecology, wildlife management, and law. The virtual lack of representation from the actual industries that develop energy facilities suggests some bias, although such a bias was not really apparent to me. (In the interest of disclosure, this reviewer has consulted for the wind-power industry for more than 15 years.) Perhaps an industry perspective is not important for the present volume, although implementation of its suggestions and recommendations will depend on the industry's input and cooperation, and the industry's managers certainly need to be educated.

Energy Development is organized in three parts: an overview of energy development, biological responses, and conservation and planning. Integrating these three areas required a massive effort by the editor, David Naugle, integration thoughtfully accomplished by division of each part into chapters that focus on specific issues or types of wildlife. The chapters'