



Energy Development and Wildlife Conservation in Western North America.

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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'

authors review effects as diverse as collision fatalities, habitat destruction and modification, edge effects, noise pollution, vehicle disturbance, mowing, death in oil pits, and introduction of invasive plants, among others.

While not exhaustive (which would require a set of volumes), the chapters provide excellent accounts of the issues and what we know about effects on particular groups or species of wildlife. Topics such as the geography of energy development, adaptive management, forecasting energy development, community-based landscape conservation, and cumulative effects are given their due in several chapters. The remaining chapters focus on individual species or groups of animals for which there is concern or existing information about effects from energy development. Sections or chapters on ungulates such as the woodland caribou (*Rangifer tarandus caribou*), the grizzly bear (*Ursus arctos*), songbirds, sage-grouse, invasive plants, and others are interesting and hold the reader's attention.

Avian biologists will likely be most interested in the chapters on sage-grouse (Chapter 4), songbirds (Chapter 6), and wind power and biofuels (Chapter 8). That on sage-grouse provides details of extirpations caused by the long history of oil and gas development and potential displacement by more recent plans for wind-power development. The lesson from oil and gas development, that areas of core populations must be protected, can be used to plan where and how large wind-power facilities may be located without extirpating the species from large areas of the West (Chapter 8).

Chapter 3, "Unifying Framework for Understanding Impacts of Human Developments on Wildlife," may be one of the more important chapters, especially for those new to energy issues. It provides a brief review of the approaches to understanding and studying the effects of energy development. Although known by many who work in the field, the discussion of the biological scale of effects (behavior; physiology/energetics/nutrition; population responses to cumulative effects; community responses to cumulative effects) is a solid primer for those who have little or no background in this field, as well as remedial reading for those of us who work in it. The chapter also provides a good introduction to the methods and scale of studies necessary to understand the effects of energy development.

Whereas chapters like those on sage-grouse, ungulates, songbirds such as the Ovenbird (*Seiurus aurocapilla*), grizzly bears, and invasive plants will be of particular interest to biologists, conservationists, agency staff, and students, the chapters on "forecasting energy development scenarios to aid in conservation

design" (Chapter 10) and "community-based landscape conservation" (Chapter 12) will be especially useful to agency staffers and those working in the nonprofit conservation arena.

Perhaps a more important audience for *Energy Development* than wildlife agency staff and the conservation community are the energy developers, and federal, county, and state planners (not biologists) who are actively developing or permitting natural gas or wind-power projects. It is unfortunate that there appear to be no mechanisms in place to reach this audience so that they can proactively gain insight into how they may work with agencies to develop their projects in places where effects can be lessened or to develop mitigation plans that are meaningful. This book would undoubtedly help them in their efforts to develop energy facilities responsibly.

As necessary for a successful book of this type, the literature cited is extensive, reflecting the immensity of the task of reviewing the effects of energy development, especially as this book focuses only on western North America.

The concluding chapter examines practical, potentially win-win solutions for people and wildlife through community-based landscape conservation. The authors maintain that this approach will bring cooperative, societal benefits through "partner-centric" approaches rather than through "biologist-centric" approaches. Instead of a "no" approach to energy development, the authors make a case for an approach that emphasizes "where" to develop. They explain that a "people approach" to landscape conservation is paramount and that "working with people to maintain rural ways of life that are compatible with biological goals" will promote development that is less destructive to wildlife and humans.

Energy Development left me wanting more. This is a compliment. A sequel focusing on eastern North America would certainly be welcome and useful. This book is also a starting point for comparing the effects on wildlife of the various forms of energy generation so that use of fossil fuels, wind, and other sources of energy may be wiser in the future.

Overall, *Energy Development* is a fine introduction to the major issues of energy development and its effects on wildlife. I found little to criticize in this well organized and timely volume. Anyone interested in the rapid development of wind power, not to mention the continuing development of natural gas, oil, and coal, will find this book interesting and, perhaps, the best introduction to the topic.—PAUL KERLINGER, Curry & Kerlinger, LLC, P. O. Box 453, Cape May Point, NJ 08212. E-mail: pkerlinger@comcast.net.