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12-2016

Review of *Estimation of Parameters for Animal Populations: A Primer for the Rest of Us* by Larkin A. Powell and George A. Gale

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Post van der Burg, Max, "Review of *Estimation of Parameters for Animal Populations: A Primer for the Rest of Us* by Larkin A. Powell and George A. Gale" (2016). *The Prairie Naturalist*. 11.
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Estimation of Parameters for Animal Populations: A Primer for the Rest of Us. Larkin A. Powell and George A. Gale. 2015. Caught Napping Publications, Lincoln, Nebraska, USA. 239 pages. \$17.50 (paper) or free online PDF (<http://larkinpowell.wixsite.com/larkinpowell/estimation-of-parameters-for-animal-pop>). ISBN: 978-329-06151-4.

“Me? A modeler? *Never!*” This is the opening challenge of the book, *Estimation of Parameters for Animal Populations: A Primer for the Rest of Us*, by Larkin Powell and George Gale. I say “challenge” because I think this book attempts to challenge the misconception that quantitative methods are out of reach for most biologists and wildlife scientists. When many of us attend college or graduate school to study wildlife science there’s a sense that, at some point, there will be math. But it appears that the attitude of many students toward this reality is to simply suffer through the math, quickly forget it, and then move on. That is, until they encounter it again on the job. As a person who started out their professional life in a non-quantitative way, but later learned how to think quantitatively, I assure you that it is possible to learn this stuff. You just need the right resources. For students, this might mean seeking out the right teachers, whereas practicing wildlife professionals may have to rely more on books. The problem is that there aren’t many easily accessible books available on this topic for those who want to learn, but really cannot devote their time to a Ph.D. in statistics.

Powell and Gale’s book sets out to remedy this. The first part of the book is dedicated to understanding many of the basic quantitative estimation concepts that a wildlife professional might encounter. These include concepts such as maximum likelihood and variance estimation. While these may seem like esoteric topics to those who do not think of themselves as modelers, many of these concepts underlay the process of estimating fundamental population parameters, like abundance or survival. By way of full disclosure, I was a student in Dr. Powell’s research lab, and I have to admit that I was passingly frustrated by the fact that concepts that took me years to learn were explained so simply and clearly in this section of the book. This is not to say that these concepts aren’t still complicated, but that the authors present intuitive explanations of what these concepts mean without requiring large effort on the part of the reader. Thus, we should thank Powell and Gale for investing their time in trying to lessen the work of learning these concepts.

The second section does get a bit more complicated. It’s focused more on the types of models used with marked animals. While the authors admittedly did not cover many of the newer developments in mark-recapture models, their explanations provide the reader with information on how marked population data are generated and subsequently analyzed. Their approach to explaining the analytical models addresses one of my main frustrations in recommending resources to those who want to learn how to estimate population parameters. If I might contrast for a moment: many of the other

text books available on this topic make a tacit assumption that people understand that the model structure reflects the assumed process that generated the observed data. Powell and Gale’s explanations of these models do not make this assumption, but rather explain this outright. This approach promotes the idea of thinking about the data first and then picking the simplest model possible to represent those data.

The third and final section of this book is focused on that mainstay of wildlife research, the survey. This is, in my opinion, where wildlife scientists experience a lot of grief in terms of design and analysis. While Powell and Gale do provide a little guidance in terms of choosing survey methods, their real point is to provide the reader with the tools to *think* about surveys. What I mean by this is that readers won’t necessarily learn about how to best design a survey. But it will encourage readers to think critically about what questions they are trying to answer and whether one is collecting data to estimate population size or an index of population. Again, many other texts simply make the assumption that practitioners already understand these key differences, have properly designed a survey, and are simply looking at methods to estimate something. The remainder of this section focuses on simple estimation techniques assuming perfect detection of subjects and slightly more complicated models for dealing with cases of imperfect detection.

Powell and Gale state in the introduction that they are visual learners, and so they use quite few a graphical representations of concepts, which I think adds to the interpretability of their explanations. They also provide lucid textual explanations for more verbal-linguistic learners. This is really one of my main criticisms of the book. Many of us learn by going to the text, trying out the concepts, failing at the application, and then going back to the text to see what we did wrong. To that end, this book provides some but not enough opportunity for practice. This is not to say that there aren’t some exercises—there just aren’t as many as I would have liked. This may be a moot criticism, however, given that a quick internet search turns up exercises on many of these topics. But those aren’t necessarily expressed in the same terms used by Powell and Gale. Be that as it may, I would still highly recommend this book as an introductory text for biologists and students wishing to expand their quantitative toolbox.

There is one last thought that deserves mention about this book. The authors have laudably distributed this book free of charge in electronic form. Their goal here is to provide the book as a resource for people who may not be able to afford texts on quantitative analysis, especially in developing countries. Likewise, if you desire a hard copy of the book, the charge is relatively nominal because the publisher only charges for the costs of printing the book. This means that you have one less excuse to not begin the process of becoming quantitatively literate.—*Max Post van der Burg, Research Ecologist, U.S. Geological Survey, Northern Prairie Wildlife Research Center, 8711 37th Street SE, Jamestown, North Dakota 58401, USA.*