Introductory Fisheries Analyses with R. D. H. Ogle. 2016. CRC Press. ISBN 9781482235203. 317 p. $79.95 (hardcover).—The R programming language (R Core Team, 2016) has rapidly become the standard for fisheries scientists and ecologists to manage their workflow from data input to analysis, statistics, and the creation of beautiful graphics. The key reasons for its success are that R is free and open source, and well-written R scripts allow anyone to completely and easily reproduce your results. Indeed, I tell people that between coauthor revisions, finding mistakes, and reviewer comments, they will certainly rerun their entire analysis at least ten times before it is published—and this is easy to do when the entire analysis is coded in R. The main drawback to R is the somewhat steep learning curve, especially for those scientists who have never programmed before. Nevertheless, R programming is becoming such an essential skill that in our school we offer introductory R courses to our incoming fisheries graduate students (and many from other departments take these courses too). However, despite good online sources, there really is not a good textbook for beginners that covers the range from the skimpy and introductory Beckerman and Petchey (2012) to the more advanced Matloff (2011). The newest claimant to fill this gap is *Introductory Fisheries Analyses with R* by Derek H. Ogle, a professor of mathematical sciences and natural resources at Northland College, Wisconsin.

The book itself aims to teach practicing fisheries scientists and graduate student how to conduct a suite of introductory fisheries analyses, which it does well. One feature of the book is extensive reliance on the author's own R package FSA, which has the benefit of simplifying analyses but the cost of being tailored to offering specific solutions to specific problems. The book goes through an all-too-brief introduction to R, a great overview of data loading and manipulation, gives some instruction on plotting, and then moves to fisheries-specific topics: age validation, age-length keys, length frequencies, length-weight relationships, fish condition, mark-recapture abundance, mortality, individual growth rate, and recruitment.

Of particular interest to me was the section on data loading and manipulation, which makes extensive use of the R package dplyr, as well as magrittr and tidyr. The author excels at clearly explaining and demonstrating how to use the %>% operator from dplyr to combine data manipulations together using intuitive syntax. For example, he presents a single easy-to-read R command over several lines that does all of the following: read in a data frame, extract the rows for a particular species, remove unneeded columns, calculate log-length, store log-length in a new column, and sort the data by ID and length. Reading this chapter left me convinced that data manipulation should be taught first using dplyr instead of my current focus on teaching this using base R functions.

Another area of great value is the last half of the book with estimation of various fisheries quantities such as length-weight, individual growth, mortality, and recruitment. Here there is a good blend of examples, statistical background, and how to solve each problem in R. In some places, though, there is considerable reliance on using the functions in FSA instead of teaching readers how to code and solve questions in general.

My hope in getting this book was that I would be able to hand it out to students with no prior programming or R knowledge and let them teach themselves R. Here the introductory chapters could have been greatly expanded. In my experience, R novices struggle most with how to get started, and later with writing loops and functions. These topics are only briefly described. Later in the book, I wished

that two advanced topics had been covered so that I could use this as a textbook for my advanced fisheries modeling class: how to model marine protected areas with fishing, and how to calculate maximum sustainable yield. These additional chapters would have taught the skills and intuition to understand how fisheries management works, as well as advanced programming skills involving nested loops, user-defined functions calling other functions, and the judicious use of large matrices.

Nevertheless, this book is a valuable addition to add to the arsenal of budding fisheries scientists, even if (very selfishly speaking) it does not quite meet my needs for an introductory book suitable for R novices in fields outside fisheries.

LITERATURE CITED

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