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# BOOK REVIEWS

**Fisheries Science: The Unique Contributions of Early Life Stages.** *Edited by L. A. Fuiman and R. G. Werner. Iowa State Press, Ames. 2002. 326 pages. $52.99.*

L. A. Fuiman and R. G. Werner have successfully assembled a number of experts to produce a comprehensive book that addresses the majority of relevant concepts, subjects, and processes important to the study of early life stages of fishes and fishery science. *Fisheries Science* is intended for upper level undergraduate and graduate students. It is well illustrated; subjects are presented in a logical order; and most chapters are well written, although not always consistent in style.

The book begins with a review of the biological aspects of fish eggs and larvae (Chapter 1 by L. A. Fuiman), that highlights their striking differences with juveniles and adults in respect to structure, size, and the speed at which ontogeny and growth can occur. This introduction is followed by a review by C. M. Jones of age and growth in the light of salient and subtle methodological issues.

From here, the book addresses the ecology of fish eggs and larvae. The theme is introduced with an interesting chapter by E. D. Houde on mortality that describes the habitat conditions occupied by fish eggs and larvae. The complexity of the microcosm in which fish eggs and larvae occur is reinforced in a review by J. H. Cowan and R. F. Shaw of the critical period and other hypotheses related to recruitment. This chapter is especially stimulating because this is an important but difficult subject. The authors show that recruitment is so complex that few generalizations are possible.

Studying fish eggs and larvae ecology, however, is not always complex and uncertain. In Chapter 5, P. Pepin discusses stock assessment methods using fish eggs and larvae data, and K. E. Limburg follows with a chapter on cohort identification that reviews new technologies, such as genetics, stable isotopes, and otolith chemistry. In a chapter on habitat requirements, R. G. Werner explains the fragility of early life stages as a consequence of the dynamic nature of habitat needs. This section of the book ends with a controversial review of processes that form, maintain, and disrupt larval fish assemblages, in which T. J. Miller argues that, ''ichthyoplankton assemblages *cannot* be thought of in terms of evolutionary communities.''[my emphasis]

The last third of the book focuses on human influence. In a chapter on fisheries management, Rutherford optimistically argues that an understanding of fish eggs and larvae ecology will advance the field and that aquaculture can help ensure the sustainability of wild stocks through direct consumption and supplementation. Feeding the world's population is certainly an urgent need, but another equally important message to get across to students, which I think was insufficiently emphasized, is the need to manage fish stocks with an eye to environmental conservation. Although the following chapter by Holt reviews the harmful side effects of such human activities as fishing, habitat degradation, and the introduction of invasive species, here too I missed a call for a more precautionary approach in our everyday actions. The book concludes with three case studies, one on Japanese sardines by Y. Watanabe, another on Great Lakes impacts by J. A. Rice, and the third on Danube River conservation by H. Keckeis and F. Schiemer.

I have used this book in a graduate seminar during the fall of 2002 in which most chapters provided an excellent basis for discussions. The lack of suitable citations, however, in many cases impeded further analysis and was particularly problematic when students challenged claims made by the authors. This minimization of references constitutes a pedagogical problem because students should learn that science is not constructed of ''truths'' but rather of tentative explanations of reality (Solar and Marone 2001). Nevertheless, I recommend this book to young as well as experienced fishery scientists, who will without a doubt benefit from reading this instructive synthesis.

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## Reference

Solar, R. G., and Marone L. 2001. The ''freezing'' of science: consequences of the dogmatic teaching of ecology. BioScience 51:683–686.

**Modelling and Quantitative Methods in Fisheries.** *By M. Haddon. Chapman and Hall/CRC, Boca Raton, Florida. 2002 (revised printing). 406 pages. $69.95.*

This book covers selected topics in quantitative fisheries with an emphasis on parameter estimation and stock assessment. A unique feature of the book is the 72 example boxes and the availability of associated spreadsheets on the Internet. The text consists of 11 chapters and an appendix that supplies some guidance on using the Microsoft spreadsheet program Excel. The first two chapters provide an introduction to concepts and models of population dynamics; chapters 3 through 7 cover estimation and inference, including randomization, bootstrapping, and Monte Carlo simulation. Chapters 8 and 9 describe individual growth and stock-recruitment relationships, and chapters 10 and 11 focus on stock assessment using surplus production and age-structured models. The book is based on workshop materials developed for fishery professionals, which is evident in the worked examples and a moderate mathematical level. The workshop origin is probably the reason why some topics are covered in detail while others that one would expect in a quantitative fisheries course are covered only briefly, if at all. There is also an emphasis on how to do a particular analysis, with limited and uneven discussion of the underlying theory. Citation of sources is also quite unbalanced.

Unfortunately, the numerous typos, misuse of terms, and inconsistencies are likely to confuse some readers. For example, the legend of Figure 5.1 states that a probability density function is plotted, but what seems to be plotted is the complement of the cumulative distribution function (CDF). Further confusion is created in the associated example box (5.1) through misnaming the CDF, and indicating that Excel functions would return the CDF, when they actually return its complement or something else.

For some topics, I thought the presentation might lead to serious confusion about the subjects or approaches. My most substantial concerns had to do with the discussion of estimation and inference, a topic that was emphasized in this book. First, the construction of likelihood profile confidence intervals seems to be described and applied incorrectly, in that all parameters other than those that are being profiled are left at the maximum likelihood estimates, in contrast with reestimation of them by constrained maximum likelihood estimation (Meeker and Escobar 1995). There is a confounding discussion of noninformative priors and a call for formal analysis regarding topics that are already well worked out, which may stem from failure to fully take into account the fundamental and philosophical differences between Bayesian and frequentist approaches. I also found the discussion of randomization tests and bootstrap bias estimation problematic. In the discussion of randomization tests, the term ''independence'' is used incorrectly to refer to the idea of sampling from the same population (or identical distributions) under the null hypothesis, which may result in some readers falsely concluding that the independence assumption is not required for a randomization test to be valid (Stewart-Oaten et al. 1992). The discussion of bootstrap estimates of bias seems to imply that if the bootstrap procedure detects bias, then the data are not representative of the population about which inferences are intended. However, the bootstrap estimate of bias reflects a property of the estimator even if it is being applied to a representative sample (selected at random from the target population).

Although the basic approach of this book has appeal, I cannot recommend it as a primary self-study guide because of its numerous small errors and inaccuracies regarding several larger conceptual issues. The narrow focus of the book makes it unsuitable as the only text in a graduate course in quantitative fisheries. It could, however, be a useful supplemental text for experienced quantitative fisheries scientists, and I will probably use some ideas from this book in my future teaching.

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## References

Meeker, W. Q, and L. A. Escobar. Teaching about approximate confidence regions based on maximum likelihood estimation. American Statistician 49:48–52.

Stewart-Oaten, A., J. R. Bence, and C. Osenberg. 1992. Assessing effects of unreplicated perturbations: no simple solutions. Ecology 73:1396–1404.