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BOOK REVIEW

Michael King: Review of "Fisheries Biology, Assessment and Management, Second edition"

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Michael King's second edition of *Fisheries Biology, Assessment and Management*, builds on the previous version (King 1995) by expanding the discussion of fisheries management to include the ecosystem. The continued decline of total catches from fisheries around the world, compounded by other anthropogenic stressors, including habitat destruction, coastal development, pollution, and eutrophication have prompted the view of fisheries as part of broader marine ecosystems that need to be considered in management strategies. In an improvement to the first edition, many examples of fisheries data have been augmented with instructions for building computer spreadsheets found in the extensive and useful appendices. The book consists of five chapters, each divided into clearly noted subsections, and each followed by exercises with select answers online. Overall, this well-organized, comprehensive text could serve an upper level undergraduate or beginning graduate course in fisheries. This review was performed as part of a graduate fish ecology class.

Apropos of the ecosystem focus, this edition devotes 25% of the text to the first chapter, 'Ecology and Ecosystems.' This chapter serves as an excellent review of physical, chemical and biological oceanography while introducing basic terms and concepts to establish the foundation upon which the full text is built. In doing so, the importance of the ecosystem in fisheries management is solidified as the basis of subsequent chapters. The reader is also introduced to King's high-quality illustrations and supplementary information boxes that add detail and enhance the main text.

Exploited species are the focus of the second chapter. Life histories of commercially and recreationally important invertebrates, as well as demersal, coastal and pelagic fishes are presented. Perhaps the key sentence in chapter two is King's opening statement, "The proper assessment and management of a fishery requires an understanding of the biology, life cycle and distribution of the species on which it is based." This proclamation helps remind the reader that the organisms themselves are at the core of assessment and management challenges. This chapter also describes some of the pressures exerted on exploited fishes from sources other than fishing such as destruction of coastal habitat.

Chapter three begins with a description of commercial and recreational fishing gears and methods of employing them. It follows with a discussion of the fundamental differences in fishing objectives such as food, income, and recreation. A sensitive elucidation of social, cultural and political issues surrounding various fisheries is included in this chapter with particular emphasis on the complex and difficult role of artisanal fishers, who are responsible for one-half of global fish landings. Eight pages of color

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photographs showing various habitats, fishing markets and vessels are inserted into chapter three. Fisheries data are presented in figures throughout the chapter; an approach that continues through the remainder of the text and effectively demonstrates how data are applied in assessment and management. Chapter three closes with a brief but informative description of the effects of fishing practices on target species, non-target species, and associated habitat.

Chapter four, 'Stock Structure and Abundance,' moves from fisheries biology to assessment and shifts from an ecological perspective to a more mathematical one. Population parameters and methodologies for collecting data are presented from fisheries independent and dependent sources. Although present throughout the text, this chapter has over 50 figures and 75 equations that provide many quantitative tools used in fisheries management. Unfortunately, many of the equations are derivations of previous ones and the reader would be better informed if the proofs were noted as such, and if all formulas were separated from the text. The supplemental boxes as well as the extensive appendices continue to add valuable insight and information.

In the following chapter on stock assessment, King asserts that it is not the purpose of assessment scientists to recommend a single best level of exploitation for a fishery but to provide decision-makers with various management approaches that will be considered along with social, economic and political factors when setting quotas. This chapter covers the history and controversy surrounding the use of maximum sustainable yield as a basis for quotas. Assessment models are presented in increasing order of complexity, moving from dynamic production assessment, including equilibrium and non-equilibrium models, to models that include growth and mortality, yield-per-recruit, as well as biomass dynamic simulation. All models are detailed with appropriate graphs and equations and the appendices include raw data and instructions on developing computer spreadsheets. At the end of the chapter, there is brief presentation of the ecosystem assessment model Ecosim with Ecopath. King's description of ecosystem based models is by no means an exhaustive list but does give the reader a good starting point for further investigation.

The final chapter builds the case for a broader approach to fisheries management, examines various challenges in managing small and large fisheries, reviews damage caused by over fishing, and outlines general management processes and plans. A large portion of the chapter is devoted to reference points and indicators as well as input and output controls. The eight-page section on controls to protect ecosystems includes a discussion of ecosystem-based fisheries management, marine protected areas, and closures as management tools. The chapter culminates with a discussion of compliance and the difficult task of enforcement.

King's *Fisheries Biology, Assessment and Management,* second edition, is a well-constructed synthesis of biological, ecological, assessment, and management information, and an overall improvement to the first edition. However, we noticed that the spine of the book is inadequately manufactured and sections fall out after only a few weeks of normal use. This edition would also be more useful as a textbook if the figures were available online for faculty to use easily in lectures. Nonetheless, the information contained within the text is invaluable for advanced undergraduates or beginning graduate students in the field of fisheries. King makes a sometimes difficult subject matter clear to understand and inserts fascinating bits of information such as the origin of the term 'mad as a hatter' and the scientific name of *Mercenaria mercenaria*. Ultimately, King makes his case for movement toward an ecosystems-based management approach without losing sight of classic biological, assessment, and management information.

Reference

King M (1995) Fisheries biology, assessment and management. Fishing News Books, Oxford