

communities in which they live. Paulson covers these topics with lively prose and illustrates these topics with beautiful photographs throughout the book.

The first chapter presents the basic information about the Odonata for general readers. The 250-million-year evolutionary history of the order is summarized as the major groups of dragonflies (the Anisoptera) and damselflies (the Zygoptera) are introduced. The basic morphological features that define the insect order, physiological features associated with thermoregulation, and the types of habitats where dragonflies and damselflies live are discussed. He describes the spectacular diversity in adult coloration across the order and many of the ways that various colors and patterns of coloration influence mating success and thermoregulation.

The place of dragonflies in the food webs they inhabit is then explored. Dragonflies and damselflies are voracious predators because of the adaptations for flight and vision that they possess. The author also vividly describes their interactions with their own enemies, the birds, frogs, fish, and other insects that feed on them, as well as the parasites that infect them.

Chapter 3 discusses the fascinating reproductive tactics that males and females of many different species use to produce their offspring. Some species have elaborate courtship displays, others quickly pair and mate, and still others have males that continually harass females in order to induce mating. Many readers will find the photographs of courtship and the various mating strategies intriguing.

The complex life cycle that all species express is then expounded in Chapter 4. Most species spend months to years as aquatic larvae before they metamorphose into terrestrial adults. This chapter will probably be the most surprising to many, because people are not very familiar with the full scope of the insect life cycle.

The next chapter explores the place of dragonflies in various human cultures of the world. Dragonflies in our cultural artifacts, in various mythologies, and as delicacies in some cuisines are briefly explored. Paulson also provides a brief introduction to current scientific research being conducted on odonates, and conservation efforts to preserve these important members of aquatic communities.

Between each chapter, brief descriptions of individual species from around the world are presented along with beautiful photographs that illustrate key information about the species. The author is one of the foremost authorities on the worldwide diversity of the odonates, and his insights about the natural histories of these species provide important depth to the general presentation in the chapters. Readers seeking a general introduction

to the Odonata that is also spectacularly illustrated will greatly enjoy this book.

MARK A. MCPEEK, *Biological Sciences, Dartmouth College, Hanover, New Hampshire*

#### AGE AND GROWTH OF FISHES: PRINCIPLES AND TECHNIQUES.

*Edited by Michael C. Quist and Daniel A. Isermann. Bethesda (Maryland): American Fisheries Society. \$79.00. xxii + 359 p.; ill.; no index. ISBN: 978-1-934874-48-6. 2017.*

Age and growth data are critical variables used to assess fish population demographics and dynamics in order to guide management and conservation. Historically, age and growth investigations were a common staple of fisheries education. But, as the editors of this book concede, many fisheries programs are moving away from some of the more traditional methods of population ecology. But, as there are still critical needs for this information and capabilities, the editors were prompted to organize a volume that can serve as a comprehensive overview of concepts and techniques for use by students, fishery managers, and researchers.

The book includes 12 chapters and each is authored by experts in the field. The first chapter reviews the history and importance of age and growth information, and the following 11 chapters address background, methods, and techniques: Morphology, Composition, and Growth of Structures Used for Age Estimation; Validation of Annual and Daily Increments in Calcified Structures and Verification of Age Estimates; Choice of Structure for Estimating Fish Age and Growth; Sampling for Age and Growth Estimation; Scales; Cleithra, Dentaries, and Other Bones; Fin Rays and Spines; Otoliths; Age Structure; Growth Estimation: Summarization; and Growth Estimation: Growth Models and Statistical Inference. Each chapter begins with an introduction and then presents the relevant background and methods. Illustrations are included in most chapters and provide important information to explain the methods and techniques described. All of the chapters are well referenced and include a list of citations that will lead readers to more information if needed.

Although this book will be useful to fishery scientists and students working anywhere, the emphasis is on North American fishes (when species are mentioned) and postlarval fishes. There are some other publications available that cover some of the same concepts and techniques, but they are difficult to find and are becoming dated. This volume provides a modern and up-to-date compilation of methods and techniques. Although the entire book will prove

useful, one standout chapter is Growth Estimation: Growth Models and Statistical Inference. This chapter provides a very thorough examination using clear examples and explanations using the R programming environment.

This volume achieves the editors' goals and will serve as a useful reference and textbook. It will be of interest to undergraduate and graduate students as well as professionals in the fields of fishery management and fish biology.

CHRISTIAN E. ZIMMERMAN, *Alaska Science Center,  
U.S. Geological Survey, Anchorage, Alaska*

knowledge gaps by the current and likely future generation of salmon researchers. Although some of the recommendations for future work reinforce the consensus of the scientific community (e.g., better understand the role of nearshore carrying capacity during the early stages of ocean entry), others are perhaps less obvious (e.g., the need to better understand the role of native and invasive pathogens and parasites on salmon ecology in a changing climate).

Where the volume falls short is ironically not in presenting too little, but rather trying to do too much. Specifically, each chapter includes new information on freshwater ecology that ultimately felt out of place not only with the primary focus (and