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THE ECOLOGY OF MARINE FISHES

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CALIFORNIA AND ADJACENT WATERS

Edited by

LARRY G. ALLEN

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TO OUR TEACHERS



JULES M. CRANE, JR. (1928–1995), naturalist, mentor, and friend who published broadly on snails, amphipods, clams, fossil fishes, grunion and wiggling sticks, midshipman courtship, and truly loved all things bioluminescent. —*LGA*



JOHN S. STEPHENS, JR. (1932), naturalist, systematist, ecologist, scholar, teacher, friend—a true ichthyologist. Doc may know more about fish than all of the rest of us. This book would be much shorter if it were not for John. —*DJP*



CARL D. RIGGS (1920–2002), fish biologist, station director, able administrator, dry wit, steady mentor, and warm friend, who studied white bass, gars, and bowfin and offered his support at the right moment to help launch an ichthyological career. —*MHH*

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PREFACE

Starting with David Starr Jordan in the late 1800s, California marine fishes have been one of the most intensively studied groups of fishes in the world. Known for its sandy beaches, kelp beds and palisades, the California coastline is a mere glimpse of the beauty that lies beneath its waves. Some of the most prestigious universities and institutions of higher learning gaze down upon these shores. Thus, it is not surprising that in such an ideal setting some of the fundamental ideas in the science of marine ecology have been formulated. The volume of literature published on California marine fishes is stunning and truly daunting for someone new to this field. With this in mind, we asked 35 experts in science, policy, and conservation to assemble this unique text. This book was designed to provide the first-ever compilation and interpretation of the large body of information on the ecology of California's marine fishes. Each chapter brings together color illustrations to greatly enhance its accessibility to the reader. Our goal was to make this volume a valuable source of information for students and professionals, as well as the general public. This book should also be an important contribution to the study of marine fish ecology worldwide, but particularly for California's marine fish populations. The fish populations in California are greatly impacted by coastal shelf development, commercial and recreational fishing, discharge of pollutants, and other human activities. The decline of many fisheries species has led to rather drastic management measures, the development of

the Nearshore Fishery Management Plan, the the Marine Life Management Act and the Marine Life Protection Act, which is being used to establish marine reserves. The information in this book should prove useful in these processes.

In general, each chapter begins with an overview of the subject matter providing a synthesis of existing information including theory, models, and classifications where appropriate. Most examples focus upon California representatives placed in the context of information known from other temperate habitats worldwide. Finally, many chapters end with a prospectus for future research.

The authors and editors of this work are greatly indebted to a large number of professionals who have contributed their knowledge and talents to the review process for each chapter. They include Jonathan Baskin, Denise Breitburg, Jennifer Caselle, Robert Cowen, Edward DeMartini, Christopher Dewees, Michael Fahay, David Greenfield, Richard Haedrich, Mark Hixon, Edmund Hobson, Sally Holbrooke, Timothy Hovey, G. David Johnson, Geoff Jones, Phillip Lobel, George Losey, William MacFarland, Alan Mearns, H. Geoffrey Moser, Tim Mulligan, Hiroyuki Munehara, John Musick, John Paxton, Theodore Pietsch, Chet Rakocinski, John E. Randall, Bruce Robison, Richard Rosenblatt, Stephen Ross, Russell Schmitt, Eric Schultz, John S. Stephens, Jr., Camm C. Swift, Russell Vetter, and Robert Warner. Illustrations by Larry G. Allen unless otherwise indicated.