Introduction and Historical Overview

California's Living Marine Resources: A Status Report is the fourth edition in a series of reports that address the status of California's marine and anadromous fisheries and other marine life. Since the California Department of Fish and Game published *California Ocean Fisheries Resources to the Year 1960* (1961) and *California's Living Marine Resources and Their Utilization* (1971), and the California Sea Grant Program updated and expanded *California's Living Marine Resources and Their Utilization* in 1992, the state's marine resources and their management have continued to undergo constant change. For example, by the early 1990s the sardine fishery, which was the world's largest during the first half of the 20th century and practically has been non-existent since the 1960s, reappeared under precautionary management. In 1998, the sardine resource was declared fully recovered. Tropical tunas were an extremely valuable segment of California fish landings until the tuna canning industry moved overseas during the mid-1980s. Changes in California's commercial fisheries between 1970 and 1990 included the development of specialized and valuable fisheries for sea urchins, hake, Pacific herring and widow rockfish.

Change has continued in many fisheries since the 1992 edition of this report. For example, increased international demand for squid resulted in a 500 percent increase in landings to over 300 million pounds annually during non-El Niño years. This expansion attracted many new participants from salmon purse seine fisheries in the Pacific Northwest. A squid management plan including restricted access is currently being developed. In 1994, gillnets were prohibited in most of the nearshore areas of the coast and islands of southern and central California. This happened as a result of a voter approved California constitutional amendment (Prop. 132). During the 1990s, a major fishery developed for nearshore species including rockfishes, cabezon, and sheephead that were often marketed live for significantly higher prices. Concerns about sustainability of this new intense fishery provided much of the impetus for the Marine Life Management Act (MLMA) of 1998 and a moratorium on permits in the nearshore fishery. The southern California commercial lobster fishery continued to demonstrate higher catches during the 1990s resulting in record landings in 1997. California barracuda increased as a component of the recreational fisheries to the levels of the 1950s, and the white seabass population is showing signs of a recovery at the end of the century. The California halibut commercial fishery continued to sustain landings comparable to the 1980s, despite the gillnet closure.

Severe declines in abalone abundance resulted in total closure of recreational and commercial abalone fishing south of San Francisco, and there are serious concerns about the potential for extinction of the white abalone. Some major groundfish stocks, especially long-lived rockfishes, continued to decline. Quota reductions, seasonal and area closures, bag limit reductions and long-term stock rebuilding plans are causing major disruption in the commercial and recreational industries and communities dependent on groundfish.

Since the last edition was published, five California salmon populations have been listed under the federal Endangered Species Act (ESA): Sacramento River winter chinook, Central Valley spring chinook, California coastal chinook, California coastal coho (south of the San Francisco Bay), and steelhead (south of the Klamath-Trinity River system). The principal problem faced by these runs is the habitat degradation that has accrued from water uses that compete with the requirements of salmon. Primary among these is diversion of water for irrigation and domestic use. In addition, alterations of rivers and watersheds to enable navigation, provide power, control flooding, and otherwise accommodate the needs of humans have taken their toll.

While California's population continued to grow and diversify during the 1990s, participation in marine recreational fishing measured by license sales continued to be relatively stable. The number of active commercial passenger fishing vessels (partyboats) declined from 308 in 1989 to 300 in 1998. Other forms of marine recreation linked to the health of marine living resources such as ecotourism have grown significantly and have become an important segment of California's coastal dependent economy.

The public's interest and involvement in the management and conservation of marine living resources have increased substantially since the 1992 edition of *California's Marine Living Resources and Their Utilization*. Major federal and state legislation is altering the way marine resources are managed. The 1996 reauthorization of the Magnuson-Stevens Act specified a precautionary approach in federally managed fisheries. This resulted in establishing much lower catch limits and designing long-term stock rebuilding plans for many Pacific Coast groundfish species, especially the rockfishes. The MLMA also required the identification and protection of essential fish habitat.

This report was written during a period of extraordinary change in our state. The MLMA of 1998 significantly altered the way the state manages marine life. The MLMA provides the mechanisms whereby the management responsibility for commercial fisheries can be moved from the California State Legislature to the Fish and Game Commission. The MLMA mandates the development of fishery management plans incorporating peer-reviewed science, increased constituent involvement in marine life management, implementation of an ecosystem based research and management approach, and regular analyses of the status of California's fisheries such as those found in this publication. While the initial management plans man-

dated are for white seabass, nearshore fisheries, and emerging fisheries, it is anticipated that similar management plans will be developed for many other California marine fisheries.

Use of marine reserves and marine protected areas to preserve marine wilderness and manage fisheries is intensifying at both the state and national level. California's Marine Life Protection Act of 1999 requires development of a master plan for a network of marine reserves. On the federal level, intense discussions by panels of scientists and constituents have occurred regarding plans for marine reserves in large areas of the Santa Barbara Channel Islands. Although no consensus was reached by mid-2001, debate regarding MPAs was continuing at both the state and federal levels.

During the 1990s, overcapitalization was widely recognized as a major problem in some fisheries. The difficult task of designing restricted access programs to improve the balance between fleet fishing power and sustainable harvest levels has become a major component of fishery management plans seeking to sustain fisheries economically as well as biologically.

Earlier editions of this publication proved to be among the most valuable general reference works available on California's economically important marine species. The reports have been widely used by fisheries researchers and managers, policymakers, interested citizens, journalists, the fishing industry, enforcement officers, educators, and others. Publication of this edition is mandated by the MLMA of 1998. A primary purpose of the book is to provide a baseline of information for all concerned with managing living marine resources in California.

The editors of this edition have retained much of the style and format of earlier editions. Many of the conventions of scientific writing are foregone because it was felt that this style better serves the broad interests of readers. Each species article presented in this report contains a short list of general references for further reading. Detailed fish and shellfish landings statistics, which begin in 1916, have been updated through 1999.

Readers of earlier editions will notice some significant changes and new features. The publication is organized by marine ecosystems (bays and estuaries, nearshore, and offshore) rather than species-by-species. For species that occur in more than one ecosystem, the discussion appears in the ecosystem section where they spend most of their life and/or their principal harvest location. Descriptions of the three marine ecosystems used for this report are also included. Added or expanded chapters include a detailed description of the human dimensions of marine life management, California's ocean environment, marine law enforcement, water quality and pollution, and restricted access in fisheries. We have also taken advantage of new technologies to increase the use and effectiveness of maps, graphs and tables. For ease of use, historical landings statistics have been moved to the end of each appropriate chapter rather than being placed in large appendices. A new glossary of technical terms and acronyms as well as a fishing gear appendix have been addded.

Compiling a publication like this is a collaborative effort. The editors were fortunate to be able to recruit top experts from the California Department of Fish and Game, other state and federal agencies, universities, and private industry in the preparation of this report. Each section has been peer reviewed for accuracy. The author's name and affiliation appear at the end of the section they wrote. When significant portions of the text from the 1992 edition were left intact, the original author is credited. We want to thank the more that 200 authors and reviewers who volunteered their time and expertise. We also greatly appreciate the contributions of many photographers who allowed us to use their images to greatly enhance this publication.

All editors participated in the development of the overall design and layout of the report. Bill Leet served as the lead editor as he did for the 1992 edition. Rick Klingbeil served as project manager for the Department of Fish and Game. Christopher Dewees led the University of California's participation. Eric Larson coordinated the creation of the numerous statistical tables, graphics and maps found in the report. Principal publication production assistance was provided through a contract with the University of California, Davis. Tom Jurach from Repro Graphics Services and Marianne Post from Creative Communications Services organized the layout, design, and publication of the document.

Christopher M. Dewees, Marine Fisheries Specialist, Sea Grant Extension Program, Wildlife, Fish and Conservation Department, University of California, Davis

Richard Klingbeil, Program Manager, California Department of Fish and Game, Los Alamitos

Eric J. Larson, Senior Marine Biologist, California Department of Fish and Game, Belmont

William S. Leet, Senior Editor, Davis