

Part I

REPORTS, REVIEW, AND PUBLICATIONS

REPORT OF THE CALCOFI COMMITTEE

THREE CALCOFI ICONS BID FAREWELL

Dr. Geoffrey Moser, a world leader in the field of larval fish ecology and taxonomy, retired on 14 June 2002, after nearly 40 years of service with the Bureau of Commercial Fisheries and its successor agency the National Marine Fisheries Service (NMFS). Thanks to his pioneering work and leadership and to the excellence of his research team, it is possible to identify the larvae of most fishes in the California Current by visual means. The 1,517-page monograph *The Early Life Stages of Fishes in the California Current* (CalCOFI Atlas 33), one of the finest scholarly achievements ever produced by NMFS, contains descriptions of 586 species and 2,500 illustrations. It is widely used throughout the world as an identification guide and frequently copied in regional guides. Moser's work has been central to CalCOFI and continues to this day. In CalCOFI's early years most of the larvae taken in cruises were not identified, but today most of them are; over 500 species are routinely identified each year. He and his staff identified the larvae of many previously unidentified species; they also went back through earlier collections, identifying larvae using the new characters and thereby making a new time series for each species starting from CalCOFI's inception. They accomplished this huge task in spite of a large backlog of unidentified specimens. Upcoming CalCOFI atlases and publications will document this work. The bottom line is that the CalCOFI ichthyoplankton time series is, and continues to be, up to date; the data are available for stock assessments from the current year back to 1951. Over the years, Moser has published many outstanding papers on larval ecology, and recently he has begun studying assemblages of species as a measure of ecosystem state. Our hope is that his ideas about ecosystem functioning that evolved through his work with CalCOFI are just the beginning of a new understanding of ecosystems that will be carried onward by others. We expect a continuation of the fine tradition Moser established, of making the collection of ichthyoplankton data a practical and timely undertaking for resource agencies. Moser is undeniably one of the best minds in the field and an unparalleled source of knowledge on the early life history and ecology of larval fishes. Those of us at the Southwest Fisheries Science Center (SWFSC) and in the CalCOFI family wish him well in his new endeavors.

Dr. Thomas Hayward retired from the University of California in November 2001. Hayward was a strong proponent of the CalCOFI program for his entire career. Since 1993, he served as academic administrator in charge of the SIO-CalCOFI seagoing operations and data processing and distribution. He expanded and improved CalCOFI measurements and guided the development of the CalCOFI Web site and procedures for online data-dissemination. His efforts significantly expanded the number of ancillary programs participating on CalCOFI cruises. He obtained external funding to support monthly "mini-CalCOFI" cruises during the 1997-98 El Niño. He introduced the "State of the California Current" section into the *CalCOFI Reports* and authored many of them himself. We are pleased to report that Dr. Ralf Goericke has agreed to replace Hayward in the role of academic administrator. We are confident Goericke will bring the same combination of resourcefulness and innovation to the job.

In the spring of 1982, Julie Olfe first met with Reuben Lasker and took on the editorship of *CalCOFI Reports*. Since that time, Olfe has been responsible for editing and co-producing 20 volumes of *CalCOFI Reports*, beginning with Vol. 23 (1982) and ending with Vol. 42 (2001). Much to the disappointment of the Committee, Olfe announced her retirement from *CalCOFI Reports* in the fall of 2001. Through her diligence and attention to detail, Olfe has helped make *CalCOFI Reports* the outstanding journal it is today, and she will truly be missed. We are pleased to announce the hiring of Joni Harlan (with strong recommendations from Olfe) as our new editor. Harlan makes her debut with this volume.

ALLIANCE FOR CALIFORNIA CURRENT ECOSYSTEM OBSERVATION (ACCEO)

Participants in the 2001 CalCOFI Conference recommended the development of a new vision of monitoring the pelagic ecosystem of the California Current built upon the solid base of CalCOFI and other survey programs but expanded to observe the entire California Current pelagic ecosystem. Such an integrated monitoring program would require building a new coastwide monitoring consortium and generating information that would benefit communities from British Columbia to

Baja California. A comprehensive California Current observation system is needed because the dynamics of current flow, marine populations, and ecosystems cannot be accurately interpreted from regional monitoring programs without considering the dynamics of the larger system of which any given region is a part. In addition, resource management should be based on the dynamics of populations, not pieces of them, yet no population of any California Current species is contained within the boundaries of any present California Current survey.

Subsequent to the 2001 CalCOFI Conference, John Hunter, NMFS, held planning meetings at Monterey and Seattle, where representatives of the marine scientific community expressed keen interest in the proposed alliance. The recommended partnership would have a new name, broader mission, and different structure from CalCOFI, but would preserve the most successful features of CalCOFI. These include (1) sustaining a flexible alliance of academic and resource organizations, (2) supporting a blend of applied and long-range science goals, (3) a commitment to understanding the dynamics of the California Current and of the populations it contains, and (4) dedication to maintaining the physical and biological time series needed for this understanding. A central research theme of such an alliance would be understanding and predicting how decadal to inter-annual shifts in the climate of the California Current affect the dynamics of marine populations. Another planning meeting was held in September 2002 in Portland, Oregon.

CALCOFI ATLAS 35

CalCOFI Atlas 35, entitled *Distributional atlas of fish larvae and eggs from Manta (surface) samples collected on CalCOFI surveys from 1977 to 2000*, was published in May 2002. Authors included Geoffrey Moser, Richard Charter, Paul Smith, David Ambrose, William Watson, Sharon Charter, and Elaine Sandknop. This atlas summarizes the spatial and temporal distribution and abundance of 93 ichthyoplankton taxa collected in manta net tows on CalCOFI biological-oceanographic survey cruises. Manta net tows, included in CalCOFI station protocol since December 1977, provide a quantitative sample of planktonic organisms that live, either permanently or facultatively, in the upper 15 cm of the water column. This time series contains data on commercially and ecologically important species of fish larvae (e.g., cabezon, lingcod, greenlings) that are not sampled adequately by oblique tows. The station, tow, and ichthyoplankton data that form the basis for Atlas 35 have been published in a series of 19 reports in the NOAA Technical Memorandum NMFS series; principal authors of individual reports are David Ambrose, Sharon Charter, Geoffrey Moser, Elaine Sandknop, and William Watson.

Atlas 35 is the fourth CalCOFI atlas on the ichthyoplankton time series. CalCOFI Atlases 31 and 32 presented distributional summaries for all taxa taken in oblique tows on surveys that covered the greater CalCOFI sampling area extending from northern California to Cabo San Lucas, Mexico, during 1951–84. CalCOFI Atlas 34 summarized distribution and abundance of fish eggs and larvae taken in oblique tows from 1951 to 1998 in the area defined by the present survey pattern. Atlas 35 and the Manta data reports were distributed during 2002 and are available on request.

CALCOFI ROCKFISH LARVAE

Russell Vetter and staff at the SWFSC have made it a priority to develop molecular methods for identifying previously unidentifiable ichthyoplankton from CalCOFI bongo tows. The focus is on *Sebastes* (rockfish) because of the large number of unidentified species, the lack of species-specific visual characters, and the importance of rockfish to resource management. Cynthia Taylor (Scripps Institution of Oceanography, SIO) is working with William Watson (SWFSC) to identify all of the *Sebastes* larvae from the 1999 CalCOFI cruises. The population genetics of the adults of some nearshore rockfish species such as the brown rockfish, *S. auriculatus*, show evidence of limited dispersal (e.g., genetic differences north and south of Point Conception). Other species, however, such as the bocaccio rockfish, *S. paucispinus*, do not show genetic differences. Retention and limited dispersal would correlate with the high level of genetic structure.

A manuscript entitled “Biology and population dynamics of cowcod (*Sebastes levis*) in the Southern California Bight from 1918 to 1997,” by John Butler, Larry Jacobson, Thomas Barnes, and Geoffrey Moser, has been submitted to *Fishery Bulletin*. The paper was based in part on the long time series of cowcod larvae in the CalCOFI collection. Since the larval time series closely tracks the cowcod population and provides a link to historical biomass levels, an ichthyoplankton survey is one tool being used in a baseline study of the recently created Cowcod Conservation Area (CCA). Closely spaced plankton samples in the CCA are embedded within the CalCOFI survey area. The first cruise to monitor the CCA took place in February 2002 using standard CalCOFI protocols.

MOCNESS SURVEY FOR JUVENILE ROCKFISHES

A second micronekton survey of the Southern California Bight was conducted with a 10 m² multiple opening/closing net and environmental sensing system (MOCNESS) in June–July 2001, to continue the investigation that began in 2000 on the spatial distributions of late larval and pelagic juvenile rockfishes. Because

young stages of many rockfish species cannot be reliably identified below the family level using visual characters, molecular techniques will be used to identify the rockfishes collected. In addition to the rockfishes, late larvae and pelagic juveniles of many other fishes and several cephalopod species were collected during the 2000–2001 micronekton surveys. These often are poorly sampled with standard plankton nets and trawls, which typically target smaller and larger size classes, respectively. All survey data have been entered into the CalCOFI ichthyoplankton database.

MARINE ECOLOGICAL RESERVES RESEARCH PROGRAM (MERRP)

The NMFS study of the distributions of planktonic fish eggs and larvae in nearshore waters in the vicinities of Big Sycamore Canyon and Vandenberg Marine Ecological Reserves and Anacapa and San Miguel Islands in the Channel Islands National Marine Sanctuary was completed, and the resulting data have been incorporated into the CalCOFI database. Eggs and larvae of fishes that reside in hard-bottom and kelp habitats were most abundant at the islands, which have much more of those habitats than the mainland reserve sites. Eggs and larvae of soft-bottom fishes were more abundant at the Big Sycamore site, which is almost entirely soft-bottom habitat. It appears that no significant production of planktonic fish eggs and larvae occurred in the immediate vicinity of Vandenberg Marine Ecological Reserve. The University of California Sea Grant College Program, La Jolla, published the results of the MERRP study on CD-ROM this year. Highlights from two MERRP projects are published by Watson et al. and Yoklavich et al., in this volume.

ACOUSTIC DOPPLER CURRENT PROFILER (ADCP)

The acoustic backscatter from the Acoustic Doppler Current Profiler (ADCP) provides an alternate method to the bongo-tow volumetric measure of zooplankton. Ronald Lynn (SWFSC) has a manuscript in press that relates the distribution of strong backscatter to spring sardine spawning, as determined by the continuous underway fish egg sampler (CUFES), and to the development of the California Current jet. Backscatter, as a measure of zooplankton, has important advantages over net tows because it provides continuous along-track recording (an ensemble reading every 1.5 km at 10 knots) and vertical structure. However, target strength is highly variable between zooplankton species, and returns are dependent upon instrument frequency. The 150 kHz unit aboard the *David Starr Jordan* is best for macrozooplankton. In spite of any caveats, the pattern of results from four spring surveys reveals a strong relationship to the current patterns and large response to the extreme

annual changes caused by the El Niño/La Niña cycle. In the four spring surveys studied (1996–99) there is a large drop-off in acoustic backscatter at the offshore limit of sardine eggs; this suggests that presence of adequate forage is an important factor in the spawning habitat. A level of forage may be needed for spawning energetics and/or as an element of spawning strategy for the survival of larvae.

SIO HIGHLIGHTS

This past year brought extensive internal reevaluation of the Scripps/CalCOFI program and of its relationship with the rest of SIO. In preparation for a presentation to the Director's Academic Council, statistics were compiled on the number of ancillary programs participating in CalCOFI. The numbers are impressive. In the past 10 years, 23 graduate students have used either CalCOFI data or samples as a major portion of their doctoral research, or have "piggy-backed" on CalCOFI cruises to collect their data. There were 50 graduate-student-trips on CalCOFI cruises. There were 8 participating post-docs (24 post-doc trips), and 40 visitor trips with 10 countries represented. During the past year alone, five externally funded programs used CalCOFI as a platform.

Each of these ancillary programs enriches our knowledge of the California Current system at very little cost to CalCOFI. We are encouraging others at SIO (and elsewhere) to make use of CalCOFI resources in their research. Two proposals are currently under discussion: one would contribute a modeling component to the program, the other would develop a shipboard technique for rapidly identifying phytoplankton, microzooplankton, and larval fish by genetic analyses. Our goal is to obtain external funding to support these and other ancillary activities. Two proposals were recently submitted to the U.S.-Mexus Program to enhance our collaboration with the IMECOCAL (Investigaciones Mexicanas de la Corriente de California) program. If funded, one proposal would establish a coordinated program of phytoplankton pigment analysis using high-performance liquid chromatography. The other would implement a joint database to facilitate the exchange of information and stimulate collaborations between CalCOFI and IMECOCAL.

CALIFORNIA'S LIVING MARINE RESOURCES: A STATUS REPORT

California Department of Fish and Game (CDFG) and the University of California Sea Grant Extension Program proudly announced publication of *California's Living Marine Resources: A Status Report*, edited by William Leet, Christopher Dewees, Richard Klingbeil, and Eric Larson. This 592-page report examines the current status

of the state's commercial and recreational fisheries and discusses the natural history of many of the plants and animals of California's marine environment. The report involved dozens of California's and the nation's best marine scientists in its preparation and review, and it provides readers with photos and population and biological information on the current state of more than 150 marine species. It includes the writings and contributions of more than 125 scientists affiliated with well-known natural resource organizations, including scientists from CDFG, University of California and California State University, NMFS, National Oceanic and Atmospheric Administration, and numerous private organizations. The status report was mandated under landmark legislation known as the Marine Life Management Act of 1998. To download a free copy of the report or to print individual chapters of species, see the CDFG's Web site at <www.dfg.ca.gov/mrd/status>.

KUDOS

The seagoing personnel of SIO's Integrative Oceanography Division, the SWFSC's Fisheries Research Division, and CDFG's Marine Region all contributed, through their dedication and diligence, to the success of CalCOFI's quarterly fieldwork. The CalCOFI Committee thanks the officers and crews of the research vessels

that have served us well as platforms for our observations during the past year: the NOAA Ship *R/V David Starr Jordan*, the University of California *R/V New Horizon*, and CDFG's *R/V Mako*.

We also thank the reviewers of contributed papers in Volume 43: Jim Allen, Todd Anderson, Tom Barnes, Darrin Bergen, Steven Bograd, Jim Bohnsack, Susan Bower, Ray Conser, Paul Crone, Don DeAngeles, Chris Ehrler, Carolyn Friedman, Marty Golden, Pete Haaker, Annette Henry, John Hunter, Larry Jacobson, Mati Kahru, Raphael Kudela, Dave Kusner, Ralph Larson, Nancy Lo, Milton Love, Bev Macewicz, Mark Ohman, Bill Peterson, Steve Ralston, Laura Rogers-Bennett, Niklas Schneider, Paul Smith, Dale Sweetnam, and Paul Waterstrat. We are especially grateful to Joni Harlan for her professional style in editing this volume of *CalCOFI Reports*.

Finally, we would like to thank Marisela Vargas (IOD-SIO), Brad Neuschwanger (CDFG), and Diane Foster (SWFSC) for providing invaluable assistance to the CalCOFI Committee throughout the year.

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