

Part I

REPORTS, REVIEW, AND PUBLICATIONS

REPORT OF THE CALCOFI COMMITTEE

In April 1997 CalCOFI celebrated its three hundredth cruise in the California Current. This number includes neither the countless other cruises and expeditions inspired by the CalCOFI program nor the annual fisheries cruises to sample eggs and fish larvae along the coast of the Californias. Researchers on the April 1997 cruise sampled a portion of the sampling grid first established in 1949. That first sampling program has been modified over time to incorporate new technologies and to answer questions that have arisen since the program began. Owing to reductions in funding and modified priorities, the locations sampled today are a subset of those sampled at the outset. But the underlying scientific question that drives the program has remained constant: "What are the causes of changes in populations, over time, of commercially important fishes in California's coastal waters?" The constancy of the program has produced perhaps the largest, most robust multivariate marine fisheries database in the world. Scientists and policymakers all over the world refer to these data: during 18 months of operation, the CalCOFI Web pages have received over 25,000 hits from private industries, private scientific research laboratories, U.S. government agencies, state agencies, and universities around the world. Many of these organizations manifest a pattern that suggests serious data use.

Over the years, CalCOFI's researchers have demonstrated that episodic atmospheric and oceanic events significantly affect the biology of the California Current. The paper by Schwing et al. discusses the events and trends of the last year in the California Current from a perspective that is both interdisciplinary and global. Baduini discusses how such episodes affect the food chain in Monterey Bay.

Disciplines not normally associated with fishery oceanography in the strictest sense are often brought to bear in the open intellectual climate of CalCOFI. An example in this volume is the work by Lange et al., which, together with other studies of local anaerobic basins, helps us to understand how annual layers of sediment are deposited, and to expand our scope of inquiry backward in time through several centuries.

The commercially important species of fishes in the California Current must be managed by agencies of both

the United States and Mexico. Thus a community of interest, speaking a common scientific language, has developed through several decades of transborder cooperation and education through the efforts of the CalCOFI member agencies and Mexican fisheries agencies (cf. Cotero-Altamirano and Green-Ruiz). The management of coastal lagoons and estuaries as nurseries for fishes is an important matter to both nations, and requires a common understanding of methods of measurement and analysis. Rosales-Casián collaborated with CalCOFI agencies in his research on two estuaries in Baja California.

Selected papers from last year's CalCOFI symposium on the biology of the Pacific hake (*Merluccius productus*) and related species worldwide constitute a valuable collection of contributions to our understanding of these commercially important species.

During the past year, scientists of the National Marine Fisheries Service (NMFS), the California Department of Fish and Game (CDFG), and the Scripps Institution of Oceanography have collaborated in several cruises. In autumn of 1996, the new research vessel *Roger Revelle* was inaugurated into the service of the University of California with a CalCOFI cruise. Instruments designed for use on the NOAA ship *David Starr Jordan* and the UC vessel *New Horizon* were successfully adapted for use on the *Revelle*. The ship's extra capacity resulted in increased participation from ancillary, extramurally funded programs whose researchers have become regular participants on CalCOFI cruises.

CalCOFI scientists are constantly seeking new methods of collecting data to optimize information gathering. A fish egg-pumping device has been incorporated into the routine underway operations of the cruises. Preliminary studies have shown exciting mesoscale relations between physical properties and fish eggs. The system has been tested on several NOAA cruises, and a similar system has been sent to South Africa for studies in the Benguela Current. In addition, NMFS and CDFG, together with NOAA's Office of Oceanic and Atmospheric Research, have tested airborne lidar (laser imaging) for detecting pelagic fish schools. A CDFG aircraft collected lidar data while an NMFS vessel collected acoustic data and high-speed trawl specimens for ship-

board identification. Shipboard acoustic data and lidar data were found to be comparable. Airborne lidar may prove to be an economical way to assess biomass.

Also in order to improve stock assessments, the CDFG has reached an informal agreement with the Mexican government's Instituto Nacional de la Pesca to include Port of Ensenada fisheries statistics and biological data in CDFG analyses. Additional cross-border cooperation included a summer 1996 larval mackerel survey in Baja California waters to determine the extent and intensity of chub mackerel spawning. Survey data were compared to data collected from 1951 to 1966. All historic larval data were entered into a common database, to hindcast abundances through that earlier sixteen-year period. This analysis vastly improved the accuracy of the model used for current-year estimates of abundance. On the basis of this new model, the estimate of mackerel abundance used for 1997 is nearly double, and the coefficient of variation was significantly reduced.

In addition, CDFG's fishery sampling was extended northward in response to increased sardine abundance and decreased chub mackerel abundance. In order to obtain additional biological information and size-at-age data, CDFG began sampling the Monterey fishery. Additional sardine and chub mackerel fishery data may be available from a new study of whiting bycatch, funded by the Pacific States Marine Fisheries Commission, and from experimental sardine fishery data collected by the Canadian Department of Fisheries in 1996.

This year, the Southwest Fisheries Science Center (SWFSC) began a new initiative to monitor egg and larval fish production in marine reserves near Ventura and Point Conception. These studies are designed to develop methods for testing the effectiveness of marine reserves as sources of adult spawning biomass that may reseed heavily exploited areas outside the reserves. The field research is designed to monitor spatial and temporal variation in egg production and the patterns of egg and larval dispersal from the reserves. These studies, supported by funds administered by California Sea Grant, draw upon methods that include the egg pump, satellite-tracked current drifters, and vertically hauled bongo nets.

The U.S. GLOBEC (Global Ocean Ecosystem Dynamics) program of the National Science Foundation and NOAA has long invoked concepts and methods similar to those of CalCOFI, but its field work has been limited to Georges Bank off Massachusetts. Plans for a new study off the U.S. west coast have stimulated CalCOFI investigators to consider how their expertise and experience may contribute to the GLOBEC study. The biogeographic center of the study is an area of historic CalCOFI

interest and research, but is located north of the present CalCOFI study area, where a less complicated coastal structure simplifies the field studies and where salmon is a politically potent subject of investigation.

In July of 1996 the Ichthyoplankton Group at SWFSC, together with the CalCOFI Committee and the Allen Press, published the 1,517-page *CalCOFI Atlas 33*, titled *The Early Stages of Fishes of the California Current Region*. This tome, edited by Geoff Moser, treats the life history of 586 species in 158 families and 25 orders. The book includes 2,500 illustrations of eggs, yolk-sac larvae, pre-flexion larvae, flexion larvae, and post-flexion larvae. Parts of the book were over 40 years in development.

With new funding provided through the Saltonstall-Kennedy program of NMFS, the Ichthyoplankton Group is reexamining the preserved ichthyoplankton collection in order to update the time-series data for rockfish (*Sebastes*) larvae. New alcohol-preserved samples, taken simultaneously with formalin-preserved samples, will be used for studies of molecular genetic markers that may help identify fish eggs and larvae when visual methods are ineffective.

The committee thanks the officers and crews of the NOAA ship *David Starr Jordan*, the State of California research vessel *Mako*, and the University of California research vessels *New Horizon* and *Roger Revelle* for their excellent support of the CalCOFI field sampling program. Appreciation is also extended for the collaborative efforts of the hydrographic department of the Mexican navy and the Instituto de Investigaciones Oceanológicas, Universidad Autónoma de Baja California for their contribution to the article on the California Current (Schwing et al.). The committee and coordinator also thank the following people for their invaluable contribution of time and expertise in reviewing the manuscripts that are published in this volume: Shannon Cass-Calay, Loren Hauray, George Hemingway, Roger Hewitt, Sharon Kramer, Uta Passow, Susan Picquelle, Drew Talley. And finally we thank the editor, Julie Olfe.

Portions of the *CalCOFI Reports*, as well as extensive data archives, calendars of operations, maps of cruises, animations, links to cooperating agencies, and general information about CalCOFI, are available online at <http://www-mhr.ucsd.edu/calcofi.html>.

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