

Part I

## REPORTS, REVIEW, AND PUBLICATIONS

### REPORT OF THE CALCOFI COMMITTEE

#### CALCOFI LEGENDS RETIRE

##### **John Hunter “Weighs Anchor”**

After more than 40 years as a scientist and administrator for CalCOFI, Dr. John R. Hunter retired from the Southwest Fisheries Science Center (SWFSC) of the National Marine Fisheries Service (NMFS) in the summer of 2003. He began his CalCOFI career as a laboratory scientist defining the progress of egg and larval development and particularly the development of schooling and feeding behavior of aggregations of larvae preying on patches of motile plankters. He started this phase of his career after studying tuna and porpoise field behavior; one of his contributions was to define the behavior of tuna near flotsam. Tropical tuna fisheries now take advantage of the aggregation of tuna around artificial floating devices. Hunter's doctoral dissertation concerned nest parasitism of sunfishes by minnows. These divergent areas of study prepared him for the diversity of scientific approaches he has used to understand and manage the coastal pelagic species of the CalCOFI program interests. About a third of his numerous publications concern the details of spawning and the importance of that knowledge in evaluating fish resources; these are published under the pseudonym J. Roe Hunter.

Hunter's international recognition as a scholar was furthered by his research conducted under a Rockefeller Foundation Fellowship during which he and J. H. S. Blaxter wrote the definitive work on Clupeoid biology, published in *Advances in Marine Biology* 20 years ago. This work constituted the unification of field and laboratory studies that have been grist for field, laboratory, and modeling works to this day. The scholarly demands on Hunter have multiplied through his interactions with faculty and graduate students at Scripps Institution of Oceanography (SIO) and other important centers around the world. Through these important activities, he has carried the CalCOFI process into his supervision and planning of research for the U.S. Agency for International Development, U.S. Global Ocean Ecosystem Dynamics (GLOBEC), and International GLOBEC. Hunter used the CalCOFI format in the design of the International Geosphere-Biosphere Programme in relation to Small



Pelagics and Climate Change. Hunter founded this project a decade ago, and it is carried on by his colleagues, led by Dr. Juergen Alheit.

Recently, following the massive recovery of the sardine population and its expansion from small habitats in the Southern California Bight to dominance of the pelagic biota from Mexico to Canada and Alaska, Hunter proposed a multi-institutional program to overcome the parochial geography of CalCOFI and expand biological and oceanographic measurements through the entire California Current System from British Columbia to Baja California, Mexico. This is a work in progress (now called Pacific Coastal Observing System, PaCOS; formerly known as Alliance for California Current Ecosystem Observation, ACCEO) and, fortunately, we can rely on his guidance for several more years to expand the CalCOFI grid beyond its present scope.

Hunter is best at careful observation. Flaws in traditional observation systems stimulated him to design rapid and incisive methods for those times when the ocean, and particularly its biota, would not stand still for patient observation. His first contribution was to assemble a group of scientists to adapt and modernize river and coastline methods for tagging fish that could be used in the open ocean habitat, especially for tuna scanned by satellites. Hunter was a pioneer in the study of archival tags nearly two decades ago when the existing technology was far behind researchers' needs. Now the age of miniature computer tags has brought these techniques into functional prominence. Hunter has been spreading the understanding and application of daily egg production methods for the rapid and precise assessment of the spawning biomass of multiple spawning schooled fishes around the world. He recently added continuous sampling by the Checkley egg-pump sampler, which in its first use on the West Coast forced the revision of our time-honored opinions about the life and geography of the Pacific sardine. Lastly, Hunter forged airborne LIDAR technologies to assess schooling surface fishes, which are resistant to normal acoustic surveys. As a result, the upper areas of the ocean are now rapidly observable, and these methods are the methods of choice for slow-schooling fishes and virtually the only methods for rapid-swimming fishes like mackerel. Hunter's research exemplifies how basic research can be combined with applied research to address management needs. His paper on ultraviolet radiation damage to surface-living anchovy larvae, co-authored with John Taylor and Geoff Moser, has been cited 43 times in the 25 years since its publication. A quarter of these citations relate to invertebrate and fish damage and appear in works published in the last three years, long after his personal involvement.

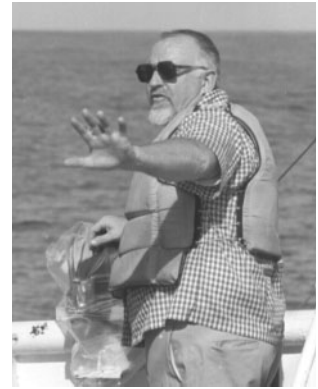
In his scholarly wake, he has also left us the definitive handbook on fisheries science writing, *Writing for Fishery Journals*. (And, although it contains no signal for when to stop writing about a top scientific and scholarly career, I trust the editors who have been brought up with its sage advice will exercise the necessary controls over those of us who need it [editors' note: we did]). While Hunter is leaving the field of science administration, we are confident that there will be issues in CalCOFI that will rise to his standard for giving guidance and consideration.

Great job, well done, and thanks for the extra labor on CalCOFI's behalf.

### Paul Smith "Casts Off"

Dr. Paul E. Smith, leading fisheries research biologist at SWFSC and adjunct professor at SIO, retired in January 2003 after 40 years of service. Smith came to the SIO campus as a postdoctoral student in ecology with

Professor E. W. Fager, who pioneered the use of modern statistics in oceanography. Smith soon developed a close working relationship with Dr. Garth Murphy, CalCOFI Coordinator, and Dr. Elbert Ahlstrom, director of the La Jolla Laboratory of the Bureau of Commercial Fisheries (BCF). His interest in plankton and sardine



biology led to his appointment as fisheries research biologist at BCF, later to become NMFS. Smith's interest in sampling design and techniques led to several important papers on plankton net performance and efficiency. This research was, and continues to be, a major contribution to the CalCOFI field surveys and to the quality of the plankton data derived from them. His classic monograph, "Standard Techniques for Pelagic Fish Egg and Larva Surveys," co-authored with Dr. Sally Richardson, published by the UN Food and Agriculture Organization in 1977, remains the international standard manual for plankton field surveys. Smith's early interest in acoustic biological sampling led him to Norway, where he worked closely with Simrad engineers in the design and installation of acoustic instrumentation aboard the newly commissioned *RV David Starr Jordan*. Scientists throughout the world have continued to call on Smith for his expertise in the design of acoustical samplers and in the biological interpretation of data derived from them. His core research interest has centered on coastal pelagic fisheries (sardines, anchovies, mackerels, and hake), and he has published numerous classic papers on all of these. His career has bridged the period of the Pacific sardine collapse, the explosive growth of northern anchovy, and the recovery of the sardine population during the past decade. His leadership in the establishment of a harvest moratorium for Pacific sardine was critical



to the population's recovery. He played a similar advisory role in the conservation and management of coastal pelagic fisheries in Mexico, Chile, Peru, Spain, Japan, and South Africa through the introduction of scientific advances developed in the CalCOFI program. His studies of larval fish assemblages in re-

lation to changes in the ocean environment form a basis for ecosystem management of the California Current System. One of Smith's most important roles has been as a graduate student advisor and postdoctoral mentor. Many of his students have become leaders in their research fields and have made major contributions to fisheries and ecological science. Following his retirement, Smith has continued his research projects, service on scientific committees, and student advising, and he remains a vital resource for CalCOFI and SIO. Just as one of his ancestors opened new vistas and opportunities as a member of the Lewis and Clark expedition, Smith's career continues to be a truly remarkable series of explorations in fisheries science and ocean ecology.

### Ronald Lynn "Rides the Ebb Tide"

Ronald J. Lynn retired in January 2003 after 40 years of service with BCF and its successor agency NMFS.



Lynn was a rare specimen at NMFS, being the only physical oceanographer at La Jolla's SWFSC through most of his career. His unique expertise, contagious enthusiasm, and kind, unassuming demeanor made Lynn's office a popular spot for the center's scientists. (Not to mention the great view!)

His talents are reflected in

his extensive and diverse body of work, which includes seminal papers on subjects ranging from abyssal water properties (with Joe Reid), to California Current physical dynamics, to West Coast fisheries oceanography. CalCOFI was always a focal point of Lynn's career: he participated in planning, in data collection at sea, and, of course, in the analysis of CalCOFI's vast data set. He was a regular contributor to *CalCOFI Reports*, and his *CalCOFI Atlas* no. 30 remains a classic and much-referenced guide to the CalCOFI hydrographic data set.

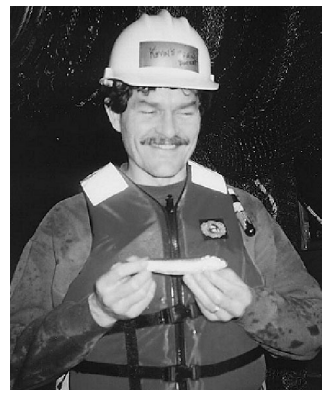


Lynn's career spanned two climate regimes, from the period of Nansen bottle casts and hand annotation of data to CTDs and real-time satellite imagery. He was always at the forefront of technological advances and

always approached problems with simple curiosity and logic. Four decades of productive research have earned Lynn a well-deserved reputation as a leading expert in fisheries oceanography and the physical oceanography of the California Current. He will be missed in the CalCOFI community, but his ideas and accomplishments will continue to guide our work. We wish Lynn well in his retirement.

### Kevin Hill "Steps Down and Jumps Ship"

Dr. Kevin T. Hill has stepped down as CalCOFI coordinator and has left the California Department of Fish and Game (CDFG) to work with SWFSC in La Jolla as part of its population dynamics research team.



He served as CalCOFI coordinator from 2000 to 2003. He organized the annual CalCOFI conference from 2000 to 2002 and oversaw production of volumes 41 to 43 of *CalCOFI Reports*. For the past three years, Hill was the project leader for CDFG's pelagic fisheries assessment unit and was

responsible for conducting stock assessments and biomass evaluations for Pacific sardine and Pacific mackerel. He also represented CDFG on the Pacific Fisheries Management Council's Coastal Pelagic Species Management Team and the Scientific and Statistical Committee. Hill worked for CDFG for over eight years, spending his entire tenure at SWFSC in La Jolla collaborating with federal scientists working on coastal pelagic fish stocks. Hill's expertise, professionalism, and enthusiasm will be missed by CDFG. As coordinator of CalCOFI, Hill's exceptional organizational skills made it a pleasure for the committee to conduct CalCOFI business, gave us the ability to track financial transactions easily, and kept us on track. As organizer of the conferences, he attended to every detail and ensured that participants were well cared for; his closing remarks were always exceptionally gracious



and warm and made both him and CalCOFI shine. On behalf of the entire CalCOFI community, we thank Hill

for his dedication and tireless energy, which have helped CalCOFI move forward into the twenty-first century.

#### SIO HIGHLIGHTS

CalCOFI personnel from SIO have devoted considerable time and energy to finding operating funds to replace those that until recently were provided by the University of California. In the summer of 2002, the state of California imposed stringent budget cuts throughout the university system. University of California, San Diego, elected to absorb much of its cut by decreasing allotments for research. This ultimately translated into a \$1.3 million cut in state-supported research at SIO. Approximately \$1 million of those funds represented SIO's contribution to CalCOFI, for technicians and two of the quarterly research cruises.

SIO/CalCOFI has since received emergency funding from NOAA and the Office of Naval Research. These, together with other carry-forward funds, will provide technicians' salaries through early summer 2004 and research vessel support through the fall cruise in 2004. The emergency funds would not have been realized without the support of SIO's director, Charlie Kennel, and miraculous efforts on the part of Kathleen Ritzman, Kennel's director of government relations. Additional outside funds are being sought to fill the funding gaps beyond 2004.

A bright spot during the past year was the April CalCOFI cruise. The Office of Naval Research supported the use of the RV *Roger Revelle* for an expanded cruise, providing space and time for several navy-supported programs and a few additional days for extra CalCOFI-dedicated research. This gave us the opportunity to demonstrate the value of CalCOFI as a research platform. During the three-week cruise, there were 25 "ancillary" personnel with 23 different projects. On-board were researchers from three foreign countries and three California institutions (in addition to SIO). Most programs met or exceeded their expectations. By all criteria, the objective of demonstrating CalCOFI's value as a research platform was fully met.

The additional research occurred on the third leg of the cruise; we conducted a closely spaced hydrographic survey along the perimeter of the CalCOFI area while returning to San Diego from station 77.49. At the same time, the RV *David Starr Jordan*, which had completed a larval fish and egg survey up to San Francisco, was able to do a similar hydrographic survey around the northern area. We hope that this increased sample density will enable us to estimate a flux budget for the CalCOFI area from a single cruise. Previous efforts (Roemmich 1989 in Deep-Sea Res. I, vol. 36; and Bograd, Chereskin, and Roemmich 2001 in J. Geophys. Res., vol. 106) have been forced to average over several cruises to reduce the

error bars. If we obtained sufficient sample spacing on this cruise, we will be able to compare fluxes of numerous properties between cruises and between areas; this will open approaches to a number of ecological questions concerning off-shore transport and advective versus in situ processes.

#### CDFG HIGHLIGHTS

CDFG established the largest marine reserve on the West Coast in 2002, setting aside 12 areas (175 square miles) within the Channel Islands National Marine Sanctuary where fishing is not allowed. CDFG will convene workshops to review the best methods for monitoring the newly established marine reserves. The next phase would expand the network of reserves into federal waters—those lying beyond the 3-mile boundary of state waters that surround each island. The full system of marine reserves would cover 426 square miles and once adopted by the federal government would make California the home of the largest network of marine reserves in the continental United States.

A cooperative program involving state, federal, and university researchers is being assembled to provide information needed to manage nearshore fish and invertebrates under the authority of the California Fish and Game Commission. Specifically, the Cooperative Research and Assessment of Nearshore Ecosystems program (CRANE) will develop a fishery-independent sampling program to provide density and size frequency information on marine invertebrates, fishes, and kelps in nearshore rocky subtidal habitats (5–100 m depth). CDFG will conduct aerial kelp bed surveys annually to measure the distribution and abundance of kelp habitat and resources.

#### PACOS AND THE FUTURE OF CALCOFI

At the CalCOFI conference in November 2001, Dr. John Hunter, SWFSC, proposed that CalCOFI begin strengthening communication and data exchange between existing pelagic surveys along the west coast of North America. Existing programs, if effectively coordinated, could ultimately serve as the framework for an expanded program of observation covering the entire California Current System. This idea was enthusiastically received and discussed by conference participants. Hunter and other CalCOFI personnel conducted three workshops along the West Coast (in Moss Landing, California; Portland, Oregon; and Seattle, Washington) to assess support for this concept; support was enthusiastic from Baja California to British Columbia.

The concept has been favorably received by NOAA Fisheries. Early in April, a workshop was held at SWFSC in La Jolla, attended by Michael Sissenwine and Bill Fox from NOAA Fisheries headquarters, scientists from

NMFS laboratories in La Jolla and Seattle, and representatives from CDFG and SIO. NOAA pledged support for a broad view of the alliance, which would include not only CalCOFI and allied programs but also all the biological observing systems presently in place in the Exclusive Economic Zone (for instance, the MBARI/NPS Line 67 near Monterey, California, and the line off Newport, Oregon, that is repeatedly surveyed by Oregon State University and NWFSC). The program has been named Pacific Coastal Observing System (PaCOS). A workshop of key federal, state, and university institutions will occur on 1 June and 30 July 2003. Those attending the April workshop also agreed on the importance of maintaining the CalCOFI program, which will be a key component of any expanded alliance.

#### *CALCOFI REPORTS GOES ONLINE*

In an effort to keep up with the information age, reach the largest possible audience, and reduce costs, *CalCOFI Reports* is now available on the Internet. Articles from the entire series (volumes 1 to 44) may be downloaded, free of charge, as Adobe Acrobat™ (pdf) files. See the CalCOFI Web site, [www.calcofi.org](http://www.calcofi.org), for details. Volumes 43 and 44 files were generated electronically during the final layout process. Volumes 1 through 42 were scanned and electronically archived in a searchable format thanks to the efforts of Information Technology Services of the SWFSC. The CalCOFI Committee is especially grateful to Rob Bistodeau for offering his time and expertise to this worthy cause!

#### 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: NOAA's RV *David Starr Jordan*, University of California's RV *New Horizon* and RV *Roger Revelle*, and CDFG's RV *Mako*.

We thank H. Geoffrey Moser, Steven J. Bograd, Ronald C. Dotson, Franklin B. Schwing, and Dale Sweetnam for their assistance in preparing this report. We also thank the reviewers of contributed papers in this volume: Larry Allen, Steven Bograd, Larry Breaker, Kurt Buck, Gregor Cailliet, Aloysius Didier, Jr., John Geibel, John Hunter, Eric Knaggs, Milton Love, Baldo Marinovic, Jerrold Norton, Richard Parrish, Paul Reilly, Franklin Schwing, Gary Sharp, Mary Silver, Cindy Thomson, Sam Herrick, William Watson, and Mary Yoklavich. We are especially grateful to Joni Harlan for her professional style in editing this volume of *CalCOFI Reports* and to Barry Age and Simone Llerandi for their exceptional efforts in producing it.

Finally, we would like to thank Brad Neuschwanger (CDFG), Mary Ellsworth (CDFG), Corey Chan (CDFG), and Diane Foster (NMFS) for providing invaluable assistance to the CalCOFI Committee throughout the year.

#### ***The CalCOFI Committee:***

*Kevin Hill, CalCOFI Coordinator*

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*Laura Rogers-Bennett, CDFG*

*Elizabeth Venrick, UCSD*