



Dayton Receives Assembly Accolades

Dr. Paul Dayton, a long-time Sea Grant researcher and biological oceanographer at Scripps Institution of Oceanography, was recently honored with a California Assembly Resolution from the Joint Committee on Fisheries and Aquaculture.

It recognizes his “stellar career as a marine ecologist, committing himself to advancing underwater science and technology...and his significant contributions to the state of California,” which has supported Dayton’s research for many years through California Sea Grant. Shown presenting Dayton the award is State Senator Dede Alpert, vice chair of the committee.



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An Interview with Harry Scheiber on Fisheries Management

If the old adage about history is true, then the scholarship of Harry Scheiber may provide some guidance in helping to avoid repeating the mistakes of past ocean policies.

Scheiber is a historian of marine policy, the Stefan Riesenfeld Professor of Law and History at the Boalt School of Law at UC Berkeley, and a scholar of the 1982 United Nations Convention on the Law of the Sea—the leading international convention to preserve and protect the world’s marine ecosystems. He is also the director of the university’s Earl Warren Legal Institute, co-director of the University’s Law of the Sea Institute, and has recently served as a consultant on fisheries law to the Pew Oceans Commission and the National Research Council. For the last five years, he has been chair of California Sea Grant’s advisory board.

Scheiber has authored or co-authored 24 publications with Sea Grant in the last two decades, covering a wide range of topics including the history of fisheries policy, oceanography and the Law of the Sea. His book, “Inter-Allied Conflicts and Ocean Law, 1945–53: The Occupation Command’s Revival of Japanese Whaling and Marine Fisheries,” published in 2001, discusses the effects of the Allied occupation on ocean law, fishing and whaling in Japan. He is currently working on a second, related book, “Japanese–U.S. Relations, the Pacific Fisheries, and Ocean Law, 1937–70.”

His most recent Sea Grant publication, published in the Virginia Environmental Law Journal in 2002, takes a provocative look at the successes and failures of ocean and fisheries policy. The article, “Ocean Governance and the Marine Fisheries Crisis: Two Decades of Innovation and Frustration,” was one of the most frequently requested California Sea Grant publications last year.

Harry Scheiber recently spoke to Sea Grant’s science writer about fisheries policy.

Q. What has been the innovation in fisheries policy, globally?

A. The innovation has been breaking away, in a major way, from the old doctrine in fisheries that any flagged vessel is free to fish anywhere it wants on the high seas, with any gear it wants, and in any quantity it wants, without regulation.

Now, we have had a series of commitments by the majority of maritime nations that fish on the high seas to take on new obligations and to enforce them. Under the United Nations (UN) Convention on Biodiversity, the UN Fish Stocks Agreement of 1995, as well as the Law of the Sea, we see a rising number of regulations protective of the environment and of fisheries stocks, at least potentially protective. These were unheard of before.

Q. And the frustration?

A. The biggest single frustration is that, within the 200-mile offshore Exclusive Economic Zones of the nations that have established them, which is almost every coastal nation, there has been an abject failure to fulfill the promises of the economic-zone advocates of 20 years ago. These advocates



Attending the April 2002 international conference, “Bringing New Law to Ocean Waters” are, left to right: Yan-Huei Song, Academia Sinica, Taiwan; Tullio Treves, UN Tribunal for the Law of the Sea, and Milan University; David Caron and Harry Scheiber, Boalt Hall School of Law. Photo: UC Berkeley

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said, “Once we get foreigners out of these zones, each nation will control its zone in a conservationist manner.” But, what we have learned is that the pressures of local politics and of fishery interests, combined with the dangers that come from pollution and other human activity, have meant that we still have a trend pointing toward the depletion of important fisheries.

Q. How can this downward trend be rectified?

A. The whole question of too many boats and too few fish must be addressed by policies that will protect habitats and protect against bycatch. We have to adopt regulatory measures that will protect stocks at sustainable levels. The Sustainable Fisheries Act adopted by the United States in 1996 is an example of the recognition that ecosystems have to be the focus. Habitats must be protected.

The second thing that has to be done is to come to agreement, fishery by fishery, as to whether other arrangements have to be put in place that will further curtail freedom of fishing. People will have to look afresh at what the economists have favored for 20 years, whether to move over to some variant of privatization of fish resources. Somehow national interests and not just the interests of coastal communities must be taken into account.

Q. Can better laws really protect fish stocks?

A. First, you need to have very reliable science, and that is another very difficult area because of the whole problem of uncertainty in science.

Q. Three decades ago, respected biologists dismissed the notion that marine stocks could become “depleted.” How can we place our trust in science?

A. Many biologists objected to talking about “depletion.” They felt that you could not actually deplete a stock. You could damage it, but you could not deplete it. It would always come back, they said.

People, including some scientists at the University of California, said the word “depletion” was an exaggeration. “Fishery stocks don’t get depleted,” they said. “There may be a reduction in the stock. But they are not totally wiped out.”

Well, that was the wrong way of phrasing the argument. To wipe out a stock or species totally, that’s not a reasonable way of framing the question. When and how do you control fishing and other factors harming the stocks; that’s a reasonable approach.

Today, the UN Food and Agriculture Organization uses the words “exhausted” and “overexploited,” which of course actually mean “depleted,” to describe fisheries that are no longer commercially viable. We now accept these terms. Nobody today denies the idea that you can bring a species to the point of endangerment. The old arguments about “misplaced” rhetoric of “depletion” is out the window, thank goodness.

Q. You discuss four different approaches to fisheries management in your most recent Sea Grant book: the precautionary principle, the preservationist approach, protection of biodiversity and ecosystem integrity, and privatization of property rights in fisheries. Which of these offers the most promise in rebuilding and protecting fish stocks?

A. All four are important. If I had to single out one, it would be the precautionary principle, if it is really taken seriously. It is the hardest to formulate, and it is the hardest to implement. But, if you accept the precautionary principle, it will mean that a lot of what have proved to be high-risk policies—and in many cases disastrous policies—would be halted. Under the precautionary principle, the burden of proof falls on those who want to pursue exploitative activities.

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Fisheries Management (continued)

The precautionary principle is incorporated now in many international agreements, including the Fisheries Stocks Agreement, the Biodiversity Treaty, several regional treaties relating to marine pollution, and so on. I think that it is the best hope, but it is also the most complicated. Some species and habitats simply have to be preserved; others can be exploited sustainably, but only if our knowledge from science and economics informs law and politics in creative and effective ways. It's a tall order, but we'd better turn to it if the oceans aren't going to be...yes, depleted! ■ ■ ■

Estimating Rates of Human Illness from Water Pollution

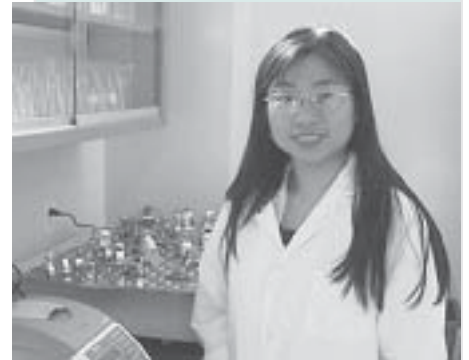
If you are a surfer, swimmer or avid beachgoer in Southern California, you know all about Huntington Beach's pollution woes. In 1999, spikes in bacterial counts forced health officials to close stretches of Surf City during much of the summer. These closures hit the local economy and were followed by a flurry of science projects to figure out the pollution's source. Rusted sewer systems, the massive municipal sewage outfall pipe four miles offshore, storm water, birds, and the Santa Ana River were all suggested as potential culprits.

Although nobody yet knows where the bacteria were coming from that year, research funded by California Sea Grant is shedding light on the potential health risks of chronic water pollution—not just from super-high bacteria counts, but also from lower levels that can elevate a person's chance of contracting water-borne disease. Sunny Jiang, a professor at UC Irvine, and her doctoral student David Turbow, estimate that water pollution could have realistically been the direct cause of about 95,000 cases of gastrointestinal illness at Huntington and Newport beaches between June 1998 and December 2000. On some summer days, as many as 600 people might have contracted gastrointestinal illness from water contact. According to their model, 99% of these people were getting sick at beaches that were open to swimming and where bacterial counts were within safe guidelines.

It is important to stress that the scientists did not track actual incidences of illnesses in bathers. Their estimates are based on a model that predicts the risk of contracting a "highly credible gastrointestinal illness," defined as nausea, diarrhea, vomiting or stomachache, accompanied by fever, for a given enterococcus level. The Environmental Protection Agency uses the same model to set water-quality standards under the Clean Water Act.

Enterococcus is a bacteria found in mammalian intestines and associated with fecal pollution. Its levels are monitored by state law. Many other illnesses, such as upper respiratory infections, may be caused by water pollution and may actually be more common than gastrointestinal illnesses. The scientists focused on gastrointestinal ones because the data for other illnesses is not as statistically defensible.

Turbow and Jiang's findings have been published in *Environmental Health Perspectives*, a journal of the National Institute of Environmental Health Sciences. The abstract can be obtained at <http://ehpnet1.niehs.nih.gov/docs/2003/5563/abstract.pdf>. ■ ■ ■



Dr. Sunny Jiang, a water quality expert at UC Irvine, is developing tools for measuring viruses in coastal waters. Photo: UC Irvine.



When bacteria reach dangerously high levels, health officials post warning signs at beaches. The sign above was placed near a storm drain outlet on a La Jolla beach. Photo: G. Ratcliffe, California Sea Grant



Female snail laying egg capsules.
Photo: Scripps Institution of Oceanography

Novel Compound Found in Egg Capsules

Many marine snails package—technically speaking deposit—their eggs in special protective wrappings called egg capsules. These capsules come in a variety of weird and wonderful shapes. Some look like candy necklaces, miniature Chinese dragons, waxy blobs, a tiny crushed trumpet, or lima beans on a string. The longest reach over a foot in length; most are much shorter.

A female snail moulds the capsule material into its distinctive shape with her foot. The process is a lot like kneading bread. The crushing, pushing and pulling of the capsule “dough” activates the cross-linking of proteins. In bread, kneading forms gluten. For the snails, kneading hardens and stabilizes the egg capsule material—all the better for protecting eggs that may incubate for months in the ocean.

Marine biologists have long speculated that the capsule material might hold some unusual properties since it is both malleable and immune to microbial attack. Mechanical tests led by marine biology professor Robert Shadwick of Scripps Institution of Oceanography

and Sea Grant Trainee Scott Rapoport have verified scientists’ hunches. The capsule material does have interesting properties.

For one, it shares characteristics of both elastin and collagen. In the human body, collagen is a structural protein—the “bricks” that give tissues rigidity. Elastin imparts elasticity. Collagen and elastin work together in blood vessels, tendons and ligaments, as well as in our skin and other organs, to provide support and flexibility. Snails have evolved a way to construct a protein polymer that can be both rigid and flexible.

This bimodal character is somewhat common in natural materials. What makes the capsule material even more unusual is that it can be stretched and re-stretched without altering its properties. “You could stretch the capsule material to almost twice its length without damaging the material,” Rapoport said. This “self-healing” property could have applications in developing better human soft-tissue transplant material such as artificial tendons and ligaments for use in treating sports injuries.

In ongoing Sea Grant work, Shadwick and colleagues have begun to identify the genes that code for the production of proteins in the capsule material. They plan to compare these genes to those that code for other known structural proteins. Hopefully, they will be able to insert the snail’s genes into an easy-to-culture organism, such as a yeast or bacterium. This organism could then, it is hoped, be coaxed into producing large amounts of the capsule material for further testing and potentially for commercial use. ■ ■ ■



Instrumentation used to test the mechanical properties of egg capsule material. Photo: Scripps Institution of Oceanography



Christine Blackburn. Photo C. Blackburn

Sea Grant Fellow Wins New Appointment

Former California Sea Grant State Fellow Christine Blackburn has won a Policy Fellowship with the American Association for the Advancement of Science (AAAS) in Washington, D.C. Blackburn is now working in the Office of Science and Technology at the National Heart, Lung and Blood Institute, an arm of the National Institutes of Health.

Blackburn earned a doctorate degree in marine chemistry and in 2002 was awarded a California Sea Grant State Fellowship at the Ocean Program of the California Resources Agency. As a State Fellow, she helped organize the California and the World Ocean Conference 2002 and the first meeting of the board of trustees of the newly formed California Ocean Trust.

“Until I started the Sea Grant State Fellowship, my only job experience was in the lab, doing independent research,” she said. “After completing my doctoral degree, I was interested in taking a different career path and wanted to get involved in policy work related to science. Opportunities to switch fields are limited. The Sea Grant

fellowship gave me an unparalleled opportunity to experience this kind of work firsthand.”

After her AAAS Fellowship ends, Blackburn hopes to return to marine policy and conservation.

“I’d like to do what I was doing as a State Fellow,” she said. “I’m looking at options in Washington, D.C.” ■ ■ ■

Seafood Program Awarded Fisheries Honor

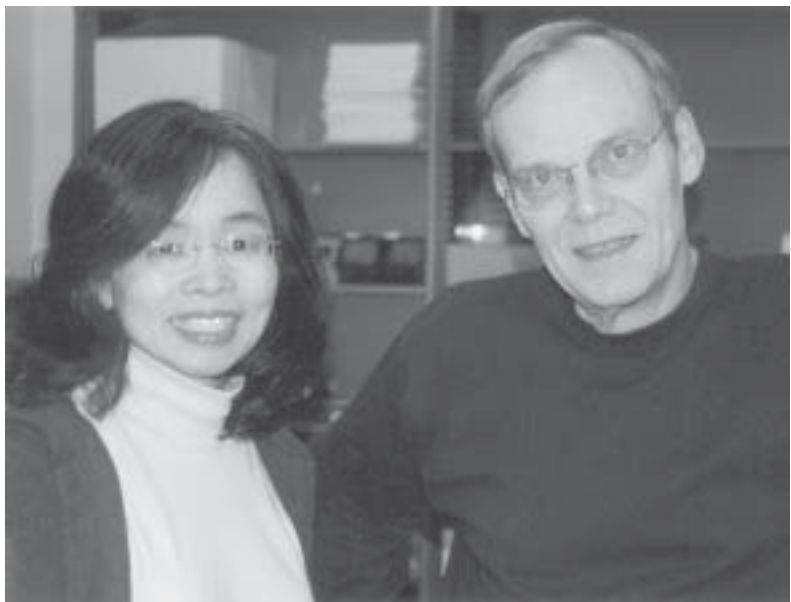
In November 2002, Sea Grant seafood Specialist Dr. Robert Price and Program Manager Pamela Tom were jointly awarded a FINesse Award for Seafood Nutrition, Health & Food Safety Research by the National Fisheries Institute.

The National Fisheries Institute, a nonprofit trade association, created the FINesse Awards in 2000 to honor outstanding companies, organizations or individuals in the seafood industry. The seafood research award is presented to the company, organization or individual who has made exceptional advances in research

efforts to identify new health and nutrition facts on seafood.

It was a fitting tribute to Price’s distinguished 30-year Sea Grant career, during which he garnered a host of awards for his work in seafood technology and safety. Price retired in January 2003, and Sea Grant’s Seafood Technology program continues under the able leadership of Pamela Tom.

For a retrospective on Price’s Sea Grant years, see the program web site at <http://www.csgc.ucsd.edu/EXTENSION/pricestorypriceindex.html>.



Program Manager Pamela Tom and Seafood Specialist Robert Price. Photo: Phil Roberts, Department of Food Science & Technology, UC Davis

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New California Sea Grant Publications

A list of available publications is on the Sea Grant web site at <http://www.csgc.ucsd.edu>. To order publications, contact Gretchen Frederick at gfrederick@ucsd.edu, call (858) 534-4446, or write Communications Department, California Sea Grant, 9500 Gilman Drive, La Jolla, CA 92093-0232.



- *California Marine Protected Areas Past & Present* by Deborah A. McArdle. 2002. Publication No. T-050. (Free)
- *California Marine Protected Area Update* by D.A. McArdle, S. Hastings, and J. Ugoretz. 2003. Publication No. T-051. (Free)
- *International Caulerpa taxifolia Conference Proceedings* edited by E. Williams and E. Grosholz. 2002. Publication No. T-047. CD-ROM. (Free)
- *What You Need to Know About Nontoxic Antifouling Strategies for Boats* by Leigh Taylor Johnson and Jamie Anne Miller. 2002. Publication No. T-049. (Free)

Public Notice

On October 6-8, 2003 a Program Assessment Team (PAT) appointed by the Director of the National Sea Grant College Program will conduct a review of the California Sea Grant College Program. If you have comments concerning the program or its work, please direct them, by September 15, 2003, to Dr. Fritz Schuler, Executive Director, National Sea Grant College Program, NOAA R/SG, 1315 East-West Highway, Silver Spring, MD 20910 (fritz.schuler@noaa.gov).

