NOAA National Sea Grant College Program Biennial Report 2002-2003

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Message From the Director Ronald C. Baird

TO OUR CONSTITUENTS:

We are now well into a new century and our fourth decade of service to this country. That says volumes about our resilience as an institution and the regard in which those we serve hold us. Today, the Sea Grant enterprise is nationally recognized as a dynamic, innovative, effective and well managed program. That recognition was never more evident than during events leading up to the unanimous passage in both Houses of Congress of the Sea Grant Act of 2002 (PL 107-299) signed into law by President Bush on November 26, 2002.

Sea Grant, through two Congressional hearings and a plethora of written and verbal testimony in numerous forums, made convincing, factual arguments as to the effectiveness of the Sea Grant Program (in its current form), and its benefits to the taxpayer.

The success of this endeavor was due to the many dedicated individuals, stakeholders and partners who constitute the remarkable Sea Grant network. To all of you who help make this organization a model of effective service, our sincere thanks. To the many constituencies we serve and who support our work, our deep appreciation for your continued confidence in Sea Grant.

With passage of the Sea Grant reauthorization bill and the value of our unique organizational infrastructure—with its corporate culture, core values and experienced personnel well established—our task now is to look to the future. Our previous assessment of the new century holds that the sustainable reconciliation of economies and environment will occupy the global stage for the foreseeable future. And, the assets and organizational strengths of NOAA's Sea Grant Program are well positioned to address the difficult transition to sustainability. Our management paradigm, legislative mandates and strong performance against exacting criteria have lead to an innovative program that has developed efficient and effective mechanisms for getting scarce resources to problems—the right problems—as defined by NOAA priorities and input from local and regional constituencies.

Looking to the future, sustainable management of coastal resources is an ongoing, complex endeavor analogous, in many respects, to the management of human health. This means sustained, long-term investment in complex issues and emerging problems. We are positioning ourselves to manage an ever-changing portfolio of investments in university-based activities directed toward our most critical problems. The return on our investments is assessed against the long-term benefits of our activities to society, versus cost. The temporal urgency for practical solutions to coastal issues requires coordination, cooperation, partnerships and effective investment at unprecedented levels. In response, our organization, its products and services are being shaped for the accelerating demand of sustainable resource management.

Looking to the future, Sea Grant has produced its first strategic plan that focuses specifically on the needs of the new century. The plan is consistent with NOAA's mission, yet tailored to Sea Grant's unique strengths. In concert with that planning, Sea Grant is developing a number of new dimensions to better engage the problems we foresee.

We remain committed to our guiding principle first articulated in 1997—to position ourselves for the future by the continuous process of becoming a more efficient, effective and responsive organization to those we serve. How we are moving forward is the subject of the remainder of my message to our stakeholders.

HIGHLIGHTS OF 2002-2003

1. In Fiscal Year 2002, the Sea Grant reauthorization provided several significant changes. It mandates that all appropriations above the FY 2003 level be awarded on the basis of merit ratings and competition, and it dictates that the National Academy of Science evaluate Sea Grant's performance review procedures and report to Congress by 2006.

2. In FY 2004, Sea Grant's authorized funding level is $93 million, which includes a general authorization of $75 million plus another $18 million for specific programs in invasive species, oyster disease, fisheries extension and harmful algal blooms. The general authorization ramps up to $85 million by FY 2008.

3. Congressional appropriations of $62.4 million in FY 2002 and $60.0 million in FY 2003 (after a $2 million loss of carryover), meant that Sea Grant was virtually level funded compared with appropriations for the previous biennium (2000-01) of $59.3 million and $62.3 million respectively.

4. Funds under management, from all sources, totaled $105 million in FY 2002 and $110 million in FY 2003.

5. Sea Grant commissioned, under the leadership of Dr. Robert Duce, professor of oceanography at Texas A&M University, a blue ribbon committee that reviewed NOAA's National Sea Grant Office (NSGO) and its future role in enhancing Sea Grant's effectiveness and efficiency in FY 2001. An important objective of this review is to increase Sea Grant's overall coordination and integration within NOAA. The recommendations in the committee's report are being implemented and are making an impact.

6. Sea Grant began the second cycle of performance based evaluations of all Sea Grant programs. Program Assessment Teams (PATs), which are chaired by members of the Sea Grant Review Panel and include outside experts as part of the teams, review every Sea Grant program on a four-year cycle. PAT reports provide findings of a program's performance with respect to four major criteria (management, planning, user connections and impacts), make recommendations for improvement of the program, and provide ratings against a standard set of performance benchmarks. For the first time, Sea Grant has introduced a set of qualitative and quantitative indicators of performance that all programs are rated against. Upon further review by the NSGO, program ratings are used to allocate merit-based funding to individual programs.

"Congress recognized that Sea Grant's university-based network offers the most cost-effective way to promote understanding, assessment, development, utilization and conservation of our Nation's coastal regions," said House Committee on Resources Member Congressman Eni F.H. Faleomavaega (D-American Samoa). Congressman Faleomavaega (left) introduced the National Sea Grant College Program Authorization Enhancement Act of 2001.

7. In March of 2003, "Positioning Sea Grant: An Integrated National Communications Plan" was completed to enhance communications "inside the beltway." The goal of the plan is "to more effectively transfer information from the National Sea Grant College Program to Congress, NOAA, the Department of Commerce, Office of Management and Budget, the White House, national non-governmental organizations, national news media and other relevant partners and audiences." The document resulted from the collaboration of many within the Sea Grant network, and represents the comments, suggestions and recommendations from interviews with more than three-dozen individuals in the National Sea Grant Office, other units of NOAA, the Sea Grant Association, university Sea Grant communications and selected non-government organizations.

NEW INITIATIVES

Sea Grant has initiated several new programs and partnerships in this biennium.

1. NOAA Sea Grant Strategic Plan (2003 – 2008 and Beyond)

The Sea Grant Strategic Plan is posted on our new national website and can be read in its entirety at: **www.seagrant.noaa.gov**

2. Fisheries Extension

To better respond to the needs of fisheries constituencies, Sea Grant invested $2 million in FY04 to fund new fisheries extension capacity and activities. The allocation of these funds to state Sea Grant programs was done on a competitive basis, and will result in the hiring of approximately 20 new fisheries extension personnel, a significant bolstering of existing capabilities. This five - year, $18 million program will involve collaboration between Sea Grant and various federal, state, and tribal fisheries agencies, regional fishery management councils, interstate fisheries commissions, and local and community management organizations.

3. Centers for Ocean Science Education Excellence (COSEE)

In partnership with the National Science Foundation, Sea Grant is involved in helping fund this major initiative in marine education. COSEE seeks to increase and enhance collaboration and communications among ocean scientists, educators and the general public. Sea Grant has played an integral role in conceptualizing and realizing the COSEE vision. The seven COSEE centers around the U.S. (five of which are partnered with Sea Grant programs) are working to facilitate the integration of research into high quality educational activities, programs and materials. The idea is to engage students and their teachers, and to develop their interest in understanding the relevance of the oceans to their lives.

A University of Southern California Sea Grant Program "Island Explorer" investigates the world of plankton while participating in the Parent Child Education Program.

4. International Sea Grant Paradigm

The National Sea Grant College Program, NOAA Research's International Activities (IA) Office, and the University of Rhode Island's Coastal Resources Center (CRC) are working together to foster global capacity for sustainable resource use and social development in marine and coastal environments worldwide by adapting the Sea Grant model of applied research, extension and education to international contexts. Sea Grant, IA, and CRC are currently working on supporting the U.S. State Department's "*White Water to Blue Water Initiative,*" focused upon watershed and marine ecosystem based resource issues throughout Latin

"Sea Grant funds critical marine research. It also ensures, through its education and outreach activities, that the results of that research are conveyed to state and local decision-makers, commercial and recreational interests, and future marine scientists," said Subcommittee on Environment, Technology and Standards (ETS) Chair, Vernon Ehlers (R-MI).

Artisanal Fishermen in the Gulf of Fonseca, southern Honduras.

America and the wider Caribbean. The goal in each region is to work toward developing a global network, modeled upon and linked to the U.S. Sea Grant network, dedicated to discovering and applying the knowledge, values and technologies that lead to more sustainable forms of coastal development and conservation.

5. NOAA's Program Matrix Structure

Sea Grant is fully engaged with NOAA's new matrix structure and is currently involved with six programs in NOAA's Ecosystem Mission Goal. In addition to its major contribution to the Ecosystem Research matrix program, Sea Grant also provides substantial input to the Aquaculture, Coastal Resource Management, Corals, Fisheries Management, Invasive Species and Habitat Restoration programs. We believe the opportunity is there to better engage NOAA's programs in utilizing Sea Grant's university-based capabilities, and to reach coastal constituents.

We believe this process of continuous improvement is the key to Sea Grant's success (and ability to perform) in a fast changing world. The organizational paradigm of national programming and local implementation is a powerful mechanism for effectively engaging emerging problems at multiple geographic scales.

In closing, Sea Grant continues to prosper because of its dedicated, talented personnel and an effective management structure that combines the strength of a large national organization with the responsiveness of a small one. As a result, Sea Grant is poised to have greater impact on the emerging U.S. coastal agenda than ever before.

Thanks again to our many friends, partners, supporters and constituents who are at the heart of what this unique organization is all about.

Ronald C. Baird
Director, NOAA National Sea Grant College Program

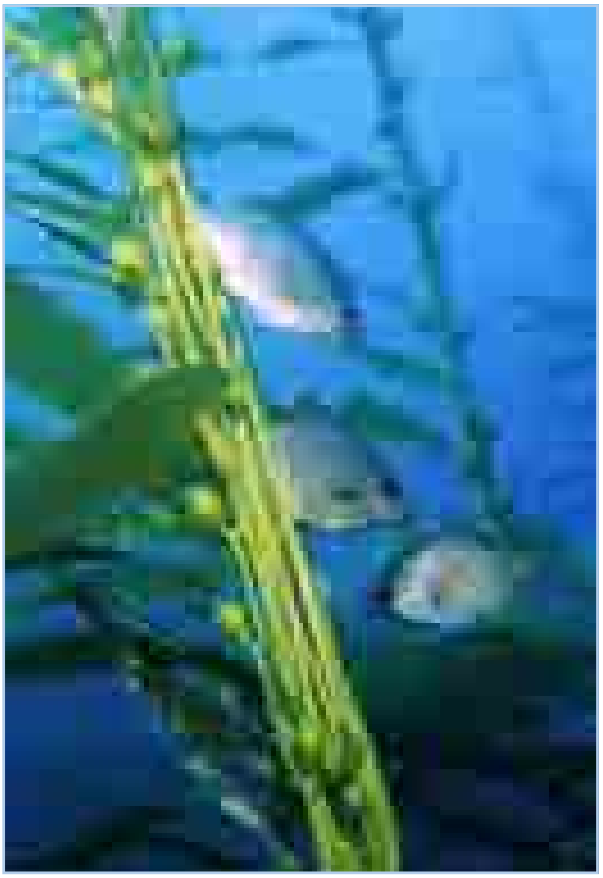
"The National Sea Grant College Program has expanded our knowledge about Great Lakes and Coastal ecosystems, trained thousands of professionals, and transferred research results into practical use.This partnership between the federal government and participating states has truly been a success," said ETS Subcommittee Ranking Member, James Barcia (D-MI).

BEHIND THE MICROSCOPE

MEET THE SEA GRANT SCIENTISTS WHO SERVE OUR NATION

"Without research, there is no hope," said distinguished Congressman and sponsor of the first Sea Grant Act, Florida's Paul Rogers. More than thirty years after its inception, research remains a cornerstone of NOAA Sea Grant's investment portfolio. We support about 500 research projects each year across the full spectrum of marine sciences.

This biennium, we are proud to present five Sea Grant researchers who are addressing pressing issues of local, regional and national significance. From the shores of California to the waters of the Atlantic, our researchers are building better acoustic fish counters, making scuba diving safer, improving shrimp harvesting gear, studying microbial indicators of ecosystem health and using genetics testing to monitor the shark trade. Philippe Roux, Charlie Lehner, Pingguo He, Hans Paerl and Mahmood Shivji are—the scientists "behind the microscope."



PACIFIC

Philippe Roux: Building the Ultimate Acoustic Fish Counter

By Christina S. Johnson, California Sea Grant

Roux

Philippe Roux adjusts a metal ball suspended in a bucket of water and turns a knob, saturating the water with inaudible, high-frequency sound waves. Silent echoes make squiggles on a small computer screen.

A physicist at the University of Paris, Roux usually designs instruments that use sound to diagnose and treat medical conditions. Now a visiting researcher at Scripps Institution of Oceanography, Roux has changed gears and is tackling the opaque physics of underwater acoustics. His goal: to build the world's best acoustic fish counter. The project is being funded by California Sea Grant in collaboration with NOAA's Southwest Fisheries Science Center and Kent SeaTech, a large San Diego-based sea bass farm founded by two former California Sea Grant trainees.

"When we are finished," Roux said. "I think we will not only be able to count fish, but to tell their average size and monitor their activity in the tank." The device that Roux imagines is portable, inexpensive and capable of scanning a commercial tank in a few minutes. Such an instrument would let farmers monitor fish growth rates, optimize feeding and harvesting routines and detect disease early—all valuable cost-saving measures.

" I think we will not only be able to count fish, but to tell their average size and monitor their activity in the tank. "

Roux, however, readily acknowledges he knows little about aquaculture. He is a physicist who was educated in France, came to Scripps in 1998 to complete post-doctoral research on tracking submarines acoustically and now holds a lifetime position in the acoustics and waves laboratory at the University of Paris. His expertise is in understanding the propagation — and in particular the reverberation — of sound in chambers. He has, for example, built an acoustic gun for non-invasively breaking apart kidney stones, as well as a device for burning brain tumors with intense, narrow blasts of sound.

With the fish counter, Roux's challenge is to figure out how to decode reverberations in a water-filled chamber: a tank chockfull of swimming, eating fish. Decoding echoes in a bucket, he said, is a good first start. "The metal ball is a proxy for a fish," he said. Once calibrated, more balls and different sized balls will be added to the bucket. The idea will be to measure simultaneously the number and size of balls in the bucket. From there, he said, it is relatively easy to scale up to a commercial tank.

The father of five young children, Roux took extra care to include an educational component to the project. In collaboration with the Birch Aquarium in La Jolla, he is designing an interactive exhibit called, "How many fish?" in which school children are asked to guess the number of fish in a tank and are then invited to obtain an estimate using the echo patterns of sound.

GREAT LAKES

Charlie Lehner: Making Scuba Diving Safer

By John Karl, Wisconsin Sea Grant Institute

Lehner

When Charlie Lehner plunged into the Pacific Ocean off the rocky coast of Peru in 1968, his scuba gear was merely a tool for collecting fish for his Ph.D. thesis in marine biology. He had no idea that three decades later he would rank among the world's leading experts on diving physiology.

Lehner has a deep love of science and a broad liberal arts and scientific education. With these, he was flexible enough to later take advantage of a job opening at the diving physiology laboratory at the University of Wisconsin-Madison.

Today, Lehner employs his scientific enthusiasm enhancing the safety of scuba divers. With a team of doctors and scientists from the University of Wisconsin and the University of Puerto Rico, and funding from the Wisconsin Sea Grant Institute, he is working with a group of seafood divers who have volunteered to participate in a study of decompression injuries.

Decompression sickness, commonly known as "the bends," can lead to death of bone tissue, which can ultimately result in the collapse of the ends of the long bones in the arms and legs, causing complete debilitation. In preliminary work on the project, bone scans of the Puerto Rican divers show they sustain high rates of injuries from diving for conch and spiny lobsters—delicacies that fetch high prices at the island's restaurants. Risk for such injuries can also be high among military and commercial divers and among submariners who make emergency escapes from disabled vessels.

By studying the precise ways that the length and depth of dives influence the onset and severity of decompression injuries in the Puerto Rican seafood divers, Lehner and his colleagues can develop risk assessment guidelines for those divers and many others. Lehner ultimately plans to mount outreach education efforts based on those guidelines.

"We want to give divers of all sorts—high-risk commercial, military and seafood divers, as well as low-risk recreational divers—the information they need to make their own decisions about what is acceptable risk," Lehner says. "We don't want to see anyone get hurt needlessly."

" I've been blessed to have had so many encounters with so many extraordinary scientists and clinicians along the way. "

Lehner credits the support of his parents and a succession of inspiring mentors with nurturing his early interest in science. That interest ignited when he was 10 years old and his father discovered mammoth bones and prehistoric human artifacts in an arroyo near their house in southeastern Arizona.

"I was quite taken with the way the archaeologists, paleontologists and geologists came and explained the age of the site," Lehner recalls. "It showed me the power of careful observation." The site is now known as the Lehner Mammoth-Kill Site, a National Historic Landmark.

As Lehner describes his youthful years and subsequent career, it's clear he maintains his early enthusiasm for science—and for the people engaged in it.

"I've been blessed to have had so many encounters with so many extraordinary scientists and clinicians along the way," he says.

NORTHEAST

Pingguo He: Working With Fishers to Improve Shrimp Harvesting Gear

By Kathleen Schmitt, New Hampshire Sea Grant

Pingguo

Pingguo He stands in front of a water-filled tank the size of two freight cars and watches intently as the water begins to move, the current pulling a large net with it.

A commercial fishing specialist with New Hampshire Sea Grant, Pingguo He designs and tests fishing gear that is easy on the environment. At the world's largest flume tank at the Memorial University of Newfoundland, he is testing a modified otter trawl that he developed with George Littlefield, a commercial fisherman from Kensington, NH. Their collaborative study is supported by the Northeast Consortium, a NOAA-funded program that encourages such research partnerships.

"Working with fishermen is a mutual learning process," says He. "I've studied fishing gear for many years, but I don't spend as much time with it as the fishermen do. I learn a lot from them."

Growing up in a small fishing village in China, He never imagined he'd one day be doing fishery research. Many universities shut down in the 1970s during the turbulent Cultural Revolution in China. He was training to be a carpenter when the political climate changed and a national admissions exam was announced. He passed the test and 10 years later became the first person from China to earn a Ph.D. in fisheries research.

Now He finds himself in another turbulent climate—the regulations facing the New England fishing industry. Once one of the world's richest fishing grounds, the Gulf of Maine has suffered from stock declines and fish habitat degradation.

Trawling is the primary method of harvesting shrimp in the Gulf. He and Littlefield are working on one particular type of gear—the otter trawl—to reduce its impact but still allow good shrimp catches.

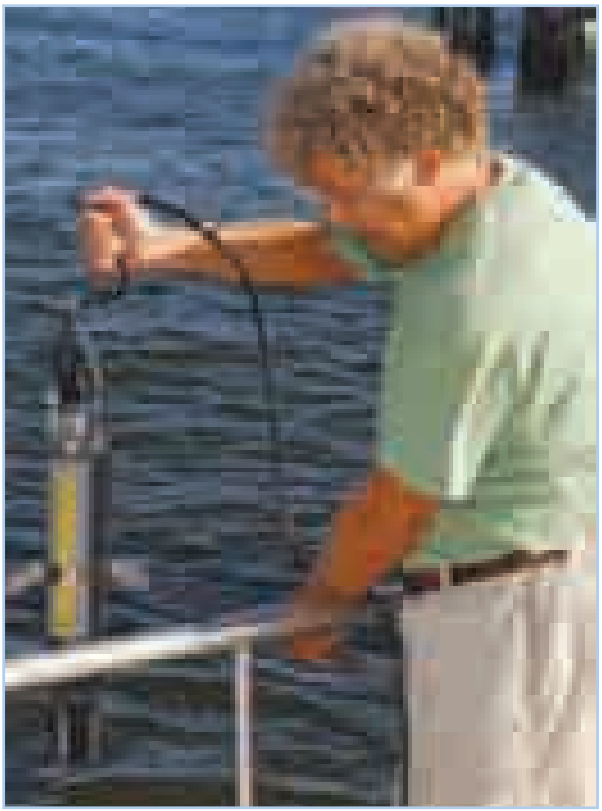
" Working with fishermen is a mutual learning process. "

Otter trawls consist of a net that is pulled behind a boat and spread open by two doors that drag along the seafloor. The doors stir up sand clouds that herd fish into the net, but they also damage fragile habitat. Because shrimp are poor swimmers and can't be herded, He and Littlefield are developing doors that will float above the seafloor.

So far He and Littlefield have found net catches from the modified version comparable to traditional otter trawls. After testing the gear at sea, the team will introduce it to other Gulf of Maine fishermen. He hopes that this and other cooperative research efforts will help fishermen become part of the solution to the problems facing the industry—protecting the environment *and* their livelihoods.

Rapid Response: Hurricane Isabel

South Carolina and Florida Sea Grant researchers designed and deployed four portable 10-meter wind towers. For the first time, detailed coastal tower wind data was transmitted in real time from the field to NOAA's National Hurricane Center during Hurricane Isabel. These high quality observations constitute the highest wind speed for which continuous, high frequency digital observations have been recorded in a U.S. landfalling hurricane.



MID-ATLANTIC

Hans Paerl: Studying Human Impacts on Coastal Ecosystems at the Microbial Level

By Pam Smith, North Carolina Sea Grant

Hans Paerl's universe starts with the tiniest biological entities—microbes. According to Paerl, a long-time North Carolina Sea Grant researcher, microbes are not only the building blocks of life, but are largely responsible for making our waters and living spaces livable.

Shivji

This Kenan professor of marine and environmental sciences at the University of North Carolina, Chapel Hill has gained worldwide recognition for his contributions to the understanding of aquatic microbial processes. Last February, Paerl was presented with the American Society of Limnology and Oceanography's 2003 G. Evelyn Hutchinson Award for his aquatic microbial work, and for documenting linkages between nitrogen deposited from the atmosphere, coastal eutrophication and the formation of harmful algal blooms.

Microorganisms play a vital role in aquatic productivity and nutrient cycling. "Without them," Paerl says, "commercial and recreational fisheries would shut down. We need to keep tabs on microbes in dynamic, natural waters."

Microbes also are sensitive to environmental changes. Much like the canary in the coal mine, they can often serve as indicators of natural and human effects on coastal and estuarine ecosystems. Dr. Paerl tests the ability of microbial indicators to gauge ecosystem health, and works to identify trends resulting from natural variability and human-induced stresses.

" We need to keep tabs on microbes in dynamic, natural waters. "

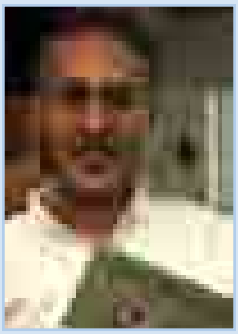
Dr. Paerl has a long, dynamic history, spanning nearly three decades, of study in the nation's second largest estuarine complex—North Carolina's Neuse River Estuary and Pamlico Sound. In addition to his many other accomplishments, Paerl and his colleagues have developed a network of water quality monitoring stations (ModMon) to help track nutrients in the estuary. Many of these nutrients, especially nitrogen, were responsible for harmful algal bloom formation and subsequent fish kills in the 1990s. As a result of the robust efforts linking land practices to water quality, the 1998 Neuse River Watershed Management Plan mandated a 30 percent reduction in nitrogen input.

It is a consistent, multidisciplinary approach and collaboration with brilliant teams of researchers that have allowed Paerl to flourish in his career—a solid career spanning basic microbial processes to the effects of human pollution and small-scale habitat alteration. Paerl believes that in the long run, the ability to differentiate between human and natural changes to our environment will greatly enhance the nation's understanding of and ability to manage water quality, habitat ecosystem health, and ultimately, the health of those who depend on these resources.

SOUTHEAST/GULF

Mahmood Shivji: Using Genetics Testing to Monitor Shark Trade

By Dorothy Zimmerman, Florida Sea Grant



Shivji

Shark fin soup? How about a shark cartilage pill? Although we think of *sharks* as being voracious, *human* appetite for these creatures has resulted in the exploitation of at least 35 major shark species. Yet, tracking the illegal trade has been difficult because isolated fins looked the same—until now.

Florida Sea Grant researcher Mahmood Shivji and his team of scientists have developed a revolutionary way to identify shark body parts. This rapid and reliable method of DNA analysis identifies shark species from fins, carcasses and other body parts, and is giving fisheries managers the bite they need to enforce protective measures for rapidly declining shark populations. Shivji's one-step forensics technique now puts teeth in NOAA's efforts to identify and prosecute U.S. fishing vessels suspected of catching and selling protected species such as the dusky and the great white shark.

With just a sliver of dried fin or even powder from shark cartilage pills, Shivji's genetics research team can quickly and inexpensively test for legal or illegal species—up to seven simultaneously—in a single test-tube reaction. Existing genetics tests are either too slow or too expensive to be practical for monitoring the shark trade.

"Modern genetic approaches can provide a powerful means of solving previously intractable problems in marine fisheries and conservation," says Shivji. That kind of potential, he says, is what drives the work of the genetics team he has assembled at Nova Southeastern University's Guy Harvey Research Institute in Dania Beach, Florida.

"I started out as a field marine biologist, but during my masters work I came to the realization that genetic approaches would be necessary to tackle some of the difficult questions in marine biology," he says. "That led me to 'retrain' in molecular biology."

In recent months, his group has helped federal prosecutors confirm the presence of prohibited species in four of five investigations, resulting in fines of more than $100,000. Law enforcement, however, is just one application for the innovative technique. Shivji's team is also beginning to chip away at a larger unknown—how many and what kinds of sharks are being traded in fin markets worldwide. One of the group's most successful efforts has been to obtain and identify the main shark species sold in the Hong Kong shark fin trade, the world's largest fin market.

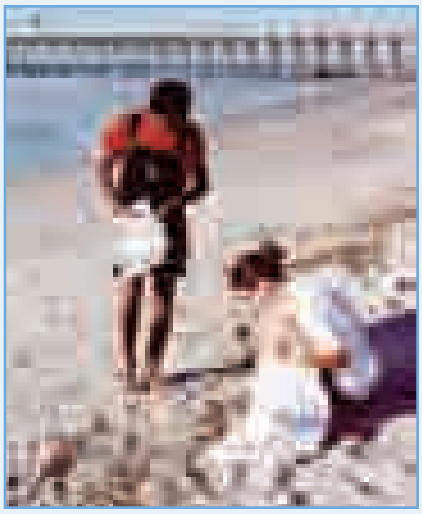
"Nobody knows which shark species are being caught and in what numbers."

"Nobody knows which shark species are being caught and in what numbers," Shivji says, an alarming fact given documented declines of 50 percent and more in shark populations in the northwest Atlantic. Most experts, Shivji says, suspect comparable if not greater declines globally.

"The problem of shark over-fishing globally needs to be urgently addressed, and genetics provides a useful way to collect catch and trade data for more effective fisheries management," he says.

Thus far, his team has fully developed and tested DNA markers for 18 U.S. Atlantic shark species. Within the next two years, Shivji hopes to develop markers for more than 30 species likely to be found in the U.S. Atlantic and Pacific fisheries trade.

South Carolina's Annual Beach Sweep Saves Taxpayer Dollars



The annual Beach Sweep/River Sweep litter cleanup program saved taxpayers $120,000 in 2002. Organized by South Carolina Sea Grant, the event is funded by private donations. Over the past 14 years, more than 75,000 volunteers have collected 728 tons of trash, and have saved state taxpayers more than $1.6 million. The sweep helps pinpoint sources of aquatic debris—volunteers log their findings on data cards that are included in an international database of marine debris. Beach Sweep/River Sweep won numerous awards, including the South Carolina "Watchdog for the Taxpayers" award in 1998.

Visit **www.scseagrant.org/education/education_bsrs.htm**

Want to Know About Marine Science Careers? Turn to Sea Grant

www.marinecareers.net

New Hampshire Sea Grant and Woods Hole Oceanographic Institution Sea Grant have addressed the national need for comprehensive information on careers in the marine sciences. The partners produced a publication and website (**www.marinecareers.net**) designed to help students of all ages and their parents and teachers explore career options in the marine sciences. This resource includes overviews of the fields of marine biology and oceanography, and question-and-answer profiles of dozens of men and women in those fields. There are some 40,000 copies of Marine Science Careers in circulation across the country and around the world.

Sea Grant Helping Offshore Oil Industry

Sea Grant funded and produced a detailed, three-dimensional bathymetric map, in both CD and print, for the Gulf of Mexico. These maps provide oil and gas producers with highly detailed information on where to lay pipelines and locate platforms. Revenues from these commercial sales are paying for smaller and cheaper maps for use in schools to educate students about the sea floor.

Sea Grant Supports Life-saving Research

Sea Grant has supported life-saving research into techniques for treating cold water, near-drowning hypothermia, and has been nationally recognized for its work in dive safety issues—training hundreds of emergency medical personnel and dive rescue workers and producing training materials that are used internationally.

Paradise and a Parking Lot

"Don't it always seem to go that you don't know what you've got till it's gone; they paved paradise and put up a parking lot."

—Joni Mitchell, Big Yellow Taxi

Though written decades ago, Joni Mitchell's lyrics capture today's pressing issue of land use development, especially in our coastal regions. Roughly 3,600 people move to the coast each day, and more than half of the U.S. population lives in coastal counties.

Without question, our coastal cities are growing at unprecedented rates; but are they growing *well?* Are communities developing land in a way that conserves natural resources and preserves fragile ecosystems while also accounting for economic development and transportation needs? All too often, the answer is no. Consistent with its mission of promoting wise coastal land use and development, Sea Grant aims to change this by focusing its extension and education infrastructure on this critical coastal issue.

NOAA Sea Grant Introduces the Coastal Community Development Program to Address a Pressing Problem

In 2001, Sea Grant established the Coastal Community Development Program (CCD) to improve coastal development processes at the local level. The CCD program assists coastal communities in their efforts to protect their environmental amenities, strengthen their economies and improve their quality of life. Sea Grant extension agents (men and women who provide science-based information, technical assistance and educational materials to facilitate the efforts of coastal decision-makers), are the key conduits for this initiative.

The CCD Program ensures that every coastal state has at least one Sea Grant extension agent who specializes in developing educational programs that address coastal development issues. Agents are responsible for informing community decision-makers about their regions' land use issues, and working with communities to solve problems.

Sea Grant Extension Helps Revitalize the Detroit Shoreline

Mark Breederland, a Michigan Sea Grant extension agent has been working on a sustainable land use project in the Detroit area for five years. The project centers around the Detroit River, which was designated an American Heritage River (AHR) in 1998 to protect its natural resources, stimulate economic development and preserve its historical and cultural presence.

Breederland chaired the Detroit AHR steering committee, which spearheaded efforts to develop a RiverWalk Project (a three-mile riverfront pathway that will serve as a recreational hub for bikers, joggers, artists and other citizens). The first phase is under design and will be completed by December 2005. The Detroit RiverWalk is the focal point of AHR's vision—a vision that is shared by community groups and stakeholders. Sea Grant's efforts to engage these groups led to support from donors including General Motors, the Kresge Foundation and others.

"The AHR initiative has helped leverage more than $13 million in projects ranging from developing riverfront greenways to remediating contaminated sites," says Breederland.

Currently, as part of the AHR initiative, Michigan Sea Grant is also supporting the 32-mile Detroit River shoreline by developing and implementing "soft" engineering techniques. Soft engineering uses ecological principles and practices to stabilize shorelines for safety,

Rendering prepared for Detroit Water and Sewage by Hamilton Anderson Associates, and Hazen and Swayer, P.C.

Modifications like this one on Belle Isle in Detroit, Michigan, are known as "soft engineering"–using ecological principles and practices to stabilize shorelines for safety and to reduce erosion while enhancing natural habitat and improving aesthetics.

and to reduce erosion while enhancing natural habitat and improving aesthetics. For example, native plants, boulders and other materials replace traditional concrete breakwalls used to stabilize shorelines. So far, there are at least two demonstration sites in Detroit. "This is a 'win' for development such as boardwalks and marinas, and a 'win' for habitat," says Breederland. "Despite the complexities, soft engineering techniques are often less expensive than traditional hard engineering."

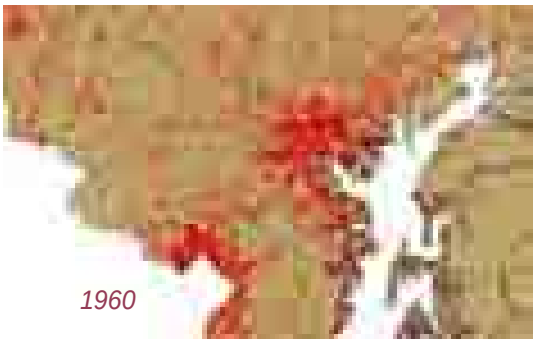
As the education component to the AHR project, Michigan Sea Grant and other agencies have led education programs that provide both classroom and vessel-based learning for elementary and secondary school students. Teachers and chaperones evaluated the overall effort as a 3.9 on a 4.0 scale, and 91% rated the curricular material as excellent.

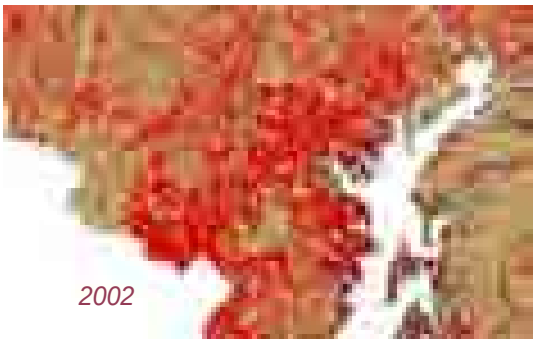
"This is a 'win' for development such as boardwalks and marinas, and a 'win' for habitat."

—Mark Breederland, Michigan Sea Grant Extension Agent

Sea Grant Helps Communities Find NEMO

In order to provide community planners with technical expertise, Sea Grant extension agents have joined their efforts with the National NEMO Network, a confederation of programs whose goal is to educate local land use decision-makers about the links between land use and natural resource protection. NEMO uses Geographic Information System (GIS) technology to produce maps that show the relationship between a town's land use and its water quality in a dramatic and understandable way. "By using GIS, we are applying the principle of 'a picture is worth a thousand words' to the education process," says Chet Arnold, a NEMO Project Manager and former Sea Grant extension agent. Currently, Sea Grant supports NEMO activities in approximately half of all coastal states. Sea Grant has also agreed to fund a full time NEMO technical specialist who will provide both CCD extension agents and NASA scientists with geospatial information.





These Geographic Information System images show population growth around the Chesapeake Bay area in Maryland.

Rhode Island's Aquidneck Island Project: Integrated Management of Island Ecosystems

As coastal populations grow, coastal communities are seeking ways to preserve their character and nurture healthy environments and economies. The Rhode Island Sea Grant College Program/University of Rhode Island Coastal Resources Center (Sea Grant/CRC) is helping coastal communities, including the residents of Aquidneck Island, preserve the best of the past and take stock of the present in order to plan for the future.

To enable islanders to manage their resources, Sea Grant/CRC created the Aquidneck Island Partnership, a collaborative of local organizations, and built the capacity of the Aquidneck Island Planning Commission to do regional planning. Sea Grant/CRC has assisted the Planning Commission (which started with no budget) in securing a total of approximately $900,000, and islanders are developing the framework to implement smart growth techniques. Projects involve islanders and seek solutions for improving resources management. Projects range from identifying prime land for open space acquisition, to measuring the economic benefits of open space preservation in real dollars, to guiding a master plan process for sustainable redevelopment of the west side of the island.

Aquidneck Island

The west side master plan has designed evaluation criteria and a land-use scenario that encourages smart growth, such as green development, alternative modes of transportation, public access and affordable housing—factors that would not have been considered previously.

Rhode Island Sea Grant/CRC's work on Aquidneck Island is being cited as a preeminent example of visioning for a desirable future and was presented a certificate of achievement by Renew America and the National Awards Council for Environmental Sustainability.

Where Land Meets Water is a publication developed by Michigan Sea Grant and the Great Lakes Commission, depicting various land uses that occur in a typical Great Lakes basin watershed. **www.miseagrant.umich.edu/pubs**

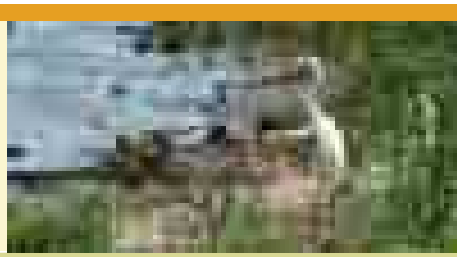
Bringing Some "Smart" Ideas to Coastal Communities

To further its CCD efforts, Sea Grant recently partnered with the Environmental Protection Agency (EPA) in a joint Smart Growth initiative. Smart Growth is defined as environmentally-sensitive land development with the goals of minimizing dependence on auto transportation, reducing air pollution and making infrastructure investments more efficient. Although EPA holds the smart growth expertise and products, it lacks Sea Grant's locally-based infrastructure. Sea Grant extension agents are able to transfer EPA's Smart Growth guidance to local coastal decision-makers. As a result of this national partnership, EPA has helped fund smart growth extension projects at 29 Sea Grant programs. Several Sea Grant programs, such as Rhode Island, have long worked with coastal communities to incorporate Smart Growth practices, while others are just beginning this process.

Through strong partnerships with EPA and others, Sea Grant can do what it does best—get the right resources to problems at state and local levels. In the end, we hope these efforts will form a nation that's "growing smart"—a nation with paradise *and* a parking lot.

Did You Know?

Did you know that Sea Grant is also partnering with NOAA's Coastal Services Center (CSC) in order to improve our coasts in a sustainable and economic fashion? Please visit the CSC website for more information: **www.csc.noaa.gov**

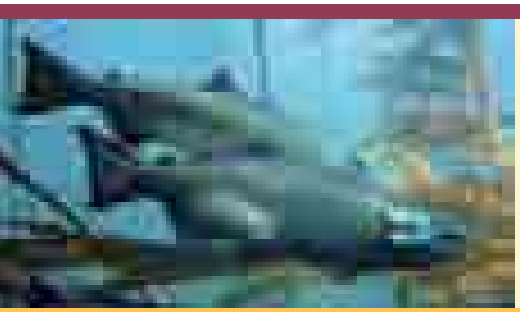


NOAA FISHERIES AND SEA GRANT FELLOWSHIP PROGRAM

"Empty Oceans: Why the World's Seafood Supply is Disappearing," a special report published by *U.S. News & World Report*, June 2003; "Net Loss: Industrialized Fishing hits Fish Stocks," a front page headline from *Nature*, May 2003; "High-Tech Fishing Is Emptying Deep Seas, Scientists Warn," a story from *National Geographic News,* February 2002; the list of reports goes on. How do we really know fish stocks are declining? Where does this research begin? You may want to ask one of our NOAA Fisheries/Sea Grant Fellows.

In partnership, NOAA Fisheries and NOAA's National Sea Grant College Program established a graduate fellowship program in population dynamics and marine resource economics. Population dynamics is the study of fish populations and how fishing mortality, growth and recruitment affect fish stocks. Marine resource economics involves investigating the social and economic implications of living marine resources' conservation and management. Students are funded through this fellowship for up to three years, and are given the opportunity to work closely with an expert from NOAA Fisheries. This expert helps provide data for the fellow's thesis, serves on the fellow's committee, and hosts an annual summer internship at the participating NOAA Fisheries facility. On average, 12 Ph.D. students around the nation are funded each year.

Dana Hanselman, a population dynamics fellow from Alaska, studies hydroacoustic track lines from a traditional rockfish survey to gain precision in the abundance estimate. His project is part of a larger effort to reduce uncertainty in the Pacific Ocean perch stock assessment. Since rockfish are extremely long-lived and highly vulnerable to overfishing, an accurate stock assessment is critical. Hanselman believes his research is important because, "Fisheries managers in the past have often relied on a point estimate produced from a survey each year to set a fishing quota. Population dynamics has been crucial in shifting this static methodology to one that is adaptive and responsive to changes in biology and management," he says. "Instead

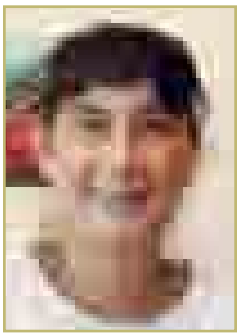


Increasing Chinook Salmon

Sea Grant research on river flow around dams located on a major Lake Michigan tributary led to a shift in flow management practices. Water is now allowed to flow naturally through the dams. As a result, the survival of young chinook salmon, a key Lake Michigan sportfish, has increased dramatically in response to the stable water flow.

of looking for one number to summarize everything, computer simulations have allowed us to explore random natural systems in a way that is more descriptive of the underlying processes."

Receiving the NOAA Fisheries/Sea Grant Fellowship has allowed Hanselman to spend three more quality years on a project that was still in its infancy following his master's graduate studies: "Now, I have extended a small sampling design project into survey design and stock assessment for rockfish. The fellowship has allowed me to develop the skills for further research in a fisheries career." Currently, Hanselman is a recent hire at the NOAA Fisheries Auke Bay Laboratory near Juneau, AK, which is part of the Alaska Fisheries Science Center.



Shaw

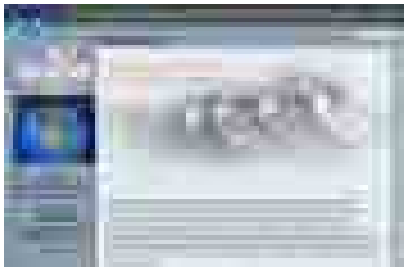
A marine resource economist fellow from Rhode Island, Reena Shaw is investigating compliance with commercial fishing regulations in the Northeast groundfish fishery. She collects fishing activity data, United States Coast Guard boarding/violations data, and NOAA General Council data in order to estimate violation rates within the groundfish fishery. Furthermore, to incorporate the fisher's perspective, Shaw is conducting a survey of commercial groundfish fishers in the Northeast. The last aspect of her research is to ask participants to make hypothetical decisions relative to simulated fishing activities to assess whether fishers are likely to adhere to or violate various regulatory measures. Their responses to various situations, and the risks of violating laws, are intended to test how well regulatory measures work.

According to Shaw, the fellowship has been valuable in compiling this research. "The fellowship has provided me with key contacts at the Northeast Fisheries Science Center, who have been instrumental in helping me obtain access to the data I need to conduct my research and have also helped me refine my research goals," she says.

"The fellowship has allowed me to develop the skills for further research in a fisheries career."

Shaw considers her research something that, in the end, may affect managers who are developing policy on fishery management plans. "Often we find that issues concerning marine resources come into conflict with each other," she notes. "I think marine resource economics provides a strong framework for analyzing and comparing the tradeoffs associated with different uses so that policies with the greatest benefits can be achieved with a low cost to society."

Hanselman



NOAA SEA GRANT UNVEILS ITS NEW NATIONAL WEBSITE

Where can you go for information on marine biotechnology? What is offshore aquaculture and how is it making an impact in Hawaii, New Hampshire and Puerto Rico? What kinds of resources do Sea Grant educators have to offer students and teachers? What is extension and how is it benefiting the nation? The answers to these questions and many others can be found at **www.seagrant.noaa.gov**

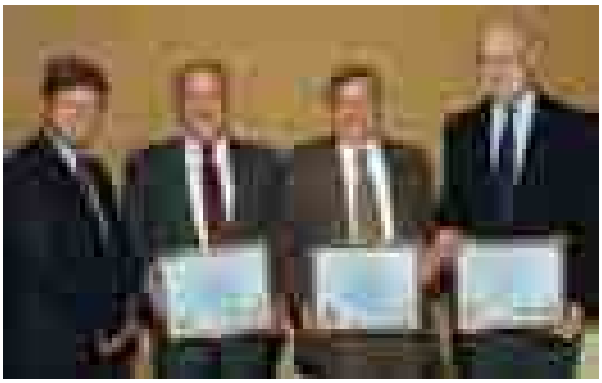
Visit our new site and learn all about the latest Sea Grant research, education and extension projects; learn more about Sea Grant's work in your community; read up on our theme areas; check out our strategic plan; and, visit every Sea Grant program throughout the nation. We hope our visitors will find this new and improved site engaging, informative and useful. We will continue to make enhancements and add information and news each week. Please visit **www.seagrant.noaa.gov** and let us know what you think!

Announcing the NOAA Sea Grant Strategic Plan (2003 – 2008 and Beyond)

We are pleased to present our first strategic plan that addresses the needs of a new century. The plan, which can be found on our website (**www.seagrant.noaa.gov)**, lists specific objectives, including creating new opportunities for investment, broad-based partnerships and cooperative ventures, enhancement of management-critical, place-based research and outreach, better methods of information transfer to user constituencies and strengthening the Sea Grant network to increase its effectiveness as a national organization. Eleven areas are identified as critical issue themes for coastal resource management in the new century. These primary areas of focus and investment include Aquaculture, Aquatic Invasive Species, Biotechnology, Coastal Communities and Economies, Coastal Natural Hazards, Digital Ocean, Ecosystems and Habitats, Fisheries, Marine/Aquatic Science Literacy, Seafood Science/Technology and Urban Coasts. Specific priority actions are identified for each theme area, providing the critical national focus and coordination needed for long term sustained investments and solutions to complex problems. These themes are integrated with NOAA's current program structure.

NATIONAL SEA GRANT REVIEW PANEL

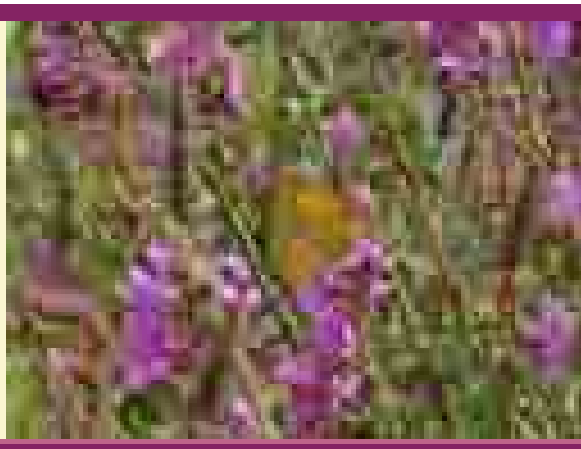
The NOAA National Sea Grant College Program's Review Panel was established in 1976 and is authorized by statute (33 U.S.C. 1128) to advise the Secretary of Commerce, the Under Secretary for Oceans and Atmosphere (NOAA), and the Sea Grant Director on the direction, operations, and performance of the National Sea Grant College Program. Panel members currently serving include (in alphabetical order): Robin Alden, former Maine Commissioner of Marine Resources in Augusta; Manuel L. Hernandez-Avila, former professor and chairman of the Department of Marine Sciences at the University of Puerto Rico, Mayaguez; James Arrington, vice-president for academic affairs and a professor of biology, South Carolina State University, Orangeburg; Peter Bell (former chair), adjunct senior research scientist at the Carnegie Institution of Washington's Geophysical Laboratory and retired vice president and chief scientist of the Norton Company in Worcester, Mass.; Robert Duce, professor of oceanography and former dean of the School of Geosciences at Texas A&M University in College Station, Texas; Elbert (Joe) Friday, former AA for NOAA Research; G. Ross Heath, professor of oceanography and dean emeritus of the College of Ocean and Fishery Sciences at the University of Washington; Geraldine Knatz, managing director for the Port of Long Beach in California; John A. Knauss, professor and dean emeritus at the Graduate School of Oceanography, University of Rhode Island; Frank Kudrna, Jr., chief executive officer of Kudrna & Associates, Ltd., a Chicago engineering consulting firm; Nathaniel Robinson (chair-elect), special assistant to the Secretary of the Wisconsin Department of Administration in Madison and chair of the Great Lakes Commission; Jerry R. Schubel (chair), president and chief executive officer of the Aquarium of the Pacific; Jeffrey Stephan, manager of the United Fishermens' Marketing Association, Inc., Kodiak, Alaska; Judith Weis, professor of biological sciences at Rutgers University, and president of the American Institute of Biological Sciences; and, John T. Woeste, professor emeritus at the University of Florida.



Left to right: Ron Baird, Manuel L. Hernandez-Avila, Jerry R. Schubel, G. Ross Heath at the Panel's swearing in ceremony.

Sea Grant Partnership Seeks to Control Invasive Species

Sea Grant's Great Lakes Programs formed a partnership with their local Newspaper in Education (NIE) programs to provide students with learning materials through a special 16-page newspaper. The partnership fulfills NIE's need for more science-based information and insures that Sea Grant science reaches thousands of teachers. *The Erie Times News* produced an additional 85,000 copies of the aquatic invasive species NIE supplement to distribute to its general readership, and sold the supplement to additional newspapers. An estimated 48,000 students will be reached with AIS information through this partnership.



THE SEA GRANT LAW CENTER

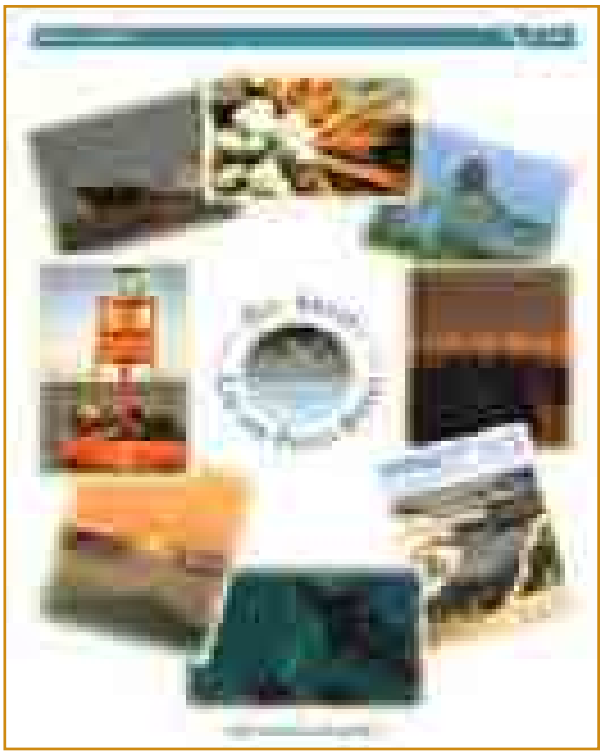
Coastal and Ocean Legal and Policy Information Is at Your Fingertips

Keeping up with the latest "legal-ease" can be challenging, particularly in the courtroom of our nation's coasts and oceans. For topics including aquaculture, protection of marine habitat, fisheries and marine operations, the laws and policies are complex and ever changing. The National Sea Grant Law Center helps organizations and individuals navigate the complexities of our legal system by providing both legal research (critical analysis of coastal law and policy) and advisory/outreach services (dissemination of legal information).

Established in February 2002, this resource and its services are available to the legal community, state and federal agencies, Sea Grant programs, and to individuals working in the field of ocean and coastal management and policy. The Law Center is housed at the University of Mississippi in Oxford, Mississippi and is administered in conjunction with the Mississippi-Alabama Sea Grant Legal Program (the legal research arm of the Mississippi-Alabama Sea Grant Consortium).

The Center's website serves as the clearinghouse for information related to the projects, services and publications of both the Law Center and the Legal Program. Various resources can be accessed through the center's website, including online versions of publications, Power Point presentations, links to upcoming conferences and coastal news articles.

For more information on the Center's services, please visit the National Sea Grant Law Center website at **www.olemiss.edu/orgs/SGLC**



Did You Know?

Did you know that a federal judge recently ruled that a lawsuit concerning the pollution of North Carolina's shellfish waters could proceed to trial? For more information, please visit the National Sea Grant Law Center website **www.olemiss.edu/orgs/SGLC**

LOOKING FOR PUBLICATIONS ON A RANGE OF AQUATIC AND MARINE ISSUES?

Visit the National Sea Grant Library

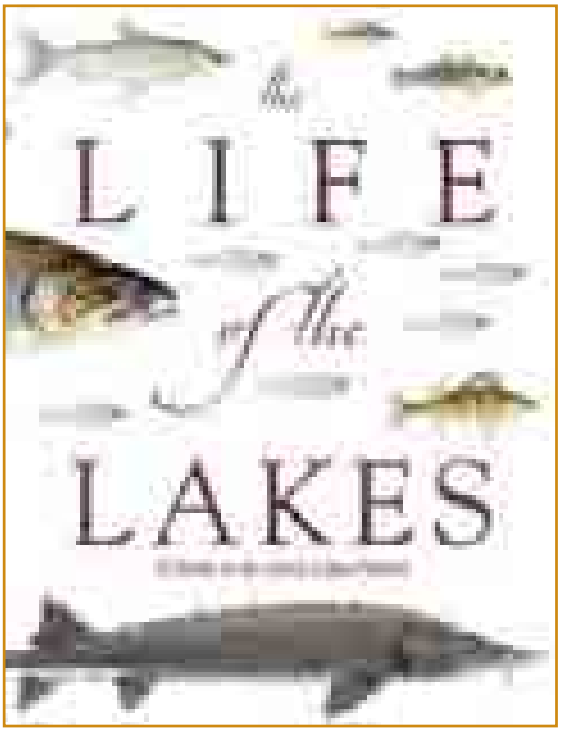
For more than three decades, the National Sea Grant Library (NSGL) has served as an archive and lending library for Sea Grant-funded publications and documents. The library makes available a wealth of material on topics such as oceanography, marine education, aquaculture, marine biotechnology and coastal zone management—to name just a few.

The NSGL lends documents to aid scientists, educators, fishers and many others in their research and studies. The library is unique in that it houses the only complete collection of Sea Grant-funded work, which includes about 30,000 titles and a total of 90,000 documents. Furthermore, the NSGL maintains a 36,000 record bibliographic database that is searchable through its website. Website visitors can obtain citations and abstracts of Sea Grant publications, access journal reprints/books/reports, view recent acquisitions, see Sea Grant's video/CD-rom collection, order materials and read documents online.

To discover a wealth of marine and aquatic information resources, please visit the NSGL website at **www.nsgd.gso.uri.edu**

Alaska Sea Grant

Washington Sea Grant



Michigan Sea Grant

Did You Know?

Did you know that the National Sea Grant Library contains 1,814 documents on aquaculture alone? Visit the library to see how we can help with your research and studies. **www.nsgd.gso.uri.edu**

FACES, PLACES AND EVENTS

November 2002

NOAA Sea Grant Reauthorization Signed into Law

After unanimous passage in both houses of Congress, President George W. Bush signed the National Sea Grant College Program Act into law (P.L. 107-299), reauthorizing Sea Grant through 2008.

February 2003

Vice Admiral Conrad C. Lautenbacher Welcomes 2003 Knauss Fellows Class

The NOAA Administrator welcomed 33 new Sea Grant Dean John A. Knauss Marine Policy fellows to Washington, D.C. The Knauss fellows, selected through a rigorous and highly competitive process, serve for one year in the legislative and executive branches of the federal government.

March 2003

Celebration on Capitol Hill

Sponsored by the Sea Grant Association, the Coastal States Organization, NOAA's Office of Ocean and Coastal Resource Management, and other partners, the 10th Annual Ocean and Coastal Celebration on Capitol Hill was held on March 19th. The event provided Sea Grant Knauss fellows with the opportunity to meet representatives from their home states and brought multiple organizations together from across the ocean and coastal sciences.

Margaret Spring, Democratic Senior Counsel (Oceans & Fisheries Subcommittee) and Jena Carter, Knauss fellow (1999).

April 2003

Sea Grant Week

With the theme, "Expanding Our Horizons," the Texas Sea Grant Program hosted the biennial "Sea Grant Week" conference in Galveston. Sponsored by the Sea Grant Association, over 250 people from the National Sea Grant network attended the meeting. Representative Nick Lampson from the 9th Texas Congressional district greeted participants. Paul Kelly, a member of the U.S. Commission on Ocean Policy, and VADM Conrad Lautenbacher, NOAA Administrator, discussed the future of U.S. ocean and coastal policy. Founders and early leaders of the Sea Grant Program were recognized at an awards banquet.

NOAA Sea Grant Fish Fry participants with Senator Daniel Kahikina Akaka (D-HI) and Cates International

June 2003

NOAA Fish Fry and Capitol Hill Briefing

NOAA Sea Grant hosted a booth at this celebrated event, featuring seafood from the New Hampshire/New England Offshore Aquaculture Program, the Gulf of Mexico, the Puerto Rico/Florida Offshore Aquaculture Project, and the Hawaii Offshore Aquaculture Project. Hawaiian guest chef, Glenn Chu dazzled U.S. Department of Commerce Secretary Donald Evans, Senator Daniel Akaka (D-HI) and many others. On the same day, Sea Grant briefed the House and Senate on several highly successful offshore aquaculture projects.

Knauss Class of 2003 on its class trip

August 2003

Congratulations to the University of New Hampshire

Department of Commerce Secretary Donald Evans officially designated the University of New Hampshire (UNH) as the 29th Sea Grant College. NOAA Administrator, Vice-Admiral Conrad Lautenbacher presented UNH President Ann Weaver Hart with a plaque in celebration of the University's Sea Grant College designation, recognizing the university's high quality and balanced program of marine research, education and outreach.

University of New Hampshire Sea Grant designation. Left to right, Vice-Admiral Conrad Lautenbacher, Ann Weaver Hart, Ann Bucklin and Ron Baird.

August 2003

Fisheries Symposium

NOAA Sea Grant, NOAA Fisheries, and a number of other government agencies co-sponsored a symposium titled, *Aquatic Protected Areas as Fisheries Management Tools,* in conjunction with the 133rd Annual Meeting of the American Fisheries Society (AFS). This marks the third in a highly successful series of symposia designed to help frame critical policy issues from the perspectives of major stakeholders. The third proceedings volume in this series will be published by AFS in 2004.

November 2003

Sea Grant/NOAA Fisheries Meeting

Approximately 20 senior managers from NOAA Fisheries and 40 leaders from the Sea Grant network (Sea Grant directors, extension leaders, National Office staff, and Sea Grant Review Panel members) participated in a workshop to forge new working partnerships. Participants planned future activities and collaborations associated with fisheries research, aquaculture and fisheries extension—several of which are in the beginning stages of implementation. The historic meeting was the first ever involving the full Sea Grant network leadership and the nationwide NOAA Fisheries senior leadership.

FINANCIAL REPORT

DISTRIBUTION OF FEDERAL FUNDS (SG APPROPRIATIONS)

Fiscal Year	FY 2002	FY 2003
Appropriation	62,410	62,410
Recission	0	-391
Prior Year Deobligation Assessment	-58	0
Prior Year Carryover	1,990	4,500
Carryover Recission	0	-2,000
Prior Year Resuse of Deobligated Funds	297	426
Available Funding	64,639	64,945
Sea Grant Core Programs *	46,528	46,448
National Competitions		
Oyster Research/Gulf of Mexico Oyster	1,579	4,662
Marine Biotechnology	499	1,461
Nonindigenous Species	2,822	3,699
Coastal Technology/Aquaculture	827	1,081
Fisheries Habitat	0	1,106
Fisheries Extension #	2,384	33
COSEE	0	126
HBCU Program	196	178
Total	**8,307**	**12,345**
Other Network Activities		
Rapid Response Fund	287	753
Network Communications	490	396
SBIR Program	827	728
Education/Fellowships	798	666
Adjusted Prior Year Grant Obligation		32
Total	**2,403**	**2,575**
Total Programmatic Activities **	57,238	61,367
NSGO Program Mangement Cost	2,901	3,052
Total Expenditures	60,139	64,419
Carryover	4,500	526

* Nonindiginous Species projects funded with core Sea Grant Funds are shown under non indiginous species program

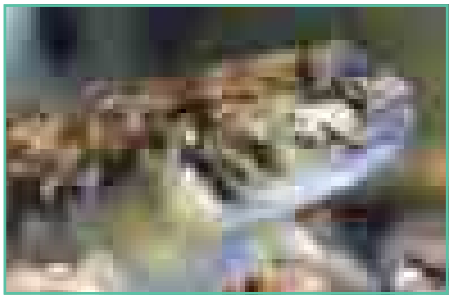
** Programmatic activities include all Grants, Contracts, Interagency and Intraagency transfers excluding NSGO administrative expenditures.

\# An additional $616,000 in fisheries extension was funded in Core Funding.

- In FY 2002, total **programmatic expenditures** for the National Sea Grant College Program were **$102.6 million**.
- Approximately **55 percent** of these funds came from federal appropriations after a congressionally mandated recission.
- **Matching funds** from state partners accounted for about **34 percent**.
- **Pass through funds** from NOAA and other agencies accounted for the remaining **11 percent** of the total.
- In FY 2003, total **programmatic expenditures** for the National Sea Grant College Program were **$107 million**.
- Approximately **56 percent** of these funds came from federal appropriations after congressionally mandated recissions.
- **Matching funds** from state partners accounted for about **33 percent.**
- **Pass through funds** from NOAA and other agencies accounted for approximately **11 percent** of the total.

National Competitions

- **National Strategic Investments (NSIs):** Sea Grant invested $20.6 million this biennium in national competitions in oyster research, marine biotechnology, nonindigenous species, coastal technology, fisheries habitat, fisheries extension, aquaculture and several other areas. NSIs have a national focus and are intended to enhance Sea Grant's network-wide capabilities (research and development, education, extension, and outreach) to respond to high priority issues and opportunities.



Round goby (aquatic invasive)

Many of Louisiana's oystermen have been in the business for a lifetime.

Other Network Activities

- **Small Business Innovation Research (SBIR) Program:** Sea Grant invested $1.5 million in SBIR Program. This Congressionally mandated program provides funding for research projects to assist small businesses in developing commercial products. Principal investments were made in areas such as an underwater camera and mapping system for autonomous underwater vehicles and development of a feed for shrimp brood stock.
- **Rapid Response Funds:** The National Sea Grant Office invested $1,040,000 during the biennium to develop new initiatives and to respond to opportunities throughout the network.
- **Knauss Fellowship Program:** Sea Grant invested $760,000 the biennium to support the Knauss Fellowship program, established to provide an opportunity for graduate students to work in government agencies and Congress on national policy decisions affecting ocean and Great Lakes resources.
- **Network Communications Projects:** Sea Grant invested $886,000 during this biennium to support network communications projects such as the National Sea Grant Library and network publications.

"I learned more about my interests in this one year than I ever did in any one year in graduate school."

- Carrie McDougall, Knauss fellow (2003), pictured with Conrad C. Lautenbacher, Vice Admiral, U.S. Navy (Ret.)

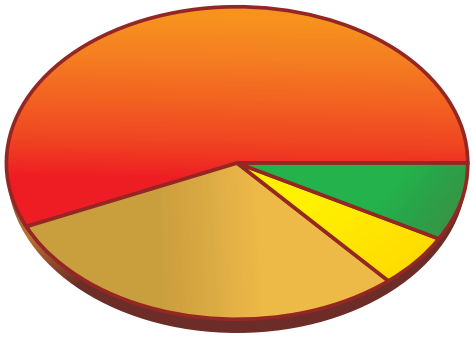
Sea Grant supports graduate students through its network of programs.

INVESTMENTS	1999	2000	2001	2002	2003	TOTAL
Admin	8,004,722	8,153,720	8,429,161	8,410,684	8,968,323	**41,966,610**
Education	5,481,802	5,004,937	4,991,369	6,970,870	5,952,239	**28,401,217**
Outreach	28,238,516	27,124,550	29,341,985	35,958,895	31,284,218	**151,948,164**
Research	55,022,473	56,234,708	64,465,367	51,210,057	60,753,891	**287,686,496**
Grand Total	**96,747,513**	**96,517,915**	**107,227,882**	**102,550,506**	**106,958,671**	**510,002,487**

Sea Grant Funding for Research, Education, and Outreach

The chart (right) shows Sea Grant's level of investment during FYs 2002 and 2003 in the broad areas of research, education and outreach. In addition, costs of program administration are shown. A few explanatory notes:

- **Research** ($112 million this biennium) in Sea Grant supports approximately 500 projects per year across the full spectrum of the marine sciences—from aquaculture, biotechnology, coastal processes, and estuarine studies to fisheries, habitat restoration, ocean engineering, seafood technology and water quality. Also included here are the regional and program development funds that seed research efforts, and support for graduate research assistants.



2002-2003

Research	111,963,948
Administrative	17,379,007
Education	12,923,109
Outreach	67,243,113
TOTAL	209,509,177

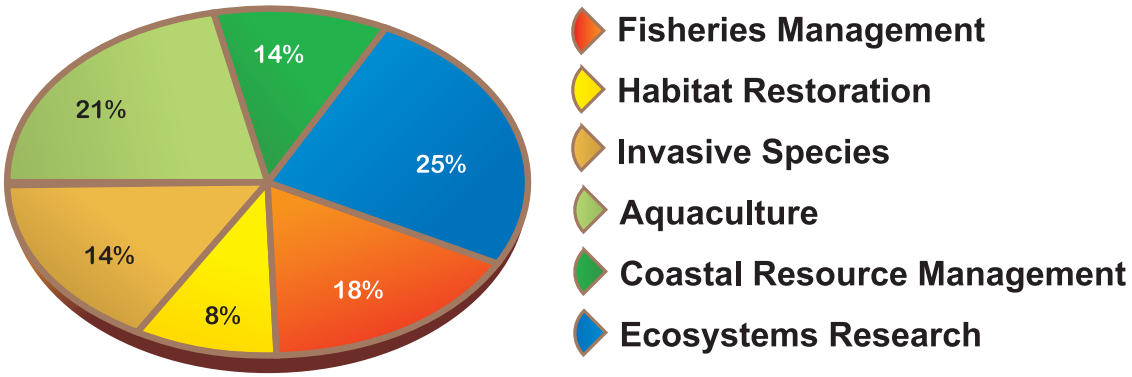
David J. Jude, Ph.D., Sea Grant research scientist for the Great Lakes studies aquatic invasive species with a graduate student.

- **Education** ($13 million this biennium) in Sea Grant includes efforts such as development of pre-college curricula, training of K-12 teachers in the marine sciences, fellowship opportunities for policy study in Washington, D.C. and for work with industry, and support for graduate research assistants (except for those cases where such assistants are included in specific research project budgets as above).
- **Outreach** ($67 million this biennium) in Sea Grant includes both the extension service and the communications activities of the individual Sea Grant programs. These activities facilitate the rapid transfer of scientific information in forms that can be readily understood by coastal clients and other users.
- **Program Administration** ($17 million this biennium) in Sea Grant relies on individual State Sea Grant directors and their staff who shape and manage programs that draw upon the strengths of academic institutions to tackle coastal and Great Lakes issues and problems. This also includes communications.

Sea Grant Support of NOAA Matrix Programs

- **Matrix Support:** Sea Grant investments support six programs in NOAA's new program matrix structure.

SEA GRANT SUPPORT of NOAA MATRIX PROGRAM 2002-2003



FUNDING SUMMARY BY PROGRAM STATE

FISCAL YEAR	2002	2002	2002	2002
Sea Grant Program	Sea Grant $	PassThru $	Match $	Total $
Alaska	1,504,667	1,207,050	1,378,372	4,090,089
California	4,386,388	19,000	2,147,702	6,553,090
Connecticut	1,164,318	435,534	820,971	2,420,823
Delaware	1,395,479	225,800	1,401,869	3,023,148
Florida	2,624,830	227,729	1,328,882	4,181,441
Georgia	1,265,585	60,700	666,429	1,992,714
Hawaii	2,169,543	336,484	1,198,675	3,704,702
Illinois/Indiana	1,838,744	0	1,222,496	3,061,240
Louisiana	1,492,147	19,000	1,162,756	2,673,903
MIT	2,345,102	308,700	1,788,217	4,442,019
Maryland	2,136,917	215,334	1,248,132	3,600,383
Maine	1,171,125	59,900	815,638	2,046,663
Michigan	2,253,576	302,651	1,271,906	3,828,133
Minnesota	1,055,200	88,900	527,600	1,671,700
Mississippi/Alabama	1,455,046	92,335	1,122,989	2,670,370
North Carolina	2,046,675	95,040	1,074,961	3,216,676
New Hampshire	1,066,879	3,200,600	537,076	4,804,555
New Jersey	1,077,079	0	660,117	1,737,196
New York	3,077,626	38,000	1,599,084	4,714,710
Ohio	1,267,458	0	817,798	2,085,256
Oregon	2,542,819	147,968	1,309,018	3,999,805
Other*	149,020	2,157,747	444,728	2,751,495
Pennsylvania	236,542	38,000	237,162	511,704
Puerto Rico	982,560	50,000	768,059	1,800,619
Rhode Island	2,434,259	864,534	1,260,724	4,559,517
South Carolina	1,676,904	306,811	854,451	2,838,166
Texas	2,426,175	0	1,528,082	3,954,257
Univ. Southern California	1,039,739	100,000	634,029	1,773,768
Virginia	1,695,586	703,926	902,012	3,301,524
Vermont	216,000	0	215,408	431,408
Washington	2,702,773	140,000	1,411,370	4,254,143
Woods Hole	1,328,946	0	745,154	2,074,100
Wisconsin	2,146,274	34,290	1,600,625	3,781,189
Total	56,371,981	11,476,033	34,702,492	102,550,506

* Funds awarded through universities and institutions not having Sea Grant program status

FUNDING SUMMARY BY PROGRAM STATE

FISCAL YEAR	2003	2003	2003	2003
Sea Grant Program	Sea Grant $	PassThru $	Match $	Total $
Alaska	1,429,500	1,449,060	935,456	3,814,016
California	4,174,440	176,000	2,172,071	6,522,511
Connecticut	1,120,500	137,800	700,986	1,959,286
Delaware	1,669,622	404,298	1,721,349	3,795,269
Florida	2,835,575	353,824	1,560,490	4,749,889
Georgia	1,428,623	104,100	738,881	2,271,604
Hawaii	2,078,000	0	1,010,000	3,088,000
Illinois/Indiana	1,134,817	0	568,329	1,703,146
Louisiana	2,792,819	19,000	1,841,786	4,653,605
MIT	2,228,403	38,000	1,662,001	3,928,404
Maryland	2,655,629	1,183,480	1,791,471	5,630,580
Maine	1,055,950	0	764,347	1,820,297
Michigan	2,082,441	250,792	1,086,161	3,419,394
Minnesota	1,384,249	45,300	669,072	2,098,621
Mississippi/Alabama	2,121,315	0	1,508,653	3,629,968
North Carolina	1,949,985	86,000	1,027,638	3,063,623
New Hampshire	962,500	2,759,000	466,159	4,187,659
New Jersey	1,228,197	0	808,514	2,036,711
New York	2,565,274	19,000	1,336,628	3,920,902
Ohio	1,309,239	126,400	758,768	2,194,407
Oregon	2,658,241	236,001	1,366,650	4,260,892
Other*	831,436	2,328,020	407,381	3,566,837
Pennsylvania	179,759	0	200,000	379,759
Puerto Rico	910,500	73,000	790,942	1,774,442
Rhode Island	2,485,772	92,297	1,147,891	3,725,960
South Carolina	1,642,644	60,800	828,883	2,532,327
Texas	2,468,069	76,000	1,345,556	3,889,625
Univ. Southern California	818,500	100,000	424,583	1,343,083
Virginia	3,378,538	680,994	1,716,042	5,775,574
Vermont	197,000	38,000	184,321	419,321
Washington	3,198,076	132,000	1,610,841	4,940,917
Woods Hole	1,456,059	0	871,111	2,327,170
Wisconsin	1,974,682	19,800	1,540,390	3,534,872
Total	60,406,354	10,988,966	35,563,351	106,958,671

* Funds awarded through universities and institutions not having Sea Grant program status

SEA GRANT PROGRAMS

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Sea Grant Colleges (total 28)
*Sea Grant Institutional Programs (total 2)
^Sea Grant Projects (total 2)

REGIONAL WEBSITES AND RESOURCES

Location Map With Regional and Local Program Hot Links
http://www.seagrant.noaa.gov

National Sea Grant Library
http://nsgd.gso.uri.edu

National Sea Grant News Media Center
http://www.seagrantnews.org

Northeast Region
http://web.mit.edu/seagrant/northeast/

Mid-Atlantic Region
http://www.mid-atlantic.seagrant.org

Southeast Atlantic and Gulf of Mexico Region
http://seagul.tamu.edu

Great Lakes Region
http://www.greatlakesseagrant.org

Pacific Region
http://www.wsg.washington.edu/regional

AquaNIC (Aquaculture Network Information Center)
http://www.aquanic.org

BRIDGE (Teacher Resource Center)
http://www.vims.edu/bridge

HazNet (Coastal Hazards)
http://www.haznet.org

Marine Science Careers
http://www.marinecareers.net

Sea Grant Law Center
http://www.olemiss.edu/orgs/SGLC

Sea Grant Nonindigenous Species Site (SGNIS)
http://www.sgnis.org

National Aquatic Nuisance Species Clearinghouse (NANSC)
http://www.cce.cornell.edu/programs/nansc