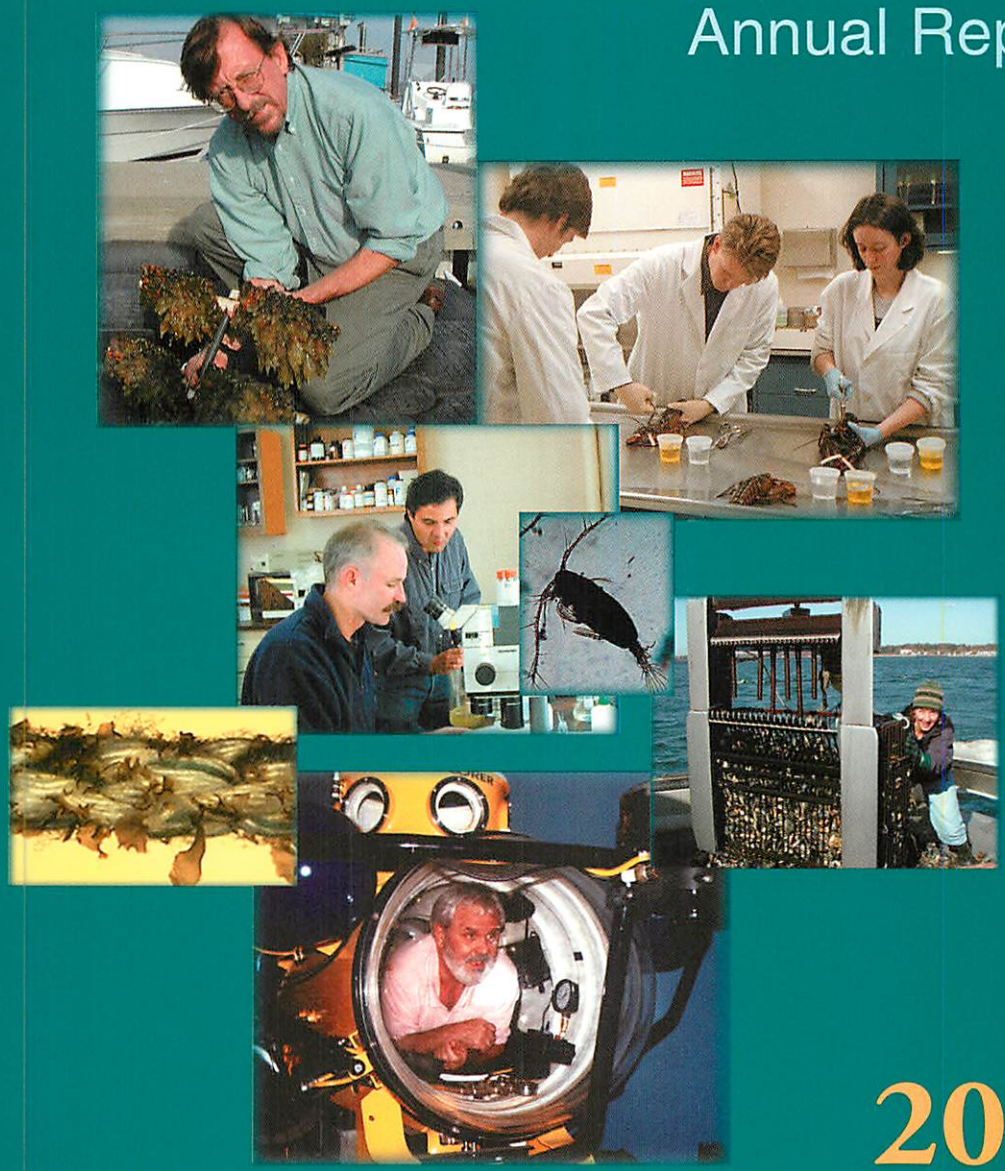
CONNECTICUT SEA GRANT
College Program

Annual Report



2000

Sea Grant
Connecticut

The Connecticut Sea Grant College Program is sponsored by the National Sea Grant College Program, administered through the National Oceanic and Atmospheric Administration (NOAA)., United States Department of Commerce, and the University of Connecticut. This document reports the program's activities during the calendar year 2000.

The program is based at the University of Connecticut at Avery Point in Groton, Connecticut, and has branch offices at the Yale School of forestry and Environmental Studies in New Haven and at The Maritime Aquarium in Norwalk. It is one of a network of university-based programs in coastal and Great Lakes states, established by Congress in 1966 and modeled after the Land Grant Colleges.

Publication design and editing: Peg Van Patten, Connecticut Sea Grant Communications Director

Text: Peg Van Patten, Connecticut Sea Grant Communications, with contributions from the Sea Grant Director, Extension staff, Educators, and the Principal Investigators of the projects described.

Additional copies of this report can be obtained at no charge from:

Connecticut Sea Grant Publications
University of Connecticut
1084 Shennecossett Road
Groton, CT 06340-6097

Tel. (860) 405-9128

Sea Grant
Connecticut

TABLE OF CONTENTS

Letter from the Sea Grant Director

The year 2000 is proving to be another very eventful year for the Connecticut Sea Grant College Program, and for the small cadre in our Connecticut Sea Grant Office.

In reviewing this year one certainly needs to don bifocals, because some of the noteworthy items are distinctly in the near-field, while a good many others are of the far-field variety.

A far-field item currently involving all of the staff in our Connecticut Sea Grant Office, and those good folks who provide us with advice, is the preparation of the Connecticut Sea Grant College Program's Strategic Plan for the Period 2002-2006. We are working to have this document in place in ample time for the National Sea Grant Office's Program Assessment Team Visit now planned for mid-2001.

CT Sea Grant photo

Dr. Edward C. Monahan

One of the most pressing near-field challanges facing our Sea Grant Program is the mounting of a timely response to the massive die-off of lobsters over the past several years in Long Island Sound. Our Connecticut Sea Grant Program, in conjunction with several other Sea Grant programs, the National Marine Fisheries Service, and agencies in both New York and Connecticut, mounted in April of this year the first Long Island Sound Lobster Health Symposium in Stamford, CT. Now on behalf of our own Sea Grant program, of our sister Sea Grant program in New York, and of the Connecticut Department of Environmental Protection, our office is coordinating the processing of proposals submitted in response to the late Summer 2000 Request for Proposals, a request made possible by the allocation by Congress of $2.5M to the National Oceanic and Atmospheric Administration, and by a state of Connecticut allocation of $1M to its Department of Environmental Protection, for the support of this lobster research competition. All of the facilitating offices hope that the grants arising from this competition can be made by early 2001, so that the pressing problems of the Long Island Sound lobster fishery can be quickly, and we fervently hope successfully, addressed.

There is ample evidence of the success of the research efforts of the various investigators supported via our Connecticut Sea Grant College Program in the material that follows this introductory letter. We will though comment here on two further successes achieved within the past year by efforts that have already by every measure proved their worth. With the support of this office, a most successful National NEMO Network Workshop, dubbed "Nemo U", drew participants from some 20 states and numerous sister Sea Grant Programs to Haddam in October to share their insights as to how best to mount Nonpoint-source Education for Municipal Officials efforts in their respective jurisdictions. And the public education product, Sound Facts, initially the result of an EPA-funded collaboration of the Connecticut Sea Grant Communications office and The Day newspaper, has now, thanks to the efforts of the NOAA Atlantic Oceanographic and Meteorological Laboratory, given rise to one more spin-off - Biscayne Bubbles - which is scheduled to run weekly for the next year in a Florida newspaper.

One of the difficulties of wearing bifocals is keeping in sharp focus items that are transitioning from the far-field to the near-field, and our Connecticut Sea Grant program is engaged in several efforts of this sort.

The long-delayed completion of the University of Connecticut's magnificent $28M Marine Science and Technology Center building is now fast approaching, with late Winter -early Spring 2001 now a firm ETA. All of us in the Connecticut Sea Grant Office look forward to working in our new quarters in the MSTC, but recognize that moving office is much like moving house, in that it will take us a while to literally get un-packed and settled in.

A second opportunity that is fast approaching is the aforementioned Program Assessment Team visit. We are already hard at work attempting to assure that this will be a constructive exercise for all involved.

And while dealing with issues that appear in the upper and lower halves of our lenses, we need to continually exercise our peripheral vision. As an example of just one of the items that came to us "out of the blue" in 2000, was the opportunity to became constructively involved in the educational aspects of the AMISTAD program, by providing support for the first several AMISTAD Maritime Fellows.

All of us in the Connecticut Sea Grant Office recognize the challenges to be faced in 2001, such as the physical relocation of our office, and the quadrennial Program Assessment Team visit, but I am confident that my hard-working and motivated colleagues are more than ready to meet these challenges.

Sincerely,

Edward C. Monahan, Ph.D., D.Sc.
Sea Grant Director

The Connecticut Sea Grant College Program

Founded in 1988 http://www.seagrant.uconn.edu

Mission

The Connecticut Sea Grant College Program, based at the University of Connecticut's Avery Point campus, is part of a national network of 30 Sea Grant programs based at flagship universities in coastal states. Its mission corresponds to the mandate of the National Sea Grant College Program: to foster the wise use and conservation of coastal and marine resources. To accomplish this goal, the program funds research, outreach, and education activities that have special relevance to Connecticut and Long Island Sound, and tie into theme areas that the National Sea Grant College Program has identified in its Strategic Plan: Economic Leadership, Coastal Ecosystem Health and Public Safety, and Education. Implemented as a partnership between the University and the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce, the program awards grants for marine research, provides extension outreach services, and carries on educational activities. Key research themes include Aquaculture, Ecosystems Health, Biotechnology, Long Island Sound, Climate Change and Sea Level Rise, and Living Marine Resources.

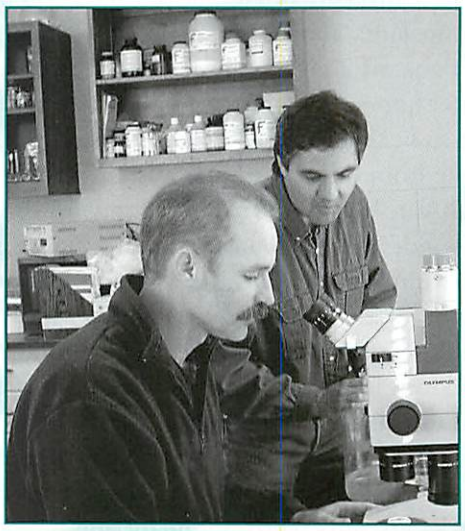
RESEARCH

Eight major and many smaller regional and pilot research efforts were supported in the 2000-2001 calendar year, involving seven academic institutions in the State and their partners. Following are descriptions of Connecticut Sea Grant-funded research and outreach activities conducted in the calendar year 2000.

Controlling Harmful Algal Blooms

How and where do harmful algal blooms begin, and what makes them expand outward and worsen, or shrink and disappear? Outbreaks of red or brown tides, and other harmful algal blooms (HABs) can kill or injure aquatic organisms, close beaches and shellfishing beds, impact human health, and severely impact economies dependent on coastal resources. To better understand factors that can delay, prevent, trigger, prolong, or control harmful algal blooms, Sea Grant is supporting research on the ways natural predators may control potentially harmful algae. This knowledge could enable advance warnings of blooms and can also improve the site selection of aquaculture facilities.

George McManus and Hans Dam, Associate Professors of Marine Sciences at the University of Connecticut, and colleagues at the Marine Biological Laboratory (Woods Hole), Southampton College, and the NOAA National Marine Fisheries Milford Laboratory completed their Sea Grant-supported study of the effects of several HAB species on consumer organisms, such as tintinnids, copepods, and scallops. The HAB species they studied are found in Long Island Sound and other locations worldwide. Results showed that planktonic grazers (copepods, tintinnids and other ciliates) were not adversely affected by *Prorocentrum minimum*, a harmful dinoflagellate. Bay scallops fed the same alga, on the other hand, experienced digestive disruptions and higher mortality. Consequently, the scallops, which are important grazers of dinoflagellates and other algae in shallow waters, probably cannot feed enough on *P. minimum* to keep it from reaching bloom population levels. Thus bloom organisms would accumulate in bays and harbors, then be exported into deeper estuaries, such as Long Island Sound, where their numbers would be reduced gradually by ciliates, copepods, and other planktonic grazers.



P. Van Patten, Conn. Sea Grant

Prof. Hans Dam and George McManus examine microscopic zooplankters found in Long Island Sound.

Connecting People and Ecosystems

Ecological and social systems are inextricably connected, says Stephen Kellert, Professor of Social Biology at the Yale School of Forestry and Environmental Studies. His Sea Grant research, which involved six Yale faculty members and many graduate students, attempted to determine how the structure and function of natural ecosystems affect, and are affected by, human values and socioeconomic behavior, using subwatersheds of the Greater New Haven area as models.

N. Balcom, Sea Grant

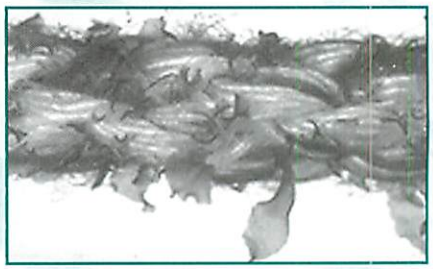
Human attitudes and behavior and ecosystem structures are linked together in complex feedback systems, examined in this Yale University study.

Their hypothesis, that the health and functioning of natural systems significantly influences human environmental values (the meanings people attach and the benefits they derive from natural systems) in a series of complex feedback loops, was supported by the research. In "healthy" watersheds, (e.g., based on such criteria as species richness, fecal coliform, phosphate, etc.) there was a statistically greater occurrence in humans of more positive environmental values, greater environmental responsibility, enhanced environmental understanding, higher levels of neighborhood and household quality, and higher quality of life. Conversely, some sub-watersheds of lower environmental quality revealed in humans a lower quality of life, less interest in and contact with the natural environment, less concern and responsibility for conserving the natural environment, and a greater inclination to support the dominance and control of natural processes and diversity.

Cleaning Up Our Act:

Polyculture with Algae for Bioremediation

Balancing the increasing demand for high quality seafood with the negative environmental impacts of high-intensity aquaculture is a challenge being met by the developers of new biotechnology in the form of integrated aquaculture systems. Professor Charles Yarish, (University of Connecticut (UCONN) Department of Ecology and Evolutionary Biology) and Raquel Carmona, a post-doctoral investigator from Spain, are teaming up with Prof. George Kraemer (State University of New York (SUNY), Purchase), to lead the way. With Professors Chris Neefus (University of New Hampshire), and Thierry Chopin, (University of New Brunswick), they have demonstrated that economically important aquatic animals can be grown in concert with seaweeds that clean the waters. The team uses *Porphyra*, a red alga better known as nori, to scrub nitrogen and phosphorus from the waters surrounding salmon pens. The nori, itself commercially valuable to the food and pharmaceutical industries, acts as a nutrient pump to cleanse the effluent. The waste from the farmed fish waste is transformed into nutritious food, while surrounding waters stay cleaner and healthier. In further collaboration with Professor José Zertuche, (University of Baja California in Mexico), Yarish and colleagues have demonstrated the efficacy of nori grown with abalone in aquaculture operations. In this case, the nori serves as both food for the abalone and a wastewater treatment process. The nutrients that the nori uptakes are converted into saleable products - nori and biochemicals. This work can be applied to optimize the efficiency of aquaculture operations, and to maintain the health of coastal waters. In a related project, Yarish and colleagues at the University of New Hampshire are cataloguing and characterizing the DNA of various native *Porphyra* species, to determine which species are sufficiently abundant and have desirable traits for the development of commercial aquaculture. Yarish's extensive laboratory culture collection also serves as a gene bank and resource for other researchers.

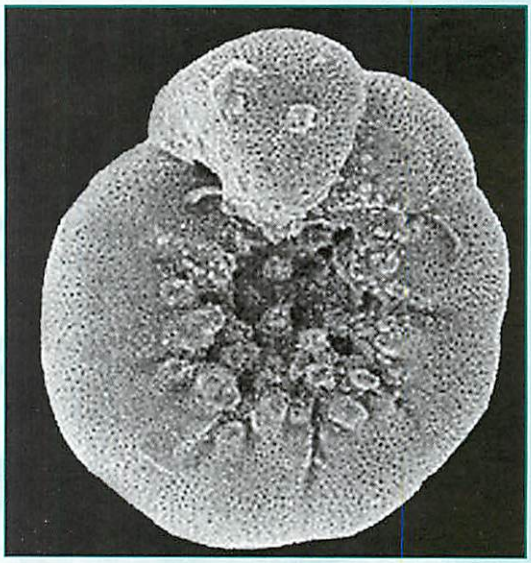


C. Yarish, UCONN

Juvenile nori have been "seeded" onto rope for aquaculture experiments in Dr. Yarish's lab.

Tiny Foraminifera Provide Climate Clues

The species of foraminifera, one-celled animals surrounded by a rigid shell or "test," have changed dramatically in the benthic Long Island Sound ecosystem over the last 40 years, and have changed most rapidly over the last 4 years, say Professors Ellen Thomas and Johan Varekamp at Wesleyan University. They used these very site-specific animals as enviornmental indicators. Through high-resolution stratigraphic studies based on sediment chemistry, and the remains of benthic foraminifera preserved in peat cores from Connecticut marshes, Varekamp (a geochemist) and Thomas (a paleozoologist) have documented fluctuations in sea level rise over the past 2,000 years. Stable isotope analysis of the foram shells showed interesting evidence , preserved in the shells, for anoxia in recent times during which Long Island Sound has suffered eutrophication. They have detected a shift in the foraminifera species most prevalent in the Sound fromspecies that consume algae to those that consume detritus. Corresponding evidence of increased wastewater effluent has supported their hypothesis that human activities have strongly impacted both the water quality and species composition in Long Island Sound.



E. Thomas, Wesleyan University

Foraminifera like this one, *Ammonia beccarii*, can provide clues to climate and environmental changes.

NEMO UNIVERSITY Class of 2000 Graduates

On October 17-19, 2000, Connecticut Sea Grant sponsored the first national meeting of "NEMO University," a conference to discuss educational projects modeled after the University of Connecticut's successful Nonpoint Education for Municipal Officials (NEMO) Project. Created in 1991 as a joint effort between the UCONN Cooperative Extension System and Connecticut Sea Grant, NEMO uses satellite-derived information and geographic information system (GIS) computer technology to educate local land use decision makers about the links between land use and water resource protection. Environmental Protection Agency (EPA) statistics show that nonpoint source pollution, or polluted runoff, is now the biggest water quality problem in the nation.

NEMO projects represented at the meeting came from all corners of country, including Alaska, Alabama, Kansas, South Carolina, Maine and New Hampshire. Hosted by the University of Connecticut Cooperative Extension System in Haddam, the meeting attracted about 40 attendees representing state and federal agencies and Sea Grant programs that have instituted adaptations of the NEMO program in 20 states, according to National NEMO Network Coordinator John Rozum.

"Smart growth and land use practices translate directly to the bottom line in terms of sustainable economies and ecosystems," said Dr. Ronald Baird, Director of the National Sea Grant College Program. "We are pleased that almost half of the Sea Grant (coastal and Great Lakes) states have now established NEMO projects".

NEMO has won numerous honors, including national awards from the American Planning Association and the National Environmental Education and Training Foundation. An Interagency Work Group was recently formed to support the National NEMO Network. Agencies represented on the group include USDA, the Environmental Protection Agency, NASA, and the National Oceanic and Atmospheric Administration, according to Project Director Chester Arnold.

Does Phragmites deserve its bad rep?

P. Van Patten, Sea Grant

Phragmites (common reed grass), has a bad reputation for its aggressive tendency to invade coastal ecosystems, displacing marsh grasses.

Phragmites australis, or common reed grass, has a bad reputation with botanists and ecologists, because the species is invasive and takes over wetlands aggressively. Once established, it tends to dominate and form monocultures, displacing native marsh grasses and decreasing biodiversity and productivity. However, perhaps it's not all bad, say Randy Chambers, Asst. Professor of Biology at Fairfield University, and David Osgood, Asst. Professor of Biology and Environmental Science at the University of New Haven. In the final year of a Sea Grant project in which they examined conditions that encourage or discourage *Phragmites*, they noted that stands of this reed accrete sediment well, sometimes moreso than other marsh vegetation, and thus may help wetlands in the Southeastern United States hold their own against the tug-of-war with rising sea level.

Native, after all

In light of its success in usurping traditional marsh vegetation, a suggestion long made in the botany/ecology community is that a new, more aggressive, strain of *Phragmites* has been introduced to North America, but evidence was only anecdotal. To answer this question, Jeffrey R. Powell and Kristin Saltonstall, Dept. of Ecology and Evolutionary Biology at Yale University, compared the genetic traits of modern Phragmites with samples up to 500 years old, attempting to completely understand the genetic variation and geographic structuring in this species. Results showed no indication of a new species introduction.

What Makes an Invader Successful?

In this first year of a two-year project, Dr. Robert B. Whitlatch, UCONN Department of Marine Sciences, is leading a team studying the causes and consequences of the invasion of New England rocky subtidal communities by four species of introduced sea squirts: *Botrylloides diegensis*, *Diplosoma macdonaldi*, *Ascidiella adspersa*, and *Styela clava*.

They found that more biologically diverse communities had a higher resistance to invasion by both colonial and solitary species, both in terms of the survival of recruits and the total space occupied by the invaders. Communities with a greater number of species appeared to utilize resources (i.e., space) more completely, leaving little for incoming invaders to gain a foothold. Native species richness had no effect on the settlement or recruitment of propagules of invasive species, although individual species often had strong facilitative or inhibitory effects. Thus while the specific composition of communities may impact recruitment of invaders, the total number of species was more important in predicting the survival and growth of those propagules. Patterns of field distribution show that more diverse

P. Van Patten, CT Sea Grant

Dr. Robert B. Whitlatch holds invasive fouling organisms.

native communities have fewer invaders, suggesting that the mechanisms demonstrated in these small-scale experiments are important in determining field distributions at larger spatial scales. Continuing research is presently examining the impact of these sea squirt invaders on native communities, in particular those subtidal communities in which the red seaweed *Chondrus crispus* grows in conjunction with snail predators and the invasive green crab.

Oyster Check-ups Made Easier

Connecticut has historically produced some of the most valued oysters in the world. Following recent outbreaks of three diseases–Dermo, MSX, and SSO–in the Eastern Oyster, Atlantic coast populations declined and the industry was impacted. UCONN pathobiologists Richard A. French, Sal Frasca, and Sylvain DeGuise, with doctoral candidate Spencer Russell, have been working with colleagues at Woods Hole and the CT Bureau of Aquaculture to investigate the potential of molecular diagnostic tests which are sensitive, rapid, cost-effective, and convenient for the detection of these oyster disease agents. The tests would aid shellfish managers and aquaculturists.

Peter Morenus, UCONN

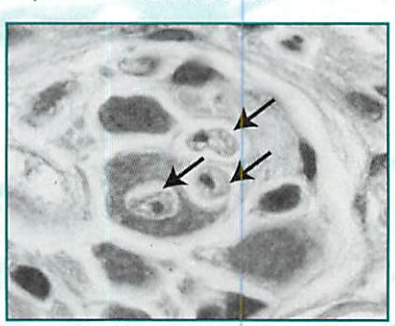
UCONN pathobiologists perform necropsies on lobsters from western Long Island Sound. Dr. Richard French, left

Development Projects

Connecticut Sea Grant developments are available to sponsor emergency needs, pilot programs, or purchase necessary equipment or travel for investigators as unexpected needs arise. These development projects, both in-state and regional, are listed on page 19. A few selected projects are described here as examples:

Lobster Mortalities in Long Island Sound

Severe mortalities of the American lobster, *Homarus americanus*, in Long Island Sound devasted the industry during 1999 and 2000. As a result, the U.S. Department of Commerce declared the fishery a disaster. Connecticut Sea Grant responded rapidly to requests from lobstermen, researchers, and the Connecticut Department of Environmental Protection to provide the first funds to address this emergency. Using these modest funds, Dr. Richard A. French and colleagues in the University of Connecticut Pathobiology Department, performed necropsies on individual lobsters collected from Long Island Sound. Gross and histopathologic examination, hematology, microbiology, virology, parasitology and toxicology were performed on affected lobsters. 'Sick' lobsters exhibited lethargic/limp behavior and discoloration of meat, viscera and hemolymph. Examination of all organ systems and associated tissues revealed a systemic inflammatory disease affecting multiple tissues, but primarily the nervous system. The team found a protozoan parasite, tentatively a paramoeba species, presumed to be the immediate cause of deaths.



R. French, UCONN

Arrows point to parasites, thought to be paramoebae, that have invaded a western Long Island Sound lobster's brain tissue.

An additional $98,097 was awarded to French in May, after a competition funded jointly by the EPA Long Island Sound Office and the CT and NY Sea Grant programs. Investigations are now focused on the parasite and identified climatic and anthropogenic stressors to determine whether the parasite is the primary cause of mortalities or physiologic stress is a contributing factor.

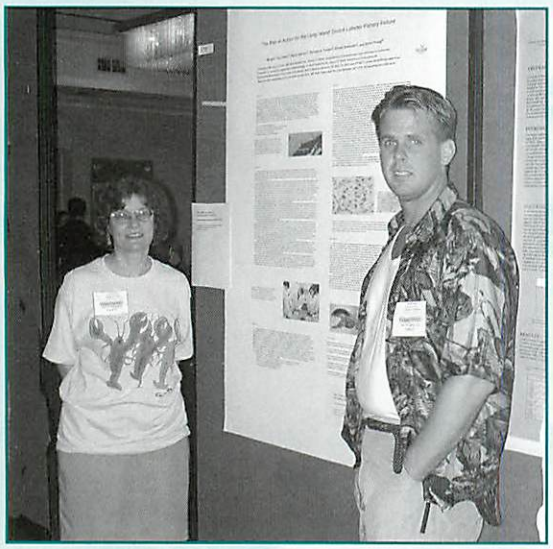
SoundWaters Urban Explorers Program

SoundWaters, a non-profit on-the-water marine education organization, received a development grant to hold a 6-week-long after-school program in three locations, for 40 middle school-aged urban youth. Youngsters received an introduction to Long Island Sound that included study of invertebrates and birds.

National Ocean Sciences Bowl 2000

The National Ocean Sciences Bowl is an academic competition for high school students, focusing on ocean topics. On February 10, nearly 100 students participated in Quahog Bowl 2000, the CT/RI regional competition, sending a team on to the national finals. All participants received "goodie bags" of prizes and services, and students on the top two teams received $1,000 cash scholarships.

COMMUNICATIONS



Sea Grant Communicator Peg Van Patten and Dr. Richard French presented papers and posters about the Long Island Sound lobster mortalities at the 6th annual Lobster Health Symposium in Key West, FL, October 2000.

Communications Office

The Connecticut Sea Grant Communications office is responsible for disseminating information, producing publications, developing and running websites, and coordinating media relations for the program. Research results were transmitted to libraries, universities, and user groups. The Communications office coordinates production of the program's publications, which included this annual report, two timely, widely-distributed fact sheets on lobster diseases, used by Environmental Protection Agency offices and others. The Communications office accomplished a redesign and organization of the program's websites this year, and contributed educational articles to the regional Northeast Sea Grant website, hosted by MIT Sea Grant.

In April, Communications Director Peg Van Patten coordinated publicity efforts for a major workshop on the Long Island Sound lobster fishery disaster, resulting in extensive TV, radio, and print coverage for four Sea Grant researchers and various lobstermen. In the fall, Van Patten presented posters on the bi-state response to the lobster mortalities at the 6th International Lobster Conference in Key West, Florida and the 5th Long Island Sound Research Conference. Two educational fact sheets were produced in only two days' preparation time, which have been widely distributed, including hundreds at the Big E agricultural fair, and electronically via the joint NY-CT lobster information website.

The Sea Grant Communications office coordinates International Coastal Cleanup and Coastweeks for Connecticut. The cleanup attracts between 500 and 900 volunteers annually and is part of the world's largest volunteer event, kicking off the national Coastweeks celebration. Connecticut Sea Grant staff organize an annual rowing regatta as a Coastweeks event. The Communications Office carries out publicity for this event in conjunction with the Mystic Seaport.

Van Patten received a $17,000 grant from the U.S. E.P.A. Long Island Sound Study to expand the Sea Grant educational graphic series, "Sound Facts," into a packet of transparencies and posters for K-12 teachers in Connecticut and New York.

This year, Van Patten participated as an observer in an underwater archaeology mission to search for PaleoIndian settlement remains, undertaken by the Mystic Aquarium Institute For Exploration and the Mashantucket Pequot Museum and Research Center. Her article on the undertaking was published in *Undercurrents* magazine.

OUTREACH

Sea Grant Extension

P. Van Patten, CT Sea Grant

Getting on the "gumby" suit quickly and correctly can mean the difference between life and death in an emergency. Here, teams race in competition at the joint CTSG/Coast Guard vessel safety workshop held in Stonington.

The Sea Grant Extension Program (SGEP) works with coastal communities, industries, and other users marine resources to transfer technology. Staff includes three educators specializing in aquaculture, marine resources, water quality, aquatic nuisance species, and seafood safety.

Fishing Vessel Safety Training: How to Survive the Perfect Storm?

On a list of Top Ten Dangerous Occupations, commercial fishing is at the top. Safety know-how, training and familiarity with safety equipment can mean the difference between life and death when reaction to an emergency is time-critical, as it often is on the water. To help local commercial fishermen test and refresh their skills, Nancy Balcom, SGEP Program Leader and Associate Extension Educator, collaborated with Kyra Dwyer, of the U.S. Coast Guard's Marine Safety Office in New Haven and Art Medeiros, President of the Southern New England Fishermen's and Lobstermen's Association (SNEFLA), to host a Fishermen's Safety Training Day. The training day was scheduled to run just before the beginning of the annual Blessing of the Fleet festivities at the town dock in Stonington, Connecticut. Most of the fleet was in, and thus participation was maximized .

About 50 commercial fishermen participated in the deployment of life rafts, tested their EPIRBs (Emergency Position Indicating Radio Beacons) to ensure they are working properly and transmitting the correct data, tried on immersion suits, and tested their ability to operate water pumps, shoot off pyrotechnics, and patch broken pipes or breaches. There was also a vessel stability demonstration tank and basic first aid/CPR instruction. Highlights included a basket hoist demonstration by a USCG helicopter team over the harbor, and immersion suit races in which individuals and teams competed for prizes.

The U.S. Coast Guard demonstrates sea rescue techniques at the vessel safety workshop.

Medeiros wrote on behalf of SNEFLA, "Everyone I have talked to gave the program a "thumbs up" and definitely want to make this an annual event. Safety on the water is something [fishermen] often take for granted. An event such as the one you coordinated with the U.S. Coast Guard brings it to the foreground and refreshes it in [our] minds. I look forward to working with you on future safety training days."

Seafood HACCP Training Update

During 2000, an additional thirteen seafood processors and eight shellfishermen received training in HACCP procedures for seafood and shellfish, during two courses held in collaboration with the Connecticut Department of

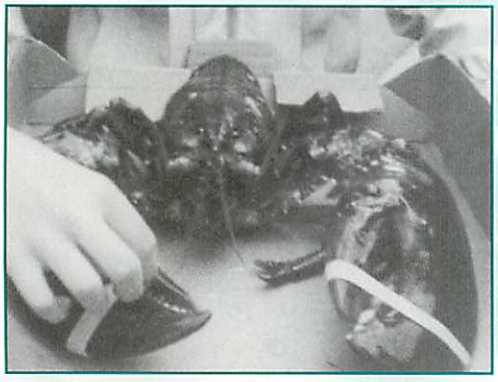
Agriculture, Bureau of Aquaculture. SGEP's Nancy Balcom also assisted in teaching a seafood HACCP course in Rhode Island, reaching another 24 seafood processors. To date, Balcom has team-taught 14 HACCP courses, reaching nearly 300 processors, harvesters, wholesalers and regulators in the Northeast.

The third issue of *Seafood Safety Savvy*, the semi-annual newsletter for HACCP-trained seafood processors in Connecticut and Rhode Island, was issued in collaboration with Dr. Lori Pivarnik, of the Department of Food Science and Nutrition at the University of Rhode Island. Balcom also completed training in Sanitation Control Procedures, and expects to offer the first one-day training course in a new, follow-up course developed by the Seafood HACCP Alliance in Connecticut during the winter.

Addressing the Commercial Lobster Disaster

During the late summer and fall of 1999, the Long Island Sound lobster stock, the basis of an important multi-million dollar commercial fishery in Connecticut and New York, began to come up dead in lobster traps in unprecedented numbers, particularly in the western portion of the Sound. Simultaneously, lobstermen working more eastern waters observed a greater than usual incidence of chitinolytic shell disease syndrome on lobsters, which renders the lobsters unmarketable. In some areas, lobster landings dropped by 90% during the fall run. Early in 2000, Secretary of Commerce William F. Daley pronounced the Long Island Sound lobster fishery a commercial fishery disaster.

In response, Connecticut Sea Grant teamed up with New York Sea Grant, the marine resource agencies from Connecticut and New York, the National Marine Fisheries Service/NOAA, the U.S. Environmental Protection Agency, local researchers, and industry leaders to host and co-sponsor a lobster health symposium. The purpose of the symposium was to shed light on what was known to date regarding the die-off, identify potential causes, and develop priority research areas. Sea Grant Extension Educator Nancy Balcom was instrumental in coordinating the symposium, in concert with the planning committee. Following the symposium, Balcom chaired a committee to develop more formal work plans to address resource assessment and monitoring, pathology, environmental/oceanographic conditions, and anthropogenic input questions, and extension outreach. Balcom established a lobster listserve to facilitate communication among researchers and resource managers. Balcom developed a preliminary timeline of events leading up to and during the die-off in 1999, based on the symposium proceedings. Balcom also responded to a request from a staff member of a U.S. Congressman from Connecticut to develop a research plan and budget, part of the supporting documentation which led to the federal emergency appropriation of $13.9 million for financial relief and research in July 2000. A Lobster Steering Committee was established with representatives from several state and federal agencies, including CT and NY Sea Grant and the National Sea Grant Office.



Peg Van Patten, CT Sea Grant

Sea Grant responded quickly with both outreach and research when the Long Island Sound lobster industry suffered massive

In September, Balcom worked with the Lobster Steering Committee and a representative from the CT Department of Long Island Sound Programs to draft and issue a call for pre-proposals for research projects addressing the lobster mortality and shell disease syndrome in September 2000. There will be up to $3.5 million in research funds awarded through a competitive process through CT Sea Grant, NY Sea Grant and CT DEP by early spring 2001. (Up to $2.5 million in federal funds and $1 million in State of CT funds will be awarded). Other federal funds will go to provide economic relief to affected lobster fishers, to the National Marine Fisheries Service in support of several research projects, the States of Connecticut and New York to support resource monitoring and assessment, and to CT and NY Sea Grant for support of extension outreach activities.

Balcom is currently drafting a plan of work for lobster extension and outreach in conjunction with the New York Sea Grant Extension Marine District staff. She serves as a liaison to the Lobster Steering Committee, a subcommittee of the Atlantic States Marine Fisheries Commission Lobster Management Board. Work also continues on pulling together transcripts from the lobster symposium, and to complete the timeline. Upon approval by the Lobster Steering Committee, she will also begin interviewing industry members formally about their observations and experiences during the 2000 lobster fishing season.

Balcom serves as an *ex officio* member of the fledgling Connecticut Seafood Council, and has produced three issues of a newsletter for the Council.

New Extension Educator

Connecticut Sea Grant's Extension program staff expanded this year with the addition of Tessa Simlick, full-time Extension Educator specializing in aquaculture. Simlick, who has experience culturing flatfish and mollusks, organized the "Connecticut Industry-Based Aquaculture Workshop" held in March in Old Lyme, CT. The workshop addressed social, economic, biological, and technological issues. She has also worked with shellfish commissions in the State to help them standardize regulations, and has compiled the regulations into a publication. Most recently she has produced a fact sheet on seed oystering to aid novices. Simlick interacts with Sea Grant-funded researchers to provide technology transfer of science-based information to the aquaculture industry, particularly to help educate the public about the potential risks and benefits of marine biotechnology.

Simlick plans to continue organizing meetings and/or workshops to inform the industry of new issues and concerns in aquaculture, and will also stay abreast of new biotechnology that affects aquaculture.

L. Williams

Tessa Simlick, CTSG s newest Extension Educator.

Sea Grant and Invasive Aquatic Plants: A New National Outreach Initiative

Sea Grant has been funding research and outreach efforts related to invasive aquatic species issues since the introduction of the zebra mussel to the Great Lakes brought the issue to national attention. A recently funded national outreach initiative on invasive aquatic plants brings together five Sea Grant programs and a national panel of experts representing research, industry and regulatory agencies to identify invasive aquatic plants of national or multi-regional significance and prepare educational materials and programs. The project goal is to reduce invasive plant introductions and enhance early identification of new invasive plant outbreaks by targeting backyard water gardeners, landscape managers and field staff from natural resource protection and other land management agencies. In the first year of the project, Connecticut's role was to create and convene a meeting of a national advisory panel. This meeting took place in August in conjunction with the annual Aquatic Plant Management Society's national meeting at which Extension Educator Heather Crawford also made a presentation about the project during the plenary session. The advisory panel worked to develop a list of twenty priority plants, six to be addressed in the first year of the project, and provided important feedback to the project team about reaching target audiences and avoiding duplication of effort.

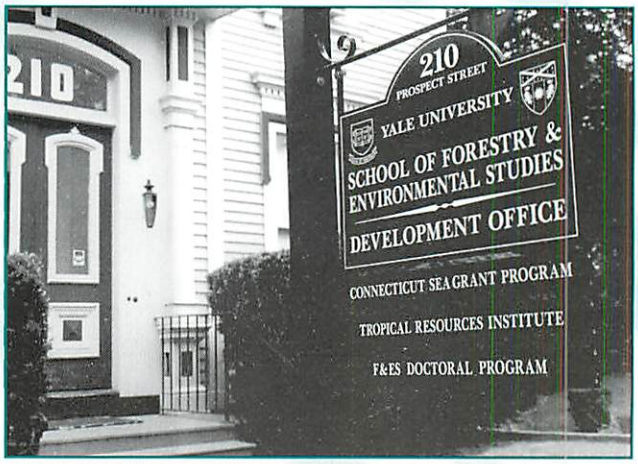
Clean Waters: Reaching Homeowners with a Water Quality Message

Clean Waters: Starting in Your Home and Yard, is an educational program developed by Extension Educator Heather Crawford, focused on the everyday practices through which individuals can pollute or protect their local water resources. A series of 11 fact sheets by various authors was developed and produced. Topics include care of septic systems, household hazardous chemical and waste management, yard and garden care, and naturalistic landscaping. In 2000, more than 350 members of garden clubs, local land trusts and service organizations have attended 23 general presentations. A joint program with The University of Connecticut Cooperative Extension System has trained volunteers in the Norwalk River and Lewisboro NY lakes region to visit and educate their neighbors about protecting water quality. In addition, 50 high school science teachers received Clean Waters training as part of the state-level preparation for National Envirothon competition because the special topic for the 2001 competition is urban nonpoint source pollution related to residential activities.

EDUCATION

Yale Sea Grant Interns: Where Science Meets Policy

The Sea Grant funded internship program at the Yale School of Forestry and Environmental Studies (YFES) continues to provide excellent practical experience for the student interns on the role of science in the actions of government and the formulation of public policy as well as providing important data or analyses to local organizations and regulatory agencies. In the past year students have examined the implications of harmful algal blooms in shellfish management to assist the state aquaculture agency in developing new policies, completed an ecological and human health risk assessment related to the spraying of pesticides to control mosquitoes carrying West Nile-like encephalitis, tracked a rapidly developing salt marsh associated with a national wildlife refuge, compiled baseline water quality data for a new watershed organization, and inventoried anadromous fish populations and breeding habitat to assist the state fisheries management program and local conservation groups in evaluating the feasibility of placing a fish ladder in a river in New Haven. In the Fall of 2000, a research intern is examining urban subsistence fishing in relation to historic pollution problems of the Mill River in New Haven. Another intern is organizing a series of lunch seminars for YFES students to meet researchers from other Connecticut universities who are working on coastal and marine issues. (See also page 15).



Heather Crawford, CTSG Extension

While the Connecticut Sea Grant College Program is primarily based at the University of Connecticut's Avery Point campus, there is a branch office at the Yale University School of Forestry, home of the Sea Grant Coastal Interns activity.

K-12 Education at TMA

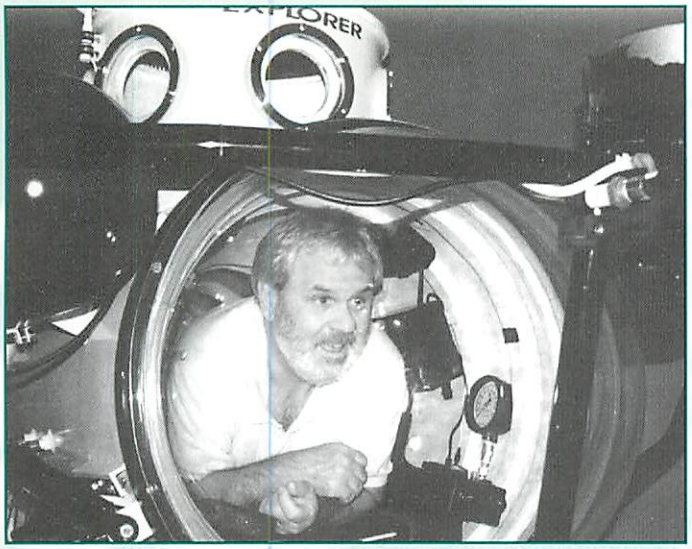
The program's formal K-12 education effort is based at The Maritime Aquarium in Norwalk, Connecticut. Activities include training workshops and internships for teachers and the development of teacher resource materials. Sea Grant Educators Diana Payne and Kim Raccio developed successful teacher-UConn faculty researcher collaborations, linking students with exceptional scientific ability with real ongoing scientific investigations.

K-12 teachers learn and practice techniques used in marine archaeology at The Maritime Aquarium's workshop in 2000.

Sea Grant-supported educational programs held at The Maritime Aquarium in Norwalk during 2000 served 1000 schools in five states. Workshops included the annual Long Island Sound Educators Workshop, JASON workshops, "ROVing the Ocean," and a Marine Archaeology conference. Several smaller workshops were also held on special topics, such as seals and dolphin training.

At the November "ROV-ing the Ocean" workshop, teachers experienced a hands-on introduction to robotics, remote sensing, and other innovative ocean technologies for exploring ocean depths. Additional activities demonstrated the use of satellites and fiber optics.

Payne and Raccio developed and distributed to K-12 teachers marine resource materials including curricula, literature, and audio-visual materials. They organized and implemented three 4-week, paid summer Sea Grant Teacher Internships, and produced *Making Waves*, a Sea Grant supported newsletter for marine educators.



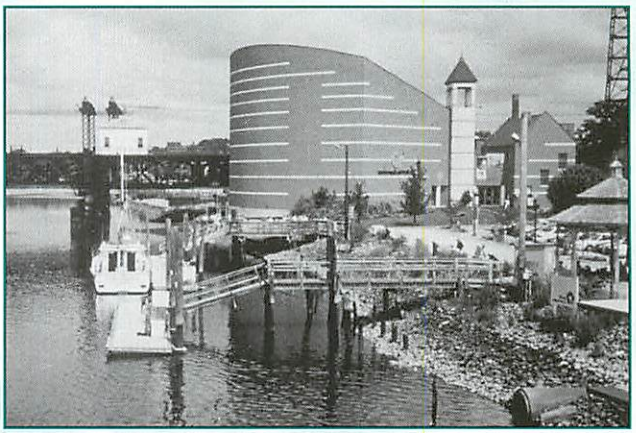
A K-12 teacher gets up close and personal with a Remotely Operated Vehicle (ROV), used for undersea observations, at "ROV-ing the Ocean," one of The Maritime Aquarium's Sea Grant-sponsored workshops for educators held in 2000.

The Sea Grant Teacher Resource Center at TMA features a wide variety of items produced by Sea Grant and others, with special emphasis on Long Island Sound. TMA staff assist teachers in connecting these items with curricula tied to the National and State science standards. The Center is free and open weekdays for teacher use.

TMA also features JASON workshops. The JASON Project is a program that links live broadcasts by undersea explorers, scientists and students in the field to classrooms of students in Grades 4-9.

An estimated 1500 teachers benefit from TMA's Connecticut Sea Grant-supported activities and resources each year, hailing from five states.

Right: The Maritime Aquarium in Norwalk is located on Long Island Sound, an ideal living laboratory for students, teachers, and families. Connecticut Sea Grant's formal K-12 education activities are based there.



The Sea Grant/ Amistad Maritime Fellows are high school students who serve as crew aboard the Amistad replica, learning lessons in seamanship, history, and cultural diversity - while educating visitors on the Amistad s message of freedom and cooperation.

Amistad Maritime Fellows Program

The Amistad Maritime Fellows Program is a pilot program for high school students. It allows students who are juniors or seniors in high school to serve as crew aboard the Amistad replica vessel, learning lessons in seamanship, history, and cultural diversity.

The *Amistad* is a 129-foot replica of a Spanish schooner by the same name that was the scene of an insurrection on the high seas in 1839 by 53 African men and children, the survivors of hundreds kidnapped in Sierra Leone, West Africa and sold into slavery in Cuba. After a revolt led by a Mende tribesman, they broke free and sailed the schooner to Long Island, where they were seized by the US Navy and imprisoned. In a landmark court case argued in New Haven, Connecticut, the Africans were judged to be free citizens and subsequently returned to their homeland. The *Amistad* replica is meant to symbolize freedom, cooperation, and leadership.

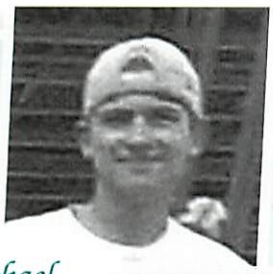
Meet the Sea Grant Amistad Maritime Fellows:

Ben

Ben Kelsey, from Branford, helped to build the Amistad replica, and worked with riggers and learned nautical knots to complete the vessel's rigging. Using an antique forge, he made the spikes that hold the vessel together. Stepping around the hefty 500-pound anchor, Ben talks about the meaning of Amistad. "Without the history, it's just another boat," Ben said. "The history makes it what it is. Even though it's a replica, it conveys power."

Elanya

Elanya Delacruz, from New Haven, is tackling an ambitious project - she is locating and researching burial sites of some of the *Amistad* captives, and she wants to write a book from what she's learned about the Amistad's history. Her book would be a biography of Margru, a six-year-old female captive on the Amistad. In later life, Margru returned to the United States and attended Oberlin College, eventually becoming headmistress of a mission school. "She was a real go-getter," says Elanya, who feels that Margru is an exceptional role model for young women.



Michael

Michael Ferraiuolo, from Branford, was also involved in the original construction of the replica , and returned to it as a Maritime Fellow. "I have a long-term involvement with the Amistad," Michael says. His 14-week internship included learning to navigate and sail a vessel, and honing other skills such as splicing. He served on 24-hour watches as crew during the summer, explaining the vessel's mission and equipment to visitors.

Erin

Erin Nolan, from Chariho School in Rhode Island, learned to do splicing and whipping as she helped with the construction of the vessel. She hopes to gain shipboard experience and memories to cherish.

Not shown: *Amistad* Maritime Fellows Buddy Klumbis, alumnus of Chariho H.S.; Chris Marston, senior at the Sound School in New Haven.

Graduate and Undergraduate Education

It's difficult to track exact numbers of students supported by Sea Grant research at the numerous academic institutions in Connecticut; however we estimate that 16 masters students, 6 doctoral candidates, and 8 undergraduates were involved in projects funded by Connecticut Sea Grant in 2000. Examples include the following:

• A recent unwelcome invader to Long Island Sound shores is the Japanese shore crab, a small red crab with striped legs that quickly became so abundant after its introduction to the Sound that it has displaced larger, commercially valuable native crabs and become the dominant predator in many coastal ecosystems. The Sea Grant Extension program worked with UCONN Marine Sciences doctoral candidate Andrew Lohrer, planning and supporting doctoral research comparing Japanese shore crabs in their native environment to those invading Long Island Sound. Lohrer traveled to Japan to carry out this research, which resulted in many presentations and publications (see list at the end of this report).

• Salt marsh contamination research described earlier in this report conducted at Wesleyan University in Middletown supported two Masters theses and one undergraduate honors project. Two additional Masters projects are in progress. The investigators are also working with teachers who use the actual marsh data in a program to increase mastery of mathematics and science in middle schools.

The Connecticut Sea Grant coastal intern program at Yale links graduate students with citizens, local officials and agency resource managers. The program structure is described on page 12, and on the program's website:

http://www.yale.edu/ccws/seagrantinternships.html

Heather Crawford, Sea Grant

Graduate student Sean Corson, a Sea Grant Yale Intern, puts a sample net into the West River while evaluating fish habitat and populations.

Projects by student interns at the Yale School of Forestry and Environmental Studies in 2000 included:

• "West Nile Virus: a Case Study in Managing New and Emerging Public and Environmental Health Threats". Christine Chui and Shannon Heyck-Williams. Project resulted in a report that includes an overview and recommendations to assist local, state, and federal governments in responding to the West Nile mosquito health threat in coastal regions.

• "Salt Marsh Development at Milford Point, Connecticut". This study by intern Christon Robbins examines the processes and conditions needed for marsh development in the face of sea level rise, at a "new" coastal marsh (Wheeler Marsh).

• "Marine Biotoxin and Phytoplankton Monitoring Programs: Current Status in the Northern United States and Canada between Latitudes 32° and 55° N including Atlantic and Pacific Coasts". Interns Navis Bermudez and Ellen Clark outline the status of biotoxin and phytoplankton monitoring programs in an effort to provide the State of Connecticut's Bureau of Aquaculture with updated information on the current initiatives.

• Assessment of the Mill River: Analysis to Establish Baseline Data for Conservation". The Mill River watershed, which includes public water supplies as well as contaminated areas, has been and continues to be heavily impacted by development. This study by intern Melissa Slotnick will provide data to aid managers in maintaining the health of this valuable resource.

Sea Grant Industrial Fellows

A project by a Sea Grant Industrial Fellow, Michael Berman, may improve our ability to quickly detect hydrocarbon pollution in the oceans and estuaries. Berman applied analytical chemistry techniques to develop a marketable prototype *in-situ* sensor. When events such as oil spills or leakage occur in aquatic environments, these hydrocarbons may negatively impact water quality, living wild resources, and aquaculture facilities. A doctoral candidate at UCONN, Berman worked with Dr. Richard Jadamec at UCONN's Coastal Environmental Laboratory and with Spectrogram, Inc., the industry partner.

Left to right: Connecticut Sea Grant Knauss Fellows Amy Owsley and Donna An, Sea Grant Director Edward Monahan, and former Fellow Macole Stewart, at a reception for the Knauss Fellows in Washington D.C. All three women were previously Sea Grant Yale Coastal Interns.

Knauss Fellows Contribute on Capitol Hill

The Dean John A. Knauss Marine Policy Fellowship Program provides opportunities for highly qualified graduate students to work in key federal offices in Washington D.C. on marine issues. Fellows are recommended by their state's Sea Grant Program and selected by the National Sea Grant Office in a keen national competition. This year Connecticut Sea Grant supported two Fellows, Amy Owlsley and Donna An (left).

Selected Reprints from Sponsored Research

Acharya, G. and L. Bennett. Valuing open space and land use chaos in urban watersheds: an hedonic property value analysis. *Journal of Real Estate Economics and Finance* (submitted)

Anisfeld, *et al.* 1999. Analysis of temporal sampling requirements for determination of riverine nitrogen loads. *EOS* 80: S129.

Anisfeld, S.C. *et al.* 1999. Effects of social and economic variables on hydrology and water quality of urban watersheds. *EOS* 80: S124.

Bermudez, N., A. Owsley, S. Anisfeld, and G. Benoit. 1999. Implications of land use for nitrogen and sediment fluxes on a variety of time scales. *Proc. of AWRA Annual Water Resources Conference*, 289.

Buchholtz ten Brink, Mecray, E.L., and Varekamp, J.C., 2000. Mercury in sediments from Long Island Sound. AGU spring meeting, Washington DC.

Chambers, R.M. and L.A. Meyerson and K. Saltonstall. 1999. Expansion of Phragmites into tidal wetlands of North America. *Aquatic Botany* 64: 261-273.

Chopin, T. and C. Yarish. 1999. Aquaculture does not only mean finfish monoculture...seaweeds must be a significant component for an integrated ecosystem approach. *Bull Aquacul. Assoc. Canada* 99-1:35-37.

Chopin, T., C. Yarish, R. Wilkes, E. Belyea, S. Lu & A. Mathieson. 1999. Developing *Porphyra*/salmon integrated aquaculture for bioremediation and diversification of the aquaculture industry. *J. Appl. Phycol.* 11:463-472.

Chui, C. and S. Heyck-Williams, 2000. West Nile Virus: a Case Study in Managing New and Emerging Public and Environmental Health Threats. Report to Yale Univ. School of Forestry and Environmental Studies.

Heller, N.A., Kruge, M.A., Varekamp, J.C., 2000. Molecular biogeochemistry and pollutant geochemistry of estuarine sediments, Housatonic and Connecticut Rivers, Connecticut, USA. AGU spring meeting, Washington DC.

Kellert, S. (in press) *Ordinary Nature: Exploring and Designing Natural Diversity in Everyday Life.* Berkeley: University of California Press.

Kellert, S. 2001. Ordinary nature: the value of exploring and restoring nature. *Landscape Ecology* (submitted).

Knebel, H. J., Lewis, R., and Varekamp, J.C. 2000. Regional Processes, Conditions, and Characteristics of the Long Island Sound Sea Floor. *J. Coastal Research* 16: 519-521.

Kraemer, G. P. & C. Yarish. 1999. A preliminary comparison of the mariculture potential of *Porphyra purpurea* and *P. umbilicalis*. *J. Appl. Phycol.* 11:473-477.

Laufer, Hans. 1999. Methyl farnesoate induced ovarian maturation in the spider crab, *Labinia emarginata. Invertebrate Reproduction and Development* **36**: 1-3, pp. 79-85.

Lohrer A.M. and R.B. Whitlatch. Alien crabs in Long Island Sound: relative impacts of two exotic brachyuran species. Submitted to *Mar. Ecol. Prog. Ser.*

Lohrer, A.M. 2000. Mechanisms and consequences of an exotic crab species invasion. Doctoral Dissertation, Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs, CT, USA.

Lohrer, A.M. and R.B. Whitlatch. (in press) Modeling life-stage based dynamics of marine invertebrates in soft-sediment habitats: some implications for habitat conservation. In: J.B. Lindholm and M. Ruth (eds.). *Dynamic Modeling for Marine Conservation.* SpringerVerlag, New York, USA.

Lohrer, A.M. and R.B. Whitlatch. Interactions among aliens: apparent replacement of one exotic species by another. Submitted to *Ecology.*

Lohrer, A.M., Fukui, Y., Wada, K., and R.B. Whitlatch. 2000. Structural complexity and vertical zonation of intertidal crabs, with focus on habitat requirements of the invasive Asian shore crab, *Hemigrapsus sanguineus* (de Haan). *J. of Exp. Mar. Biol. and Ecol.* 244:203-217.

Lohrer, A.M., Whitlatch, R.B., Wada, K., and Y. Fukui. 2000. Home and away: comparisons of resource utilization by a marine species in native and invaded habitats. *Biological Invasions* 2(l): 41-57.

Lohrer, A.M., Whitlatch, R.B., Wada, K., and Y. Fukui. 2000. Using niche theory to understand invasion success: a case study of the Asian shore crab, *Hemigrapsus sanguineus.* In: J. Pederson (ed.). *Marine Bioinvasions: Proceedings of a National Conference.* MIT Sea Grant College Program, Cambridge, MA.

Thomas, E., Gapotchenko, T., Varekamp, Buchholtz ten Brink, M.R., and Mecray, M.L., 2000, Environmental change in Long Island Sound over the last 35 years. AGU spring meeting, Washington DC.

Thomas, E., Gapotchenko, T., Varekamp, J.C., Mecray, E.L., and Buchholtz ten Brink, M.F., 2000, Benthic Foraminifera and Environmental Changes in Long Island Sound, *J. Coastal Research* 16:641-653.

Thompson, W.G., Thomas, E. and Varekamp, J.C., 2000, 1500 Years of Sea Level Rise in Long Island Sound, *Fourth Biennial LIS Research Conference proc.* Univ. of Connecticut Marine Sciences Dept.

Thompson, W.G., Varekamp, J.C. and Thomas, E., 2000, Fault motions along the eastern border fault, Hartford Basin, CT over the last 2800 years. AGU spring meeting, Washington DC.

Varekamp, J.C., Buchholtz ten Brink, M. R. Mecray, E.L. and B. Kreulen, 2000, Mercury in Long Island Sound sediments. *J. Coast. Res.* 16: 613-626.

Whitlatch, R.B., Lohrer, A.M., and S.F. Thrush. *In press.* Scale-dependent recovery of the benthos: effects of larval and post-larval life-stages. In: J.Y. Aller and S.A. Woodin (eds.). *Organism-Sediment Relationships.* University of South Carolina Press, Columbia, SC, USA.

Wilkes, R.J., C. Yarish & G.G. Mitman. 1999. Observations on the Chromosome Numbers of Porphyra (Bangiales, Rhodophyta) Populations from Long Island Sound to the Canadian Maritimes. *Algae* 14(4):219-222.

Yarish, C. T. Chopin, R. Wilkes, A.C. Mathieson, X.G. Fei, and S. Lu. 1999. Domestication of Nori for Northeast America: The Asian Experience. *Bull Aquacul. Assoc. Canada* 99-1:11-17.

Reprints, technical manuals, and other literature resulting from Sea Grant-sponsored activities are available from the **Sea Grant Library**. The Library can be accessed online at **http://nsgd.gso.uri.edu**.

MAJOR PROJECTS FUNDED 1999 (completed or c

Project No.	Title	Investigator
Core Program Elements		
M/PA-1	Program Management/ Admin. & Planning	E. Monahan
M/PD-1	Program Development	E. Monahan
M/PD-4	Multi-program and Regional Initiatives	E. Monahan
A/E-1	Sea Grant Extension Program	N. Balcom
M/CP-1	Communications Program	M. Van Patten
R/ER-2	Environmental Changes In and Around Long Island Sound: Natural and Anthropogenic Factors	J. Varekamp, E. Thomas
R/ER-12	Hydrologic and Chemical Control of Phragmites Growth in Tidal Marshes	R. Chambers D. Osgood
R/SL-8	Connecting Ecological and Social Systems: Watershed Research Relating Ecosystem Structure and Function to Human Values and Socioeconomic Behaviors	S. Kellert *et al.*
Education and Outreach Initiatives		
A/E-3	Yale/ Sea Grant Coastal Internship Program: Development and Coordination of Public Policy ...	G. Benoit M. Tyrell
E/T-7	Bringing Maritime Science into Classrooms: Outreach Programs and Teacher Support	J. Schneider
E/T-9	Advancing Science Learning for the Deaf Through Marine Science	P. Scheifele
Knauss Marine Policy Fellowships (2)		
TOTAL		

* Development projects are listed separately on page 19.

ngoing in 2000)

Institution	NOAA funds	Non-federal Match	Totals
UCONN	$143,300	$190,800	$334,100
UCONN	$ 35,000	0	$ 35,000
UCONN	$100,000	0	$100,000
UCONN	$139,000	$ 74,900	$213,900
UCONN	$125,300	0	$125,300
Wesleyan U.	$ 24,000	$ 16,300	$ 40,300
Fairfield U.	$ 43,300	$ 29,000	$ 72,300
Yale U.	$ 52,200	$ 87,900	$140,100
Yale U.	$ 28,400	$ 30,100	$ 58,500
The Maritime Aquarium	$ 59,800	$ 37,800	$ 97,600
NURC, UCONN	$ 3,400	$ 3,100	$ 6,500
	$ 76.000	--	$ 76,000
			$1,432,400

FINANCIAL REPORT MAJOR PROJECTS FUNDED 2000

Project No.	Title	Investigator
Core Program Elements		
M/PA-1	Program Management/ Admin. & Planning	E. Monahan
M/PD-1	Program Development	E. Monahan
M/PD-4	Multi-program and Regional Initiatives	E. Monahan
A/E-1	Sea Grant Extension Program	N. Balcom
M/CP-1	Core Communications Program	M. Van Patten
Research Projects		
R/A-25	... Growth Enhancement in Two Economically Important Euryhaline Teleosts, Rainbow Trout and Tilapia	T. Chen
R/A-28	Sustainable Integrated Finfish/Nori Aquaculture for Bioremediation and Production of Food and Biochemicals	C. Yarish
R/ER-14	...Sulfide Complexation on Heavy Metal Biogeochemistry and Bioavailability in Conn. Rivers and Estuaries	G. Benoit
R/ER-15	The Long Island Sound Paleo-Environment Program	E. Thomas, J. Varekamp
R/ES-15	"Species and Community Attributes Affecting Invasion Success by Exotic Species"	R.B. Whitlatch
R/A-29	"...Chemilluminescent Quantitative Multiplex PCR for Dermo, MSX, and SSO in the Eastern Oyster..."	R. French
Education and Outreach Initiatives		
A/E-3	Yale/ Sea Grant Coastal Internship Program: Development and Coordination of Public Policy	G. Geballe M. Tyrell
E/T-7	New Recruits: Marine Science for the Next Generation (K-12 education and teacher support)	J. Schneider
E/T-10	Marine Science Education for the Deaf: Classroom of the Sea	P. Scheifele
A/E-14	Enhancing the Sea Grant Network s Ability to Address Land Use Impacts on Coastal Resources ('NEMO')	C. Arnold
A/E-16	"A National Invasive Aquatic Plant Outreach...Initiative"	H. Crawford
	Knauss Marine Policy Fellowships (2)	
TOTAL		

Institution	NOAA Funds	Non-Federal Match	Totals
UCONN	$168,200	$ 210,500	$378,700
UCONN	$ 49,500	0	$ 49,500
UCONN	$ 14,600	0	$ 14,600
UCONN	$140,400	$ 70,700	$211,100
UCONN	$129,400	0	$129,400
UCONN	$ 54,070	$ 29,087	$ 83,157
UCONN	$ 69,209	$ 50,704	$ 119,913
Yale U.	$ 68,175	$ 67,465	$135,640
Wesleyan U.	$ 26,800	$ 33,200	$ 60,000
UCONN	$ 74,307	$ 60,058	$134,365
UCONN	$102,187	$ 61,427	$163,614
Yale U.	$ 29,400	$ 14,800	$ 44,200
The Maritime Aquarium	$ 62,100	$ 55,800	$ 117,900
NURP, UCONN	$ 19,900	$ 36,211	$ 56,111
CES, UCONN	$ 16,178	$ 9,340	$ 25,518
UCONN, CTSG	$ 17,010	$ 9,919	$ 26,929
	$ 76,000	--	$ 76,000
	$1,117,436	$ 709,211	$ 1,826,647

FINANCIAL REPORT

M/PD-1 DEVELOPMENT PROJECTS

Project/Request Title	Investigator
Travel to US/Japan Natural Resources Aquaculture meeting	T. Chen
Conn. River Basin Pollutants - Aquatic Vertebrate Endocrine Systems	T. Chen
Northeast Aquaculture Educators Network	F. Hanes
Fish Briefs newsletter	P. Auster
Long Island Sound Lobster Mortality	R. French
System for Housing Oysters for Research	S. DeGuise
Sources and Speciation of Trace Metals in the Naugatuck River Watershed	G. Benoit
National Ocean Sciences Bowl	P. Schiefele
Amistad Maritime Fellows	C. Cloud
Spontaneous Diseases in Two Species of Shark	J. Borucinski
Clinton Harbor Sediment Transport Investigation	F. Bohlen
Tautog Reproduction	E. Schultz
Immunomagnetic C^{14} - Harmful Plankton	S. Lin
Biogeochemical Cycles of P in Sediments of LIS	R. Blake
Coastal Perspectives 2000 Public Lectures	J. Kremer
UCONN-Los Lagos Workshop	B. Bravo-Ureta
Sound Waters Urban Explorers Club	L. Beauchamp
LIS EMPACT study	T. Torgersen
National Ocean Sciences Bowl	P. Schiefele
Third International Conference on Molluscan Shellfish Safety	S. Shumway
The ¶18O of phosphate in LIS: a new tracer for nutrient point sources ...	K. Turekian
Assistance with Strategic Plan	P. Kremer
Accumulation and fate of paralytic shellfish toxins in the planktonic copepod	H. Dam

DEVELOPMENT PROJECTS - M/PD-4 REGIONAL AND MULTI-PROGRAM FUNDS

Project/Request Title	Investigator
Marine Bioinvasions Conference	J. Pederson
Marine Bioinvasions	R. Whitlatch
LIS Lobster Health Symposium	N. Balcom
East Coast Live Aquatics conference	N. Balcom
Southern New England Aquaculture Conference, Newport, RI Oct. 1-2, 2000	T. Simlick
Visit of Prof. Tang Xiaogeng, Qingdao, China	C. Yarish
Travel to 6th International Lobster Conference	R. French
Travel to U.S./Japan Natural Resources Aquaculture Conference	R. French

NOTE: Projects R/A-28, C. Yarish, and A/E-14, C. Arnold were also supported from M/PD-4. See listings under research.

Institution	Funds
UCONN	$2,650.00
UCONN	$2,250.00
New England Board of Higher Ed.	$1,400.00
UCONN	$2,760.00
UCONN	$4,970.00
UCONN	$4,163.00
Yale University,	$3,847.00
National Undersea Research Ctr.	$2,500.00
Amistad America Inc.	$5,000.00
Univ. of Hartford	$3,670.00
UCONN	$4,835.00
UCONN	$2,506.00
UCONN	$3,520.00
Yale University	$4,700.00
UCONN	$ 460.00
UCONN	$3,000.00
Sound Waters Inc.	$2,500.00
UCONN	$1,836.00
National Undersea Research Ctr.	$2,500.00
Southampton College, LIU	$1,000.00
Yale University	$4,550.00
UCONN	$3,808.00
UCONN	$3,750.00
	$ 72,175.00

(includes Development Awards of previous year not included in 1999 annual report.)

Institution and Partner(s)		Funds
MIT	(with MIT, NJ and RI Sea Grant)	$3,500
UCONN	(with Acad Nat. Sci., PA)	$4,100
UCONN	(with NYSGI)	$8,000
UCONN	(with DE and MD Sea Grant)	$2,000
UCONN	(with RI Sea Grant)	$ 550
UCONN	(with NH and NY Sea Grants)	$1,760
UCONN	(with NY Sea Grant)	$1,853
UCONN	(with NSGO)	$1,000
		$ 22,763

CONNECTICUT SEA GRANT
STAFF

Edward C. Monahan, Ph.D., D.Sc., Director
Nancy C. Balcom, Extension Educator
Heather M. Crawford, Extension Educator
Capt. Charles H. Nixon, Executive Officer
Karen Massaro, Administrative Assistant
Diana L. Payne, Education Programs Coordinator
Kim Raccio, Education Resources Coordinator
Irene K. Schalla, Secretary
Tessa Simick, Extension Educator
Peg Van Patten, Communications Director

SENIOR ADVISORY BOARD

The Connecticut Sea Grant Advisory Board is comprised of senior individuals at academic institutions in the state and representatives of state and federal agencies. The group guides the policy and direction of the Sea Grant College Program.

RADM Michael W. Bordy, USN retired
President/CEO
The Maritime Aquarium

Dr. Orrin Grossman
Acting Vice President for Academic Affairs
Fairfield University

Dr. Ian Hart (chairperson)
Interim Vice Provost for Research and Grad. Education
University of Connecticut

Dr. Thomas Haas
Dean of Academics
U.S. Coast Guard Academy

Dean J. Gustave Speth
School of Forestry and Environ. Studies
Yale University

Dr. Herman Lujan
Chief Academic Officer for Academic Affairs & Research
Connecticut. State University System

Dr. Mark Zimmer
Dean of Natural Sciences
Connecticut College

Dr. Laura Grabel
Dean of Natural Sciences & math
Wesleyan University

Dr. Anthony Cernera
President
Sacred Heart University

Mr. Hugh Connell
President
Mystic Aquarium and IFE

Mr. J. Revell Carr
President
Mystic Seaport Museum

Agency Representatives

Mr. Arthur Rocque, Jr.
Commissioner
State of CT, Dept. of environmental Protection

Dr. Anthony Calabrese,
Director
NOAA National Marine Fisheries Service
Milford Laboratory