

Maine Sea Grant Program



Annual Report 2001

Maine Sea Grant

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This annual report summarizes the accomplishments and activities of the Maine Sea Grant Program from October 1, 2000 to September 30, 2001. We have organized the report by program areas: management, research, extension/education, and communications. The projects and activities in the *Marine Extension Team Covers the Coast* section are grouped according to the three theme areas (ecosystem health, aquaculture, and fisheries) listed in our strategic plan for 2001-2005, *Marine Science for Maine People*. If you have any questions about the Maine Sea Grant Program, please contact one of our staff members listed in the management section of the report or visit our web site at www.seagrant.umaine.edu.

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A Message from the Director

A few days after writing this message, I will be leaving Maine Sea Grant to take a new job as the director of the Academy of Natural Sciences' Estuarine Research Center in St. Leonard, Maryland. This annual report summarizes the achievements of Maine Sea Grant from October 2000 to September 2001, and coincides with the end of my fourth year as head of the program. Here, I would like to reflect on the accomplishments of the past four years and the current status of the Maine Sea Grant Program, as well as on the challenges and opportunities for the future. Although I may claim some credit for charting the course, all that has been achieved over the past four years is largely due to the efforts of others. In this regard, I am grateful for the active support I have received from the higher administration at the University of Maine; the advice and encouragement of our Policy Advisory Committee; and most of all, to the dedication, enthusiasm, and hard work of all the Sea Grant and Marine Extension Team staff.

Perhaps the major change over the past four years is that Maine now has its own independent Sea Grant program and, like other programs in the national network, is able to bring federal and local resources together to address marine and coastal issues and concerns affecting the citizens of the state. Although October 2001 is only the first anniversary of the independent Maine Sea Grant Program, it is already clear that the program is better able to establish closer connections with, and provide better service to, the people of Maine and the nation. In particular, the Marine Extension Team, which was established in 1999 as a joint initiative between Sea Grant and Cooperative Extension at the University of Maine, has greatly enhanced our ability to provide educational programs for, and assistance to, our stakeholders. For example, over the past year members of the Marine Extension Team have been active in developing partnerships to facilitate the lobster zone management process, providing accurate and unbiased information about aquaculture, and monitoring coastal waters for pollution and habitat change. Paul Anderson, the Marine Extension leader and Sea Grant associate director, has been a highly effective leader for the Marine Extension Team, and it is sometimes difficult to believe he has only been with the program for 18 months. Paul will be the acting director of Maine Sea Grant until my successor is identified, and I am confident that I am leaving the program in capable hands.

Reorganization of Maine Sea Grant over the past four years impacted all aspects of the program. Our increased investment in extension has been achieved at the expense of reductions in clerical support and communications. Despite this, I believe that both aspects of the program are highly effective. This is due to the dedication of the staff and their willingness to learn new skills, which have allowed them to function more efficiently. Susan White, who became the communications coordinator in 1998, and who is now also the assistant director of Maine Sea Grant, has been instrumental in leading this reorganization and developing effective partnerships with the Marine Extension Team to develop new educational products. This October, Susan will be taking a

well-earned sabbatical at the Institute of Marine Biology of Crete (Greece) where she will learn new techniques to produce educational materials and develop distance-learning programs. One of the recent highlights in communications is our new web site (<http://www.seagrant.umaine.edu/>) that was completed in 2000 and has been continually improved and developed over the past year. The web site was created by our science writer Natalie Springuel who, with no prior experience, developed an outstanding vehicle for communicating with our stakeholders. Another staff member who has acquired new skills is our fiscal officer, Lynn Wardwell, who developed a database for the program. The database is now fully functional and it is proving to be an invaluable management tool.

Sea Grant makes a major investment in research, which accounts for more than 50% of the total federal budget. We now have an annual research competition, which ensures that we fund the most current and relevant research, and we have incorporated annual stakeholder-generated research priorities into our request for proposals. In addition, we have successfully increased the number of researchers and institutions receiving Sea Grant funding. When our new research projects start in February 2002, our portfolio of projects will not only represent highly relevant science selected by a rigorous peer-review, but the majority of the investigators will be new to Sea Grant and they represent a greater number of institutions than in previous years. Because Sea Grant's federal budget has not kept pace with inflation, our ability to fund research has eroded. Consequently, finding new sources of funding has become a priority. This year, Maine Sea Grant partnered with the Maine Oil Spill Advisory Committee (MOSAC) to run and manage a new research competition targeted at the prevention, mitigation, and impacts of oil spills. I am grateful to Joe Kelley, a faculty member in the School of Marine Sciences at the University of Maine and member of MOSAC, who was instrumental in making this new competition a reality.

This year, Maine Sea Grant produced a new four-year strategic and two-year implementation plan, *Marine Science for Maine People*, which is intended to serve as a guide, but not a straightjacket, for the program over the next few years. The new strategic plan was a major factor considered by two reviews of Maine Sea Grant that occurred in 2001. The first was an internal review commissioned by the University of Maine, and the second was the National Sea Grant Office's Performance Assessment Team (PAT) review. These reviews made several useful recommendations that will be implemented over the next 12 months. However, the general assessment of both reviews was that the Maine Sea Grant Program is in good shape and well positioned to meet the challenges and opportunities of the future. I am sure that this is true, and wish the staff of Maine Sea Grant and the new director every success in the future.

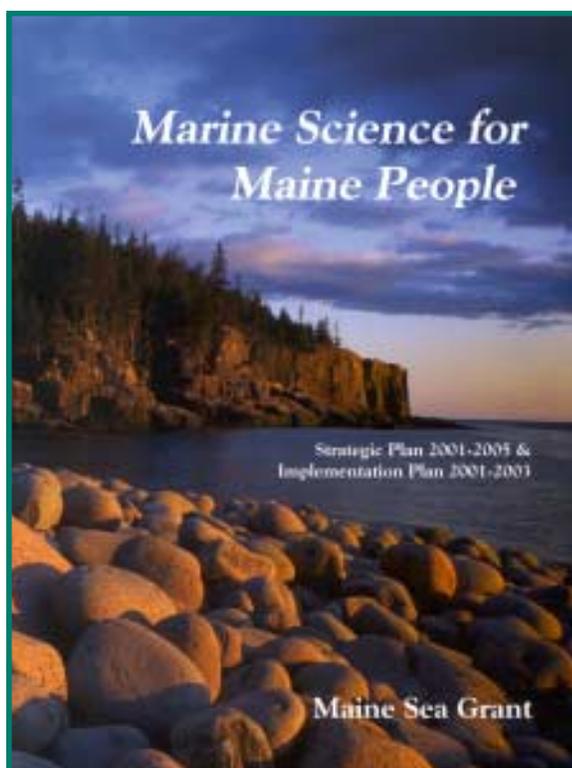
A handwritten signature in black ink that reads "Ian Davison". The signature is written in a cursive style with a long horizontal stroke at the end.

Ian Davison
September 2001

MANAGEMENT CHARTS THE COURSE

The management team of Maine Sea Grant consists of the director, Ian Davison, associate director and extension leader, Paul Anderson, and the assistant director and communications coordinator, Susan White. Lynn Wardwell, fiscal officer, and Margaret Rocheleau-Shina provide program support.

The management highlight of 2001 was the publication of Maine Sea Grant's four-year strategic and implementation plan, *Marine Science for Maine People*, which represents the collective vision and aspira-



tions of our staff and stakeholders. The strategic plan articulates clear goals and objectives that will not only guide the program into the future, but also will allow us to evaluate our progress and assess our effectiveness in serving the people of the state of Maine.

This year also represents a milestone as the first full year of the independent Maine Sea Grant institutional program, which was formed after the joint Maine/New Hampshire Sea Grant College

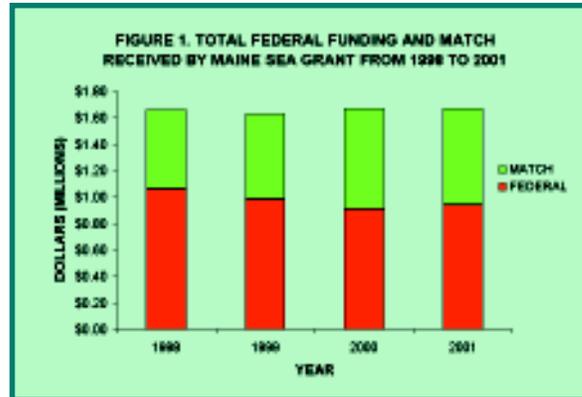
Program ended in October 2000. This has allowed Maine Sea Grant to more closely tailor our programming to meet the needs of Maine's marine industries, coastal communities, and other stakeholders. However, Maine Sea Grant remains committed to working collaboratively with other programs in the Northeast and across the entire Sea Grant network.

A major focus of program management in 2001 was preparing for an internal review conducted by the University of Maine and an external review by the Performance Assessment Team appointed by the National Sea Grant Office (NSGO). Our challenge for the coming year

will be to implement the recommendations made by the reviewers and we look forward to documenting our progress in next year's annual report.

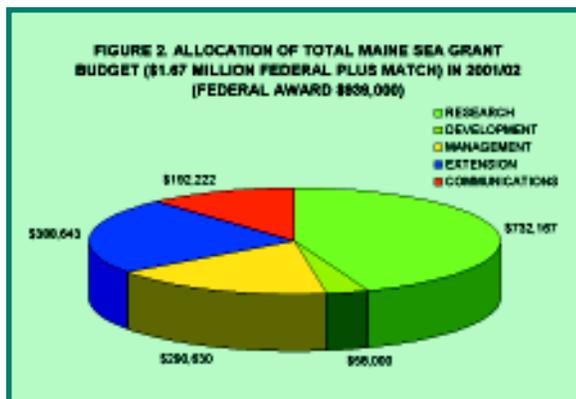
Work continued on the program's database, which is now fully functional and populated with information from the past decade. The database is proving to be an invaluable tool for program management to track outcomes and impacts of projects, and it greatly facilitated the preparation of this annual report.

As with all Sea Grant programs, a major challenge facing Maine Sea Grant's management team is maintaining an effective program with a budget that has remained static at approximately \$1.7 million for more than four years (Figure 1).



Despite the continual erosion of our budget from pay raises and inflation, we have maintained the research budget (\$478,000) at slightly more than 50% of our federal award (\$938,000), which represents the largest percentage of our overall budget (Figure 2). This has been achieved by using most of the discretionary money allocated for other parts of the program.

Although we are fully committed to work within the Sea Grant Association and with the NSGO to advocate for increased federal funding, we recognize that the federal Sea Grant budget is unlikely to increase significantly in the near future. Our strategy is to aggressively pursue alternate funding sources to support our programmatic priorities. For example, we have recently been able to secure increased support for marine research from the Maine Oil Spill Advisory Committee



(MOSAC), which will be awarded in a competition managed by Maine Sea Grant. The Marine Extension Team has also been successful in securing external grants and we anticipate that this effort and success will continue in the future.

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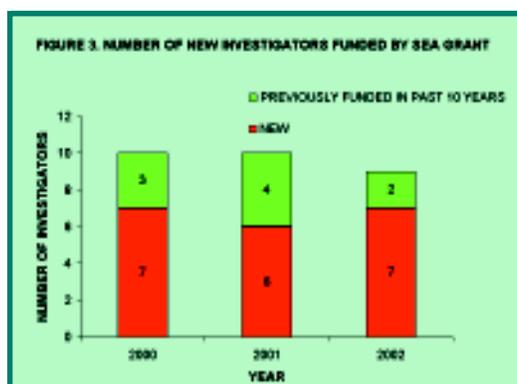
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RESEARCH PROBES THE QUESTIONS

A critical issue in managing Maine Sea Grant's research competition is ensuring that the state's intellectual resources are fully utilized to address the priority needs and questions identified by stakeholders. Previously, the allocation of research funding was heavily weighted in favor of a small number of individual investigators or research groups. We have made a conscious effort to increase the number and diversity of funded researchers without compromising the peer-review process, and the majority of new research awards over the past three years have been to investigators who have not previously received funding from Maine Sea Grant (Figure 3). In addition, we have been successful in increasing the diversity of academic and research organizations receiving Sea Grant funding. When our new projects start in February 2002, they will include researchers from the Bigelow Laboratory for Ocean Sciences, the Maine Department of Marine Resources, The Lobster Conservancy, the University of Southern Maine, the Wells National Estuarine Research Reserve, and the University of Maine.



The most immediate outcomes of funded research are peer-reviewed publications, books, technical reports, and presentations at conferences and workshops. Maine Sea Grant continues to maintain a high level of productivity as measured by these indices. However, the major rationale for our research program is to provide information that can be used by stakeholders. Because of the nature of research, such impacts often are not evident until some time after the projects have ended and frequently represent the collective efforts of several researchers on several projects. This year's report highlights one such impact in the area of lobster management.

Over the past 10 years, Maine Sea Grant has made a sustained investment in biological studies of the American lobster (*Homarus americanus*) with the overall goal of providing improved information for management and ultimately developing predictive models that can allow the industry and managers to prepare for changes in lobster

abundance. Earlier this year three scientists, Bob Steneck from the University of Maine and Lew Incze and Rick Wahle from the Bigelow Laboratory for Ocean Sciences, presented independent evidence that the decade-long increase in lobster abundance and harvests is over, and that the size of the stock and catches will decline over the next few years. The ability to make such predictions is a major advance for this fishery and represents a significant accomplishment for these scientists, as well as for Sea Grant and the other agencies that have funded this research. Two of our current projects (by Wahle and Incze) focus on this area and will further increase our understanding of lobster population biology and allow the development of even more accurate predictive tools.

The 10 research projects funded during 2001 are listed below under the three theme areas of ecosystem health, aquaculture, and fisheries that are identified in Maine Sea Grant's strategic plan, *Marine Science for Maine People*. The selection criteria involved both stakeholder input and rigorous peer-review, and these projects therefore have the potential to make a significant difference to the lives of the people of Maine and the nation. More information about these projects and researcher contacts is available on our web site at www.seagrant.umaine.edu.

Ecosystem Health

Cowan, D. *Environmental Impacts of Lobster Pounds: Monitoring Impacts, Modeling Holding Capacity, and Assessing Policy*. \$28,217.

Lopez-Anido, R. *Repair of Wood Piles with Fiber-Reinforced Composites*. \$58,557.

Aquaculture

Anderson, E. *Development of Molecular Technologies for Disease Diagnostics in Aquaculture*. \$60,000.

Boettcher, K. *Development of Immunological and PCR-Based Assays to Detect Bacterium Associated with Juvenile Oyster Disease (JOD)*. \$40,000.

Gilbert, J. *Interactions Between Pinnipeds and Atlantic Salmon Aquaculture Farms in Downeast Maine*. \$15,000.

Kornfield, I. *Genetic Signatures of Atlantic Salmon: Assisting Aquaculture and Restoration*. \$46,180.

Rawson, P. *Molecular Genetic Characterization of Blue Mussel Populations in the Gulf of Maine*. \$39,999.

Fisheries

Incze, L. *Vertical Distribution of Larval Lobsters and Other Plankton: Effects on Along-Shelf and Shoreward Transport in a Coastal Current System*. \$80,000.

Steneck, R. *No-Harvest Conservation Areas for Sea Urchins in Maine: Exploring New Tools for Sustaining the Fishery*. \$37,038.

Wahle, R. *Developing Predictive Tools for the American Lobster Fishery: Validating Trap-Based Mark-Recapture Methods to Estimate Abundance, Survival and Movement in Open Populations*. \$72,500.

Total: \$477,491

The MET includes three Sea Grant Extension associates and an education coordinator, as well as four University of Maine Cooperative Extension (UMCE) educators. Based along Maine’s 4500-mile coast, the extension associates work in local communities to identify the important issues and convey the needs of the user groups to university scientists working in disciplines related to marine and coastal issues. Staff then transfers the research results back to the resource users, industry, managers, and decision-makers. By providing a balanced approach to facilitation and building collaborations, the extension staff has helped decision-makers and stakeholders identify critical information needs and fostered opportunities to fill those data gaps.

ECOSYSTEM HEALTH

Environmental Monitoring

The Maine Shore Stewards Program is a collaborative effort of Sea Grant, Maine Department of Marine Resources (DMR), the Maine Coastal Program (MCP), Maine Department of Environmental Protection (DEP), and UMCE that supports coastal groups statewide with water quality and phytoplankton monitoring. The goal is to train and educate citizens about their marine resources and the coastal ecosystem.

Water Quality

Maine has 17 watersheds that the State Planning Office has designated “Priority Watersheds” because they have water quality that is impaired and/or because the rivers and estuaries within the watersheds are deemed a valuable economic resource.

Sea Grant /Cooperative Extension staff, working with the respective municipalities, facilitated the formation of two new Maine Shore Steward citizen volunteer water quality monitoring groups. The groups, consisting of about 20



volunteers each, are self-sustaining and have begun to monitor to gather baseline data and identify potential pollution sources. Marine Extension Team members Esperanza Stancioff and Sarah Gladu coordinate and train volunteers and provide technical support to these (as well as over 40 other) citizen-based groups.

The Medomak watershed in central Maine drains about 109 square miles and includes a 740-acre estuary that provides some of the most productive clam flats in the state, with shellfish valued at \$1 to \$2 million annually. DMR monitors the estuary for bacteria (for shellfish sanitation reasons) but there have been no recent attempts to understand the current conditions of the watershed as a whole entity –until the Friends of Medomak Watershed (FMW) was formed this year.



Early this summer, volunteers decided what questions were most critical to answer and began learning how to address those issues. They participated in several training sessions to learn monitoring methods

and divided into two teams, one to monitor bacteria in the river and the other to take dissolved oxygen profiles and chlorophyll samples in the estuary. The data the latter team is providing will be used by DEP to establish a total maximum daily load (TMDL), a calculation of the highest amount of a pollutant that a body of water can receive and still meet water quality standards.

Phytoplankton Monitoring

Some phytoplankton produce toxins that can accumulate in shellfish and threaten food safety when consumed. Cooperative Extension, Maine Sea Grant, and the Maine Department of Marine Resources (DMR) Biotoxin Program, in collaboration with the Bigelow Laboratory for Ocean Sciences and U.S. Food and Drug Administration, support the Maine Phytoplankton Monitoring Program. Under the leadership of marine extension staff member Sarah Gladu, 30 trained citizen volunteers monitor 37 sites from Kittery to Calais weekly and report on the phytoplankton cells they find. Every year since 1996, volunteers have noted the presence of toxic algae days before it was detected in the shellfish. According to the DMR, the volunteers enable the Biotoxin Program staff to efficiently focus their efforts on locations where biotoxins are most likely to accumulate.

In the spring of 2001, volunteers observed large numbers of *Pseudonitzschia*. DMR did not have the capacity to monitor the entire 4,500-mile coast, but the volunteers did, alerting the Biotoxin Program staff to the extent of the potential threat. The volunteers also alerted

DMR to the presence of *Alexandrium*, which resulted in several regions being tested for toxicity levels and subsequently closed to shellfish harvesting.

The Maine Phytoplankton Program was recognized "for providing invaluable assistance to FDA."

– FDA Team Award

The Maine Phytoplankton Monitoring Program was presented with the U.S. Food and Drug Administration's prestigious Team Award on June 22,

2001 in Washington, D.C., "for efforts in support of volunteer field plankton observer programs, to help ensure the safety of seafood for consumers throughout the United States." The letter accompanying the award stated that the Maine Phytoplankton Program was being recognized "for providing invaluable assistance to FDA."

In its effort to educate and recruit participants from the aquaculture industry, the phytoplankton program was presented to 165 aquaculturists, fish health scientists, and veterinarians at the Ninth Annual New England Farmed Fish Health Management Workshop in Eastport last spring. Approximately 10 aquaculturists attended, and several have shown interest in developing monitoring programs. As a result of these efforts, the number of aquaculturists involved in the program increased to five areas this year.

Data Management

Study design and data reporting are important aspects of volunteer environmental monitoring programs. Working with DMR and MCP, Maine Sea Grant and the Maine State Planning Office funded a data project that resulted in developing a model program to assist coastal groups with preparing reports. The model has been replicated by other New England states. Two data reports are nearing





completion and will be followed by community forums to present the reports. The completion of these reports will help monitoring groups determine the future direction of their nine-year monitoring efforts.

Nonpoint Source (NPS) Pollution Curriculum

The Maine State Learning Results encourage field-based educational experiences to enhance learning. Science teachers across the state have adopted watershed and NPS

pollution as themes for hands-on learning, yet there is a lack of curriculum materials in these theme areas that are aligned with the Learning Results. Extension associate Kristen Whiting-Grant is working with a middle school science teacher with extensive background in teaching watershed and NPS themes to design a Learning Results-aligned curriculum guide on these themes. Other collaborators include the Kittery Conservation Commission, Maine Coastal Program, University of Maine Cooperative Extension, and Maine Conservation Corps.

Whiting-Grant is coordinating the development, review, publication and dissemination of the guide, which will provide Maine teachers with easy-to-use lesson plans on topics such as watershed mapping, estuarine zonation, water quality monitoring, and impacts of NPS. Each of these lessons specifically identifies the Performance Indicators that are being addressed by the lesson, enabling teachers who use the materials to readily demonstrate how they are achieving the mandates of the Learning Results. This guide can be easily adapted for use in any estuarine watershed in the state and can serve as a model for similar efforts in other states.

Webhannet Watershed Nonpoint Source Pollution Investigation

In recent years, the town of Wells, University of New England, Wells National Estuarine Research Reserve (WNERR), and Maine Department of Marine Resources have worked together to restore, reopen, and manage the Webhannet estuary's clam fishery. Through these efforts, some flats within the estuary were reopened in 1996, but about half the total area of productive clam flats remained closed due to bacterial contamination from unidentified sources. Past water quality work and shoreline surveys indicated that fecal coliform contamination is due to freshwater runoff entering the estuary via inland streams.

Sea Grant extension associate Kristen Whiting-Grant, working in partnership with project staff from WNERR/Maine Conservation Corps and the University of New Hampshire (UNH) /Jackson Estuarine Lab, helped implement a fecal coliform monitoring program and shoreline surveying program designed to collect samples that

could be put through a microbial source tracking (MST) procedure in order to identify the mammalian and/or avian source of contamination. Nearly 40 community volunteers, including participants in the Cumberland County United

The steering committee has used preliminary results to guide the development of an action plan for the town of Wells.

Way's Day of Caring 2000, were involved in the effort. The Gulf of Maine Council on the Marine Environment and the Maine State Planning Office's Shore Stewards program provided funding for the project. Whiting-Grant assisted with recruiting, training, and coordinating volunteers; facilitating steering committee meetings; developing an action plan; and organizing community outreach efforts.

Although the MST results of the study are still pending, this project has provided a baseline for a comprehensive study, funded by a two-year \$193,970 grant from the Cooperative Institute for Coastal and Estuarine Environmental Technology at UNH, to identify sources of fecal coliform bacteria over the next two years in the Webhannet and Little River watersheds. The steering committee has used preliminary results to guide the development of an action plan for the town of Wells, which includes the creation of a comprehensive storm water management plan for the town. Final results of the project will be broadcast to the Wells community on local cable access television. Specific management practices will be recommended, depending on the sources of bacteria that are ultimately identified.

Habitat Monitoring and Restoration

Humans have many impacts on the coastal and marine environment. One of the most important impacts is habitat loss or habitat degradation resulting from commercial and residential construction and the associated infrastructure. Many of the most sensitive and threatened coastal ecosystems, such as salt marshes, sea grass beds, estuaries, beaches, and sand dunes, play an important role in the overall ecology of the Gulf of Maine. The Maine Sea Grant Marine Extension Team is working on several habitat monitoring and restoration projects in southern Maine, the most heavily populated area of the state, to understand human impacts and explore possible mitigation techniques.

Beach Profile Monitoring

Many beaches in southern Maine are experiencing chronic erosion that threatens public and private property, as well as critical wildlife habitat. Camp Ellis, a fishing village in Saco, has experienced extensive property loss. Nesting habitat of the piping plover, a shorebird federally listed as threatened, is also endangered. Changes occurring on southern Maine sandy beaches are poorly understood due to a lack of long-term data.

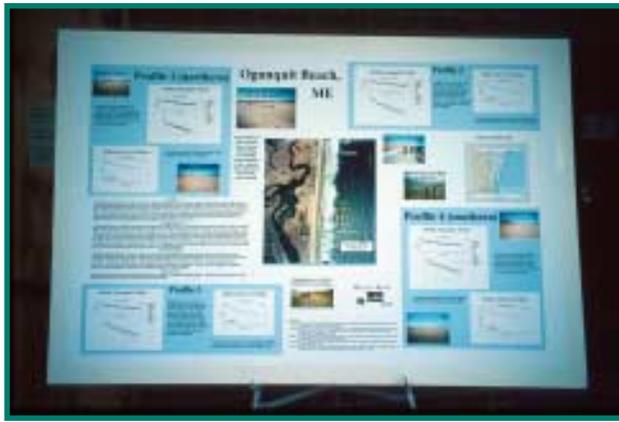
Marine extension staff member Kristen Whiting-Grant is coordinating more than 120 local volunteers who are monitoring 15 sandy beaches between Georgetown and York, Maine, once a month at low tide, by



using a simple surveying technique to measure the contour of their beaches. The profiling project is a collaboration of the University of Maine, Maine Coastal Program, Maine Geological Survey (MGS), University of Maine Cooperative Extension, and Maine Sea Grant. Due to overwhelming public support, five new beaches were added to the project between 2000 and 2001, bringing the total to 15 beaches. Whiting-Grant continues to receive requests from citizens to include additional beaches in the project.

The second annual State-of-Maine's Beaches Conference,

held in July 2001, attracted over 200 participants. The conference highlighted beach-profiling data collected by volunteers on 12 beaches for one year and on three beaches for over three months. This data allowed



Heather Heinze, a Maine Sea Grant-supported graduate student involved in the *Co-Management of Maine's Beaches through Volunteer Monitoring* research project, to identify significant trends on the monitored beaches. The beach profile data has proven to be a valuable tool to MGS in reviewing permits for construction in sand dunes and will be used by MGS and other agencies involved in helping the state develop a policy for beach nourishment.

From the evaluations received of the conference, 84% of the attendees indicated that their knowledge of coastal processes and beach planning had increased due to participation in the event, and 98% of them said that beach profile monitoring efforts should continue primarily because

the project "provides valuable information that guides coastal decision-making."

"... beach profile monitoring efforts should continue primarily because the project provides valuable information that guides coastal decision-making."
– Conference participant

Project partners are working to identify sustainable funding to transform the beach-profiling program from a short-term research/ extension project into a long-term monitoring program.

Southern Maine Beach Planning Process

Chronic erosion problems, heightened development pressures, increased demand for public access, higher rates of sea-level rise, and regulatory conflicts have recently focused attention on southern Maine's beaches. Stakeholder opinions differ widely as to how these issues should be addressed. Shorefront residents and regulators struggle to find common ground between private land use practices and natural resource concerns. Environmental advocates urge greater beach and habitat protection. Guardians of fiscal resources focus on long-term erosion solutions. Ultimately, healthy sand beaches are the common goal among all these stakeholders.

From 1999 – 2001, regional beach planning committees in Saco Bay, Wells Bay, and Scarborough have been trying to reach agreements on new ways to protect Maine’s beaches. These committees are comprised of local stakeholders, including shorefront business and homeowners, conservation commission members, non-profit environmental organization members, and state representatives from Maine Department of Environmental Protection and Maine Department of Inland Fisheries and Wildlife.

In 2000-2001, the beach planning process took place in Wells Bay. The beach planning committee met monthly, hearing presentations from regional experts on the geology, ecology, and economy of southern Maine. Research-based information gained from these presentations and other educational opportunities helped committee members to make informed decisions that will lead to the development of a set of final recommendations. Sea Grant marine extension associate Kristen Whiting-Grant provided educational materials to committee members, managed outreach efforts in local communities, assisted with meeting facilitation, and served as a member of the public access and outreach subcommittee.

After a year and a half of facilitated deliberations and divergence of opinion among beach planning committee members, a consensus-based, beach management plan for Wells Bay was drafted by the committee in the spring of 2001. This draft is now in final revision by the committee and all members will sign off on the document. The final plan will be presented to the local boards of selectmen for acceptance, and then will need final approval from the Land and Water Resources Council before the plan may be implemented.

Dune Grass Die-off Investigation

Shorefront property owners in southern Maine noticed unexplained beach grass die-off in the dunes that protect their homes from the sea. The problem has also been documented in many states along the eastern seaboard and internationally. In Maine, researchers have been unsure of the origin of the problem. More extensive research was needed to isolate the cause of the problem.

Extension associate Whiting-Grant worked with Southern Maine Regional Planning Commission to conduct a municipal survey of town managers and planners in southern Maine coastal towns to assess the extent of the problem. She then assisted University of Maine plant pathologist Dave Lambert and volunteers from a local business, Tom’s of Maine, to plant beach grass in highly, moderately, and non-impacted sections of three southern Maine beaches. Research is currently being conducted on these plots to monitor the response.

Whiting-Grant coordinated resource people to address the problem, including consultants at Maine Department of Environmental Protection and Maine Geological Survey; conducted the municipal survey; served as a liaison between university, municipalities, and property owners; and recruited, trained, and coordinated volunteers. Southern Maine beachfront property owners greatly appreciated the quick response and coordinated effort to solve a community problem of immediate concern. The current research may produce reliable conclusions on its own. It will also provide baseline data for a more comprehensive study.



Habitat Restoration Workshop

The international region of the Gulf of Maine lacks coordinated approaches to coastal and marine habitat restoration. To provide a forum for dialogue and planning on restoration, the Gulf of Maine Council on the Marine Environment (GoMCME), with support from National Marine Fisheries Service, Maine Sea Grant, and other regional (New Hampshire and Massachusetts) and international (New Brunswick and Nova Scotia) partners, held a Gulf-wide workshop that was attended by nearly 80 practitioners. At the conclusion of the two-day workshop, participants had drafted a set of recommendations to restore various habitat types. These were compiled into a report that will become the habitat restoration action plan in the next GoMCME five-year plan. Marine extension associate Kristen Whiting-Grant served on the steering and implementation committees; facilitated the beaches, dunes and islands workgroup; assisted with event logistics; and reviewed the draft report.

AQUACULTURE

Aquaculture Informational Meetings

Many Maine citizens are concerned about the growth of the state's aquaculture industry. These concerns include environmental impacts, transmission of disease and other effects on wild stocks, conflicts with capture fisheries on uses of the waterways, and aesthetics of gear in nearshore areas. Public hearings on aquaculture leases have become heated and extremely contentious and, many times, participants' concerns are based on faulty or incomplete information. In addition, there are many cases where concerned individuals do not have the opportunity to raise issues for discussion in the evaluation and approval of a proposed aquaculture site. Consequently, there remain unanswered questions, controversial decisions and, in some cases, misinformation that is circulated among community members in areas where aquaculture facilities are being proposed.

"Informational meetings coordinated by Sea Grant facilitate the exchange of ideas necessary to making informed decisions."

– Dave Schmanska,
Harbormaster, St. George

To provide an opportunity for citizens to openly discuss issues and concerns before a formal public hearing is held, members of the Marine Extension Team have been holding informational meetings in those areas where aquaculture facilities are proposed. At the request of either the fish

farmer or community members, Sea Grant and Cooperative Extension have organized and facilitated four of these meetings, which address general topics in aquaculture, as well as specific lease applications, and provide accurate and scientifically based information.

Many participants said they had learned enough at the meetings to be able to participate in better-informed discussions at formal hearings. During these open forums, industry members have also benefited from meeting citizens who are concerned about aquaculture. In one case, the fish farmer changed his proposal to accommodate some local concerns of which he was previously unaware. Another meeting empowered several shorefront property owners to work through their local legislator to change the public notification statute to increase the number of abutting property owners that must receive site plans from an aquaculture lease applicant.

According to Dave Schmanska, Harbormaster in St. George, "Informational meetings coordinated by Sea Grant facilitate the exchange of ideas necessary to making informed decisions."

Shellfish

Growout Technology

Tidal upwellers are important in the nursery culture of several species of shellfish, such as Eastern oysters and hard shell clams, and are used in regions where tidal flow can be captured effectively. So far, tidal upwellers have been designed, based on trial and error, and built with materials the culturist has on hand. Extension associate Dana Morse initiated a project to bring engineering science into the understanding of how upwellers perform with the goal of improving their performance and efficiency, ultimately translating into higher profitability for shellfish growers.



In a project funded by the Maine Aquaculture Innovation Center, Morse worked with John Riley, professor in the University of Maine (UMaine) Biosystems Science and Engineering Department, who determined the hydrodynamic theory that governs the performance of tidal upwellers and assessed the impacts of changes to some of the critical design components. An interim report was presented at the World Aquaculture Society (WAS) annual meeting last year and the final report will be presented at the WAS meeting in January 2002. Also, an article on the project appeared in the November/ December issue of *Fish Farming News*. As a result of this study, inquiries have been received from Georgia, Washington, Florida, and Massachusetts on maximizing upweller performance.

Shellfish Health

Juvenile Oyster Mortality (JOM) is a disease that, in some years, has resulted in greater than 90% losses of a given year class in oysters on the East coast. Last summer, there was a JOM outbreak in Maine, which prompted Morse to get involved as a liaison between the oyster industry, researchers, and managers. During the past year, he organized and facilitated a meeting between scientists and representatives of 10 shellfish companies at the Darling Marine Center (DMC) and worked with researchers to produce and distribute a fact sheet on JOM. An outgrowth of this meeting was that researchers made a commitment to apply for funding to study JOM, which resulted in three funded JOM research projects. Another meeting that Morse coordinated at the beginning of 2001 on the oyster-breeding program (to produce faster growing and disease-resistant oysters) resulted in an offer by the UMaine dean of the College of Natural Sciences, Forestry, and Agri-

culture to match industry money for a hatchery position at the DMC. The industry has nearly achieved their financial goal, which would enable ongoing research on the breeding program. This research could ultimately help reduce the incidence of JOM in Maine waters.

Sea Scallop Stock Enhancement

Collection of very young sea scallops, or spat, is a new and exciting effort along the Maine coast. Fishermen are experimenting with this aquaculture technique, pioneered in Japan, in hopes that the scallop fishery can be strengthened. Special “spat bags” are needed to collect the scallops, but capital to purchase the bags in sufficient quantities has been a critical issue in the development of this effort.



In the fall of 2000, extension associate Dana Morse secured a \$3000 development grant from Maine Sea Grant, which attracted \$3000 in matching funds from the Northwest

Atlantic Marine Alliance (NAMA). These funds were used for purchasing spat collection equipment. Working with NAMA, the Maine Department of Marine Resources (DMR), commercial fishermen, the Island Institute, Cobscook Bay Resource Center, Beals Island Regional Shellfish Hatchery, the University of Maine at Machias and others, Morse distributed spat collection equipment to fishermen.

In 2000/2001, nearly 50 fishermen statewide participated in spat collection activities, with more anticipated for the fall 2001 collection season. Morse worked with the industry and scientists to determine catch rates and provide growth information on scallops from the collectors. He also supported educational efforts in



schools. Fishermen recorded and shared information on where and when the bags were set, and on the resulting catch. Industry and DMR collaborated on several efforts to seed scallop beds with the spat that came from the collectors, and to track the results scientifically. A database has been developed, so that groups around the state can contribute data on collector deployment, catch, and other important parameters, in a standardized way, that may be compared and analyzed later. Several high school classes have been involved in the project, as spat collection has proven to be an ideal platform for experiential

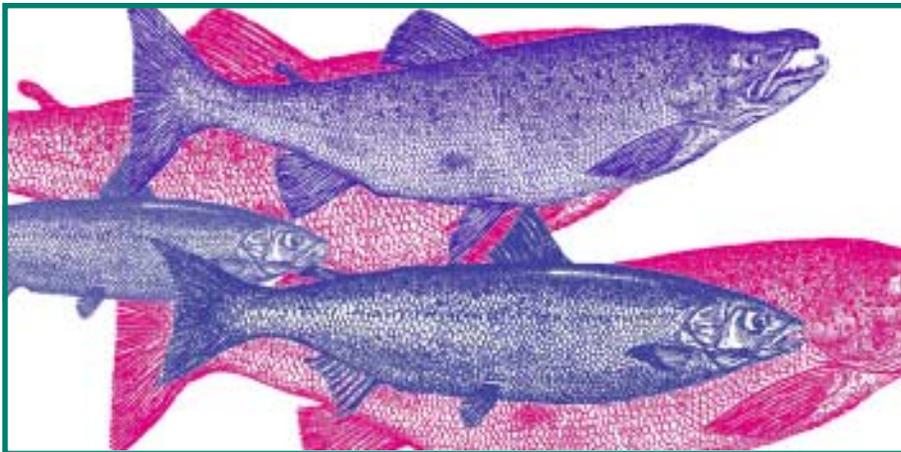
learning about biology, oceanography, and chemistry.

For the scallop stock enhancement project to survive, strong relationships must be built between industry, scientists, and resource managers. One of the most significant results of this project is that these three groups are having productive conversations, and the project is proving to be a good opportunity for collaborative research. Support for spat collection among industry members continues to grow and, because fishermen are primarily leading the project, they take ownership of it and feel empowered by it. Fishermen have become more optimistic that greater opportunities are possible for Maine's fishing communities and for tomorrow's generation of fishermen. Finally, the interest and success of the work is an important factor in development of regulatory policy by DMR.

Finfish Aquaculture

Farmed Fish Health Management Workshop

In April 2001, extension associate Chris Bartlett assisted Mike Opitz, University of Maine Cooperative Extension veterinarian, to organize the ninth New England Farmed Fish Health Management Workshop (NEFFHMW), a conference held each spring to bring the salmon aquaculture industry together to discuss technical issues. Bartlett's responsibilities included: coordinating facility requirements, serving as chair of the Disease Prevention Measures session, and coordinating the salmon farm tour. This year, the workshop attracted approximately 160 participants from several countries. In addition, Bartlett co-facilitated the Fish Hatchery Effluent Waste/Nutrient Management Workshop that was held in conjunction with the NEFFHMW.



Fish Health Technical Committee

Bartlett serves on the eight-member Maine Fish Health Technical Committee (FHTC) that counsels the commissioners of Maine Department of Marine Resources (DMR) and Maine Department of Inland Fish and Wildlife on fish health-related issues. In this capacity, Bartlett also serves as a liaison between state regulators and the finfish aquaculture industry.



In the past year, the committee has recommended procedures for the potential transfer of Atlantic salmon broodstock from Cobscook Bay to the UMaine Center for Cooperative Aquaculture Research in Franklin, Maine; re-drafted the

Maine Infectious Salmon Anemia (ISA) virus plan with the Maine Aquaculture Association Industry Fish Health Committee; and reviewed individual farm management plans for the control of ISA. In recent months, the highly contagious ISA virus has been found at several finfish aquaculture facilities in Cobscook Bay. The FHTC's work led to the DMR commissioner developing emergency rules in September 2001 in an attempt to contain the spread of this fatal disease. Controlling ISA is especially critical with the recent federal listing of wild Atlantic salmon as an endangered species. Biosecurity issues must be evaluated and effective plans implemented in order for the salmon aquaculture industry to continue in eastern Maine. Extension is in a position to provide balanced support to this, often contentious, committee and make linkages where applicable to the scientific community.

Another related project is ISA monitoring in wild finfish species. Bartlett is helping National Marine Fisheries Service to sample other species—including herring, winter flounder, and pollack—for the ISA virus. So far, all specimens have tested negatively.

Sea Lice Control

Maine salmon farmers have experienced serious economic hardship due to losses caused by sea lice infestations. Sea lice disfigure fish, making them unappetizing and difficult to market. Maine Sea Grant has collaborated with University of Maine Cooperative Extension and participating fish farmers in establishing an integrated pest management program (IPMP) for the control of sea lice in Maine's salmon aquaculture industry. The program includes a coordinated monitoring

effort for the parasite on cultured salmon and research into assessing, prevention, and treatment methods. Extension associate Chris Bartlett has been an integral part of an FDA Investigational New Animal Drug (INAD) study to evaluate the effectiveness of the drug EXCIS cypermethrin in controlling sea lice infestations.

EXCIS cypermethrin was found to be very effective in treating sea lice in cultured salmon. Farmers now routinely monitor the numbers of this parasite on their stocks to assess prevention and treatment strategies. Since salmon farmers implemented the integrated pest management program, losses due to sea lice have dropped significantly.

Bartlett's activities have included: conducting annual training for nearly 40 participants per session on the safe handling, distribution, and storage of EXCIS cypermethrin; coordinating the distribution, usage, and disposal of EXCIS Cypermethrin with all trained participants and associated company employees; coordinating research to assess the effects of EXCIS cypermethrin use on the marine environment and target species; and coordinating all record keeping in accordance with FDA INAD protocols. Without the support of Bartlett as the controlled distribution point for the therapeutant, this project would not be possible.



Aquaculture Education Panel

In cooperation with the Maine Aquaculture Innovation Center, the Marine Extension Team organized three sessions on aquaculture education at the Northeast Aquaculture Conference and Exposition held in December 2000 in Portland, Maine. Sessions brought together educator panelists, including several involved in the New England Board of Higher Education's Project Aqua, to discuss how aquaculture can be used in the classroom. Workshop participants included Maine teachers, as well as interested industry members. Phyllis Wyeth, owner of the Herring Gut Learning Center, a marine science education facility at the Marshall Point Sea Farm in Port Clyde, Maine, said that the aquaculture education workshop "prompted her to investigate setting up internships at the Center."

FISHERIES

Facilitation and Conflict Resolution

Marine Worm vs. Clam Harvesters

Conflicts between marine worm harvesters and soft-shell clam harvesters have a long history on Maine's intertidal flats. The combined landings of both fisheries produce over \$20 million in income annually to the 3,000 to 4,000 fishermen harvesting these two species. Conflicts

"This agreement could begin much-needed cooperation and improved relations between the two fisheries,"

– Stan Fairservice,
marine worm buyer, Alna.

reduce the productivity of both fisheries, reducing income to harvesters and dealers. Maine Sea Grant and Cooperative Extension staff, working with Maine Department of Marine resources (DMR) and the Maine Soft-shell Clam Advisory Council, initiated and facilitated a meeting last summer of the town shellfish committees and marine worm buyers and harvesters to explore ways to reduce or eliminate the conflicts.

Restrictive legislation, written by Casco Bay regional shellfish committees and strongly opposed by the worm industry, was the subject of the meeting. This legislation would have provoked intense conflict on the flats and in the legislative process. As a result of the meeting, the shellfish committees withdrew the controversial legislation and a written agreement of cooperation between the two fisheries was drafted. The group will meet early in 2002 to evaluate the success of the agreement and decide on further action. "This agreement could begin much-needed cooperation and improved relations between the two fisheries," said Stan Fairservice, a marine worm buyer in Alna, Maine.

Sea Urchin Regulations

In 1993, the Maine sea urchin fishery was second only to lobster in value, with 41 million pounds harvested by nearly 3,000 fishermen. In 1999, landings had declined to 15 million pounds harvested by fewer than 1,600 fishermen. Urchins had dropped to the fourth most valuable fishery in the state. Scientific studies indicate that, without immediate drastic measures, urchin landings will continue to decline in weight and value. To reverse this decline, the DMR commissioner called for a reduction in landings by 25% for the 2001-2002 season. The Sea

Urchin Zone Council (SUZC)—representing harvesters, dealers, processors and scientists—was charged with recommending regulations to accomplish this goal.

“This meeting gives the SUZC useful information to move us forward with a difficult task.”

– Blair Pyne, chairman,
Sea Urchin Zone Council

During several months of heated debate, the SUZC was unable to agree on new regulations. Maine Sea Grant and Cooperative Extension staff, working with DMR and the SUZC, organized and facilitated a full-day meeting of 60 urchin harvesters, dealers, scientists, and regulators who recommended new regulations for this season. Blair Pyne, chairman of the SUZC, said, “This meeting gives the SUZC useful information to move us forward with a difficult task.” Pyne continues, “What we have learned today will help us take action.”

Guided by the regulations, the SUZC decided on a more restrictive season and size limits. These changes in the regulations will hopefully begin a process of sustainable management of the fishery

Lobster Zone Management Process

Lobster is Maine’s most valuable fishery with over 7000 licensed harvesters. Under a new co-management (democratic) program, lobstermen elect representatives to their districts and zone councils, which are tasked with making recommendations on new management regulations. Extension staff members Dana Morse, Sherman Hoyt, and Chris Bartlett, along with extension leader Paul Anderson, are working with Maine Department of Marine Resources to help improve the participation in and effectiveness of the Lobster Zone Management process. Each of the staff members has been assigned two regions along the coast where they help facilitate meetings, assist with administrative duties, and encourage greater participation by the industry. This project helps lobstermen feel their voice is being heard in Augusta on key issues.

In 2001, the extension team helped to promote the election of district representatives. The zone council leaders were surveyed to assess their interest and to obtain their input in developing training materials and/or sessions in the coming months. Marine extension staff members are a critical part of the design and delivery of these materials and sessions to enhance the effectiveness of this process.



Applied Research and Technology

Improving Clam Growout

Compared to the value of its landings, the soft-shell clam industry in Maine has had little research applied to the important problems of settlement, predation, and recruitment. Research done collaboratively with industry has been productive, and the conservation work, which industry members must perform, provides labor for the stock enhancement efforts. Involving industry in research has added to our knowledge of biological issues and reduced the gap between research, industry, management, and the public.



In 2000, a study was initiated in Huston's Cove on the Damariscotta River using a technique known as "tenting" to capture juvenile soft-shell clam seed. Working with members of the local industry, researchers at Maine Maritime Academy, University of Maine at Machias, Department of Marine Resources, the Army Corps of Engineers, and riparian landowners, extension associate Dana

Morse helped install eight clam tents. Analysis revealed a 20- to 30-fold increase in clam settlement, and results have been delivered to stakeholders.

The most positive impacts of this project are the engagement of the local industry, the interest shown in this technique by other clamming groups throughout the state, and the contribution to our scientific understanding of clam recruitment. In addition, this project has yielded positive results in improved relations with riparian landowners around Huston's Cove, and in the general interest the public has shown. Two news articles and a presentation to the clam committee have also been well received. Further presentations to clam committees, academic audiences, and the general public are planned, and a final report will be developed. In addition, the local clam committee has expressed interest in continuing to use their conservation time for applied research.

Sea Urchin Relocation Studies in Cobscook Bay

Green sea urchins are being overfished in Maine, with landings declining steadily since 1994. In an attempt to increase the urchin's value, fishermen in Cobscook Bay moved 65,000 pounds of low quality urchins to potentially more productive areas. Although no studies had been conducted to assess this technique, fishermen were optimistic that the self-imposed management strategy would work. However, for the second round of transplanting 8,000 urchins, fishermen asked for help in scientifically evaluating the productivity of the relocated urchins.

Collaborating with Maine Department of Marine Resources (DMR) and the Cobscook Bay Fishermen's Association, extension associate Chris Bartlett and a research team evaluated the urchins in their new location over a period of several months



for changes in mortality, movement, and weight. Initial findings of the study indicate that over 70% of the urchins perished several weeks after being moved. Although area fishermen were disappointed with the results, they appreciated the collaboration with researchers to evaluate this management strategy and will investigate other measures to manage urchins.

Halibut Studies

Biological information on Atlantic halibut stocks in the Gulf of Maine is needed for future fisheries management decisions. To provide this data, extension associate Chris Bartlett is working with DMR, National Marine Fisheries Service, University of Maine (UMaine), and participating fishermen to collect data on age, maturation, and abundance of halibut caught in state and federal waters along the Maine coast.

Since the program began two years ago, 12 fishermen have been trained to collect samples from their catch and record geographic and environmental information. They were also trained to tag and release small halibut (under 36 inches) for future studies on growth and migration. Some halibut were caught and transferred to the UMaine Center for Cooperative Aquaculture Research (CCAR) for a captive broodstock program.

The information gathered from the program will be used to formulate state rules for the halibut fishery, such as those governing size limit, catch limit, and length of season. The halibut broodstock held at



UMaine CCAR will be used to generate offspring for research in early life history and aquaculture development of the species.

A workshop was conducted at the Maine Fishermen's Forum to disseminate the program's findings and to seek input from interested stakeholders. Articles on the program appeared in *Commercial Fisheries News*, *Working Waterfront*, and *Fishermen's Voice*. In the future, the program will be expanded to train additional fishermen for data collection,

tagging, and transferring live fish to UMaine CCAR.

Building Capacity in Industry Groups

Fishermen Downeast organized the Cobscook Bay Fishermen's Association (CBFA) for the purposes of conservation, enhancement, and sustainable use of the marine resources in Cobscook Bay. However, they lacked the group process skills needed to sustain the effort. Extension associate Chris Bartlett, in collaboration with the Cobscook Bay Resource Center, assisted the newly formed CBFA with gaining these skills.

With Bartlett's help, the Association implemented a set of bylaws, elected board members, and met on a biweekly basis throughout its first year to formulate legislative bills and determine research priorities for area fisheries management.

Bartlett also assisted with clerical duties, created a database to organize membership information, and facilitated the election of officers. In June 2001, the CBFA presented Bartlett with a plaque which stated, "Chris Bartlett- In thanks for your generosity to the CBFA and the natural resources of our waters."

"Chris Bartlett- In thanks for your generosity to the CBFA and the natural resources of our waters."
– Cobscook Bay Fishermen's Association plaque

Bartlett is also a member of the Cobscook Bay Resource Center (CBRC) Board, its executive committee, and fisheries subcommittee and was recently elected chair of the Board. He also helped organize the Cobscook Bay Fishermen's Forum, held at the Marine Technology Center in Eastport in February 2001, that was sponsored by the CBRC and the CBFA.

Research Priority Setting Sessions

In recent years, researchers, fishermen, and management agencies have worked together to collect scientific information to better understand the fisheries in the Gulf of Maine. To date, these efforts have been based on individual ideas and themes, as funding and expertise were available. The various partners in these efforts soon realized that there needed to be a systematic evaluation of the research and information needs to ensure that fisheries management was based on current and accurate scientific data and that research was being applied to the appropriate questions.

In 2000, Maine Sea Grant (MSG) provided \$5000 of development funds for a series of workshops to identify priority research needs for five of the most commercially important harvested species in Maine. Several Marine Extension Team members helped to organize and facilitate the workshops. The project was led by the Maine Department of Marine Resources (DMR) and involved other partners, including the Gulf of Maine Aquarium. DMR published the results of these sessions in *Coastal Fisheries Research Priorities*, which includes sections on lobster, scallop, shrimp, clam, and urchin fisheries. This is the first effort to identify data gaps and compile research and information needs for these fisheries in a format that can be used by the research community and funding agencies to target research funds.

Since its publication in February 2001, the Research Priorities document has been used to develop requests for proposals and helped several researchers in the Northeast successfully obtain funding when it was included as justification in their grant proposals. The MSG research competition for 2001 also used the information from this document to develop priority areas for soliciting proposals. MSG organized a follow-up session at the annual Maine Fishermen's Forum in March 2001, and DMR is planning similar follow-up sessions this fall to formulate RFPs for targeted questions about these five fisheries.

Education (K-12)

MERITS Program

Educators throughout the country recognize that hands-on research programs for high school students and teachers are among the best teaching tools, but opportunities for these experiences in Maine are limited. By partnering with the MERITS (Maine Research Internships for Students and Teachers) program, Maine Sea Grant (MSG) is able

MERITS student interns said they were excited by the opportunity to learn more about marine biology and conduct real-life marine research.

to support summer internships for high school students and teachers through a proven internship program. Since 1992, MERITS has provided training opportunities to 201 students and 61 teachers at 52 business and nonprofit laboratories across Maine. However, every year applicants to the program far exceed the number of available internships.

In the summer of 2001, MSG supported three interns (two high school students and one teacher) through the MERITS program. Each intern learned state-of-the-art molecular biological techniques in marine research areas relevant to the state. Paul Rawson and Katherine Boettcher, University of Maine researchers involved in the program, said they would not be able to fund such experiences without the Sea Grant-MERITS program. The MERITS student interns said they were excited by the opportunity to learn more about marine biology and conduct real-life marine research and, because of the MERITS program, would probably pursue scientific careers.

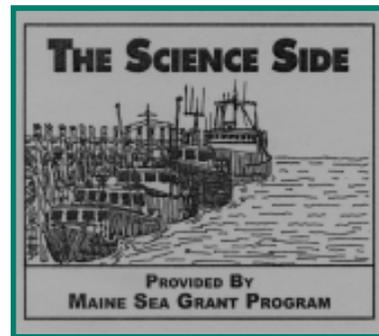


COMMUNICATIONS GETS THE WORD OUT

The primary objective of our communications program is to provide information about and promote Maine Sea Grant by producing materials that demonstrate how Sea Grant has affected the lives of people in coastal communities and had an impact on the state's economy. The second objective is to provide the public with information about marine science and the Gulf of Maine in order to increase their general understanding of ocean and coastal issues. We accomplish both of these objectives by providing information and communications support to the other Sea Grant components—research, extension, education, and management—and by collaborating with organizations in the state who have missions similar to ours, other Sea Grant programs in the region and the nation, and the media.

Targeting Audiences

Following the three theme areas (ecosystem health, fisheries, and aquaculture) that are the focus of our strategic plan for 2001-2004, *Marine Science for Maine People*, communications has developed products in the last year to reach audiences in each of these areas. Working with *Commercial Fisheries News (CFN)*, communications is producing a two-page column, called **The Science Side**, for their monthly newspaper. The newspaper is distributed to 10,000 commercial fishermen, marine industry members, and others throughout the eastern seaboard. We are currently working on our fourth column, and the relationship between Maine Sea Grant and CFN has proven to be mutually beneficial.



To target an audience interested in ecosystem health, we are involved in **The Maine Shore Steward**, a newsletter that is a new collaboration with the Maine Coastal Program, University of Maine Cooperative



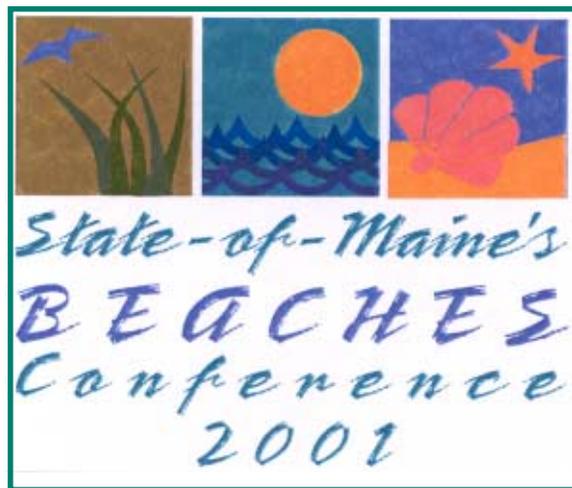
Extension, Maine Department of Marine Resources (DMR), and Maine Department of Environmental Protection. The newsletter supports the coastal monitoring efforts of citizen volunteers and is distributed throughout the state.

For the aquaculture theme area, communications will continue to produce special publications for a smaller, more targeted audience. An example of this is **Marine Aquaculture: A Primer on How the Public Can Participate in the Leasing Process for Marine Aquaculture Farms in Maine**, a booklet we are developing with the Maine State Planning Office, DMR, and the Maine Aquaculture Innovation Center. This publication will be distributed to participants in pre-hearing aquaculture information sessions, municipal officials, environmentalists, and others interested in the aquaculture leasing process.

Supporting the Program

Communications works with our 10-member Marine Extension Team and education coordinator to identify information needs for their constituents and to determine the best delivery mechanisms. Many of our communications projects result from collaborations between researchers and extension staff, and provide the essential link between Sea Grant and stakeholders. For example, last summer our extension associate Kristen

Whiting-Grant, based at the Wells National Estuarine Research Reserve, coordinated the second annual **State-of-Maine's Beaches Conference** that drew over 200 year-round and summer residents. The conference was part of a Sea Grant-funded research project on the *Co-Management of*



Maine's Beaches Through Volunteer Monitoring. Communications wrote and distributed press releases to promote it, designed the logo, produced the promotional brochure and program; designed the conference folder, banner, and T-shirts; and produced signs.

Program management support is another important function of communications. Last year, Natalie Springuel, science publications specialist, developed the **new program web site** for the independent Maine Sea Grant Program. The site (www.seagrants.umaine.edu), which has become an invaluable communications tool, includes our 2001 Project

Directory for research projects, as well as brief articles on the marine extension and education activities that are going on throughout the state. To promote our new web site and to inform the public that our project directory is now available online, we produced a **postcard/magnet** combination that we sent out to 3000 stakeholders in the state. The communications office also produced both the **Maine Sea Grant Strategic and Implementation plans** and the **Executive Summary** in the last year.

Informing the Public

Communications also provides information to a wide range of audiences to promote public understanding of critical marine and coastal issues in Maine, the Gulf of Maine region, and beyond. To do this most effectively, we have formed collaborations with other communications professionals in the University, the state, region, and nation.

Collaborating with the Maine Coastal Program of the State Planning Office and the Wells National Estuarine Research Reserve, we produced last year another series of the **Sea & Shore 90-second radio spots** that are aired during Maine Public Radio's very popular "Morning Edition" program.

We also collaborate with other Sea Grant programs in the region and throughout the national network. As participants in the Northeast Sea Grant regional web site, we recently produced a **postcard/bookmark** for the seven programs to distribute to educators throughout the region.

Communications also works closely with the University's Department of Public Affairs to get information about Sea Grant-supported research, extension, and education activities out to the public. Their science writer Nick Houtman maintains a statewide *MaineSci* list serve that regularly carries, and many times highlights, Maine Sea Grant's activities.

During the past year, communications has sent out 14 press releases and placed articles in several newsletters of organizations with whom we collaborate to reach new audiences and expand coverage of Sea Grant news and events.



Board/Committee Participation (2000-2001)

- Down East Institute (BIRSH) Board of Directors – Chris Bartlett, Paul Anderson
- Maine Fish Health Technical Committee – Chris Bartlett
- Cobscook Bay Resource Center Board of Directors – Chris Bartlett
- Cobscook Bay Fisherman’s Association – Chris Bartlett
- Salmon Industry Fish Health Committee – Chris Bartlett
- Lobster Zone Management Councils – Chris Bartlett, Dana Morse, Sherman Hoyt
- Northeast Regional Aquaculture Center Technical Industry Advisory Committee – Dana Morse
- Northwest Atlantic Marine Alliance – Sherman Hoyt, Dana Morse
- Maine Soft-Shell Clam Advisory Committee – Sherman Hoyt
- Wells Bay Regional Beach Planning Committee – Kristen Whiting-Grant
- Spruce Creek Work Group – Kristen Whiting-Grant
- Wells National Estuarine Research Reserve Education Committee – Kristen Whiting-Grant
- Kids Consortium – Kristen Whiting-Grant
- Nonpoint Education of Municipal Officials Sustainability Committee – Kristen Whiting-Grant
- Gulf of Maine Council on the Marine Environment Habitat Committee – Kristen Whiting-Grant
- Maine Fishermen’s Forum Board of Directors – Paul Anderson
- Gulf of Maine Marine Research Collaborative – Paul Anderson
- Northeast Consortium – Paul Anderson
- Maine Island Trail Association Advisory Committee – Natalie Springuel
- Maine Association of Sea Kayak Guides and Instructors President – Natalie Springuel
- Cove Brook Watershed Council – Susan White
- Cooperators’ Network for the Gulf of Maine – Esperanza Stancioff
- Penobscot Bay Stewards – Esperanza Stancioff, Ron Beard
- Penobscot Bay Network – Esperanza Stancioff, Ron Beard, Paul Anderson
- Northeast Regional Monitoring Collaborative – Esperanza Stancioff
- Scarborough Estuarine Educational Curriculum Board – Sarah Gladu
- Nor’easter (National Ocean Sciences) Bowl Maine Coordinator – Sara Lindsay

Scientific Publications

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- Cowan, D.F., A.R. Solow, and A. Beet, 2001, Patterns in Abundance and Growth of Juvenile Lobster, *Homarus americanus*, *Marine and Freshwater Research* (in press).
- Ellis, S.L. and D.F. Cowan, 2001, Volunteer-Based Monitoring of Intertidal Nursery Grounds of American Lobster, *Homarus americanus*, *Marine and Freshwater Research* (in press).
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- Jackson, J.B., M.X. Kirby, W.H. Berger, K.A. Bjorndal, L.W. Botsford, B.J. Bourque, R. Bradbury, R. Cooke, J.A. Estes, T.P. Hughes, S. Kidwell, C.B. Lange, H.S. Lenihan, J.M. Pandolfi, C.H. Peterson, R.S. Steneck, M.J. Tegner, R. Warner, 2001, Historical Overfishing and the Recent Collapse of Coastal Ecosystems, *Science*, 293: 629-638.
- Rawson, P.D., S. Hayhurst and B. Van Scoyoc, 2001, Species Composition of Blue Mussel Populations in the Northeastern Gulf of Maine, *J. Shellfish Research* (in press).
- Solow, A.R., A. Beet, and D.F. Cowan, 2000, Optimal seasonal sampling for estimating an interannual trend, *Israeli J. Zoology*, 46: 351-354.
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Gontz, A.M., D.F. Belknap and J.T. Kelley, 2001, Evidence for Changes in the Belfast Bay Pockmark Field, Maine, *Geological Society of America Abstracts with Programs* 33: 1, p. A2.

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Gontz, A.M., J.T. Kelley, and D.F. Belknap, 2001, *The Use of Sidescan Sonar, Shallow Seismic Reflection Profiling, and GIS to Assess the Coastal Zone: Examples from Penobscot Bay, Maine*. Coast GIS 2001, Halifax, NS, June 2001.

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Graduate Students/M.S. and Ph.D. Theses

Jill Fegley, *The Effects of Rockweed (Ascophyllum nodosum) Harvesting on the Associated Community*. Ph.D.

Matthew Gordon, *Patterns of Nucleotide and Amino Acid Variation at the Gpi Locus in the Blue Mussel, Mytilus edulis. What Can They Tell Us about the Evolutionary History of this Gene?* M.S.

Susan Hayhurst, *Differential Thermal-Tolerance of Larvae of the Blue Mussels Mytilus edulis and M. trossulus*. M.S.

Heather Heinze, *Shoreline Response of Beaches in Southern Maine to Seasonal Meteorological Events*. M.S.

Theresa Johnson, *Policies for Complex Fisheries Exploration of Ecosystem Models*. M.S.

Development Projects

Sea Grant Staff Projects

1. Lindsay, S. *Northeast Science Bowl – 2001*. \$1,000.
Maine Sea Grant provided staff support, assistance with coordination, and funding for the annual Northeast Science Bowl competition that was organized by the Bigelow Laboratory and held at the University of New England.
2. Lindsay, S. *MERITS Program Support*. \$2,550.
Support was provided for the coordination of this educational program at the University of Maine. Stipends were provided for two students and one teacher for summer internships, in partnership with the Maine Research Internships for Teachers and Students (MERITS) program.
3. Springuel, N. *Maine Coast Seminar*. \$2,000.
Maine Sea Grant was one of several funders that supported this educational conference (held in Bar Harbor, Maine) that focused on sea kayaking safety, ecotourism, and stewardship issues along Maine's coast.
4. White, S. *Northeast Regional Web Site Maintenance*. \$1,162.
Maine Sea Grant, along with other Sea Grant programs in the Northeast, contributed to this annual effort to maintain the regional web site.
5. Whiting-Grant, K. *State-of-Maine's-Beaches Conference*. \$730.
Provided funding for travel expenses for the keynote speaker at this annual conference.
6. Whiting-Grant, K. *Healthy Coasts Undergraduate Intern*. \$1750.
Worked with New England Board of Higher Education to place an undergraduate intern from Maine Maritime Academy in the southern Maine extension office.

Research Projects

1. Barber, B. *Juvenile Oyster Disease Investigations*. \$15,000.
At the end of 2000, there was a significant outbreak of Juvenile Oyster Disease. Funds were provided to cover the costs of sampling and diagnostics as a rapid response to this incident, and as a prelude to subsequent funding of a related research project by these investigators.
2. Chen, Y. *Evaluation of Egg-Per-Recruit Model in Maine*. \$5,292.
Research was conducted to evaluate the utility of the EPR model in managing Maine's lobster fishery.
3. Danner, R. *Multimedia Educational Tools Related to Fish Pathology*. \$2,507.
Funds were provided to the Maine Department of Inland Fisheries and Wildlife to implement new technologies for educating fishing and aquaculture industry members about fisheries pathology.

4. Steneck, R. *Larval Light Traps for Juvenile Lobsters*. \$3,000.
Research was conducted to determine if prototype light traps can capture stage IV postlarval lobsters and to determine if the capture rate corresponds to the observed settlement rate.
5. Wahle, R. *Settlement Index of Lobster Larvae*. \$5,000.
Research was conducted to validate methods for determining the settlement index of juvenile lobsters.
6. Wise, J.P. *Student Internship in Marine Toxicology*. \$1,000.
In partnership with the Marine Biological Laboratory in Bar Harbor, Maine, and Yale University, provided support for an undergraduate student conducting research in Maine during the summer.

Conference Support:

1. Ames, T. *Coastal GeoTools Conference*. \$1,200.
Travel expenses for Ted Ames to present research results in Charleston, South Carolina.
2. Costa-Pierce, B. *Open Ocean Aquaculture IV*. \$5,000.
Maine Sea Grant was one of several co-sponsors for this international conference held in Halifax, Nova Scotia.
3. Devin, M. *National Shellfisheries Association*. \$2,000.
Travel expenses for Mick Devin to present research on sea urchins in Orlando, Florida.
4. Colt, A. *Marine Aquaculture and the Environment*. \$1,000.
Maine Sea Grant helped to sponsor this workshop at the University of Rhode Island for stakeholders in the aquaculture industry.
5. Weinstein, M. *Phragmites Forum*. \$2,000.
Travel expenses were provided to attend this conference on *phragmites* in Vineland, New Jersey.

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