2002

Maine Sea Grant Annual Report 2002

Maine Sea Grant

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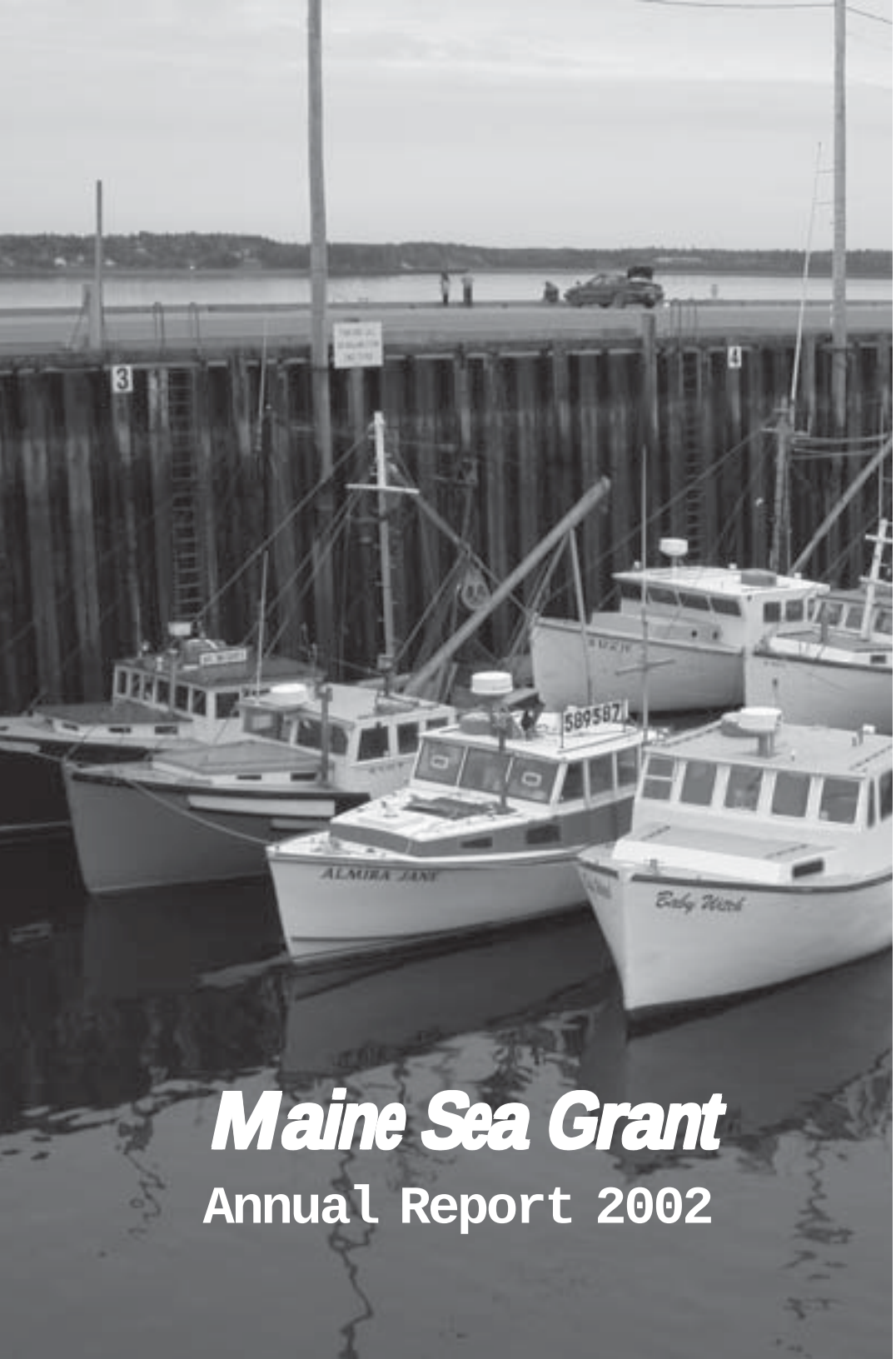
ANNUAL REPORT

2002

Cover Art

Emily Lansingh Muir (American, b. 1904)
The Haul (c. 1950, Oil on canvas, 19 1/4” x 37 1/4”)
Collection of the University of Maine Museum of Art
Photograph by Melville McLean



Maine Sea Grant
Annual Report 2002

This annual report summarizes the accomplishments and activities of the Maine Sea Grant Program from October 1, 2001 to September 30, 2002. We have organized the report by program areas: management, research, extension/education, and communications. The projects and activities in the *Marine Extension Team: Connecting to Coastal Residents* 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 on page five of this report or visit our web site at: www.seagrant.umaine.edu.

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A Message from the Director

Coastal communities throughout the nation face many challenges as we struggle to manage our natural resources, minimize adverse impacts from human behavior, and promote sustainable economic opportunities. As more and more people visit or move to our coasts, pressures on these natural ecosystems are becoming intense. The challenge for a program like Maine Sea Grant is to balance our intention to be strategic with our desire to be responsive to emerging issues. We are in a position to help funnel the tremendous intellectual resources of the University of Maine and other research institutions in the state to address the issues facing our coastal communities, while we also have a continued presence in those communities through the Marine Extension Team and our partnership with Cooperative Extension.

Although we have an important role to play, Maine Sea Grant is only one of many players who are collectively making progress in helping people to understand the challenges we face in our coastal zones. With relatively few resources in Maine, one way to effectively address these challenges is through partnerships with other research institutions; municipal, state and federal agencies; environmental, non-governmental, and industry organizations; coastal communities; and other stakeholders. Maine Sea Grant contributes to these partnerships through our science-based, unbiased outreach and by applying our facilitation skills to help foster productive relationships between organizations that may otherwise have competing interests.

The past year has been a period of transition for Maine Sea Grant with significant changes in program leadership. Ian Davison, former director, accepted a position as research director at the Academy of Natural Sciences' Laboratory on Chesapeake Bay in the fall of 2001. Ian made many important changes to the Maine Sea Grant Program during his tenure and helped to establish Maine Sea Grant as an independent program with a diverse research portfolio. Following a national search, I was appointed as the new director of Maine Sea Grant after being the associate director for over two years and acting as interim director from October 2001 through April 2002. Susan White, assistant director and communications coordinator, spent a six-month sabbatical at the Institute of Marine Biology of Crete in Greece. Despite these challenges, we continue to be a productive program and are eager to participate in the regional and national Sea Grant networks.

This annual report describes many of the accomplishments and outcomes of Maine Sea Grant over the past year in our sponsored research, extension/education, communications, and management programs. We believe the report represents some exciting examples of the great things happening here in Maine that Sea Grant is helping to accomplish. I hope that you will contact me or other staff members and share your comments, criticisms, and new ideas to help us improve our programming and make a difference.

Sincerely,

Paul S. Anderson
Director

"We are in a position to help funnel the tremendous intellectual resources of the University of Maine and other research institutions in the state to address the issues facing our coastal communities, while we also have a continued presence in those communities through the Marine Extension Team ..."

Management
Navigating Through Transition

The management team of Maine Sea Grant consists of the director/ marine extension leader, Paul Anderson, the assistant director and communications coordinator, Susan White, and a vacant assistant director for research position. Lynn Wardwell, fiscal officer, Margaret Rocheleau-Shina, and Jennifer Peters provide program support.

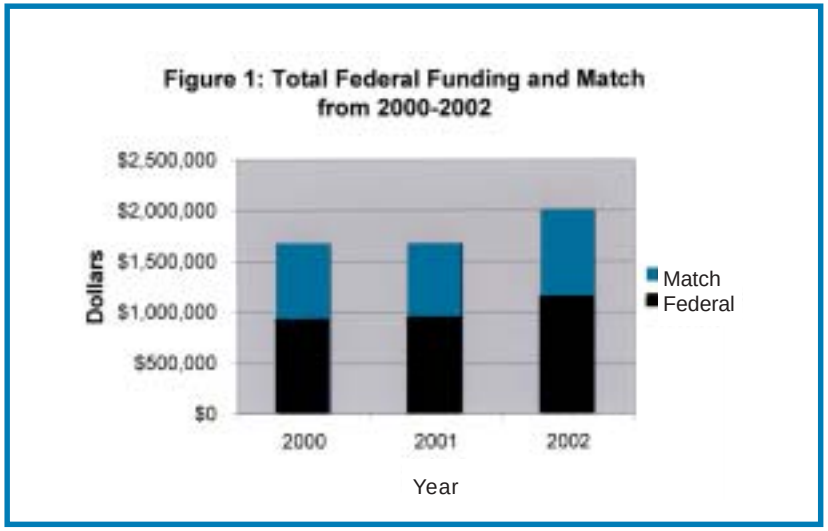
Under it's new leadership, the Maine Sea Grant Program has been re-structured. The director provides overall program management but also will lead the Marine Extension Team. The assistant director, Susan White, will continue to coordinate the communications program and a new assistant director for research will be hired in the next few months to manage the annual research competition and other related duties. These three positions will constitute the Maine Sea Grant management team.

Since October 2000, when the joint Maine/ New Hampshire Sea Grant program was dissolved, Maine Sea Grant has been an independent program with institutional status. We expect to achieve college status in the coming year.

The program has been building a database over the past few years that 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 has greatly facilitated the preparation of this annual report. A GIS component has been constructed for the database and, in the near future, portions of these two systems will be made available to the public via our web site.

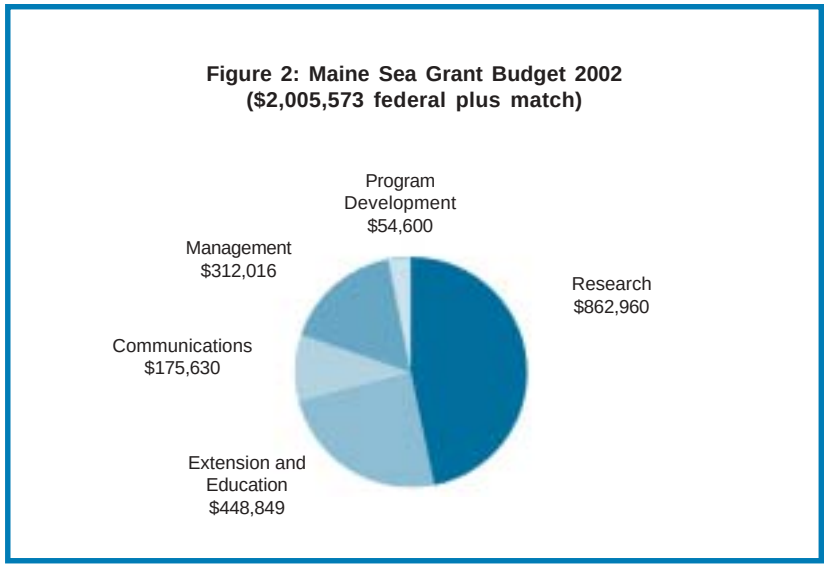
Budget Analysis

Maine Sea Grant continues to comply with the National Sea Grant Office guidance suggesting that at least 50% of the programs federal base funds plus merit funds ($955,000) be allocated to competitive proposals in research and education. Figure 2 shows the Maine Sea Grant budget for 2002, indicating how the federal funds and matching funds were spent on various program elements. As indicated in the graphic, $862,960 of these funds supported competitive research projects in 2001-2002. The balance of the program budget covered extension/education ($448,849), communications ($175,630), management ($312,016), and program development ($54,600).



Overall Funding

The overall funding for Maine Sea Grant in 2001-2002 was $2,005,573 with $1,156,516 in federal funds and $849,057 in non-federal matching funds (Fig.1). The federal award includes base ($855,000), merit ($100,000), Coastal Community Development ($50,000), National Strategic Initiatives ($91,616) and NOAA ship time ($59,900). Matching funds are derived from a combination of University of Maine resources, including the Maine Economic Improvement Fund and other University sources.



Maine Sea Grant Policy Advisory Committee

The Maine Sea Grant Policy Advisory Committee (PAC) membership is listed in the back of this report. The PAC meets three times per year and provides programmatic advice to the management team and helps develop policy, strategic planning documents, and program evaluation mechanisms. Currently, the PAC includes 29 members, representing research institutions, state agencies, non-governmental organizations, industry groups, and community-based organizations. In the past year, this group participated in the Performance Assessment Team review of the program, established priorities for the annual research competition, and helped amend the program's implementation plan for 2003-2005.

Dean John A. Knauss Marine Policy Fellowship Program

Maine Sea Grant was again successful in placing a fellow for the 2003 class of the National Sea Grant Knauss Fellowship program. Amanda Leland, a pending graduate of the University of Maine's School of Marine Sciences (M.S., Marine Biology), was awarded a legislative appointment for 2003. At the time of this report, final assignments have not yet been made. These fellowships provide the entire country with extremely qualified young people to work in many different capacities related to coastal issues.

University of Maine Research Council

The University of Maine has recently established a research council led by the vice president for academic affairs (provost). This group includes all of the college deans, research center directors, and other key University representatives. Maine Sea Grant is represented on this council and anticipates this will be an excellent way to interact closely with the various research programs on campus and to gain a more complete understanding of the assets that the University can bring to bear on coastal issues for Maine. Indeed, there will be an increasing need in the future for multidisciplinary approaches to scientific investigations. Maine Sea Grant, through participation on the research council, will be poised and ready to respond to these opportunities.

Maine Oil Spill Advisory Committee (MOSAC)

In 2002, Maine Sea Grant administered a research fund for the Maine Oil Spill Advisory Committee (MOSAC), arranged in a memorandum of understanding between the Maine Department of Environmental Protection and the University of Maine. The competition resulted in approximately $122,000 in awards to researchers who responded to the MOSAC RFP. Awards went to: Pamela Morgan at the University of New England for *Ecological Functions and Values of Fringing Salt Marshes Susceptible to Oil Spills in Casco Bay, Maine* ($52,000); and Yong Chen at the University of Maine for his project on *Spatial Dynamics of the Lobster Fishery and Oil Spills in the Gulf of Maine: A Risk Analysis of Oil Spills on the Lobster Fishery* ($70,000). Maine Sea Grant receives a modest administrative fee for providing this service. This arrangement is likely to continue for at least three years, and the anticipated pool of funds for the 2003 competition is $178,000.

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RESEARCH
Addressing Coastal Issues

Maine Sea Grant provides funding for research projects that have relevance to the needs of Maine's coastal communities and stakeholders. Research projects typically fall within the three Maine Sea Grant strategic plan themes of ecosystem health, aquaculture, and fisheries. A list of research projects that received funding during 2001-2002 is included at the end of this section. A selection of recently funded research projects that have resulted in significant contributions to coastal communities and stakeholders are described in detail on the following pages. Impacts from Sea Grant-funded research vary considerably, depending on the nature of the problem being addressed. The examples given have provided support to the manufacturing industries, the regulatory process for state and federal governments, and coastal municipalities and landowners participating in the development of more effective resource management strategies.

Case Studies in Co-Management of Marine Fisheries: $238,184 (1997-2001)

In fisheries management, there is increasing interest in co-management in which control over resources is distributed among industry, government, and local communities. Unfortunately, there is very little information on fisheries where co-management has been tried. In 1997, Jim Acheson and his research team were awarded a four-year grant to evaluate the efficacy of the recently enacted lobster zone management process in the state of Maine and to assess the impact of co-management strategies on fisheries management around the world. The findings of this study, along with those of other related studies by Acheson, are being presented in a book, entitled *Capturing the Commons: Devising Institutions to Manage the Maine Lobster Industry*, being published by the University Press of New England and due out in early 2003.

The research involved assessing co-management strategies in Japan, Norway, Iceland, New Zealand and other countries. Although Japan has utilized these types of management strategies for more than 1000 years, they are relatively new to the other countries studied. In general, Acheson found that these strategies can achieve an effective framework for controlling access to the fisheries, thereby allowing sustainable harvest levels to be attained with or without traditional stock assessment methods. In Maine, Acheson found that the lobster industry is very unique in its willingness to develop and adopt harvest regulations that have resulted in healthy lobster stocks, despite the warnings of traditional stock assessment studies indicating the fishery is in jeopardy. Maine's lobster industry has devised rules to voluntarily constrain itself for many years with harvest restrictions on gear, size limits, and trap limits.

The lobster industry represents the most valuable fishery in Maine and Maine Sea Grant has invested heavily in scientific studies to better understand the life history and sustainability of this heavily harvested species. While earlier Sea Grant-funded studies helped lead to the adoption of the Lobster Zone Management process in Maine, this study has provided a further opportunity to assess the effectiveness of the process. From Acheson's investigation, it seems that Maine is utilizing the best possible means of managing the lobster fishery for sustainability and, by including industry members in the process, has provided for more effective management.

Influence of Rockweed Harvesting on the Habitat Value, Biodiversity, and Reproduction of Intertidal Communities: $87,720 (1997-1999)

Until very recently, the seaweed harvesting industry in Maine was largely unregulated. In 1997, Maine Sea Grant awarded a grant to Bob Vadas to study the impacts of rockweed harvesting on the intertidal ecosystem. Clearly, the seaweed population in the intertidal zone provides important habitat for many marine organisms. Information from this study was used to develop new regulations on harvesting activity intended to prevent severe losses of critical habitat.

The principal focus of this research was to increase our knowledge of the effects of harvest practices on the habitat value and reproduction of rockweed, *Ascophyllum nodosum*. Such information is necessary to be able to understand and predict the potential impacts that different cutting heights may have on species associated with the seaweed. This study also provided information to help determine the direct effect of harvesting on the seaweed's ability to reseed itself under different harvesting conditions. Intense harvesting potentially reduces the refuge and buffering capacity that a full canopy provides. This study, along with a supplemental study by a graduate student, Jill Fegley, provided scientific information to the Maine Department of Marine Resources (DMR) for developing regulations controlling the harvest of rockweed and other seaweeds in Maine.

These results have been shared with a number of relevant user groups besides the DMR, including the Maine Seaweed Council, industry groups, and conservation organizations. The new seaweed harvest regulations, put into effect in 2000, have established limits on how much of the rockweed can be harvested so that sufficient plant material remains with the holdfast to ensure the seaweed's regeneration and growth. The regulations also provide a framework for reporting requirements that will allow the DMR to track harvest activity.

In addition, there has been considerable interest shown by the scientific and regulatory communities of maritime Canada, where there has long been a seaweed industry. The project supported the Ph.D. research for Fegley who is now an assistant professor at Maine Maritime Academy in Castine, Maine.

Repair of Wood Piles with Fiber-reinforced Composites: $110,577 (2000-2001)

Shipworms have been a scourge of wooden ships and piers for centuries but, until recently, they were unknown in Maine's cold coastal waters. In the past few years, shipworms have caused millions of dollars in damages to harbor structures and aquaculture facilities in Maine. A recent research project funded by Maine Sea Grant has shown that engineered wood composites can be used to protect these structures from shipworm damage.

Roberto Lopez-Anido, assistant professor in the University of Maine's Department of Civil and Environmental Engineering and a member of the Advanced Engineered Wood Composites Center (AEWC), recently completed a research project to develop new composites technology that may protect piers in coastal waters from shipworm attack. The two-year award from Maine Sea Grant, along with participation from a Maine composites manufacturing company, the Kenway Corporation of Augusta, Maine, provided an opportunity for AEWC to combine research and development phases of this project, which resulted in deploying these new technologies in several locations around the state of Maine.

The research resulted in the development of a wood composite shield, reinforced with fiberglass fabric in a polymer that is durable in the marine environment. The material, known as an FRP (fiber-reinforced polymer) Shield strengthens wood piles and protects them from marine

borers, such as shipworms. The company and the University of Maine have a patent pending on this material and the manufacturing process. Also, the AEWC has developed a set of Material, Fabrication, and Installation Specifications to transfer the technology to fabricators and contractors. At the time of this report, two companies in Maine are interested in commercializing this technology.

Co-Management of Maine's Beaches Through Volunteer Beach Profiling and Annual Meetings: $60,000 (1999-2001)

Maine's major tourist attractions, its sandy beaches, are eroding in many places, with many private and public resources at risk from storms. The state does not allow new engineering armor on the beaches and requires removal of damaged property, leaving beach replenishment or house relocation as the only options for property that is at risk. Heretofore, there has been a "top-down" management of the coast, which has resulted in numerous court challenges to existing laws from property owners. In 1999, geology Professor Joe Kelley and a research team were awarded a two-year grant to develop and deploy methods for evaluating profiles of sandy beaches in Maine using volunteers. This project has been very successful at fostering collaborative interactions among coastal towns/local citizens and scientists/

government regulators. With the help of Sea Grant Extension Associate Kristen Whiting-Grant, volunteers have been trained to make monthly topographic profiles of 16 of Maine's most important beaches.

The profile data, combined with current meters deployed nearby, have provided the information needed to track changes in elevation and to assess the loss of beach replenishment efforts. The town of Wells has been able to use this data to understand the cost/benefits of dredging their harbor and the concurrent replenishment of the nearby beach with the dredge materials. This is the first opportunity for coastal communities and resource management agencies to have a time-series of observations to better track these costly projects. In nearby Camp Ellis, it has been found that one or two storms can result in the removal of up to 30% of the sand on a beach in a matter of hours. The U.S. Army Corp of Engineers is about to initiate a $5 million project in this area. The network of volunteers, along with the researchers, stand ready to help monitor the nearby beaches.

This research project has led to the annual State-of-Maine's-Beaches conference, which is organized by a collaborative steering committee including members from the local communities, state agencies, and the University of Maine. The meeting has been highly successful in providing a place where volunteers and scientists can present and discuss the data, as well as current beach-management issues.

MAINE SEA GRANT RESEARCH PROJECTS - 2002

Ecosystem Health

Cowan, D., J. Sowles, and M.Tlusty, *Environmental Impacts of Lobster Pounds: Monitoring Impacts, Modeling Holding Capacity, and Assessing Policy*. $29,374.

Dionne, M. and R. MacKenzie, *Ecological Processes, Energy Pathways, and Impacts of Human Activities on Maine Marsh-estuarine Secondary Production: A Salt Marsh Panne Model*. $44,284.

Aquaculture

Boettcher, K. and B. Barber, *Development of Immunological and PCR-based Assays to Detect the Bacterium Associated with Juvenile Oyster Disease*. $40,000.

Millard, P., C. Kim, J Vetelino, and C. Pierce, *A Biosensor Platform for Fish Pathogens*. $70,000.

Fisheries

Chen, Y. and C. Wilson, *Developing a Bayesian Stock Assessment Framework for the American Lobster*. $70,000.

Duff, J., *Seaweed Harvesting in Maine: Evolving Laws to Meet the Needs of an Evolving Industry*. $10,490.

Incze, L., G. Lough and H. Xue, *Vertical Distribution of Larval Lobsters and Other Plankton: Effects on Along-shelf and Shoreward Transport in a Coastal Current System*. $76,581.

Townsend, R., *Assessment of Municipal Clam Management in Casco Bay*. $16,801.

Van Beneden, R. and S. Lindsay, *Assessing Potential Population-level Effects of Pesticide and Herbicide Toxicity in Maine Soft-shell Clams in Maine*. $52,000.

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*. $70,000.

Total: $479,530

MARINE EXTENSION TEAM

Connecting to Maine's Coastal Residents

Extension Developments in 2002

In the past year, there have been many new developments with the Marine Extension Team (MET). The entire Sea Grant network has responded admirably and collaboratively to meet the stipulations in the congressional appropriations bill last year that required Sea Grant to initiate new programs in fisheries extension, without providing funding for these activities. Maine Sea Grant was able to re-program personnel funds as directed and was successful, along with other programs in the Northeast, in competing for funds to enhance fisheries extension activities. Many of these activities are just beginning and will be discussed in next year's annual report. Other exciting opportunities for the Marine Extension Team include participation in the enhanced Nonpoint (source pollution) Education for Municipal Officials (NEMO) Program in Maine; involvement in the swim beach monitoring program, funded by a significant grant from the U.S. Environmental Protection Agency; and co-sponsorship of the Gulf of Maine Expedition.

ECOSYSTEM HEALTH

Maine Shore Stewards Involves Many Programs

Maine Shore Stewards is a collaboration of the Maine Coastal Program, state departments of Marine Resources (DMR) and Environmental Protection (DEP), University of Maine Cooperative Extension (UMCE), and Maine Sea Grant that supports the monitoring efforts of citizen volunteers. The goal of Maine Shore Stewards is to educate citizens about their marine resources and coastal ecosystems and to train them to collect data to be used by management agencies and their own communities. Marine Extension Team members Esperanza Stancioff, Sarah Gladu, and Kristen Whiting-Grant are playing pivotal roles in facilitating and strengthening these programs.

Water Quality

While Maine's coastal watersheds are too expansive for state agencies to monitor all water bodies and provide education at a community level, this *can* be accomplished through local citizen efforts. In 2002, a dozen coastal watershed groups received a total of $125,000 from the Shore Stewards grants program, administered by the Maine Coastal Program, for water quality education, monitoring, and pollution control projects. One of these community-based projects is the Great Works River Watershed Coalition, a citizen water quality monitoring group in southern York County. Marine Extension Team members Esperanza Stancioff and Sarah Gladu have been actively involved with this group since 1999. So far, the group has collected data used by Maine's Department of Inland Fisheries and Wildlife to decide whether stocking fish will be feasible in a specific area, by Trout Unlimited to determine recommended fishing areas, and by DEP to test the Great Works River since sewage treatment plants discharge their effluent into the river at various times during the year.

Another project is the Mount Desert Island Water Quality Coalition (MDIWQC), one of the most active monitoring groups in the state that engages citizens of all ages in preserving and improving the water quality of

the island through environmental research and community education. Marine Extension Team members Esperanza Stancioff, Sarah Gladu, and Ron Beard have been intimately involved with the evolution of this organization. According to Jane Disney, executive director of MDIWQC, "Esperanza was instrumental in establishing the Shore Stewards Partners in Monitoring Program and from that the MDI Water Quality Coalition was born." With Stancioff's support in the past year, MDIWQC has expanded its membership; established an Institute of Environmental Studies; facilitated water monitoring in public schools, including storm drain stenciling and stream studies; and completed a municipal watershed survey in Bar Harbor involving 226 properties. Under Gladu's leadership, the coalition also actively participates in the toxic phytoplankton monitoring program. MDIWQC was the first volunteer citizen group in Maine to not only monitor swim beaches, two years before the official Coastal Swim Beach Monitoring Program began, but also to survey beach users, a tool now used by others involved in monitoring coastal swim beaches.

Through presentations and training sessions, organizational development workshops, and other supporting roles, MET staff members have worked with the Coalition over the past 10 years to develop their program in community science and meet organizational challenges. The MDI Water Quality Coalition serves as a model for other communities in building collaboration between students, teachers, and community volunteers to solve environmental problems.

Maine Phytoplankton Monitoring Program

Blooms of algae that carry harmful toxins can threaten human health when the toxins accumulate in shellfish. Harmful algal blooms, or HABs, can also affect fish health, and farmed fish are particularly vulnerable. A collaborative project of UMCE, Sea Grant, DMR, Bigelow Laboratory for Ocean Sciences, and the U.S. Food and Drug Administration, the Maine Phytoplankton Monitoring Program is a citizen volunteer effort that provides a first-alert system to the DMR biotoxin monitoring program. This past year, the program received funding from UMCE to partner with the University of Maine's School of Marine Sciences (SMS) to enhance the capacity of the Maine Phytoplankton Monitoring Program. With this funding, MET member Sarah Gladu is developing a quality assurance project plan and producing a field guide to Maine's common marine phytoplankton to help volunteers better identify these organisms and to ensure they collect high quality data.

Under this expanded monitoring program, fish and shellfish aquaculturists will also be trained to monitor marine phytoplankton, and the site-specific, real-time data they collect will be used to develop crop management strategies. Aquaculturists who manage mussel rafts will simultaneously gather mussel larvae samples for a University of Maine research project. These new partnerships with aquaculturists and SMS will help determine if there is a common mechanism affecting the movement of mussel larvae and phytoplankton at a pilot site.

Coastal Swim Beach Program

Thousands of people visit Maine's beaches and swim in coastal waters each year. Few of these visitors consider how the quality of the water they swim and play in may affect their health, or how their behavior can affect their own health or that of others. A new initiative, called the Coastal Swim Beach Monitoring Program, hopes to change that by enlisting volunteers to help monitor for waterborne bacteria that cause illnesses and by educating the public about preventing the spread of Recreational Water Illnesses (RWIs).

With nearly $317,000 in funding from the U.S. Environmental Protection Agency, the Coastal Swim Beach Monitoring Program was created as a joint effort of the Maine State Planning Office, UMCE, Sea Grant, the Maine Department of Human Services, DEP, Department of Conservation, DMR, MDI Water Quality Coalition, Maine Surfrider, and several municipalities.

MET members Esperanza Stancioff and Sarah Gladu are leading efforts to organize citizen groups to monitor the swim beaches in their towns. They have made presentations to town boards, state park staff, and volunteers and then provided training on the beach and in the water on how

to gather water samples for bacteria (enterococci) analysis, store them, and transport them to the lab. With five communities now participating, the program will eventually be expanded to include all coastal swim beaches where visitor numbers and local conditions warrant a testing program; and those beaches located where towns, watershed groups, or others are interested in participating. In the first phase of this two-year project, MET staff members have surveyed beach users and municipal officials in order to develop the most appropriate training methods and educational materials.

Beach Profile Monitoring Program

For over three years, teams of volunteers have been measuring the erosion and accretion of sand on southern Maine beaches as part of the Beach Profile Monitoring Project. The data the volunteers gather is being used to create a long-term picture of coastal processes on our sandy beaches, and will help determine management actions on beaches where chronic erosion threatens critical wildlife habitat and public and private property. The Beach Profile Monitoring Project is a collaboration of Maine Sea Grant, UMCE, the Maine Coastal Program, and Maine Geological Survey (MGS).

Since the program began, Extension Associate Kristen Whiting-Grant has trained teams of over 150 volunteers who monitor 16 beaches between Georgetown and York, Maine. Nearly 90% of the volunteers who began monitoring beaches in the summer of 1999 are still involved with the program. Data management has always been a critical component of the beach profiling project. Sea Grant funded a short- term work study student to enter backlogged data, and MGS analyzed and interpreted some of this data for a presentation at the third annual State-of-Maine's Beaches Conference held in July 2002. A grant from the Kendall Foundation created six graduate fellowships at the University of Maine, one of which has been designated for the beach profiling program. The recipient of the fellowship will begin to help manage beach profiling data in January 2003. The data generated by the profiling program is being widely used to enhance beach planning efforts. MGS Marine Geologist Steve Dickson has used the data to determine the results of a 2000 harbor dredge and beach nourishment project in Wells. Dickson has also used the beach profiling data when reviewing DEP permits for activities in coastal sand dunes. Finally, the first state beach nourishment policy being developed by MGS is also relying on data from this project.

The 2002 State-of-Maine's Beaches Conference

The Third annual State-of-Maine's Beaches Conference, held on July 15, 2002 at Thornton Academy in Saco, Maine, has become a model for similar events elsewhere in the country. The First Annual Northeast Beaches Conference, held in Massachusetts in October 2002, was based largely on Maine's event. The State-of-Maine's Beaches Conference continues to be well reviewed by its participants. Of the nearly 180 participants who attended this year, 60% returned their evaluations. Over 95% of those completing evaluations indicated that they would attend the event again in the future; 86% said that their knowledge of coastal processes of Maine's sandy beaches increased due to participation in the event; and more than 97% recommended that beach profile monitoring efforts continue. The event was also successful at reaching its main target audience; more than 45% of those completing evaluations identified themselves as coastal property owners.

Dune Grass Die-out Study

American beach grass (*Ammophila breviligulata*) thrives in sandy habitats and, with its dense root structure, forms and stabilizes sand dunes. Before shoreland zoning laws were implemented in the 1970s, town efforts to enhance beaches for property owners and beachgoers led to the removal of dunes and associated vegetation. Over the past 30 years, beach grass has been replanted to restore those areas where significant erosion was occurring. Several years ago, landowners noticed that the dune grass was dying, and Marine Extension Team member Kristen Whiting-Grant initiated a research project with University of Maine plant pathologist Dave Lambert to find out why this was occurring.

After beach grass planting was completed at six sites in April 2001, areas were monitored during that summer. Preliminary data indicated that at five of the six sites there had been an 80 % survival rate of the replanted grass and that at the remaining site, the survival rate appeared to be only about 10 %. This site was replanted in April 2002 and was monitored during the growing season. Preliminary findings suggest that die-out is most likely in plants under stress (lack of water) in areas where there is little root regeneration. The pattern of die-out suggests that one or more pathogens are involved, which interact with these stress factors. Lambert and Whiting-Grant presented these findings at the Third Annual State-of-Maine's- Beaches Conference, and they soon will be made available to the public as a draft publication.

Microbial Source Tracking Project

Unidentified sources of contamination from fecal coliform bacteria in southern Maine estuaries pose a threat to public health and to the economies of coastal communities. Bathers at the beaches adjacent to these estuaries may become ill after swimming in contaminated waters. Also, productive acres of clam flats may be closed to harvesting due to contaminated clams. The threat of beach closings may impact the local tourist economy and the reduction of clam harvesting affects the shellfish industry in coastal communities.

To address this issue in the Webhannet and Little River watersheds, Maine Sea Grant has partnered with the Wells National Estuarine Research Reserve, the Jackson Estuarine Lab at the University of New Hampshire, University of Southern Maine, and the Maine Conservation Corps/ AmeriCorps Program. This collaboration received a two-year grant of over $143,000 from the Cooperative Institute for Coastal and Estuarine Environmental Technology to conduct water quality and microbial source tracking (MST) analyses in an attempt to identify the mammalian and/or avian (bird) hosts of the bacteria, develop remediation plans, and reduce contamination levels. At the end of the project's first year, Extension Associate Whiting-Grant has helped to train 24 volunteers who have collected field samples and/or assisted with lab procedures, providing scientists with the material needed to conduct MST analyses. With Whiting-Grant's assistance, a project web site has been developed, presentations have been made at conferences, and community group informational meetings have been held. The project also was covered in a feature article in the *Portland Press Herald*, Maine's largest newspaper.

Coastal Community Development Program

In 2002, Maine Sea Grant launched its Coastal Community Development (CCD) Program through targeted funding from the National Sea Grant Office (NSGO). Recognizing that many coastal communities lack the resources, tools, and science-based information to adequately address marine-related issues, NSGO provided funding to state programs so they could assist coastal communities in their efforts to protect environmental amenities, strengthen local economies, and improve quality of life.

The goal of Maine Sea Grant's CCD Program is to provide Maine's coastal communities with locally relevant science-based information, technical assistance, and educational materials that can be used for decision-making related to coastal and marine ecosystems. The CCD program encompasses three projects—the Gulf of Maine Expedition, the Ecosystem Assessment Project, and the NEMO (Nonpoint Education for Municipal Officials) Program—which, combined, address topics ranging from low-impact tourism, water safety, and sustainable land-use practices, to community-based marine management.

Gulf of Maine Expedition

The Gulf of Maine Expedition (GOMEX) was a five-month sea-kayaking journey (May to September 2002) organized to raise awareness about the ecology and cultural legacy of the Gulf of Maine and to promote low-impact, coastal recreational practices, boating safety, and stewardship principles. Marine Extension Associate Natalie Springuel led the expedition, which covered more than 1,000 miles from the tip of Cape Cod, Massachusetts, to Cape Sable Island, Nova Scotia. The Gulf of Maine Council on the Marine Environment, the Maine Coastal Program, and the New England Biolabs Foundation (Boston) sponsored the expedition and many nonprofit organizations, outdoor businesses, and volunteers throughout the Gulf of Maine provided additional support. Over the course of the expedition, the GOMEX team stopped in over 20 communities, meeting with local residents and leading workshops on topics such as kayaking safety and navigation, coastal ecology, and water quality/ phytoplankton monitoring. Photographs, recorded observations, scientific data, and journal entries were compiled in expedition reports. The expedition web site (www.gomexpedition.org) tracked the team's progress and the journey was recorded on video. The knowledge Springuel gained on the expedition will be invaluable as she continues her work back on land on recreation, ecotourism, and coastal access issues.

The Ecosystem Assessment Project

This new project aims to engage citizens and municipalities in the study and management of their local bays and estuaries and to provide the resources and training needed for developing comprehensive plans and protecting bays. As the coordinator of the Ecosystem Assessment Project, Marine Extension Associate Tracy Hart has launched a pilot program in Taunton Bay. Hart is working within this pilot area to develop a template for community-based groups throughout the coast of Maine to participate in inventorying the natural and human resources of nearshore estuaries. Baseline data collected in the process will be used by communities and state agencies to track changes to the health of local coastal ecosystems and to identify research gaps, problem hotspots, and priority issues for monitoring and regulation.

In the fall of 2002, Hart conducted the first community survey in Taunton Bay. Survey data will indicate the issues of greatest concern to local residents and will be used to develop targeted training workshops and resources to enhance information transfer and partnerships between the scientific community and local citizens. In bringing scientific research and information to bear on local questions, Maine Sea Grant hopes to encourage science-based decision-making at the local level.

Nonpoint (Source Pollution) Education for Municipal Officials (NEMO) Program

MET members Sarah Gladu, Esperanza Stancioff, and Tracy Hart received training in the NEMO Program the summer of 2002. NEMO focuses on providing municipal officials with the training and resources they need to make local planning and resource-use decisions, which minimize impacts of land-based activities on the marine environment. Gladu serves as a presenter of this program in midcoast Maine where she provides workshops for coastal municipal officials.

AQUACULTURE

Aquaculture Informational Meetings Encourage Community Discussions

With an increasing number of aquaculture facilities being proposed along the Maine coast, it is critical that the public receive unbiased and accurate information about aquaculture activities. To that end, University of Maine Cooperative Extension and Sea Grant have organized informational sessions in the communities where aquaculture facilities are proposed. Extension Associate Dana Morse coordinates the informational programs with other MET members serving as technical specialists and facilitators as needed. The 12 sessions held so far, including five last year, have provided a much-needed dialogue between regulators, aquaculturists, and other marine stakeholders in coastal communities. Over 140 people have attended the meetings held in five communities. The meetings have helped to improve relationships among applicants, DMR, environmental non-profit organizations, and citizens in general. Most of the feedback received from attendees to date has been very positive.

Shellfish Aquaculture Seminars Bring New Perspectives

Marine Extension Team member Dana Morse has coordinated a shellfish aquaculture seminar series at the Darling Marine Center for the past two years. Rick Karney, the founder of the Martha's Vineyard Shellfish Group, was the most recent seminar presenter who spoke to a group of Maine shellfish growers and hatchery operators in late March. Karney's talk covered aspects of shellfish hatchery operations, and of grow-out stages that are unfamiliar in Maine. As a result of the talk, shellfish hatcheries in this region began experimenting with a new technique in setting shellfish larvae, and several shellfish growers organized a trip to Cape Cod and the outer islands, specifically to view other culture operations. Morse was instrumental in helping to build these invaluable connections between Maine growers and others in the industry.

Oyster Breeding Program Expands

For the past two years, researchers, managers, and oyster industry companies have been working together to study the causes of Juvenile Oyster Mortality (JOM) disease, develop a breeding program for faster growing and disease-resistant oysters, and disseminate information to growers. Morse played an integral role in bringing these interests together to reduce the occurrence of JOM in Maine and to help secure grant funding to support the oyster breeding program. He also obtained a lease at the Darling Marine Center (DMC) to support ongoing research projects. Based on this, the University of Maine and the oyster industry provided funds to hire a new hatchery technician at the DMC, which will greatly enhance the University's capability in shellfish aquaculture research.

Farmed Fish Health Workshop Celebrates Tenth Anniversary

Last April, the tenth Annual New England Farmed Fish Health Management Workshop brought over 160 people together to explore innovative techniques and management strategies for salmon aquaculture operations in Maine. Held at Washington County Technical College in Eastport, the conference included a discussion of factors affecting the success of Infectious Salmon Anemia (ISA) control. ISA has recently plagued Maine salmon farms, resulting in removal of all fish and gear at farms in Cobscook Bay. The Maine Aquaculture Association presented Marine Extension Team member Mike Opitz, veterinarian and workshop founder, with a plaque commemorating 10 years of dedication to the needs of Maine's salmon farming industry. Extension Associate Chris Bartlett served on the organizational committee, coordinated a session on ISA, and served as facilities manager during the workshop.

Aquaculture Education Sessions Draw Diverse Groups

This past summer, Extension Associate Dana Morse hosted an intern, Clark University student Molly Letsch, through the New England Board of Higher Education. Under Morse's supervision, Letsch arranged 12 educational sessions at the Darling Marine Center (DMC) on shellfish aquaculture for municipal officials, legislators and candidates, harbormasters, environmental groups, and local citizens. The sessions attracted about 120 participants who were introduced to the aquaculture research program at the DMC and got involved in hands-on activities related to oyster aquaculture. Morse also facilitated visits by two local political candidates who visited the DMC to gain a better understanding of the state's aquaculture industry and the issues it faces.

Fish Health Technical Committee Tackles ISA

The eight-member Maine Fish Health Technical Committee evaluates the scientific merit of fish health-related information used by the commissioners of Maine departments of Marine Resources and Inland Fish and Wildlife to make public policy. As a committee member, Marine Extension Associate Chris Bartlett contributed his expertise on issues such as ISA, the presence of which has dramatically impacted salmon aquaculture operations in Maine this past year. Bartlett worked with the committee to make recommendations to mitigate the impact of ISA on Maine's domestic and wild salmon stocks.

FISHERIES

Atlantic Halibut Research Links to Management

Future management decisions on Atlantic halibut can only be successful if based on sound biological information. As part of a federal experimental halibut fishery, Marine Extension Associate Chris Bartlett has worked with the Maine Department of Marine Resources (DMR), the National Marine Fisheries Service, and participating fishermen to collect data on age, maturation, and abundance of halibut caught in the downeast waters of Maine. Fishermen are trained to tag and release sub-legal halibut and record information from their fishing efforts. The program is being expanded to train additional fishermen and an annual workshop on the program's accomplishments will be held at the 2003 Maine Fishermen's Forum.

Following from political pressures and the federal program's success, DMR implemented new regulations for the state halibut fishery. Fishermen now must receive a license endorsement for halibut fishing that requires training in data collection and tagging of sub-legal fish. The data collection tools and methods for this program were a direct outgrowth of those that Bartlett helped to develop for the federal experimental fishery. Bartlett coordinated eight training sessions for 12 fishermen during the months of April and May. As part of this training, he distributed halibut tags for the marking and release of sub-legal fish. With the addition of the state program, participation has grown to over 100 fishermen, 70 of which are from Washington County.

Tagged fish from the federal fishery program are beginning to turn up, offering information on migration patterns and growth rates. Maine Sea Grant was instrumental in this initial tagging work by contracting with instructors on tagging methods and providing funds for supplies.

MET is Conduit for Halibut Stocks Information

Extension Associate Chris Bartlett has played an instrumental role in the exchange of information on Maine halibut stocks and the stock assessment program. In February, Bartlett met with scientists from DMR and from the Marine Fish Division of the Bedford Institute of Oceanography (BIO) in Dartmouth, Nova Scotia. BIO has coordinated an Atlantic halibut assessment program for the Scotian shelf region. The halibut stocks in downeast Maine are thought to be part of the southern fringe of the Scotian

shelf stock. Bartlett also coordinated and moderated a panel discussion, entitled "Recent Initiatives in the Gulf of Maine Halibut Fishery," at the Maine Fishermen's Forum in 2002, which included overviews of DMR's Federal Experimental Halibut Fishery, recent changes in state halibut regulations, and updates on the halibut fisheries in the Gulf of Maine and the west coast of North America.

Scallop Stock Enhancement Project Gains Momentum

Efforts to enhance sea scallop stocks off the coast of Maine are thriving. In the past year, Extension Associate Dana Morse continued to provide outreach and support for various groups involved in the scallop enhancement project. Morse joined DMR, local citizens, and members of the East Penobscot Bay Environmental Alliance in an industry-led spat counting session in Stonington, Maine, in June. He helped to distribute several hundreds of thousands of scallop seed in the Stonington/Isle au Haut area, worked with DMR divers to assess seeded areas (Cape Jellison, Stonington, and Isle au Haut), and conducted outreach activities to involve more industry members in the project. Morse also coordinated and moderated the scallop enhancement seminar at the 2002 Maine Fishermen's Forum and participated in six statewide public meetings that DMR held to discuss management options.

Morse is currently applying for a scientific experiment permit for federal waters to collect spat more than three miles from shore and working with industry to investigate small-scale aquaculture options for enhancement project participants. In addition, the scallop enhancement project is used in educational programs at the Darling Marine Center as an example of a productive partnership with industry leadership. The industry now better understands the effectiveness of reseeding, as well as the collection and distribution of spat data. About 100 fishermen statewide are covered by the special licenses from DMR, with approximately half of them actively involved in setting spat collectors this fall.

Sea Urchin Summit Helps Troubled Fishery

Rapidly declining landings, ecological changes in urchin habitat that are hindering biological recovery of the resource, and a management process that is dealing with years of overfishing and inadequate harvest controls, have put the future of the commercial sea urchin fishery in doubt. At the request of the DMR and the Sea Urchin Zone Council (SUZC), the Marine Extension

Team organized and facilitated a one-day sea urchin summit in Ellsworth to stimulate more innovative and effective urchin management. Urchin fishermen, processors, scientists and regulators came together to discuss new management actions, and made clear the serious condition of the urchin fishery. The summit resulted in revising the sea urchin research funding process and identified the need for research results to be presented in a new format. This new format will help the industry, scientists, legislators and the SUZC to understand the benefits that research-based knowledge could have for managing the urchin fishery.

MET Supports Lobster Zone Management Process

The lobster zone management legislation of 1997 established an innovative process, through which lobster fishermen participate in the stewardship and management of the resource, by creating the Lobster Zone Council. Fishermen in each zone elect their council representatives. Each year, referendums are held on management issues, such as limits on the number of traps per license; time frame for compliance; the number of traps on a trawl; and the time and days when fishing is permitted. Marine Extension Team members Sherm Hoyt, Chris Bartlett, and Dana Morse assisted with outreach for the lobster zone elections earlier this year. They spent time on the docks, talking with fishermen about the upcoming elections, distributing informational flyers, and generally encouraging greater participation in the election process. Participation seems to have increased since the MET has been working with DMR and the Maine Lobstermen's Association on this issue.

Lobster Newsletter Developed to Improve Zone Management Process

During the fall and winter of 2001 and 2002, Marine Extension Team member Sherm Hoyt and Cooperative Extension staff worked with Lobster Management Zone D to evaluate and improve its management process. The need to get information to fishermen about the activities of their representatives on the Lobster Zone Council was identified as a high priority. A newsletter was created to deliver specific news about council activities to all lobster fishermen included in that zone. Hoyt provided overall project coordination. The model newsletter was mailed to the 1, 200 lobster license holders in late February and was well received by the fishermen.

Salmon Habitat Restoration Symposium Is International

Initiated by the Sheepscot River Association, this conference brought together nearly 200 representatives of local coalitions working to restore salmon habitat in Maine, with representatives from successful projects in Canada, Ireland, California, and other U.S. states. Marine Extension Team member Ron Beard summarized the key points from the various presentations and led a group discussion on possible next steps for habitat restoration in Maine. A conference proceedings is being published.

Fisheries and Climate Change Symposium Held in Bar Harbor

In April 2002, MET member Ron Beard was invited by faculty members at College of the Atlantic to help plan and serve as moderator for a one-day symposium to address the possible effects of climate change on local fisheries and coastal communities. Presenters included university and government scientists from Maine and other coastal states. A conference summary is being compiled to be posted on the Web and mailed to the more than 75 participants.

Game Educates the Public about Commercial Fishing

As a public resource, fisheries are managed by state, local, and federal governments. It is important for the public to understand the nature of commercial fishing, both as a profession and as an avocation, in order for sound policy decisions to be made. MET member Sherm Hoyt developed a hands-on outdoor activity, which involves participants in the physical and psychological experience of commercial fishing. The field-based fishing simulation activity is intended to enhance the classroom presentation of Fish Banks, Ltd., a simulation game about natural resource depletion and teamwork developed by the U.S. Department of Education.

Using crabs or shrimp as the "resource," the excitement of hunting, the competitive nature of collecting and finding concentrations of animals, as well as the simulated financial rewards duplicate the experience of commercial fishing. After a series of rounds, participants conclude the activity by observing changes in densities and catches of the target species and discussing how a sustainable fishery for these animals might be achieved. Last year, Hoyt led a session with high school students and staff at the Tanglewood 4-H Camp in Lincolnville, Maine.

EDUCATION (K-12)

Engaging Students and Teachers in Marine Science

Involving students in hands-on explorations of marine organisms and the natural communities they are part of is an effective way to encourage greater understanding and stewardship of marine resources. Several Marine Extension staff members incorporate K-12 education into their work throughout the year and make special efforts to involve students in marine research projects.

Initiating Education through Phytoplankton Monitoring

In 2002, over 250 school-age children participated in hands-on marine water quality monitoring programs led by Marine Extension Team member Sarah Gladu. Students from Biddeford High School and Lubec High School went beyond the class activities and contributed data to the Maine Phytoplankton Monitoring Program. Gladu also led Friendship Elementary School students in a day of learning about phytoplankton to supplement an ongoing curriculum on lobsters.

Expanding the Drifter Study

Extension Associate Chris Bartlett has been involved for over three years with the Cobscook Bay current monitoring study, a project originally conceived by David Brooks at Texas A&M University that involved the Cobscook Bay Resource Center (CBRC) and Scott Fraser and his students at Shead High School in Eastport. Drifting devices released at various points in the bay track currents and, when the data is entered into a computer model, it shows how water circulates throughout the bay and pinpoints locations where tides flush out excess materials and those where nutrients or pollutants likely will be deposited. Shead students designed the drifters, tracked their progress with GPS recorders and data loggers, and assimilated data into files that were incorporated into computer models and animated graphics. This fall, Brian Leavitt and his aquaculture students at Lubec High School joined the project. The students are collecting data and helping the CBRC create GIS maps.

Linking the Sea Scallop Enhancement Project with Students

The sea scallop enhancement effort is a unique project in Maine, involving fishing industry leadership and resource managers, researchers, conservation organizations, and other community groups and individuals. Because of the applied learning that can occur, there also have been opportunities to make partnerships with schools and teachers. Through the Gulf of Maine Foundation, a fundraising and educational branch of the University of Maine's Darling Marine Center, Extension Associate Dana Morse developed a relationship with the South Bristol Elementary School and involved students in his scallop husbandry project. Hands-on sessions immersed students in explorations of scallop biology, aquaculture, the wild fishery, and management, and showed how these are all interconnected. Since many of the students are from fishing families, the sessions were especially relevant to them.

Supporting High Schools with the MERITS Program

The Maine Research Internship for Students and Teachers (MERITS) program provides research opportunities for high school students and teachers in the areas of science and technology. Opportunities for teachers and students to engage in hands-on marine research are scarce within Maine. By partnering with MERITS, Sea Grant supports collaboration between the Maine research and pre-college educational communities and encourages students to pursue careers in marine sciences or related technical fields. In 2002, Sea Grant funding supported one teacher and two high school student internships.

Meeting Maine's Learning Results through Environmental Education

The cause of the silver blue wake that trails behind boats at dusk or swirls up when an object is dropped into coastal waters is a mystery to many Maine citizens who live along the coast. The wake, in fact, is created when marine phytoplankton are disturbed. The University of Maine Cooperative Extension, Sea Grant, and the School of Marine Sciences (SMS) have developed an environmental education program for middle school teachers and students, called *The Silver Wake*, to encourage students to observe and respond to phenomena such as this; to demonstrate how hands-on science can help meet *Maine's Learning Results* standards; and to engage students not only in examining their local environments, but also in protecting them.

Funded by a $102,000 grant from the U.S. Environmental Protection Agency, *The Silver Wake* project began this fall. Marine Extension Associate Esperanza Stancioff and Sara Lindsay of SMS are recruiting 12 middle school teachers from among the 23 school systems in which coastal water monitoring programs are already active at the high school level. They are also planning the seven-day training institute to be held in June of 2003 at the University of Maine's Darling Marine Center in Walpole, Maine, on the Damariscotta River estuary.

COMMUNICATIONS
Informing Diverse Audiences

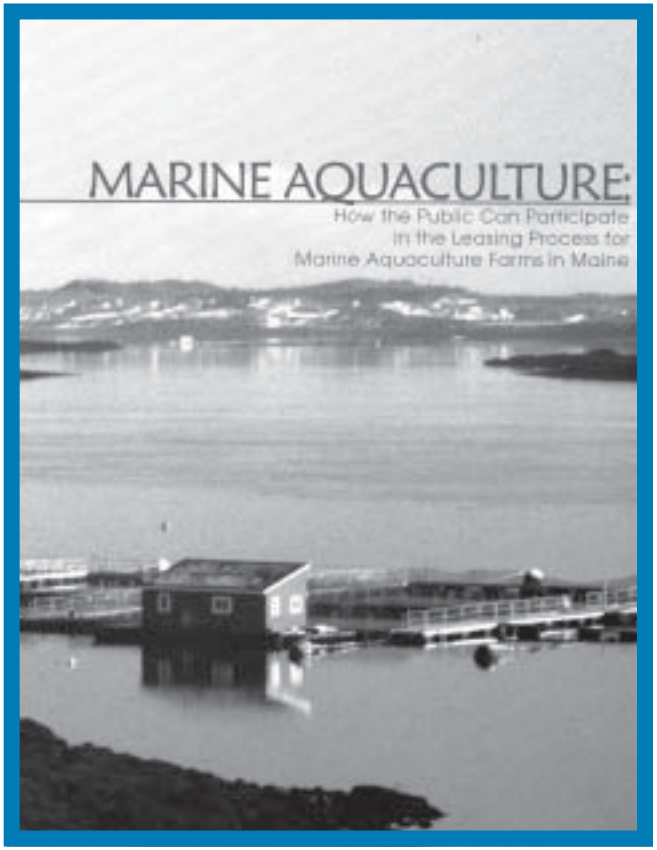
The communications program underwent several changes in the last year. Susan White, assistant director and communications coordinator for the program, was absent from the office for six months while she was on sabbatical at the Institute of Marine Biology of Crete (IMBC) in Greece. While at IMBC, White worked with the Information Communications Technology/ Multimedia department where she honed her skills in video production and explored new educational media. Natalie Springuel, science publications specialist, led the communications effort until this past March, when she joined the Maine Sea Grant Marine Extension Team as a coastal community development specialist. Cheryl Daigle was hired in July of this year to replace Springuel. Despite all the changes that occurred in 2002, the communications program continued to provide the public with current information about Maine Sea Grant's activities, marine science topics, and ocean and coastal issues.

Choosing the Medium

To get the Sea Grant word out last year, communications developed products to reach diverse audiences. Some of these products were more ephemeral while others were designed to have a longer shelf life.

Newspaper articles, press releases, newsletters, and brochures were developed to provide timely information in an economical format. Communications staff wrote **The Science Side**, a two-page column that appears in the monthly newspaper *Commercial Fisheries News*. The newspaper is distributed to 10,000 commercial fishermen, marine industry members, and others throughout the eastern seaboard.

Staff members edited ***The Maine Shore Steward*** newsletter**,** a 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 showcases the coastal monitoring efforts of citizen volunteers, including water quality, phytoplankton, and swim beach monitoring; beach profiling; and other environmental data-collecting projects in the state. It is distributed to over 3,100 interested citizens throughout the state.



For those interested in the aquaculture leasing process, communications worked with the Maine State Planning Office, DMR, and the Maine Aquaculture Innovation Center to produce ***Marine Aquaculture: How the Public Can Participate in the Leasing Process for Marine Aquaculture Farms in Maine***. Over 7,000 copies of the booklet were printed and the majority of them have already been distributed to participants in pre-hearing information sessions, municipal officials, environmentalists, and others.

Sea kayaking is the fastest growing sector of the burgeoning coastal ecotourism industry in Maine. An increasing number of people are buying kayaks and going out on the water with little or no safety training or knowledge about the marine environment. In the past year, communications produced a brochure, called ***A Sea Kayakers Guide to Safety and Stewardship in Maine,*** to help remedy this situation. This project was a collaborative effort with the Maine Island Trail Association, Maine Association of Sea Kayak

Guides and Instructors, and National Safe Boating. The brochure is being distributed through the numerous outdoor outfitters in the state and at boating safety workshops.

A project with a longer shelf life completed in the last year was the book entitled ***Life Between the Tides: Marine Plants and Animals of the Northeast***. The book includes invertebrates found in coastal waters, salt-marsh vascular plants, seaweeds of the nearshore area, and fishes found in tide pools and salt marshes. It is an outgrowth of a very popular book, *Guide to Common Marine Organisms Along the Coast of Maine*, published by Maine Sea Grant in 1998. ***Life Between the Tides*** is being published by Tilbury House Publishers in Gardiner, Maine, and will be released in the spring of 2003.

Broadcasting the Message

To provide information on critical marine and coastal issues in Maine, the Gulf of Maine region, and beyond to a broad audience, communications co-produces the **"Sea & Shore" radio spots**. Collaborating with the Maine Coastal Program at the State Planning Office and the Wells National Estuarine Research Reserve, communications produced the third series of spots, which are aired during Maine Public Radio's very popular "Morning Edition" program.

Increasing Sea Grant Visibility

In the past year, communications focused on ways to increase Maine Sea Grant's visibility in the local community and within the University. To accomplish this, communications facilitated the installment of a glass tile mosaic representing dolphins in the University of Maine's Memorial Union. The mosaic is a replica of the Dolphin Fresco, found in the 1900 B.C. Minoan palace of Knossos in Crete, Greece, which is believed to represent this ancient civilization's love for the sea. Sixteen fifth grade students at State Street School in Brewer, Maine, created the mosaic, which is being hung in one of the most heavily used stairways on the University campus. A plaque provides passersby not only with background on the mosaic but also with information on Sea Grant.

Supporting the Program

Communications staff members provide ongoing support to the research, extension/education, and management components of the Maine Sea Grant Program. Working with the 10-member Marine Extension Team, communications identifies information needs for MET constituents and determines the best delivery mechanisms. Program management support is another important function of communications. Last year, the communications office regularly provided information to update the web site, one of the most effective management and communications tools for the program. Staff members also take the lead in photographing research and extension activities. These photos are used not only for the web site but also in program publications, such as the implementation plan and annual report.

Reaching New Audiences

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

Maine Sea Grant Board/Committee Participation 2001-2002

Coastal Swim Beach Committee - Esperanza Stancioff
Coastal Swim Beach Monitoring Program - Sarah Gladu
Cobscook Bay Fishermen's Association - Chris Bartlett
Cobscook Bay Management Area Group - Chris Bartlett
Cobscook Bay Resource Center Board (chair)/ Executive Committee - Chris Bartlett
Cove Brook Watershed Council (vice-president) - Susan White
Data Assessment Team - Esperanza Stancioff
DMR Lobster Zone Management Committees A and B - Chris Bartlett
Downeast Institute for Applied Marine Sciences and Education Board Executive Committee - Chris Bartlett
Eastern Association of Veterinarians in Aquaculture (EAVA) (chair) - Mike Opitz
Friends of Medomak Watershed - Sarah Gladu
Georges River Shellfish Management Committee - Sherman Hoyt
Governor's Task Force on Fishing Vessel Safety - Paul Anderson
Great Works Watershed Coalition - Sarah Gladu
Gulf of Maine Council on the Marine Environment (Habitat Restoration) and Gulf of Maine Expedition Board - Paul Anderson
Gulf of Maine Research Collaborative - Paul Anderson
Maine Fish Health Technical Committee - Chris Bartlett
Maine Fishermen's Forum Board - Paul Anderson
Maine Phytoplankton Monitoring Program Advisory Board - Sarah Gladu, Esperanza Stancioff
Maine Sea Urchin Zone Council and Lobster Zone Council D (advisor) - Sherman Hoyt
Maine Shore Stewards - Sarah Gladu
Maine Shore Stewards Advisory Board - Esperanza Stancioff
Maine Soft-shell Clam Advisory Council - Sherman Hoyt
Merrymeeting Bay Advisory Committee - Esperanza Stancioff
Microbial Source Tracking Project Advisory Committee - Esperanza Stancioff
National Sea Grant Extension Growth Committee - Paul Anderson
New England Farmed Fish Health Management Workshop Planning Committee (chair) - Mike Opitz
New England Regional Monitoring Committee - Esperanza Stancioff
NOAA Habitat Restoration Network - Kristen Whiting-Grant
Northeast Aquaculture Conference and Expo (NACE) Planning Committee - Dana Morse
Northeast Consortium - Paul Anderson
Northeast Regional Aquaculture Center, Technical/Industry Advisory Committee (TIAC) - Dana Morse
Northwest Atlantic Marine Alliance (NAMA) Board of Trustees - Dana Morse
Orono Land Trust - Cheryl Daigle
Penobscot Bay Network- Paul Anderson, Esperanza Stancioff, Ron Beard
Penobscot Bay Stewards - Esperanza Stancioff
Preservation Committee - Kristen Whiting-Grant
SLICE INAD Monitor - Mike Opitz
SMS Peer Committee (aquaculture representative) - Mike Opitz
State-of-Maine's-Beaches Conference Steering Committee - Kristen Whiting-Grant, Susan White
University of Maine Research Council - Paul Anderson
USDA ISA Standards Committee (chair) - Mike Opitz
Wells National Estuarine Research Reserve, Education Advisory Committee - Kristen Whiting-Grant
WNERR Coastal Training Program Advisory Committee - Kristen Whiting-Grant

SCIENTIFIC PUBLICATIONS

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Graduate Students
Theses and Fellowships

Graduate Student Theses

William Brennan, *Overcoming Transaction Cost Impediment to Resolving the Dilemma of Collective Action in the New England Fisheries.* Ph.D.

Jennifer Brewer, *Closure or Classrooms: Apprenticeship and Entry Limits in the Maine Lobster Fishery.* Ph.D.

Wei Chen, *Predicting Wave Conditions in Harbor and Nearshore Regions with Complex Bathymetry and Strong Ambient Current*. Ph.D.

Li Dongcheng. *Los Angeles-Long Beach Harbor Pier 400 Harbor Resonance Study Using Numerical Model, CGWave.* M.S.

Deirdre Gilbert, *Simulating an Ecosystem Approach to Fisheries Management: Marine Protected Areas*. M.S.

Allen Gontz, *Conceptual Model for Pockmark Formation: A Case for Wave and Tide-dominated Processes, an Example from Belfast Bay, Maine*. Ph.D.

Richard Gordon, *The Role of Water Motion and Turbulence in Algal Reproduction*. M.S.

Dorothea Kistner, *Exchange Between the Kennebec Estuary and Casco Bay: Implications for Transport of Contaminants and Red Tide*. Ph.D.

Christopher Lage, *Genetic Evaluation for Haddock Stocks in the Northwest Atlantic Ocean.* Ph.D.

Timothy Riordan, *Mechanisms of Chemoreception and Chemosensory Mediated Feeding in the Spionid Polychacte* Polydora quadrilobata. M.S.

Karl Schlenker, *A 3-D Boundary Element Model for Water Waves Near Floating Bodies.* M.S.

Lindsay Seward, *The Predictability of Spring Phytoplankton Blooms and Sea Urchin Spawning: Factors Influencing Temporal and Spatial Variation Along the Maine Coast.* M.S.

John Vavrinec, *Forces Regulating Populations of the Green Sea Urchin* (Strongylocentrotus droebachiensis) *in Gulf of Maine Marine Protected Areas: Anthropogenic Impacts, Larval Ecology, and Post-Settlement Survival*. Ph.D.

Luizhi Zhao, *Estimulation of Extreme Wave Heights Using GEOSAT Measurements*. Ph.D.

Coastal Management Fellowship Program

In 2002, Maine Sea Grant was successful in placing Julia Knisel, a postgraduate student in Marine Policy at the University of Maine, in the prestigious Coastal Management Fellowship Program. Knisel was one of only five candidates chosen to participate in the program, managed by the NOAA Coastal Services Center, and is working this year with the North Carolina Department of Natural Resources, Division of Coastal Management.

Dean John A. Knauss Marine Policy Fellowship

Maine Sea Grant was fortunate to have a Knauss Fellowship candidate selected to participate in the program in 2001. Deirdre Gilbert, a master's degree student in marine policy at the University of Maine, was chosen to work in U.S. Congressman Tom Allen's office where she worked as staff for the House Oceans Caucus and handled all fisheries and oceans issues for the office. This entailed tracking marine-related legislation, generating advice on particular bills, and handling constituent requests. Since returning to Maine, Gilbert has been working as special assistant to the commissioner of the Maine Department of Marine Resources where she helps with policy development and acts as liaison to the State Legislature. The experience she gained as a Knauss Fellow was invaluable in obtaining her new position.

Deirdre Gilbert and U.S. Congressman Tom Allen

External Grant Awards

Whereas Maine Sea Grant, in partnership with Cooperative Extension, is able to support the salaries of four full-time extension associates, many of the members of the Marine Extension Team (MET) are participating in projects that are funded externally. With funding levels basically flat and an ever-increasing budgetary obligation to staff salaries, it is also important for all MET members to attract extramural funding to help support extension programming. In the current year, there have been several awards that are providing support for staff salaries and/or programming costs. These include:

- Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET) Microbial Source Tracking in Two Southern Maine Watersheds - $96,985
- U.S. Environmental Protection Agency
  The Silver Wake: An Integrative, Community-based Curriculum for Middle School Environmental Education - $72,148
- U.S. Environmental Protection Agency (through Maine Coastal Program & Cooperative Extension)
  Swim Beach Monitoring – $57,000
- Maine Coastal Program Nonpoint (Source Pollution) Education for Municipal Officials (NEMO) - $31,260
- NOAA (through Connecticut Sea Grant) Nonpoint (Source Pollution) Education for Municipal Officials (NEMO) Expansion Grant- $20,811
- Maine Coastal Program – Shore Stewards Partnership
  Medomak River Watershed Management - $16,431
- Maine Department of Environmental Protection
  MOSAC Administrative Fee - $15,224
- Maine Geologic Survey and Maine Coastal Program
  State-of-Maine's-Beaches Conference - $5534
- Wells National Estuarine Research Reserve
  Little River Watershed Project - $3000
- Maine Aquaculture Innovation Center
  Cobscook Bay Nutrient Study - $2500
- Northeast Regional Aquaculture Center
  Aquaculture Industry Seminars/Workshops - $1200

Program Development Awards

The Maine Sea Grant Program has a modest pool of funds reserved for program development. Most of these funds are intended to be used for small research awards to help scientists prove a concept or collect preliminary data that can then be used to develop full research proposals to Sea Grant or other funding agencies. These funds are also available for conference and travel support, as well as for other types of programming that are consistent with Maine Sea Grant's mission. Although there is no formal request for proposals and these funds are generally available throughout the year, the Maine Sea Grant Program has recently established a protocol that provides more organizational guidance in the use of these limited funds. For example, proposals submitted to the program via the Project Proposal Form (available at the web site) are received throughout the year, but are evaluated on three scheduled decision points: June 1, October 1, and February 1. This allows the program to ensure that this type of funding is available throughout the year for issues that require an urgent response. The program allocates these funds in a manner similar to the general Sea Grant budget as follows: research – 50%; extension / education – 30%; workshops / conferences – 10%; and other – 10%.

Staff Development Projects

Gladu, S. *Maine Phytoplankton Monitoring Program Volunteer Training*. $700. Supported organizational costs of the annual training of volunteers and leveraged $700 from Cooperative Extension.

McCullough, L. *Maine Research Internships for Students and Teachers (MERITS*). $5,180. Provided funding to pay stipends to one secondary school teacher and two student interns to work alongside scientists on marine-related research.

Morse, D. *Shellfish Aquaculture Education Intern at Darling Marine Center*. $3,000. Provided funding to hire an undergraduate intern (Molly Letsch) through the New England Environmental Internship Program of the New England Board of Higher Education to work with Extension Associate Dana Morse on aquaculture education programs.

Springuel, N. *Gulf of Maine Expedition Vital Signs and Phytoplankton Monitoring Kits*. $2,000. Funded the purchase of a Vital Signs kit for measuring various environmental parameters and phytoplankton collection equipment to be used on the Gulf of Maine Expedition.

Cohen, A. *Northeast Regional Sea Grant Web Site*. $1250. Provided support to this effort for the enhancement of regional collaboration among Sea Grant programs in the Northeast.

Research Projects

Brown, N. *Investigation of Nutritional Content of Sea Worms for Use in Halibut Broodstock Diets*. $6,400. Supported a student and supplies related to research on cultivation of marine worms for aquaculture development in Maine.

Chen, Y. *Improving the Information on Spatial Structure of Groundfish Fisheries in the Gulf of Maine for Stock Assessment and Management: A Preliminary Study to Develop Spatially Explicit Stock Assessment Models*. $5,925. Partially supported a graduate student and supplies as part of a research project to develop a framework for stock assessment models and to apply these models to groundfish in the Gulf of Maine.

Horn, T. *Developing Guidelines for Resource Inventories of Geographically Discrete Marine Areas in Maine*. $4,000. Provided organizational support for meetings and the design and printing of guidelines that will help coastal communities and other institutions to collect and analyze baseline data related to natural and cultural characteristics of discrete geographic areas along Maine's coast.

Kelley, J. *International Coastal Symposium*. $1,300. Provided travel support for Joe Kelley, Dan Belknap, and a graduate student to present their Sea Grant-funded research at this bi-annual meeting of coastal geologists, sponsored by the Coastal Education and Research Foundation, held in Northern Ireland.

Moore, S. *Taunton Bay Impact Assessment Project (Phase 1).* $6,513. Supported vessel costs, travel expenses, and collection of aerial imagery related to this effort to provide a baseline characterization of Taunton Bay as part of an assessment of the potential and demonstrated dragging-related impacts to the bay's ecological attributes.

Riley, J. *Pilot Study on the Underwater Maneuvering Capabilities of the Humpback Whale*. $2,850. Provided support for student salaries and travel costs associated with this effort to develop better data-logging tags for humpback whales.

Sowles, J. *Nutrient Study of Cobscook Bay*. $2,000. Provided a student's salary and supplies for analyzing seawater samples for nutrients as part of a preliminary study of potential nutrient impact that finfish aquaculture may have in Cobscook Bay.

Steneck, R. *Feasibility of Applying Genetic Tools to Determine American Lobster Larval Source-sink Connectance between Maine and Canada.* $5,000. Provided travel, shipping of supplies, and vessel time for visiting investigators from California to evaluate the feasibility of utilizing recently developed genetic tools on lobsters in Maine.

Wahle, R. *Developing Stock Assessment Methods for the New England Deep Sea Red Crab Fishery*. $9,000. Provided salary support for a technician as part of a $200,000 project funded by the Northeast Consortium and Saltonstall-Kennedy to improve our knowledge of the red crab fishery.

Conference Support

Bean, L. *Fifth Toxic Shellfish Workshop.* $600. Supported the 2002 bi-annual conference at the Maine Department of Marine Resource's laboratory in Boothbay Harbor, Maine.

Burdick, D. *NEERS Spring 2002 Meeting*. $500. Supported the spring 2002 meeting of the New England Estuarine Research Society held in Bar Harbor, Maine.

Clark, W. *Coastal Society Meeting*. $1,500. Sponsored the 2002 bi-annual meeting of the Coastal Society held in Galveston, Texas.

Costa-Pierce, B. *National Fisheries Law Symposium*. $1,000. Sponsored this national conference on fisheries law at the University of Rhode Island.

Devoe, R. *International Conference on Shellfish Restoration*. $500. Provided support for this fourth annual conference held at Charleston, South Carolina.

Hayden, A. *Workshop on Ecosystem-based Approaches to Fisheries Research and Management.* $3,250. Sponsored and provided general support for a facilitated workshop to encourage further development of collaborations and ideas related to using an ecosystem approach to fisheries research and management.

Hayes, M. *Second Annual Maine Coast Seminar*. $1,000. Co-sponsored this second annual event (held in Stonington, Maine) with the Headwaters Institute.

LaPage, W. *Nature-based Tourism in Maine: Legacy & Opportunity Symposium.* $300. Supported this conference, held at the University of Maine, which was co-sponsored by the Parks, Recreation, and Tourism program.

Morse, D. *Executive Committee Participation for the Northeast Aquaculture Conference and Expo (NACE) 2002*. $1,000. Provided organizational sponsorship and general conference support.

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