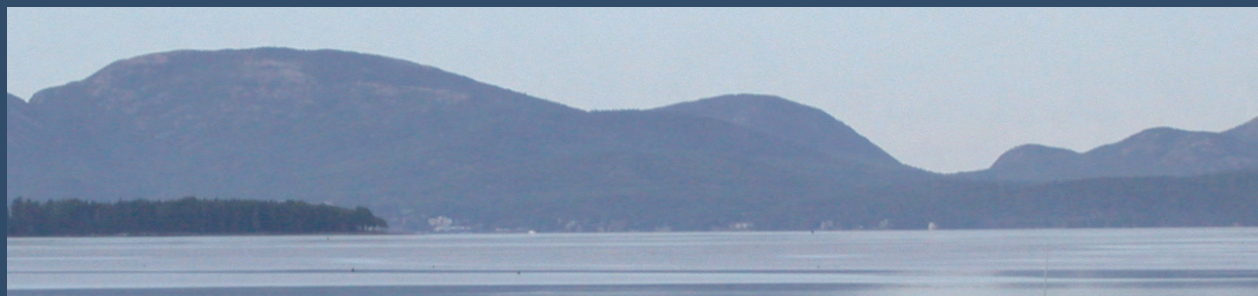


# MAINE SEA GRANT College Program



Annual Report 2006-07

# **MAINE SEA GRANT COLLEGE PROGRAM ANNUAL REPORT**

## **(February 1, 2006-January 31, 2007)**

### **Introduction**

The Maine Sea Grant College Program had a very productive year in 2006-2007. Having spent a significant amount of program effort in recent years on external reviews and planning activities, the program was able to focus its resources on the work that we do in integrating research and outreach related to marine and coastal issues in Maine.

Over this past year, Maine Sea Grant has worked to improve its connections within the university community through collaborative projects with the Climate Change Institute, the School of Marine Sciences, the College of Engineering, and the Center for Tourism Research and Outreach (CENTRO). These collaborations have involved joint funding proposals for new programs, presentations, and workshops, and Sea Grant financial investments in research activities in these units.

Maine Sea Grant continues to build its partnerships throughout the state and region and, this year, we took the lead on a national assessment of access to the coast. In partnership with Hawaii Sea Grant, Maine Sea Grant coordinated a survey and compiled a report on the issues related to access along the nation's coast. This effort will help to inform national, regional, and local strategies for coastal communities in planning for and preserving multi-use working waterfronts, while managing other coastal development pressures. The report has been of great interest nationally and in the U.S. Congress, where Senator Collins is proposing legislation to address some of these issues as they relate to the commercial fishing industry.

Maine Sea Grant also had a successful year in attracting extramural funds, with a total of \$241,161 awarded from outside sources. Coupled with our NOAA award of \$1,020,200, we were able to leverage the University of Maine's Maine Economic Improvement Fund (MEIF) contribution of \$233,489 by over five times.

In January 2007, Maine Sea Grant Director Paul Anderson began a two-year term as president of the National Sea Grant Association and has been responsible for overseeing planning and government relations for the entire Sea Grant network. These activities are critical for improving the funding for all programs in the Sea Grant network.

In a recent meeting with the University of Maine Vice President for Research, Director Anderson was encouraged to identify other measures of program impact and success. We came up with three ideas for capturing some significant impacts that are not readily included in the standard reporting criteria. These data may be found in the supplemental section at the end of this report. In brief, one section captures our activities that have resulted in changes to legislation, regulation, and policy in the State of Maine and another section describes situations where we have convened and facilitated collaborative efforts that could not have been successful without the involvement of Maine Sea Grant. For these two sections, we have included information from approximately the last five years. For the last section, we have included staff presentations, posters, facilitated meetings,

and board and committee participation from the last year, because much of our most meaningful work occurs through these activities.

### I. Award Reporting

- Institution/Grantee: University of Maine System – Maine Sea Grant College Program
- Award Number: NA03OAR4170054
- Time period: 2/1/06 – 1/31/07
- Award Title: University of Maine Sea Grant Program

**Research Accomplishments/ Outcomes** (See award # NA06OAR4170108 for Extension, Education, and Communications accomplishments/ outcomes.)

R-03-01 Belknap, Daniel

Project Title: Monitoring of coastal dynamics at the Saco River mouth near jetty modifications and beach nourishment projects

The U.S. Army Corps of Engineers (USACOE) constructed and subsequently lengthened a paired jetty system in Saco Bay to what is now one of the longest jetties on the East Coast. Consequent beach erosion, as a result of an erroneous assumption about sand movement, has resulted in the loss of more than 30 homes. The Sea Grant-funded research led to an accurate understanding of sand transport in the bay. **Outcome:** Nearshore currents and sand transport (and in a related non-Sea Grant project, offshore sand deposits) are now known for Saco Bay as a basis for mitigation of erosion.

R-03-02 Brawley, Susan

Project Title: Enhanced spore production for net-seeding of native New England *Porphyra* in integrated finfish/seaweed aquaculture

Integrating the aquaculture of seaweeds with that of finfish offers a way to grow aquafarm-raised products cost effectively, while reducing the amount of surplus nutrients released into the marine environment. Sea-Grant supported researchers are developing techniques for the culture of native Maine species of *Porphyra*, a red alga known as “nori” in Asian cuisine. **Outcome:** *Porphyra umbilicalis* was found to reproduce exclusively by asexual spores on the Maine coast. Thus, a protocol was developed to seed nori culture nets with asexual spores of *P. umbilicalis*.

R-04-01 Wilson, James

Project title: An agent-based model of the Maine lobster fishery

The Maine lobster fishery is one in which a self-organizing process at a very local level, the groups’ territoriality, has created the basis for a form of collective action. Collective action is more effective and more likely to occur when it is consistent with the self-interest of the individuals, or agents, involved. The Maine lobster fishery is an unusual example in fisheries of biological and physical circumstances combining with individual self-interest to create conditions favorable to collective action. In the model, behavioral decision rules of individual agents, lobstermen, that yield results consistent with self-

interest are retained and those rules that do not are discarded. **Outcome:** The agent-based model provides an analytical framework, giving a bottom-up perspective on the circumstances that make collective action more or less feasible and on prevention of overfishing.

R-04-02 Townsend, David

Project title: Environmental controls on shrimp recruitment dynamics

R-04-03 Rawson, Paul

Project title: Population structure of sea scallops, *Placopecten magellanicus*, in two coastal embayments in Maine

Preliminary results from sequencing of numerous marker segments of DNA indicate that the genetic signature of sea scallops from Cobscook Bay is different from the signature of the other locations sampled in Penobscot Bay, Casco Bay, and Georges Bank. From rearing experiments, carbon isotopes in larval scallop shells seem to be a reasonably accurate proxy for dissolved inorganic carbon, and oxygen isotopes are a proxy for temperature of the rearing water, with some inherent limitations. **Outcome:** The ability to reconstruct the organic carbon concentration and temperature of the water mass in which sea scallop larvae developed provides a means to pinpoint the source water mass of sea scallop larvae or newly settled spat.

R-04-04 Grabowski, Jonathan

Project title: The effect of herring bait on lobster population dynamics and the benthic community

In order to determine the importance of herring bait for the diet and growth of lobsters in coastal Maine, the researcher is comparing lobster (1) diet composition using stomach contents and stable isotope analyses, (2) size frequency and density using quadrat samples, and (3) growth rates using mark-recapture studies in fished vs. unfished areas. Resident epifauna and infauna have been sampled to determine the effects of herring bait on the benthic community in the nearshore portions of the Gulf of Maine. **Outcome:** Laboratory analysis of field samples collected in prior years was completed in 2006.

R-04-05 Panchang, Vijay

Project title: Wave predictions for coastal Gulf of Maine

In 2006, wave prediction models with 0.5-km resolution were completed for five New England coastal regions—Harrington coastal region, Bath coastal region, Saco Bay (all in Maine); Portsmouth (New Hampshire) coastal region; and Massachusetts Bay. These were added to previous models for Frenchman Bay and surrounding coastal region, Machias Bay, and Penobscot Bay. Hind-casts of wave conditions for seven years were made for Machias and Penobscot Bays to develop extensive seasonal- and extreme-wave climatologies. **Outcome:** The climatologies can be used by existing and potential aquaculture operations and for other applications.

R-05-01 Amirbahman, Aria.

Project Title: Monitoring mercury fluxes in estuarine sediment porewaters using novel reactive membranes

In 2006, equilibrium porewater samplers, developed in earlier stages of the project, were deployed in the field to measure methylmercury (MeHg) concentration and flux in the sediment of the lower Penobscot estuary. MeHg is the species that is most toxic, due to its bioaccumulation potential. A great amount of MeHg is produced at the depth where sulfate-reducing bacteria are active but the dissolved sulfur-II accumulation is low enough to inhibit Hg methylation. MeHg, however, disappears within 2 cm of the sediment-water interface, perhaps due to demethylation. While estuary sediments act as a net sink for particulate Hg inputs, they also function as a source of dissolved Hg over a considerable time interval. **Outcome:** Relevant data will be provided to appropriate beneficiary agencies, such as the Maine Department of Environmental Protection, Maine state office of U.S. Fish and Wildlife Service, and Maine Bureau of Remediation and Waste Management, if requested.

R-05-02 Perry, Mary Jane

Project title: Phytoplankton carrying capacity in the Damariscotta River estuary

The spatial and temporal distribution of phytoplankton in the Damariscotta River Estuary, as well as certain key environmental factors, was assessed to better understand the variability of phytoplankton with regard to the carrying capacity of the estuary for shellfish aquaculture, an important economic resource in Maine. Strong spatial gradients in temperature, salinity, and phytoplankton were observed in the estuary, with the largest phytoplankton biomass occurring in the upper estuary. Phytoplankton cells <20 µm were the dominant fraction of phytoplankton biomass throughout most of the shellfish growing season, which has important implications for the shellfish industry because oysters typically feed on cells that size. **Outcome:** The high concentration of cells < 20 µm diameter in the surface waters of the upper estuary during the late spring and early summer provides rationale for using floating grow-out enclosures for juvenile oysters in this section of the estuary. Continued monitoring of phytoplankton variability can help oyster and mussel farmers decide when to sow, maintain, and harvest.

### **Award Reporting**

- Institution/Grantee: University of Maine System – Maine Sea Grant College Program
- Award Number: NA06OAR4170108
- Time period: 2/1/06 – 1/31/07
- Award Title: Maine Sea Grant Omnibus 2006-2007 Funding

### **Research Accomplishments/ Outcomes**

R-06-01 Ambrose, William

Project title: Frequency, intensity, and ecological consequences of bloodworm (*Glycera dibranchiata*) harvesting on intertidal flats in Maine

A group of interrelated studies was conducted to assess the effect of bloodworm digging on intertidal flats on the infauna at the community and individual levels. Field and laboratory research was the focus in 2006. **Outcome:** At the individual level, juvenile soft-shell clam mortality was significantly higher at dug than undug (control) sites. Professional worm diggers harvested about 45%-65% of marked bloodworms in test plots. Marked bloodworms grew almost 40% between June and October. At the community level, chlorophyll-a concentration was reduced in the upper few centimeters of sediment by digging. Oxygen consumption in the sediments was reduced for about two weeks by digging. Ammonia levels were increased in the sediments to a depth of at least 8 centimeters.

R-06-02 Belknap, Daniel

Project title: Are Maine's marshes drowning? Determining the life-cycles of salt marsh pannes and pools

Salt marsh pannes and pools (SMPs) are ubiquitous features of marshes in northern New England, which provide protected nursery sites for finfish and invertebrates and open water and food for waterfowl. Understanding of the formation and duration of SMPs is critical for marsh restoration to mitigate anthropogenic stresses (e.g., pollution, constriction of flow, construction, and invasive species). Along the Maine coast, through coring and sediment analysis, hypotheses of SMP formation are being tested, and through modern and historical aerial photography, SMP durations are being estimated. **Outcome:** In 40 years of comparative aerial photography, many SMPs have drained and re-vegetated and many new SMPs have formed, indicating a dynamic marsh system. Development of a marsh with numerous SMPs has formed behind a barrier spit less than 200 years old, confirming the dynamic nature of marshes.

R-06-03 Brawley, Susan

Project title: Integrated mariculture with *Porphyra* ("nori") to achieve sustainable mariculture with new food products

DNA libraries were made of various parts of *Porphyra umbilicalis* plants, including the spores through which the plants reproduce asexually. The purpose of the study is to begin to understand gene expression during asexual reproduction. **Outcome:** A collaboration was begun to redesign rafts for nori nets to reflect the conditions present in Cobscook Bay (strong tidal currents, waves, and need for tiered nets).

R-06-04 Chen, Yong

Project title: Developing and evaluating biological reference points for the American lobster (*Homarus americanus*) fishery management

The simulation design for evaluating biological reference points was developed and fine-tuned, and the computer programming for the simulation was completed. A reference database for the project was established. A list of biological reference points to be tested was developed with the help of the Atlantic States Marine Fisheries Commission Lobster Technical Committee. **Outcome:** Although the study is still in progress and there have

been no results, the researcher has presented to the Atlantic States Marine Fisheries Commission (ASMFC) Lobster Technical Committee the approach, scope of the work, and potential outcomes of this project. The ASMFC Lobster Stock Assessment Committee has shown interest in incorporating the results derived from this study in the next round of lobster stock assessment.

DV-06-003 Sirois, Alison

Project title: A pilot study to determine the use of three tools to monitor bloom dynamics in Harpswell, Maine

The Phytoplankton Monitoring Program of the Maine Department of Marine Resources (DMR) compared the presence of toxins that produce paralytic shellfish poisoning (PSP), as measured by the Jellet Rapid Response Test (JRT) in qualitative and quantitative water samples, with traditional microscopic examination for presence of cells of the toxin-producing alga, *Alexandrium* spp., through a bloom event in 2006. Microscopic identification of *Alexandrium* by volunteers is only 50%-75% accurate. **Outcomes:** (1) Quantitative water samples were more closely correlated with shellfish toxicity in clams and mussels than qualitative samples, so DMR will train staff and volunteers and implement this method in 2007. (2) JRT kits are sufficiently sensitive to *Alexandrium* in water samples to provide a check on identification of cells by volunteers.

### **Extension, Education, and Communications Accomplishments/Outcomes**

**Towns work together to protect water quality:** Runoff from paved areas, lawns, and fields is the greatest source of water pollution in Maine, according to the Department of Environmental Protection. In rapidly developing southern Maine, many towns and organizations are attempting to address this “nonpoint source pollution,” often in isolation from each other. Maine Sea Grant, in cooperation with the Wells National Estuarine Research Reserve, brought together municipal officials from the four towns within the York River watershed in order to create a network of support for those engaged in maintaining and improving water quality in the region. **Outcome:** The towns formed the York River Watershed Council, and completed a training session at the University of New Hampshire Stormwater Research Center. Coordinated stormwater management will provide cost savings to the individual towns and protect water quality.

**Coastal access is examined in southern Maine:** Working waterfronts and access to coastal resources are a vital part of the coastal Maine economy. However, soaring shorefront real estate values and their associated property taxes are pricing many fishing and water-dependent businesses out of the market, and threatening recreational access to the coast. Congestion and conflict among diverse users of the waterfront has increased as more people seek to access the water. Building on the success of Sea Grant-sponsored forums held in the midcoast and Downeast regions of the state in 2005, Sea Grant organized the *Southern Maine Regional Forum on Coastal Access* in June 2006. **Outcomes:** The forum was attended by 92 people who represented a wide range of interests, especially coastal property owners and recreational users. Needs identified in this forum, as well as in the other previous forums, resulted in a successful proposal,

*Legal and Policy Tools for the Protection of Coastal Access in Maine and the Nation*, to the National Sea Grant Law Center and \$54,531 in funding.

**Forums promote community design that includes resource protection:** The southern Maine town of Wells is rapidly growing, and the increased population and development threaten to degrade the very qualities that make Wells an attractive place to live. Depot Brook is a coldwater trout stream that flows through a heavily traveled part of town that is designated as a growth area. Working in partnership with the Town of Wells, Wells Reserve, and community members, Sea Grant received funding from U.S. EPA Smart Growth to implement the Wells Gateway Community Design Workshop Series.

**Outcome:** A local team of partners coordinated with EPA specialists in urban design, transportation, and stormwater management to implement a community-based series of forums designed to encourage ideas on how the town should grow with resource protection in mind. The resulting vision will help the town pursue additional funding from EPA to work with Maine Department of Transportation to conduct a design charrette for the congested intersection in the study area in order to agree on a final plan for the intersection.

**Sea Grant leads Environment sector in KEYS Our Future By Design:** Working in cooperation with a range of partners representing all elements of community life, a series of workshops have been held for residents of Kittery, Eliot, York and South Berwick (KEYS) to help them clarify their vision for the future. Action plans for 14 community life areas have been developed, and a Sea Grant Marine Extension Team member led the "Environment" sector. **Outcome:** A Web site has been created to share goals, indicators, accomplishments, and resources to encourage citizens to understand the relationships between sectors and identify opportunities for participation. The Environment sector can be viewed at [www.keysregion.org/keys\\_ofbd/topics/environment.htm](http://www.keysregion.org/keys_ofbd/topics/environment.htm).

**Sea Grant expands statewide recreational fishing surveys:** The Maine Department of Marine Resources conducts recreational fishing surveys to gather information on the catch, participation, and effort of marine recreational fishing in selected demographics. The program was recently broadened to also include expenditure data. Due to limited staff and Maine's extensive coastline, surveys were only conducted twice during the summer months in eastern Washington County and, as a result, produced limited information on recreational fishing in this region. In 2006, Sea Grant's Marine Extension Team assisted the DMR with surveys in Downeast Maine. **Outcome:** As a result of Sea Grant's involvement, the number of surveys greatly increased and an expanded survey will continue in 2007. In addition, Sea Grant is partnering with the University of Maine at Machias to analyze the economic contribution of saltwater angling in eastern Maine.

**Beach water quality monitoring intensifies at southern Maine beaches:** The 2006 summer season saw a record number of high bacteria scores at Maine's swimming beaches, prompting 82 health advisories. Now in its fifth year, the Maine Healthy Beaches program systematically monitors coastal swim beaches throughout southern Maine. Routine monitoring of several beaches has revealed persistent bacteria problems, prompting more detailed investigations of the source of water quality impairment through



new collaborations. **Outcomes:** At Goose Rocks Beach in Kennebunkport, program staff worked with the town and others to analyze 650 water quality samples from a total of 57 locations to identify hotspots of pollution. Results were disseminated at a workshop with town officials and local stakeholders in September 2006. In Biddeford, a sanitary survey identified potential pollution sources and recommended remediation techniques. A sanitary survey was also completed for a South Portland beach and the city has incorporated the results in beach planning efforts. After the April 2006 *Southern Maine Beaches Forum*, co-sponsored by Maine Sea Grant, several forum participants held town workshops on the factors that affect beach water quality, developed communication plans, pursued remediation of local pollution sources, and networked with other towns for regional solutions. Beach water quality monitoring in Lincolnville found high bacteria counts, and the Town pursued legislation to transfer ownership from the State so that municipal officials could be more involved in the Healthy Beaches program.

**USDA veterinary medical officers receive aquaculture training:** USDA Veterinary medical officers throughout the country have been charged with providing services to their region's aquaculture enterprises. Many of these veterinarians have little or no prior knowledge of basic aquaculture practices. Sea Grant's Marine Extension Team partnered with the USDA APHIS and others to host an aquaculture training program for USDA liaisons in September 2006. **Outcome:** 24 veterinarians participated in classroom lectures, laboratory exercises, and field trips. Post-training evaluation showed that a majority of participants gained new knowledge and skills, and future training opportunities are planned.

***Spring Running celebrates the return of anadromous fisheries:*** Around the country, rivers and riverfront towns have been experiencing a revival as water quality improves and communities recognize the economic and social value of healthy waterways. In 2000, the Edwards Dam on the Kennebec River was removed, allowing upstream access for sea-run fish for the first time in 160 years. In May 2006, Maine Sea Grant sponsored and organized the Spring Running to celebrate the improved health of the Kennebec River, and to highlight the river as a resource to local communities. **Outcome:** Despite cold, rainy weather, over 600 people attended the event, and the Spring Running is now an annual event.

**Sea Grant partners with Elderhostel for marine education:** A Marine Extension Team member served as naturalist and boat captain during four Elderhostel cruises in eastern Maine's Cobscook Bay in the summer of 2006. Topics included marine ecology, resource management, and coastal flora and fauna. **Outcome:** Surveys of the participants ranked Sea Grant highly, and the partnership with Elderhostel will likely continue in 2007.

**Roundtables help provide a voice for community-based fisheries management:** Continued declines in the commercial fishing industry and tightening management regulations have driven pursuit of alternative fisheries management structures. Maine's Down East Initiative is attempting to implement community-based fisheries management in that part of the state, but fishermen in central and southern Maine are still struggling with the regional and federal status quo. In the spring and summer of 2006, Sea Grant

partnered with Bowdoin College's Environmental Studies Program to facilitate a series of seven discussion groups to jumpstart a more collaborative process promoting and developing community-based management of New England's groundfish fishery. Marine extension staff brought proponents of the Down East Initiative together with staff of the Northwest Atlantic Marine Alliance, the Conservation Law Foundation, the Gulf of Maine Research Institute, The Nature Conservancy, Ocean Conservancy, and members of the academic community to move forward development of a collaborative, community-based groundfish plan. **Outcomes:** The roundtable series influenced the formation of the Area Management Coalition (AMC), which is working in an organized way to promote community-based ecosystem management. The effort has attracted significant new funding to develop and promote community-based management in New England, and the AMC continues to have a strong voice in rulemaking decisions of the New England Fisheries Management Council.

**Maine Sea Grant helps implement New England's first ecosystem and community-based inshore marine management pilot project.** Documenting and protecting Maine's coastal biological diversity while maintaining traditional economic uses of marine resources is a challenge for many coastal communities. Traditionally, Maine's coastal resources like mussels, scallops, seaweed, and clams were managed species by species in a fragmented manner. Scientists and managers are recognizing that a more holistic, local approach to inshore resource management would reduce conflicts among users and benefit coastal ecosystems. Local ecosystem management is supported by the Pew Oceans Commission, the U.S. Commission on Ocean Policy, and Maine's Bay Management Study. However, creating new management regimes takes considerable time, effort, and commitment on the part of those involved. **Outcomes:** Maine Sea Grant worked with the Department of Marine Resources Ecology Division and the Maine Legislature's Marine Resources Committee to develop a new case study of community-based marine resource management in Taunton Bay, Hancock County, Maine. A collaborative governing board will manage an entire ecosystem, including both human and non-human communities. The Taunton Bay pilot will provide valuable information for pursuing community-based management elsewhere in Maine.

**Partnership with NOAA Fisheries introduces Sea Grant to new audiences:** After successfully producing two outdoor kiosk displays describing the Penobscot River watershed in 2005-2006 with NOAA Fisheries, Maine Sea Grant's Communications team has expanded this educational project to other locations in the watershed. The Penobscot Salmon Club asked that Sea Grant assist them in producing displays for their historic clubhouse in Brewer, Maine (with funding from the Corporate Wetlands Restoration Partnership), and another display is planned for Old Town in partnership with the Penobscot River Restoration Trust and Old Town Elementary School. **Outcome:** With each new display, Maine Sea Grant extends its reach to new communities and partners. The kiosk displays have also strengthened collaborations with the local NOAA Fisheries office and more projects are planned for the coming year.

## II. Impacts

**Sea Grant-funded researchers are active in erosion mitigation plan:** The U.S. Army Corps of Engineers (USACOE) constructed and subsequently lengthened a paired jetty system in Saco Bay to what is now one of the longest jetties on the East Coast. Consequent beach erosion, as a result of an erroneous assumption about sand movement, has resulted in the loss of more than 30 homes. The Sea Grant-funded research led to an accurate understanding of sand transport in the bay. Nearshore currents and sand transport (and in a related non-Sea Grant project, offshore sand deposits) are now known for Saco Bay as a basis for mitigation of erosion. **Impact:** A mitigation project by the USACOE received support, but not final approval, in the U.S. Congress in 2006 and is presently in the design phase for several options of engineering structures and beach nourishment. Principal investigators and the graduate student involved participate on the Saco Bay Implementation Team—comprising USACOE, Maine Geological Survey, town and public representatives, and academic scientists—which is planning the USACOE actions at the jetties.

**Marine invasive species now included in state nearshore surveys:** Marine invasive species present a growing ecological and economic challenge to the State of Maine. Exotic invasive species may displace or prey on native organisms, impact habitat, and introduce new parasites and diseases, and it is difficult and costly to eradicate these invaders once they become established in a new area. In response, Maine Sea Grant is working with the other northeastern Sea Grant programs to raise awareness and educate key target audiences about marine invasive species vectors and appropriate prevention strategies, through a project called “Interrupting the Flow.” Maine Sea Grant has focused on outreach and collaboration with the SCUBA diving community in the Gulf of Maine; putting on three species identification and monitoring trainings in 2006, and working with science divers to develop an underwater survey protocol for tracking location and abundance of species of highest concern. As a result of this program, recreational divers have learned to identify key species of concern, and have submitted reports, digital photos, and video footage of these species to an online database developed and maintained by MIT Sea Grant. This database is a resource for invasive species scientists and marine resource managers who do not have sufficient funding or staff time to collect this data. **Impact:** As a result of their involvement in the survey protocol development, the Maine Department of Marine Resources incorporated location and abundance metrics for *Didemnum sp.*, a high priority invasive colonial tunicate, into its annual nearshore surveys.

**Partnership adds value to Sea Grant’s evaluation efforts:** Nationwide, Sea Grant and other federally funded entities are increasing their efforts to effectively evaluate the impacts of their extension and education programs. High quality evaluations help Sea Grant reflect on and improve its work in these areas, and to demonstrate clear program benefits to its stakeholders. To add value to its internal expertise in education program evaluation, Maine Sea Grant staff formed a new partnership with the University of Maine Center for Science and Mathematics Education Research. In 2006, faculty and graduate

students within the Center started working closely with Maine Sea Grant staff to design and implement efficient educational program evaluations based on the findings of current education research studies. The results of three of these collaborative evaluations will be available in the winter of 2007 and spring of 2008, as the programs draw to a close.

**Impact:** Through this new partnership, Maine Sea Grant has added significant value to its internal expertise in research-based evaluation design and implementation, and the evaluations produced through this ongoing partnership will enable Maine Sea Grant to continually improve the quality of its education and extension programming.

**Science writer is correspondent for national magazine:** Wild seafood is an \$11 billion industry in the United States today, and at \$800 million per year, it is big business in Maine, too. Consumers are becoming more interested in how and where their seafood is harvested, creating a demand for science-based information on the sustainability of different species of fish and shellfish. In 2006, Seattle-based Northwest Publishing Center launched *Wild Catch*, a magazine for food service and retail fish buyers and chefs. The editor of the magazine contacted Maine Sea Grant in search of high-resolution photographs of lobsters, and a prompt and helpful response by the Communications staff led to an assignment for an article about Northern shrimp in the August/September issue of the magazine. **Impact:** Maine Sea Grant's Science Writer is now a regular contributor to the magazine, acting as its Northeast Correspondent and reporting on seafood and industry issues from northern New England (with much assistance from Sea Grant Marine Extension staff).

**III. Performance Measures (2/1/06-1/31/07)**

	2006-2007 Actual		2007-08 Anticipated	
	<i>Developed</i>	<i>Applied</i>	<i>Developed</i>	<i>Applied</i>
Measure 1	0	0	1	1
Measure 2	2	1	1	0
Measure 3	11	25	24	11

**Measure 1: Economic and Societal benefits derived from the discovery and application of new sustainable coastal, ocean, and Great Lakes products from the sea.**

**II. DETAILED INFORMATION**

**2006-2007 ACTUAL**

*0 products developed.*

*0 products applied to use.*

*Economic benefits generated.*

- We are currently unable to estimate the potential economic benefits derived.

## 2007-2008 ANTICIPATED

### *1 product developed.*

- Value-added food products based on native species of *Porphyra* (“nori”) will be developed and tested for sensory acceptability and nutritional value.

### *1 product applied to use.*

- New designs for tiered nets for the culture of *Porphyra* (“nori”) will be developed to withstand the strong currents and tides characteristic of New England’s coastal waters. Nori culture is being developed for use in multi-species integrated aquaculture, in part to mitigate nutrient enrichment from finfish culture.

## **Measure 2: Cumulative number of coastal, marine, and Great Lakes issue-based forecast capabilities developed and used for management.**

## 2006-2007 ACTUAL

### *2 new forecast capabilities developed.*

- In 2006, wave prediction models with 0.5-km resolution were completed for five coastal regions in Maine, New Hampshire, and Massachusetts, which were added to previous models to develop extensive seasonal- and extreme-wave climatologies. The climatologies can be used by existing and potential aquaculture operations and for other applications.
- In a Sea Grant-supported study, the simulation design for evaluating biological reference points for lobster fishery management was developed and fine-tuned, the computer programming for the simulation was completed, and a reference database for the project was established. A list of biological reference points to be tested was developed with the help of the Atlantic States Marine Fisheries Commission (ASMFC) Lobster Technical Committee. Although the study is still in progress, the ASMFC Lobster Stock Assessment Committee has shown interest in incorporating the results derived from this study in the next round of lobster stock assessment.

### *1 new forecast capability applied to use.*

- Forecasts of wave height, wave direction, and wave period are made and posted on the Web on a continuing basis for the Gulf of Maine and for seven sub-domains along the New England Coast, using the numerical model SWAN and NOAA’s forecasted winds. Forecasts are made for the ensuing 48 hours and are updated twice daily.

### *Economic benefits generated.*

- We are currently unable to estimate the potential economic benefits derived.

## 2007-2008 ANTICIPATED

### *1 new forecast capability developed.*

- Mortality-based biological reference points will be developed for the American lobster, *Homarus americanus*, fishery in New England to determine if the stock is

being “overfished.” Robustness of the reference points will be determined for various scenarios of stock dynamics, uncertainty of data, and biological and fishery processes.

*0 forecast capabilities applied to use.*

**Measure 3: Percentage/number of tools, technologies, and information services that are used by managers (NOAA and/or its partners and customers) to improve ecosystem-based management.**

2006-2007 ACTUAL

TOOLS

*4 tools developed.*

- A Bayesian model for assessment of American lobster, *Homarus americanus*, population size and demographics will most likely be used in the next New England lobster stock assessment conducted for the Atlantic States Marine Fisheries Commission.
- Sea Grant-funded research on monitoring coastal dynamics at the Saco River mouth near jetty modifications led to an accurate understanding of sand transport in the bay. A mitigation project by the U.S. Army Corps of Engineers received support, but not final approval, in the U.S. Congress in 2006 and is presently in the design phase for several options of engineering structures and beach nourishment.
- An agent-based model of the Maine lobster fishery was developed with Sea Grant support. In the model, behavioral decision rules of individual agents, lobstermen, that yield results consistent with self-interest are retained and those rules that do not are discarded. The agent-based model provides an analytical framework, giving a bottom-up perspective on the circumstances that make collective action more or less feasible and prevention of overfishing.
- A scientific SCUBA diving survey protocol was developed for monitoring 10 target marine invasive species in the Gulf of Maine. Maine Sea Grant worked with six science divers to field-test the protocol and gather data in three areas of midcoast Maine in the summer and fall of 2006. The protocol will be used to gather survey data in several additional coastal areas of Maine and New Hampshire in 2007.

*1 tool applied to use.*

- Maine Sea Grant collaborated with New Hampshire and MIT Sea Grant programs and Salem Sound Coastwatch to conduct marine invasive species identification workshops for 100 volunteer recreational divers and 20 commercial divers during the summer and fall of 2006. This collaborative developed a Web-based reporting system for the divers to log their sightings.

*Economic benefits generated.*

- We are currently unable to estimate the potential economic benefits derived.

## TECHNOLOGIES

### *2 technologies developed.*

- A trawl modified to improve escapement of small cod and haddock, while retaining market-sized fish, has been tested. Initial results were promising, and continued refinements will be tried in the field during 2007.
- Sea-Grant supported researchers are developing techniques for the culture of native Maine species of *Porphyra*, a red alga known as “nori” in Asian cuisine. *Porphyra umbilicalis* was found to reproduce exclusively by asexual spores on the Maine coast. Thus, a protocol was developed to seed nori culture nets with asexual spores of *P. umbilicalis*.

### *1 technology applied to use.*

- Siloxane-gel sensors were developed and field tested for measuring total mercury (Hg) in marine sediment pore waters. The process analyzes flux of mercury, allowing for assessment of contaminated sediments based on risk of mercury mobility from the sediments. These sensors are now used to measure mercury in the lower Penobscot River. Information gathered on mercury contamination at an industrial site on the river will be presented to the court during litigation on remediation of the site.

### *Economic benefits generated.*

- We are currently unable to estimate the potential economic benefits derived.

## INFORMATION SERVICES

### *5 information services developed.*

- Sea Grant worked with the southern Maine town of Wells to obtain funding from the EPA Smart Growth Implementation Assistance Program. The Town of Wells has received a technical assistance grant from EPA and will develop a town center plan that protects a nearby trout stream and promotes sustainable economic growth.
- Funding has been received to develop and implement a pilot elementary-level education program on large-scale river restoration and sea-run fisheries in the Penobscot River watershed during the 2007-2008 school year.
- Working in partnership with the Town of Wells, Wells Reserve, and diverse Wells community members, funding was received from U.S. EPA to implement the Wells Gateway Community Design Workshop Series. Seventy-five community members participated in the forum series. The Board of Selectmen will review the final report and design options in early 2007. Partners will agree on a final design plan for a busy highway intersection in the next year.
- Sea Grant staff worked with a middle school teacher to develop and publish the *Coastal Connections* watershed curriculum unit for the middle grades. The unit will be introduced to middle school teachers in Maine via three regional workshops in the 2007-2008 school year.
- Maine Sea Grant worked with the Maine Department of Marine Resources Ecology Division and the Maine Legislature’s Marine Resources Committee to develop a new

case study of community-based marine resource management in Taunton Bay. A collaborative 18-member governing board will manage an entire ecosystem including both human and non-human communities. The Taunton Bay pilot will provide valuable information for pursuing community-based management elsewhere in Maine.

*23 information services applied to use.*

- As a result of a strategic planning process for Destiny 2010: Downeast Sustainable Tourism Initiative, two workshops and a national ecotourism conference were held, with Sea Grant taking the lead on developing a comprehensive resource guide to sustainable tourism practices, available both in print and on the program's Web site.
- MDI Tomorrow, a group of citizens and nonprofit organizations working to plan the future of Mt. Desert Island, Maine, is serving as a model for Maine and the country, and was highlighted at the Maine Smart Growth Conference, the 4th Conference of the International Rural Network, and the annual conference of the Northern New England Chapter of the American Association of Planners.
- Two forums addressing coastal access have been held along the Maine coast in this reporting period, with over 100 participants attending each event. Maine Sea Grant was asked to lead a national effort to assess working waterfront access throughout the country.
- Current Use Taxation is an innovative new tool created as a result of a statewide referendum to protect working waterfront. Maine Sea Grant partnered with the Maine Revenue Services, the Maine State Planning Office and the Working Waterfront Coalition to host five well-attended workshops on the nuts and bolts of this new system, along with a suite of other tools for preserving working waterfronts.
- Abundance, size distributions, and sex ratios have been mapped for red crab, *Chaceon quinque-dens*, in the fishery along the continental slope of the Gulf of Maine, providing information to the New England Fishery Management Council toward development of a management plan for the species.
- A meeting on nonpoint source pollution, organized by Maine Sea Grant and the Wells National Estuarine Research Reserve, brought together four towns in the York River watershed, which resulted in the formation of the York River Watershed Council. Coordinated stormwater management will provide cost savings to the individual towns and protect water quality.
- Sea Grant organized the *Southern Maine Regional Forum on Coastal Access*. The forum was attended by 92 people who represented a wide range of interests, especially coastal property owners and recreational users. Feedback provided by participants will be used to identify next steps for coastal access activities in the region.
- In 2006, Sea Grant's Marine Extension Team assisted the Maine Department of Marine Resources with recreational fishing surveys in Downeast Maine. As a result of Sea Grant's involvement, the number of completed surveys greatly increased and an expanded survey will continue in 2007.
- Sea Grant worked with partners throughout the region to develop and implement the 2006 Northeast Aquaculture Conference and Expo, in conjunction with the Milford



Aquaculture Seminar. The event attracted 300 attendees and 40 commercial and educational vendors.

- Maine Sea Grant co-sponsored the *Southern Maine Beaches Forum* in April, after which participants held town workshops on the factors that affect beach water quality, developed communication plans, pursued remediation of local pollution sources, and networked with other towns for regional solutions. Beach water quality monitoring in Lincolnville found high bacteria counts, and the Town pursued legislation to transfer ownership from the State so that municipal officials could be more involved in the Maine Healthy Beaches program (coordinated by University of Maine Cooperative Extension and Maine Sea Grant).
- In May 2006, Maine Sea Grant sponsored (with the Town of Augusta) and organized the Spring Running to celebrate the improved health of the Kennebec River, and to highlight the river as a resource to local communities. Over 600 people attended the event, and the Spring Running is now an annual event.
- In the spring and summer of 2006, Sea Grant partnered with Bowdoin College's Environmental Studies Program to facilitate a roundtable discussion series, resulting in the formation of the Area Management Coalition (AMC), which is working in an organized way to promote community-based ecosystem management. The effort has attracted significant new funding, and the AMC continues to have a strong voice in rulemaking decisions of the New England Fisheries Management Council.
- An eight-page fact sheet on marine invasive species was produced and distributed to coastal managers, the Maine State Legislature, educators, and K-16 students throughout Maine in the fall of 2005. Due to continued high demand for this resource, a second printing of 3000 copies is planned for 2007.
- A poster and a one-page brochure were produced promoting public education and involvement in searching for the invasive Asian shore crab in Acadia National Park. The brochure was intended for park visitors.
- Two fact sheets, *Overwintering of Eastern Oysters: Guidance for Small-scale Growers* and *Phytoplankton in the Damariscotta River Estuary* were produced and distributed at the Damariscotta Oyster Festival and elsewhere.
- A display for the Maine Healthy Beaches Program was produced, highlighting the science and education aspects of the program, which was utilized in two conferences and several other forums.
- The Maine Healthy Beaches Program 2006 Annual Report was developed and distributed to 25 towns and over 1000 citizens.
- For the Beach Profile Monitoring program, a Quality Assurance Project Plan has been developed and data-sharing strategies implemented.
- Eight years of data from the Southern Maine Beach Profile Monitoring Program is being used by Maine Geological Survey to produce the "State of Maine Beaches in 2007" report, released in June 2007 at the Maine Beaches Conference.
- On April 6, 2006, the 14<sup>th</sup> Northeast Farmed Fish Health Management Workshop attracted nearly 100 participants from New England and the Canadian Maritimes; a survey of participants indicated that 97% would apply information gained from the workshop into their current work.
- A Sea Grant-supported project to determine phytoplankton carrying capacity in the Damariscotta River estuary found that the largest phytoplankton biomass occurred in

the upper estuary during the shellfish growing season, and that phytoplankton cells <20 µm, the size on which oysters typically feed, were the dominant fraction of phytoplankton biomass. This provides rationale for using floating grow-out enclosures for juvenile oysters in this section of the estuary. Continued monitoring of phytoplankton variability can help oyster and mussel farmers decide when to sow, maintain, and harvest.

- Fact sheets on Maine Sea Grant and the Marine extension Team were produced and widely distributed throughout the University of Maine community, the state, and to federal legislators.
- Maine Sea Grant's science writer wrote and placed eight feature articles in several journals, including *Wild Catch* (for which she is the Northeast correspondent) and the prestigious *Maine Boats, Homes, & Harbors*.

*Economic benefits generated.*

- We are currently unable to estimate the potential economic benefits derived.

## 2007-2008 ANTICIPATED

### TOOLS

*5 tools developed.*

- The data collection and analysis phase of the sea scallop fencing project, funded by the Maine Aquaculture Innovation Center, will be finalized. If warranted, additional fieldwork will commence in the fall of 2007 to run through the winter, including outreach to land-based lobster holding facilities.
- An applied research program of biological sampling, behavior, and migration study of Atlantic Halibut (*Hippoglossus hippoglossus*) in the Gulf of Maine will be initiated.
- The MET will work with the Maine Department of Marine Resources to improve the process of collecting data for the Marine Recreational Fisheries Statistics Surveys.
- MET staff will work with shellfish growers, University faculty, and the Maine Aquaculture Association to develop a suite of instruments appropriate to measure the effects of oyster dragging on the turbidity of the Damariscotta River.
- Maine Sea Grant extension will work with mussel growers and researchers from MIT to evaluate the effectiveness of an auditory deterrent on duck predation of mussel longlines.

*3 tools applied to use.*

- A Bayesian seasonal, sex-specific, length-structured model for assessing the stock of American lobster, *Homarus americanus*, was developed and tested against existing models. The Atlantic State Marine Fisheries Commission plans to adopt the model and its new approach.
- Maine Sea Grant received a \$54,531 grant from the National Sea Grant Law Center for the project, *Legal and Policy Tools for the Protection of Coastal Access in Maine and the Nation*. Marine Extension Team members will work with project partners to implement educational products and programs about tools for protecting access and working waterfront. Tools will include various methods of conserving lands for coastal access, models of cooperative agreements for coastal

access, and municipal and tax tools and will be delivered through printed materials and workshops.

- A quantitative water sampling method, using the Jellet Rapid Response Test, is more accurate than microscopic identification by volunteers in determining the presence of toxins in phytoplankton that produce paralytic shellfish poisoning. Maine Department of Marine Resources will train staff and volunteers in using this method in 2007.

## TECHNOLOGIES

*2 technologies developed.*

- A trawl designed to reduce bottom impact and improve selectivity will be modeled at a precise scale, and tested in the Flume Tank Facility at the Marine Institute at Memorial University of Newfoundland, Canada. A full-scale prototype will be constructed, and tried in the field, taking into account the modeling data.
- Two applied research projects on fishing gear selectivity will begin fieldwork, data collection and analysis, reporting, and outreach.

*1 technology applied to use.*

- Molecular padlock probes were used, with an amplification technique, to capture RNA and DNA sequences from Infectious Hematopoietic Necrosis Virus and Infectious Salmon Anemia Virus, two viral pathogens of fishes. The researcher is in the process of identifying a partner to be involved in the fabrication of a marketable detection product.

## INFORMATION SERVICES

*17 information services developed.*

- Sea Grant is partnering with the University of Maine at Machias to analyze the economic contribution of saltwater angling in eastern Maine. A report will be released next year.
- At least two communications/marketing tools and a new display will be developed so that targeted audiences and the general public will be aware of Maine Sea Grant and the products and services we offer.
- A three-year pilot report on island impact monitoring will be completed and digital documents will be delivered in usable format to managers.
- The lease will be finalized for the Oyster Gardening program, opportunities created for students to participate in community service volunteer programs, and the program's potential in other communities will be explored.
- The MET will assist the towns along the Damariscotta River with a community-wide effort to discuss planning for the river's future.
- The education coordinator will expand opportunities for Maine middle school teachers to incorporate watershed education into their "Learning Results" aligned curricula.
- The MET will work with stakeholders of watersheds in coastal York County and partners to achieve key objectives of their watershed management plans.

- Maine Sea Grant and University of Maine Cooperative Extension will implement the Aquatic Invasives in Maine (AIM) program, a one-year program on marine invasive species and biodiversity, beginning with a 5-day teachers' professional development institute in June 2007. The program will continue through the 2007-2008 school year.
- The MET will work with the Maine Marine Invasive Species Working Group and a Northeastern Sea Grant marine invasive species collaborative to train citizens, students, and scuba divers to monitor for invasive species in intertidal and subtidal areas of the Gulf of Maine. Trainings for personnel in the Maine departments of Environmental Protection and Transportation are planned for 2007.
- The Penobscot River Watershed Education Program, a one-year pilot education program for 5<sup>th</sup> grade students in the Penobscot River watershed, will be launched.
- Maine's K-12 teachers and informal educators will increase their use of Maine Sea Grant's education products, programs, and services, and teachers' and students' working knowledge of local, regional, and global ocean and coastal research and management topics will be measured.
- Through the Maine Healthy Beaches program, University of Maine Cooperative Extension and Sea Grant will develop and implement special studies in Kennebunk and Ogunquit including: monitoring 36 sites in high priority areas in the watersheds, conducting sanitary shoreline surveys, GIS mapping, undertaking a fluorometry study in Kennebunk, and partnering with Maine Geological Survey to conduct an acoustic doppler profiling study in Ogunquit.
- Through the Northeast Regional Aquaculture Program, Sea Grant Extension will work with aquaculture specialists in the region to develop a Regional Extension Project to identify educational needs for industry, and to deliver these materials and programs in a comprehensive and coordinated fashion.
- Maine Sea Grant will work with the Maine Aquaculture Innovation Center, the Maine Aquaculture Association and other regional partners to development and implement the Northeast Aquaculture Conference and Expo (NACE) to be held in Portland, Maine, in December 2008.
- In collaboration with Oregon Sea Grant, Maine Sea Grant received a \$289,887 grant in July 2007 from NOAA's Climate Program Office for a two-year project, "Climate Variability and Coastal Community resilience: Testing a National Model of State-based Outreach." Needs assessment through focus groups and surveys will be conducted in the next year.
- MET members will coordinate a preliminary forum on climate change for researchers, environmental organizations, college administrators, and others to discuss current work and plan for future collaboration on this issue. A larger conference may result from these discussions.
- The almanac, *The Seaside Companion: Discovering the Maine Coast a Day at a Time*, will be published by Tilbury House Publishers and distributed through their marketing Network.

#### *7 information services applied to use*

- The Maine Healthy Beaches Program, a collaboration of University of Maine Cooperative Extension and Maine Sea Grant, produced the brochure *Healthy Boating Equals Healthy Beaches*, a guide to best practices for boaters, including contacts for

pumpout stations along the Maine coast. The first print run was 5000 and towns and marinas have already requested 3000 more copies. They will be distributed throughout summer and fall 2007.

- An MET member will represent the Downeast region on the Governor’s Nature-based Tourism Task Force, serve as an advisor and collaborator with the new Cooperative Extension tourism specialist at the University of Maine and the new Maine Office of Tourism staff for Downeast region, and collaborate on statewide tourism initiatives that promote sustainable tourism.
- A collaborative effort to examine new strategies for managing closed bottom habitats for sea scallops will be implemented.
- The 3<sup>rd</sup> annual Spring Running Festival will be successfully organized for the summer of 2008.
- The Beach Profile Monitoring Program will be self-sustaining in the next year through financial contributions from towns and coastal property owners.
- The Sea Grant-produced educational posters on the Penobscot River and Penobscot Bay will be installed in the kiosks at the Penobscot Narrows Bridge Observatory in Prospect, Maine. Since the observatory opened in May 2007, it has attracted over 10,000 visitors a month.
- Educational posters on the Kenduskeag Stream and Penbscot Bay, produced in collaboration with NOAA Fisheries, will be installed in kiosks in Bangor and Bucksport.

#### IV. Appendices

##### Management Metrics

##### a. Staff Composition

##### FTEs (Full Time Employees = 12 man months) Devoted to Sea Grant

Sea Grant Staffing	# of Individuals	# of FTEs funded by Sea Grant \$	# of FTEs funded by Non-Sea Grant \$ (including match)
Administrative	5	1.69	2.56
Communications	3	.93	1.07
Extension	10	3.02	6.98
Education	1	0	1
Research	0	0	0
<b>TOTAL</b>	<b>19</b>	<b>5.64</b>	<b>11.61</b>

<b>Mgmt. Team Member</b>	<b>Position</b>	<b>FTEs devoted to Sea Grant</b>
Paul Anderson	Director	1
Susan White	Associate Director for Outreach	1
Jim McCleave	Assistant Director for Research	.25
Lynn Wardwell	Fiscal Manager	1

**b. Program Development Projects**

<b>Project Title</b>	<b>PI</b>	<b>Institution</b>	<b>Federal Funds</b>	<b>Matching Funds</b>
9th International Conference on Shellfish Restoration	Rick Devoe	SC Sea Grant	\$500	
A Pilot Study to Determine the Use of Three Tools to Monitor Toxicity in Bloom Dynamics in Harpswell, Maine	Alison Sirois	Maine Dept. of Marine Resources	\$3,500	
Ambassadors of the Bay: Vision Quest 2006	Jane Disney	Mount Desert Island Water Quality Coalition	\$1,000	
Characterization of Coastal Brook Trout Movement Strategies Between Fresh and Marine Waters	Ben Letcher	Conte Anadromous Fish Research Center/USGS	\$6,000	
Characterization of Meiofaunal Associations in Altered Maine Sandy Beaches	Stephen Fegley	Maine Maritime Academy	\$4,000	
Conference Support for "Special Strategies for Protecting Special Areas"	Katherine Kerkam	Maine School of Law	\$500	
Enhancing Capacity for Economic Research on	Kevin Athearn	UMaine Machias	\$3,500	

Marine Industries of Eastern Maine				
Gulf of Maine Expedition Institute Web Site Development	Rich MacDonald	Gulf of Maine Institute	\$1,500	
Habitat Restoration Primers	Jon Kachmar	Gulf of Maine Council	\$2,000	
Improved Estuarine Passage of Atlantic Salmon Smolt in the Penobscot River via Sea-Ready Hatchery Preconditioning	Steven Jury	Marical	\$3,200	
Maine Coastal Waters Conference	George Lapointe	Maine Dept. of Marine Resources	\$3,000	
Monitoring the Abundance and Distribution of the Invasive Asian Shore Crab, <i>Hemigrapsus sanguineus</i> , on the Schoodic Peninsula and Its Effects on Intertidal Crab and Bivalve Populations	Aimee Phillippi	Bates College	\$4,000	
Preliminary Wetland Survey of the Penobscot River and Estuary	Aram Calhoun	University of Maine	\$1,600	
Salt Marsh Speaker: Denise Reed	Joseph Kelley	University of Maine	\$680	
Spring Running Festival	Jay Adams	City of Augusta	\$500	

**c. List of Partnerships**

<b>Federal</b>	<b>Regional</b>	<b>Local &amp; State</b>	<b>NGOs</b>
Acadia National Park (2)	New England Fishery Management Council	York Harbor Commission	Casco Bay Estuary Project (2)
National Park Service (2)		City of Augusta (2)	Census of Marine Life
NOAA Fisheries (4)		City of Biddeford	Coastal Mountains Land Trust
Northeast Consortium (2)		City of Portland	Coastal Studies for Girls
U.S. Coast Guard		City of Saco	Cobscook Bay Resource Center (2)
U.S. Environmental Protection Agency (3)		City of South Portland	COSEE New England
U.S. Fish and Wildlife Service (2)		Crescent Beach State Park	COSEE Ocean Systems
U.S. Geological Survey (2)		Ferry Beach State Park	Damariscotta River Association
USDA APHIS VS ISA Control Program		Maine Coastal Program, State Planning Office (8)	Eastern Aquaculture Veterinary Association
Wells National Estuarine Research Reserve (5)		Maine County Soil and Water Conservation Districts	Friends of Casco Bay (3)
		Maine Dept. of Conservation	Friends of Midcoast Maine
		Maine Dept. of Environmental Protection (4)	Friends of Sears Island
		Maine Dept. of Health	George Mitchell Center (3)
		Maine Dept. of Inland Fisheries and Wildlife (2)	Gulf of Maine Council
		Maine Dept. of Marine Resources (11)	Gulf of Maine Expedition Institute
		Maine State Planning Office	Islesboro Islands Trust
		Maine Dept. of Public Health	Kennebec Valley Trout Unlimited
		Maine Dept. of Transportation	Maine Aquaculture Association (2)
		Maine Geological Survey	Maine Aquaculture Innovation Center (5)
		Popham Beach State Park	Maine Chapter of the Sierra Club
		Reid State Park	Maine Lakes Conservancy Institute
		Scarborough Beach State Park	Maine Rivers
		Southern Maine Regional Planning Commission	Maine Sea Urchin Zone Council
		Town of Bristol	Maine Seacoast Mission
		Town of Camden	Marine Environmental Research Institute
		Town of Kennebunk	Mr. And Mrs. Fish
		Town of Kennebunkport	National Marine Educators Association



		Town of Kittery (2)	Old Fort Western
		Town of Lincolnville	Penobscot Bay Alliance
		Town of Ogunquit	Penobscot River Restoration Trust
		Town of Old Orchard Beach	Protect Sears Island
		Town of Scarborough	Salem Sound Coast Watch
		Town of Wells (2)	Salt Water Network
		Town of York	SOS Maine
		University of Maine Cooperative Extension (9)	Surfriders NNE
			The Chewonki Foundation (3)
			The Nature Conservancy (3)
			The Ocean Conservancy (2)
			Time and Tide RC+DA, USDA
			Trout Unlimited

**c. List of Partnerships (cont.)**

<b>International</b>	<b>Industry/Business</b>	<b>Academic Institutions</b>	<b>SG Programs</b>	<b>Other</b>
	F/V Bad Penney (2)	Bowdoin College (2)	CT Sea Grant	MDI Biological Laboratory
	Kittery Trading Post	College of the Atlantic (2)	HI Sea Grant	MDI Paddling Club
	L.L. Bean	Old Town Elementary School	MIT Sea Grant	Gulf of Maine Research Institute (4)
	Maine Aquaculture Training Institute	Seacoast Science Center	NH Sea Grant (2)	
	MariCal	University of Maine (13)	WHOI Sea Grant	
	MDIWebsites.com	University of Maine Machias (2)	NY Sea Grant	
	National Park Sea Kayak Tours	University of New Hampshire	RI Sea Grant	
	Pemaquid Oyster Company	University of Southern Maine		
	River Market	Washington County Community College		
	Spahr and Dabrowski			
	Urchin Buyer			
	Wild Catch Magazine (5)			

**d. Leveraged Funds**

<b>Project</b>	<b>Source</b>	<b>Amount</b>	<b>Yrs</b>
Sediment Transport	UMaine Cooperative Extension	\$5,000	2
Buoyant Ground Cables	Northeast Consortium	\$119,794	2
Seabed Fencing	ME Aquaculture Innovation Center	\$7,410	1
Resource Guide for Sustainable Tourism	Gulf of Maine Council	\$9,750	1
Four-seam Bottom Trawl	Northeast Consortium	\$65,749	2
MOSAC Admin Fee	ME Dept. of Environmental Protection	\$9,013	2
Economic Contribution of Recreational Fishing	UMaine Cooperative Extension	\$5,000	2
WCCC Waterfront Director	Washington County Community College	\$2,500	1
Kayak Safety Brochure (reprint)	Kittery Trading Post	\$300	1
Kayak Safety Brochure (reprint)	Maine Coastal Program	\$300	1
Kayak Safety Brochure (reprint)	L.L. Bean	\$300	1
Waterfront Access	UMaine Cooperative Extension	\$9,000	2
Waterfront Access	Hawaii Sea Grant	\$2,500	2
Farmed Fish Health Workshop	ME Aquaculture Innovation Center	\$4,545	1
<b>TOTAL</b>		<b>\$241,161</b>	

**e. Communications Metrics  
Publications List**

**Technical Reports**

14<sup>th</sup> Annual Northeast Farmed Fish Health Management Workshop Program Guide and Abstracts

**Brochures, fact sheets, posters, etc.**

1. *Marine Aquaculture in Maine: How the Public Can Participate in the Leasing Process* booklet (revised)
2. PAT Briefing Book
3. *Overwintering of Eastern Oysters: Guidance for Small-scale Growers* fact sheet
4. *Phytoplankton in the Damariscotta River Estuary* fact sheet
5. *2006 Maine Sea Grant Annual Report*
6. Southern Maine Beach Profile Monitoring brochure
7. *Ambassadors of the Bay 2005 Final Report*
8. Maine Sea Grant fact sheet

9. Marine Extension Team fact sheet
10. *Maine Healthy Beaches Program 2006 Report*
- 11-12. Kenduskeag Stream and Penobscot Bay posters
13. *What Lies Between: The Penobscot River Estuary* poster

**Peer-reviewed journal articles/ book chapters**

- Li, D., Panchang, V. and Jin, J., 2005. Development of an online coastal wave prediction system. In: L. Wallendorf, L. Ewing, S. Rogers and C. Jones (Editors), *Solutions to Coastal Disasters 2005*. American Society of Civil Engineers, pp. 24-32.
- McCarthy, E.L., Bickerstaff, L.E., Pereira da Cunha, M. and Millard, P.J., 2007. Nucleic acid sensing by regenerable surface-associated isothermal rolling circle amplification. *Biosensors and Bioelectronics*, 22: 1236-1244.
- McCarthy, E.L., Egeler, T.J., Bickerstaff, L.E., da Cunha, M.P. and Millard, P.J., 2005. Rapid detection of IHNV by molecular padlock recognition and surface-associated isothermal amplification. *Proceedings of SPIE*, 5994: 7 pages.
- McCarthy, E.L., Egeler, T.J., Bickerstaff, L.E., Pereira da Cunha, M. and Millard, P.J., 2006. Detection and identification of IHN and ISA viruses by isothermal DNA amplification in microcapillary tubes. *Annals of Bioanalytical Chemistry*, 386: 1975-1984.
- Merritt, K.A. and Amirbahman, A., 2007. Mercury dynamics in sulfide-rich sediments: Geochemical influence on contaminant mobilization within the Penobscot River estuary, Maine USA. *Geochimica et Cosmochimica Acta*, 71: 929-941.
- Merritt, K.A. and Amirbahman, A., 2007. Mercury mobilization in estuarine sediment porewaters: a diffusive gel time-series study. *Environmental Science and Technology*, 41: 717-722.
- Millard, P.J., Bickerstaff, L.E., LaPatra, S.E. and Kim, C.H., 2006. Detection of infectious haematopoietic necrosis virus and infectious salmon anemia virus by molecular padlock amplification. *Journal of Fish Diseases*, 29: 201-203.
- Rogers, J.N., Kelley, J.T., Belknap, D.F., Gontz, A. and Barnhardt, W.A., 2006. Shallow-water pockmark formation in temperate estuaries: A consideration of origins in the western gulf of Maine with special focus on Belfast Bay. *Marine Geology*, 225: 45-62.
- Woodward, B.L. and Winn, J.P., 2006. Apparent lateralized behavior in gray whales feeding off the central British Columbia coast. *Marine Mammal Science*, 22: 64-73.

### **Videos/CDs/DVDs**

- *Downeast Sustainable Tourism Resources and Tools* (CD)
- *Coastal Access and Working Waterfront in Maine Resources* (CD)

### **Handbooks, manuals, guides**

- *Coastal Connections: Field, lab, and classroom experiences focusing on coastal watershed study in Maine* (pilot)

### **Electronic publications**

- *Coastal Connections: Field, lab, and classroom experiences focusing on coastal watershed study in Maine*
- *Field Trials of 4" Rings in the Inshore Scallop Fishery of the Gulf of Maine* (\*)
- *The Wells Bay Beach Planning Process*
- *Maine Beaches Conference 2007 Proceedings* (\*)

(\* Outside this reporting period)

### **Theses/ dissertations**

Brothers, Laura. 2006. Sedimentary Pathways and Their Social Implications, Saco Bay, Maine. Dual M.S. degree in Oceanography and Marine Policy. University of Maine, Orono.

Kristen Lee. 2006. Late Quaternary sea-level lowstand environments and chronology of outer Saco Bay, Maine. M.S. Thesis (Earth Sciences). University of Maine, Orono.

Blouin, Nicolas. 2006. Asexual Reproduction in *Porphyra umbilicalis* (L.) Kützing and Assessment of Its Use in Integrated Multi-trophic Aquaculture (IMTA). M.S. degree in Marine Biology. University of Maine, Orono.

Brian Thompson. 2006. Temporal and spatial variability of phytoplankton biomass in the Damariscotta River estuary, Maine, USA. M.S. thesis (Oceanography). University of Maine, Orono.

### **Media placements**

#### **List A**

**Maine Sea Grant Press** (resulting from press releases sent out February 1, 2006—January 31, 2007)

***Maine Sea Grant Welcomes New Education Coordinator***—February 22, 2006

***National Fellowships Awarded to University of Maine Graduates***—February 24, 2006  
- Marine Specialists on Capitol Hill, *UMaine Today* (journal), March/April 2006

***Farmed Fish Health Workshop Celebrates Fourteenth Year***—March 20, 2006  
- Aquaculture Workshops Scheduled at WCCC, *Bangor Daily News*, April 15, 2006  
- Fish Health Workshop Planned for March 27, *Fish Farming News*, Issue 6, 2006

***Tourism Workshop a Success***—April 6, 2006

***Maine Sea Grant Will Host “Coastal Access in Maine: An Open Discussion Among Regional Stakeholders”***—May 2, 2006

***Forum to Address Coastal Access in Southern Maine***—May 15, 2006

- UNE to Host Coastal Access Workshop, *University of New England in the News*, May 26, 2006
- UNE to Host Coastal Access Workshop, *Biddeford Journal Tribune*, May 26, 2006

***The Spring Running Celebrates the Return of Migrating Fish and a Renewed Kennebec River***—May 17, 2006

- The Spring Running Celebrates Kennebec River Revival, *UMaine Today Online*, May 3, 2006
- Celebrating a River, its Fish, and Our Connection to Both, *Morning Sentinel*, May 14, 2006
- Festival Hails Rebound of River, Fish Numbers, *Kennebec Journal*, May 18, 2006

***The Growing Town of Wells Seeks Input on Preserving Town Character and Natural Assets***—August 14, 2006

- RT. 1/109 corridor up for discussion, *York County Coast Star*, August 21, 2006
- What Should Wells Look Like, *York County Coast Star*, September 21, 2006
- New Options for Route 109, *York County Coast Star*, September 28, 2006

***New Publications Designer Joins Maine Sea Grant***—September 7, 2006

- Tenga-Gonzalez Joins Maine Sea Grant, *Inside UMaine* (newsletter), October 2006

***Maine Sea Grant Director to Lead National Organization***—December 8, 2006

- Maine Sea Grant Director to Lead National Organization, *UMaine Today* online, 12/7/2006
- *Go Blue!* University of Maine President Robert Kennedy’s online letter to university community, January 4, 2007
- Anderson to Lead National Organization, *Inside UMaine*, February 2007.

***Workshops on New Current Use Taxation and Other Tools for Preserving Working Waterfronts to be Offered Statewide***—January 22, 2007

- Workshops Set on New Tax Law Aimed at Protecting Working Waterfronts, *The Ellsworth American*, January 25, 2007
- Workshops Set on New Tax Law, *The Ellsworth American* online, January 25, 2007
- Workshops to be held Concerning Working Waterfronts, *Quoddy Tides*, January 26, 2007

- Waterfront Tax Program to be Discussed at Meetings, *Bangor Daily News* (Weekend), January 27-28, 2007
- Workshops Set on New Tax Law, City of Ellsworth Web site, February 2, 2007
- Preserving Waterfront Topic of Workshops, *Bangor Daily News*, February 19, 2007
- Working Waterfront Seminar in Ellsworth, *Bangor Daily News*, February 26, 2007

## **List B**

### **Press coverage not related to press releases**

Act Today, Protect Water Tomorrow, *York County Coast Star*, February 16, 2006

Maine Coastal Waters Conference 2006 (calendar listing with sponsors), *Gulf of Maine Times* and *Maine Coastline*, Spring 2006

Connection to the Community: Carrying Out UMaine's Land- and Sea-Grant Mission, University of Maine Cooperative Extension poster, May 2006

Extension Books and Publications catalog, *Life Between the Tides: Marine Plants and Animals of the Northeast*, Spring/Summer 2006

Working Waterfronts Featured in New Exhibit, Art Show Opening June 9, *Village Soup*, June 3, 2006

Working Waterfronts Exhibit Surfaces June 9, *Village Soup*, June 4, 2006

Onboard Handling Techniques Key to Higher Quality and Price, New Hampshire Sea Grant fact sheet, June 2006

Ocean Bowl, *UMaine Today* magazine, May/June 2006

Wading in Quinnipiac Mud Guides Career Path for Beth Owen, *Wrack Lines*, Spring/Summer 2006

One Size Doesn't Fit All for New England Fisheries Management, *Wrack Lines*, Spring/Summer 2006

Shirt Tail Point Beach Advisory Remains in Effect, *Village Soup*, July 7, 2006

On the Trail of Beach Bacteria, *Portland Press Herald*, July 8, 2006

Couple to Serve as Naturalists on "Prairie Home" Cruise, *Bangor Daily News*, July 12, 2006

Invading Crabs a Focus of Maine Coastal Classroom, *College Campus News* Web site, July 14, 2006

Bar Harbor to Take Part in Beach Monitoring, *Bangor Daily News*, September 7, 2006

Conserving Working Waterfronts in Maine, *Coastal Services* (journal), September/October 2006

Water Woes: Shortages along the East Coast Pose Problems, *Coastal Contractor*, September/October 2006

Businesses Take Runoff By Storm, *Portsmouth Press Herald*, 10/1/ 2006

KEYS Coalition: Two Years Later, *The Weekly Sentinel*, 10/20/2006

Fish Health Workshop Planned for March 27, *Fish Farming News*, Winter/2006

## **Other**

### ***Displays***

- Maine Healthy Beaches Program display

### ***Feature articles***

- Despite their golden color, these (sea urchins) still flourish in the Gulf of Maine, *Wild Catch*, March /April 2007.
- Seaweed beyond sushi, *Maine Boats, Homes, & Harbors*, February/March 2007.
- Monkfish: Julia loved them, *Wild Catch*, January/February 2007.
- No matter what you call it, “squat” isn’t lobster, *Wild Catch*, January/February 2007.
- A Day at the Portland Fish Exchange. [www.seagrant.maine.edu](http://www.seagrant.maine.edu), December 2006.
- Diver-harvested scallops: Precious as pearls, *Wild Catch*, November/December 2006.
- Northern Shrimp: A gala addition to a winter's night, *Wild Catch*, August/September 2006.
- Coffin haddock net yields mixed results, *Commercial Fisheries News*, November 2006.

2. Insert the total number of publications below in each category.

<b>Category</b>	<b># of Pubs</b>
Technical reports	1
Proceedings, symposia	0
Brochures, fact sheets, posters, etc.	13
Books, monographs	0
Peer-reviewed journal articles, book chapters	9
Videos/CDs/DVDs	2
Maps/charts	0
Handbooks, manuals, guides	1
Electronic publications	4
Theses, dissertations	4
Newsletters, periodicals	0
Media placements	42
Other	9

**f. Students Supported**

Students supported by any Sea Grant funds (i.e., hourly support, tuition and/or stipend).

<b>Category</b>	<b># of new students</b>	<b># of continuing students</b>	<b># of Degrees Awarded</b>
Knauss Fellowship	3		
Industry Fellowship			
NMFS/SG Fellowship			
State Fellowship			
Sea Grant Supported MS/MA Graduate Students	2	2	4
Sea Grant Supported PhD Graduate Students	0		0
Sea Grant Supported Undergraduate Students	2		
Other			
<b>TOTAL</b>	<b>7</b>	<b>2</b>	<b>0</b>



**g. Program Awards and Honors**

- Bartlett, Chris: Received book, *Gulls of North America, Europe, and Asia*, with the inscription, "In Appreciation for your five years of service as the chair of the Cobscook Bay Resource Center," October 2006.

**V. OPTIONAL SECTION**

**a. Education Metrics**

**1. K-16**

**Compiled for Entire ME Sea Grant MET (02/01/06 – 01/31/07):**

<b>Professional Development for Educators</b>	<b>Elementary School</b>	<b>Middle School</b>	<b>High School</b>
Number of professional development sessions (workshops, institutes NOT for college credit)	<b>0</b>	<b>2</b>	<b>1</b>
Number of attendees at professional development sessions	<b>0</b>	<b>16</b>	<b>2</b>
Number of students reached through educators (NOTE: if you have this number, great, otherwise please use a multiplier for your state, e.g. most elementary teachers teach 25 students in your state.)	<b>0</b>	<b>352</b>	<b>50</b>
Number of curricula developed	<b>0</b>	<b>1</b>	<b>0</b>

<b>Courses for College Credit</b>	
Number of courses taught (for credit, college level)	<b>0</b>
Number of students/participants in courses	<b>N/A</b>

<b>Advisory (state standards, national standards)</b>	
Number of consultations	<b>1</b>

**2. Informal Education/Free Choice Learning**

<b>Professional Development for Educators</b>	
Number of attendees at professional development sessions	<b>9</b>

<b>Programs for children and families</b>	
Number of camps, programs, activities, clubs, etc.	<b>11</b>
Number of attendees	<b>1,058</b>
Number of class trips	<b>4</b>

### 3. Extension Metrics

<b>Number of SG-sponsored/organized meetings, workshops and conferences</b>	<b>73</b>
<b>Number of attendees in SG meetings/workshops</b>	<b>2,563</b>
<b>Number of Radio Interviews</b>	<b>2</b>
<b>Number of TV appearances</b>	<b>2</b>
<b>Number of Public Presentations</b>	<b>42</b>
<b>Number of attendees at presentations</b>	<b>1,647</b>
<b>Number of volunteer hours</b>	<b>10,990</b>

#### b. Supplemental Impacts and Outcomes: Legislation, Regulation, and Policy Development

Through research investments and the work of the Marine Extension Team, Maine Sea Grant helps to inform and facilitate the development of new laws, regulations, and policies. Though not an advocacy organization, Sea Grant plays a role in convening, facilitating, and bringing science to discussions, and this often contributes to the work of agencies, municipalities, and other stakeholders in crafting new approaches to natural resource management.

**Aquaculture Task Force:** *Paul Anderson chaired this task force, presented the findings to the Governor and the Legislature, and provided testimony throughout the effort to change legislation and regulation. Several MET members also contributed to the Task Force’s work.*

- Legislators implemented nearly a dozen changes to Maine aquaculture law in 2005-2006.
- The Department of Marine Resources promulgated regulatory changes in response to several other recommendations from the Task Force in 2005-2007.
- A vision for aquaculture in Maine was adopted by the state.

**Bay Management:** *Paul Anderson served on the Bay Management Steering Committee, which submitted a report to the Land and Water Resources Council that ultimately led to an executive order and legislation. Several MET members also provided input and testimony related to the Bay Management study.*

- The Land and Water Resources Council submitted the steering committee’s report, *Managing Maine’s Nearshore Coastal Resources*, to the Marine Resources Committee at the beginning of January, and the committee voted unanimously to generate a Joint Resolution in support of the report in its entirety. The Joint Resolution is currently moving through the legislative process.
- The Legislature passed LD 1420 to correct an outdated reference within the Coastal Policies Act. LD 1420 also provided a vehicle to make a special provision with regard to rulemaking in Taunton Bay (see below).
- Governor Baldacci signed an Executive Order in March 2007, which directed state agencies to follow up on a number of the recommendations in the Bay Management study.

**Taunton Bay:** *Sherman Hoyt has been closely involved in discussions that led to successful implementation of a comprehensive resource management plan in this region. The plan was informed by the Sea Grant-led “Needs and Issues in the Taunton Bay Region: A Survey of Residents from Franklin, Hancock, and Sullivan, Maine (2003).” Other MET members provided facilitation support in this effort, and the bay was selected as a pilot program under the Bay Management study mentioned above.*

- DMR submitted the report on the Taunton Bay Resource Management Plan to the Marine Resources Committee in January 2007. The legislature approved an amendment to LD 1420, which stated that such rules adopted to implement the Taunton Bay Resource Management Plan would be routine technical instead of major substantive. This means that these rules do not have to come back to the Legislature for final review.

**The Cobscook Bay Management Plan for Finfish Aquaculture:** *Chris Bartlett was asked by the Maine Aquaculture Association and the Department of Marine Resources to convene and facilitate this effort in the fall of 2002.*

- The plan includes best management practices for the separation of year classes, fallowing of farm sites, and biosecurity and disinfection strategies. The Cobscook Bay Management Plan has become part of the standard operating procedure for salmon aquaculture in Maine, and portions of the document have been incorporated into regulations by the Maine Department of Marine Resources and into USDA Animal Plant Health Inspection Service’s standards for Infectious Salmon Anemia management.

**Scallop Enhancement:** *Chris Bartlett, Dana Morse, and Sherman Hoyt convened a workshop in 2006 with the Maine Department of Marine Resources on scallop enhancement strategies to address declines in the scallop fishery. The workshop invited experts to present on topics ranging from wild spat collection, re-seeding methods, and assessment techniques to policy implementation.*

- Fishermen in the towns of Jonesport and Beals partnered with Maine Sea Grant and the Downeast Institute for Applied Marine Research to design a scallop enhancement project, which was funded by the Northeast Consortium (142K). In April 2007, the Maine Legislature unanimously passed an emergency bill that closed two areas to commercial fishing in the Jonesport area for three years to accommodate this enhancement project.

**Sea Urchin Regulations:** *Sherman Hoyt and other members of the MET organized and facilitated a series of workshops in 2001-2002 that brought scientists, regulators, and industry together to develop new strategies for managing this struggling fishery.*

- The outcomes from these meetings prompted legislation and improved regulations regarding maximum and minimum size limits and new strategies for the establishment of seasons and total take by the fishery. As a result, the “free fall” of the urchin resource has stabilized.

**Special Licenses for Aquaculture:** *Dana Morse has been working in recent years to develop and transfer technologies related to the collection of wild scallop spat for aquaculture along Maine’s coast.*

- The DMR modified their policy, eliminating the requirement for a special license with Advisory Council approval. It is now legal for growers to collect scallop spat and transfer juvenile scallops to lease sites for growout without a special license.

**Limited Purpose Aquaculture License:** *Dana Morse worked with DMR over the last few years to develop a Limited Purpose Aquaculture license option for growers in Maine.*

- Maine Sea Grant brought useful observation and information to DMR as they crafted the regulation for this innovative leasing category that ultimately resulted in an option for growers which was based on both science and practical considerations from the growers' perspective.

**Maine Sand Dune Law:** *Kristen Whiting-Grant coordinates the state's volunteer Beach Profile Monitoring Program and other outreach efforts, such as the Maine Beaches Conference, that have informed development of better management strategies for Maine's sand beaches.*

- The biennial Maine Beaches Conference provides an opportunity for the regulatory agencies to get input from coastal property owners and researchers outside of the formal public hearing process, enabling more effective legislative and regulatory changes which were promulgated in 2006.
- Data routinely collected by the beach profile monitors has helped the state and local officials in developing sand budgets and implementing beach management strategies.

**Consistency in the application of fishing gear rules:** *Dana Morse was approached by the Maine Marine Patrol and NMFS enforcement personnel, to convene workshops that brought fishermen and enforcement together to ensure mutual understanding of the compliance criteria for fishing nets and gear.*

- This effort has resulted in changes to how the enforcement community utilizes gauges and implements rules for fishing gear in hopes of achieving better compliance.

**Facilitation and Group Process as an Unbiased Convener:** Maine Sea Grant and the Marine Extension Team (MET) have a strong reputation in the state as non-advocacy, and unbiased conveners. We are frequently called upon to either facilitate directly, or help to develop processes that result in collaborative solutions to complex problems. Since Sea Grant staff are knowledgeable about most of the natural resources and sociological issues in the state of Maine, and because of our skills in group process, we are uniquely capable of helping stakeholders to be more effective collaborators and ensure inclusion, engagement, and the utilization of science when possible in these multi-stakeholder processes. Since the Marine Extension Team is distributed along the coast, we are able to respond to varying situations throughout the coastal counties of Maine and to utilize a team approach that builds on our individual strengths. In many cases, these convening activities involve organizations and institutions that are often at odds, and without the assistance from Sea Grant would never reach consensus in a collaborative spirit.

1. Urchin Summits [conflicts between draggers, divers and regulators]
2. Cobscook Bay Fishermen's Association [conflicting fisheries uses and aquaculture]
3. Towns of Kennebunk and Kennebunkport [conflicting issues related to non-point source pollution and the Healthy Beaches Program]
4. Towns of Ogunquit and Wells [conflicting issues related to non-point source pollution and the Healthy Beaches Program]

5. Healthy Beaches Program [conflicts between agency partners about jurisdiction, responsibility, and technological design]
6. Bowdoin Round Table Series on Community Based Fisheries Management [conflicting perspectives on the groundfish fishery that led to the Area Management Coalition]
7. Town of Wells Rt. 109 Gateway Project [facilitated a collaborative approach between the town, local citizens, and the state to develop a better plan for this busy corridor]
8. Northwest Atlantic Marine Alliance board [facilitation of conflicting viewpoints on the future of the groundfishery and innovative strategies]
9. Sediment Transport related to Oyster Grower harvesting in the Damariscotta River [facilitating the collaboration between growers and scientists on an applied research project to study this issue of concern to riparian owners]
10. Maine Beaches Conference [biennial convention of regulatory, landowner and researcher interests to better understand conflicting perspectives and identify consensus-based solutions]

### c. Presentations, Posters, Conferences/Workshops and Meetings

#### 1. Presentations

Amirbahman, A., and K.A. Merritt,

- *Mercury Release at the Sediment-water Interface*, November 2006, Dartmouth College, Hanover, NH.

Bartlett, C.

- *Didemnum, a Non-Native Invasive Tunicate in Our Waters*, Cobscook Bay Fishermen's Forum, February 11, 2006, Eastport, ME.
- *Overview of Major US Marine Aquaculture Industries*, USDA Veterinary Medical Services Aquaculture Liaison Training, September 12, 2006, Eastport, ME.
- *Marine Aquaculture Production Practices*, USDA Veterinary Medical Services Aquaculture Liaison Training, September 12, 2006, Eastport, ME.
- *A Collaborative Effort to Examine New Strategies for Managing Closed Bottom Habitats for Sea Scallops*, Maine Scallop Advisory Council, October 23, 2006, Hallowell, ME.

Belknap, D.

- Guest Lecturer: Geology 103: Earth Surface Processes, *Construction and Destruction, Saco Bay, ME: Evaluating Sediment Transport Pathways in an Altered Embayment*, March 3, 2005, Bates College, Lewiston, ME.
- Oral and poster presentations, Northeastern Section Meeting of the Geological Society of America, March 19-22, 2006, Harrisburg, PA, and presentation at American Geophysical Union Ocean Sciences Meeting 2206.

Chen, Y.

- ASMFC Lobster Stock Assessment Committee, June 22, 2006, Providence, RI.

Grabowski, J.

- *Are we Farming Lobsters in the Gulf of Maine?* Bowdoin Symposium, April 21-22, 2006, Brunswick, ME.

Hoyt, S.

- *Using Lobster Districts as Management Units for Restoring and Sustaining the Sea Urchin Fishery in Western Penobscot Bay*, Bay Management Workshop, February 17, 2006, Belfast, ME.
- *Community-based Management of Nantucket Bay Scallop Fishery*, March 2, 2006, Rockport, ME.
- *Using Lobster Zones to Create a Local Sea Urchin Management Process*, April 2006, Belfast, ME.
- *Fisheries of the Gulf of Maine*, Tanglewood Elderhostel, June-September, 2006, Rockland, ME.

Merritt K.A., and A. Amirbahman,

- *Mercury Cycling in the Penobscot River Estuary, Maine: The Role of Sulfide*, Gordon Research Conference (Environment–Water), June 2006, NH.
- *Mercury Dynamics in Sulfide-Rich Sediments: Geochemical Influence on Contaminant Mobilization within the Penobscot River Estuary, Maine, USA*, Paper presented at the AGU Fall Meeting, December 2006, San Francisco, CA.

Morse, D.

- *The Heck with the Data! Look What Else is Going On with Collaborative Research*, American Fisheries Society, October 11-14, 2006, Lake Placid, NY.
- *Seeking the Most Intelligent Design: The Evolution of an Oyster Garden Program In Maine*, Milford Aquaculture Seminar, February 27-March 1, 2007, New Haven, CT.
- *The Spring Running*, Maine Sportsmen’s Show, April 1-2, 2006, Augusta, ME.
- *Update on The Spring Running*, Augusta City Council, August 1, 2006, Augusta, ME.
- *Update on Working Waterfront Access Issues in Maine*, National Fisheries Extension, October 16, 2006, Jacksonville FL.

Panchang, V.

- *Development of an Online Wave Prediction System*, American Society of Civil Engineers’ “Solutions to Coastal Disasters” Conference, 2005, Charleston, VA.

Schmitt, C.

- *The Mitchell Center, Maine Sea Grant, and the Penobscot River*, Penobscot Salmon Club, March 8, 2006, Brewer, ME.
- Schmitt, C., and C. Daigle. Discussion of Penobscot River issues, “Talk of the Towns,” WERU Community Radio, Orland, ME, March 24, 2006.
- Discussion of Penobscot River issues with students from College of the Atlantic, May 23, 2006, Veazie, ME.
- *Restoration Narratives: The Penobscot River Example*, Association for the Study of Literature and Environment, Summer Symposium, June 3, 2006, Farmington, ME.
- *Penobscot River Restoration Project and the Science Steering Committee*, Gulf of Maine Council on the Marine Environment Stream Barrier Removal Monitoring Workshop, June 20, 2006, Orono, ME.
- *Penobscot River Environmental History*, Senior Honors English class on Rivers and American Literature (K. Ellis), October 3, 5, 12, 2006, Veazie and Orono, ME.

Springuel, N.

- *Leave No Trace as an Educational Tool for Tourism Businesses in Downeast Maine*, Sustainable Tourism Workshop, March 17, 2006, Machias, ME.
- *Using GIS to Monitor Recreational Impact on Island*, U. Maine Parks, Recreation, and Tourism Senior Seminar, March 22, 2006, Orono, ME.
- *Condition Class Ratings for Volunteer Island Stewards*, Maine Island Trail Stewards Training, April 22, 2006, Wheeler Bay, ME.
- Maine Sea Grant Program Assessment Team presentations, April 24-28, 2006
  - Gulf of Maine Expedition
  - Coastal Access
  - Sustainable Tourism
  - Island Monitoring
- *Coastal Access and Working Waterfronts, Lessons from Maine*, Mississippi Working Waterfront Conference, June 7, 2006, Biloxi, MS.
- *Coastal Access and Working Waterfronts, Lessons from Maine*, Alabama Working Waterfront Conference, June 7, 2006, Bayou La Batre, AL.
- *Maine Sea Grant Sustainable Tourism Programs*, presented to University of Maine Cooperative Extension Hancock County Advisors, June 22, 2006, Ellsworth, ME.
- A Prairie Home Companion Cruise 2006, *Marine Mammals of the North Pacific and Southeast Alaska; Sea Stars, Sea Slugs and Other Cool Critters Beneath the Pacific Tides; From Vitus Bering to John Muir: Early Explorers and Naturalists to Alaska*; and additional daily interpretive programming, July 14-21, 2006, British Columbia and Southeast Alaska.
- *Sustainable Tourism Planning in Downeast Maine*. National Extension Tourism Conference, September 10-13, 2006, Burlington, VT.
- *Using GIS to Monitor Recreational Impact on Island*, College of the Atlantic, October 16, 2006, Bar Harbor, ME.
- *2006 Ambassadors of the Bay Expedition Final Presentation*, December 11, 2006, Bar Harbor, ME.

Stancioff, E. and K.Lindberg

- *Maine Healthy Beaches Program*
  - Statewide Lifeguard Academy, June 13, 2006, China Lake, ME.
  - Maine Sea Grant Performance Assessment Team, June 27, 2006, Orono, ME.
  - EMT Health Professionals Regional Meeting, October 1, 2006, Bath, ME.
  - EPA Regional Meeting, December 8, 2006, Chelmsford, MA.
  - Maine Sea Grant Policy Advisory Committee, Oct 16, 2006, Portland, ME.

Thompson, B.

- *Variability of Phytoplankton Biomass in the Damariscotta River Estuary*
  - National Shellfisheries Association, March 29, 2006, Monterey, CA.
  - School of Marine Sciences Symposium, May 15, 2006, Walpole, ME.
  - Northeastern Section Meeting of the Geological Society of America, March 19-22, 2006, Harrisburg, PA.
  - American Geophysical Union Ocean Sciences Meeting 2006.

Whiting-Grant, K.

- Eliot Board of Selectmen, April 6, 2006, Eliot, ME.
- Maine Sea Grant Performance Assessment Team review, April 19, 2006, Orono, ME.
- South Berwick Town Council, May 8, 2006, South Berwick, ME.
- The Coastal Society, May 16, 2006, Tampa, FL.
- NEMO Train the Trainer, June 6, 2006, Wells, ME.
- Visual Preference Survey, Sept 9, 2006, Wells, ME.
- Maine Sea Grant Policy Advisory Committee, Oct 16, 2006, Portland, ME.
- Kennebunkport Growth Management Committee, Jan 9, 2007, Kennebunkport, ME.

## 2. Posters

Brothers, L., C.D. Janzen, J.T. Kelley, and D.F. Belknap

- *Assessing Spring Nearshore Currents and Sediment Transport in the Saco River Estuary, Saco Bay, ME, USA*, February 20-24, 2006, Honolulu, HI.

Morse, D.

- *Selective Gear Research: Investigating the Use of Square Mesh Side Panels and Increased Taper in a Groundfish Trawl*, International Conference for the Exploration of the Sea (ICES), Boston, MA, Oct 30-Nov 3, 2006.
- *Selective Gear Research: Investigating the Use of Square Mesh Side Panels and Increased Taper in a Groundfish Trawl*, American Fisheries Society, Lake Placid, NY, Oct 11-14, 2006.
- *Development of a Submersible Mussel Raft*, Milford Aquaculture Seminar, New Haven, CT, Feb 27-Mar 1, 2007.

Schmitt, C.

- *What Lies Between: The Penobscot River Estuary*, Maine Water Conference, March 2006, Augusta, ME; and Maine Coastal Waters Conference, April 10, 2006, Rockport, ME.

Thompson, B.

- *Variability of Phytoplankton Biomass in the Damariscotta River Estuary, Maine*, Maine Coastal Waters Conference, April 10, 2006, Rockport, ME; and Sea Grant Performance Assessment Team Review, April 25, 2006, Orono, ME.

Whiting-Grant, K.

- Ogunquit Conservation Commission, June 11, 2006, Ogunquit, ME.

## 3. Workshops, Conferences

Anderson, P.

- Maine Fishermen's Forum (board president), March 2-4, 2006, Rockport, ME.

Bartlett, C.

- 2006 Cobscook Bay Fishermen's Forum, February 11, 2006, Eastport, ME.
- 14<sup>th</sup> Annual New England Farmed Fish Health Management Workshop, April 6, 2006, Calais, ME.
- Coastal Access in Southern Maine, June 2, 2006, Biddeford, ME.
- Aquaculture Training Program for USDA Aquaculture Liaisons, September 12-14, 2006, Eastport, Maine.



Hoyt, S.

- Bowdoin Roundtable Series on Community-based Fisheries Management, January-August, 2006, Brunswick, ME.

Morse, D.

- The Spring Running, May 20, 2006, Augusta, ME.
- Northeast Aquaculture Conference and Expo, December 6-8, 2006, Mystic, CT.

Owen, B.

- Data, Data Everywhere... a technology workshop for K-12 teachers working with online environmental data, June 28-30, 2006, Acadia National Park, ME.
- Diver Monitoring Training Workshops, May 13, 2006, Gloucester, MA and July 24, 2006, Portsmouth, NH.
- Underwater Monitoring Protocol Development Workshop and Field-Test, September 7, 2006, Walpole, ME.
- Underwater Scientific Survey Protocol Field-Testing Workshops, September 20, 2006, Walpole, ME; October 5, 2006, Boothbay, ME; October 19, 2006, Pemaquid, ME.

Springuel, N.

- MDI Affordable Housing Meeting, Island Heritage Trust, February 2, 2006, Somesville, ME.
- *Business Tools for Sustainable Tourism*, Workshop on Sustainable and Experiential Tourism in Downeast and Acadia, March 17, 2006, Machias, ME.
- Southern Maine Forum on Coastal Access, June 2, 2006, Biddeford, ME.
- *Coastal Access and Working Waterfronts, Lessons from Maine*, North Carolina Changing Waterfronts Conference, June 5, 2006, New Bern, NC.

Whiting-Grant, K.

- Southern Maine Healthy Coastal Beaches Workshop, April 3, 2006, Wells, ME.
- Southern Maine Access Forum, June 2, 2006, Biddeford, ME.
- Wells Gateway Community Design Workshop Series, Sept 18, 19, 20, 2006, Wells, ME.

#### **4. Meetings and Facilitation**

Anderson, P.

- Bay Management Steering Committee (member), February 17, 2006, Belfast, ME.
- Northeast Regional Association of Ocean Observing Systems (facilitator), February 28, 2006, Portsmouth, NH.
- Sea Grant Association (president-elect), spring meeting, March 6-8, 2006, Washington, DC.
- Maine Coastal Conference Planning Committee (member), April 10, 2006, Rockport, ME.
- Northeast Consortium review panel, May 19, 2006, Portsmouth, NH.
- Bay Management Steering Committee (member), June 2, 2006, Belfast, ME.
- Maine Aquaculture Innovation Center review panel, June 23, 2006, Orono, ME.
- Northeast Regional Association of Ocean Observing Systems (facilitator), June 28, 2006, Portsmouth, NH.
- Bay Management Steering Committee (member), August 15, 2006, Brunswick, ME.

- EPA review panel, September 14-15, 2006, Washington, DC.
- Bay Management Steering Committee (member), October 2, 2006, Walpole, ME.
- Sea Grant Association (president elect), fall meeting, November 1-3, 2006, Cleveland, OH.
- Bay Management Steering Committee (member), December 1, 2006, Augusta, ME.
- Northeast Regional Association of Ocean Observing Systems (facilitator), January 17, 2007, Bristol, RI.

Bartlett, C.

- Cobscook Bay Resource Center (board and executive committee)
  - March 30, 2006, Brunswick, ME.
  - October 26, 2006, Eastport, ME.
- Downeast Institute for Marine Research and Education (board and executive committee)
  - February 3, 2007, Machias, ME.
  - May 5, 2006, Beals, ME.
  - July 14, 2006, Beals, ME.
  - October, 20, 2006, Machais, ME.
  - December 21, 2006, Machias, ME.
- Maine Scallop Advisory Council (science representative)
  - May 18, 2006, Hallowell, ME.
  - June 28, 2006, Hallowell, ME.
  - November 9, 2006, Hallowell, ME
- USDA Infectious Salmon Anemia Technical Board (chair), December 6, 2006, St. John, NB.

Bouchard, D.

- USDA/APHIS Viral Hemorrhagic Septicemia Virus (expert panel member).
- Maine ISAV Technical Review Board (member).

Hoyt, S.

- Georges River Shellfish Management Committee (member).
- Taunton Bay Mudflat Management Plan Advisory Committee.
- Muscongus Bay Project (steering committee member).
- Maine Soft-shell Clam Advisory Council (member).
- Maine Sea Urchin Zone Council (ad hoc member).
- Area Management Coalition (member).
- Taunton Bay community meeting, April 5, 2007, Franklin, ME.

Morse, D.

- Shellfish Working Group (member).
- Oyster Gardening Meetings (project coordinator).
- Northwest Atlantic Marine Alliance board meetings (presiding director, board of trustees).
- The Spring Running planning meetings (chairman).

Owen, B.

- Northern ME Children's Water Festival (steering committee member), October 10, 2006, Orono, ME.
- 2007 National Marine Education Association Conference (planning committee member and exhibits chair); monthly planning meetings.
- Penobscot River Watershed Education Program (principal investigator); organized and facilitated 12 program planning meetings.
- Gulf of Maine Marine Education Association (board member); quarterly meetings and annual meeting.
- Maine Marine Invasives Working Group (member); co-facilitated quarterly meetings.
- Maine Water Conference, March 21, 2007 (education session chair); facilitated four planning meetings.
- Aquatic Invaders in Maine (AIM) Program (program staff and planning committee member); four planning meetings.

Schmitt, C.

- Penobscot River Science Steering Committee (coordinator); planned and facilitated five meetings during the reporting period.

Springuel, N.

- National Extension Tourism Conference (planning committee), September 10-13, 2006, Burlington, VT.
- Vacationland Resources Committee (co-chair), Downeast Resource Conservation and Development; monthly meetings.
- Island Monitoring Task Force (chair).
- Governor's Task Force on Maine's Nature-based Tourism Initiative (represented Downeast/Acadia region).
- Working Waterfront Coalition (member) and member of WWC education committee; monthly meetings.
- National Coastal Access Inventory and Survey (committee chair).
- Maine Island Trail Association (board member) and member of marketing and Trail committees; quarterly meetings.
- Island Monitoring Task Force (committee chair; four meetings in 2006).
- Bar Harbor Sustainable Tourism Committee (member); four meetings in 2006.
- Sustainable Tourism Workshop (planning committee), March 17, 2006.
- National Extension Tourism Conference (planning committee), September 10-13, 2006.
- National Coastal Access and Waterfronts Conference (planning committee), May 10-12, 2007.
- Downeast (January 19, 2006) and Southern Maine (June 22, 2006) Coastal Access Forums, (planning committees).
- Maine Association of Sea Kayak Guides and Instructors (member).
- The International Ecotourism Society (professional member).
- Maine Sea Grant science publications designer search committee (member), and UMCE tourism extension educator search committee (member).

Stancioff, E. and K. Lindberg  
*Maine Healthy Beaches Program*

- Meetings
  - June 12, 2006, Biddeford, ME.
  - June 13, 2006, Augusta, ME.
  - July 6, 2006, Kennebunkport, ME.
  - July 12, 2006, South Portland, ME.
  - September 22, 2006, South Portland, ME.
  - January 22, 2007, Ogunquit.
- Trainings
  - June 27, 2006, Cape Elizabeth, ME.
  - July 5, 2006, Biddeford, ME (2 sessions).
  - July 12, 2006, York, ME (2 sessions).

White, S.

- Cove Brook Watershed Council (vice president); monthly meetings, Winterport, ME.
- Penobscot Bay Alliance (vice president); bi-monthly meetings, Searsport, ME.

Whiting-Grant, K.

- Merriland River, Branch Brook, and Little River (MBLR) Watershed Council, Feb 1, 2006, Wells, ME.
- Kittery, Eliot, York, and Saco (KEYS) Coordinating Council, Feb 15, 2006, Kittery, ME.
- York River Watershed Council, June 14, 2006, Wells, ME.
- University of New Hampshire Stormwater Research Center trip, June 20, 2006, Durham, NH.
- York River Watershed Council, Oct 25, 2006, Wells, ME.
- Kennebunk River Watershed Meeting, Oct 26, 2006, Wells, ME.
- KEYS Coordinating Council, Nov 29, 2006, Kittery, ME.
- Maine Beaches Conference steering committee meetings, Dec 15, 2006, and Jan 24, 2007, Portland, ME.



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