

Maine Sea Grant College Program  
Annual Report  
2009

*Submitted to the Vice President for Research  
30 July 2010  
University of Maine*

**Maine Sea Grant College Program Annual Report  
1 February 2009 - 31 January 2010**

Information in this report, gathered from staff, partners, and funded researchers, relates to the research, extension, communications, education, and management activities of Maine Sea Grant. The information is organized according to the guidance provided by the Office of the Vice President for Research at the University of Maine, and also will be provided to the NOAA National Sea Grant Office.

Most, if not all, of these projects and programs—and their results—involve partnerships with other individuals and organizations. These stakeholder relationships are key to Maine Sea Grant’s success, and we wish to thank our partners for their commitment to the people of Maine and the natural resources upon which we all depend.

**I. Membership Determination (% funded by MEIF, E&G, MAFES)**

Staffing	# of Individuals	# of FTEs (Sea Grant)	# of FTEs (MEIF)	Additional MEIF	Cooperative Extension
Administration	4	0.32	2.85	0.08	0.05
Communications	4	2.28	0.41	0.17	
Extension	4	2.61	0.30	0.28	
Education	1	0.00	0.03	0.08	
Research	15	2.44	Unknown	0.08	

## II. Return on Investment

### Sponsored Research Activity

Activity/Project	Funding Source	Award	Indirect	Total	Years
Program Leadership Team	Cooperative Extension	\$4,500	\$0	\$4,500	1
Rainbow Smelt	Maine DMR	\$4,852	\$2,052	\$6,904	1
Rainbow Smelt	Cooperative Extension	\$3,000	\$0	\$3,000	1
MOSAC Administration	Maine DEP	\$12,500	\$0	\$12,500	1
Marine Protected Areas	NOAA	\$20,160	\$3,367	\$23,527	1
Watershed Education	Acadia Partners/NOAA	\$13,409	\$3,593	\$17,002	1
Vital Venture	GMRI	\$5,246	\$1,406	\$6,652	1
Dixon Fellowship	Acadia Partners	\$10,000	\$0	\$10,000	1
Southern Maine Beach Profile Monitoring	Maine Community Foundation	\$18,659	\$3,116	\$21,775	3
Downeast Fisheries Trail	Maine Community Foundation	\$7,000	\$483	\$7,483	1
Trap Density Study	Maine DMR	\$4,425	\$575	\$5,000	1
Lessons Learned from Taunton Bay	Maine Community Foundation	\$16,760	\$1,400	\$18,160	1
Working Waterways & Waterfronts Symposium	Hawaii Sea Grant	\$200	\$0	\$200	1
Working Waterways & Waterfronts Symposium	Florida Sea Grant	\$2,000	\$0	\$2,000	1
Working Waterways & Waterfronts Symposium	States Organization for Boating Access	\$250	\$0	\$250	1
Working Waterways & Waterfronts Symposium	Middle Peninsula	\$500	\$0	\$500	1
Working Waterways & Waterfronts Symposium	Rhode Island Sea Grant	\$2,000	\$0	\$2,000	1
Working Waterways & Waterfronts Symposium	Coastal Enterprises	\$250	\$0	\$250	1
Working Waterways & Waterfronts Symposium	Georgia Sea Grant	\$500	\$0	\$500	1
Maine Beaches Conference	Maine Geological Survey	\$500		\$500	1
Maine Beaches Conference	Maine Coastal Program	\$3,000		\$3,000	1
Maine Beaches Conference	Surfrider	\$500		\$500	1
Maine Beaches Conference	Wells National Estuarine Research Reserve	\$500		\$500	1
Maine Beaches Conference	SOS Maine	\$300		\$300	1
Marine Invasives Display	Maine Coastal Program	\$250		\$250	1
Marine Invasives Poster	Maine DEP	\$2,450	\$0	\$2,450	1
Seafood Calendar	Maine Fishermen's Forum	\$4,903	\$0	\$4,903	1
Downeast Institute	UMaine Machias/NSF	\$7,624	\$2,043	\$9,667	1
		<b>Total: \$146,238</b>	<b>\$18,035</b>	<b>\$164,273</b>	

## Peer-Reviewed Publications

### *Journals (6)*

- Merritt, K.A., and A. Amirbahman. 2009. Mercury methylation dynamics in estuary and coastal marine environments – a critical review. *Earth-Science Reviews* 96:54-66.
- Panchang, V., C. Jeong, and D. Li. 2008. Wave climatology in coastal Maine for aquaculture and other applications. *Estuaries and Coasts* 31:289-299.
- Rajakaruna, N., N. Pope, J. Perez-Orozco, and T.B. Harris. 2009. Ornithocrophilous plants of Mount Desert Rock, a remote bird-nesting island in the Gulf of Maine, USA. *Rhodora* 111:417-447.
- Sypitkowski, E., W.G. Ambrose, Jr., C. Bohlen, and J. Warren. 2009. Catch statistics in the bloodworm fishery in Maine. *Fisheries Research* 96:303-307.
- Sypitkowski, E., C. Bohlen, and W.G. Ambrose, Jr. 2010. Estimating the frequency and extent of bloodworm digging in Maine from aerial photography. *Fisheries Research* 101:87-93.
- Wilson, K.R., J.T. Kelley, A. Croitoru, M. Dionne, D.F. Belknap, and R. Steneck. 2009. Stratigraphic and ecophysical characterizations of salt pools: dynamic landforms of the Webhannet salt marsh, Wells, ME, USA. *Estuaries and Coasts* 32:855-870.

### *Conference Proceedings (12)*

- Belknap, D.F., J.T. Kelley, and K.R. Wilson. 2009. Geologic evolution of Northern New England salt marshes. Geological Society of America Abstracts with Programs 41:18, Northeastern Section Meeting, 22-24 March 2009, Portland, ME.
- Blouin, N., Brawley, S.H. 2009. Reproduction in *Porphyra umbilicalis* Kutzing: insights from AFLPs. Plant Biology Abstracts 2009:120, Joint Annual Meetings of the American Society of Plant Biologists and the Phycological Society of America, 18-22 July 2009, Honolulu, HI.
- Brawley, S.H. 2009. The crop and the organism. Plant Biology Abstracts 2009:49, Joint Annual Meetings of the American Society of Plant Biologists and the Phycological Society of America, 18-22 July 2009, Honolulu, HI.
- Hart, T.E., and J.H. Grabowski. 2009. Integrating seafloor mapping and benthic ecology into fisheries management in the Gulf of Maine, Workshop Proceedings, 15-16 June 2009, Portland, ME.
- Mendelson, M. (editor). Proceedings from exploring fine-scale ecology for groundfish in the Gulf of Maine and Georges Bank, 2-3 April 2009, York Harbor, ME.
- Neckles, H.A., A.R. Hanson, P. Colarusso, R.N. Buchsbaum, and F.T. Short (editors). 2009. Status, trends, and conservation of eelgrass in Atlantic Canada and the Northeastern United States, Workshop Report, 24-25 February 2009, Portland, ME.

- Schmitt, C. 2010. What we talk about when we talk about recreation: outdoor experience, access to the coast, and relationship with nature. *Environmental Communication as a Nexus: Proceedings of the 10th Biennial Conference on Communication and the Environment* (Seitz, E., T.P. Wagner, and L. Lindenfeld, eds.), 27-30 June 2009, Portland, ME.
- Springuel, N. 2009. Tourism in regions of natural resource decline: a Newfoundland case study. *Proceedings of CMT2009, the 6th International Congress on Coastal and Marine Tourism* (Albers, A., and P.B. Myles, eds.), 23-26 June 2009, Nelson Mandela Bay, South Africa.
- Wahle, R. 2009. American Lobster Settlement Index looking back/looking ahead 1989-2009, *Workshop Proceedings*, 19-21 June 2009, Boothbay Harbor, ME.
- Wilson, J., and L. Yan. 2009. Self-organizing economic activity with costly information. *Genetics and Evolutionary Computation Conference*, 8-12 July 2009, Montreal, Canada.
- Wilson, K.R., J.T. Kelley, D.F. Belknap, and B.R. Tanner. 2009. Salt pools in the stratigraphic record and their role in governing surficial change in five Maine salt marshes. *Geological Society of America Abstracts with Programs* 41:18, Northeastern Section Meeting, 22-24 March 2009, Portland, ME.
- Wilson, K.R., J.T. Kelley, D.F. Belknap, and B.R. Tanner. 2009. New salt pool description warrants reinterpretation of the stratigraphic records of Maine salt marshes. *New England Estuarine Research Society Spring Meeting*, 2-4 April 2009, Salem, MA.

#### Other Publications

##### *Technical Reports (13)*

- Atkinson, J., *et al.* *Muscongus Bay Circulation Study Pilot* (map), 13 August 2009. Waldoboro, ME: Quebec-Labrador Foundation.
- Cobscook Bay Resource Center. 2009. A pilot field study of circulation patterns in Muscongus Bay, preliminary report to Quebec-Labrador Foundation. Eastport, ME: Cobscook Bay Resource Center.
- Jacobson, G.L., I.J. Fernandez, P.A. Mayewski, and C.V. Schmitt. 2009. *Maine's Climate Future: An Initial Assessment*. Orono, ME: University of Maine.
- Maine Healthy Beaches Program. 2009. US EPA Report. Waldoboro, ME.
- Maine Healthy Beaches Program. 2009. *Maine Healthy Beaches tiered monitoring plan*. Waldoboro, ME.
- Maine Healthy Beaches Program. 2009. *Washington County beaches and Clam Cove data summaries*. Waldoboro, ME.

- Maine Healthy Beaches Program. 2009. An examination of the effect of incident light on *Enterococci* levels at Seal Harbor Beach. Waldoboro, ME.
- Maine Healthy Beaches Program. 2009. Rainfall and bacteria study. Waldoboro, ME.
- Maine Healthy Beaches Program. 2009. Sanitary survey of Ogunquit Beach and River watersheds (report and map). Waldoboro, ME.
- Maine Healthy Beaches Program. 2009. Southern Maine optical brightener study (includes map). Waldoboro, ME.
- Morse, D. 2009. The use of positively buoyant ground cables and sweep to reduce seabed contact and to enhance species selectivity, final report. Durham, NH: Northeast Consortium.
- Morse, D., C. Coffin, and K. Pinkham. 2009. Building on promise: continued investigation in using a four-seam bottom trawl to improve escapement of small haddock and cod, final report. Durham, NH: Northeast Consortium.
- Morse, D. 2009. A trial of seabed fencing for wild stock enhancement of sea scallops (*Placopecten magellanicus*), in coastal Maine waters, final report. Orono, ME: Maine Aquaculture Innovation Center.
- Morse, D., and M. Pietrak. 2009. Maine aquaculture situation and outlook report, No. 105-2009. College Park, MD: Northeast Regional Aquaculture Center.
- Outreach publications (communications products) (14)*
- College of the Atlantic. Food, farming and fisheries for the 21st century (video), Bar Harbor, ME.
- Dority, A. *Community Supported Fishery manual* (draft). Stonington, ME: Penobscot East Resource Center.
- Jacobson, G.L., I.J. Fernandez, P.A. Mayewski, and C.V. Schmitt. *Maine's Climate Future: Executive Summary*. Orono, ME: Maine Sea Grant College Program.
- Maine Healthy Beaches Program. *2009 Field Training Packet*. Waldoboro, ME.
- Maine Healthy Beaches Program. *2009 Laboratory Training Packet*. Waldoboro, ME.
- Maine Healthy Beaches Program. *Kennebunk River Watershed and Septic System Risk Analysis* (map). Waldoboro, ME.
- Maine Healthy Beaches Program. *Kennebunk sanitary survey work* (map). Waldoboro, ME.
- Maine Sea Grant College Program. *2009 Maine Seafood Calendar*. Orono, ME.
- Maine Sea Grant College Program. *Maine Sea Grant: Facts at a Glance 2009*. Orono, ME.

Maine Sea Grant College Program, MIT Sea Grant College Program, Maine Coastal Program, and Maine Marine Invasive Species Working Group. *New England's Marine Invasions* (poster). Orono, ME.

Maine Sea Grant College Program. *Building a Resilient Coast: Maine Confronts Climate Change* (DVD). Corvallis, OR: Oregon Sea Grant College Program.

Southern Maine Beach Profile Monitoring Program (multimedia). Wells, Biddeford, Scarborough, ME: cable access stations.

Springuel, N. *What is the Downeast Fisheries Trail?* (fact sheet) Orono, ME: Maine Sea Grant College Program.

Vacationland Resources Committee. *VRC Outlook: A Voice for Sustainable Tourism Down East* (electronic newsletter). Issue 1, October 2009.

#### *Feature articles (6)*

Schmitt, C. Trail to highlight Downeast fishing heritage, *Fishermen's Voice*, January 2010.

Schmitt, C. Maine's seafood industry. *Maine Food & Lifestyle*, No. 2, November 2009.

Schmitt, C. Building a resilient coast. *Fishermen's Voice*, September 2009.

Schmitt, C. The state of Maine's beaches. *Maine Boats, Homes & Harbors*, August 2009.

Schmitt, C. Maine sets sail to be wind energy leader. *Working Waterfront*, July 2009.

Schmitt, C. Alewives and harvesters see strength in numbers. *Fishermen's Voice*, June 2009.

#### *Websites (6)*

[www.accessingthemaine coast.com](http://www.accessingthemaine coast.com) (website and postcard)

[www.extension.umaine.edu/maineclimatenews/](http://www.extension.umaine.edu/maineclimatenews/)

[www.maine coastdata.org](http://www.maine coastdata.org)

[www.maine.gov/doc/nrimc/mgs/explore/marine/beach-conference/beaches-2009.htm](http://www.maine.gov/doc/nrimc/mgs/explore/marine/beach-conference/beaches-2009.htm)

[www.fishsafeme.org](http://www.fishsafeme.org)

<http://porphyra.org/index.html>

## Presentations/Creative Shows

### *State, Regional, National, and International Meetings (31)*

Amirbahman, A., and K.A. Merritt. A diffusive gel gradient study of mercury mobilization in estuarine sediment pore waters (invited keynote). Second International DGT Conference, October 2009, Sardinia, Italy.

Belknap, D.F., J.T. Kelley, and K.R. Wilson. Geologic evolution of Northern New England salt marshes. Geological Society of America Northeastern Section Meeting, 22-24 March 2009, Portland, ME.

Belknap, D.F., J.T. Kelley, and K.R. Wilson. Are Maine's marshes drowning – or could they soon? Borns Symposium, 7 May 2009, Orono, ME.

Bergeron, C., R. Wahle, and T. Ames. A lobster hatchery in Maine: why now? 37th Annual Benthic Ecology Meeting, 9-13 April 2009, Providence, RI.

Bisson, B. Seascapes: getting to know the sea around us, a guide to characterizing marine and coastal areas. Maine Coastal Waters Conference, 28 October 2009, Northport, ME.

Blouin, N. Reproduction in *Porphyra umbilicalis* Kutzing: insights from amplified fragment length polymorphisms (AFLPs). University of Maine School of Marine Sciences Symposium, 11 May 2009, Walpole, ME.

Blouin, N., and S.H. Brawley. Asexual reproduction in *Porphyra umbilicalis*. Northeast Algal Society meeting, 14 April 2009, Amherst, MA.

Brawley, S.H. *Porphyra*: A crop of the sea (invited symposium). American Society of Plant Biology/Phycological Society of America Joint Meeting, 22 July 2009, Honolulu, HI.

Brzezinski, D., J. Wilson, and Y. Chen. Further analysis of voluntary participation in New England Fisheries Management Council meetings: how representative is the public representation? American Fisheries Society Annual Meeting, 30 August-3 September 2009, Nashville, TN.

Chang, J., and Y. Chen. Predicting the spatial distribution of the American lobster, *Homarus americanus*, along the coastal Gulf of Maine using habitat suitability modeling. American Fisheries Society Annual Meeting, 30 August-3 September 2009, Nashville, TN.

Carlson, A.E., J.S. Eickhorst, and C.E. Tilburg. Wind and river discharge effects on the Saco River plume: a study using biodegradable drifters. Maine State GIS Undergraduate Championships, 29 April 2009, Fairfield, ME.

Carlson, A.E., J.S. Eickhorst, and C.E. Tilburg. Determining the distribution of the Saco River plume with biodegradable drifters. University of New England College of Arts and Sciences Symposium, 29 April 2009, Biddeford, ME.



- Carlson, A.E., J.S. Eickhorst, and C.E. Tilburg. Biodegradable drifters and their implications on the Saco River plume. Maine Biological and Medical Sciences Symposium, 17-18 April 2009, Bar Harbor, ME.
- Coghlan, S.M, Jr., J. Zydlewski, R.A. Wathen, C. Gardner, S. Ratten, R. Hogg, and K. Simon. Penobscot River research summary. Penobscot Science Exchange/Diadromous Species Restoration Research Network, 26 January 2010, Orono, ME.
- Coghlan, S.M. Jr., S. Ratten, C. Gardner, J. Zydlewski, and K. Simon. Barrier removal and range expansion in sea lamprey: quantifying habitat conditioning in small streams. 35th Annual Meeting of the Atlantic International Chapter of the American Fisheries Society, 20-22 September 2009, Shelburne, NH.
- Cowperthwaite, H. Accessing the Maine coast. Coastal Zone '09 Conference, 21 July 2009, Boston, MA.
- Dickson, S.M., P.A. Slovinsky, J.T. Kelley, D.F. Belknap, and L.L. Brothers. Coastal storms, sediment budgets, and mitigating engineering in Saco Bay (field trip). Geological Society of America Northeast Section Meeting, 21 March 2009, Portland, ME.
- Gardner, C., S.M. Coghlan, Jr., and J. Zydlewski. Monitoring changes in resident and anadromous fish communities in Sedgeunkedunk Stream after barrier removal. Atlantic Salmon and their Ecosystems Research Forum, 6-7 January 2010, Orono, ME.
- Grant, K. Partnering with Sea Grant extension in your state. Coastal Zone '09 Conference, 20 July 2009, Boston, MA.
- Hogg, R., S.M. Coghlan, Jr., S.A. Ratten, C. Gardner, J. Zydlewski, and K. Simon. Barrier removal in Sedgeunkedunk Stream: lamprey colonization and implications for salmon habitat restoration, Atlantic Salmon and their Ecosystems Research Forum, 6-7 January 2010, Orono, ME.
- Holland, D.S., and G. Herrera. The benefits and risks of increased spatial resolution in management of fishery metapopulations under uncertainty. Fifth Biennial Conference of the North American Association of Fishery Economists, 21-22 May 2009, Newport, RI.
- Lindberg, K. A municipal guide to clean water: a sanitary survey resource guide. University of Maine School of Marine Sciences Symposium, 11 May 2009, Walpole, ME.
- Schmitt, C. What we talk about when we talk about recreation: outdoor experience, access to the coast, and relationship with nature. 10th Biennial Conference on Communication and the Environment, 27-30 June 2009, Portland, ME.
- Springuel, N. Accessing the Maine coast. National Sport Fishing and Boating Partnership Council Annual Meeting, August 2009, Portland, ME.
- Stancioff, E. Communicating climate change. Coastal Zone '09 Conference, 23 July 2009, Boston, MA.

Wahle, R. Zone C lobster seeding trials: progress report. Zone C Hatchery Annual Workshop, 16-17 April 2009, Stonington, ME.

Wilson, K.R. Salt pools in the stratigraphic record and their role in governing surficial change in five Maine salt marshes. Geological Society of America Northeastern Section Meeting, 22-24 March 2009, Portland, ME.

Wilson, K.R. New salt pool description warrants reinterpretation of the stratigraphic records of Maine salt marshes. New England Estuarine Research Society Spring Meeting, 2-4 April 2009, Salem, MA.

Wilson, K.R. What do salt marsh stratigraphic records reflect: local dynamics or regional sea-level fluctuations? Borns Symposium, 7 May 2009, Orono, ME; School of Marine Sciences Symposium, 11 May 2009, Walpole, ME.

Zsak, A., C. Shankland, and D. McNaught. Development of techniques to hatchery-rear green sea urchins from fertilization to settlement. UMM Symposium on Undergraduate Research, 7 May 2009, Machias, ME.

Zsak, A. The roles of larval nutrition versus maternal provisioning in the growth and survival of larval urchins. Senior Seminar in Marine Biology, 4 May 2009, Machias, ME.

#### *Poster presentations*

Lindberg, K. Maine Healthy Beaches special studies for the improvement of beach management. Maine Beaches Conference, 10 July 2009, South Portland, ME.

Maine Geological Survey. Southern Maine beach profile monitoring data (12 posters). Maine Beaches Conference, 10 July 2010, South Portland, ME.

Springuel, N., *et al.* Accessing the Maine coast. Maine Coastal Waters Conference, 28 October 2009, Northport, ME.

Swett, M.P. Assessment of benthic flux of dissolved organic carbon in estuaries using the eddy-correlation technique. American Geophysical Union Fall Meeting, 14-18 December 2009, San Francisco, CA.

#### *Public presentations (lay audiences; 38)*

Ames, T., and A. Dority. Downeast Groundfish Initiative and community supported fisheries. Public Library, Blue Hill, ME; Schoodic Education and Research Center, Winter Harbor, ME.

Beal, B. Spatial and temporal variation of intertidal, soft-sediment macrofauna in the Cobscook Bay region (eastern Maine, USA). Fundy Chapter of the Maine Audubon Society, 6 June 2009.

Beard, R. Summary of key informant interviews. Winter Harbor Selectboard, July 2009; Gouldsboro Selectboard, December 2009.

Bisson, B., and C. Schmitt. Exploring the world of science careers. Coastal Studies for Girls and Cornerstones of Science, 6 October 2009, Freeport, ME.

Brewer, J. Assessing a community-based fisheries stewardship education program. East Carolina University Engaged and Outreach Scholars Academy, 2 December 2009, Greenville, NC.

Dority, A. Groundfish community supported fishery. Eat Local Foods Coalition CSA/CSF Fairs, Belfast and Bangor, ME.

Grant, K. Accessing the Maine coast. Maine Beaches Conference, 10 July 2009, South Portland, ME.

Hoyt, S. Testing new fisheries management tools in Taunton Bay. Maine Fishermen's Forum, 7 March 2009, Rockport, ME.

Lindberg, K. Maine Healthy Beaches Ogunquit Beach and Ogunquit River watersheds. 17 February 2009, Ogunquit, ME.

Lindberg, K. Maine Healthy Beaches Kennebunk River watershed. 19 March 2009, Wells, ME.

Lindberg, K. Municipal Guide to Clean Water: conducting sanitary surveys to improve coastal water quality. Walpole, ME.

Lindberg, K. Children's Water Festival, 22 May 2009, Portland, ME.

Lindberg, K. Maine Healthy Beaches: promoting best practices at the beach. Maine State Coastal Lifeguard Training, Phippsburg, ME.

Lindberg, K. The state of Maine's beaches in 2009. Maine Beaches Conference, 10 July 2009, South Portland, ME.

Lindberg, K. Maine Healthy Beaches Program: monitoring water quality and protecting public health. EPA Press Conference, 19 August 2009, Kennebunkport, ME.

Lindberg, K. Maine Healthy Beaches Program: creating partnerships to improve water quality. DEP Watershed Roundtable, 17 November 2009, Bangor, ME; DEP Division of Environmental Assessment, 13 January 2010, Augusta, ME.

Lindberg, K. Maine Healthy Beaches Program: special studies and sanitary survey work in the Ogunquit Beach and Ogunquit River watersheds. Ogunquit River Conference, 20 November 2009, Ogunquit, ME.

Morse, D. Energy use in fisheries. Maine Fishermen's Forum, 5 March 2009, Rockport, ME.

Morse, D. Maine's Shellfish Working Group. Darling Marine Center, 19 March 2009, Walpole, ME.

Morse, D. Fishing gear in the modern age. Maine Maritime Museum, 18 June 2009, Bath, ME.

Morse, D. Aquaculture in Maine. Bremen Library, 2 November 2009, Bremen, ME.

Schmitt, C. *A Coastal Companion: A Year in the Gulf of Maine from Cape Cod to Canada* (book readings/signings). Acadia Birding Festival, 12 June 2009, Bar Harbor, ME; Ellsworth Public Library, 20 August 2009, Ellsworth, ME; Bar Harbor Book Festival, 12 September 2009, Bar Harbor, ME.

Schmitt, C. All about Maine oysters. Maine Fare, 12 September 2009, Camden, ME.

Schmitt, C. Taking your research beyond conclusions...and into the real world. Department of Wildlife Ecology Seminar Series, 23 November 2009, Orono, ME.

Springuel, N. Fishing for tourists: the Newfoundland cod crisis and the role of tourism in outport revitalization. College of the Atlantic Human Ecology Forum, 12 February 2009, Bar Harbor, ME; YMCA, March 2009, Bar Harbor, ME; Schoodic Second Saturday Lecture Series, 9 May 2009, Winter Harbor, ME; College of the Atlantic Ecotourism Class, 26 May 2009, Bar Harbor, ME.

Springuel, N. Using GIS in planning and coastal decision making. College of the Atlantic geographic information systems class, February and May 2009, Bar Harbor, ME.

Springuel, N. Tourism and working waterfront activities on Mount Desert Island. NOAA Maine Coastal Program National Review, 15 September 2009, Bar Harbor, ME.

Stancioff, E. Building a resilient coast: Maine confronts climate change. Camden Yacht Club, July 2009, Camden, ME.

Number of Spin-Out Companies (0)

Number of Patents and Other Forms of Intellectual Property (0)

Number of Jobs Funded (0)

Revenue Generated

\$1,700 (from book sales)

### **III. Summary of Accomplishments for the Year**

#### Research Accomplishments

*Northeast Sea Grant Programs partner for regional research.*

Sea Grant's competitive research program continues to attract significant attention, with 35 pre-proposals submitted for the 2009 request for proposals. This is the highest number ever for Maine Sea Grant, indicating that this is an important opportunity for the research community to secure funding for small, applied research projects. The Northeast Sea Grant directors have

formalized the regional agreements by which the programs can collaborate on research projects, through an MOU among the University of Maine, University of New Hampshire, Massachusetts Institute of Technology, Woods Hole Oceanographic Institution, University of Rhode Island, and University of Connecticut. This arrangement comes as the Regional Ocean Science Committee (NEOSC) is finalizing its regional research priorities document as part of a National Sea Grant-funded planning exercise. These efforts will help to incent investment in the region for collaborative, interdisciplinary research studies; two regional projects were selected for funding in 2010.

*Sea Grant model predicts dangerous waves.*

On Maine's lengthy coastline, surface waves can be the most energetic ocean elements affecting coastal communities and habitats. Information about wave conditions has many applications, including the safety of boat or ship operations, the transport of pollutants, the siting of aquaculture activities, and coastal engineering. Building on previous Maine Sea Grant-funded wave modeling studies, Texas A & M researcher Vijay Panchang developed a detailed atlas of fine-resolution wave climates in coastal Maine and a computerized wave prediction system for forecasting wave heights. Wave forecasts now cover all of coastal Maine, providing 48-hour forecasts of wave height, peak period, and wave direction. Panchang recently added a module for wave-induced surface drift velocities, which NOAA oil spill forecasters requested and access as needed. In 2009, the system correctly predicted the conditions surrounding Hurricane Bill, including large waves near Thunder Hole in Acadia National Park, where several injuries and one fatality occurred. The complete dataset has been transferred to the US Geological Survey in Augusta. (R-04-05)

*Fisheries managers adopt Sea Grant's lobster model.*

The American lobster (*Homarus americanus*) supports one of the most valuable commercial fisheries in the United States and the largest fishery in Maine. Landings have increased steadily since the early 1970s, and fishing effort is intense and increasing throughout the species' range. For decades, fishermen and scientists disagreed about methods used in assessing the status of lobster populations: stock assessments suggested that Gulf of Maine lobsters were overexploited and vulnerable to collapse, yet other studies and field observations suggested otherwise. Sea Grant researcher Yong Chen developed a new computer model based on lobster size that accounted for many factors, including seasonal patterns and lobster biology. Management scenarios can be plugged into the model to predict results of different fishing activities, such as v-notching. Prior to Chen's research, v-notching (the practice of fishermen marking reproductive female lobsters with a v-shaped notch in their tails and not keeping any such marked lobsters in their catch) was undocumented and unsupported by government and fisheries scientists. Chen's models helped confirm that v-notching has made a difference in the lobster fishery by protecting reproductive stocks. The Atlantic States Marine Fisheries Commission adopted Chen's model for determining the status of lobster fisheries, and the health of lobster stocks. The model was first used in the 2009 assessment. (R-06-04)

*Sea Grant researchers improve fishing safety.*

Maine's commercial fishermen had a difficult year, with seven fishing-related deaths in Cobscook Bay alone. Fishermen vary widely in their level of safety preparedness, and more stringent safety regulations would not affect everyone equally. The costs and realities of achieving compliance will be more difficult for some groups than others. After dozens of interviews aboard Maine fishing vessels, Tufts University (formerly UMaine) researcher Mary Davis found that fishermen

consistently under-rated the risks of working on the water. Fishermen in locations that are more isolated from Coast Guard training efforts and stations, such as Downeast Maine, had a lower level of preparedness. Prompted by the number of deaths in the eastern Maine urchin industry, the lack of safety training of dive tenders, and to some extent by this study, the Sea Urchin Zone Council and DMR staff developed an online Diving Safety Course that is required for those who want to be licensed for tending fishermen diving for urchins and other hand-harvest fish. Since the course was available in December, 25 new diver tender licenses have been issued. (R-08-03)

#### *Theses and dissertations*

Brzezinski, D. 2009. Ecological and policy implications of voluntary participation in fisheries management (MS, University of Maine).

Undergraduate students supported: 10

Other graduate students supported: 6

#### Program Development Accomplishments

##### *Sea Grant researchers document the impacts of dam removal.*

Many coastal rivers and streams once provided habitat for sea-run (or anadromous) fishes like Atlantic salmon and alewives, but populations of these fish have declined or disappeared as a result of centuries of dam construction and pollution. A growing number of small-scale dam removals are attempting to restore freshwater-marine linkages in Maine watersheds, but the effects on fish are not well documented. University of Maine researchers are attempting to establish a rigorous monitoring program documenting the effects of barrier removal and anadromous species recovery on freshwater habitat, communities, and ultimately ecosystem-level functions. In June 2008, researchers discovered a small but seemingly healthy population of sea lamprey spawning in Sedgeunkedunk Stream, a tributary of the lower Penobscot River that is currently the target of restoration efforts. Similar to Pacific salmon's well-documented effects on West Coast watersheds, spawning populations of sea lamprey may have widespread influence on stream ecosystems. As the timeline for dam removal accelerated, researchers asked Sea Grant for emergency funds to collect crucial pre-dam removal data. The researchers leveraged the \$5,000 development grant to obtain \$105,224 in competitive Sea Grant research funding. (DV-09-007)

##### *Sea Grant helps Port Clyde education center produce food for local community.*

With many stocks of wild seafood in decline, aquaculture provides a sustainable source of local, healthy food. The Herring Gut Learning Center in Port Clyde trained two local science classes in fish and produce production as part of the "egg to plate initiative." Sea Grant funding supported equipment and supply upgrades to an existing aquaponics system that was then utilized by 26 students to produce 62 pounds of tilapia and 35 pounds of basil, lettuce, and bok choy that were sold to the local vocational school, where 30 students prepared meals using the fish and produce in their culinary class. Approximately 15 community members purchased greenhouse produce from July through January. Broodstock tilapia were provided to the Maine State Veterinarian, a local commercial aquaponics enterprise, and a professor at Colby College to set up an aquaponics system at the school. Facility and equipment upgrades enabled by Sea Grant

reduced heating and electric costs in the greenhouse and finfish hatchery by up to one-half and improved water quality and waste management. Increased fish and produce production provided the schools and community with a reliable source of locally grown food, and created a supply of tilapia broodstock for educational and commercial facilities throughout the region. System improvements led to cost-savings that reduced the amount of funding required to provide Herring Gut education programs. (DV-09-010)

*Sea Grant investment in the Lobster Settlement Index yields two decades of return.*

In the 1980s, a disconnect between what lobstermen were seeing at sea and what scientists were saying led to a new approach to marine ecology. Scientists began to recognize the importance of larval dynamics to the “supply-side” of fish populations. In 1987, Sea Grant provided funds to support development of a method to identify and quantify lobster nursery habitat. With successful demonstration of “larval suction sampling,” researchers were able to show a link between larval settlement and recruitment of adult lobsters on the sea floor. Later, scientists found they could follow year classes through time, from the moment they settled on the bottom to their adult stage. Since that first Sea Grant funding over 20 years ago, the American Lobster Settlement Index has expanded to over 60 sampling sites in other lobster producing regions in New England and Atlantic Canada. Data from the long-term monitoring provided valuable insights into the pre- and post-settlement processes influencing lobster recruitment, as well as promising signs for a forecasting tool. The index has been included in the most recent federal stock assessments as an indicator of the health of the lobster resource. In Maine, Massachusetts, and Rhode Island, state managers have taken over monitoring, showing that technology transfer is possible. The Index has been leveraged for numerous research projects funded by NOAA, NSF, and NASA, and has contributed to some 26 peer-reviewed publications, including an Editor’s Choice paper in *Science*. In June 2009, scientists, students, and managers came together at a workshop on Burnt Island in Boothbay Harbor to review accomplishments and prioritize future work, and to celebrate the anniversary of the Lobster Settlement Index. (DV-09-012)

#### Extension Accomplishments

*Resulting from the work of the Marine Extension Team, a partnership between Maine Sea Grant and University of Maine Cooperative Extension, organized by strategic focus area.*

#### Healthy Coastal Ecosystems

*Sea Grant efforts improve water quality at Maine’s beaches.*

Tourism is Maine’s largest industry, and beach-related spending by tourists is estimated at over \$500 million, supporting the employment of more than 8,000 people. Yet high bacteria levels can impair water quality, threaten public health, and lead to advisories/closures of valued coastal beaches. These facts are a reality in Kennebunk, where routine monitoring of popular sandy beaches has resulted in over 40 exceedances of bacteria safety standards since the town joined the Maine Healthy Beaches (MHB) program in 2003. Maine Sea Grant and University of Maine Cooperative Extension coordinate MHB with the Department of Environmental Protection, and since 2005, the program has supported special studies and intensified monitoring to help identify pollution sources and transport pathways impacting beach water quality. MHB and Maine Geological Survey conducted a circulation study of the Kennebunk River, EPA scientists helped locate pollution sources, and a task force of MHB, Department of Environmental Protection, and

municipal staff surveyed 31 priority properties. A 2009 workshop built local capacity to find, fix, and prevent sources of fecal pollution. MHB data and technical assistance have supported the town's effort to improve the nearby stormwater drainage system, and to increase the number of properties serviced by the municipal sewer system. The Kennebunk River Action Committee, comprised of citizen volunteers, is promoting best practices. These and other actions taken throughout the watershed have resulted in measureable improvements in water quality, lending support for continued efforts.

### Safe and Sustainable Seafood Supply

#### *Sea Grant research informs smelt management rules.*

Rainbow smelt is an anadromous fish listed by the NOAA National Marine Fisheries Service (NMFS) as a species of concern due to the effects of harvesting, water quality and habitat degradation, inaccessibility of spawning grounds, and possible disease issues. As part of a NMFS study to conserve and restore wild populations of rainbow smelt within the US Gulf of Maine watershed, the Marine Extension Team worked with the Department of Marine Resources to establish two index sites in Washington County for monitoring spawning smelt populations and collecting information on water quality and habitat status. Additional smelt spawning areas have been identified throughout Downeast Maine. Results from this monitoring effort have contributed to regulations enacted in December 2009 that provide additional conservation measures for smelt in Maine.

#### *Sea Grant maps the extent of local lobster fishery.*

In 2009, intense territorial conflicts and violence plagued Maine's lobster fishery. Lobster prices were low, costs were high, and tempers short. Many fishermen viewed scientists as part of the problem, not partners in finding solutions. In the spring of 2009, Maine Sea Grant convened and facilitated a series of meetings and conversations with Tenants Harbor fishermen to design and conduct a research experiment in collaboration with the Department of Marine Resources head lobster biologist. DMR wanted to mimic an experiment with fishermen from Monhegan Island conducted in 2005, in which fishermen voluntarily removed traps from certain areas to test the influence of trap density on catch rates. Because Tenants Harbor fishermen were concerned about research results being "used against them," individual participation was uncertain right up until the experiment began. The experiment did, however, produce scientific and social results. Aerial photography and buoy count analysis allowed scientists to map the lobster fishery as never seen before. In addition, the collaborative participation of 15 fishermen in trap removal and sea sampling data collection has laid the foundation for future research, and helped change attitudes about science and scientists on the St. George Peninsula.

#### *Sea Grant unites communities to manage seafood resources.*

In Maine, municipalities can request authority from the state to manage their soft-shell clam resources. Participating communities benefit with clean water and direct support of an important local fishery. However, a lack of financial and staffing resources often prevents small towns in central and eastern Maine from developing shellfish programs, and the Maine Coastal Program's encouragement of regional or multi-town programs has had limited success. In 2009, Sea Grant worked with the Maine Coastal Program and the Department of Marine Resources to create the Frenchman Bay Regional Shellfish Management Program in Hancock County. This program is modeled directly on the Georges River Regional Shellfish Management Program, developed by the Marine Extension Team. The Georges River program has brought over \$30



million in clam landings into the Thomaston, St. George, Cushing, Warren, and South Thomaston communities since 1996, supporting over 100 commercial clam diggers and their families. The seven Hancock County towns in the program have adapted the municipal ordinance and interlocal agreement from the Georges River program, and a similar program is currently being explored in the Cobscook Bay region.

*Sea Grant helps reduce eider predation on a longline mussel farm.*

Predation by the common eider is a major obstacle to financial viability for mussel farmers in Maine, regardless of the culture method used. Based on a request from a mussel producer, with funding from the Northeast Regional Aquaculture Center, and in partnership with the Maine Cultured Mussel Company and the Massachusetts Institute of Technology, Maine Sea Grant developed prototype acoustic buoys for deployment on a longline mussel farm in Blue Hill Bay. Losses from duck predation dropped drastically, and the equipment has been improved from the initial design, to improve strength and reduce maintenance needs. The farmer considers the buoys “essential equipment” and “would not consider going into the predation season without it.” Mussel producers in Maine and outside the state will benefit from this improved technology.

#### Sustainable Coastal Community Development

*Maine Sea Grant’s public access resource is national model.*

Across Maine and the US, access conflicts among diverse waterfront users are resulting in substantial economic, social, and environmental impacts in coastal communities. Of Maine’s 5,300 miles of coast, only 20 miles support water-dependent industries, and the majority of commercial access points are privately owned and vulnerable to conversion. Workshops conducted by Maine Sea Grant, in collaboration with the Maine Working Waterfront Coalition, Coastal Enterprises, Inc., Maine Coastal Program, Island Institute, University of Maine Law School’s Center for Law and Innovation, and Maine Department of Revenue Services, identified a strong need for information about legal mechanisms for addressing waterfront access issues. Maine Sea Grant received funding from the National Sea Grant Law Center to conduct research on new and existing legal tools, which was then made available to waterfront users, landowners, and government and public trust entities via [www.accessingthemainecoast.com](http://www.accessingthemainecoast.com). Extension staff received positive feedback about the site from waterfront landowners, land trusts, and regional planners. The Maine Association of Sea Kayak Guides provided a link from their website, and the Maine Department of Island Fisheries and wildlife added it to their resource list for candidates studying to become Registered Maine Guides. The National Sea Grant Law Center identified the website as a national model, and provided Maine Sea Grant with additional funding to administer a call for proposals from other Sea Grant programs to produce similar websites. Five states (NJ, VA, MS, AL, HI) are now using Maine’s model to produce public access information websites of their own.

*Sea Grant and partners protect working waterfront on Mount Desert Island.*

After attending Sea Grant-sponsored and facilitated forums on coastal access (in Machias in 2006 and Ellsworth in 2007), brothers and third-generation fishermen Wayne and Robert Davis applied for and received funds from the new Working Waterfront Access Pilot Program to preserve their family’s 0.57 acre property (Davis Wharf) located in Goose Cove in the town of Tremont on Mount Desert Island. Davis Wharf is believed to be the last full-service non dealer-owned fishing wharf on Mount Desert Island, and it currently supports eight commercial

fishermen with potential to benefit a total of 12 in the future. Awarded monies will refinance the business and improve the wharf infrastructure with additional docking space, more efficient loading and unloading capacity with a new electric hoist, and a large float and ramp for better access between tides.

### Hazard Resiliency in Coastal Communities

*Sea Grant identifies strategies for adapting to climate change in coastal communities.*

One of the challenges society faces in a changing climate is applying global-scale information and data to the local environment. In order for communities to change and adapt to new climate regimes, they need information, tools, and resources that are applicable at the state, town, and even ecosystem level. Based on the results of the joint Maine-Oregon Sea Grant project, *Coastal Community Resilience: Developing and Testing a National Model of State-based Outreach*, Maine Sea Grant and the Marine Extension Team have emerged as a resource on coastal climate change impacts and adaptation, providing social science research results and expert consultation to Maine communities and other states. One of the investigators on the project is now a full-time climate change educator with Sea Grant Extension, one of only two in the nation. A new related project, funded by the National Science Foundation through the Sustainability Solutions Initiative EPSCoR, is developing a climate change vulnerability and community assets assessment with pilot communities in Maine in order to develop adaptation tools and approaches. A second related project resulting from this work is a new partnership with Inner City Fund International and the Casco Bay Estuary Partnership's Climate Ready Estuaries initiative in Casco Bay.

*Sea Grant facilitates plans for offshore wind energy.*

With extensive undeveloped coastline and some of the most promising offshore wind resources in the US, Maine is at the forefront of the emerging ocean energy sector. In May 2009, the Maine Legislature directed the State Planning Office and the Department of Conservation to identify up to three locations suitable for demonstrating offshore, deepwater wind technology. State officials asked Maine Sea Grant to assist in planning an outreach strategy to engage stakeholders in siting decisions, which was accomplished through three meetings of representatives of the relevant state agencies, including the Department of Marine Resources, and various statewide interest groups. The state then engaged the Marine Extension Team to plan and facilitate five stakeholder scoping sessions along the coast during August, providing a chance for project leaders to outline the legislation and share preliminary maps of study sites. Feedback from the scoping sessions allowed the state to revise preliminary recommendations in preparation for a round of public information sessions that sought broader input from citizens and stakeholders, also facilitated by members of the Marine Extension Team, in September and October. As a result of the successful outreach strategy, in mid-December, state officials established three offshore wind demonstration sites, one of which will be used by the University of Maine, with over \$12 million in grants for developing testing facilities and equipment.

### Communications Accomplishments

*Sea Grant documentary highlights coastal resiliency.*

Working with Oregon Sea Grant, Maine Sea Grant produced and distributed *Building a Resilient Coast: Maine Confronts Climate Change*, a five-segment documentary to inform facilitated

discussions in coastal communities. A segment of the DVD was selected to air at the Climate Change Summit held in Copenhagen, Denmark, in December 2009, and the DVD received an AVA gold award, an international competition of the Association of Marketing and Communication Professionals. The DVD was distributed to 52 Maine communities, and was requested by partners in eight states (NH, MA, CT, NY, PA, FL, LA, WA) and two Canadian provinces. The DVD aired on Maine Public Television in October 2009 and was featured in MPBN's "Mainewatch" segment.

*Sea Grant produced statewide climate change assessment.*

Maine Sea Grant worked with 75 scientists from the University of Maine and other institutions to produce *Maine's Climate Future: An Initial Assessment*. The report, requested by Governor Baldacci and delivered in February 2009, prompted the state legislature to initiate a climate change adaptation stakeholder process, coordinated by the Department of Environmental Protection. Based in part on needs identified in that process, Sea Grant and Cooperative Extension partnered with the Climate Change Institute and the Maine State Climatologist to create *Maine Climate News*, an online resource for statewide weather and climate updates, research descriptions, and news, [www.extension.umaine.edu/maineclimatenews/](http://www.extension.umaine.edu/maineclimatenews/).

*Sea Grant fact sheet employed to educate citizens.*

A "Research in Focus" fact sheet on a Sea Grant-funded study of mercury in the Penobscot River was distributed to participants in a river cruise hosted by Maine People's Alliance. From the event coordinator: "I just didn't know that there was such a concise piece of information about mercury in the Penobscot. All the sources I had found so far had been academic and very dense. It's good to know you are making the information accessible to the average person."

*Sea Grant writer awarded for book.*

*A Coastal Companion: A Year in the Gulf of Maine from Cape Cod to Canada* (Tilbury House, 2008) received a Silver Award for Writing from the Association for Communication Excellence.

## Education Accomplishments

*Sea Grant engages K-12 teachers in inquiry-based curriculum development.*

Inquiry-based science instruction encourages students to learn and practice the skills of a scientist by asking and answering their own questions about the world around them and learning how to communicate their findings to others. Both state and national science education standards require inquiry-based instruction, and teachers at all grade levels in Maine are looking for opportunities to fulfill these standards through investigations of locally-relevant resource management questions. To develop useful curriculum that complements existing instructional materials, and working closely with our science education partners, Maine Sea Grant engaged 35 elementary, middle, and high school teachers in three different curriculum development projects in 2009. With a three-year Bay, Watershed, Education and Training (B-WET) grant from NOAA, Maine Sea Grant and the Gulf of Maine Research Institute worked with 31 middle school teachers to develop *VitalVenture*, a series of watershed science curriculum units. Sea Grant also initiated an inquiry-based oyster gardening curriculum for third grade students in partnership with the Herring Gut Learning Center and the Great Salt Bay School in Damariscotta, and worked with Old Town and Nokomis Regional high schools, Acadia Partners for Science and Learning, and the UMaine Senator George J. Mitchell Center to design and initiate a pilot watershed research

program on the American eel. A second three-year NOAA B-WET award will provide the funding to extend the eel research curriculum to additional schools from 2010-2012.

### Program Management Accomplishments

#### *Sea Grant's new strategic plan aligns with national goals.*

In 2009, Maine Sea Grant staff spent a good deal of time and energy working on the finalization of a new four-year strategic and implementation plan. The National Sea Grant Office required state programs to develop local plans that align with national goals and priorities. With input from the Maine Sea Grant Policy Advisory Committee, staff created a coherent and simplified strategic and implementation plan that provides a framework for evaluating progress over the next four years.

#### *Sea Grant strengthens campus connections.*

In recent years, Maine Sea Grant has committed to improving connections to other units on campus to explore new partnerships and ways to bring new skill sets and expertise to the Sea Grant realm. The following relationships enjoyed continued expansion and depth in 2009:

- Advanced Engineered Wood Composites Center
- Aquaculture Research Institute
- Center on Aging
- Center for Research and Evaluation
- Climate Change Institute
- Cooperative Extension
- Department of Communication and Journalism
- Sen. George J. Mitchell Center/Sustainability Solutions Initiative
- School of Marine Sciences
- School of Business

#### *Sea Grant activities resulted in changes in legislation and policy.*

A continuing strategic goal and measure of performance is the number of changes in legislation, policy, or rules, based on Sea Grant-supported research results or extension activities. The following policy changes occurred in 2009:

#### State (Maine)

- LD 1465, An Act To Facilitate Testing and Demonstration of Renewable Ocean Energy Technology
- LD 460, Resolve To Evaluate Climate Change Adaptation Options for the State
- DMR added sea scallops to the list of species allowed under a Limited Purpose Aquaculture License.
- DMR requires dive tenders to pass an online Diver's Safety Course, First Aid, and CPR.
- DMR made changes to smelt harvesting regulations
- DEP Maine Coastal TMDL Process Final Report

#### State (Other)

- Alabama House Joint Resolution 656, Waterfront Access Study Committee.

#### Regional

- Atlantic States Marine Fisheries Commission American Lobster Stock Assessment.

### Federal

HR 3619, Maritime Fishing Safety Act of 2009 would create safety regulations and improve the training requirements of Maine fishermen.

HR 2548, Keep America's Waterfronts Working Act of 2009 would create a national working waterfront grant program.

EPA *Smart Growth for Coastal and Waterfront Communities* promotes water-dependent uses as an element of Smart Growth.

### Changes from Previous Year

Maine Sea Grant is part of a national network of 32 programs and is obligated to operate under a four-year plan closely aligned to the National Sea Grant College Program strategic plan. The National Sea Grant Advisory Board periodically reviews Maine Sea Grant to assess program proficiency and evaluate local, regional and national outcomes. Maine Sea Grant is entering the first year of this cycle with a majority of programming aligned with the four national focus areas as provided in this report. While it is important for the program to maintain this strategic direction, there are other needs in the state and priorities of the University that the program pays attention to and is including as emerging issues. These include climate change and how it might affect Maine's coast, as well as ocean-related energy. The program is also paying close attention to issues related to the restoration of the Penobscot River watershed and diadromous fishes in general through sponsored research and outreach activities.

### **IV. Goals for Next Year**

*For more information on next year's goals and long-term priorities, please see the Maine Sea Grant College Program Strategic and Implementation Plan 2009-2013:*

<http://www.seagrants.umaine.edu/publications/program>

#### Hazard Resilience and Climate Change

- Continue implementing coastal resiliency outreach plan, including publication of research results, creation of coastal property owner hazard mitigation guide, and research opportunities for hazard mitigation demonstration projects.
- Identify sustained funding source for coordination of *Maine Climate News*.
- Continue work with the Climate Change Institute and with the DEP to assist in the further development of climate change adaptation strategies in Maine's coastal communities.

#### Alternative Ocean-Related Energy

- Continue to work with AEWC, the state, and others toward offshore energy initiatives with specific emphasis on outreach and community engagement.

#### Sustainable Seafood

- Finalize the report for the Maine Aquaculture Association MTI-funded planning effort and provide outreach support in delivering the findings and recommendations.
- Expand aquaculture extension capacity to work with the University in developing aquaculture research and community engagement priorities and participate in the implementation of technology transfer opportunities.

- Continue to reach out to commercial fishermen and promote shellfish aquaculture as a growth opportunity, expand the Oyster Garden Program, and utilize UMaine faculty to enhance education connections.
- Work with DMR to update research priorities for select commercial species.
- Participate in the National Sea Grant Sustainable Seafood Theme Team and help to organize a national conference on Energy in Fisheries.
- Secure a sustainable future for the Taunton Bay fisheries management experiment.
- Continue building the Port Clyde Boat Maintenance Fund and supporting the Midcoast Fishermen's Association and Monhegan Boat Lines joint venture to construct a marine railway, freezer, and ice plant in Port Clyde.

#### Tourism and Cultural Heritage

- Launch the Downeast Fisheries Trail and ensure that it is recognized as a significant tourism and community development effort in Washington and Hancock counties.
- Continue to provide leadership capacity in tourism planning as VRC chair, represent Downeast region in tourism dialogues in Augusta and beyond, and implement effective outreach for sustainable tourism through online newsletters, business training workshops, and nature-based tourism collaborations.

#### Management and Program Sustainability

- Develop a program to engage Sea Grant-funded graduate students both during their academic career and post graduation.
- Implement the Sea Grant undergraduate scholarship for the School of Marine Sciences.

#### Community Development, Engagement, and Capacity Building

- Build community capacity to engage the public in sustainable planning efforts.
- Finalize plans for sustainably funding beach profile monitoring.
- Build capacity of local resource managers to identify and remediate sources of bacterial pollution affecting beaches and/or shellfish growing areas.
- Design, implement, and evaluate Working Waterways and Waterfronts Symposium.
- With National Sea Grant Law Center funding, act as principle investigator for new project exploring implications of tax policy for preserving working waterfronts.
- Continue work at the national level to advance the Sustainable Coastal Community Development agenda through the focus team and the national extension network.

#### Formal and Informal Education and Outreach

- Implement pilot oyster gardening program pilot for students in Damariscotta, and plan for extension to additional classrooms and schools.
- Evaluate DMR marine nuisance species diver survey data (2007-2009), plan supplemental 2010-2011 diver surveys, and continue related outreach and monitoring efforts with the Maine Marine Invasive Species Working Group.
- Work with the Gulf of Maine Research Institute to develop a website for the *VitalVenture* watershed education program. Develop additional curriculum units related to climate change, backyard ecosystems, and sea-run fish. Increase awareness and use of *VitalVenture* curriculum units through professional development workshops and presentations.
- Work with Acadia Partners for Science and Learning and the UMaine Senator George J. Mitchell Center to complete a high school watershed research pilot on the American eel

(2009-2010 school year). Plan for expansion of the program to additional school districts with a three-year grant from the NOAA B-WET program.

- Work with the USA National Phenology Network, UMaine Cooperative Extension, Acadia Partners for Science and Learning, and the UMaine Climate Change Institute to develop a pilot climate change education and citizen monitoring program focused on phenology.

## **V. Challenges and Solutions**

The reorganization of Maine Sea Grant management, initiated in 2008, will be completed in 2010 when Associate Director Susan White retires. The program's leadership intends to pay close attention to interpersonal relationships and office dynamics in the coming year and convene staff frequently in the interest of maintaining a highly effective work environment.

Program management will hire a research coordinator in 2010, a critical part of enhancing the integration of research, extension, and education. The reorganization also subtracts from the program's "hands-on" capacity for education projects with Beth Bisson becoming Assistant Director. The program plans on taking advantage of partnerships and externally funded projects to maintain momentum on select education projects and will seek opportunities to attract more robust funding to grow this important program element.

Budgets remain tight and it is more critical than ever for staff to scrutinize budgets and identify opportunities to attract and leverage extramural funding for specific projects to ensure current staffing levels. Such opportunities are presented by emerging issues like climate change, alternative ocean energy, and marine aquaculture. While Sea Grant is being called upon to work on these issues, the program lacks the staff to be as responsive as is necessary and, in order to apply focused support in these areas, additional resources beyond the program's core budget are required.

### Long Term Priorities

Maine Sea Grant has an active and dynamic process for establishing four-year strategic and implementation plans based upon guidance and requirements of the National Sea Grant Office. This plan provides the basis for much of the program's efforts and the framework by which the program is periodically reviewed. The Maine Sea Grant College Program strategic and implementation plans can be found at: <http://www.seagrants.umaine.edu/publications/program>. The National Sea Grant College Program strategic plan can be downloaded at: <http://www.seagrants.noaa.gov/focus/index.html>.

## Appendix A. NOAA National Sea Grant Performance Measures and Metrics

### **Sea Grant sponsored/organized workshops, meetings, and conferences**

*Events sponsored with program development funds 2009-2010 (9 total; 1,821 attendees)*

Status, Trends, and Conservation of Eelgrass in Atlantic Canada and the Northeastern United States, 24-25 February 2009, Portland, ME (113 attending)

Energy Independence talk by Soren Hermansen, 24 March 2009, Orono, ME (~100 attending)

Exploring Fine-scale Ecology for Groundfish in the Gulf of Maine and Georges Bank, 2-3 April 2009, York Harbor, ME (~100 attending)

Spring Running, 13 June 2009, Augusta, ME (500 attending)

Integrating Seafloor Mapping and Benthic Ecology into Fisheries Management in the Gulf of Maine, 15-16 June 2009, Portland, ME (35 attending)

American Lobster Settlement Index Looking back/Looking ahead 1989-2009, Workshop Proceedings, 19-21 June 2009, Boothbay Harbor, ME (40 attending)

Penobscot River Revival, 18 July 2009, Bangor, ME (~500 attending)

Maine Coastal Waters Conference 2009: Climate, Energy, and our Coastal Communities. 28 October 2009, Northport, ME (255 attending)

The Ecology of Marine Wind Farms: Perspectives on Impact Mitigation, Siting, and Future Uses, 8th Annual Ronald C. Baird Sea Grant Science Symposium, 2-4 November 2009, Newport RI (178 attending)

*Events facilitated/coordinated by Sea Grant staff (124)*

#### Maine Healthy Beaches Program

Interagency Meetings (8) in four communities (52 attendees).

Regional Beach Management Meetings (6) in six communities (39 attendees).

Special Study/Problem Solving Meetings (19) in nine communities (101 attendees).

Field Trainings (33) in 23 communities (103 attendees)

Laboratory Trainings (4) in four communities (15 attendees)

#### Offshore Wind Energy

Outreach Planning Meetings (3), Augusta, ME (15 attending)

Demonstration Site Scoping Sessions, Machias, ME (30); Cutler, ME (40); Isle au Haut, ME (60)

Demonstration Site Public Forums, Ellsworth, ME (120) Stonington (20), Machias (35), Cutler (35), Rockport (-)

#### Coastal Community Resilience

Technical Advisory Committee, 2 February 2009, Orono, ME (6)



Stakeholder Advisory Committee, Augusta, ME (10)  
Building a Resilient Coast Workshop, 16 June 2009, Rockland, ME (20)  
Building a Resilient Coast Workshop, 23 June 2009, Kennebunk, ME (31)

VitalVenture Program Development/Professional Development Workshops (5), March-August 2009, Portland, ME (31 teachers participated, each attending three workshops)

Maine Marine Invasive Species Working Group Meetings (3), March-December 2009 (50 total attending)

Taunton Bay Advisory Group meetings (8), March 2009-January 2010, (-)

Energy Efficiency in Fisheries, Maine Fishermen's Forum, 5 March 2009, Rockport, ME (150)

Accessing the Maine Coast RFP Webinar, 6 March 2009, (-)

Shellfish Working Group, 19 March 2009, Walpole, ME (25)

Workforce Housing Coalition Annual Meeting, 14 April 2009, Portsmouth, NH (75)

Maine Beaches Conference, 10 July 2009, South Portland, ME (146)  
Maine Beaches Conference Steering Committee meetings (9), December 2008-August 2009 (60).

Sustainable Urbanism Training, 19 July 2009, Boston, MA (25)

Sea Grant Sustainable Coastal Community Development Network Annual Meeting, 21 July 2009, Boston, MA (35)

Maine Solutions Community Forum, 12 August 2009, Winter Harbor, ME (40)

Southern Maine Beach Profile Monitoring Program Advisory Committee, 23 September 2009 (9)

Vacationland Resources Committee Sustainable Tourism Initiatives in Washington and Hancock Counties, Legislative breakfasts (2), Fall 2009, Augusta, ME (5 legislators at each)

Food For Thought, Time for Action (plenary session), 3 October 2009, Bar Harbor, ME (60)

Nearshore Migration of Atlantic Salmon in the Gulf of Maine, 9 November 2009, Orono, ME (10)

Bar Harbor Chamber of Commerce board retreat (10)

Allied Whale curriculum development project, two-day teacher workshop, Bar Harbor, ME (20)