

2012

Maine Sea Grant Annual Report 2012

Maine Sea Grant

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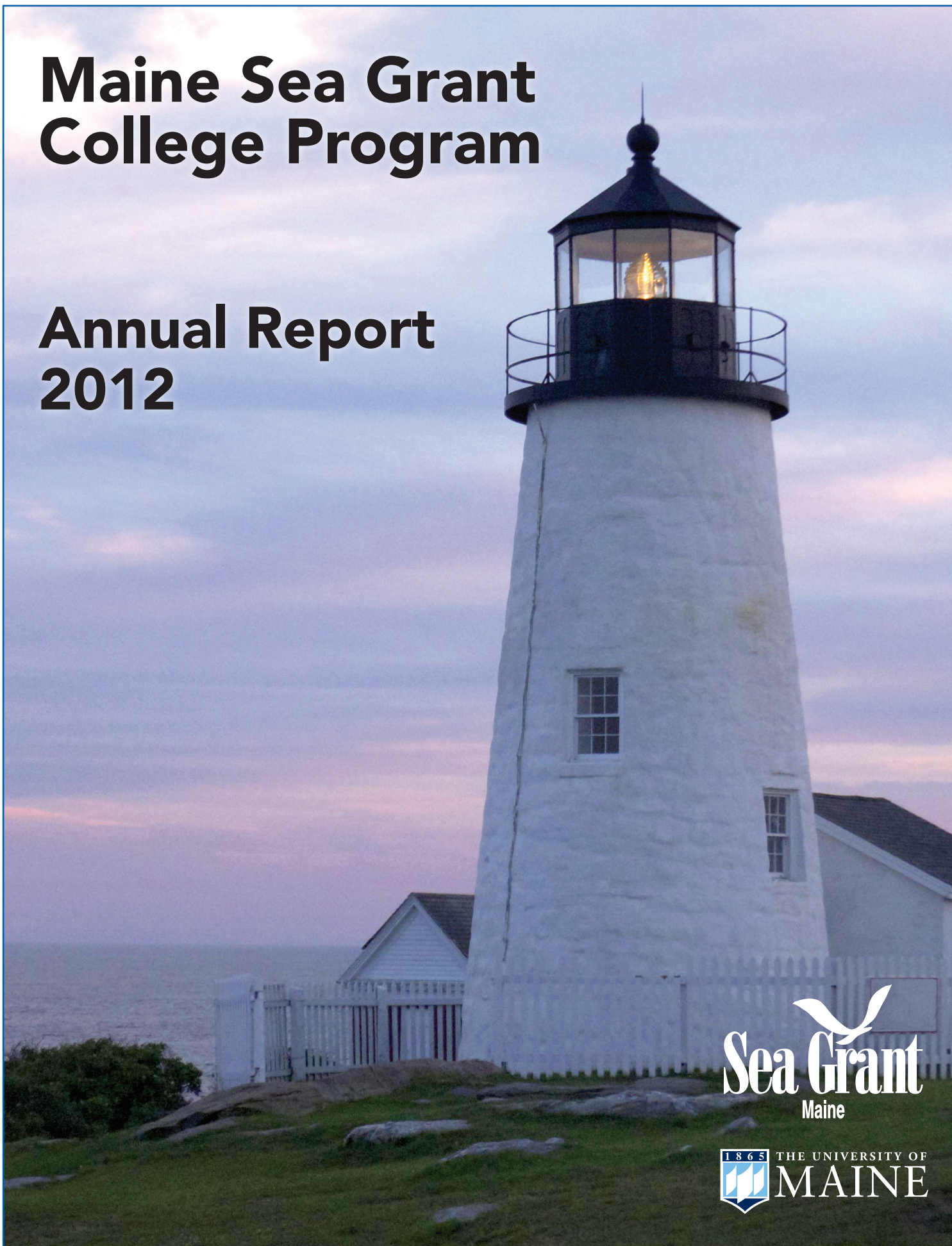
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Maine Sea Grant College Program

Annual Report 2012



Sea Grant
Maine

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The Maine Sea Grant College Program at the University of Maine is part of a network of 33 NOAA Sea Grant programs throughout the coastal and Great Lakes states. We sponsor scientific research throughout the state and region that focuses on marine and coastal issues of concern to the people of Maine.

Maine Sea Grant's Marine Extension Team, a partnership with University of Maine Cooperative Extension, helps to identify community needs and concerns, and works to address them through outreach, education, and technical assistance. Marine extension staff are based along the coast from Eastport to Wells.

Our education efforts to develop tomorrow's marine workforce include formal and informal programming for students of all ages, as well as fellowships and scholarships.

Communications staff assist with all aspects of the program, maintaining Sea Grant's role as a neutral source of science-based information.

Our work is organized into four "focus areas" according to our 2009-2013 strategic plan: healthy coastal ecosystems, sustainable coastal development, safe and sustainable seafood, and hazard resilience in coastal communities.

2012 Annual Report

Introduction

This report summarizes the major accomplishments of the Maine Sea Grant College Program between February 1, 2012 and January 31, 2013, a period in which we saw impacts, accomplishments, and growth despite budget uncertainties.

Members of the Marine Extension Team, who continue to serve Maine coastal communities, are highly sought after by our many new and longtime partners. Highlights from extension programs, as well as the investments in research and program development, are provided in this report.

Initiatives in climate change adaptation and sustainable aquaculture are just a few of the new programs developed in this reporting cycle. Staff are involved in various aspects of climate change as it relates to coastal issues, including ocean acidification, sea level change, and coastal community resilience. Our sustainable aquaculture efforts have grown significantly with the award of three competitive research grants, including the “Aquaculture in Shared Waters” initiative, in which extension staff are helping to link traditional commercial fishermen from two fishing communities with University of Maine researchers to evaluate social acceptance of aquaculture.

State and federal budgets remain in flux. Congress finally resolved lingering uncertainty of the federal allocation of NOAA funds in late June, when we learned of a 2% cut in our core NOAA funding (after the National Sea Grant Office absorbed a significant portion of the reduction in NOAA’s budget). This was a smaller cut than we had feared. Maine Sea Grant has been very successful in attracting funds from other sources and in building effective partnerships to continue and expand programmatic initiatives—these numbers are provided in the leveraged funding sections of this report.

We continue to connect with other units at the University of Maine, who increasingly seek our involvement in academic and outreach endeavors, recognizing that Maine Sea Grant has knowledge, experience, community engagement skills and strong relationships that benefit the University of Maine. Notably, these connections include the Offshore Wind Energy initiative funded by the U.S. Department of Energy, and the Sustainable Aquaculture EPSCoR (NSF) project in preparation.

The demand for Sea Grant expertise is also evidenced by the hundreds of presentations, publications, and meetings conducted by Sea Grant staff and researchers in 2012, which are listed in this report.

Membership Determination

| Staffing | Individuals | FTEs (SG) | FTEs Match (MEIF) | Additional MEIF | FTEs Match (Cooperative Extension) |
|----------------|-------------|-----------|-------------------|-----------------|---------------------------------------|
| Administration | 4 | 1.36 | 1.74 | .12 | |
| Extension | 6 | 2.87 | .73 | .75 | .91 |
| Education | 1 | .19 | .31 | | |
| Communications | 3 | 2.15 | .85 | .2 | |
| Research | 12 | 2.9 | Unk | n/a | n/a |

Return on Investment

Sponsored Research Activity

| Project Title | Source | Direct Costs | Indirect Costs | Total Award |
|---|--|--------------|----------------|-------------|
| 2012 Omnibus (including research) | NOAA | \$828,936 | \$227,518 | \$1,056,454 |
| Omnibus Match | Cooperative Extension | \$59,418 | \$19,490 | \$78,908 |
| Omnibus Match | UMaine MEIF | \$127,042 | \$41,670 | \$168,712 |
| Aquaculture Extension (Year 3) | NOAA | \$80,192 | \$19,808 | \$100,000 |
| Sea Grant Climate Adaptation 2011: City of Ellsworth, ME (2 years) | NOAA Sea Grant | \$70,028 | \$29,972 | \$100,000 |
| A Tool for Assessing Economic Impact of Sea Grant Investments | NOAA Sea Grant | \$17,658 | \$5,792 | \$23,450 |
| Fisheries Licensing for the Future Workshop | Broad Cove Fund/ Maine Community Foundation | \$30,000 | \$0 | \$30,000 |
| Engaging the Sea Grant Network to Build a Weather-Ready Nation (2 years) | NOAA North Atlantic Regional Team | \$18,825 | \$6,175 | \$25,000 |
| Economic Impact Assessment of the National Sea Grant College Program: An Inventory of Current Practices | NOAA Sea Grant | \$23,214 | \$7,614 | \$30,828 |
| Promoting Climate Change Awareness and Adaptive Planning in Atlantic Fisheries (2 years) | NOAA Coastal and Ocean Climate Applications | \$25,060 | \$6,516 | \$31,576 |
| Aquaculture in Shared Waters (2 years) | NOAA | \$217,065 | \$82,153 | \$299,218 |
| Conserving Maine's Unique Natural Resource: Monitoring, Outreach, and Education on our Sand Beaches | Maine Outdoor Heritage Fund | \$7,400 | \$962 | \$8,362 |
| Adding Value to the Sea Urchin Fishery with Aquaculture (2 years)* | NOAA | \$7,468 | \$3,197 | \$10,665 |

| Project Title | Source | Direct Costs | Indirect Costs | Total Award |
|---|--|--------------------|------------------|--------------------|
| The American Lobster in a Changing Ecosystem: A US-Canada Science Symposium | NOAA | \$15,000 | \$0 | \$15,000 |
| | Canada Dept. of Fisheries and Oceans | \$5,000 | | \$5,000 |
| | CINAR/NMFS | \$5,000 | | \$5,000 |
| | UMaine CNSFA | \$2,500 | | \$2,500 |
| | Lobster Institute | \$2,500 | | \$2,500 |
| | Maine Coastal Program | \$2,500 | | \$2,500 |
| | URI Cooperative Extension | \$1,000 | | \$1,000 |
| | Newfoundland and Labrador Dept. of Fisheries and Aquaculture | \$1,000 | | \$1,000 |
| | Nova Scotia Dept. of Fisheries and Aquaculture | \$1,000 | | \$1,000 |
| | Province of Prince Edward Island | \$1,000 | | \$1,000 |
| | Consulate General of Canada, Boston | \$1,000 | | \$1,000 |
| | Northeast Sea Grant Consortium | \$7,500 | | \$7,500 |
| | University of New Brunswick | \$1,000 | | \$1,000 |
| | Aquatic Science and Health Services | \$600 | | \$600 |
| 2013 Maine Beaches Conference | Southern Maine Planning Commission | \$500 | | \$500 |
| | Ogunquit Conservation Commission | \$500 | | \$500 |
| | Wells National Estuarine Research Reserve | \$500 | | \$500 |
| | Surfrider | \$250 | | \$250 |
| Invasive Mitten Crab | NOAA | \$21,395 | \$7,018 | \$28,413 |
| New England Aqua Ventus 1: Advanced Technology Demonstration Program** | US Department of Energy | \$21,062 | \$9,014 | \$30,076 |
| Additional MEIF (for cost sharing; 2 years) | UMaine VP Research | \$61,673 | | \$61,673 |
| Total Sponsored Research Activity 2012 | | \$1,664,786 | \$466,899 | \$2,131,685 |

* Redmond portion only

** Anderson portion only

Publications

Peer-reviewed journals

- Blouin, N.A., and S.H. Brawley. 2012. An AFLP-based test of clonality in widespread, putatively asexual populations of *Porphyra umbilicalis* (Rhodophyta) in the Northwest Atlantic with an in silico analysis for bacterial contamination. *Marine Biology* 159:2723-2729.
- Brewer, J. 2012. Don't fence me in: boundaries, policy, and deliberation in Maine's lobster commons. *Annals of the Association of American Geographers* 102(2):383-402.
- Brewer, J. 2011. Paper fish and policy conflict: catch shares and ecosystem-based management in Maine's groundfishery. *Ecology and Society* 16(1):15.
- Chan, C.X. *et al.* 2012. *Porphyra* (Bangiophyceae) transcriptomes provide insights into red algal development and metabolism. *Journal of Phycology* 48:1328-1342.
- Chan, C.X. *et al.* 2012. Analysis of *Porphyra* membrane transporters demonstrates gene transfer among photosynthetic eukaryotes and numerous sodium-coupled transport systems. *Plant Physiology* 158:2001-2012.
- Demi, L.M., K.S. Simon, S.M. Coghlan Jr., R. Saunders, and D. Anderson. 2012. Anadromous alewives in linked lake-stream ecosystems: do trophic interactions in lakes influence stream invertebrate communities? *Freshwater Science* 31(3):973-985.
- Gardner, C., S.M. Coghlan Jr., and J. Zydlewski. 2012. Distribution and abundance of anadromous sea lamprey spawners in a fragmented stream: current status and potential range expansion following barrier removal. *Northeastern Naturalist* 19(1):99-110.
- Kovach, A.I., T.S. Breton, C. Enterline, and D.L. Berlinsky. 2013. Identifying the spatial scale of population structure in anadromous rainbow smelt (*Osmerus mordax*). *Fisheries Research* 141:95-106.
- Pershing, A., R.A. Wahle, P. Meyers, and P. Lawton. 2013. Large-scale coherence in New England lobster settlement associated with regional weather. *Fisheries Oceanography* 21:348-362.
- Stillier, J.W. *et al.* 2012. Major developmental regulators and their expression in two closely related species of *Porphyra* (Rhodophyta). *Journal of Phycology* 48:883-896.
- Wahle, R.A., C.E. Bergeron, J. Tremblay, C. Wilson, V. Burdett-Coutts, M. Comeau, R. Rochette, P. Lawton, R. Glenn, and M. Gibson. 2013. The geography and bathymetry of American lobster benthic recruitment as measured by diver-based suction sampling and passive collectors. *Marine Biology Research* 9:42-58.
- Willis, T.V., K.A. Wilson, K.E. Alexander, and W.B. Leavenworth. 2013. Tracking cod diet preference over a century in the northern Gulf of Maine: historic data and modern analysis. *Marine Ecology Progress Series* 474:263-276.
- Ying, Y., Y. Chen, L. Lin, and T. Gao. Risks of ignoring fish population spatial structure in fisheries management. *Canadian Journal of Fisheries and Aquatic Sciences* 68:2101-2120.
- Zhang, Y., and Y. Chen. 2012. Effectiveness of harvest control rules in managing American lobster fishery in the Gulf of Maine. *North American Journal of Fisheries Management* 32(5):984-999.
- Zhang, Y., Y. Li, and Y. Chen. 2012. Modeling the dynamics of ecosystem for the American lobster in the Gulf of Maine. *Aquatic Ecology* 46:451-464.
- Zoellick, B., S. Nelson, and M. Schauffler. Participatory science and education: bringing both views into focus. *Frontiers in Ecology and the Environment* 10(6):310-313.

Technical Reports

- Anderson, P., and C. Schmitt (eds). Marine Ecology of Gulf of Maine Atlantic Salmon, summary document from a 2008-2010 series of workshops, MSG-TR-12-01. Orono, ME: Maine Sea Grant College Program.
- Bouchard, D. Response to an emerging shellfish pathogen: MSX in Maine oysters (*Crassostrea virginica*), 8 May 2012. Orono, ME: Aquatic Animal Health Laboratory.
- Brawley, S., S. Redmond, and N. Brown. Pilot production of native *Porphyra* for land and sea-based IMTA, Final Report, Project No. 12-06. Orono, ME: Maine Aquaculture Innovation Center.

Brewer, J.F. Social assessment of the Community Fisheries Action Roundtable, final summary report. Stonington, ME: Penobscot East Resource Center.

Carey, J., J. Falk, and K. Havens. Sustainable coastal tourism: renewing Sea Grant's role. Sustainable Coastal Development Focus Team of the National Sea Grant Network.

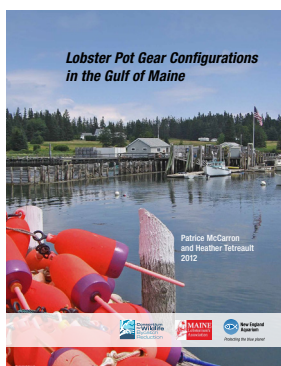
Enterline, C.L., B.C. Chase, J.M. Carloni, and K.E. Mills. A regional conservation plan for anadromous rainbow smelt in the U.S. Gulf of Maine. Augusta, ME: Maine Department of Marine Resources.

Farrow, K., K. Grant, P. Anderson, and B. Bisson. Report on the economic impact assessment method inventory for the Sea Grant network. Orono, ME: Maine Sea Grant College Program.

Grant, K., N. Springuel, and R. Heimes. Working waterfront preservation: opportunities and impediments posed by tax policy, final report to the National Sea Grant Law Center. Wells, ME: Maine Sea Grant College Program.

Kaczor, K., M. Sims, and A. St. Gelais. Enhanced monitoring study of Goosefare Brook, New Salt Road tributary, Old Orchard Beach, Maine. Waldoboro, ME: Maine Healthy Beaches Program.

Kaczor, K., M. Sims, and A. St. Gelais. A preliminary study of Spurwink River water quality. Waldoboro, ME: Maine Healthy Beaches Program.

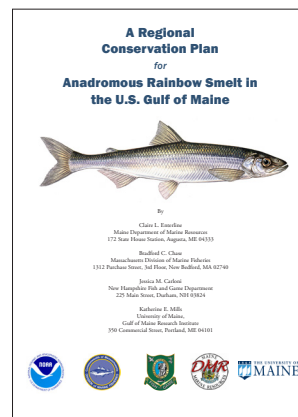


Maine Healthy Beaches Program. 2011 annual report to US EPA. Waldoboro, ME: Maine Healthy Beaches Program.

McCarron, P., and H. Tetreault. Lobster pot gear configurations in the Gulf of Maine. Kennebunk, ME: Maine Lobstermen's Association, Consortium for Wildlife Bycatch Reduction, and New England Aquarium.

Pinette, A. Working waterfront protection through tax policy: a transferability analysis of tax-focused portions of the "Accessing the Maine Coast" website. Portland, ME: University of Maine School of Law.

Stancioff, E., and K. Kaczor. Town of Camden 2012 water quality monitoring, testing, and remediation for Meganticook River, Camden Harbor, and Laite Beach. Topsham, ME: Wright-Pierce Engineering.



Conference Proceedings

Muhlin, J., and K. Pelletreau, editors. Northeast Algal Society 51st Annual Meeting Program with Abstracts. Winter Harbor, ME: Northeast Algal Society.

Schmitt, C., editor. American Lobster in a Changing Ecosystem: A US-Canada Science Symposium. Orono, ME: Maine Sea Grant College Program.



Outreach publications

Aman, J. The Wandering Road: southern Maine's volunteer beach profile monitoring program. Biddeford Public Access Television.

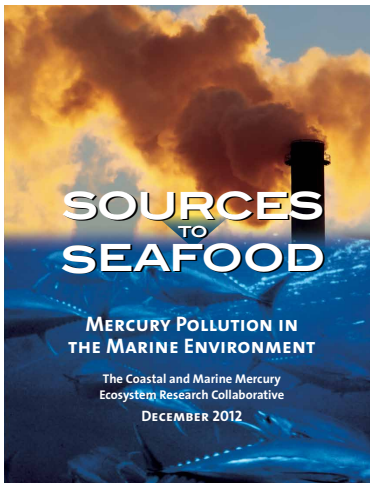
Anderson, P., D. Morse, S. Redmond, T. Olson, and M. Moretti. Talk of the Towns: seaweed aquaculture. WERU, 8 June 2012.

Anderson, P. Science for the coast: Maine Sea Grant. *Maine Lobstermen's Association Newsletter*, June 2012.

Battista, N., H. Deese, and C. Schmitt. Fathoming: Saving fuel doesn't have to be a drag. *The Working Waterfront*, 14 February 2012.

Beard, R. Talk of the Towns: Community and ecological impacts of tidal energy in Cobscook Bay. WERU, 11 May 2012.

Bisson, B., H. Webber, and C. Schmitt. Acadia Learning: Introduction to culverts and stream connectivity (video). Orono, ME: Maine Sea Grant and Schoodic Education and Research Center Institute.



Chen, C.Y., C.T. Driscoll, K.F. Lambert, R.P. Mason, L.R. Rardin, C.V. Schmitt, N.S. Serrell, and E.M. Sunderland. Sources to Seafood: Mercury Pollution in the Marine Environment. Hanover NH: Toxic Metals Superfund Research Program, Dartmouth College.

Coghlan, S., H. Webber, and B. Bisson. Acadia Learning: Introduction to stream ecology (video). Winter Harbor, ME: Schoodic Education and Research Center Institute.

Dawson, K. Research in Focus: The critical leading edge of Gulf of Maine salt marshes (YouTube video). Orono, ME: Maine Sea Grant College Program.

Dawson, K. Research in Focus: Sea lamprey, dam removal, and habitat restoration (YouTube video). Orono, ME: Maine Sea Grant College Program.

Dawson, K. Research in Focus: Mitigating risks to whales from lobster fishing (YouTube video). Orono, ME: Maine Sea Grant College Program.

Deese, H., and C. Schmitt. Fathoming: The oyster connection. *The Working Waterfront*, April 2012.

Deese, H., and C. Schmitt. Fathoming: An eye on the sea from above—what seabirds tell us about the Gulf of Maine. *The Working Waterfront*, May 2012.

Deese, H., and C. Schmitt. Fathoming: On history. *The Working Waterfront*, July 2012.

Deese, H. and C. Schmitt. Fathoming: Slow but steady success for sea mammals. *The Working Waterfront*, September 2012.

Deese, H. and C. Schmitt. Fathoming: Cod, If ever there was a fish worthy of science's 'A' game. *The Working Waterfront*, October 2012.

Deese, H., and C. Schmitt. Fathoming: Green slime. *The Working Waterfront*, November 2012.

Deese, H., and C. Schmitt. Fathoming: Science potpourri for the holidays. *The Working Waterfront*, December 2012/ January 2013.

Grant, K. Monthly legislator newsletter articles. Senator Amy Volk, Scarborough, ME.

Harden, M., H. Deese, and C. Schmitt. Fathoming: Bad bait fish. *The Working Waterfront*, August 2012.

Maine Sea Grant. Aquaculture & Restoration Partnership (northeastaquaculture.org). Orono, ME: Maine Aquaculture Innovation Center.

Maine Sea Grant. Downeast Fisheries Trail (map brochure). Orono, ME: Maine Sea Grant College Program.

Maine Sea Grant. Downeast Fisheries Trail (downeastfisheriestrail.org). Orono, ME: Maine Sea Grant College Program.

Maine Sea Grant. Downeast Fisheries Trail 2013 Calendar. Orono, ME: Maine Sea Grant College Program.

Maine Sea Grant. Facts at a Glance 2012. Orono, ME: Maine Sea Grant College Program.

Morse, D. Northeast lobstermen begin to realize benefits from the USDA's Trade Adjustment Assistance Program. *Fishermen's Voice* 17(5), May 2012.

Morse, D. What is aquaculture? (YouTube video). Orono, ME: University of Maine Cooperative Extension.

Morse, D. Careful handling key to better lobster prices. *Commercial Fisheries News*, October 2012.

Morse, D. Resources for shellfish growers (seagrant.umaine.edu/resources-for-shellfish-growers). Orono, ME: Maine Sea Grant College Program.

Redmond, S., and D. Morse. Seaweed production on mussel farms in Maine (seagrant.umaine.edu/extension/kelp-mussels). Orono, ME: Maine Sea Grant College Program.

Redmond, S. Roadmap to a seaweed farm. Franklin, ME: Maine Sea Grant College Program.

Redmond, S. Seaweed aquaculture: kelp. Marine Aquaculture Community of Practice, extension.org.

Redmond, S. Seaweed aquaculture: gracilaria. Marine Aquaculture Community of Practice, extension.org.

Redmond, S. Seaweed aquaculture in Maine. *Mainely Agriculture* 4(5):8.



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Schmitt, C. Maintaining lobster quality in an era of quantity. *Maine Lobstermen's Association Newsletter*, April 2012.

Schmitt, C. Maine alewife harvesters, federal listing. *Fishermen's Voice*, May 2012.

Schmitt, C., N. Springuel, and N. Montgomery. Downeast Fisheries Trail: Access to inner Cobscook Bay (interpretive panel). Portland, ME: Montgomery Designs and Maine Bureau of Public Lands.

Schmitt, C., N. Springuel, and N. Montgomery. Downeast Fisheries Trail: Diversity created by the tides (interpretive panel). Portland, ME: Montgomery Designs and Maine Department of Inland Fisheries and Wildlife.

Schmitt, C., N. Springuel, and N. Montgomery. Downeast Fisheries Trail: Aquaculture's place in a working harbor (interpretive panel). Portland, ME: Montgomery Designs and Maine Bureau of Public Lands.

Schmitt, C., R. Rich, and K. Tenga-Gonzalez. Downeast Fisheries Trail: Reconnecting habitat, restoring migrations (interpretive panel). Columbia Falls, ME: Downeast Salmon Federation.

Schmitt, C., R. Rich, and K. Tenga-Gonzalez. Downeast Fisheries Trail: A meeting place for fish (interpretive panel). Columbia Falls, ME: Downeast Salmon Federation.

Schmitt, C. Maine's kelp highway. *Maine Boats, Homes & Harbors* 122:31-35, Winter 2012.

Schmitt, C. Lobstering is a form of ecosystem monitoring. *Landings*, January 2013.

Springuel, N. Maine's working waterfront coalition now at national level. *Maine Lobstermen's Association Newsletter*, February 2012.

Springuel, N. Talk of the Towns: Fisheries heritage in Downeast Maine. WERU, 8 June 2012.

Springuel, N. Maine's Downeast Fisheries Trail: Celebrating fisheries heritage, then and now. *Sea Grant Sustainable Coastal Community Development Bulletin*, August 2012.

Stancioff, E., and B. Bisson. Signs of the Seasons: A Maine Phenology Program (poster). Orono, ME: Maine Sea Grant College Program.

Stancioff, E., B. Bisson, and C. Eves-Thomas. 2012. Signs of the Seasons: A Maine Phenology Program (umaine.edu/signs-of-the-seasons/). Orono, ME: University of Maine Cooperative Extension.



Presentations at Local, State, National, International Meetings (102 total; 7,926 attending)

Aman, J. Southern Maine Volunteer Beach Profile Monitoring Program (poster). Maine Sea Grant Research Symposium, 5 April 2012, Orono, ME. (45 attending)

Anderson, P. About Maine Sea Grant. Maine Legislature Marine Resources Committee, 23 January 2013, Augusta, ME. (20)

Bartlett, C. Sea Grant's role in marine renewable energy development. Sea Grant Week, 17-22 September 2012, Girdwood, AK. (35)



Beaty, J., and Y. Chen. Life history and habitat preferences of Atlantic halibut, *Hippoglossus hippoglossus*, in the Gulf of Maine. Maine Sea Grant Research Symposium, 5 April 2012, Orono, ME. (45)

Beaty, J., and Y. Chen. Life history and habitat preferences of Atlantic halibut, *Hippoglossus hippoglossus*, in the Gulf of Maine. University of Maine School of Marine Sciences Symposium, May 2012, Walpole, ME. (100)

← Beaty, J., and Y. Chen. Patterns in growth and movement of Atlantic halibut, *Hippoglossus hippoglossus*, in the Gulf of Maine. RARGOM annual science meeting, October 2012, Portsmouth, NH. (80)



← Belknap, D., and J. Kelley. Sea-level rise in Downeast Maine (field trip). International Conference on Ecosystem Behavior BIOGEOMON 2012, 18 July 2012, Bar Harbor and Gouldsboro, ME. (15)

Bisson, B., and E. Stancioff. Signs of the Seasons: building partnerships for sustainable communities. Maine Environmental Education Association, 23 March 2012, Wiscasset, ME. (30)

Bisson, B. Signs of the Seasons: engaging communities through citizen science. Silent Spring Revisited: Exploring Rachel Carson's Legacy, 14 May 2012, Waterville, ME. (25)

Bisson, B. Signs of the Seasons: Connecting community with STEM education. RiSE Center Conference: Integrating STEM Education Research into Teaching, 20 June 2012, Orono, ME. (7)

Bisson, B. Signs of the Seasons: A Maine Phenology Program (poster). Sea Grant Week, 20 September 2012, Girdwood, AK. (300)

Bisson, B. Signs of the Seasons: A Maine Phenology Program (poster). Acadia Science Symposium, 23 October 2012, Winter Harbor, ME. (100)

Brehme, C., H. Kite-Powell, S. Kraus, K. Lageux, B. Wikgren, P. McCarron, and H. Tetreault. Mitigating risk to whales from lobster fishing off the coast of Maine. Atlantic Large Whale Take Reduction Team Meeting, 9 January 2012, Providence, RI. (unknown)

Cao, J., Y. Chen, J.H. Chang, and C. Wilson. Evaluation of fixed-station sampling for lobster settlement survey in the mid-coast region of Gulf of Maine. The American Lobster in a Changing Ecosystem: A US-Canada Science Symposium, 27-30 November 2012, Portland, ME. (150)

Carrier T., S. Eddy, and S. Redmond. Comparing growth rates of juvenile green sea urchins *Strongylocentrotus droebachiensis* on four different diets (poster). Northeast Aquaculture Conference and Exposition, December 2012, Groton, CT. (30)

Chen, Y., J-H. Chang, Y. Zhang, C. Wilson, and K. Reardon. Roles of legal sizes in the management of American lobster (*Homarus americanus*). American Lobster in a Changing Ecosystem: A US-Canada Science Symposium, 27-30 November 2012, Portland, ME. (150)

Coghlan Jr., S.M. Improving Atlantic salmon and brook trout habitats from headwaters to mouth. Androscoggin River Watershed Council Annual Meeting, 5 May 2012, Auburn, ME. (40)

Coghlan Jr., S.M. Impacts of spawning sea lamprey on foraging behaviors and growth potential of stream fishes. Northeastern Natural History Conference, 17 April 2012, Syracuse, NY. (75)

Coghlan Jr., S.M., R. Hogg, J. Zydlewski, C. Gardner, K. Simon, and R. Saunders. Effects of dam removal on anadromous fishes, resident fishes, and physical habitat in a coastal Maine stream. Northeastern Natural History Conference, 16 April 2012, Syracuse, NY. (75)

Coghlan Jr., S.M. Impacts of spawning sea lamprey on foraging behaviors and growth potential of stream fishes. Atlantic Salmon and their Ecosystem Research Forum, 10 January 2012, Orono, ME. (100)

Coghlan Jr., S.M. Restoring the Penobscot River: dam removal and recovery of native fishes. Maine Maritime Academy Department of Ocean Studies Seminar Series, 3 December 2012, Castine, ME. (35)

Coghlan Jr., S.M. Fish/forestry interactions (invited lecture/field demonstration), University of Maine Introduction to Forest Resources, 29 August 2012, Lincolnville, ME. (30)

Concepcion, A., and S. Redmond. Sea Grant's role in facilitating the commercialization of seaweed aquaculture in New England. US-Korea Joint Panel for Aquaculture Cooperation Exchange, 10 September 2012, Stamford, CT. (8)

Gibson, M., R.A. Wahle, M. Fogarty. Closing the circle: southern New England's lobster collapse reveals strong environmental signature in the spawner-to-recruit linkage. The American Lobster in a Changing Ecosystem: A US-Canada Science Symposium, 27-30 November 2012, Portland, ME. (150)

Grant, K. Building a professional network: Sea Grant's Sustainable Coastal Community Development Network. The Coastal Society, 5 June 2012, Miami, FL. (17)

Grant, K., E. Stancioff, and C. Schmitt. Maine Property Owner's Guide to Managing Flooding, Erosion & Other Coastal Hazards. Maine Code Enforcement Officer Trainings, 15 February 2012, Bangor, ME; 7 March 2012, Rockport, ME; 29 May 2012, Ellsworth, ME; 30 May 2012, Saco, ME; 1 June 2012, Augusta, ME. (130)

Grant, K. Preparing for coastal hazards in York County. Office of Senator Susan Collins, 1 June 2012, York Beach, ME. (9)

Grant, K. Risk communication and coastal climate change. The Coastal Society, 4 June 2012, Miami, FL. (18)

Grant, K. How social science is helping to build a resilient coast in Maine. NOAA Coastal Services Center Climate Change Adaptation Training, 17 January 2013, Wells, ME. (38)

Gray, A. Maine Property Owner's Guide to Managing Flooding, Erosion & Other Coastal Hazards, Municipal Planning Departments, Biddeford and Kennebunkport, ME. (3)



← Henry, A., and T.R. Johnson. Lobster as a source of vulnerability and resilience in Maine fishing communities. American Lobster in a Changing Ecosystem: A US-Canada Science Symposium, 27-30 November 2012, Portland, ME. (150)

Henry, A., and T.R. Johnson. Vulnerability and resilience in Maine fishing communities. University of Maine School of Marine Sciences Graduate Student Symposium, 7 May 2012, Walpole, ME. (50)

Hogg, R., S.M. Coghlan Jr., J. Zydlewski, and C. Gardner. Barrier removal in Sedgeunkedunk Stream: sea lamprey recolonization and implications for Atlantic salmon restoration. Atlantic Salmon and their Ecosystem Research Forum, 10 January 2012, Orono, ME. (100)

Johnson, T., G.B. Zydlewski, M. Peterson, C. Bartlett, and G. Marquis. Building partnerships for sustainability solutions: the Maine Tidal Power Initiative. Maine EPSCoR Conference, 24 September 2012, Orono, ME. (150)

Johnson, T.R., A. Henry, and C. Thompson. Understanding meaning of resilience in fishing dependent communities: lessons from Maine. Society for Applied Anthropology, 28 March 2012, Baltimore, MD. (40)

Kaczor, K. Strategies to identify, eliminate and prevent sources of bacterial pollution impacting coastal beach water quality. Center for Watershed Protection Watershed and Stormwater Conference, 10 October 2012, Baltimore, MD. (40)

Kim, J.K., S. Redmond, G.P. Kraemer, J. Curtis, and C. Yarish. Open water cultivation of *Gracilaria tikvahiae* and *Saccharina latissima* in Long Island Sound and the Bronx River Estuary. Northeast Aquaculture Conference and Exposition, December 2012, Groton, CT. (30)

Kocik, J., M. Guyette, and S.M. Coghlan Jr. Interactions among coevolved diadromous species and their implications for Atlantic salmon recovery. Diadromous Species Restoration Science Meeting, 10 January 2013, Orono, ME. (100)

Leeuw, T., S.O. Newburg, E.S. Boss, W.H. Slade, M.G. Soroka, J. Pederson, C. Chrysosostomidis, and F.S. Hover. Remote identification of the invasive tunicate *Didemnum vexillum* using reflectance spectroscopy. Ocean Optics 2012 Conference, 12 October 2012, Glasgow, Scotland. (300)

Lindberg, K. Strategies to identify, eliminate and prevent sources of bacterial pollution impacting coastal water quality. New England Association of Environmental Biologists Conference, 23 March 2012, Falmouth, MA. (25)

Mansfield, M.E. The critical leading edge of Gulf of Maine salt marshes: interface with freshwater wetlands. University of Maine Department of Earth Sciences Brown Bag Seminar, 14 March 2012, Orono, ME. (20)

Mansfield, M.E. The critical leading edge of Gulf of Maine salt marshes: interface with freshwater wetlands. Geological Society of America Northeastern Section, 20 March 2012, Hartford, CT. (60)

Mansfield, M.E., D.F. Belknap, J.T. Kelley, and C.S. Loftin. The critical leading edge of Gulf of Maine salt marshes: interface with freshwater wetlands (poster). Maine Sea Grant Research Symposium, 5 April 2012, Orono, ME. (45)

Mansfield, M.E., D.F. Belknap, J.T. Kelley, and C.S. Loftin. The critical leading edge of Gulf of Maine salt marshes: interface with freshwater wetlands (poster). University of Maine Graduate Student Symposium, 12-13 April 2012, Orono, ME. (300)

Mansfield, M.E., D.F. Belknap, and J.T. Kelley. The critical leading edge of Gulf of Maine salt marshes: interface with freshwater wetlands. Geological Society of America, 5 November 2012, Charlotte, NC. (100)

Morse, D. Shellfish aquaculture 101 for fishermen. Maine Fishermen's Forum, March 2012, Rockport, ME. (35)

Morse, D. An overview of shellfish aquaculture in Maine. Oyster Industry Roundup, 10 March 2012, New Orleans, LA. (60)

Morse, D. Aquaculture and the fishing industry. US/Canada Lobstermen's Town Meeting, 24 March 2012, Portland, ME. (55)

Morse, D. Shellfish aquaculture in Maine. University of New England, 27 March 2012, Biddeford, ME. (20)

- Morse, D. A pilot project to stimulate seaweed production on mussel farms in Maine. Aquaculture Canada, 29 May 2012, Prince Edward Island, Canada. (75)
- Mosley, S., T. Bridges, and K. Lindberg. Tracking human-sourced pollution: using optical brighteners to identify sources of fecal bacteria impacting water quality on Gooch's Beach, Maine. Maine Sea Grant Research Symposium, 5 April 2012, Orono, ME. (45)
- Nixon, M., N. Battista, and S. Pude. Using participatory mapping in Maine: case studies in energy and fishing. Social Coast Forum, 15-16 February 2012, Charleston, SC. (100)
- Oppenheim, N.G., and R.A. Wahle. Cannibals by night? Density-dependent feedbacks in the Gulf of Maine's inflated lobster population. American Lobster in a Changing Ecosystem: A US-Canada Science Symposium, 27-30 November 2012, Portland, ME. (150)
- Paredes, F., and R. Steneck. Drivers of marine invasions: identifying abiotic and biotic factors in Maine estuaries (poster). Benthic Ecology Meeting, March 2012, Norfolk, VA. (600)
- Paredes, F. The role of predation in resisting the invasion of solitary species in benthic communities in the Damariscotta River. School of Marine Sciences Symposium, May 2012, Walpole, ME. (100)
- Reardon, K., C. Wilson, J-H. Chang, and Y. Chen. Impacts of v-notching on the assessment and management of American lobster stock in the Gulf of Maine. American Lobster in a Changing Ecosystem: A US-Canada Science Symposium, 27-30 November 2012, Portland, ME. (150)
- Redmond, S. Seaweed aquaculture 101. Maine Fishermen's Forum, 1-3 March 2012, Rockport, ME. (25)
- Redmond, S., *et al.* Development of seaweed culture technologies in Maine (poster). Maine Sea Grant Research Symposium, 5 April 2012, Orono, ME. (45)
- Redmond, S., *et al.* Development of seaweed culture technologies in Maine (poster). Northeast Algal Society, 20-22 April 2012, Winter Harbor, ME. (120)
- Redmond, S. Beyond sushi: a review of current and potential products from marine macroalgae. Maine Seaweed Scene, 30 August 2012, Belfast, ME. (125)
- Redmond, S., and D. Morse. A pilot project to stimulate seaweed aquaculture on mussel farms in Maine. Maine Seaweed Scene, 30 August 2012, Belfast, ME. (125)
- Redmond, S., D. Morse, C. Yarish, J. Kim, P. Dobbins, T. Olson, and S. Brawley. The cooperative culture of seaweed in New England: how research, industry and extension are cultivating a new field in aquaculture. United States-Japan Natural Resources Panel on Aquaculture Scientific Symposium: Hatchery Technology for High Quality Juvenile Production, 22-23 October 2012, Honolulu, HI. (50)
- Redmond, S., *et al.* Development of sea vegetable culture technologies in Maine. Northeast Aquaculture Conference and Exposition, 13 December 2012, Groton, CT. (30)
- Redmond, S. The seaweed industry in Maine: an overview of harvest and culture. Maine Maritime Academy, 21 August 2012, Castine, ME. (12)
- Redmond, S. Opportunities for seaweed aquaculture in Maine. University of New England, 27 November 2012, Biddeford, ME. (11)
- Redmond, S. Sea vegetables of Maine. Herring Gut Learning Center, 28 November 2012, Port Clyde, ME. (20).
- Schmitt, C. When facts are not enough: understanding risk perception and belief in science. University of Maine BMB 420 Infectious Diseases, 23 March 2012, Orono, ME. (40)
- Schmitt, C. Out of the petri dish and into the public sphere (invited presentation and workshop). Northeast Algal Society, 21 April 2012, Winter Harbor, ME. (100)
- Schmitt, C. Rachel Carson's legacy for science communication. Silent Spring Revisited: Exploring Rachel Carson's Legacy, 14 May 2012, Waterville, ME. (20)
- Schmitt, C. A year in the life: seasonal connections in Acadia (invited keynote). Acadia National Park Interwoods Training, 16 June 2012, Bar Harbor, ME. (80)
- Schmitt, C. Science and the origins of conservation on Mount Desert Island. Acadia National Park Interwoods Training, 16 June 2012, Bar Harbor, ME. (40)

- Schmitt, C. Communicating science with story and narrative. Sustainability Solutions Initiative Knowledge to Action Workshop, 6 December 2012, Orono, ME. (30)
- Springuel, N. Alternative enterprises. Trade Adjustment Assistance, 20 March 2012, Machias, ME; 11 April 2012, Rockland, ME; 12 April 2012, Ellsworth, ME; 24 April 2012, Ellsworth, ME. (35)
- Springuel, N. The sea kayak guiding industry in Maine. Northeast Workshop on Regional Ocean Planning, 22-23 March 2012, Bristol and Newport, RI. (150)
- Springuel, N. Exploring Maine's fisheries history and issues (field trip). Sustainable Food Systems Education Conference, 20-22 April 2012, Bar Harbor, ME. (150)
- Springuel, N. Legal barriers and opportunities to developing business partnerships between fisheries and tourism. The Coastal Society, 3-6 June 2012, Miami, FL. (20)
- Springuel, N. The fisheries heritage of Mount Desert Island. Acadia National Park Interpwoods Training, 16 June 2012, Bar Harbor, ME. (50)
- Springuel, N. Preserving the waterfront: available tools. Waterfront Planning for the Blue Hill Bay Region Workshop, 9 July 2012, Ellsworth, ME. (20)
- Springuel, N. Downeast Maine fisheries and working waterfronts. Acadian Internship in Resource Conservation and Stewardship Program, 18 July 2012, Winter Harbor, ME. (25)
- Springuel, N. Phylogeny of an initiative: working waterfronts and coastal access. Sea Grant Week, 17-21 September 2012, Girdwood, AK. (100)
- Springuel, N. The Downeast Fisheries Trail. Hancock County Cooperative Extension Annual Meeting, 27 September 2012, Ellsworth, ME. (30)
- Springuel, N. Supporting working waterfront communities. GrowSmart Maine Summit, 23 October 2012, Augusta, ME. (45)
- Springuel, N. Building a community of communities and the Downeast Fisheries Trail. Saltwater Connections Assembly, 25-26 January 2013, Ocracoke, NC. (85)
- Stancioff, E., and B. Bisson. Signs of the Seasons: A Maine phenology program (poster). Maine Sea Grant Research Symposium, 5 April 2012, Orono, ME. (45)
- Stancioff, E. Signs of the Seasons: A Maine phenology program. International Phenology Conference, 11-13 September 2012, Milwaukee, WI. (75)
- Stancioff, E. Climate change and phenology in Maine. University of Maine, Orono, ME. (12)
- Stancioff, E. Climate and phenology in Maine. Master Gardener Class, Belfast, ME. (28)
- Stancioff, E., and B. Bisson. Signs of the Seasons. Maine Audubon Out in the Field Teacher Workshop, 25 July 2012, Nobleboro, ME. (20)
- Steneck, R., and R.A. Wahle. Lobster dynamics in a brave new ocean. American Lobster in a Changing Ecosystem: A US-Canada Science Symposium, 27-30 November 2012, Portland, ME. (150)
- Suldovsky, B., and L. Lindenfeld. Connecting local seafood to inland communities (preconference seminar). National Communication Association Conference, November 2012, Orlando, FL. (30)
- Thompson, C., and T.R. Johnson. Gentrification and vulnerability in Maine fishing communities. Society for Applied Anthropology, 28 March 2012, Baltimore, MD. (40)
- Thompson, C. Gentrification and vulnerability in Maine fishing communities. University of Maine School of Marine Sciences Graduate Student Symposium, 7 May 2012, Walpole, ME. (50)
- Viehman, H. Fish in a tidally dynamic region in Maine: hydroacoustic assessments in relation to tidal power development. University of Maine School of Marine Sciences Graduate Student Symposium, 7 May 2012, Walpole, ME. (100)
- Viehman, H., G.B. Zydlewski, J.D. McCleave, and G. Staines. Single-beam hydroacoustics for assessing fish at tidal power sites. European Conference for Underwater Acoustics, July 2012, Edinburgh, UK. (30)
- Viehman, H. Assessing the effects of tidal power development on fishes using hydroacoustics (poster). International Network on Offshore Renewable Energy, 18-21 June 2012, Boston, MA. (500)
- Viehman, H., G.B. Zydlewski, J.D. McCleave, and G. Staines. Fishes and tidal power development in Cobscook Bay, Maine.

Meeting with Japanese delegation from Aomori Province, Hirosaki University, 19 March 2012, Orono, ME. (25)

Wilson, C. The impacts of trap density on catch rates and catch. American Lobster in a Changing Ecosystem: A US-Canada Science Symposium, 27-30 November 2012, Portland, ME. (150)

Yarish, C., and S. Redmond. Kelp and algae for domestic consumption and export. Joint Coordination Panel for Aquaculture Cooperation, 20-21 March 2012, Busan, Korea. (30)

Zhang, Y., and Y. Chen. Ecosim modeling for the American lobster in the Gulf of Maine. American Lobster in a Changing Ecosystem: A US-Canada Science Symposium, 27-30 November 2012, Portland, ME. (150)

Zydlewski, G.B. The ecological effects of marine renewable energy utilization. Marine Energy International Symposium: Approaches to Marine Renewable Energy Development, 17 July 2012, Aomori City, Japan. (100)

Presentations to Lay Audiences (37 total; 1,553 attending)

Aman, J. You, storms and our beaches. Wells Adult Education, 29 May 2012, Wells, ME. (30)

Anderson, P. Rachel Carson's legacy and the 50th anniversary of Silent Spring (panel), 6 December 2012, Portland, ME. (30)

Bisson, B. Signs of the Seasons: A Maine Phenology Program. Blue Hill Heritage Trust, 12 March 2012, Blue Hill, ME. (8)

Coghlan Jr., S.M. Restoring the Penobscot River: dam removal and recovery of native fishes. Marine Environmental Research Institute, 26 January 2012, Blue Hill, ME. (40)

Coghlan Jr., S.M. Ecology and conservation of Maine's freshwater fishes. Kezar Lake Watershed Association, 22 August 2012, Lovell, ME. (30)

Coghlan Jr., S.M. Restoring the Penobscot River: dam removal and recovery of native fishes. Carrabec High School Diversity Day, 23 April 2012, North Anson, ME. (80)

Coghlan Jr., S.M., and R. Saunders. Dam removal and recovery of Maine's native fishes. Hirundo Wildlife Refuge, 18 August 2012, Alton, ME. (20)

Coghlan Jr., S.M. Collection, identification, and natural history of Maine's freshwater fishes. Trout Unlimited Youth Trout Camp, 26 June 2012, North Anson, ME. (30)

Coghlan Jr., S.M., and K. Norris. Aquatic life through the ice: winter ecology of fish and invertebrates. Maine Audubon Fields Pond Nature Center, 3 February 2012, Holden, ME. (15)

Gray, A. Building a resilient coast. Meeting of coastal constituents, 15 August 2012, Biddeford, ME. (75)

Hogg, R.S. Fish communities in Sedgeunkedunk Stream. Maine Audubon Fields Pond Nature Center, 20 September 2012, Brewer, ME. (15)

Kaczor, K. Working together to improve water quality on Higgins Beach and in the Spurwink River. Spurwink River Water Quality Meeting, 20 November 2012, Scarborough, ME. (13)

Lindberg, K. What you can do to keep our coastal beaches healthy. Lincolnville Central School, 6 April 2012, Lincolnville, ME. (15)

Lindberg, K. Strategies to identify, eliminate and prevent sources of bacterial pollution. Hancock County Regional Planning Commission Symposium, 26 April 2012, Ellsworth, ME. (50)

Lindberg, K. What you can do to keep our coastal beaches healthy. Warren School Nature Club, 30 April 2012, Waldoboro, ME. (13)

Lindberg, K. What you can do to keep our coastal beaches healthy. Maine State Park Lifeguard Academy, 13 June 2012, Phippsburg, ME. (27)

Morse, D., and S. Redmond. Introduction to aquaculture. Maine Agricultural Trades Show, 9 January 2013, Augusta, ME. (7)

Morse, D. An update on shellfish and seaweed aquaculture in Maine. Pemaquid Watershed Association, 14 June 2012, Bristol, ME. (20)

Morse, D. Shellfish aquaculture in the Damariscotta River, and other wicked interesting stuff. Chats with Champions, 29 September 2012, Damariscotta, ME. (25)

Morse, D. Shellfish aquaculture in Maine. Pemaquid Region Lions Club, 5 November 2012, South Bristol, ME. (30)

Morse, D. Growing shellfish in the Damariscotta River. Lincoln Home Speakers Program, 20 November 2012, Newcastle, ME. (23)

Morse, D. Shellfish and seaweed aquaculture in Maine. Kennebec Estuary Land Trust, 15 November 2012, Bath, ME. (35)

Redmond, S. Kelp aquaculture in Maine. Taunton Bay Education Center, 20 June 2012, Sullivan, ME. (11)

Redmond, S. Vegetables from the sea. Old Orchard Beach/Saco Adult and Community Education, 28 January 2013, Old Orchard Beach, ME. (13)

Schmitt, C. Science and the origins of conservation on Mount Desert Island. Acadia Senior College, 19 April 2012, Northeast Harbor, ME. (25)

Schmitt, C. Art, science, and the origins of conservation on Mount Desert Island. Mount Desert Island Biological Laboratory Star Point Gala, 27 July 2012, Northeast Harbor, ME. (100)

Schmitt, C. A Coastal Companion: A year in the Gulf of Maine from Cape Cod to Canada (book reading and signing). Dirigo Pines Retirement Community, 2 October 2012, Orono, ME. (15)

Schmitt, C. Science in Acadia National Park: early history and its role in conservation. Road Scholars, 12 October 2012, Mount Desert, ME. (20)

Schmitt, C. The book heard 'round the world: 50th anniversary of *Silent Spring* (panel). University of Maine Women in the Curriculum Seminar Series, 13 November 2012, Orono, ME. (25)

Schmitt, C. A Coastal Companion: A year in the Gulf of Maine from Cape Cod to Canada. Belfast Bay Watershed Coalition, 15 November 2012, Belfast, ME. (30)

Springuel, N. The fisheries heritage of Downeast Maine. Cherryfield Days, 21 July 2012, Cherryfield, ME. (8)

Springuel, N. Multiple natural history presentations. A Prairie Home Companion Cruise, August 2012, Western Europe. (600)

Stancioff, E. How are things changing in Maine? Merryspring Gardens Education Center, July 2012, Rockport, ME. (20)

Viehman, H., G.B. Zydlewski, J.D. McCleave, and G. Staines. Assessing the effects of tidal power development on fish. Maine Tidal Power Initiative Review, 18 September 2012, Trescott, ME. (40)

Zydlewski, G.B. Fishes of Cobscook Bay. Peavey Memorial Library, 25 June 2012, Eastport, ME. (15)

Events, Meetings, Workshops, etc. sponsored, facilitated, and/or coordinated by Sea Grant

Maine Healthy Beaches Program, 74 meetings total. (371)

Maine Shellfish Growers Working Group, 3 meetings. (100)

Volunteer Community Facilitator Program, 17 meetings/trainings. (95)

Southern Maine Volunteer Beach Profile Monitoring Program, 2 volunteer trainings. (3)

Signs of the Seasons, 7 trainings. (150)

Maine Beaches Conference Steering Committee, 2 meetings. (12)

Nor'easter Bowl, 4 February 2012, Orono, ME. (500)

Maine Fishermen's Forum, 1-3 March 2012, Rockport, ME. (1,000)

Frenchman Bay Partners, 9 March 2012, Somesville, ME; 8 November 2012, Bar Harbor, ME; 18 December 2012, Somesville, ME. (46)

← Maine Sea Grant Research Symposium, 5 April 2012, Orono, ME. (60)





C. Schmitt

◀ Downeast Smelt Fry, 20 April 2012, Columbia Falls, ME. (500)

Sustainable Consumption Through Food & Fish, 20-22 April 2012, Bar Harbor, ME. (10)

Northeast Algal Society Annual Meeting, 20-22 April 2012, Winter Harbor, ME. (122)

DeepC Wind Consortium Windstorm Challenge, 27 April 2012, Orono, ME. (500)

Razor Clam Workshop, 2 May 2012, Walpole, ME. (36)

Silent Spring Revisited Professional Development Workshop for Librarians (and related events), 14 May 2012, Waterville, ME. (320)

Acadia Learning Student Poster Session, 25 May 2012, Bangor, ME. (300)

National Summit on Community Supported Fisheries, 30 May-1 June 2012, Rye, NH. (75)

U.S. Coast Guard Fishing Vessel Drill Conductor Certification Class, 1 June 2012, Eastport, ME. (10)

Sea Grant Sustainable Coastal Community Development Network Training, 3 June 2012, Miami, FL. (18)

Assessing the Capacity of Maine Fishing Communities, 10 June 2012, Lubec, ME. (6)

Assessing the Capacity of Maine Fishing Communities, 11 June 2012, Eastport, ME. (12)

National Summit on Community Supported Fisheries: Summary, Emerging Priorities, and Next Steps (webinar), 13 June 2012. (40)

National Ocean Sciences Bowl Sea Kayaking Trip and Tour of College of the Atlantic, 19 June 2012, Bar Harbor, ME. (7)

Maine Climate Change Adaptation Providers Network, 26 June 2012, Augusta, ME. (24)

The Seaweed Scene, 30 August 2012, Belfast, ME. (120)

Alternative Licensing Workshop, 6-8 September 2012, Freeport, ME. (40)

Emerging Issues, Sea Grant Week, 17-21 September 2012, Girdwood, AK. (100)

Northern Maine Children's Water Festival, 9 October 2012, Orono, ME. (700)

Portsmouth Design Charrette Neighborhood Listening Sessions & Charette, 10-12 October 2012 and 30 January 2013, Portsmouth, NH. (72)

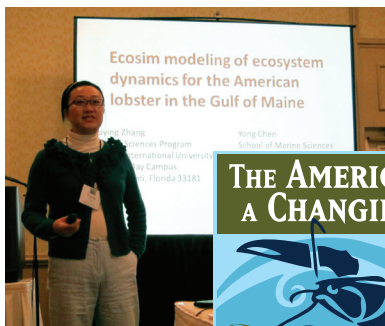
Sea gulls as potential bioindicators of ecosystem health in the Gulf of Maine, 27 October 2012, Bar Harbor, ME. (15)

The Economic Importance of Blue Hill Bay: Current Values and Future Potential, 29 October 2012, Ellsworth, ME. (19)

◀ American Lobster in a Changing Ecosystem: A US-Canada Science Symposium, 27-30 November 2012, Portland, ME. (150)

Northeast Regional Ocean Council, 10 December 2012, Walpole, ME. (25)

Northeast Aquaculture Conference and Expo, 12-15 December 2012, Groton, CT. (400)



Maine Sea Grant



Number of Spin-Out Companies

Maine Sea Grant helped create four scallop aquaculture businesses in 2012.

Maine Sea Grant helped retain 145 businesses in 2012, including a mussel aquaculture business and 133 lobstermen estimated to have stayed in business as a result of participation in the USDA Trade Adjustment Assistance Program. Seven businesses were retained via contracts with towns participating in the Maine Healthy Beaches program. Ocean Renewable Power Company's operation of their tidal electric turbine is dependent upon Sea Grant-funded research on fish community impacts.

Number of Patents and Other Forms of Intellectual Property

N/A

Number of Jobs Funded (Created or Retained)

Seven jobs were created and 151 jobs were retained in Maine in 2012 as a result of Sea Grant activities.

These jobs include full-time research associate, scientific technician, and post-doctoral positions associated with Sea Grant-funded research projects or Sea Grant-coordinated programs that are externally funded. As mentioned above, Ocean Renewable Power Company's operation of their tidal electric turbine is dependent upon Sea Grant-funded research on fish community impacts and extension capacity. ORPC's tidal energy project retained 100 jobs in 2012. Additionally, 50 business consultants were retained through the TAA program.

Revenue Generated

\$2,048 (from book sales)

Summary of Accomplishments for the Year

Awards and honors

Henry, A. Best Student Presentation, American Lobster in a Changing Ecosystem: A US-Canada Science Symposium.

Lindsey, E. Presidential Innovation Award for Environmental Education, White House Council on Environmental Quality

Schmitt, C. Writer-in-Residence, Acadia National Park.

Sherman, E. Grosvenor Teacher Fellowship, National Geographic.

Thompson, C. finalist, University of Maine Graduate Student Research Award.

Theses and dissertations

Robert Hogg, Fish community response to dam removal in a coastal New England tributary, M.S. Wildlife Ecology, University of Maine.

Margot Mansfield, The critical leading edge of Gulf of Maine salt marshes: interface with freshwater wetlands, M.S. Earth Sciences, University of Maine.

Greg Sinnett, Circulation and transport in Casco Bay, Maine, M.S. Oceanography, University of Maine.

Students supported

PhD

Amber Bratcher, University of Maine

Jie Cao, University of Maine

Peter Hayes, University of Maine

Felipe Parades, University of Maine

Brianne Suldovsky, University of Maine

Samuel Truesdell, University of Maine

Haley Viehman, University of Maine

Carl Wilson, University of Maine

MA/MS

Julia Beaty, University of Maine

Anna Henry, University of Maine

Robert Hogg, University of Maine

Margot Mansfield, University of Maine

Noah Oppenheim, University of Maine

Molly Payne, University of Southern Maine

Jocelyn Runnebaum, University of Maine

Greg Sinnett, University of Maine

Cameron Thompson, University of Maine

Meredith Titterington, University of Maine

Jeffrey Vieser, University of Maine

Undergraduate

Avery Beck, Colby College

Matthew Dzaugis, University of Maine

Ellen Gawarkiewicz, Bates College

Alexander Jensen, University of Maine

Lara Katz, University of Maine

Ryan MacDonald, Bates College

Henry Mauck, Bates College

Jeffrey Meltzer, Colby College

Randy Perkins, University of Maine

Benjamin Segee, University of Maine

Darlene Turcotte, University of Maine

Impacts & Accomplishments

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 actions and changes occurred in 2012:

- Regional conservation plan for anadromous rainbow smelt in the Gulf of Maine
- Maine DMR Aquaculture Special License (scallop provisions)
- Maine DMR shellfish sales (cultured oysters)
- Maine DMR scallop management
- Maine DMR Lobster Population Assessment
- Maine DEP Clean Water Act 303(d) List of Impaired Waters
- Ogunquit pesticide ordinance
- Lincolnville water supply and wastewater infrastructure legislation
- York comprehensive planning
- Kennebunkport Goose Rocks Beach Ordinance

Can gentrification be a source of resilience in fishing communities?

Maine fishing communities face multiple challenges related to declining resources, changing regulations, and demographic changes. The U.S. Sustainable Fisheries Act requires fisheries managers to assess how rule changes may affect fishing communities, but this information is not always quantifiable. Sea Grant-funded research by Teresa Johnson of the University of Maine School of Marine Sciences and her graduate students assessed fishing community resilience using a participatory, place-based approach. They were somewhat surprised to find that while demographic changes and related gentrification can increase a community's sensitivity to vulnerability, such changes also can have a positive effect. Gentrification can provide new jobs and economic input, through growth in tourism and service sectors that employ fishermen during the off-season or provide supplemental income. New residents with time and money help support local fishermen and the broader community, because often they want to protect the cultural and aesthetic qualities that drew them to the region. The researchers recommend that in addition to quantitative indicators, NOAA Fisheries should also look at qualitative ethnographic research to examine the changes experienced by fishing communities, rather than making assumptions about whether certain changes are positive or negative.

Ocean tides sending power to the Northeast electrical grid.

In September 2012, the Cobscook Bay Tidal Energy Project became the first ocean energy project in the United States to deliver electricity to the grid. Sea Grant research and outreach contributed to this project's success by connecting the developer, Ocean Renewable Power Company (ORPC), to scientific expertise and technicians in the area for the implementation of fish, seabird, and marine mammal monitoring programs. Sea Grant-funded research by Gayle Zydlewski, James McCleave, and students provided data on fish numbers, relative size, and behavior in proximity to the tidal energy device, using side-looking acoustic sonar. Research results were included in permit application and approval documents. In addition, Eastport-based marine extension associate Chris Bartlett facilitated a transparent process that linked community members with researchers to exchange knowledge, as part of a Sustainability Solutions Initiative project. During the development, construction, and installation period of ORPC's overall project (2011–2016), forecasters predict 125 full-time equivalent jobs in Maine, which will generate \$8.1 million in earnings, with a multiplier effect of \$22 million in local spending. During the operating period, predictions are for 19 new full-time equivalent jobs annually, translating to \$700,000 in annual earnings, with a multiplier effect of \$1.1 million in local spending.

Sea Grant stimulates the seaweed industry in Maine.

Maine is home to several successful sea vegetable companies who have relied on sustainable wild harvest for their product for more than 30 years. Maine also is home to the first commercial kelp farm in the U.S., with innovations in culture technologies and product types. However, there remains very little expertise and few resources available for the development of seaweed aquaculture in the U.S., which could tap into the \$7 billion global sea vegetable industry, allow for diversification and integration on existing sea farms, encourage new entries into the aquaculture industry, and play a role in ecosystem services. In her first year of service as a marine extension specialist in seaweeds, Sarah Redmond has raised awareness and enthusiasm for the development of a seaweed culture industry in Maine. Collaborative research with fellow marine extension team member Dana Morse and shellfish farmers resulted in seven marine farms cultivating sugar kelp and other red seaweeds (dulse and laver). And interest is growing, as evidenced by the more than 100 people who attended a seaweed workshop hosted by Sea Grant in August 2012. Redmond also established a sea vegetable research and educational nursery to support the new industry and to provide educational and training opportunities for interested individuals or groups. Related outreach and the development of seaweed cultivation is also stimulating new research, including utilizing the technology for bioremediation, for feed production for other cultured organisms, and new product development.

Science informs and supports river restoration within and outside of Maine.

The peer-reviewed literature contains little hard evidence for the benefits of dam removal as an effective watershed restoration and recovery strategy. Restoration projects are not always accompanied by monitoring, and concurrent management activities can obscure impacts (e.g., fish stocking vs. natural recolonization by native fish species). Stephen Coghlan's Sea Grant-funded research on barrier removal in Sedgeunkedunk Stream, a tributary of the Penobscot River, has shown distinct, consistent patterns in fish diversity and abundance in watersheds with and without dams. Natural recolonization following dam removal (by several species including the endangered Atlantic salmon) is rapid and quantifiable, and is facilitated by habitat conditioning activities of recolonizing native sea lamprey. NOAA Fisheries has shared these results with West Coast partners involved in the Elwha River dam removal, and has used the results in allocating some \$1.5 million in funding for monitoring larger dam removals on the Penobscot River. Salmon biologists with the Maine Department of Marine Resources have incorporated data on habitat metrics to determine the value of habitat conditioning by sea lamprey, and to support dam removals in other small coastal streams.

Volunteer observations reveal earlier spring leaf-out of maple trees.

The timing of seasonal changes (phenology) in plants and animals is critical to the health of Maine's environment and its resource-based culture and economy, yet climate change is rapidly altering the ecology of many species. Climate models do not provide local-scale information needed by scientists and resource managers to predict, understand, and adapt to climate-driven ecological changes. Beth Bisson and Esperanza Stancioff of Maine Sea Grant and University of Maine Cooperative Extension have trained more than 350 Signs of the Seasons program participants how to observe phenology for 13 common plants and animals throughout the state. In 2012, in response to concerns that early spring warming is affecting valuable hardwood trees such as sugar maple, they worked with researchers at the National Phenology Network and Boston University to launch a special campaign to intensify observations of sugar and red maples and other hardwood tree species as they leaf out in the spring. Maine volunteers submitted more than 2,500 observations of sugar and red maple trees during the study's six-week period. Although it was only the first year of a multi-year study, Maine data showed that red maple trees leafed out an average of nearly three weeks earlier in 2012 than in 2011. In addition to the spring leafout study, researchers are also using volunteer data to understand the effects of climate change on lilacs, rockweed, and bird migrations.

Acadia Learning Program educators win national awards.

For the past five years, assistant director for outreach and education Beth Bisson has been working to support Maine science teachers in their efforts to improve STEM education through the Acadia Learning program (participatoryscience.org), a joint effort with the Schoodic Institute at Acadia National Park and the Senator George J. Mitchell Center at the University of Maine. The program provides funding and support for field-based watershed research, data literacy, science communication, and intensive professional development for educators. In 2012, the program supported 33 middle and high school teachers and nearly 750 students in research related to bioaccumulation of mercury pollution, stream connectivity, and nitrogen cycling in coastal watersheds. In 2012, two participating educators won national awards for their work. Ed Lindsey, an environmental science and chemistry teacher at Old Town High School, won the Presidential Innovation Award for Environmental Education from the White House Council on Environmental Quality and the U.S. EPA. Emily Sherman, an environmental science teacher at Scarborough High School, was awarded a Grosvenor Teacher Fellowship from National Geographic.

Sea Grant enhanced capacity for evaluating economic impact of state and federal investments.

Like many publicly funded programs, Sea Grant must be able to accurately and efficiently estimate economic impacts of programs in addition to quantifying or describing other types of impacts to particular stakeholder groups, communities, or ecosystems. However, staff have limited expertise in resource economics or experience with economic valuation. In 2012, funds from the National Sea Grant Office supported temporary professional Katherine Farrow, a resource economist from the University of Maine, to examine several programs within the Maine Sea Grant portfolio and to inventory current and past evaluation methods practiced by Sea Grant programs across the country. Farrow identified potential methods for market and non-market economic valuation of the impacts of Maine Sea Grant programs, and created a resource guide and training opportunities that can be shared with other state and federally-funded programs.

Derelict fishing gear recovered from the ocean floor.

Lobster fishermen lose hundreds of thousands of vinyl-coated wire lobster traps in the Gulf of Maine each year. These lost traps represent a direct economic loss to their owners, present a hazard to other fishermen when they collect in large clumps, continue to attract lobsters that may die in the traps, and degrade the natural bottom habitat. While the lobster industry is making efforts to recover lost traps, existing programs are expensive, require coordination, and junk traps must be recycled. To incentivize the recovery of derelict gear, marine extension associate Sherman Hoyt worked with Maine Department of Marine Resources to implement a pilot project in the summer of 2012 to collect recovered traps at seven commercial lobster wharves between Spruce Head and Port Clyde on a regular schedule. Fishermen recovered more than 300 derelict traps between June and December, returning functioning traps to their owners and recycling badly damaged “junk” traps. Fishermen and wharf owners have begun collecting derelict traps on their own. The project will continue in 2013 and may be replicated at other locations on the Maine coast.

Blue mussel seed produced for use in integrated multitrophic aquaculture applications.

Aquaculture companies attempting to integrate shellfish into finfish farming operations face challenges with sourcing supplies of juveniles, or “seed.” Marine extension associate Chris Bartlett coordinated meetings between Cooke Aquaculture and the Downeast Institute for Applied Marine Research and Education, a laboratory facility with shellfish culture experience, resulting in a \$4,000 contract to produce mussel seed as proof-of-concept. The Downeast Institute successfully produced 15 million mussel seed, which has an estimated commercial value of \$40,000. The volume was enough to seed ten mussel rafts that were deployed around salmon farms in Cobscook Bay, and Downeast Institute is further investigating research and development of commercially viable mussel seed production techniques.

Local field work contributes to rainbow smelt conservation plan.



C. Schmitt

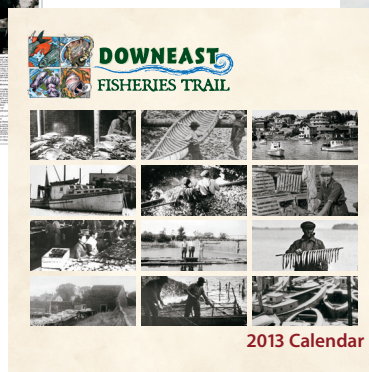
The rainbow smelt (*Osmerus mordax*), an anadromous fish in the Gulf of Maine watershed, has been listed by the National Marine Fisheries Service as a species of concern due to the effects of over-harvest, water quality and habitat degradation, inaccessibility of spawning grounds, and possible disease issues. Marine extension associate Chris Bartlett collaborated with Maine Department of Marine Resources to assess wild populations of rainbow smelt in Washington County from 2008-2011. Results from this work contributed to state regulatory changes to provide additional conservation measures for this species. The study was also instrumental in the creation of a 2012 regional conservation plan for anadromous rainbow smelt in the Gulf of Maine.

Maine fishing families receive business training and economic benefits.

Lobster profitability has been very volatile for several years and the financial crisis of 2008 brought particular hardship to the industry. Returns to fishermen have been low, and are more based on volume than quality, and these factors make the harvest sector very vulnerable to fluctuations in the market. Given the reliance of coastal communities on the lobster fishery, it is critical to keep this industry as healthy as possible. Marine extension associate Dana Morse coordinated successful application of five states to the USDA's Trade Adjustment Assistance program, and has since retained a regional coordinating role and developed an industry-specific business training program. More than 1,800 individuals have completed all or a significant portion of the program, and approximately \$2.4 million dollars was delivered to fishing families in Maine in 2012.

Downeast Fisheries Trail highlights fisheries heritage in eastern Maine.

Residents and visitors can easily overlook the vital role that fisheries have played in Maine history, and they may not recognize that even today, despite the drastic changes in fish populations and management, fisheries continue to drive much of the economy and culture of Downeast Maine. As Maine's fisheries have declined, communities are losing the "social memory" that contributes to their identity and resilience. Stories of fisheries past and working waterfronts present must be continually retold and transformed by communities seeking economic development and quality of life. Marine extension associate Natalie Springuel coordinated dozens of partners to identify and thematically link 45 sites, from museums to historical societies, from fish hatcheries to fish weirs and more, that together illustrate the region's maritime heritage and build on these local resources. In support of the Downeast Fisheries Trail effort, Maine Sea Grant's communications team produced a map brochure highlighting the 45 sites on the Trail, created a website and developed multimedia content, produced five interpretive panels for installation at sites along the Trail, coordinated media and publicity for the launching event, designed a traveling display for events, and produced a 2013 calendar to promote the new initiative to thousands of people in the Trail's first year.



Maine Sea Grant

Sea Grant facilitates partnership in Frenchman Bay.

Maine's Frenchman Bay is a unique and important environment that faces conservation and resource challenges. Marine extension associate Natalie Springuel facilitated a group of organizations, businesses, and individuals as they explored ways to tackle important conservation targets in the Bay (including eelgrass, diadromous fish, benthic habitats, and mudflats). As a result, Frenchman Bay Partners formed as a formal entity with bylaws and elected officers, for the purpose of developing a conservation plan and collaborative approach to Bay-wide issues.

Maine incorporates hazard resilience into municipal training.

Coastal property owners and municipal officials lack access to accurate information on options for and the effectiveness of climate change adaptation strategies in Maine. Maine Sea Grant created and continues to promote a series of outreach materials based on social science research (seagrant.umaine.edu/extension/coastal-community-resilience). In 2012, the State of Maine incorporated Maine Sea Grant's resources into the Basic Land Use, Shoreland Zoning, and Floodplain Management trainings for local Code Enforcement Officers. Also in 2012, 30 professionals joined the Climate Change Adaptation Providers Network, which Esperanza Stancioff helped to initiate, and the group is identifying a strategy for coordinating services for climate adaptation implementation in a pilot community.

"Storm Teams" track erosion on southern Maine beaches.

Wildlife, tourism, recreation, and residential development all compete for limited space on Maine's highly valued sand beaches, the same areas that are vulnerable to erosion, rising sea levels, and more frequent and intense storms. Since 1999, volunteers with the Southern Maine Beach Profiling Program have provided data on changes in beach shape and elevation to participating towns, who continue to support the program as part of their annual budgets (in 2012 additional funding was received from the Maine Outdoor Heritage Fund). Maine Geological Survey scientists routinely use beach monitoring data; for example, to track erosion and inform federal beach management assessment at Ferry Beach in Saco. In 2012, the National Weather Service began utilizing program volunteers as "storm teams" to conduct rapid pre- and post-storm profiling in three towns to determine the extent of short-term beach erosion and understand beach resilience dynamics.

Resolving conflicts over beach access.

The Maine Sea Grant-produced website, accessingthemainecoast.com, provides tools to facilitate cooperative resolution of coastal access issues at the local level, thereby avoiding litigation. With funding from the National Sea Grant Law Center, marine extension associates Kristen Grant and Natalie Springuel worked with the University of Maine School of Law, as well state and nonprofit agencies, to support a law student to conduct further research which was added to the website in 2012. After graduating, the student began working for the Portland law firm Drummond Woodsum and, because of his experience with the Sea Grant project, was selected to be part of the team representing the Town of Kennebunkport in the Goose Rocks Beach public access lawsuit. The team referenced the website during litigation. The Town negotiated a settlement agreement and cooperative solution with the majority of the beachfront owners in an effort to avoid litigation. This settlement and companion ordinance provide a new model of a cooperative approach to settling access disputes.



Coastal towns with swimming beaches are improving water quality and watershed health.

Unsafe bacteria levels degrade ecosystems, threatening public health and local economies largely dependent on tourism. Improving water quality is difficult, often requiring complicated and expensive strategies to identify, eliminate, and prevent pollution sources. The Maine Healthy Beaches Program, coordinated by marine extension associate Keri (Lindberg) Kaczor, works with towns, consultants, the Department of Environmental Protection, and other partners to



support enhanced monitoring and source-tracking studies throughout impaired watersheds. The program resulted in water quality improvements at several beaches in 2012. In Camden, a Boater's Education Campaign and pollution remediation efforts helped remove Rock Brook from the state's list of impaired waters, and increase use of the town's free boat pump-out service. Rockport remediated malfunctioning subsurface wastewater disposal systems, and installed a boat pump-out station in the harbor. Ogunquit passed an ordinance banning the use of pesticides on town property, spent more than \$50,000 on sewer infrastructure improvements and stormwater mapping, and acquired 56 acres of green space and wetlands to help protect the Ogunquit River Watershed and Ogunquit Beach. Kittery hired a Shoreland and Environmental Resource Officer, who identified and began remediation of pollution sources.

Report synthesizes knowledge of mercury in the marine environment.

Mercury is a potent neurotoxin that is especially toxic to women and children. The primary route of exposure to mercury is through seafood, yet the majority of mercury research has focused on freshwater environments. The Coastal and Marine Mercury Ecosystem Research Collaborative (C-MERC), led by Dartmouth College's Superfund Research Program and supported by Sea Grant, pulled together an interdisciplinary team of mercury researchers to synthesize knowledge of global mercury sources, transport, and accumulation in the marine environment, and human exposure risks. The Principal Investigators contracted with Maine Sea Grant's communications team to help produce the final report that summarized 11 peer-reviewed journal articles by more than 75 authors, and presented new analysis on the pathways of mercury pollution in the marine environment and responses to pollution controls. *Sources to Seafood: Mercury Pollution in the Marine Environment*, was released in parallel with a special issue of the journal *Environmental Research* in November 2012. Authors presented the report to the EPA, NOAA, the U.S. Senate, and the U.S. State Department in December. In January, 300 copies of the report were distributed to the United Nations Environment Program Intergovernmental Negotiating Committee, who on Saturday, January 19, 2013, agreed to the text of a global legally-binding instrument on mercury and created the Minamata Convention on Mercury.

Statewide partners recognize Sea Grant's expertise in science communication.

As scientific research more frequently addresses interdisciplinary issues of societal importance, the need for communication of scientific research results and knowledge increases. This need is recognized by current students of science, and more faculty, administrators, and research partners are seeking opportunities for training in science communication. Maine Sea Grant communications coordinator Catherine Schmitt created and delivered four presentations and workshops on science communication in 2012, and created and taught an upper-level undergraduate course in science writing. Participants in science communication workshops reported increased knowledge of tools and approaches for communicating science and research to non-scientific audiences.

Changes from Previous Year

As we reported last year, the shift in leadership in Maine government resulted in many staffing and policy changes in state agencies with which we have long-standing collaborative relationships. During the past year, we have been in discussion with new and continuing state agency staff and leadership to address the changing nature of our relationships, and adapt or change the focus of some of our collaborative efforts as necessary.

Marine extension associate Sherman Hoyt retired in 2012, after 14 years of service to the University of Maine.

Goals for Next Year

Hazard Resiliency in Coastal Communities

- Coordinate the design, implementation, and evaluation of the 2013 Maine Beaches Conference, and track related outcomes.
- Continue to sustain the beach profile monitoring program through municipal funding, expand access to and use of data, and provide development opportunities for volunteers.
- Continue the successful implementation of the extramurally-funded NOAA Coastal Communities Climate Adaptation Initiative project, *Enhancing Sea Grant's Ability to Help Coastal Communities Adapt to Climate Change* and Sea Grant Climate Adaptation 2011: City of Ellsworth, ME, *Coastal Infrastructure Resiliency in a Changing Climate*.
- Continue to partner with the Sustainability Solutions Initiative at the University of Maine, and provide linkages to coastal communities.
- Continue working with fisheries and aquaculture stakeholders and others to understand issues related to ocean acidification and other climate-related changes in Maine's coastal waters. Assist with the development of community-based monitoring and engage the science community in these developments.
- Continue to deliver and manage the "Signs of the Seasons" phenology monitoring program and expand its scope and purpose commensurate with available resources, including expansion to participants in the state of New Hampshire, through the New Hampshire Sea Grant Program.
- Lead the connection of Sea Grant programs in the northeast region with the National Weather Service's "Weather-Ready Nation" initiative enabling local communities to have better and more efficient access to NWS products and services.
- Expand and promote the *Maine Property Owner's Guide to Flooding, Erosion, and Other Coastal Hazards*.

Sustainable Coastal Development

- Implement and expand the Downeast Fisheries Trail as a network of fisheries heritage sites; lay the foundation for future fisheries heritage opportunities, both virtual and actual, for residents and visitors alike, along the Trail. Explore and implement other outreach efforts and educational tools including Internet-based applications and arts/humanities partnerships.
- Promote and share the findings of recent Sea Grant-funded research to identify legal barriers and opportunities for mutually beneficial partnerships between fisheries and tourism industries; translate research findings into outreach materials and workshops fostering collaboration between both industries.
- Present findings of working waterfront tax policy research to key stakeholders and facilitate action planning based on these results.
- Continue to enhance accessingthemaineoast.com; make tax policy findings available to other state access websites; promote adaptation of the site in other states.
- Continue to serve in a leadership capacity in the development of the National Working Waterfront Network and implementing Economic Development Administration collaborative project for working waterfronts.

- Work with Cooperative Extension, regional and multi-state partners to design and fund a public participation training series that has statewide potential for application.
- Implement the 2013 Regional Workforce Housing Charrette in partnership with the Workforce Housing Coalition of the Greater Seacoast.
- Share the results of Sea Grant-funded research on fishing community resilience.

Healthy Coastal Ecosystems

- Continue providing quality-assured structure and support to local management entities for monitoring, assessment, and public notification of water quality conditions at 61 coastal beach management areas through the Maine Healthy Beaches Program.
- Continue efforts to target human-sourced fecal contamination by analyzing optical brightener levels at routine beach and enhanced monitoring locations.
- Continue partnering with US EPA, state agencies and local entities to identify, eliminate, and prevent sources of fecal contamination.
- Continue to coordinate state and regional outreach and education efforts related to marine invasive species, including the relatively new red marine algae, *Heterosiphonia japonica*, and implementation of a regional Sea Grant outreach project to develop a coordinated regional plan for early detection and rapid response to Chinese mitten crab introductions to the Gulf of Maine.

Safe and Sustainable Seafood Supply

- Complete the delivery of the Trade Adjustment Assistance (TAA) program with Maine Lobstermen's Association.
- Expand the implementation of integrated multi-trophic aquaculture projects focused on kelp and mussels, as follow-up to the project funded by the Maine Aquaculture Innovation Center, and conduct outreach and training in shellfish/seaweed aquaculture, targeting fishermen.
- Develop aquaculture workshops on species including razor clams, sea scallops, and seaweed.
- Conduct micro-scale trials of sea scallop culture, including testing for paralytic shellfish poisoning; continue work with fishermen, shellfish growers, and DMR on spat collection.
- Renew and expand the Darling Marine Center's shellfish lease, and improve its use by researchers and students.
- Continue outreach to engineers at UMaine and elsewhere, and improve outreach to UMaine School of Business, and Food Science group at UMaine/UMCE with regard to aquaculture technology, business opportunities, and marketing.
- Provide advice/guidance for the establishment of another University aquaculture lease site associated with the UMaine Center for Cooperative Aquaculture Research.
- Observe the agricultural models of sustainable food systems and transition some of the approaches and philosophies to aquaculture and seafood systems, such as supporting the development of community-supported fisheries, based on the model of community-supported agriculture.
- Work to bring the aquaculture research and industry communities together for more collaborative partnerships.

- Provide facilitation and groups process advice to assist with the Department of Marine Resources effort to develop Fisheries Management Plans for all commercially harvested fisheries, beginning with rockweed.
- Convene a working group to investigate and identify approaches to address the problems associated with the proliferation of the invasive European green crab in Maine's intertidal areas.
- Maintain, promote, and leverage the Maine Seafood Guide.
- Work with the Department of Marine Resources to update the Maine Clam Handbook.

Management and Program Sustainability

- Support staff training and increased use of Internet technology to improve communication with stakeholders, partners, and the public about our programming and impacts, using tools such as content management systems, blogging, video, and social media.
- Continue to provide staff training and support on time management and communications tools to help ensure the program is focusing on its strategic goals and maximizing program outcomes.
- Complete the next program strategic plan and prepare for implementation and reporting.
- Explore options for implementing the competitive research element of the program to ensure efficient use of the limited research funds to focus on outcome, impact and student engagement.
- Retain a resource economist to conduct a national survey of economic impact evaluation methodology across the Sea Grant Network, and share best practices with the network via national presentations and a white paper.
- Develop and implement a staff training module focused on skills and best practices for economic impact evaluation of Sea Grant programming, working in partnership with the economist who developed the national survey and white paper on this topic.

Education and Workforce Development

- Continue to seek extramural funding for Sea Grant education programs, including funds for a coordinator for the Signs of the Seasons phenology monitoring and climate change education program.
- Develop a strategy for education and outreach programming that supplements and supports the Downeast Fisheries Trail initiative.
- Work with the UMaine Aquaculture Research Institute, and other aquaculture partners to develop priorities for marine aquaculture education in Maine, and seek funds for collaborative projects.
- Continue to support workforce development opportunities for Maine undergraduate and graduate students through the following activities: research and program development grants; recruiting applicants for NOAA fellowship and scholarship opportunities; supporting the Maine Sea Grant Undergraduate Scholarship in Marine Sciences; making student summer and academic semester internship positions available through extramural funds; and supporting student involvement in Sea Grant-supported professional meetings, workshops, and conferences.
- Continue working with SERC Institute and UMaine Mitchell Center to expand curricula and teacher participation in the Acadia Learning Participatory Watershed Research program, and develop a new line of inquiry for middle school students and teachers, related to watershed connectivity and restoration.
- Assist with the completion of the five-year strategic plan for the Herring Gut Learning Center, whose educators use aquaculture and marine science to teach at-risk youth.
- Continue partnerships with University of Maine and other institutions for student and faculty training in science communication.

Challenges and Solutions

Budgetary concerns

Although Sea Grant's federal appropriation within the NOAA budget had looked favorable for FY 2013 early in the year, the budget stalemate and resulting "sequester" resulted in an 8% cut across governmental discretionary programs, including the National Sea Grant Program. Although the National Sea Grant Office absorbed most of that cut and Maine Sea Grant's portion is only a 2% cut to our federal funds in FY13, the National Sea Grant Office will not be able to sustain that kind of buffer, and we may face deeper cuts in future years. This cut happening at such a late point in the fiscal year caused management challenges and we requested that our ongoing research projects amend their second-year budgets to reflect a 2% reduction, among other cost-cutting measures we implemented across our program budget. Similar uncertainty and vulnerability results from Maine Sea Grant's reliance on funding from Maine's research and development investment via the Maine Economic Improvement Fund (MEIF), which has an uncertain future under current state leadership and pending proposals to share these funds with campuses within the UMaine System. Therefore, the challenge of sustaining funding at a level that meets current obligations, primarily staff salaries, and investment in competitive research projects is paramount.

Our budget situation is further affected by continued increases in the cost of employee compensation through periodic salary adjustments, health insurance, and institutional indirect costs. Our solution will be to continue to identify savings in the budget for any discretionary items, but more importantly to proceed with the high-quality programming that has earned Maine Sea Grant a strong and positive reputation. This, in turn, results in high-quality partnerships and successful fundraising through other sources.

Strategic focus

As described in last year's report, the 2011 staff development retreat, dubbed "The Creative No and the Articulate Yes," has proven to be a very important conversation. Staff continually refer back to that gathering and have found it very useful to reflect on how to maintain focus towards strategic goals and program impact while also serving the role of an available public servant. No doubt the program will continue to reinforce this learning and strive for strategic focus, integration across programs, and continually remind ourselves to not get spread too thinly. We have been asked to share the retreat framework with other Sea Grant programs and our partners, and this module will be presented at the National Sea Grant Academy in October 2013 as part of training for Sea Grant Extension Agents from around the country.

Shifting of national priorities

We are in the process of finalizing our next strategic plan at the local level while the National Sea Grant Office is creating the next four-year National Strategic Plan. These plans will be in place for 2014-2018 and will be the framework by which we are evaluated over that reporting period. Although we are not obligated to undertake all aspects of the national plan, we are encouraged to align with it closely and to be able to report impacts and outcomes along the themes, goals, and objectives of the national plan (see Appendix for data we currently report to NOAA). It is important that we remain true to the needs of our local stakeholders, but equally important to honor our obligation as a NOAA-funded entity to be contributing to the nation's needs. The challenge is in both the crafting of the plan, the development of the reporting requirements and benchmarks for success, and then implementing the plan while remaining nimble and responsive to emerging needs.

Economic impact assessment of Sea Grant programs

Katherine Farrow, who finished her master's degree in resource economics in 2012, was hired as a temporary professional to evaluate several Maine Sea Grant projects and to help train our staff in identifying and evaluating economic impact. There is growing interest in being able to evaluate the expenditures of public funds for economic impact across the network. Certainly Sea Grant investments are resulting in economic activity in many ways. In addition, the program received a grant from the National Sea Grant Office that allowed us to pay Katherine to conduct a national inventory of economic assessment methods being used across the network. She reported her results at the National Sea Grant meeting in the fall, and the report is being used actively across the network as we explore ways to build this skill set. Our program is not experienced or skilled in how to evaluate economic impact of our investments but we are building on these activities to development of tools that we as non-economists might be able to use for economic impact assessment. The findings of these initiative are being incorporated into the program planning at both the local and national scale as Maine Sea Grant, and the rest of the National Sea Grant Program, strive to incorporate these types of non-market valuations into our reporting scheme(s). Later in 2013 Ms. Farrow will be conducting a staff training exercise to apply these principles to some of Maine Sea Grant's programming.

Long Term Priorities

Continued from 2012:

1. An adaptive management style that is attentive to changing needs and priorities of Maine coastal communities that helps to maximize prosperity and long-term sustainability.
2. Expanded programming in the areas of sustainable seafood, community resilience, and climate change adaptation.
3. Continued pursuit of a scientifically literate workforce by nurturing the opportunities to connect educators and students at all levels to coastal and ocean themes and applied challenges.
4. Sustainable funding that grows incrementally to meet both staffing and competitive granting needs of the Maine Sea Grant College Program.
5. Develop methodology for tracking economic impact of programming, and integrate these concepts with program development, delivery, and evaluation from inception.
6. Strive for integration of science, education, and outreach across all levels of programming and develop success stories demonstrating the value of this approach to public investment in the Sea Grant enterprise.

Additional for 2013:

1. Expand on the successful outreach and engagement work of the Marine Extension Team into other elements of the University of Maine as strong examples of the implementation goals of the Blue Sky Initiative and for the upcoming re-certification of the University of Maine's engagement under the Carnegie certification process.
2. Integrate Sea Grant's seafood-related programs with Cooperative Extension's Food Systems Initiative.
3. Explore ways to integrate the work of the Marine Extension Team into the classrooms at the University of Maine through guest lectures, seminars, or the development of a course.

Appendix A. NOAA National Sea Grant Performance Measures and Metrics

Much of the information contained in the preceding report to the University of Maine Vice President for Research also is submitted to the National Sea Grant Office. Data from all 33 Sea Grant programs nationwide are then compiled and submitted to NOAA's Office of Oceanic & Atmospheric Research. However, we also report additional metrics and performance measures (linked to our and to National Sea Grant's strategic plan) to NOAA, which are here listed.

\$3,955,362 economic benefit resulting from Sea Grant activities.

- \$2.4 million dollars delivered to date to participants in the Trade Adjustment Assistance Program.
- \$1.5 million in funding for river restoration/dam removal influenced by Sea Grant research results.
- \$40,000 worth of mussel seed from DEI to Cooke Aquaculture.
- \$15,362 Beach Profile Monitoring Program: \$7,000 continued financial support from participating towns/cities (included in annual budgets in most cases); Maine Outdoor Heritage Fund Grant \$8362.

90 constituents used Sea Grant products and services in implementing ecosystem-based planning and management approaches.

5 tools, technologies, and information services developed and 15 used by partners to improve ecosystem-based management.

7 community-based projects resulted in restored or improved ecosystem function and productivity that have been informed by Sea Grant products and services.

20 communities engaged in visioning, resource inventories, analysis of development policies, education of community leaders and citizens.

18 communities used information provided by Sea Grant to preserve and enhance access and/or balance uses.

1 project led to sustainable tourism practices.

12 communities/watersheds engaged in Sea Grant-funded diadromous species research/outreach.

4 strategies and practices to improve fishing/aquaculture operational efficiency implemented.

2 communities where alternative energy technologies are evaluated/implemented.

69 seafood producers used Sea Grant products and services to achieve success.

84 communities received resiliency trainings/technical assistance.

5 communities improved hazard resiliency (e.g., changes in zoning ordinances)

89 K-12 teachers in Maine used educational products produced by Maine Sea Grant to engage students in learning about climate change and coastal hazard resiliency in Maine.

152 K-12 teachers/classrooms engaged in standards-aligned, inquiry-based science learning activities developed and supported by Maine Sea Grant that contribute to the health of coastal ecosystems in Maine.

12,016 volunteer hours

2 curricula developed



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