METCALF INSTITUTE FOR MARINE AND ENVIRONMENTAL REPORTING

Peter B. Lord Seminars on the Environment

The Future of Aquaculture in Southern New England

September 30, 2015
Coastal Institute Hazard Seminar Room
University of Rhode Island Graduate School of Oceanography
Narragansett, R.I.

Resources List

Status and Trends of Coastal Aquaculture Use and Policy in New England and Beyond

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Augusto, K., and G. Holmes. 2015. Massachusetts Shellfish Aquaculture Economic Impact Study. The University of Massachusetts Dartmouth, Charlton College of Business, Center for Marketing Research. http://bit.ly/1gw5jTP

Flimlin, G., S. Macfarlane, E. Rhodes, and K. Rhodes. 2010. Best Management Practices for the East Coast Shellfish Aquaculture Industry. http://bit.ly/1LBllEv

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Gutierrez, C.M., C.C. Lautenbacher, Jr., and W.T. Hogarth. 2007. NOAA 10-Year Plan For Marine Aquaculture. NOAA. http://www.nmfs.noaa.gov/aquaculture/docs/policy/final_noaa_10_yr_plan.pdf

Kite-Powell, H. 2002. Aquaculture: Overview of Trends and Current Issues. Woods Hole Oceanographic Institution Marine Policy Center. PowerPoint presentation. http://bit.ly/1OiwmAS

Lapointe, G. 2013. Northeast Regional Ocean Council White Paper: Overview of the Aquaculture Sector in New England. Northeast Regional Ocean Council. http://neoceanplanning.org/wp-content/uploads/2013/12/Aquaculture-White-Paper.pdf

Markey, K.R. 2007. An Evaluation of the Current State of Shellfish Aquaculture: A Comprehensive Look at the Techniques Employed and the Potential of Industry Expansion and Environmental

Remediation. http://www.ecologicalaquaculture.org/Markey(2007).pdf

Mears, H.C. 1992. Aquaculture in the Northeast Region of the National Marine Fisheries Service. NOAA. http://www.st.nmfs.noaa.gov/tm/ner_image/ner004image.pdf

National Oceanic and Atmospheric Administration Resources

Aquaculture in the U.S. - Provides a brief summary of the relative size of the aquaculture industry in the U.S. vs. globally.
http://www.nmfs.noaa.gov/aquaculture/aquaculture_in_us.html

Aquaculture Research Map – "A comprehensive overview of aquaculture research projects carried out by NOAA scientists"
http://www.nmfs.noaa.gov/storymap/aquaculture/aquaculture_research.html

Olin, P.G. 2012. Aquaculture in the United States of America: Present Status and Future opportunities. *Bulletin Fisheries Research Agency*. 35: 7-13.
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Porter, Charlene. December 23, 2013. Trends in Aquaculture reduce environmental risks, report finds. IIP Digital, U.S. Department of State. http://1.usa.gov/1KuAQBG

Reitsma, J., C. Hollingswort, D.C. Murphy, and J.K. Buttner. 2012. Aquaculture Situation and Outlook Report 2012: Massachusetts. http://bit.ly/1KkkOJu

NOTE: there is a great list of Massachusetts-based research, extension, and education contacts on pages 11-13 of this report.

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Rhode Island Coastal Resources Management Council: Aquaculture Frequently Asked Questions.
http://www.crmc.ri.gov/aquaculture.html

Rhode Island Department of Environmental Management. Aquaculture of Marine Species in Rhode Island Waters. http://www.dem.ri.gov/pubs/regs/regs/agric/aquacult14.pdf

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http://works.bepress.com/cgi/viewcontent.cgi?article=1009&context=michael_rice

Shumway, A.E., et al. 2003. Shellfish Aquaculture – In Praise of Sustainable Economies and Environments. *World Aquaculture*. 34(4). http://narragansettbayshellfishhatchery.com/wp-content/uploads/2013/06/URI.pdf

U.S. Environmental Protection Agency. June 27, 2012. EPA Aquaculture Operations- Laws, Regulations, Policies, and Guidance. http://www.epa.gov/agriculture/anaqulaw.html

Aquaculture Interactions with Natural and Economic Environment

Adams, C. M., S.E. Shumway, R.B. Whitlatch, and T. Getchis. (2011), Biofouling in Marine Molluscan Shellfish Aquaculture: A Survey Assessing the Business and Economic Implications of Mitigation. *Journal of the World Aquaculture Society*, 42: 242–252. doi: 10.1111/j.1749-7345.2011.00460.x
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Tlusty, M.F., D.A. Bengston, H.O. Halvorson, S.D. Oktay, J.B. Pearce, and R.B. Rheault, Jr. (eds.). 2001. Marine Aquaculture and the Environment: A Meeting for Stakeholders in the Northeast. Cape Cod Press, Falmouth, Massachusetts. http://bit.ly/1UYXNyC

Future Issues for Aquaculture

De Silva, S.S. and D. Soto. 2009. Climate Change and Aquaculture: Potential Impacts, Adaptation and Mitigation. Climate Change Implications for Fisheries and Aquaculture: Overview of Current Scientific Knowledge. FAO Fisheries and Aquaculture Technical Paper. No. 530: 151-212. http://www.fao.org/docrep/012/i0994e/i0994e04.pdf

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NOAA's Pacific Marine Environmental Laboratory Carbon Dioxide Program. Ocean Acidification's Impact on Oyster's and other Shellfish. http://1.usa.gov/1FQTazA

Salisbury, J., M. Green, C. Hunt, and J. Campbell. 2008. Coastal Acidification by Rivers: A Threat to Shellfish? *EOS Transactions, American Geophysical Union*. 89(50): 513-528. http://ccg.sr.unh.edu/pdf/Salisbury_EOS_2008.pdf

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The White House. National Strategic Plan For Federal Aquaculture Research. http://1.usa.gov/1LkYnWz

The White House. 2014. The Challenge of Ocean Acidification. Office of Science and Technology Policy The White House http://1.usa.gov/1Yij8HD

Other Relevant Resources

Northwest Fisheries Science Center Glossary http://www.nwfsc.noaa.gov/research/divisions/fe/estuarine/oeip/ic-glossary.cfm

Fisheries: Climate change at the dinner table http://www.nature.com/nature/journal/v497/n7449/full/497320a.html#close

Roger Williams University: Oyster Gardening http://rwu.edu/academics/schools-colleges/fcas/ceed/oyster-gardening

Oystering in Connecticut, from colonial times to the 21st century http://connecticuthistory.org/oystering-in-connecticut-from-colonial-times-to-today/

Shellfisheries Mapping Atlas http://seagrant.uconn.edu/whatwedo/aquaculture/shellmap.php

Massachusetts Food System Plan http://www.mafoodplan.org/

Journalism Resources

Abel, D. March 07, 2015. Rising acid levels in oceans imperil region's shellfish: Changes from surge in carbon dioxide take toll. The Boston Globe. http://bit.ly/1OiwFvo

Benson, J. December 29, 2014. Shellfishermen, Seaweed Farmers Now Eligible For U.S. Aid For Severe-Weather Damages. The Hartford Courant.
http://www.courant.com/business/hc-shellfish-federal-aid-1230-20141229-story.html

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http://www.theday.com/article/20150321/NWS01/303219932

Brown, S. September 3, 2015. Scientists Use Katama Bay for Detailed Study of Oysters and Vibrio. The Vineyard Gazette. http://bit.ly/1iAZPJr

Cummings, B. May 3, 2015. Turf war brewing between shellfish industry and regulators. Connecticut Post.
http://www.ctpost.com/local/article/shellfishermen-vs-state-6238919.php

De Avila, J. August 13, 2015. Connecticut Lab Ups Its Shell Game. The Wall Street Journal.
http://www.wsj.com/articles/connecticut-lab-ups-its-shell-game-1439512390

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http://www.providencejournal.com/article/20150309/NEWS/150309280/?Start=2

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Proft, K. July 08, 2015. Providence Waterfront Could Use Some Mussel. ecoRI News.
http://bit.ly/1KbowVn

Shekhyman, L. November 23, 2014. US waters create potential for shellfish farming. The Boston Globe. http://bit.ly/1tfR9q1

Singer, S. July 2014. Connecticut seeks shellfish rules: Fishermen hope a new council will resolve tension between the industry and regulators. Portland Press Herald.
http://www.pressherald.com/2015/07/14/connecticut-seeks-shellfish-rules/

Zaretsky, M. July 20, 2013. Seaweed may offer lucrative future for Connecticut aquaculture. New Haven Register. http://bit.ly/1P5XdgH

Upcoming Events of Interest

Sixth International Oyster Symposium, October 21-23, 2015
http://oystersymposium.org/

Other Useful Contacts (a far from exhaustive list):

Shellfishing Industry Representatives and Businesses:

Jim Arnoux, East Beach Farms, LLC
http://www.oceanstateoysters.com/East-Beach-Farm.html

Jody King, Rhode Island Quahogger

Ben Lloyd, Standish Shore Oysters and Pangea Shellfish Company
http://www.standishshoreoysters.com/#about

Perry Raso, Matunuck Oyster Farm
http://www.rhodyoysters.com/matunuck-oyster-farm/

Bill Silkes, American Mussel Harvesters, Inc.
http://www.americanmussel.com/

Bren Smith, Thimble Island Oyster Company
http://www.thimbleislandoysters.com/
http://www.futureoffish.org/profile/bren-smith

John and Cindy West, Cedar Island Oyster Farm
http://www.oceanstateoysters.com/Cedar-Island-Oyster-Farm.html

East Coast Shellfish Growers Association
http://www.ecsga.org

Maine Aquaculture Association
http://www.maineaquaculture.com/Welcome/welcome.html

Massachusetts Aquaculture Association
http://massaquaculture.org

National Aquaculture Association
http://thenaa.net

National Shellfisheries Association
http://www.shellfish.org/about-nsa

Noank Aquaculture Cooperative
http://noankcooperative.org/

Ocean State Shellfish Cooperative
http://www.oceanstateoysters.com/About-the-Cooperative.html

Rhode Island Shellfisherman's Association
http://rishellfisherman.org/

Research:

Timothy Bowden, University of Maine (Management strategies for aquaculture; Shellfish immunology)
http://umaine.edu/animalveterinarysciences/faculty-and-staff/tim-bowden/

Carrie Byron, University of New England (Carrying capacity for shellfish aquaculture; Modeling food web interactions)
http://www.une.edu/people/carrie-j-byron

Xuan Chen, University of Maine (Finance; Production Economics related to Aquaculture)
http://umaine.edu/soe/faculty-and-staff/chen/

Barry Costa-Pierce, University of New England (Carrying capacities of aquaculture in relationship to natural ecosystems and coastal societies; "Ecological Aquaculture")
http://www.une.edu/people/barry-a-costa-pierce
http://ecologicalaquaculture.org/welcome/

Tracy Dalton, University of Rhode Island (Human interactions with coastal environments, including user conflicts related to shellfish aquaculture)
http://web.uri.edu/dalton/

Marta Gomez-Chiarri, University of Rhode Island (Infectious disease in shellfish)
http://web.uri.edu/favs/marta-gomez-chiarri/

Heather Hamlin, University of Maine (Reproductive challenges in commercial aquaculture
Dale Leavitt, Roger Williams University (Aquaculture education and training)
http://rwu.edu/academics/schools-colleges/fcas/faculty/dale-leavitt

Scott Lindell, Marine Biological Laboratory (Improving methods for shellfish aquaculture)
http://www.mbl.edu/bell/current-faculty/lindell/

Maine Experimental Program to Stimulate Competitive Research
Sustainable Ecological Aquaculture Network (SEANET)
http://umaine.edu/epscor/maine-epscor-programs/seanet/

NOAA Northeast Fisheries Science Center Aquaculture Research
http://nefsc.noaa.gov/nefsc/Milford/aquaculture.html

Northeast Regional Aquaculture Center
https://agresearch.umd.edu/nrac

Mike Rice, University of Rhode Island (Factors that affect growth and production in shellfish aquaculture; History of aquaculture in New England)
http://web.uri.edu/favs/michael-a-rice/

Roxanna Smolowitz, Roger Williams University (Shellfish disease)
http://rwu.edu/academics/schools-colleges/fcas/faculty/roxanna-smolowitz

University of Maine Aquaculture Research Institute
http://umaine.edu/aquaculture/

Charles Yarish, University of Connecticut (Integration of seaweeds in "polyculture" aquaculture operations)
http://stamford.uconn.edu/yarish-charles/

Regulation and Policy:

Ken Ayars, Rhode Island Dept. of Environmental Management Division of Agriculture
http://www.dem.ri.gov/programs/bnatres/agricult/index.php

Sean Bowen, Massachusetts Department of Agriculture Resources
http://www.mass.gov/eea/agencies/agr/about/divisions/aquaculture-program-generic.html

Tom Uva, Narragansett Bay Commission - tuva@narrabay.com
See his slideshow regarding water quality in Narragansett Bay here: http://bit.ly/1h3e73H

National Oceanic and Atmospheric Administration, NOAA Fisheries

Aquaculture Policy
Provides a brief summary of NOAA's most recent (2011) Aquaculture Policy, which "specifies the goals, objectives, and priorities for all aquaculture-related activities at NOAA in the context of its marine stewardship mission."
http://www.nmfs.noaa.gov/aquaculture/policy/24_aquaculture_policies.html

State by State Shellfish Aquaculture Permitting Information 2015.
http://www.nmfs.noaa.gov/aquaculture/shellfish_portal/state_permitting_shellfish_aq.pdf

Northeast Regional Ocean Council
http://northeastoceancouncil.org

State Aquaculture Agencies:

Connecticut Bureau of Aquaculture
http://www.ct.gov/doag/cwp/view.asp?a=3768&q=451508&doagNav=

Massachusetts Department of Energy and Environmental Affairs
http://1.usa.gov/1iV4ZQi

Rhode Island Coastal Resources Management Council
http://www.crmc.ri.gov/aquaculture.html

State Sea Grant Aquaculture Resources:

Connecticut Sea Grant
http://seagrant.uconn.edu/whatwedo/aquaculture/

Massachusetts Sea Grant
http://web.whoi.edu/seagrant/program-areas/sustainable-fisheries-and-aquaculture/

Rhode Island Sea Grant
http://seagrant.gso.uri.edu/projects-2/topics/seafood/