

GOALS	RECOMMENDATIONS	Action to Date	Future Action
<p>1. Invest in Maine’s Capacity to Monitor and Investigate the Effects of Ocean Acidification and Determine Impacts of Ocean Acidification on Commercially-Important Species and the Mechanisms Behind Those Impacts</p>	<p><i>1.1. Enhance monitoring and create a database sufficient to support the development of regulatory and non-regulatory approaches to reduce and limit nutrients and organic carbon from sources that are contributing significantly to acidification of Maine’s marine waters. Enhanced monitoring should begin in one or more pilot estuaries where impacts are presently occurring.</i></p>	<p>MSF continuously measures temperature, salinity, dissolved oxygen, and pCO₂ in the hatchery intake water from the Damariscotta River. From salinity, we estimate total alkalinity using an empirically-determined relationship based on ~1.5 years of simultaneous alkalinity and salinity data from the hatchery. We then calculate other carbonate chemistry parameters. All of this is done in collaboration with Joe Salisbury’s laboratory at the University of New Hampshire.</p>	<p>This monitoring will continue for the foreseeable future. We must make it a priority to effectively QA the data and make it publically available.</p>
	<p><i>1.2. Expand monitoring of ocean acidification to establish its natural variability and to detect trends in water chemistry and related biological responses.</i></p>	<p><i>Our monitoring has been running for nearly 5 years, and can begin to provide a basis for natural temporal variability.</i></p>	<p><i>We are engaged in research efforts to determine the impacts of reduced seawater pH on juvenile oysters in nursery upwellers. (Please note: a shellfish nursery is in ambient seawater, as opposed to a land-based hatchery where you can control water chemistry)</i></p>

<p><i>1.3. Develop new tools with which to assess and understand acidification and its impacts in Maine waters.</i></p>		
<p><i>1.4. Determine the causes and relative importance of acidification in the waters and sediments of Maine.</i></p>		
<p><i>1.5. Identify the impacts of acidified waters and sediments on Maine's commercial species.</i></p>		<p><i>We are engaged in research efforts to determine the impacts of reduced seawater pH on juvenile oysters in nursery upwellers. (Please note: a shellfish nursery is in ambient seawater, as opposed to a land-based hatchery where you can control water chemistry)</i></p>

2. Reduce Emissions of Carbon Dioxide	<i>2.1. Strengthen coordination and continue participation with existing national, state, and regional initiatives regarding the reduction of atmospheric CO₂ levels.</i>	Bill Mook has created the Shellfish Growers Climate Coalition (national, not just Maine) through the Nature Conservancy to bring small business voices into the national conversation about reducing greenhouse gas emissions. Mook Sea Farm is a supporter of the Energy Pathway for Maine, which endorses six guiding principles to guide development of specific solutions to grow clean energy in Maine	
	<i>2.2. Encourage key leaders and policymakers to synchronize in establishing a comprehensive and unified strategy to reduce carbon dioxide emissions.</i>	Meredith is on the MOCA Steering Committee, which has worked to move climate policy forward in the state government.	
	<i>2.3. Expand actions at the state and local levels that may help in reducing CO₂ emissions.</i>	We invested in solar panels on our new building to offset our carbon footprint. We continue to find ways to make our business more sustainable.	

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3. Identify and Reduce Local Land-Based Nutrient Loading and, Organic Carbon Contributions to Ocean Acidification and Freshwater Runoff by Strengthening and Augmenting Existing Pollution Reduction Efforts and Making Groundwater Recharge a Land Use Priority.	<i>3.1. Identify and reduce nutrient loading and organic carbon from point source and nonpoint discharges determined to cause or contribute to ocean acidification.</i>	No action from Mook Sea Farm	
	<i>3.2. Assess the need for water quality criteria relevant to ocean acidification.</i>	No action from Mook Sea Farm	
	<i>3.3. Ensure that state staff and other practitioners are working with the best information and most effective technology.</i>	No action from Mook Sea Farm	

	<p><i>3.4. Investigate incentive programs for pollution and freshwater runoff reduction.</i></p>	<p>No action from Mook Sea Farm</p>	
	<p><i>3.5. Support and reinforce current planning efforts and programs that address the impacts of nutrients and organic carbon and freshwater runoff into coastal waters.</i></p>	<p>No action from Mook Sea Farm</p>	
	<p><i>3.6. Enhance education and outreach programs that provide landowners with information about best practices for reduction of nutrient pollution.</i></p>	<p>No action from Mook Sea Farm</p>	

4. Increase Maine's Capacity to Mitigate, Remediate and Adapt to the Impacts of Ocean Acidification	<i>4.1. Preserve, enhance and manage a sustainable harvest of kelp, rockweed and native algae in bivalve areas and adjacent shoreline, and preserve and enhance eelgrass beds.</i>	No action from Mook Sea Farm	
	<i>4.2. Encourage bivalve production to support healthy marine waters.</i>	That's what we do!!!	
	<i>4.3. Spread shells or other forms of calcium carbonate (CaCO₃) in bivalve areas to remediate impacts of local acidification.</i>	We have not taken action on this	We have a large shell pile on land and would be happy to contribute it to a shell recycling program if one starts.
	<i>4.4. Increase the capacity of the fishing and aquaculture industries to adapt to ocean acidification.</i>	We have invested in a land-based oyster holding facility. This gives us the opportunity to grow seed larger on land, which should make them more resilient to OA once they are moved to leases.	We are currently engaged in research with Nichole Price at Bigelow to investigate the efficacy of using crushed shell has in the bottom upwellers to mitigate OA impacts on juvenile oysters.

<i>4.5. Identify refuges and acidification hotspots to prioritize protection and remediation efforts.</i>	No action from Mook Sea Farm	
<i>4.6. Encourage the enhancement and creation of research hatcheries.</i>		In the next two months, we will be starting experimental spawns to attempt to produce surf clam and sea scallop seed in the hatchery.

<p>5. Inform Stakeholders, the Public, and Decision-Makers about Ocean Acidification in Maine and Empower Them to Take Action.</p>	<p><i>5.1. In addition to providing the commission's report, its key findings should be communicated to the Governor, Maine's legislative leaders, Maine's Congressional delegation, the press and the general public in a series of briefings by commission members.</i></p>	<p>We continue to speak with legislators, the press, and the public about the concerns that OA and climate change present to the state and to aquaculture.</p>	<p>We will always continue this conversation. Meredith will be on Maine Calling on Monday, July 15 to discuss the impacts of warming on marine industries.</p>
	<p><i>5.2. Continue efforts to increase the understanding of ocean acidification among key stakeholders, targeted audiences and local communities to help implement the commission's recommendations.</i></p>	<p>Meredith has been the Chair of the NECAN industry working group and has been working to engage other aquaculture industry members in concerns about OA</p>	<p>We hope that the results of our study this summer will demonstrate whether juvenile oysters are affected by OA and will communicate these results with other aquaculturists.</p>

<p><i>5.3. Enhance the existing communication network of engaged stakeholders, state agency representatives and the research community.</i></p>	<p>Meredith's work on the MOCA SC has helped with this recommendation.</p>	
<p><i>5.4. Develop, adapt and use curricula on ocean acidification in K-12 schools and institutes of higher education and increase interdisciplinary university programs to equip young leaders with the skills to find solutions to complex multidisciplinary problems such as ocean acidification.</i></p>	<p>No action from Mook Sea Farm</p>	

<p>6. Maintain a Sustainable and Coordinated Focus on Ocean Acidification.</p>	<p><i>6.1. Create an on-going ocean acidification council.</i></p>	<p>MOCA!</p> <p>We were pleased to testify in support of Rep Lydia Blume's bill and of Governor Mills' climate council bill.</p>	

YOUR NAME: Meredith White

YOUR ORGANIZATIONS NAME: Mook Sea Farm