GOALS	RECOMMENDATIONS	Action to Date	Future Action
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	*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.*	GMRI (Sherwood) has piloted a mussel stable nitrogen isotope monitoring study in Casco Bay to trace inputs of human-derived nitrogen.	Combine mussel nitrogen isotope results with nitrogen monitoring programs (e.g., Friends of Casco Bay).
	1.2. Expand monitoring of ocean acidification to establish its natural variability and to detect trends in water chemistry and related biological responses.		

	1.3. Develop new tools with which to assess and understand acidification and its impacts in Maine waters.	GMRI's mussel nitrogen isotope (d15N) study provides a cost-effective, time-integrated means to identify point and non-point nitrogen sources (from humans).	
	1.4. Determine the causes and relative importance of acidification in the waters and sediments of Maine.		
	1.5. Identify the impacts of acidified waters and sediments on Maine's commercial species.		

2. Reduce Emissions of Carbon Dioxide	*2.1. Strengthen coordination and continue participation with existing national, state, and regional initiatives regarding the reduction of atmospheric CO_2 levels.*	GMRI scientists (Pershing, Mills) served as authors of the 'Oceans' and 'Northeast' chapters of the 4th National Climate Assessment, which contain examples that demonstrate the benefits of reduced CO2 emissions. Several of GMRI's research projects also help quantify benefits of reduced emissions.	
	2.2. Encourage key leaders and policymakers to synchronize in establishing a comprehensive and unified strategy to reduce carbon dioxide emissions.	GMRI (Pershing) testified on behalf of the Governor's climate bill.	
	2.3. Expand actions at the state and local levels that may help in reducing CO_2 emissions.	GMRI (Pershing) testified on behalf of the Governor's climate bill.	

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.	*3.1. Identify and reduce nutrient loading and organic carbon from point source and nonpoint discharges determined to cause or contribute to ocean acidification.*	The GMRI mussel nitrogen study identified nonpoint human nitrogen loading in eastern Casco Bay that may be underappreciated.	Determine whether elevated mussel d15N is indeed indicative of increased nitrogen loading in this area.
	3.2. Assess the need for water quality criteria relevant to ocean acidification.		
	3.3. Ensure that state staff and other practitioners are working with the best information and most effective technology.		

	3.4. Investigate incentive programs for pollution and freshwater runoff reduction.		
	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.		
	3.6. Enhance education and outreach programs that provide landowners with information about best practices for reduction of nutrient pollution.		

4. Increase Maine's Capacity to Mitigate, Remediate and Adapt to the Impacts of Ocean Acidification	*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.*		
	4.2. Encourage bivalve production to support healthy marine waters.	GMRI (Vonderweidt) provides system-level support for responsible grow of sustainable aquaculture in Maine including: Farmed Shellfish Market Analysis, Aquaculture Top Gun Accelerator Program, South Portland Pier Aquaculture & Fishing Needs Assessment, commercial oyster demonstration farm partnership, workforce development strategy (in process), & Maine Aquaculture Knowledge Portal (in process).	Complete Maine Aquaculture Workforce Development Strategy and Maine Aquaculture Knowledge Portal. Continue commercial oyster demonstration farm partnership.
	4.3. Spread shells or other forms of calcium carbonate ($CaCO_3$)in bivalve areas to remediate impacts of local acidification.		

	4.4. Increase the capacity of the fishing and aquaculture industries to adapt to ocean acidification.	GMRI (Mills) has analyzed how species available to fishing ports will change as waters warm, evaluated vulnerability of fishing communities to these changes, and identified effective adaptation strategies for responding to species shifts.	GMRI will continue to work with local communities to plan for resilience of fisheries in the context of projected future species changes. Work with managers to identify potential paths to overcome current barriers and limitations to adaptation.
	4.5. Identify refuges and acidification hotspots to prioritize protection and remediation efforts.		
	4.6. Encourage the enhancement and creation of research hatcheries.		

5. Inform Stakeholders, the Public, and Decision-Makers about Ocean Acidification in Maine and Empower Them to Take Action.	*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.*		
	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.		

	5.3. Enhance the existing communication network of engaged stakeholders, state agency representatives and the research community.		
	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.		

6. Maintain a Sustainable and Coordinated Focus on Ocean Acidification.	*6.1. Create an on-going ocean acidification council.*		

YOUR NAME: Kathy Mills

YOUR ORGANIZATIONS NAME: Gulf of Maine Research Institute