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.*	**1. American Lobster Settlement Index (ALSI)) – diver based** monitoring of coastal lobster nurseries was initiated in Maine in 1989 and expanded to encompass much of New England and Atlantic Canada in the 1990s and 2000s. Monitoring has recently been expanded to deep waters on the Maine coast using vessel deployed passive collectors. Water quality monitoring of the 100+ sampling sites is limited to nil. Samplng has been funded by respective state marine resource agencies. Deepwater work was initially funded by ME Sea Grant, and is current supported by Ready Seafood. Co., Portland, ME and Santa Monica Seafood in CA. (Santa Monica Seafood is a major distributor of Maine lobster on the West coast.) **2. Lobster Supply Chain Project -** In a lobster industry collaboration support from the UMaine Research Reinvestment Fund – the Lobster Institute has initiated monitoring of the seawater conditions at lobster buying stations and dealers to assess stress points as they pass through the supply chain from boat to dealer. This effort is just getting under way in summer 2019.	**1. ALSI –** In 2019 monitoring will be expanded to Newfoundland. To date there has been no consistent monitoring of water quality at any of the sampling sites. Is this an opportunity? **2. Lobster Supply Chain Project -** Monitoring of wharves is just being getting under way in summer 2019. Fixed monitoring sites will be established at lobster buying stations where lobsters are in temporary storage under docks and in floating crates. Several indicators of water quality and lobster condition will be monitored along the way – initially temperature and flow. Dissolved O2 and pH are be others indicators to come on line. Individual shipping crates will also be monitored as they pass through the supply chain to their destination.

	1.2. Expand monitoring of ocean acidification to establish its natural variability and to detect trends in water chemistry and related biological responses.		**See above**
	1.3. Develop new tools with which to assess and understand acidification and its impacts in Maine waters.	**See #2 above.**	**See #2 above.**
	1.4. Determine the causes and relative importance of acidification in the waters and sediments of Maine.	**NOAA OAP/SG-supported research on the joint effects of warming and acidification on lobster larval survival, performance and gene expression. (PIs: Wahle, Fields) Supported UMaine Marine Science Masters students Jesica Waller (completed 2016) and Maura Niemisto (completed 2019). One publication to date (Waller et al. 2016 ICESJMS) .**	**Second publication in prep: Niemisto et al.**
	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.*		
	2.2. Encourage key leaders and policymakers to synchronize in establishing a comprehensive and unified strategy to reduce carbon dioxide emissions.		
	2.3. Expand actions at the state and local levels that may help in reducing CO_2 emissions.		

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.*		
	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.		
	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.	**Initiating water quality monitoring in lobster boats and at buying stations is a first step in building adaptive capacity. We reason it's first important to understand the stress points; then mitigate them.**	

	4.5. Identify refuges and acidification hotspots to prioritize protection and remediation efforts.	**See above**	
	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.*		

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YOUR ORGANIZATIONS NAME: UMaine School of Marine Sciences and the Lobster Institute