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.*	**Extensive monitoring is underway (with FOCB, DEP, UMaine, PWD, and others) to enhance understanding of nutrients in Casco Bay, especially nitrogen. CBEP has coordinated monitoring and mobilization of monitoring resources** **Piloted high frequency (every two hours) nitrogen (ammonium and N+N) monitoring equipment in Casco Bay, at South Portland's Portland Street Pier** **Developed a catalog of monitoring programs in Casco Bay** **Reviewed data on macronutrients in Casco Bay and reviewed existing loading models, to support Casco Bay Nutrient Council**	**Facilitate, coordinate and improve coordination among monitoring programs in Casco Bay** **Lead discussions of monitoring needs in Casco Bay, especially regarding nutrients and system metabolism** **Continue to fund monitoring as resources are available, with a focus on system metabolism, including both nutrients and carbon** **Expand FW monitoring of nutrients and alkalinity, as resources allow**
	1.2. Expand monitoring of ocean acidification to establish its natural variability and to detect trends in water chemistry and related biological responses.	**Funded monitoring of OA parameters at SMCC pier (by Joe Salisbury of UNH)** **Partially funded water quality monitoring, including monitoring of OA parameters by FOCB at Cousins Island.** **Brought together scientists monitoring OA in Casco Bay toshare observations, lessons**	**Future funding for OA monitoring is possible, but will depend on available funds and identification of policy-relevant questions to be addressed by expanded monitoring.**

	1.3. Develop new tools with which to assess and understand acidification and its impacts in Maine waters.		**Work with UMaine to facilitate hydrodynamic and ecosystem-based models to better understand system metabolism, pollutant transport, and nearshore carbonate chemistry in Casco Bay.**
	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.*		
	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.*	**Led multi-year regional discussion about nutrient pollution via the "Casco Bay Nutrient Council". Meeting summaries and final report available via CBEP web site.**	**Will continue to lead regional conversations about strategies to reduce impact of nutrient pollution**
	3.2. Assess the need for water quality criteria relevant to ocean acidification.	**Nitrogen criteria were specifically recommended by the Casco Bay Nutrient Council**	**Convene regional stakeholder discussions about nutrient criteria for Casco Bay**
	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.	**Casco Bay Nutrient Council reviewed/cataloged existing policy tools, and potential funding sources. Identified shortcomings, and potential reponses**	
	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.	**A central purpose of the Casco Bay Nutrient Council was to gather and synthesize information needed to facilitate planning efforts** **Participating in Portland's "Blue Portland" water quality integrated planning effort**	**Expand work with local governments to identify local strategies to reduce nutrient pollution and address municipal permit obligations.**
	3.6. Enhance education and outreach programs that provide landowners with information about best practices for reduction of nutrient pollution.	**Nutrient Council reviewed existing outreach and education programs, including programs specifically targeting changing behavior of landowners.**	

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.	**Funded a pilot-scale oyster shell recycling program that is gathering shell from restaurants in Portland, for eventual use in marine environments.**	**Continue shell recycling next year; test use of shell.** **Deploy shell to reduce shoreline erosion on "living shoreline" demonstration sites**
	4.4. Increase the capacity of the fishing and aquaculture industries to adapt to ocean acidification.	**Funded research (Led by Nichole Price of Bigelow Labs) on use of shell in upweller systems to ameliorate effects of acidification on juvenile oysters.**	

	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.*	**Annual meetings with congressional delegation have highlighted work on coastal acidification and nutrient pollution.** **Presented to South Portland City Council during discussion of potential fertilizer ordinance, including discussion of OA**	
	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.	**Frequent (8-10 time per year) public speaking on related issues, especially the work of the Nutrient Council.** **Led local training events for municipalities on climate resilience, including discussion of potential impacts of OA on local communities.**	**Offer educational events, aimed at coastal community leaders such as members of conservation commission and planning boards, on coastal science, including sea level rise, coastal acidification, nutrient pollution, etc.**

	5.3. Enhance the existing communication network of engaged stakeholders, state agency representatives and the research community.	**This is a core mission of the Estuary Partnership, and permeates everything we do. Most relevant to OA / Nutrients , has been coordination and communication via the Nutrient Council, and the Casco Bay Monitoring Network**	**We will continue to facilitate communications, especially between scientists, policy makers, and stakeholders.**
	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: Curtis Bohlen

YOUR ORGANIZATIONS NAME: Casco Bay Estuary Partnership