| GOALS | RECOMMENDATIONS | Action to Date | Future Action |
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| **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.* | | |
| | *1.2. Expand monitoring of ocean acidification to establish its natural variability and to detect trends in water chemistry and related biological responses.* | Bigelow and Island Institute partnered with Ocean Approved to deploy carbonate chemistry instrumentation inside and outside of Chebeague Island kelp farm at 2 m depth from approximately January to June in 2016, 2017, 2018 | Bigelow and Island Institute have carbonate chemistry instrumentation deployed on seafloor (~7 m depth) at Green Island (mouth of Damariscotta River) in lobster settlement habitat from June 2019-October 2019.<br><br>Tentative plans to redeploy instruments at Bangs Island Mussels in Casco Bay in late 2019. |

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| | *1.3. Develop new tools with which to assess and understand acidification and its impacts in Maine waters.* | | |
| | *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.* | | |

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| **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.* | Island Institute works directly with island and coastal communities on energy efficiency and renewable energy projects, including supporting Community Energy Action Teams who lead local weatherization projects; bulk purchasing of efficiency products like LED lights and heat pumps; and/or support upgrades to local power supplies towards lower-emission alternatives. This work since 2012 has resulted in reducing at least 142,000 tonnes $CO_2$ over the lifetime of these projects.<br>• Published white paper and peer-reviewed journal article on "Bridging the Rural Efficiency Gap" that identified challenges for rural households to take on energy efficiency efforts; presented findings to federal lawmakers. | |
| | *2.2. Encourage key leaders and policymakers to synchronize in establishing a comprehensive and unified strategy to reduce carbon dioxide emissions.* | • Island Institute supported Maine climate action bill that will reduce GHG emissions to 80% below 1990 levels; encouraged nontraditional stakeholders (e.g. fishing community and other rural and island voices) to add their | |

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| | | support for this legislation. | |
| | *2.3. Expand actions at the state and local levels that may help in reducing $CO_2$ emissions.* | • Island Institute will continue to coordinate with other organizations across Maine to support community-led energy efficiency and renewable energy efforts.<br>Will continue to look for additional approaches and opportunities for partnerships for community- and state-led emission reductions, including e.g. through the transportation sector, small business adoption of efficiency and renewables—including others' plans to achieve state-level heat pump and climate goals that support island and coastal communities. | |

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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.** | *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.* | | |

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| | *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.* | Island Institute participated on Nutrient Council. (I'm sure CBEP will elaborate more on activities of the Nutrient Council, but flagging it in case). | |
| | *3.6. Enhance education and outreach programs that provide landowners with information about best practices for reduction of nutrient pollution.* | | |
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| **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.* | Island Institute's Aquaculture Business Development Program focuses on seaweed and shellfish aquaculture. Stats to date include:<br>• In its first three years, the program has had 75 participants with a total of 24 starting businesses with crops in the water.<br>• We have directly helped support a total of 125 individuals interested in aquaculture.<br>• These businesses have contributed over $3.1 million to Maine's economy. | Island Institute's Aquaculture Business Development 2020 goal: start 60 businesses with an overall impact on Maine's economy totaling $36 million. |
| | *4.3. Spread shells or other forms of calcium carbonate ($CaCO_3$)in bivalve areas to remediate impacts of local acidification.* | | |

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| | *4.4. Increase the capacity of the fishing and aquaculture industries to adapt to ocean acidification.* | Bigelow and Island Institute partnered with Ocean Approved to deploy carbonate chemistry instrumentation inside and outside of Chebeague Island kelp farm at 2 m depth from approximately January to June in 2016, 2017, 2018 to determine if farmed sugar kelp can remediate ocean acidification and improve growing conditions for co-located shellfish. | Bigelow and Island Institute have carbonate chemistry instrumentation deployed on seafloor (~7 m depth) at Green Island (mouth of Damariscotta River) in lobster settlement habitat from June 2019-October 2019.<br><br>Tentative plans to redeploy instruments at Bangs Island Mussels in Casco Bay in late 2019. |
| | *4.5. Identify refuges and acidification hotspots to prioritize protection and remediation efforts.* | | |
| | *4.6. Encourage the enhancement and creation of research hatcheries.* | | |

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| **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.* | Island Institute and Bigelow are engaged in regular outreach efforts sharing up to date findings from their OA remediation research to audiences including the Island Institute's Aquaculture Business Development program, decision-makers, students, and the public. | |

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| | *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.* | | |

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| **6. Maintain a Sustainable and Coordinated Focus on Ocean Acidification.** | *6.1. Create an on-going ocean acidification council.* | Island Institute's Marine Scientist, Susie Arnold, has participated on MOCA steering committee and advisory council. Policy Officer, Nick Battista, has been engaged with efforts to move the Governor's Climate Change Council forward. | |

**YOUR NAME: Susie Arnold**

**YOUR ORGANIZATIONS NAME: Island Institute**