

AU ANTIOCH UNIVERSITY NEW ENGLAND Center for Climate Preparedness and Community Resilience



Strengthen communities to prepare, respond and recover in the face of climate impacts and other disruptions through collaborative, innovative solutions.

communityresilience-center.org

Dr. Abigail Abrash Walton Co-Director CCPCR

Climate Change Resilience

... a series of online courses focused on the fundamentals of climate change resilience.

- Engage in each course for 4 weeks
- Enroll for graduate credit or audit the course
- Increase your skill set in climate resilience for better outcomes
- Discover solutions to local issues you face on the job or in your community.
- Register for one course or the whole series.

http://www.communityresilience-center.org/climatechange-resilience-series/





Climate Change Resilience

... a series of online courses focused on the fundamentals of climate change resilience.

Join us for the next online course in this series

Climate Justice & Equitable Adaptation April 5 – May 1, 2020

http://www.communityresilience-center.org/climate-justice/



Instructor: Sarika Tandon



Local Solutions for Strong Communities

... empowering participants to take action steps that center climate equity.



Save the Date! 2020 Local Solutions Eastern Climate Preparedness Conference

May 11-12, 2020 • Portland, Maine

http://www.communityresilience-center.org/conferences/2020local-solutions-eastern-climate-preparedness-conference/



TRANSFORM YOUR EDUCATION. TRANSFORM OUR WORLD.



International Sustainable Development & Climate Change

Apply: http://bit.ly/isdcc Deadline: February 15, 2020

CONTACT: SARAH WILSON EMAIL: SWILSON@ANTIOCH.EDU PHONE: +1 603-283-2131

THE GREEN PROGRAM



Join us for another webinar on important climate & environmental issues

Navigating the U.S. Presidential Candidate Climate Plans Webinar

Monday, March 2, 2020 - 12:00-1:00 PM ET https://conta.cc/2uvEAUU







Meet the challenges of a changing climate by finding information and tools to help you understand and address your climate risks.

toolkit.climate.gov

Dr. Ned Gardiner, Engagement Manager



Logistics

?

If you have a question, please write it in the Q&A section (not Chat) and select to All Panelists, so we can see the questions.



If you are having technical difficulty, please use Chat and send to Host, so we can address the issue with you directly.



The presentation will be recorded and posted to the Antioch website within a week www.communityresilience-center.org





Search



Maine's Lobster Fishing Community Confronts Their Changing Climate

Participatory planning and system dynamics modeling help fishermen in coastal Maine make decisions to improve their bottom lines.

Case Studies >> Maine's Lobster Fishing Community Confronts Their Changing Climate >>

Succinct video: linking science and action





Steps to Resilience

This content supports the highlighted step.



2 Assess Vulnerability & Risks

3 Investigate Options

4 Prioritize & Plan

5 Take Action

Tools

Vulnerability, Consequences, and Adaptation Planning Scenarios (VCAPS) >

Regions

Northeast > Agriculture and Ecosystems >

Northeast > People and Communities >

Topics

Food > Food Production >

Marine > Fisheries and Coastal Communities >

Marine > Living Marine Resources >

Additional Resources

Lobster Catch and Price Model User Manual (PDF) >

Maine Voices: Taking action to curb climate change could throw lifeline to Maine lobsters >

Partners

University of Maine | Cooperative Extension >

Maine Sea Grant >

Social and Environmental Research Institute >

North Carolina Sea Grant >

University of Maine | Climate Change Institute

Clark University >

Small Town Resilience: Lessons from Maine



Stephenie MacLagan

Senior Community Development Officer, Island Institute







ANTIOCH UNIVERSITY NEW ENGLAND Center for Climate Preparedness and Community Resilience

Sustainable Community Infrastructure Sea Level Rise Resiliency

Stephenie MacLagan, Senior Community Development Officer







Island Institute

- Strategic Goals
 - Strengthening Community Economies
 - Enhancing Education & Leadership
 - Delivering & Sharing Solutions

- About 10 Project Teams
 - Broadband for Sustainability
 - Shellfish & Seaweed Aquaculture
 - Sea Level Rise Resiliency
- Community Development



Climate Connections

- Broadband
 - Connected Infrastructure
 - Telecommuting
 - Resiliency Planning
- Climate Mitigation
 - Aquaculture
 - Energy
- Climate Adaptation





Lessons from small communities

Monhegan Island Plantation

- Public Infrastructure
 - Involving networks
 - Aquifer & harbor breakwater
 - Balancing cost with the longevity of solutions





Lessons from small communities

Town of Vinalhaven

- Downtown Revitalization
 - Aligning efforts
 - Ferry reliability & Downstreet flooding protection
 - Leveraging support





Lessons from small communities

- Deer Isle, Town of Stonington
- Accessibility
 - Capital stacking
 - Disaster preparedness and economic development
 - Planning → implementing takes time & \$\$





Sharing Solutions

• Animated Video:

https://www.youtube.com/watch?v=fJSGvxoHV3g&feature=yout u.be

ShoreUp Maine:

http://www.islandinstitute.org/resource/shoreup-maine-2019who-pays-and-how

- StoryMaps: https://arcg.is/1f8T91
- ShoreUp Network: Google Forum





Stephenie MacLagan Sustainable Community Infrastructure smaclagan@islandinstitute.org www.islandinstitute.org/climate-impacts

Tools

Main	e Flood Resilience Checklist						
Criti	Critical Infrastructure and Facilities			No		N/A	
	hazard repairs and cleanup?						
7	(a) Are maintenance, repair, and upgrade activities and associated costs for infrastructure and facilities documented and tracked? (b) Are costs associated with flooding identified, documented, and tracked?	a	Þ	₫	Þ		
8	Do capital improvement plans for critical infrastructure and facilities consider (<i>a</i>) existing and (<i>b</i>) potential future flood hazards?	a	Þ	₫	Þ		ĺ
9	Has your community discussed at what point it will stop repairing and upgrading existing critical infrastructure and facilities to withstand flooding?						
10	 (a) Do community plans include recommendations for abandonment, relocation, or adaptation/protection of critical infrastructure and facilities located in flood hazard areas³? (b) Have funding opportunities or mechanisms to implement those actions been identified? 	a	Þ	₫	Þ		
11	Are critical infrastructure and facilities that are located in flood hazard areas ⁵ elevated or floodproofed to at least the 0.2% chance (<i>i.e.</i> , 500-year) flood or 3 feet above the 1% chance (<i>i.e.</i> , 100-year) base flood elevation?						100
12	When planning new critical infrastructure and facilities, does your community consider existing and potential future impacts of the following coastal hazards?						
	Coastal and nuisance flooding						
	Storm surge						
	Sea level rise						
	Coastal erosion and/or shoreline change						





StoryMaps



ShoreU... & ISLAND INSTITUTE Cost of Sea Level Rise -Vinalhaven

Vinalhaven: 1.6 feet by 2050

In each community there is naturally a different story to tell. The Vinalhaven Sea Level Rise Committee was concerned that while a 6.1 feet may result in a more dramatic analysis, that threat was not imminent enough to spur the action desired. They guided us towards a planning target of 1.6 ft by 2050 because it is a near-term reality.

Vinalhaven

1,150 people live here year-round





Waypoints





Small Town Resilience: Lessons from Maine



Suzanne Arnold, Ph.D

Marine Scientist, Island Institute







ANTIOCH UNIVERSITY NEW ENGLAND Center for Climate Preparedness and Community Resilience

Kelp Farming as a Potential Strategy for Remediating Ocean Acidification and Improving Shellfish Cultivation

- Suzanne N. Arnold- Island Institute
- Nichole N. Price, Brittney L. Honisch- Bigelow Laboratory for Ocean Sciences
- Paul Dobbins- World Wildlife Fund, formerly Ocean Approved/Atlantic Sea Farms
- Sabrina L. Groves- Mount Holyoke College, Bigelow Laboratory for Ocean Sciences
- Christopher Hunt, Melissa Meléndez, Joseph Salisbury, Shawn Shellito- Ocean Process Analysis Laboratory, University of New Hampshire

Bigelow

(;;;

WWF

ISLAND

Laboratory for Ocean Sciences

Matthew Moretti- Wild Ocean Aquaculture, LLC / Bangs Island Mussels



4500 ESTIMATED ACTIVE LOBSTER BOAT CAPTAINS, REPRESENTING 80% OF THE 5652 COMMERCIAL LOBSTER LICENSES ISSUED BY THE STATE IN 2015 8,000 - 10,000 JOBS ON LOBSTER BOATS \$500 MILLION IN DIRECT SALES AT THE DOCK \$1.5 BILLION ESTIMATED ECONOMIC IMPACT Over 25% of yearround residents hold a commercial lobster license on matinicus, frenchboro,

islesford and isle au haut

(4 of the islands with smallest populations).

Lobster Landings have increased throughout the state, but have increased the most in eastern Maine. York county is the southernmost in the state, Washington county is the easternmost.

\$20 M

29%

\$62 M

17%

LOBSTER LANDINGS (POUNDS)	1995	2015	CHANGE
YORK COUNTY	2,288,242	3,859,671	1.69X
WASHINGTON COUNTY	2,538,271	21,077,810	8.3X
TOTAL IN MAINE	37,208,324	121,083,418	3.25X



Aquaculture Business Development Program

- geared towards fishermen in Maine's coastal communities
- shellfish and seaweed aquaculture
- accepting applicants now for our 5th cohort
- visit: <u>www.islandinstitute.org/aquaculture</u>







*Other species include confidential species and other species that make up less than 1% of total catch.

• ~81% of Maine's fisheries (by landings value) are shell producing species, including lobster, clams, scallops, urchins, and oysters (mussels didn't make the list last year)



6 Goals from Commission Report, January 2015:

- 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 the impacts;
- 2. Reduce emissions of carbon dioxide;
- 3. Identify and reduce local land-based nutrients and organic carbon that contribute to ocean acidification by strengthening and augmenting existing pollution reduction efforts;
- 4. Increase Maine's capacity to mitigate, remediate and adapt to the impacts of ocean acidification;
- 5. Inform stakeholders, the public and decision-makers about ocean acidification in Maine and empower them to take action; and
- 6. Maintain a sustained and coordinated focus on ocean acidification.

Maine Ocean and Coastal Acidification Partnership (MOCA)



- Public private partnership
- Meets 3-4 times per year
- Steering committee and advisory council
- Over 215 members

For description, meeting notes, and presentations, see: <u>http://www.seagrant.umaine.edu/extension/</u> <u>maine-ocean-and-coastal-acidification-</u> <u>partnership</u>

STATE OF MAINE 126th LEGISLATURE SECOND REGULAR SESSION

Final Report of the

COMMISSION TO STUDY THE EFFECTS OF COASTAL AND OCEAN ACIDIFICATION AND ITS EXISTING AND POTENTIAL EFFECTS ON SPECIES THAT ARE COMMERCIALLY HARVESTED AND GROWN ALONG THE MAINE COAST

January 2015

Recommendations

4.1. Preserve, enhance and manage a sustainable harvest of kelp, rockweed and native algae and preserve and enhance eelgrass beds.

Because plants absorb carbon dioxide through photosynthesis, they have the potential to locally remediate acidification by drawing down carbon dioxide in the surrounding seawater, a process known as "phytoremediation." Acquisition of CO_2 by marine macrophytes (sea grass, seaweeds) represents an important sink for anthropogenic CO_2 emissions. The remediation benefits are likely to be more apparent in areas of slower circulation. Growing and harvesting macroalgae could play a considerable role in carbon sequestration. Determining the benefits of co-culturing macroalgae, such as kelp and shellfish, should be a research priority.





Atmospheric CO_2 , nutrient runoff, and more acidic fresh water raise acidity levels in the ocean. Potential for marine vegetation to mitigate coastal ocean acidification and improve shellfish sustainability



ISLAND INSTITUTE

Bigelow Laboratory for Ocean Sciences Contact: Susie Arnold, sarnold@islandinstitute.org Nichole Price, nprice@bigelow.org







Parameters measured:

- SAMI pCO₂
 - pCO₂, Temp every 30 min
- SeapHOx
 - pH, O₂, Salinity, Temp, Depth every 30 min
- Discrete H₂O samples
 - Total alkalinity, total dissolved inorganic carbon every 2 weeks
- Kelp biomass



<u>Yr. 1</u>- Can we measure a difference in water chemistry?



<u>Yr. 2</u>- Determine the spatial extent of the remediation "halo"





<u>Yr. 3-</u> Can shellfish benefit?

-100 mussels per cage
-3 cages per site
-Mussel outplanted for
~2 months



Results:

• Denser shells inside kelp farm





• Shells harder to break







Next Steps:

- Determine the underlying mechanism behind co-culture benefits
- Test phytoremediation concept at a site with different hydrodynamics
- Provide information on operational design of co-cultured kelp and mussels to 1) maximize mussel resilience to OA and improve mussel yield, decrease time to market size, and 2) add revenue from the kelp itself

Acknowledgements:



Maine Coastal Program









& private family foundations

NOAA





129th MAINE LEGISLATURE

FIRST REGULAR SESSION-2019

Legislative Document	No. 167
S.P. 550	In Senate, May 2, 201

An Act To Establish the Maine Climate Change Council To Assist Maine To Mitigate, Prepare for and Adapt to Climate Change

Governor Mills Signs Major Renewable Energy and Climate Change Bills Into Law

June 26, 2019

Signed legislation establishes in law and will help achieve Governor's goals of 80 percent renewable energy by 2030 and emissions reductions of 80 percent by 2050



Governor's Office of Policy Innovation and the Future

Goals of the Maine Climate Council

Bold emissions reductions: Develop a plan to meet state greenhouse gas emissions reduction targets, including a gross 45% greenhouse gas emissions reduction below 1990 levels by 2030 and at least 80% by 2050

Mitigation: Develop mitigation strategies to meet state emissions reduction requirements in all sectors of the economy, with a focus on Maine's transportation, electricity, and buildings sectors

Resilience: Develop strategies that will make Maine people, industries, and communities resilient

Jobs: Recommend how to best grow good paying jobs in the transition to a lower carbon economy, and provide support and retraining for those industries and workers who will be most impacted by climate change

Transition: Develop programs to ensure Maine's rural, low-income and elderly populations are not adversely impacted in the shift to a low-carbon economy, while also delivering benefits like lower heating **hillps://www.maine.gov/future/initiatives/climate/climate-council**

Small Town Resilience: Lessons from Maine



Brian Ambrette

Senior Climate Resilience Coordinator, Maine Governor's Office of Policy Innovation and the Future







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MAINE

GOVERNOR'S OFFICE OF POLICY INNOVATION & THE FUTURE

Brian Ambrette

Senior Climate Resilience Coordinator

www.maine.gov/future



Governor's Office of Policy Innovation & the Future

Fostering collaboration and innovative solutions to solve Maine's most important long-term challenges.



Climate



Opioid Response







Economy & Innovation



Workforce



How is Maine tackling climate change?





Maine's Legacy of Action on Climate Change





Emissions and Renewable Energy Targets

GREENHOUSE GAS REDUCTIONS

- 45% reduction by 2030 in greenhouse gas emissions relative to 1990 levels
- 80% reduction by 2050
- Carbon neutral by 2045

RENEWABLE PORTFOLIO STANDARD (RPS)

- Increased RPS to 80% by 2030, up from 40 percent
- Set a goal of 100% renewable power by 2050







Executive & Legislative highlights

- Joined the U.S. Climate Alliance a bipartisan coalition of 25 U.S. States committed to meeting Paris Climate Goals
- Launched electric vehicle rebate & infrastructure programs using VW settlement funds
- Legislation restored net metering and incentivizes at least 375 MW of distributed generation
- Initiative to install 100,000 new heat pumps by 2025 with a focus on low-income residents, in partnership with Efficiency Maine and Maine Housing
- Ended the blanket ban on wind power development and advanced the Maine Aqua Ventus project, the first floating off-shore wind project in the U.S.



Bipartisan legislation to create the Maine Climate Council



MAINE CLIMATE COUNCIL ORGANIZATION CHART AND ROLES





More info at https://www.maine.gov/future/initiatives/climate

TIMELINE

- Council kick-off September 2019
- Working groups develop, model, and recommend strategies from October 2019 until summer 2020
- Summer-Fall 2020: Maine Climate Council considers and prioritizes strategies for Action Plan
- State Climate Action Plan delivered December 1, 2020 and plan is updated every 4 years
- Legislature and DEP pass legislation and initiate rulemaking
- Council and working groups continue to meet to monitor progress
- DEP reports on state greenhouse gas emissions every 2 years



Public Engagement & Comment Opportunitie s



COMMUNITY RESILIENCE: THE SCALE OF THE CHALLENGE



Home Rule & Capacity Limitations

- 488 municipalities
- 400 have populations below 4,000
- 430 unincorporated townships and islands

Assets

- Pioneering municipalities
- Tradition of regional cooperation (RPOs)
- In-state technical networks (MICA, CCAP)
- Out-of-state peer learning networks (US Climate Alliance)

Opportunities

- Updating aging infrastructure
- Falling technology costs
- Public & private innovation (offshore wind, aquaculture, community solar)
- Models from other states (green banks, municipal assistance programs, CDC programs)
- Local/county hazard mitigation plans
- FEMA's Community Rating System



Community Resilience Planning, Public Health, & Emergency Management Work Group

Community Resilience Planning Prioritize strategies that increase the ability of communities to mitigate, prepare for, and adapt to, the impacts of a changing climate.

- Update Maine's regulatory and governance tools to encourage resilience statewide.
- Institutionalize adaptive capacity in Maine's communities. 0
- Sustain funding for adaptation and resilience work across Maine.

Public Health Identify and prioritize public health impacts from a changing climate in Maine, and to develop and recommend priority mitigation, preparedness, and adaptation strategies to the Maine Climate Council for the protection of human, animal, and environmental health.

- o Healthcare system preparedness and emissions reductions
- Temperature extremes 0
- Vector-borne diseases
- Food- and water-borne illness outbreaks
- Air quality

Emergency Management Preparing for the impacts of natural hazards associated with climate change to private and public infrastructure and vulnerable populations.

- Coastal storms and flooding/storm surge, erosion, and sea level rise;
- Extreme precipitation, e.g., increased riverine flooding and erosion; 0
- Drought and wildfire; and Ο



Extreme heat

Coastal & Marine Work Group

Port and marine transportation, including reducing emissions from Maine's working waterfronts including ports, harbors, and marine-going vessels; retrofitting ports for emerging species and ocean renewable energy; and design standards and best practices for sea level rise and other coastal climate change impacts

Ocean renewable energy, including commercial-scale wind power, tidal power; seabed carbon storage; career and economic development opportunities; and research and design

Coastal and marine ecosystem conservation and restoration, including "blue carbon" mitigation/carbon sequestration strategies; protecting/conserving **coastal wetland**, **stream**, **and upland areas** to improve their resilience to climate change impacts and reduce land-based pollutants and manage stormwater; active management of ocean acidification; living shorelines and active beach management

Fisheries and aquaculture, such as adaptive fisheries management and support for business transitions/planning and technology

Coastal community resilience, including improved land use planning and stormwater/land-based pollutant management and planning for increased flooding and sea level rise (significant overlap with Resilience working group)



Overarching Area #1 -- Robust monitoring and research regarding Maine's natural environment and local communities and economies and the connections among them, to track changes and inform future strategies

Overarching Area #2 – Socioeconomic impacts of climate change on Maine's coastal communities

EFFICIENCY MAINE

- Heat Pumps: rebates, financing, information, and a network of installers
- Efficiency Upgrades: programs and incentives to help you upgrade the efficiency of your home or business:
 - Lighting
 - Heating
 - Appliances
 - Water Heating
 - Heat pumps
 - Weatherization
- Electric Vehicle initiatives:
 - Electric vehicle rebates
 - Installing EV charging stations across Maine







THANK YOU AND QUESTIONS

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Q&A



Stephenie MacLagan Senior Community Development Officer Island Institute



Suzanne Arnold, Ph.D Marine Scientist Island Institute



Brian Ambrette Senior Climate Resilience Coordinator Maine Governor's Office of Policy Innovation and the Future



Registration is open! Join us for the next webinar in the Weathering Change series:

March 19, 2020 12:00-1:15 PM EDT

https://attendee.gotowebinar.com/register/1923037446087965709

