NECAN Update

BETH TURNER AND THE NECAN STEERING COMMITTEE

NROC MEETING, DECEMBER 16, 2019

NECAN Steering Committee

Beth Turner, NOAA/NOS/NCCOS *Acting Chair*

Matt Liebman/Regina Lyons, EPA Region 1

Dwight Gledhill, NOAA/OAP

Meredith White/Bill Mook, Mook Sea Farm

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Esperanza Stancioff, ME SG

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Helmuth Thomas, Dalhousie

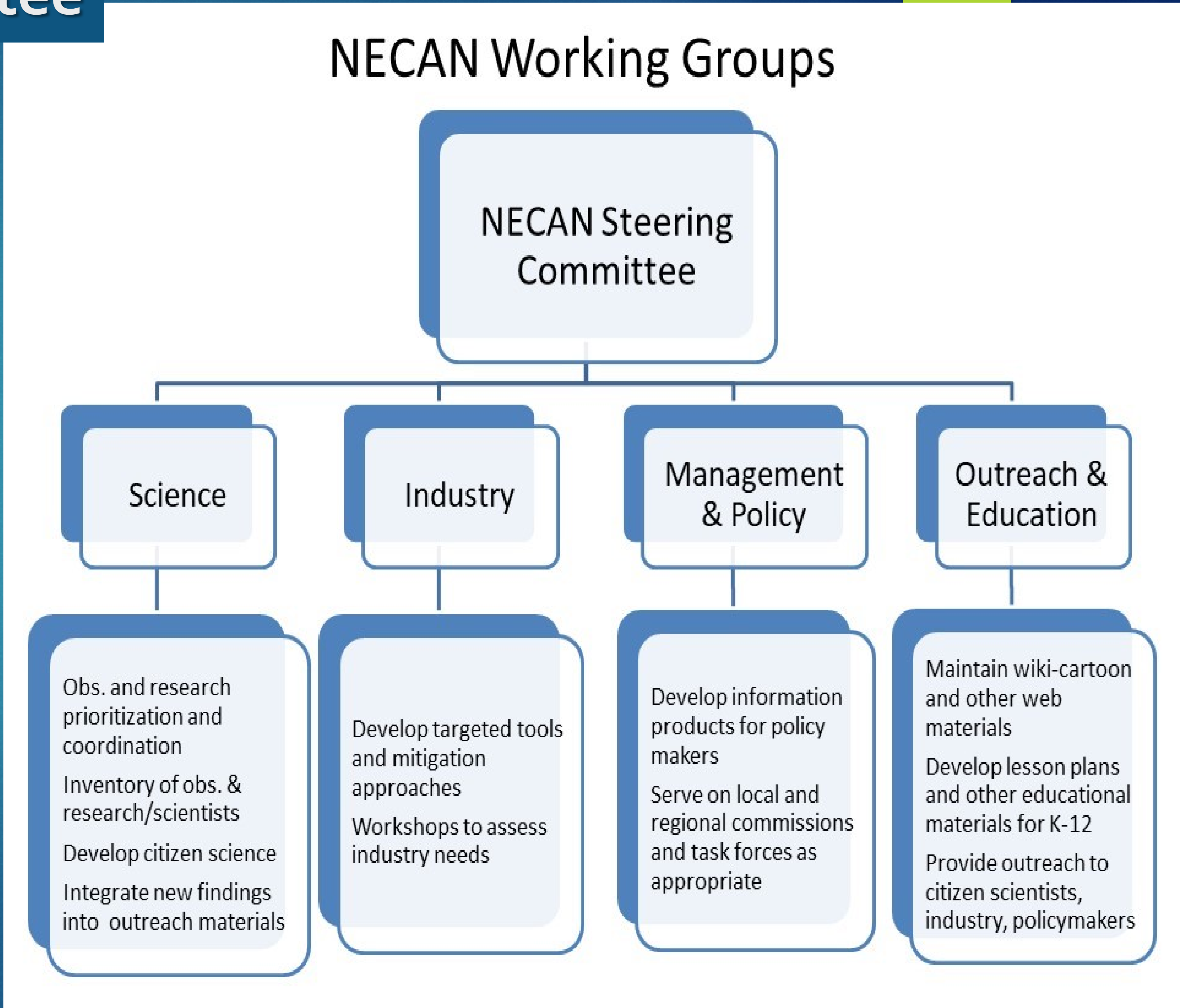
Juliana Barrett, CT SG

Steve Couture, NH DES

Kumiko Azetsu-Scott, DFO

Samantha Siedlecki, UCONN

Dana Morse, UME Coop. Ext.



NECAN Approach

Review and assess | *Communicate* | *Respond* | *Set priorities*

Webinars → Synthesis → Translation → Stakeholder Input → Implementation Plan

Webinars
2013 - 2014

State of the Science Workshop
Apr 2014

Summary Article
June 2015

Stakeholder Engagement Workshops
2014 - 2016

Implementation Plan
2017 and 2019
(revisit annually)

2013 → 2019

Gaps identified at 2014 SoS workshop

- Prioritize work on species of economic importance
  - lobster, scallop, cod
- Combined impacts of OA and other stresses
- Integrate lab
- Thi resp
- Multi experiments to exa ntability
- Benthic habitats as well as pelagic

- Maintaining experiments ver life cycle of organi
- Met e tead
- e history
  - en/where will OA impact these?
- Geographic distribution of species
  - where are they at the edge of their distributions?
- What are realistic CO_2 levels and variability in environment?

- Regional SG-OAP call for proposals 2016
- State SG funding
- OAP-NCCOS competitions 2015 and 2018

Dec 2017
NECAN
NROC

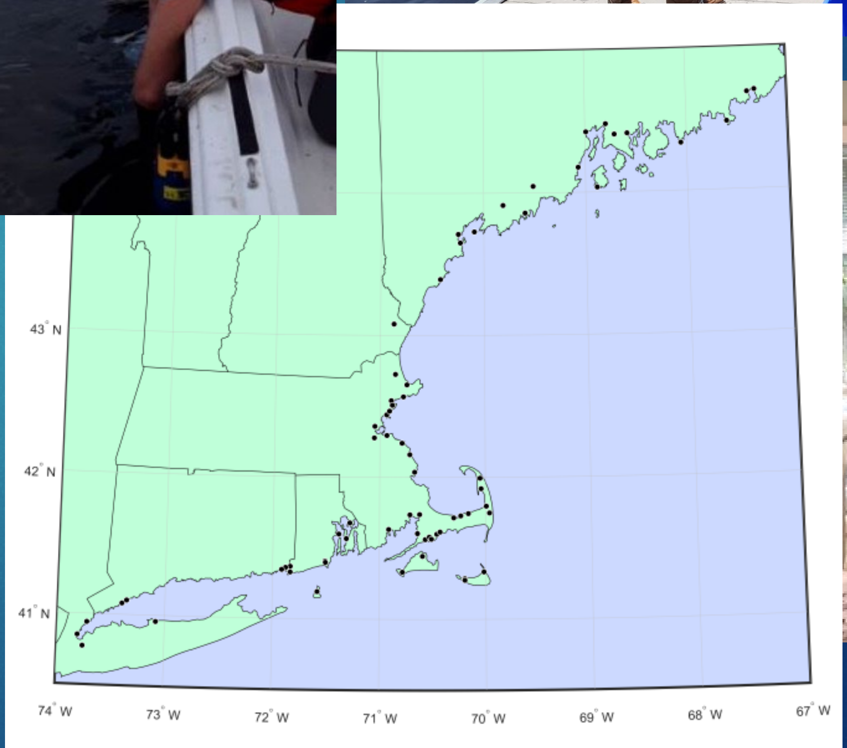
Monitoring Coastal Acidification: *Why, What, How?*

NROC
Northeast Regional Ocean Council

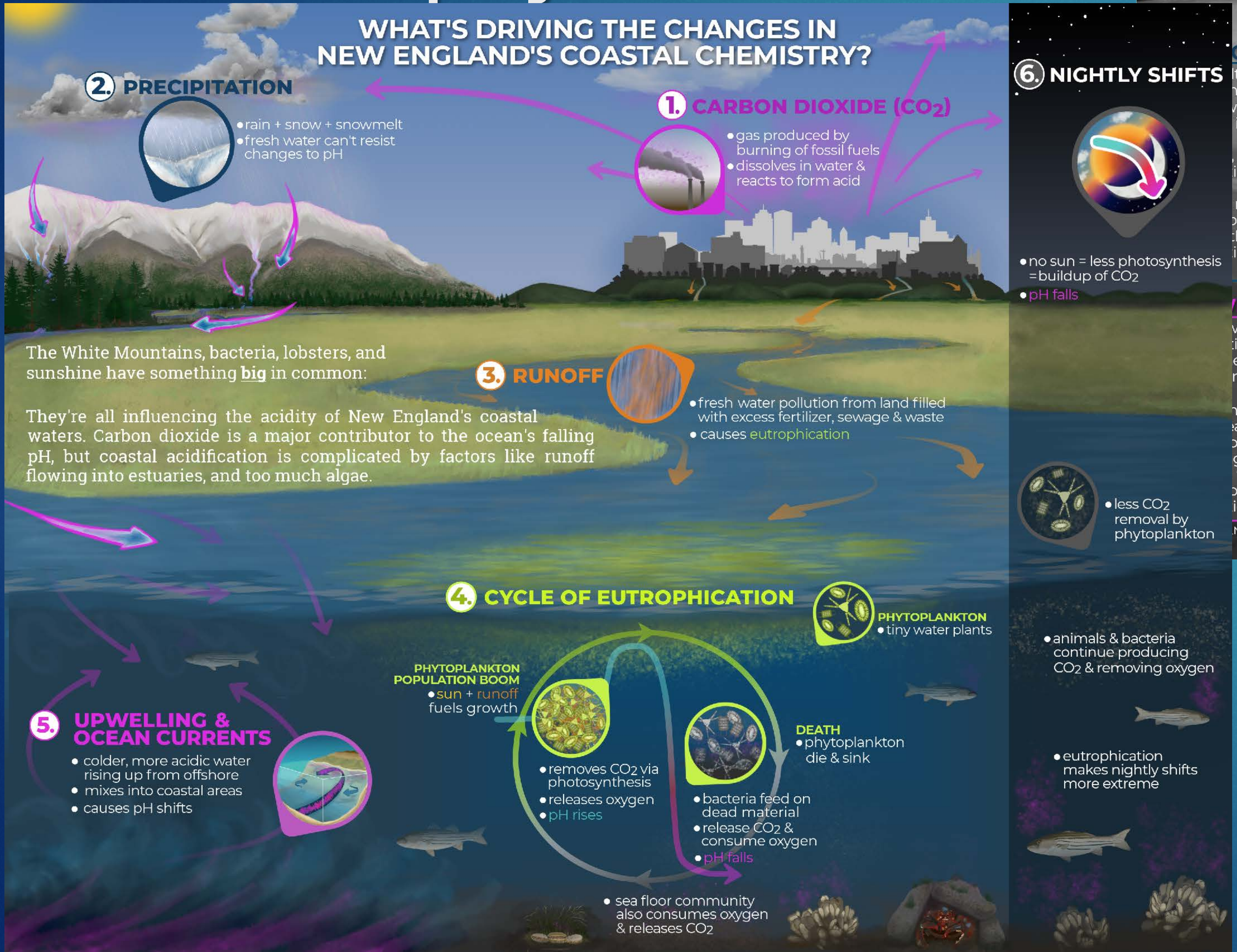
- *Goal: Help to create a coordinated monitoring strategy that can incorporate current observations as well as include emerging efforts to measure OCA parameters in order to best meet the needs of coastal managers.*
  - Develop ways to share data for integration, analysis, and interpretation for management (coordination with ISMN)
  - Create narrative standards for management with numerical interpretations
  - Better communications strategy with an emphasis on who is communicating to which audiences
  - Engage citizen science groups

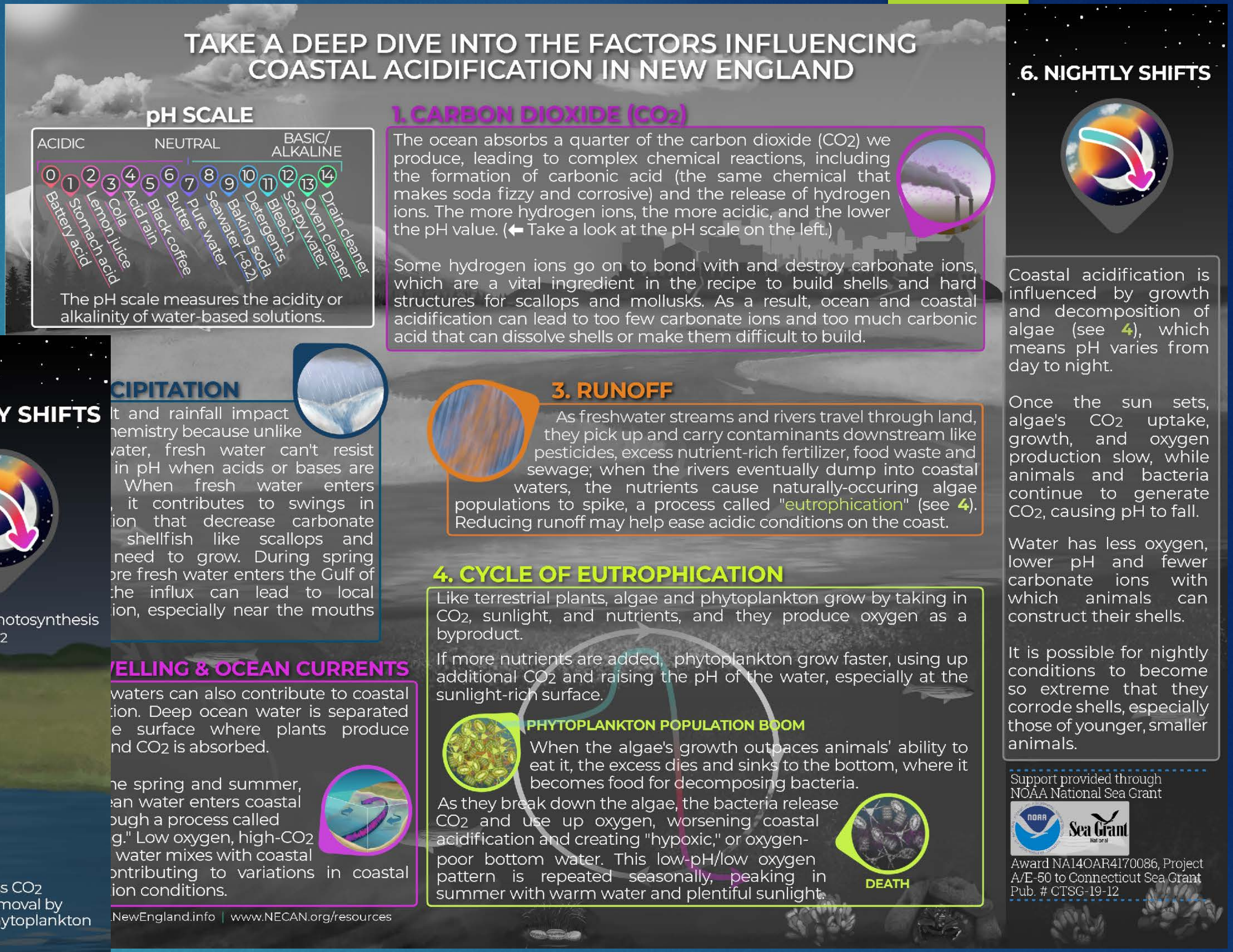
Citizen Science Monitoring Workshops and Shell Day

- **April-May 2018**: 3 Day-long workshops in CT, MA and ME
- **Aug 22, 2019**: Shell Day monitoring blitz for TA and Salinity
  - **500** samples collected
  - **100** unique sampling sites
  - **57** water quality monitoring organizations
  - **8** laboratories analyzing samples



Communications strategy
NECAN and MACAN
SG – NART project



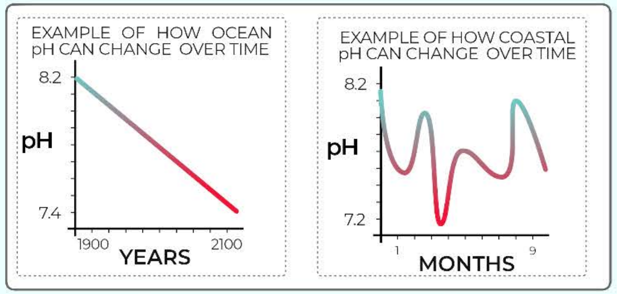


Conceptual model to show OA drivers and impacts to stakeholders in industry & policy

Info Sheet for Shellfish Industry

COASTAL ACIDIFICATION FOR INDUSTRY MEMBERS

Unlike ocean acidification, which is changing offshore water chemistry steadily over the course of years, the acidity of coastal waters fluctuates seasonally or even daily by as much as 1 unit of pH due to the many factors that converge at the coast.

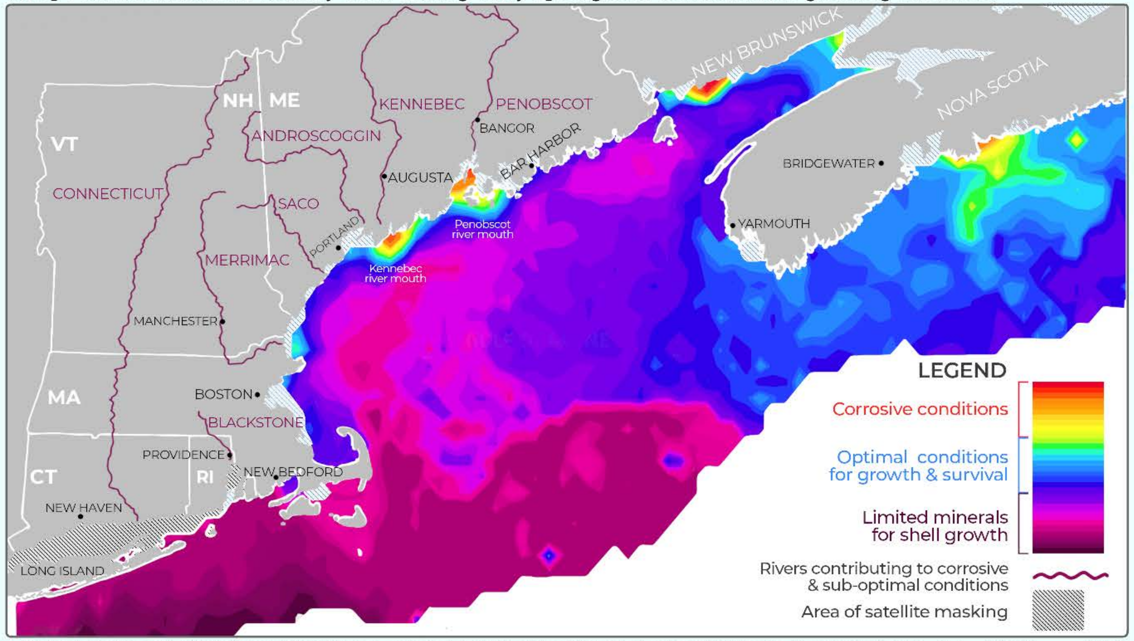


Unfortunately, we don't yet know the exact pH threshold at which shellfish will not grow or survive.

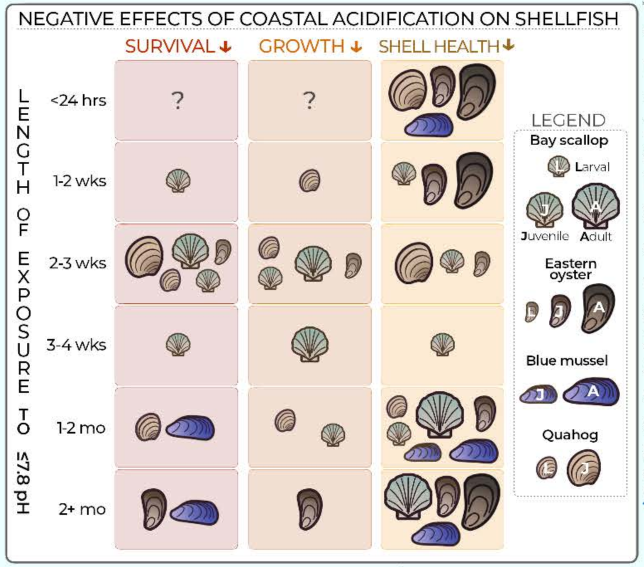
Understanding thresholds is even more difficult because coastal acidification is highly influenced by:

- daily & annual cycles of plant/algae production
- land-based fresh water & nutrient inputs
- mixing of ocean and coastal waters

This map shows general ocean and coastal acidification conditions in the Northeast based on the average minimum monthly amount of shell-building minerals (aragonite) available at the sea surface. The poorest conditions, usually seen during early spring, can be harmful to growing shellfish.

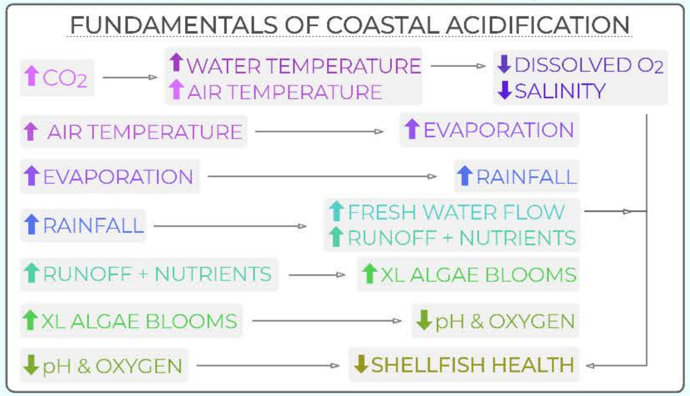


*Map adapted from Fig. 2, Gledhill et al. (2015). Ocean and coastal acidification off New England and Nova Scotia. *Oceanography*. https://doi.org/10.5670/oceanog.2015.41



There have been some studies on the short and longer-term effects of increased acidity and low aragonite mineral levels on larval and juvenile shellfish (info on adults is scarce), but nearly all were conducted in controlled lab settings.

Those studies seem to suggest that when pH is **~7.8 or below**, most species of shellfish found in New England start to show signs of stress. Generally, larvae are the most sensitive and more likely to be stressed or die than juveniles or adults. *Table compiled from Gledhill et al. (ibid) & Gazeau et al. (2013). Impacts of ocean acidification on marine shelled molluscs. *Marine Biology.* DOI 10.1007/s00227-013-2219-3



Scientists, resource managers, fishers, and aquaculturists need to work together to support projects that will monitor acidification conditions and effects on shellfish in real-world settings. Learning more about biological responses allows us to better predict how coastal communities and economies will be impacted, so we can prepare for the future.

Support provided through NOAA National Sea Grant award NA14OAR4170086, Project A/E-50, to Connecticut Sea Grant
Pub. # CTSG-19-10

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Info Sheet for Policy

LOCAL POLICY ACTIONS TO COMBAT COASTAL ACIDIFICATION WILL MAKE A DIFFERENCE. HERE'S WHAT WE CAN DO:

Coastal acidification is a danger to our region's economy, food security, ecosystem, and culture— but local-level actions can and will make a difference in mitigating damage and preparing for the future. **It's time for elected officials to publicly acknowledge the threat coastal acidification poses, work locally to implement policy changes, and support educational initiatives that will empower the next generation of coastal champions.**

CONTRIBUTORS TO ACIDIFYING CONDITIONS	WHAT IT DOES	CAN WE DO ANYTHING ABOUT IT?	WHAT POLICY ACTIONS CAN WE TAKE?
Nutrient Pollution 	• Creates harmful algal blooms that cause extreme pH swings • Closes shellfish areas to harvesting • Can cause massive fish & shellfish die-off • Closes beaches to swimming	**YES**	• *Point source pollution*: refine the Clean Water Act's technology-based standards • *Non-point source pollution*: impose and enforce limits on total maximum daily load of pollution • Support local estuaries in the National Estuary Program and the National Estuarine Research Reserves that protect important habitats and serve as focal areas for place-based research • Support tertiary system sewage treatment plants
Habitat Destruction 	• Estuaries and wetlands are important carbon mitigators; less habitat means less carbon mitigation • Loss of vital habitat/nurseries for shellfish and baby fish • Fewer wetlands & aquatic vegetation exacerbates low-oxygen "dead zones" and shore erosion	**YES**	• Legislate a state version of the National Environmental Policy Act (NEPA) to ensure that projects requiring government action can be directed *(CT, MD, MA, NJ, NY, VA & D.C. already have state-level NEPAs)* • Continue to empower coastal management programs through the Coastal Zone Management Act, and encourage planning bodies to support habitat restoration projects • Require that environmental impact assessments include analysis of potential contributions to coastal acidification
CO_2 Emissions 	• The ocean is the world's largest "sink" for CO_2, making seawater more acidic • Additional CO_2 in the atmosphere traps heat, causing climate change	**To a degree;** local action helps, but must be part of a national & global effort	• Regulate local area CO_2 emissions through the Clean Air Act • Improve public transportation infrastructure to remove vehicles from the roads • Implement green building codes for new structures and provide incentives to improve the energy efficiency of older, less economical buildings • Invest in renewable energy
Upwelling	• Creates corrosive conditions as cold, acidic water rises up from deep offshore and mixes on the coast	NO	• Upwelling is a natural process that happens on a global scale; the process is changing due to rising ocean temperatures and increased acidity, which can only be slowed by reducing CO_2 emissions
Fresh Water Inundation	• Floods the coastline with corrosive, mineral-poor water • Lowers the salinity in estuaries to the point where shellfish are biologically stressed	NO	• Spring snow melt and rain are a natural part of the climate cycle, though climate change is causing unprecedented amounts of precipitation, which is worsening the effects of freshwater inundation. This cycle can't be slowed without significant reduction in CO_2 levels.

www.VOCALpolicy.info | www.NECAN.org/resources | midacan.org/resources

Support provided through NOAA National Sea Grant award NA14OAR4170086, Project A/E-50, to Connecticut Sea Grant
Pub. # CTSG-19-11

Upcoming and ongoing NECAN activities

- Regional Modeling Project
  - NERACOOS lead, adding carbonate to NECOFS
  - Utility to water quality managers, shellfish industry and management
- Follow-up to Cit Sci Workshops
  - Analysis of samples
  - Outreach to sampling groups
- Continue webinar series
  - Industry webinars
  - SG projects from 2016 RFP

- Expanded info sheet re. impacts, including economic importance of resources
- Pursue monitoring strategy
- Potential Symposium?
  - Revisit state of science since 2014
  - Assess progress and continuing knowledge gaps
- OA Information Exchange
  - https://www.oainfoexchange.org