Ocean and Coastal Acidification Monitoring Priorities for the Northeast U.S. and Eastern Canada

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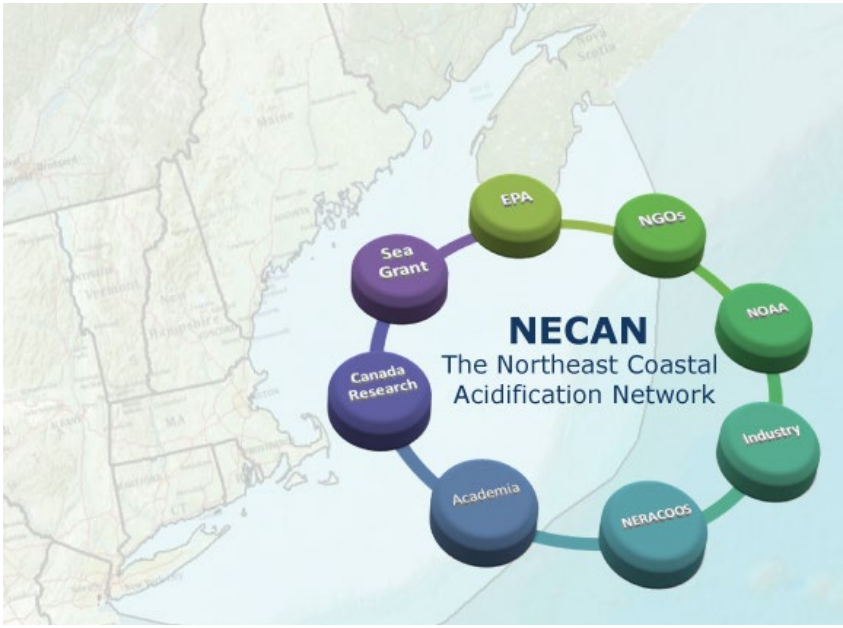
NOAA OCEAN ACIDIFICATION PROGRAM

NECAN/Background Discussions

The Role of NECAN:

- **Review, synthesize**, and **communicate** the most recent scientific, technical, and socio-economic information relevant to the economically important marine organisms potentially impacted by OCA.
- **Identify** regional priorities for monitoring, modeling, and research.
- **Communicate** critical knowledge gaps and needs identified by stakeholders to relevant state and federal agencies.
- **Coordinate** research designed to further our understanding of OCA impacts.
- **Educate** the public and stakeholders on regional OCA issues.



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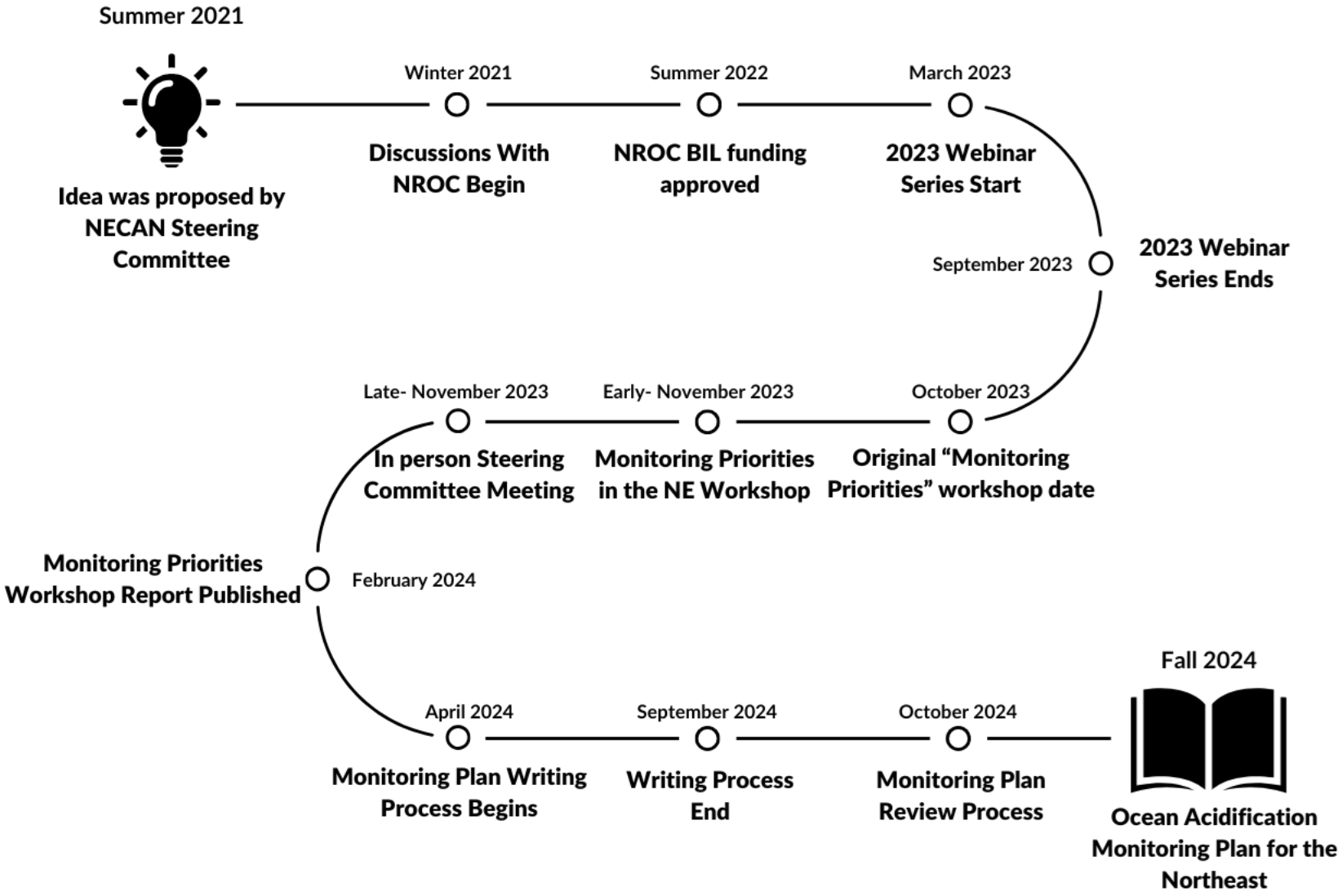
Goal of Monitoring Plan

The NECAN monitoring plan identifies specific actions that will improve the monitoring and future decision making of ocean acidification in the Northeast monitoring region

Caveats: Due to the size of the NECAN region and the high variability of the coastal zone this monitoring plan could not consider and make recommendations for all locals in the region.

Timeline Breakdown



NROC Comes on Board

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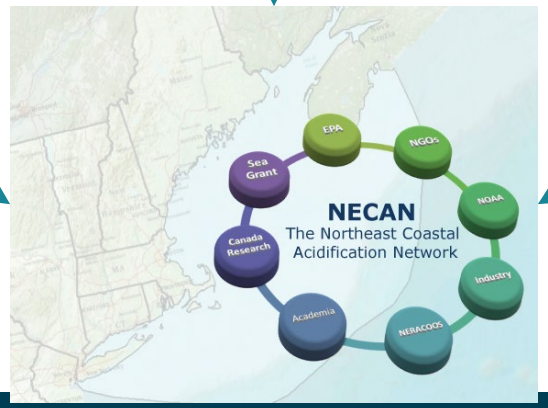


2023 NECAN Webinar Series

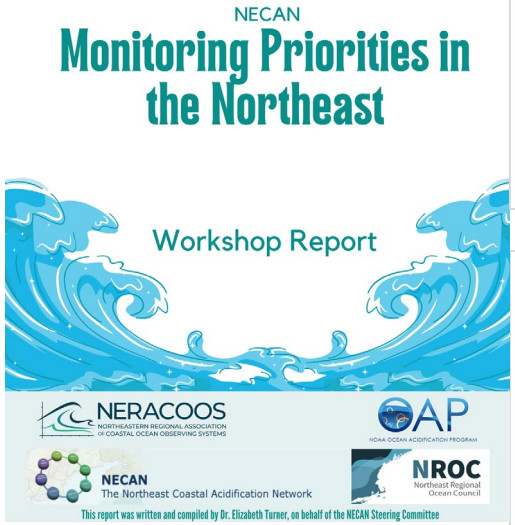
Topics:

- Current Assessments
- Climate
- Modeling
- Biological Impacts
- New Technologies/Sensors/Methods
- User Needs & Products
- Indigenous Perspectives & Concerns
- Rapid Response

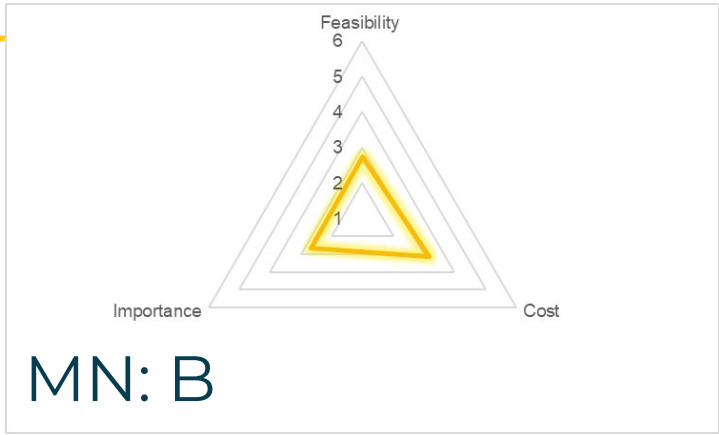
2023 Monitoring Priorities in the Northeast Workshop

	Monitoring need	Imp	Feas	Cost	Avg
MN: A	*Improve spatial and temporal scale of monitoring co-located OCA variables and biological measurements to better resolve variability of acidification dynamics in concert with biological processes*	1st	1st	2nd	2
MN: B	*Increase subsurface monitoring to understand how conditions vary at depth*	2nd	1st	2nd	2.7
MN:C	*Increase the number of high-frequency monitoring assets that measure at least two of four carbon parameters*	3rd	3rd	1st	3.1
MN: D	*Increase near-real-time and rapid response observing capacity to capture episodic events*	4th	5th	5th	3.9
MN:E	*Increase spatial coverage of "climate"-quality observations*	6th	4th	4th	3.9
MN: F	*Determine fluxes and rates that would help parameterize and constrain regional modeling efforts to understand past conditions and project future trends*	5th	6th	6th	4.7

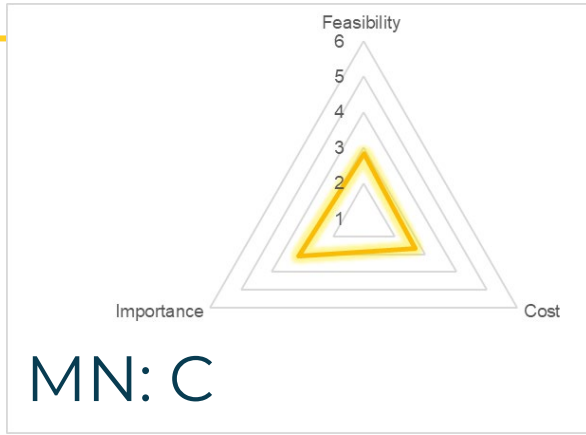
Workshop Report



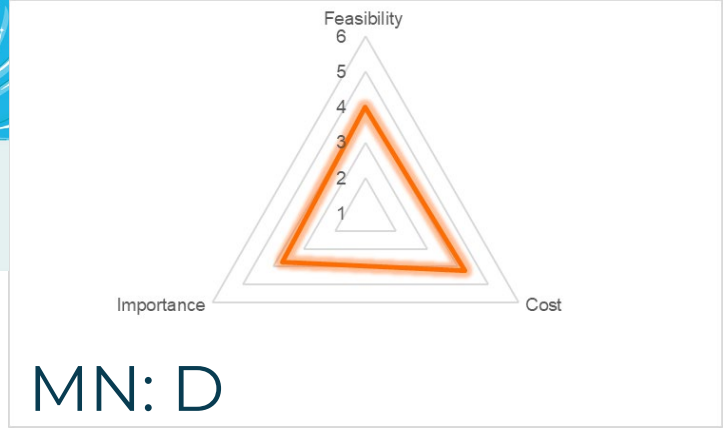
MN: A



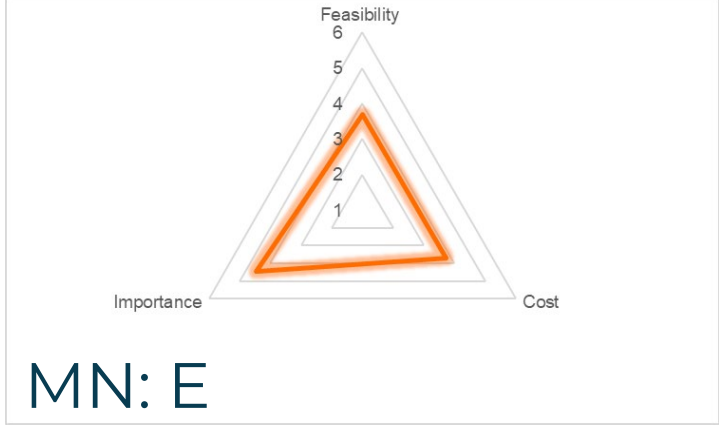
MN: B



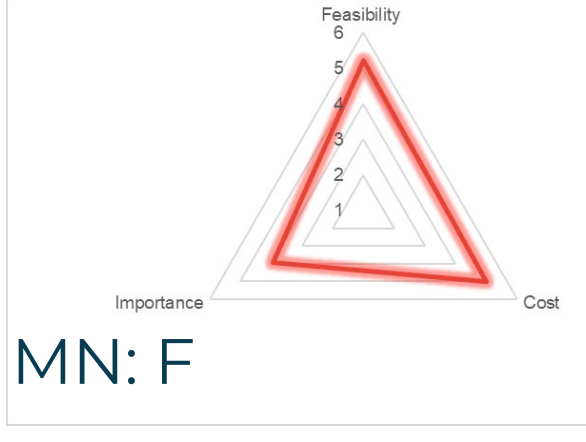
MN: C



MN: D



MN: E



MN: F

Writing Process

Began in April 2024

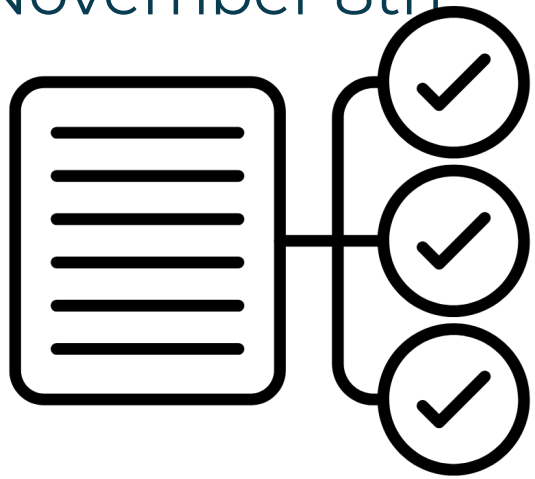
SC and partnering authors

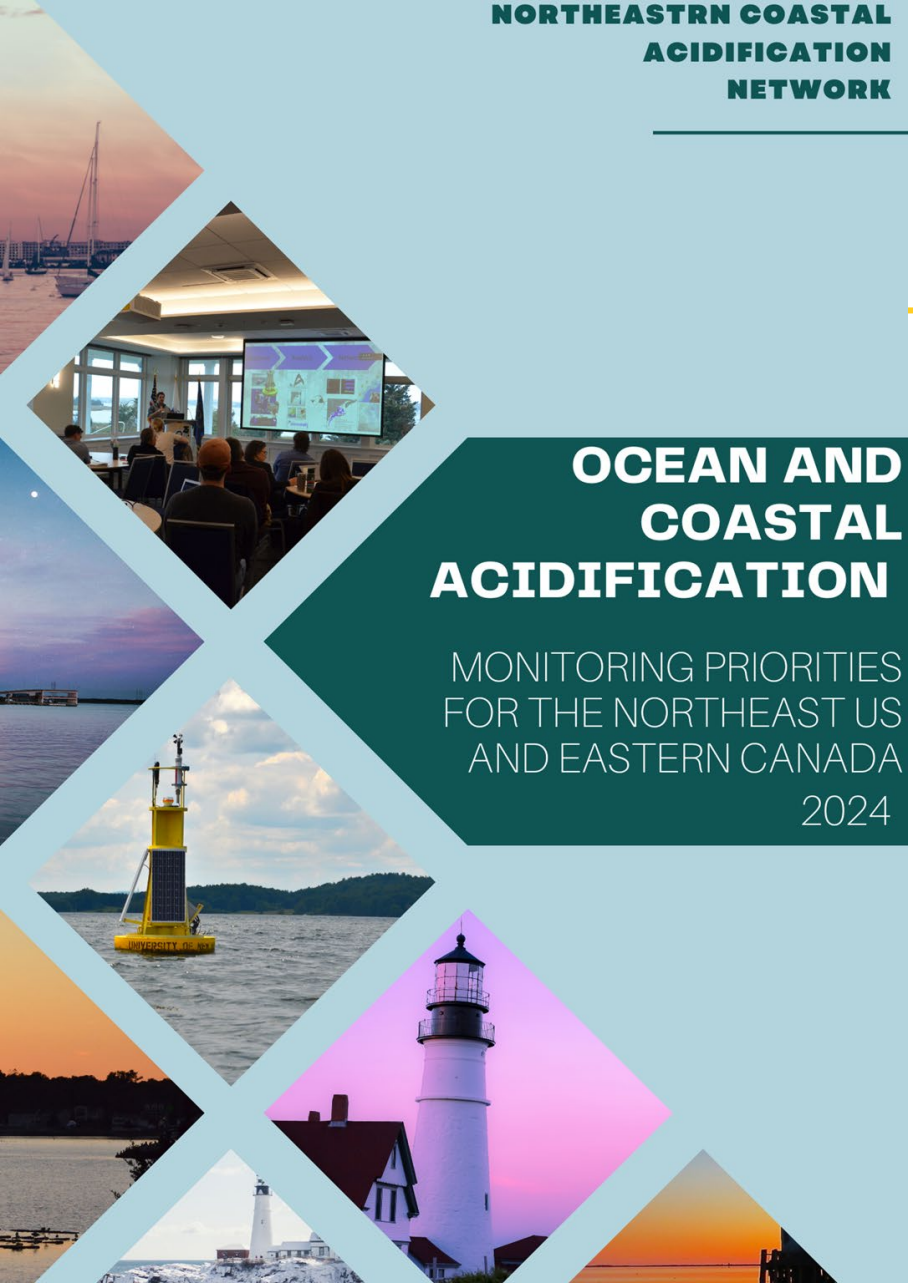
First draft Made available for comment by webinar presenters and workshop participants in October of 2024

Second Draft available for comment by anyone November 8th-24th:

- NROC meeting
- NECAN Mailing list
- OAIE

Final version available December 2024*





Report Takeaways

	A	B	C	D	E	F
A complete assessment of ocean acidification, its effects, and future trends requires expanded monitoring efforts beyond water column carbonate chemistry.	✓	✓		✓		✓
Enhance or leverage existing monitoring platforms for a cost-effective and collaborative approach to creating a more complete OA monitoring system in the NECAN region.	✓	✓	✓	✓	✓	✓
Expand the existing NECAN network to included, protected area experts, terrestrial biogeochemists and hydrologists, fisheries experts, social scientists, tribal liaisons, project leads from large assessments, and other important stakeholders, rights holders and decision makers	✓			✓		
Increase funding in the Northeast to both sustain current efforts and grow a more robust ocean acidification monitoring program as proposed here.	✓	✓	✓	✓	✓	✓
Technological and capacity limitations will make the implementation of some recommendations challenging, but pathways for more immediate implementation are identified to pursue while new technologies are developed.	✓		✓	✓		
Synthesize monitoring information to advance the collective understanding of OA in the Northeast.				✓		✓
Deploy monitoring assets strategically, with end-user needs in mind, ensuring that the collected data is accessible, relevant and useful for decision-making.	✓	✓	✓	✓	✓	✓
Share NECAN's experience in developing these recommendations with other regional CANs.	✓	✓	✓	✓	✓	✓

Monitoring Need A:

Improve spatial and temporal scale of monitoring co-located OCA variables and biological measurements to better resolve variability of acidification dynamics in concert with biological processes

MN A Proposed Action:

Monitoring Action: Current biological monitoring programs (e.g. fisheries surveys) can work with NECAN partners to add complementary OCA monitoring; conversely, OCA efforts (the ECOA cruises, for example) can incorporate relevant biological measurements. Data collection should incorporate seasonality most important for specific life stages, annual shifts in phenology, and timed phenomena such as coccolithophorid and diatom blooms which affect both food availability and carbonate cycling in marine systems.

Monitoring Need B:

Increase subsurface monitoring to understand how conditions vary at depth

MN B: Proposed Actions

Monitoring Action: Deploy bottom-water sensors (pH, pCO2) in deeper basins of the NECAN region, or in seasonally stratified shallower waters of interest. Alternatively, implement discrete sampling and lab analysis of bottom water OCA conditions (TA, DIC, pH).

Monitoring Action: Opportunistically expand OCA monitoring of bottom or near-bottom waters in deeper shelf waters (e.g. buoy M0133) or shallower areas (e.g. the eMolt program). Invest in new technologies to allow access to bottom water measurements (e.g. bottom water profiling lander or bottom-deployed sensor array).

Monitoring Need C:

Increase the number of high-frequency monitoring assets that measure at least two of four carbon parameters

MN C: Proposed Actions

Monitoring Action: Increasing carbonate chemistry instrumentation on buoys is the most direct path to increase the number of high-frequency monitoring assets that measure at least two of four carbon parameters.

Monitoring Need D:

Increase near real time and rapid response observing capacity to capture episodic events

MN D: Proposed Action

Monitoring Action: The NECAN region should develop a lending library of monitoring assets to be deployed, conduct regular scenario planning workshops and evaluations with the rapid response community, create a playbook of what steps need to be taken during an event that requires rapid monitoring, create a clear and effective communication pathway for when rapid response events occur, and evaluate how current permanent monitoring assets and remote sensing products can act as an early warning system to allow for the earlier deployment of rapid response assets.

Monitoring Need E:

Better spatial coverage of “climate”-quality observations

MN E: Proposed Action

Monitoring Action: Support and coordinate outreach and capacity-building needed to both assemble the operators in the region who can contribute to a DBO-type model, and to identify the specific sentinel sites or hotspots of focus. These activities could take the form of conferences, workshops, webinars, or OAIE discussion groups. Data from the Northeast Ocean Data Portal can be used to identify sites ideally suited to collaborative climate-quality monitoring. Once monitoring begins, NERACOOS is the regional entity best suited for hosting recent or real-time data, while NOAA's Ocean Carbon and Acidification Data System (OCADS) is a recognized and available repository for long-term data archival.

Monitoring Need F:

Determine fluxes and rates that would help parameterize and constrain regional modeling efforts to understand past conditions and project future trends.

MN F Proposed Actions:

Monitoring Action: Additional suggested sites for new, long term deployment of continuous sensors or regular sampling on the shelf in support of model and forecast efforts include Georges Bank, within the Nantucket lightship-shoals region, and the Northwest Channel. Some coastal embayments and estuarine regions of high priority to pair with long term observations include Long Island Sound, Casco Bay, the Plum Island Long Term Ecosystem Research Reserve, Wells National Estuarine Research Reserve, and the Damariscotta estuary region.

Cross Cutting Themes

a) Expand monitoring beyond water column to provide a complete assessment of OCA, its effects, and future trends requires expanded monitoring efforts beyond water column carbonate chemistry

b) Enhance or leverage existing monitoring platforms for a cost-effective and collaborative approach to creating a more complete OCA monitoring system in the NECAN region.

c) Expand the existing NECAN network to included protected area experts, terrestrial biogeochemists and hydrologists, fisheries experts, social scientists, tribal liaisons, project leads from large assessments, and other important stakeholders, rights holders and decision makers

d) Increase funding in the Northeast to both sustain current efforts and grow a more robust ocean acidification monitoring program.

Overarching Themes Cont.

e) Pursue immediate implementation of proxy approaches or interim strategies for measurements with technological or capacity limitations, while new technologies are being developed

f) Synthesize monitoring information to advance the collective understanding of OCA in the NECAN region.

g) Deploy monitoring assets strategically, with end-user needs in mind, ensuring that the collected data is accessible, relevant and useful for decision-making.

h) Share NECAN's experience in developing these recommendations with other regional Coastal Acidification Networks.

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A complete assessment of ocean acidification, its effects, and future trends requires expanded monitoring efforts beyond water column carbonate chemistry.	✓	✓		✓		✓
Enhance or leverage existing monitoring platforms for a cost-effective and collaborative approach to creating a more complete OA monitoring system in the NECAN region.	✓	✓	✓	✓	✓	✓
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Increase funding in the Northeast to both sustain current efforts and grow a more robust ocean acidification monitoring program as proposed here.	✓	✓	✓	✓	✓	✓
Technological and capacity limitations will make the implementation of some recommendations challenging, but pathways for more immediate implementation are identified to pursue while new technologies are developed.	✓		✓	✓		
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Share NECAN's experience in developing these recommendations with other regional CANs.	✓	✓	✓	✓	✓	✓

Comments and Conclusions

We need YOUR input! Scan the QR code to start commenting!

This version of the document will be open for comment for comment until 11:59 pm November 24th.

We aim to have this plan finalized in early December 2024

Thank You

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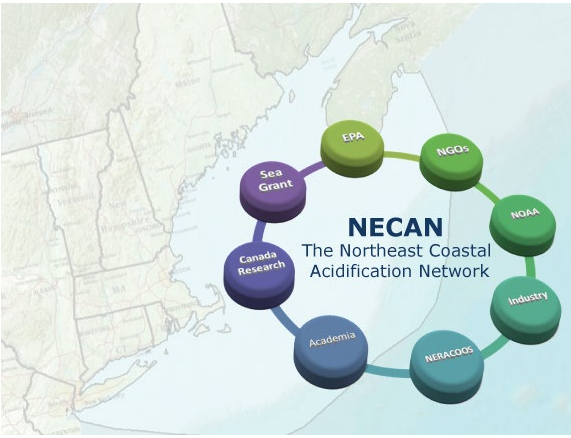

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