



# 2020 Mid-Atlantic Coastal Acidification Network (MACAN) Progress Report and 2021 Plan

**Reporting Period:** January 2020 – December 2020

**Work Group Webpage:** <https://midacan.org/>

**Work Group Leads:** Mary Ford (MARACOOS); Avalon Bristow (MARCO);  
\*Kari St.Laurent (DE); \*Kirstin Wakefield (MARACOOS)  
*\*Interim Co-Leads*

**Work Group Members:** Work group membership is open to government and non-governmental entities operating in the five Mid-Atlantic states and the District of Columbia that are willing to participate in work group activities. Members are expected to contribute on monthly work group calls and assist with project implementation.

**Current Members Include:**

Last Name	First Name	Organization
Bristow*	Avalon	Mid-Atlantic Regional Council on the Ocean
Chytalo	Karen	New York State Department of Environmental Conservation
Erksine	AJ	KCB Oyster Holdings LLC
Ford*	Mary	MARACOOS
Himes	Anthony	VIMS
Kinkade	Chris	NOAA Office for Coastal Management
Kubico	Stephanie	Environmental Protection Agency (Region 3)
Lau	Sherilyn	Environmental Protection Agency (Region 3)
Miller	Whitman	Smithsonian Environmental Research Center (SERC)

Newberry	Robert	Delmarva Fisheries Association
Ombres	Erica	NOAA Ocean Acidification Program
Phelan	Beth	NOAA Northeast Fisheries Science Center
Rivest	Emily	Virginia Institute of Marine Science (VIMS)
Rowe	Pete	New Jersey Sea Grant
Saba	Grace	Rutgers University / Mid-Atlantic Regional Association Coastal Ocean Observing System
St. Laurent**	Kari	Delaware National Estuarine Research Reserve/Department of Natural Resources
Testa	Jeremy	University of Maryland Center for Environmental Science
Wakefield**	Kirstin	MARACOOS

\* Co-Lead

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**Work Group Goals, Objectives and Actions:** MACO’s work regarding ocean acidification builds on Action 3 in the Healthy Ocean Ecosystem Goal of the Ocean Action Plan (Develop a Mid-Atlantic Ocean Acidification Monitoring Network) and is primarily conducted through the Mid-Atlantic Coastal Acidification Network (MACAN). MACAN, which is coordinated by the Mid-Atlantic Regional Council on the Ocean (MARCO) and the Mid-Atlantic Regional Association Coastal Ocean Observing System (MARACOOS), seeks to answer basic questions about the intensity, frequency, and location of acidification events. MACAN also works to understand the causes of those events, whether from atmospheric sources of carbon, land-based pollution, or as a result of internally-driven vulnerability. Building upon this increased understanding of the potential causes and impacts of ocean and coastal acidification, MACAN works to educate managers, elected officials, industry representatives, and the public about solutions to reduce those sources of acidification.

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**ACTIVITY 1- Identify ecological research needs related to acidification in the Mid-Atlantic, and support gap-filling efforts.**

Ecological research needs were characterized in MACAN’s 2019 publication, “Recommended Priorities for Research on Ecological Impacts of Coastal and Ocean Acidification in the U.S. Mid-Atlantic” by Saba et al. 2019 (available here: <https://doi.org/10.1016/j.ecss.2019.04.022>).

The Science Work Group, which was established in the spring of 2020, continued to meet regularly to help identify and work toward filling gaps in the scientific understanding around ocean acidification in the Mid-Atlantic. The Science Work Group has developed a Work Plan for 2021; the objectives are attached as an Appendix in Activity 4, below.

MACAN Leads also began planning the 2021 MACAN webinar series to cover topics of interest to our stakeholders. Confirmed webinar speakers include Chris Chambers from the National Oceanic and Atmospheric Administration, Northeast Fisheries Science Center (topic: OA impacts to flounder and finfish) in January and Susan Langley from the Maryland Department of Planning, Maryland Historical Trust (topic: OA and Cultural Resources) in February. Speakers for March, April, and May are still being confirmed, but will likely focus on drivers of coastal acidification in the Mid-Atlantic and updates on state OA action planning efforts.

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## **ACTIVITY 2- Identify OCA monitoring gaps in the Mid-Atlantic, and support efforts to fill those gaps.**

Spatiotemporal monitoring gaps in the Mid-Atlantic and recommendations were published in a MACAN white paper entitled “Scientific considerations for acidification monitoring in the U.S. Mid-Atlantic Region” by Goldsmith et al. 2019 (available here: <https://doi.org/10.1016/j.ecss.2019.04.023>) and in acidification monitoring maps showing the locations of past and present acidification monitoring in the Mid-Atlantic. These maps can be found under the [Oceanography theme on the Mid-Atlantic Ocean Data Portal](#).

MACAN is working to fill these gaps by supporting research initiatives that will enhance water quality monitoring in the region by including acidification parameters and encouraging continuous data collection where possible. This included submitting a letter of interest (LOI) titled “Building a Network to Monitor Coastal Acidification and Hypoxia in Delaware and New Jersey Shellfish Resource Areas” to the MARACOOS Operations request for LOIs. MACAN’s LOI was accepted, with modifications, by MARACOOS and will be included in the MARACOOS proposal to the FY 2021 Implementation of the U.S. Integrated Ocean Observing System Federal Funding Opportunity. This work would seek to establish and/or expand long-term water quality stations in Delaware and New Jersey by including pCO<sub>2</sub> sensors.

There has been a growing need to know what types of sensors are being used to measure acidification parameters in coastal, estuarine and ocean waters. This information could help inform new monitoring programs, or programs looking to expand

their monitoring to include acidification parameters, about which sensors are best suited for their environmental conditions and other considerations (e.g. length of deployment, frequency of calibration, etc.). To fill this need, a subset of the Science Work Group has begun planning to create a Mid-Atlantic inventory of acidification monitoring assets, including specific sensor types.

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**ACTIVITY 3- Stakeholder outreach to increase engagement of current MACAN members, gain a better understanding of potential industry impacts and concerns related to acidification, and ensure that industry needs are being met through MACAN’s activities.**

In response to needs identified from our 2019 stakeholder survey, MACAN hosted two webinars focused on the shellfish industry, entitled “Responding to Change: Perspectives from the Shellfish Industry” and “Acidification Effects on the Atlantic Surf Clam” as part of our annual webinar series (spring 2020). Two spotlights on OA forecasting tools and commercial fishing perspectives written by our OA Sea Grant fellow and were published on MACAN’s website. In partnership with VIMS, Rutgers Cooperative Extension, and NJ Sea Grant, MACAN also began planning a workshop to address the information needs from recreational and for-hire fishermen, entitled “Hooked On OA”. The workshop will be held in 2021, with support from MARACOOS.

MACAN completed the draft 2021-2022 MACAN Outreach Plan (also included in the Appendix). There are 5 focus areas:

- Engaging Urban Communities in Local Solutions
- Creating an OCA Toolbox for K-12 teachers and Informal Educators in the Mid-Atlantic
- Communicating Advances in OCA Research and Policy
- Enhancing Industry Outreach and Engagement around OCA
- Connecting Citizen Scientists with Opportunities for OCA Monitoring

The Industry and Outreach Work Groups continued to meet regularly to discuss opportunities to improve outreach and engagement with MACAN’s stakeholders. In consultation with the Outreach and Industry Work Groups, MACAN completed an outreach plan which includes “Enhancing Industry Outreach and Engagement around Ocean and Coastal Acidification” as one of the 5 focus areas for outreach for 2021-2022. The Outreach Work Group also completed a Work Plan for 2021 to help fulfill several of the objectives in MACAN’s outreach plan, including building connections between urban areas and coastal acidification and creating an outreach toolbox for K-12 teachers. Additionally, the Industry Work Group has completed a draft Work Plan for 2021 to increase the awareness of ocean and coastal acidification and MACAN

activities among members of shellfish, seafood, and commercial and recreational fishing industries in the Mid-Atlantic region; the Industry Work Group's objectives are attached as an Appendix in Activity 4. Finally, MACAN expanded its scope to include cultural resources with the addition of a member of the Maryland Historical Trust to the MACAN Steering Committee.

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**ACTIVITY 4- Formation of new work groups to focus on other areas of acidification concern.**

The following MACAN Work Groups continued to meet regularly:

1. Science
2. Outreach
3. Industry, and
4. Policy.

Draft work plans for each Work Group were completed to guide 2021 activities and priority areas; the draft work plans from each Work Group are included as Appendices.



## Appendix 1: MACAN Work Group 2021 Work Plans

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### MACAN Science Working Group 2021 Work Plan (Draft)

**Interim Lead:** Erica Ombres, NOAA

**Objectives:** Work toward filling the research and monitoring gaps identified by MACAN, which were published in 2019; advise MACAN on the most recent science related to OCA in the Mid-Atlantic region.

**Scope of Work for Work Group members:**

- Respond to funding calls as appropriate (or coordinate people that can write those proposals) for work that advances the filling of research and monitoring gaps
- Coordinate with NECAN to address cross-regional research priorities.
- Coordinate with the Outreach Working Group and/or MACAN staff to ensure that the most up to date science is reflected accurately in all outreach materials.
- Advise and inform the planning of a State of the Science workshop by ensuring that the appropriate topics are covered in the agenda and by identifying relevant researchers for participation.
- Advise state water quality monitoring efforts and/or OA Action Plans
- Maintain an ongoing list of observations and research/scientists that is updated on a somewhat regular basis.
- Create a user-friendly Equipment Inventory in coordination with the Outreach Working Group to describe tools currently being used for monitoring carbonate chemistry parameters, applications in coastal vs open ocean systems, level of effort and scientific training required to operate the equipment, as well as any options for biological monitoring (e.g. shell measurements, etc.).
- Facilitate communication and building of relationships in support of citizen science efforts (in coordination with the Outreach Working Group); Ensure that citizen science efforts are collecting data in a useful manner.

## **MACAN Outreach Work Group 2021 Work Plan (Draft)**

**Interim Lead:** Kirstin Wakefield, MARACCOOS

**Objectives:** In support of the goals identified in MACAN's Outreach Plan, the outreach working group will be focusing their efforts on the following four areas:

### **Focus Area 1: Engaging Urban Communities in Local Solutions for Mitigating Coastal Acidification**

- Develop and administer a survey to identify potential partners in urban harbor areas, such as NYC and Baltimore, who have an interest in OCA education, or are already engaged in OCA outreach
- Review state OA Action plans to identify urban outreach needs for the Mid-Atlantic region

Results from these assessments will help guide planning efforts for outreach products or educational programming relevant to urban communities in the Mid-Atlantic region.

### **Focus Area 2: Creating an OCA Toolbox for K-12 and Informal Educators in the Mid-Atlantic**

- Identify OCA educational resource needs for K-12 teachers in the Mid-Atlantic region
  - Compile list of Mid-Atlantic focused OA resources currently being used by K-12 teachers and informal educators
  - Survey NERRS programs about OA teaching resources currently being used
  - Develop an OA unit to include in the NERRS Teachers on The Estuary (TOTE) summer workshops that correlates with NGSS and State standards.
- Create an education resource page on MACAN's website to provide a one-stop shop for teaching resources and upcoming training opportunities

### **Focus Area 3: Enhancing Industry Outreach and Engagement around OCA**

- Coordinate with MACAN's Industry and Science Working Groups to develop science-based outreach materials to address information needs identified in MACAN's 2019 stakeholder outreach survey
  - Expand Outreach to For-Hire and Recreational Fishing Industry Members
    - Partner with MARACCOOS to plan and execute a workshop for VA and NJ fishermen to introduce OA, explore current research related to flounder and other species-specific impacts of OA; and introduce MACAN's OA monitoring map and an OA forecasting tool developed by VIMS researchers.

- Provide updates on these programs via regional fishing association newsletters and social media.

#### **Focus Area 4: Connecting Citizen Scientists with Opportunities for OCA Monitoring**

- Collaborate with Science Working Group to create a user-friendly Equipment Inventory to describe tools currently being used for monitoring carbonate chemistry parameters, applications in coastal vs open ocean systems, level of effort and scientific training required to operate the equipment, as well as any options for biological monitoring (e.g. shell measurements, etc.).

Upon completion, the Equipment Inventory will be shared on MACAN's website and the Ocean Acidification Information Exchange.

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### **MACAN Industry Working Group 2021 Work Plan (Draft)**

**Interim Lead:** Ryan Ono, Ocean Conservancy

**Objectives:** Increase awareness of MACAN and ocean and coastal acidification (OCA) among members of shellfish, seafood, and commercial and recreational fishing industries in the Mid-Atlantic region; arm the Industry Working Group with information about ocean and coastal acidification, particularly how it will impact species of concern to industry members; and increase industry participation in MACAN events/activities and involvement with addressing acidification.

**Scope of Work for Work Group members:**

- Communicate with industry peers about ocean and coastal acidification and other stressors using information provided by the science, outreach, and policy work groups
- Advise MACAN on industry information needs related to OCA in the Mid-Atlantic region and help MACAN identify appropriate venues (conferences, social media, etc.) for sharing that information
- Provide input to MACAN and its other work groups for various projects that involve industry, e.g. how to participate in data collection and/or water quality monitoring (led by the science WG), creating outreach materials (led by the outreach WG) for dissemination, and building communities of practice between researchers and industry in the region
- Inform the planning of the 2021 state of the science workshop(s) to optimize opportunities (timing and relevant content) for industry participation
- Provide input to state-level activities related to acidification and update the Industry WG of state activities when possible.

## **MACAN Policy Working Group 2021 Work Plan (Draft)**

**Lead:** Megan Rutkowski, NJ DEP

### **Scope of Work for Work Group Members:**

- Develop communication materials for policy makers about OCA drivers and impacts.
  - Keep up to date with state OA commissions and task forces in the Mid-Atlantic, and coordinate MACAN input to these groups as necessary.
  - Identify potential cross-state policy approaches.
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## Appendix 2: MACAN 2021 Outreach Plan

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### DRAFT MACAN Outreach Plan 2021-2022

#### Five Focus Areas for Outreach:

- Engaging Urban Communities in Local Solutions
- Creating an OCA Toolbox for K-12 teachers and Informal Educators in the Mid-Atlantic
- Communicating Advances in OCA Research and Policy
- Enhancing Industry Outreach and Engagement around OCA
- Connecting Citizen Scientists with Opportunities for OCA Monitoring

#### **Focus Area 1: Engaging Urban Communities in Local Solutions**

*Goal: Strengthen the connection between communities in urban areas (e.g. Baltimore's Inner Harbor and NYC) and coastal acidification to raise awareness and foster public engagement in local solutions*

- 1) Develop a survey to identify potential partners in urban areas with an interest in OCA education, or those already engaged in OCA outreach
- 2) Develop an outreach product(s) to illustrate urban-specific OCA drivers for Baltimore and NYC and actions that can be taken by individuals/families to address local sources of coastal acidification
  - a. Collaborate with Science Workgroup and NOAA OA Education program to develop/review content
  - b. Identify partners to help disseminate information by reviewing existing networks of city officials, environmental agencies, and associations, and NECAN's septic field and stormwater monitoring education program.
  - c. Create list of environmental education events in each city, e.g. NYC City Water Day, where outreach materials can be distributed
- 3) Explore the use of data collected through Baltimore's Floating Wetlands/Eyes on the Bay and/or Baltimore Biodiversity project to develop an outreach tool/curriculum for K-12 teachers and informal educators
- 4) Develop a module for WCS/NY Aquarium MS/HS Teacher Training Workshops that incorporates local ocean chemistry data with STEM programming, where funding allows
- 5) Review state OA Action plans, e.g. NY and MD, to identify additional urban outreach needs for the Mid-Atlantic region

## **Focus Area 2: Creating an OCA Toolbox for K-12 and Informal Educators in the Mid-Atlantic**

*Goal: Serve as an information hub for K-12 teachers and informal educators; support development of science-based curriculum that incorporates local data, where opportunities and funding allow*

- 1) Identify OCA resource needs for K-12 teachers in the Mid-Atlantic region
  - a. Compile list of Mid-Atlantic focused OA resources currently being used by K-12 teachers and informal educators
  - b. Survey NERRS programs about OA teaching resources currently being used
  - c. Develop OA module for Teachers on The Estuary (TOTE) summer workshops, where funding allows
- 2) Create a resource page on MACAN's website to provide a one-stop shop for educational resources and training opportunities
- 3) Explore development of an interactive virtual field trip to a shellfish farm or oyster restoration project to explore connections to OA, where funding allows
- 4) Write an "Interview with an OA Scientist" feature for MACAN's website (Gr. 6-12)
- 5) Explore the use of data collected through Baltimore's Floating Wetlands/Eyes on the Bay and/or Baltimore Biodiversity project to develop an urban-focused outreach tool/curriculum for K-12 teachers and informal educators
- 6) Develop a module for WCS/NY Aquarium MS/HS Teacher Training Workshops that incorporates local ocean chemistry data with STEM programming (where funding allows)
- 7) Review NOAA's OA Education Implementation Plan and state OA Action plans to identify additional outreach needs/priorities for the Mid-Atlantic region

## **Focus Area 3: Communicating Advances in OCA Research and Policy via MACAN's Website and Social Media**

*Goal: Update MACAN's website and explore the use of social media to inform stakeholders about emerging areas of OCA research and policy*

- 1) Collaborate with Science Working Group to review and update Species-Specific and Ecosystem Impacts sections
- 2) Develop content and publish new Resource Pages to address emerging areas of research and policy
  - a. Submerged and Cultural Resources information page and one-pager for public outreach
  - b. OA Action Planning Resources
    - i. Gap analysis from Policy Working Group
    - ii. State Plans (NY, MD, NJ) and key contacts

- iii. Scrolling calendar/links to opportunities for stakeholder engagement in upcoming ocean action planning meetings
- 3) Add a Blog feature to the Home Page to drive more traffic to webinars, MACAN's Youtube channel, funding opportunities, and upcoming conferences
- 4) Add an "Interview with a Scientist" (or other stakeholder) feature to help direct Gr 6-12 students and teachers to the website
- 5) Capture website metrics with Google Analytics
  - a. Collaborate with Karl Vilacoba (Monmouth) to set up Google Analytics
    - i. Collect monthly data on number of visitors, pages most frequently visited
- 6) Consider creating a social media presence on Facebook or Twitter

#### **Focus Area 4: Enhancing Industry Outreach and Engagement around OCA**

*Goal: Continue to support industry engagement on OCA and provide science-based outreach to fill information gaps*

- 1) Work with Industry Work Group (IWG) to increase industry awareness of and engagement in MACAN-sponsored activities
  - a. Share information about upcoming conferences, webinars, data tools, and other engagement opportunities etc. via MACAN's website, listserv, and social media
  - b. Maintain list of appropriate industry shows for outreach, as funding allows
  - c. Identify industry social media sites, mailing lists, etc. to distribute OCA information
    - i. Partner with urban restaurants to develop a social media message/hashtag that directs people to MACAN
  - d. Provide opportunities for industry to participate in planning and outreach related to the MACAN 2021 State of the Science workshop
- 2) Clarify the definitions of coastal vs. ocean acidification for industry members
  - a. Distribute VOCAL resources more widely through partner networks and social media
- 3) Coordinate with Outreach, Industry, and Science Working Groups to develop science-based outreach materials to address information needs identified in 2019 stakeholder outreach survey
  - a. Expand Outreach to For-Hire and Recreational Fishing Industry Members
    - i. Develop species-specific information for for-hire and recreational fishing industries. \*Summer Flounder is a priority; work with IWG and extension agents to identify other priority species and topics, e.g. food web impacts
    - ii. Develop an OCA presentation for recreational fishing club meetings
  - b. Host 1-2 webinars as part of MACAN's webinar series on topics of interest to industry members

## **Focus Area 5: Connecting Citizen Scientists with Opportunities for OCA Monitoring**

*Goal: Identify potential partners and provide communications/outreach support to engage citizens in OCA monitoring in the Mid-Atlantic.*

- 1) Create and maintain list of local organizations conducting water quality monitoring and middle school/high school partners seeking research opportunities for their students.
- 2) Collaborate with Science Working Group to create a user-friendly Equipment Inventory to describe tools currently being used for monitoring carbonate chemistry parameters, applications in coastal vs open ocean systems, level of effort and scientific training required to operate the equipment, as well as any options for biological monitoring (e.g. shell measurements, etc.).
  - a. Share Equipment Inventory on MACAN's website and the Ocean Acidification Information Exchange
- 3) Facilitate training opportunities and engagement in monitoring events/activities, where funding allows
  - a. Scope potential for a 2021/2022 Shell Day in partnership with NECAN and MACAN's Science Working Group
  - b. Explore use of apps like iNaturalist or EyeonWater.org that can be used to pair biological monitoring with water quality data during collection events.
  - c. Post upcoming opportunities on MACAN's website and listserv
- 4) Collaborate with MARACOOS OceansMap and/or MARCO data portal teams to identify ways to share citizen science data in the public domain