

OA Alliance U.S. State Coast to Coast Workshop Summary of Proceedings

The International Alliance to Combat Ocean Acidification (OA Alliance) convened a workshop on September 26 and 27, 2019 at the New York City Aquarium focused on regional impacts of ocean and coastal acidification and U.S. state-led efforts to respond. Workshop participants included governor’s policy leads, state agencies and OA task force members, federal agencies and leaders from acidification monitoring networks, particularly from the West Coast, Northeast and Mid-Atlantic regions.

This document provides a high-level summary of the workshop presentations, panels, and discussion sessions.

Workshop goals and objectives:

- Share and capture best practices for U.S. state government-led ocean acidification action planning and implementation.
- Call for high-level executive leadership; examining states’ role in elevating the need for higher climate mitigation ambition to protect ocean resources and coastal economies.

Workshop Day One- September 26, 2019

1. Welcome and Introduction

Leadership from the New York Seascape Program welcomed meeting participants and introduced the New York Aquarium, along with priority research and policy areas. Following the welcome, the meeting facilitator reviewed the agenda and logistics for the workshop. Workshop participants introduced themselves; attendees included about sixty representatives of state agencies, federal agencies, academic institutions, nonprofit organizations, industry partners, and monitoring networks.

2. Overview of the OA Alliance & Desired Outcomes of Convening

*Jennifer Hennessey, Senior Ocean Advisor to Washington Governor Jay Inslee
Coast to Coast State Convening on Ocean Acidification*

- Goals for the conference include: 1) sharing and capturing lessons, best practices, and challenges of states who are looking to advance science, understanding and actions around ocean and coastal acidification; 2) cultivate state leadership by examining the role of states within climate mitigation and aligning ocean and climate policy approaches.
- Overview of the origin and goals of the OA Alliance, an intergovernmental initiative founded by the U.S. States of Washington, Oregon and California—inviting national and state governments to create “OA Actions Plans” that invest in science and management strategies to address ocean acidification locally and regionally.

3. Examples of State Action Planning and Implementation to Date

*Dr. Caren Braby, Oregon Department of Fish and Wildlife
State of Oregon OAH Coordinating Council, OR Department of Fish and Wildlife*

*James Gennaro, Deputy Commissioner
New York OA Task Force, New York State Department of Environmental Conservation*

*Parker Gassett, Maine Ocean and Coastal Acidification Partnership
Maine Commission Report to the Legislature, MOCA Partnership*

*Dr. Justine Kimball, California Ocean Protection Council
State of California OA Action Plan*

- OA action plans can and will look different from state-to-state—much can be learned understanding individual state processes, key priorities and the existing policy landscape. For example, the Oregon State Legislature created a Coordinating Council that oversaw the process for drafting an action plan in partnership with multiple stakeholders. On the East Coast, the Maine Ocean and Coastal Partnership worked together to advance key recommendations of a 2014 legislatively commissioned report, suggesting new actions for non-government entities participating in the Partnership.
- Core areas of OA action planning & discussions have typically included:
 - i) advancing local monitoring and research;
 - ii) employing OA mitigation measures (of both atmospheric sources and land-based exacerbators);
 - iii) exploring adaptation and resilience building measures—often in partnership with local industry or communities most likely to be impacted;
 - iv) promoting public awareness;
 - v) joining initiatives and coalitions to elevate the issue of ocean acidification across climate policies or frameworks, state boundaries and;
 - vi) recommending state/local regulatory/statutory actions that support some/ all of above focus areas.
- Coalition building and action planning has been shown to occur successfully through on the ground partnerships when working directly with a state government is not possible.
- State legislation can commission or direct a process—though state legislation is not a pre-requisite for coordination and collaboration across partners.
- Outlining a process for updating an action plan/ set of recommendations and ensuring there is momentum (budget, legislative champions, partners, mechanism) for continued implementation was essential for long term sustained success.
- Involving state agencies/ resource managers in the planning process and implementation efforts is important. Particularly understanding how emerging data, monitoring, scientific information will further inform state decision making over time.

3.1 Facilitated Panel & Large Group Discussion

A group discussion on state action planning and implementation took place following the presentations. The facilitator asked participants to consider and discuss key elements from the presentations that resonated with their OA planning processes, as well as barriers and challenges.

Key themes from the discussion are described below.

- **Challenge building support for OA action planning:** Participants from states without OA action plans highlighted the challenge of planning without state directed support. Representatives from East Coast and southern gulf states emphasized that it can be challenging to galvanize action when a clear signal and impacts of OA have not yet been felt by the shellfish industry or other major economic sectors. Participants also emphasized the political challenge of working on OA because of the link to climate change can be a difficult one in some states.
- **Strategies for building support:** Recommendations included identifying and partnering with industries or communities most affected by OA (e.g., shellfish industry) and taking a proactive (non-state directed) approach to the science and species/ecosystem-specific vulnerability studies. Participants stressed the

importance of localizing the issue with regional science and local stories. Other participants suggested framing/weighing science investments and potential management strategies as co-beneficial given that many strategies to build coastal resilience also address OA (e.g., managing land-based pollution and nutrient sources.) There was an interest in high-lighting opportunities for decision-makers and other leaders to be proactive about preparing for the impacts of OA, pursuing priorities like research, and associating the issue with more understood issues like warming temperatures, red tide, and dissolved oxygen.

- **Importance and effectiveness of partnerships:** Discussion also focused on working with new and established partnerships. Partners may include industry, trade associations, federal agencies like NOAA, EPA or the military (Navy), and entities that have established networks (e.g., National Estuary Programs). Participants also discussed the benefits and challenges of working at a regional scale or across neighboring states.
- **Measuring success and implementation:** Participants from states who have developed OA action plans described the challenges and next steps for measuring success and implementation of plans. Some states with OA action plans are still in the process of developing metrics to use for reporting back to their governments on a specific time scale. Key takeaways included the importance outlining a process for updating the action plan/ set of recommendations and ensuring there is momentum (budget, legislative champions, partners, mechanism) for continued implementation. It was noted that establishing a specific body/ commission/ entity to act as a HUB for the work was helpful to ensure there was a pathway and mechanism for continued check-ins, priority setting and funding allocations.

4. Federal Landscape on OA Monitoring and Research, Investments, Budgets and Legislation

Dr. Libby Jewett, NOAA Ocean Acidification Program

Federal monitoring and research investments and priorities: How can states benefit from existing federal efforts; are there collaboration opportunities?

- NOAA is investing in OA research and monitoring in all states with the goal of facilitating, enabling, and connecting groups working on OA.
- NOAA has an Ocean Acidification Program (OAP), priorities of which include long-term monitoring, biological and ecosystem response, data management, modeling and forecasting, adaptation strategies, outreach and education, and technology development.
- Other OAP actions include sharing resources; regional research cruises; supporting coastal acidification networks, legislation, and the OA Information Exchange; and leading the Interagency Ocean Acidification Working Group, which incorporates leadership across federal government agencies.
- OAP also provides competitive research funding by providing grants for technology development, researching impacts to vulnerable species, modeling ecological impacts, graduate research fellowships, and observing optimization. Local adaptation studies are a potential future granting area.

Matthew Liebman, EPA Region 1

The role of water quality criteria in managing for OA and monitoring of coastal acidification through the National Estuary Program

- EPA's focus is on coasts and estuaries, including a emphasis on nutrients. There are strong linkages between nutrient inputs, algal blooms, and acidification.
- EPA has regulatory tools (e.g., Clean Water Act criteria, impaired waters list) that could be used to address OA, but there are outstanding questions and limitations.
- National Estuary Program (NEP) is also monitoring for OA. EPA funded continuous monitoring sensors for pCO₂ and pH between 2015-2016 at nine NEPs.
- Next steps include summarizing data, reporting lessons learned, and developing short and long-term OA monitoring plans for the NEPs. EPA is also continuing to fund opportunities for mitigation, supporting research on ocean and coastal acidification (OCA) impacts, and encouraging NEPs to evaluate links between nutrient pollution and OCA.

*Dr. Sarah Cooley, Ocean Conservancy Ocean Acidification Program
Federal legislation and policy landscape*

- The Ocean Conservancy is focused on federal OA work through tracking the appropriations process and building support for funding across priority areas.
- The Ocean Conservancy engages in advocacy by building support for bills and putting pressure on appropriators to fund OA related efforts; they have been successful in generating bipartisan support for OA. Federal appropriations for NOAA's OAP have doubled since 2013.
- Recent federal OA legislation includes: the COAT Research Act of 2019 (H.R. 1237), the Coastal Communities OA Act (H.R. 1716), the OA Innovation Act of 2017 (H.R.1921), and the NEAR Act of 2019 (H.R. 988). These bills demonstrate that there is broad support in Congress for OA related activities.

5. Regional Resources & Monitoring Networks that Inform and Support Decision Making and Actions

*Dr. Beth Turner, NOAA, Chair of NECAN Management and Policy Working Group
Responding to ocean and coastal acidification through a regional network: the role of NECAN*

- NECAN serves the states of New York, Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine, and the coastal waters of New Brunswick and Nova Scotia. It reviews and communicates science, coordinates research, identifies knowledge gaps, helps to set regional priorities and educates the public and stakeholders.
- NECAN's implementation plan includes regional priorities for research and monitoring. NECAN is interested in engaging with state governments on research, monitoring and priority setting.

*Dr. Grace Saba, Rutgers University, MACAN Co-Coordinator
MACAN*

- MACAN serves the states of New York, New Jersey, Maryland, Delaware, and Virginia and has 4 objectives: serve as an information hub to connect researchers and share acidification; develop a list of regionally impacted species and identify regional research and monitoring gaps; develop a regionally relevant education/outreach engagement strategy; and provide a forum to share best practices in monitoring and sample collection.
- They are working to identify monitoring and research gaps based upon which species may be impacted.
- MACAN has developed a monitoring map which will inform a monitoring plan to fill spatial and temporal gaps.

*Dr. Samantha Siedlecki, University of Connecticut
University Collaborations that Support Modeling and Forecasting*

- Modeling and forecasting tools are important because they can help provide near-term predictions, develop early warning systems, and conduct scenario testing—things that resource managers increasingly need.
- Traditionally, modeling and forecasting tools deal with large scale information – scale that may not be relevant to local coastal communities but is nonetheless foundational and informative. Global signals are often impacted by coastal processes, which can amplify or dampen local signals of acidification.
- To maximize the utility of forecasting tools, researchers can collaborate with coastal communities, industry, decision-makers, managers and other end users of information.
- The “Live Ocean Model” developed for the Salish Sea, lead by Dr. Siedlecki and Dr. Parker Mac Cready, may have applications including – early warning systems and scenario testing; attribution experiments; time of emergence; processes; climate variability in water mass end members; and biological impacts.

*Bill Dewey, Taylor Shellfish Farms
Industry Partnerships in Monitoring*

- Monitoring remains fundamental to the successful response of the shellfish industry to changes in coastal acidification. Taylor Shellfish Farms has developed systems in their hatcheries to treat and buffer the acidic water.
- NANOOS has a shellfish growers data platform that allows growers see what the local conditions are and track the incoming data from local monitoring equipment.
- The advancement in monitoring, real time forecasting and use of adaptation / resiliency strategies as deployed by the industry are rapidly accelerating across both coasts and internationally—efforts described as “putting headlights on a car.”

5.1 Facilitated Panel & Large Group Discussion

A group discussion took place that covered the following topics and themes:

- Impacts of ocean acidification on the shellfish industry, including sea scallops and oysters.
- How monitoring and information gaps have been presented to (and addressed) with managers and policy makers. The group discussed MACAN’s efforts to optimize existing data sharing platforms. NECAN Policy Working Group identifies partners and works to leverage existing data and monitoring efforts to be used for many purposes.
- It was agreed that scientists, managers and decision-makers need a high quality, long-term monitoring system that is responsive to and helps inform ocean and coastal acidification management needs—especially in the context of many other stressors that are impacting coastal resiliency.
- There was a discussion about how to co-locate biological, physical, and chemical monitoring in high-priority locations (hot spots.)
- It was agreed that better understanding of the specific needs of state agencies and managers was critical, including strategies for communicating information.
- Importance of building partnerships between state governments and local monitoring networks like the CANs; interactive relationships like this have formed in states such as Maryland and Washington.
- The group discussed how to identify and prioritize knowledge gaps (both in terms of actual process and in terms of a establishing a conceptual approach to getting the most useful and most urgent information that can be synthesized and has a direct “human dimension” application)
- The CANs can help bring the most recent research forward and also partner with state resource managers to help identify priority efforts.

6. Regional Partnership Supporting State Action: West Coast Governance 'Ecosystem' and Lessons Learned

*Martha Kongsgaard, Chair of Washington Marine Resources Advisory Council
Prioritizing key actions and delegating tasks across partners*

- The government-led responses of Washington and Oregon to direct impacts of OA experienced in coastal oyster hatcheries, may help provide a blueprint for other states considering a more pro-active approach.
- In 2012, Washington created the Blue-Ribbon Panel on OA, which convened a diverse set of stakeholders to develop a set of actions to better manage for OA in Washington. Following the creation of the action plan, the Marine Resources Advisory Council was formed to carry forward the action plan recommendations and work in partnership with the newly created University of Washington OA center. Together, the entities deliver updated recommendations to the legislature, hold trainings and workshops, and seek ongoing support for implementation of the plan across state agencies and other diverse partners.
- Washington recently completed an update to the 2012 action plan, which included reassessment of priorities, synthesis of emergent science, and check-in on progress and achievements.

*Dr. Kirsten Feifel, Washington State Department of Natural Resources
Actions state agencies have taken to implement action plan recommendations*

- A top priority is demonstrating how ocean acidification science can (and is) directly informing management. The department engaged with other agencies early, specifically around eelgrass, nutrient inputs, and other water quality issues relevant to the state's OA management approach.
- State agencies were issued a survey in order to get a better understanding of multi-agency manager needs. Agency OA leads also hold a monthly call.
- Through this effort, the department identified a gap in nearshore monitoring of OA and has since installed a network of sensors to look at different pH signatures. Other state agencies are building OA monitoring into their programs where applicable.
- Additional examples of agency led actions include using native species to rehabilitate nearshore environments - translating local science to management action.

Hayley Carter, California Ocean Science Trust

West Coast Ocean Acidification and Hypoxia Science Panel and role of the West Coast OAH Task Force, Ocean Science Trust and Pacific Coast Collaborative in supporting state-led OA Action Plans

- The Ocean Science Trust (OST) helped convene the West Coast Ocean Acidification and Hypoxia (OAH) Science Panel to expand upon the efforts of the WA Blue Ribbon Panel and convene scientists along the entire North American West Coast.
- The OAH Science Panel was directed to produce recommendations for regional decision-makers as well as help inform further assessments of key gaps and needs.
- Working together as a coastal region has been valuable, not just in convening scientists, but also as a way to think more broadly about the full coastal system of stressors, including hypoxia – while keeping the emphasis on decision maker needs.
- The OAH Science Panel helped to guide science investments, inform legislation, elevate the issue of OAH, and increase agency attention and action. California created an OAH science task force to carry forward recommendations of the Panel.
- The OAH Science Panel produced multiple products for several audiences, including four technical summaries designed specifically for resource managers.

Dr. Caren Braby, Oregon Dept. of Fish and Wildlife

Highlighting the joint task force to create a monitoring inventory

- The Pacific Coast Collaborative (PCC) was formed in 2008 between BC, WA, OR, CA. Under the PCC, west coast partners formed an OA working group; working on issues through the PCC is valuable because it ensures there is political will behind priorities issues.
- The PCC OA Working Group has begun to assemble a West Coast inventory of monitoring assets and relevant programs/ projects.
- Completed in 2018, the monitoring inventory now contains records from over 125 participants describing over 200 projects from Alaska to Baja California. The monitoring efforts described in the inventory are capturing trends in OAH occurring across the region and is envisioned to help scientists and decision-makers better understand and respond to potential impacts to key species and ecosystems.
- The monitoring inventory also sets the stage for a collaborative region-wide gap analysis which will inform additional priorities and strategic monitoring investments specific to help guide decision making and management.
- A functioning West Coast-wide monitoring network will effectively answer management questions about ocean acidification and hypoxia and informs actions that reduce impacts, improve resiliency and support adaptive management.

7. Group Discussion & Report Outs on All State OA Action Planning Efforts

After hearing about the lessons learned by the West Coast states in promoting and advancing regional collaboration, participants discussed collaboration as well as the challenges and of regionalizing an approach to data collection. Themes and topics covered in the discussion are described below.

- **Government-directed vs Bubble-up Process:** It was noted that West Coast OA action plans have been largely government-directed (either from executive or legislative action), whereas on the East Coast, planning has been generally more of a bottom-up process in which cooperation among local entities—often initially absent of government engagement—have sometimes resulted in state action (like in Maine.) Other states have commissioned reports but haven’t put together a meaningful next step to identify or sustain implementation of priority recommendations.
- **Multi-state collaboration can be difficult when multiple decision makers are involved:** A participant representing the state of Oregon recognized that success at a single jurisdiction level does not guarantee success at the regional level, due to the number of decision makers involved. Success in regional collaboration sometime requires separating goals and targets at a local level from goals and outcomes at a regional level. It was noted that a regional narrative can sometimes help build political support for action, more so than each state “going alone.”
- **For action planning on the East Coast, a multi-stressor approach is crucial:** A participant from Connecticut noted a need for action plans that address multiple issues related to ocean health and resiliency, stating that OA is a part of the conversation about ocean climate policy on the East Coast, but not the frontrunning issue. In order to create more buy-in around OA, comprehensive plans that address multiple factors, such as warming temperature and hypoxia will likely be more viable.
- **Monitoring, evaluation and data collection:** Investing in a monitoring and evaluation system in the early stages of action plan development is critical. Participants agreed that collecting data is important, but also acknowledged that it can be costly and difficult to start new projects (e.g. eelgrass mapping and restoration). One participant noted that it is sometimes more efficient to fortify existing projects and make them more comprehensive, instead of taking on new projects.

8. Subnational Leadership on OA within an International Climate Context

*Dr. Gwynne Taraska, US Climate Advisors
International Role of US State Leadership on Ocean Acidification*

*Jessie Turner, OA Alliance
International Alliance to Combat Ocean Acidification*

- Ocean issues are only briefly mentioned in international climate plans such as the UN Framework Convention on Climate Change (1992) and the Paris Agreement (2015), though traction has steadily been gaining and in 2019 the IPCC released Special Report on the Ocean and Cryosphere in a Changing Climate.
- Despite the federal government’s withdraw from the Paris Agreement, U.S. states can show leadership by developing action plans and setting their own mitigation, adaptation and resiliency goals.
- The OA Alliance is made up of 80 members across the globe that seek to take on OA as an immediate threat to their local coastal ecosystems and economies. Members work together to elevate ocean acidification within international and domestic climate agreements and frameworks.
- The OA Alliance engages members across stages of the action planning cycle by providing resources and networking for plan development, and by facilitating workshops and webinars across key topics. The OA Alliance’s aim is to ensure government led plans are sustained and built upon over time.

9. Closing Activity

To conclude the first day of the workshop, participants recorded “aha” moments or key takeaways from Day 1 on post-it notes. Key takeaways highlighted by participants included the need for research and monitoring to inform policy, opportunities for regional collaboration, and challenges of connecting data to decision-making. For example, one participant noted a takeaway that significant progress can be made on closing the science/policy gap “If more people evaluated projects through the lens of ‘What policy question will this info answer?’” Several participants described takeaways regarding the impacts of nutrient pollution on coastal acidification.

Workshop Day 2, September 27, 2019

The second day of the workshop began with presentations and discussions of emergent science and effective communication efforts. Following these sessions, participants had the opportunity to participate in small-group discussions and complete and discuss an OA Action planning worksheet to guide next steps upon leaving the workshop.

1. Regional Science Showcase: Updates on Recent Reports or Ongoing Biological Response Studies

Dr. Beth Turner, NOAA, Chair of NECAN Management and Policy Working Group on Behalf of Meredith White, Mook Sea Farm

Innovative aquaculture systems for buffering seawater to protect juvenile species

- Dr. Turner presented on innovative aquaculture systems for buffering seawater to protect juvenile species, however noted there are relatively few studies that look at juvenile and adult oysters in the wild. Mook Sea Farm, in partnership with Bigelow Laboratory for Ocean Sciences -- designed a solenoid system to manipulate pH by taking in the natural water that is varying in salinity and lowering the pH by points from the natural condition. This allows researchers and shellfish growers to understand how ocean acidification effects juvenile oysters (seed) when they are transferred from a hatchery to a nursery and exposed to natural sea water salinity fluctuations. This work will also examine the potential of shell hash to mitigate or buffer against the impacts of acidification in the water column.

Teresa Schwemmer, NOAA Ocean Acidification Fellow at Stony Brook University

Developing population models to predict Atlantic silversides and summer flounder growth rates under increased acidification.

- Ms. Schwemmer is working with Dr. Janet Nye, of Stony Brook University, to look at Atlantic silversides in dissolved carbon dioxide to examine the vulnerability of young fish to changing conditions. Together, they are working to build a model to take the individual physiological conditions/impacts and scale them up to the population level. Would like to model fish populations for ocean acidification and hypoxia to be able to manage those populations. They found that as carbon dioxide increases, the effect of hypoxia became more dramatic on Atlantic silverside metabolic rates.

Hayley Carter, Ocean Science Trust

Emerging understanding of seagrass and kelp as an ocean acidification management tool

- The Ocean Science Trust convened a working group to determine if seagrasses can ameliorate the effects of ocean acidification on coastal ecosystems and effectively sequester and store carbon. The working group found that the presence of seagrass and kelp can effectively increase pH in the water column. Eelgrass is able to store carbon because it attaches to the sediments, but bull kelp is not a good source of carbon storage because it does not. The buffering abilities of both seagrass and kelp is modest but measurable. There is more amelioration during the growing season. The effects can be positive, negative, or zero depending on the time of day and the season. While it isn't definitive, planting eelgrass is a no risk strategy and generally seen as having multiple co-benefits to nearshore ecosystems.

Dr. Shallin Busch, Northwest Fisheries Science Center on behalf of Dr. Richard Feeley, NOAA

Updates on monitoring/ modeling of future trends in pH and aragonite saturation

- Researchers at NOAA are working on models to look back at what the ocean pH was historically. This data is being compared against different emissions scenarios and specifically how those scenarios apply to projected pH changes in the Salish Sea. Our current emissions pathway suggests we are going to "go over a cliff" and may not be able to recover the aragonite saturation level needed for most species to survive and thrive. If we follow the lower emissions pathway, recovery, adaptation and resiliency strategies might be

achieved. It can be challenging to interpret changes in ocean acidification against the variation we see naturally. Being able to talk about and distinguish trends from variability is very important for policy makers. Biological effects of ocean acidification are happening now and will become worse under the existing emissions scenario.

2. Effective Communication: Social, Cultural and Economic Impacts

*Bill Dewey, on behalf of The Nature Conservancy
Shellfish Growers Climate Coalition*

*Julia Sanders, Global Ocean Health
Engaging Marine Resource Dependent Industries and Communities*

*Darcy Dugan, Alaska OA Network
Partnerships with Tribes, First Nations and Indigenous Communities*

*Kevin Ranker, Ocean Foundation
Creating Political Champions, Best Practices for Engaging State Legislators*

- Created by The Nature Conservancy, the Shellfish Growers Climate Coalition makes OA personal by communicating stories of families and businesses most affected by changing ocean chemistry.
- Global Ocean Health creates local champions by educating recreational fishers and coastal fisheries about the impacts that OA, warming oceans, and algal blooms. Local storytelling is used to advocate for and advance support for ocean acidification specific legislation and federal appropriations support.
- In communicating the topic to policy makers, presenters emphasized the importance of videography and photography and discouraged the use of jargon, acronyms and overly scientific terms.
- Alaska OA Network has been engaging both tribal and citizen scientists to measure pCO₂, tCO₂ and temperature levels in Alaska coastal water. It was noted that those coastal communities most affected by OA—or other climate related changing ocean conditions-- are often the most eager to find a solution and most willing to take actions.
- It was noted that politicians (policy makers) are more likely to prioritize issues that have well- defined economic impacts (in this case, the number of jobs in their community that will be impacted by an issue or measure.) For example, in Washington State, the 2012 oyster hatchery die-off put 3,200 jobs at stake and served as a catalyst encouraging politicians to support action.
- Key “communications” takeaways included:
 - Create local champions
 - Educate and involve community
 - Tell personal stories
 - Prioritize imagery over jargon
 - Emphasize the economic impacts of OA

3. Planning and Implementation Breakout Discussions

Following presentations on effective communication, participants divided into three groups to discuss planning and implementing OA action in their states. Discussion groups focused on initiating OA action planning, developing plans, and sustaining implementation over time.

3.1 Pathways for Getting Started

Facilitated by Parker Gassett, MOCA (lead) and Jessie Turner, OA Alliance (co-facilitator)

The group included representation from seven different states with varied levels of engagement and familiarity with ocean acidification. The group described that there was not a clear example of ocean acidification directly impacting their states, but were still interested in advancing proactive investments and coordination around the topic—in absence of a “smoking gun” direct impact, planning for a “no regrets” strategy and message. The group agreed that it is important to have a regional/ local story to help communicate the issues and gain support for OA action. Another central theme was finding political or legislative champions to help support and advance OA policy. The group discussed the many different types of champions, ranging from environmental organizations, members of the state legislature, or other industry leaders. Champions can help to bridge partisan divides and unite groups. An important first step identified was making a list of individuals and organizations that may want to collaborate on this topic. Organizations like Sea Grant offices or the CANs can act as organizing hubs that convene people and hold information and resources.

Some members of the group suggested a few example next step actions to take once back in their state, including: find ocean acidification champions who can help advocate with decision makers; look for partnerships with organizations like Sea Grant that can support efforts across a network of actors; put together an action planning group to help inform state-directed plans.

3.2 OA Action Plan Drafting and Incorporating OA Across Existing Management Frameworks

Facilitated by Dr. Caren Braby, Oregon Fish and Wildlife (lead) and Sherryll Jones, New York State Department of Environmental Conservation (co-facilitator)

Participants from New York State, Oregon, Maine, Maryland, and Alaska discussed challenges and opportunities at various phases of OA Action Planning. Some participants had plans that were already adopted by the state legislature, some were in the process of forming plans, and others were in the very early stages of the brainstorming a starting point. Participants and facilitators discussed the importance of public-private partnership, especially if the state government is not actively engaged or supportive. Encouraging industry support was understood as a crucial component for launching discussions, along with describing potential OA impacts as an economic concern. States further along in the action planning process encouraged participants without government engagement or directives to build coalitions on the ground. States with well-developed plans emphasized that an initial starting point, goals do not need to be elaborate or overly comprehensive.

Some members of the group suggested a few example next step actions or ideas, including:

- East Coast representatives agreed that there is an opportunity for connecting states in their region via data sharing.
- Participants agreed to continue pursuing public-private partnerships.
- A West Coast participant suggested a brainstorming session between East Coast participants of MARCO.

3.3 Sustaining Implementation of Efforts Over Time

Facilitated by Jennifer Hennessey (lead) and Dr. Justine Kimball (co-facilitator)

Participants from Washington, Oregon, California and New York discussed the challenges of implementing OA action plans and sustaining efforts across state government and other partners once the plan is adopted. Representatives from California discussed the challenge of prioritizing funding for key actions. Washington addresses this by having a central organizing entity (MRAC) that can make strategic funding requests of the legislature once priority actions have been identified. California is conducting a needs assessment as a way to support this same process. The group discussed the value of mainstreaming OA within each agency, and the importance of regular collaboration between agencies working on OA. Participants asked how

states secure funding for future work; this is a challenge in Oregon and New York, as well as in other states. Funding for monitoring and science can be a particular challenge. Oregon is looking for outside partners and ways to streamline costs. Washington has been successful in asking for startup funds for specific projects that then become integrated into regular operations.

California has had success in getting funds for general climate-related work and through special revenue mechanisms. Washington has had success generating funds because of the strong coordination aspect of their work. Finally, the group discussed engaging industry and building opportunities for industry participation in OA monitoring, technology development, and through mitigation actions.

Some members of the group described next steps they plan to take as they move forward on implementation. More than one state indicated that they will be working on strategically seeking funding for implementing aspects of their plans. Other states discussed next steps around identifying monitoring and information gaps along with potential partnerships and solutions for filling those gaps, including leveraging existing infrastructure.

3.4 Report Back

Following the breakout discussions, each discussion group shared the key takeaways from their discussion with the larger group.

4. State/ Regional Break Out Sessions & Charting Next Steps for Action Planning

As a final activity, Dr. Sarah Cooley from the Ocean Conservancy lead the group through an interactive worksheet detailing the steps and resources needed to act on OA. The activity included the following steps and discussions:

- Worksheet sections included: goals to address OA, resources at stake, the local context, opportunities to act, and next steps.

5. Report out from Group Discussions; Summary of Key Learning Opportunities, Takeaways and Next Steps

Following the workshop activity, participants had a final group discussion, focusing on the following topics & potential next steps:

The importance of education and the need to increase knowledge and understanding of OA across peers in state agencies, with state policy makers, industry leaders, coastal communities and with the public.

- Many participants have an education component of their work.
- Creating communications materials and disseminating information to the public and to peers across science networks and universities as well as government agencies.
- Engaging members of the legislature.
- Desire for more synthesized information that describes the current state of ocean and coastal acidification knowledge and potential impacts to the region.

Value of thinking about OA as part of a multi-stressor suite of changing ocean conditions- with an emphasis on overall ocean health and coastal resiliency.

- Integrating OA across existing monitoring and management frameworks; OA is understood and evaluated as part of suite of multiple and cumulative impacts facing marine species, ecosystems and coastal communities.
- Participants suggested emphasizing the co-benefits of many “OA relevant” mitigation and adaptation actions.
- Placing OA within broader climate strategies or marine/coastal environment priorities will help decision makers and stakeholders better understand its significance.

Assessing the current landscape & establishing set of knowledge gaps and priority actions.

- Access and, where needed, enhance monitoring.
- Share data and support regional research and monitoring collaboration.
- Access potential vulnerability, including economic dependence of calcifying species.
- Access other social, cultural or coastal community concerns.
- What do managers and decision makers want/ need to know about OA? How does this overlap or impact existing information like water quality, socio economic factors or other “human dimensions” relevant to ecosystem health, vulnerability and resilience?
- Identify existing information gaps (biological responses) that currently limit state’s engagement.
- Develop a formal or informal group/ platform and process for beginning discussions or revisiting a previously commissioned OA report.
- Engaging new partners and re-engaging former partners.

Implementation of OA Action Plan.

- If applicable, outline a process for updating OA action plan / set of recommendations and ensure there is momentum (budget, legislative champions, partners) and a mechanism for continued implementation, accountability and status report check-ins .
- If applicable, assess the desire/ advantage to nesting ocean acidification efforts (funding, ongoing priority setting) within broader climate priorities or other marine/coastal management frameworks.

There is a no one-size-fits- all approach to this work.

- It is essential that governments, stakeholders and the public have a better understanding of the changing ocean conditions and coastal acidification that are occurring in their region.
- Action plans are easier to create with a supportive government/political champions, though actions that are brought forward and implemented by non-government regional and local partners can still drive momentum until a window opens for deeper government engagement and leadership.
- Applying a no-regrets strategy that focuses on assessing regional vulnerability, identifying and filling knowledge gaps, addressing and reducing multiple stressors and promoting co-beneficial actions (which will be different across Action Plans) is a strong approach.