

**Ocean Acidification Program
Science Review
September 2020**

OAP Response to Panel Review Recommendations

April 3, 2021
Updated July 2022

Submitted by:
Libby Jewett, Director

Introduction

Purpose of the Review The National Oceanic and Atmospheric Administration (NOAA) Office of Oceanic and Atmospheric Research (OAR) conducts Program reviews every five years to evaluate the *quality, relevance, and performance* of the activities its Programs fund and how the Programs decide on what types of scientific research to support. The purpose of this Ocean Acidification Program (OAP) review is to provide an external assessment of the program, including its management structures, and to convey program direction and priorities to external partners. This review is useful for NOAA/OAR planning and in helping the Program progress towards its research objectives. These reviews also ensure that OAR Programs are in alignment with strategic documents, are responsive to congressional mandates, and are producing high quality and high performance outputs.

Scope of the Review This external review covered the past five years of OAP activity and management. It was the first such review that the OAP has undergone since becoming an OAR Program. The thematic areas for the OAP review were: 1) Program Scientific Priority Setting; 2) Research to Understand OA Vulnerability; 3) OA Data Management and Product Development; and 4) OA Education and Outreach. Reviewers were asked to provide perspective and advice on how OAP and NOAA can most effectively position themselves over the next five years to tackle new challenges while leveraging existing research initiatives, partnerships, technologies, data science, and products.

The review took place September 28 - 30, 2020 and was conducted virtually due to the COVID Pandemic.

In this report, each actionable recommendation provided by the Science Review Panel is italicized and followed by OAP response. A table summarizing the actions with timelines for completion is included below. Detailed responses can be found in the Appendix.

Recommendations, Responses, and Action Plans

OAP Science Review Action Sheet				
Recommendation	Action	Champion	Target Completion Dates	Status/Notes
<i>HL#1. Develop an Ocean Acidification Program Strategic Plan</i> (+ HL#2, AA1-1, AA2-3, AA4-6)	Write OAP Strategy	Director	March 2022	Should be completed by 8/22: almost done.
<i>HL#3. Define and Assess stakeholders and their needs.</i> (+ HL #4; AA1-4, AA2-7, AA3-5, AA4-4)	Stakeholder assessment (to be rolled into OAP Strategy)	Deputy Director	March 2022	Actively being pursued with purposeful plan; Should be completed by June 2023
<i>Recommendations which ask us to continue or enhance our current approaches</i>	<i>HL#4, #5, #6</i> AA1-3, AA1-5, AA1-6, AA2-1, AA2-2, AA2-6, AA2-8, AA2-9, AA2-10, AA3-1, AA3-2, AA3-3, AA3-6, AA3-7, AA4-3,	various	ongoing	Ongoing
<i>HL #7. Assess current and future staffing needs.</i> (+AA1-7)	New OAP Org Chart	Deputy Director	Done and ongoing	Done

<p>AA1-2. Consider and formalize the timing for updates to short and long-term planning documents.</p>	<p>Change the OAP review cycle to every SIX years (or no change)</p>	<p>OAR HQ</p>	<p>By next program review</p>	<p>Not an OAP action</p>
<p>AA2-4. Develop and implement an approach to improving utility of species response data in ecological scaling studies</p>	<p>Develop OA biological indicators</p>	<p>Program Manager</p>	<p>Initiate by Sept 2021; ongoing</p>	<p>This has been activated through several efforts: bio indicator development, and bio sampling protocols on ships (ongoing)</p>
<p>AA2-5. Consider creative approaches for implementing future larger scale ecosystem studies.</p>	<p>Initiate conversation on the OA Information Exchange</p>	<p>Outreach Coordinator</p>	<p>Initiate by Dec 2021; Ongoing</p>	<p>Delayed due to staffing change; will initiate Fall 2022</p>
<p>AA3-4. Engage stakeholders for solutions to data discoverability and consider development of a user guide to data access</p>	<p>Convene data stakeholders and develop guide for those seeking OA data</p>	<p>Deputy Director</p>	<p>Summer 2022</p>	<p>Completed but also ongoing. Data managers held a workshop to receive feedback on data discoverability. User access video was created and shared on the OAIE https://www.youtube.com/watch?v=kTxd8HHaUMQ&t=359s</p>
<p>AA4-1. Update the NOAA OA Education Implementation plan</p>	<p>Revise the NOAA OA Education Implementation Plan</p>	<p>Education Coordinator</p>	<p>December 2022</p>	<p>Due to change in staff and other near term pressing issues, this effort has been delayed. New completion date - Dec 2023</p>

AA4-2. Consider public accessibility to some OAIE content to increase interest in membership.	Move some OAIE content to public side of OAIE website; Assess	Outreach Coordinator	May 2021	Actively being worked on this summer (2022); opportunity presented by change in OAIE web platform.
AA4-5. Evaluate all education and outreach activities including communication (+AA4-7)	Create a coordinated multi year communications plan	Outreach Coordinator	Dec 2021	New staff hired; she is actively assessing our engagement portfolio; secured seat on NOAA Education Council

Appendix Response to Recommendations

Program Wide Recommendations

- 1. Develop an Ocean Acidification Program Strategic Plan.** Response: OAP thinks this is a good idea, and we are receptive to the ideas the panel proposed for inclusion in the strategy. Action Plan: The Strategy will be VERY short and concise. We do not think it will be a “plan” as much as a “strategy” - not unlike the OAR Strategy - as we already have the Research Plan providing specific details. We would like for the strategy to clarify HOW we do our work. Champion: OAP Director. Completion Date: March 2022.
- 2. Engage in discussion with OAR and NOAA Programs and Labs to define responsibilities.** Response: We are in constant discussion with other programs and labs across NOAA, and we already are considered the focal point for all OA related activities. However, it seems like a useful exercise to identify which of the NOAA Research Plan objectives and actions are our versus other NOAA responsibility (or, in many cases, shared responsibility). Action Plan: OAP will engage with relevant NOAA offices to work to clarify OAP versus their/shared responsibilities for executing the NOAA OA Research Plan 2020. OAP will entrain the cross-NOAA working group (NOAA OA Working Group) to facilitate this coordination. We will incorporate this information into both our Research Plan Implementation Plan and our OAP Strategy. Champion: OAP Director. Completion Date: March 2022.

- 3. *Define and Assess stakeholders and their needs.*** Response: A central charge of the OAP-supported (and founded) regional Coastal Acidification Networks ('CANs) is to define and assess stakeholder needs on an on-going basis. To date, these have not been consolidated and inventoried nationally and some 'CAN networks are only initiating this process. Action Plan: OAP Knauss Fellow will focus on providing cross-'CAN coordination and synthesis. A key deliverable of the fellowship will be to canvas the regional 'CANs and work through the OAIE to better define the regional needs of the stakeholders engaged through the 'CAN communities. We also see a path for including this stakeholder assessment into the OAP Strategy (see Rec #1 above). Champion: Director and Deputy Director. Completion Date: March 2022.
- 4. *Enhance stakeholder engagement in under invested and investigated regions.*** Response: See response to Recommendation #3. Key regions currently under invested by the OAP include the Gulf of Mexico, U.S. Caribbean, and Great Lakes regions. Action Plan: OAP will work to better scope the needs of these regions through enhanced stakeholder engagement by first doing the strategic assessment noted in recommendation AA1-4. Champion: Outreach Coordinator. Completion Date: On-going.
- 5. *Continue to re-evaluate and rebalance distribution of projects among the OA-Trifecta, regions and scientific approaches.*** Response: Key regions currently under invested by the OAP include the Gulf of Mexico, U.S. Caribbean, and Great Lakes regions. OAP recognizes and is working towards better engagement in these regions and in increasing investment in biological response and human dimensions. Action: OAP has already begun the development of a series of NOFOs and consideration of in house proposals which would better target the needs of these regions and the incorporation of more social sciences. In addition, OAP has initiated discussions with NOAA Sanctuaries to determine if leveraging potential might exist for joint investment into selected sanctuaries specifically within these regions. Champion: OAP Director and Program Manager. Completion Date: On-going (we are already doing this).
- 6. *Consider ways to track or document accomplishments that are not recorded in peer-reviewed publications.*** Response: We agree that this is a worthy goal although easier said than done - as the accomplishments achieved with OAP funding are not always easily discovered. We have, overtime, expanded our OAP definition of "transitioned" products which was part of the way towards achieving this recommendation. Action: We already have a google spreadsheet that we use to track deliverables such as knowledge transition products. However, we will work on a more deliberate effort to find these accomplishments. We are also hiring capacity, a program manager associate which should enable us to do this better than before to address tracking and

program performance. Champion: Deputy Director and Program Manager. Completion Date: Ongoing but approach will be better defined by December 2021. New staff coming on board in FY21.

7. **Assess current and future staffing needs.** Response: We agree. Action: We are already adding new hires to ensure adequate staffing for our growing responsibilities. We have realized that our staffing is too lean to work well when current staff transition out of OAP or to adequately manage our funded projects. We recently built out a staffing structure which we will work to fill in as resources increase. ELT has agreed that we need to build out our staffing and have reviewed our expanded organizational chart. As always, we also will bring in detailees as we see this as a great way to build bridges with other programs and laboratories.. Champion: Deputy Director. Completion Date: Done and ongoing.

Activity Area 1

AA1-1. Develop and consider suggestions for information to include in an Ocean Acidification Program Strategic Plan. Response: See High Level Recommendation #1 above and our response as this recommendation is directly relevant and rolled into that. Action: Use the categories supplied by the Program Review committee as an initial outline for the OAP Strategy.

AA1-2. Consider and formalize the timing for updates to short and long-term planning documents. Response: OAP is fully committed to a THREE year planning cycle even though it doesn't line up with the five year OAR review cycle. We have learned through many years of collective scientific management experience that THREE years is the ideal period for committing to longer term science endeavors without losing control of our projects or flexibility to address emerging issues. We would prefer if the OAP reviews, instead, could happen EVERY six years instead of every FIVE. Action: No change unless HQ is amenable to changing the OAP Review cycle to every SIX years to align with our investment cycle. Champion: OAR HQ. Completion Date: By time of next OAP Review.

AA1-3. Continue developing creative and alternative methods for collecting stakeholder input. Response: We agree that enhanced stakeholder engagement is always better. We founded and support the 'CANs, as well as the OA Information Exchange which are avenues for stakeholder engagement unparalleled in OAR. Action: We will hold virtual town hall meetings periodically and will seek to set up a schedule for this. Champion: Outreach Coordinator. Completion Date: Start doing these by Summer 2021.

AA1-4. Perform a strategic assessment of stakeholders. Response: Although we do not agree that there are stakeholders we haven't considered, we are willing to

engage with 'CANs and through OAIE to do an assessment. Action: See High Level Recommendation #3. Champion: Director. Completion Date: March 2022.

AA1-5. Continue to enhance communications and engagement with the Regional Coastal Acidification Networks. Response: Of course. Action: The OAP will continue to enhance communications and engagement with the 'CANs and to that end have focused our OAP Knauss fellow on enhancing cross-'CAN collaborations. We both founded and financially support the 'CANs so we want to see them be successful and have strong connections to the OAP. We are hoping with the addition of new staff, OAP will have the bandwidth to do this better. Champion: Deputy Director. Completion Date: Concerted effort in FY21.

AA1-6. Continue periodic synthesis and reporting of OAP progress and accomplishments. Response: See our response to High Level Recommendation #6 above.

AA1-7. Continue creative solutions to future staffing needs. Response: See our response to High Level Recommendation #7 above.

Activity Area 2

AA2-1. Continue leveraging partnerships and research results to strategically prioritize research activities. Response: As noted in this recommendation, we have already been using innovative approaches to improving our investment decisions. Action: OAP will continue to build and sustain partnerships within NOAA and across federal agencies to prioritize research. Champion: Director and Program Manager. Completion Date: Ongoing.

AA2-2. Continue to optimize OAP monitoring to characterize impacts to ecosystems and humans. Response: As noted, we are already optimizing OAP monitoring. Action: OAP will continue this work. Champion: Deputy Director. Completion Date: Ongoing.

AA2-3. Engage in discussion with OAR and other NOAA Programs to clearly define OAP's observation and research responsibilities. Response: See response to High Level Recommendation #1 as this recommendation directly pertains to the plan to develop an OAP Strategy.

AA2-4. Develop and implement an approach to improving utility of species response data in ecological scaling studies. Response: OAP agrees that the greatest uncertainty in OA research is in the biological response although it is impossible to determine appropriate treatments without adequate observing data from the field where species live (thus the quandary). Action: We have already increased our ability to do biological observing on our OA coastal cruises, starting with the two cruises happening in 2021. We will also continue to elevate species response as a very high priority for investment. We also plan to initiate discussions about development of

biological indicators for OA. Champion: Director and Program Manager. Completion Date: Ongoing but initiate indicator discussions by August 2021.

AA2-5. Consider creative approaches for implementing future larger scale ecosystem studies. Response: We agree. We actually worked early in OAP history to get some large scale, floating mesocosms developed by German colleagues brought to the California Current, but failed in getting traction in the National Science Foundation for the funding of US collaborators. Unfortunately, the project fell through and was discontinued. Action: We will initiate a conversation on the OA Information Exchange on this topic. Champion: Education and Outreach Coordinator. Completion Date: December 2021.

AA2-6. Invest in under-sampled regions to better inform risk and vulnerability. Response: OAP has already increased our monitoring footprint in the Gulf of Mexico over the past few years. Action: Plan to take this under consideration for all future funding opportunities. Champion: Program Manager. Completion Date: Ongoing.

AA2-7. Enhance stakeholder engagement in Southeast and Gulf of Mexico. Response: The Coastal Acidification Networks in these regions which we founded and support are engaging with stakeholders. Over the past year, we have taken extra efforts in the Gulf of Mexico to support the Coastal Acidification Network with our Knauss fellow providing coordination capacity to assist with needs. We admit we are finding stakeholder engagement very challenging in both of these regions. Action: We will first conduct the stakeholder assessment recommended in AA1-4 and then determine how to enhance engagement. Bottom line is if stakeholders don't exist, it will be hard to train them and sustain a functioning network. Completion Date: Ongoing.

AA2-8. Provide clarity and guidance on targeted research approaches for project participants. Response: It is difficult to elucidate exactly what PIs need to do to write a successful grant proposal. We feel we provide significant guidance and feedback to recipients in a one on one approach, especially for the more challenging science requests which require interdisciplinary research teams. We have recently started doing webinars at the launch of a NOFO to explain how best to approach writing a grant proposal which will meet the NOFO requirements. Action: We will continue our newly adopted practice of holding webinars at the launch of NOFOs which we can then post on our website along with NOFO information. Champion: Program Manager. Completion Date: Ongoing.

AA2-9. Consider ways to document non-published and externally published accomplishments. Response: See High Level Recommendation #6 and the response.

AA2-10. Continue efforts to better engage social scientists. Response: This is a high priority for OAP as indicated in the 2020 NOAA OA Research Plan. Action: The OAP will continue this work and prioritize social science background in any new hires. Champion: Director and Program Manager. Completion Date: Ongoing.

Activity Area 3

AA3-1. Evaluate staff and resource needs for data management and product development. Response: We agree that we have been forward thinkers in our funding of data management and creative thinking about data access and product development. We also agree that we need to continue to focus on this aspect of our work to ensure adequate staffing and capacity. Action: OAP recently initiated new activities and conversations to strengthen our understanding of how our data stakeholders access data through conversations with scientists and organization of data challenge workshops. Champion: Deputy Director and Program Manager. Completion Date: Spring 2021 and ongoing.

AA3-2. Seek to shorten the time between data collection and data publication. Response: OAP has worked from the very beginning to speed up the time from data collection to data publication without, at the same time, compromising data quality. We have achieved this by actually funding NCEI to have a dedicated person to pull data in which involves working with PIs, reminding them that their data is due, following up again, etc. We have done this not only for oceanographic data but also for biological data. We have also funded software development at PMEL to streamline this process for PIs. Action: We will continue to focus on this as this continues to be a high priority for OAP. Champion: Deputy Director. Completion Date: Ongoing.

AA3-3. Explore solutions for making real-time data publicly available. Response: OAP has been struggling with this issue since the inception of the program. NOAA PIs have been reluctant to serve real time data from OAP moorings for quality control reasons. Ideally, we need to set up automated systems for serving more than visualizations of real time data from our OAP supported moorings, at least for pre-approved partners if not the public. Action: Figure out how to push this effort forward, likely with a workshop and the setting up of an active, dedicated conversation on the OA Information Exchange about climate versus weather quality data. Champion: Deputy Director and Communications Coordinator. Completion Date: Active engagement launched by December 2021.

AA3-4. Engage stakeholders for solutions to data discoverability and consider development of a user guide to data access. Response: OAP received positive reviews for our work on data access and we are encouraged to conduct the live fire activities we have planned. PMEL recently created a new interface with OAP support for accessing PMEL collected carbon data which is a great contribution towards this effort at easing access. The suggestion to convene the data management stakeholders from the review for additional input is a good idea, especially virtually. However, it may not be possible to serve those data in the way our data management stakeholders are envisioning given the way NCEI is structured. The report also suggests that OAP develop a user guide for data access which is an interesting proposal which could be tailored regionally and live on our website. Action: 1) convene the data management stakeholders from the review to gain further insight into their data access needs (likely will roll into a data workshop we already have planned for May) and 2) consider

development of data access user guide for OA data. However, recognize that OA data is enmeshed with the rest of NOAA's oceanographic data and contained in data systems controlled by NESDIS. Champion: Program Manager. Completion Date: Some progress by February 2022.

AA3-5. Clearly define stakeholder subgroups and their data management and product needs. Response: Good idea. Action: This activity could be merged with the other stakeholder defining processes and outreach proposed in High Level Recommendation #3 (see above for more specifics on target dates).

AA3-6. Continue efforts in collaboration with NOAA programs and IWGOA to improve interoperability of data. Response: OAP is recognized for our leadership on data management - there is no action required other than continuing our good work. We will note we started leading the discussion about access to OA data across the federal agencies way back in 2012! Action: OAP will continue these discussions with other NOAA programs. Champion: Deputy Director and Program Manager. Completion Date: Ongoing.

AA3-7. Engage in discussion with OAR and other NOAA Programs to clearly define data management responsibilities. Response: OAP is recognized for our leadership on data management - there is no action required other than continuing our good work. Action: OAP will continue these discussions with other NOAA programs. Champion: Deputy Director and Program Manager. Completion Date: Ongoing.

Activity Area 4

AA4-1. Update the NOAA OA Education Implementation plan. Response: OAP was already planning to do this. Action and Due Date: A team of authors will be recruited in Summer of 2021 with a new Implementation Plan released by December 2022. Champion: Education and Outreach Coordinator.

AA4-2. Consider public accessibility to some OAIE content to increase interest in membership. Response: Good idea. Action: The OAIE Steering Committee has been discussing this and is currently brainstorming an approach to show leading content from within the OAIE publically on social media platforms to drive traffic and increase membership to the OAIE. Champion: Director and Outreach Coordinator. Completion Date: Started by May 2021 and assessed by Fall 2022 for effectiveness.

AA4-3. Update the OAP website to make content and information more 'discoverable'. Response: The OAP agrees and is currently collecting analytics on the website to understand user behavior and needs. Redesign of the website is already being planned. Champion: Outreach Coordinator. Completion Date: Begin Fall of 2021 and be completed by Spring 2023. Timeline has to take into account a shift in the OAR website provider.

AA4-4. Examine and clearly define OAP's diverse stakeholder groups, subgroups,

and their needs. Response: Good idea, although I am not convinced that our stakeholders have really changed much overtime. Action: Refer to plan to do a stakeholder analysis in High Level Recommendation #3.

AA4-5. Evaluate all education and outreach activities including communication.

Response: Given our current plan to revise the Education Implementation Plan and to develop a communications plan process, I think we have this covered. Action: That said, we are consulting with the NOAA Office of Education to seek advice on a more coordinated approach to communication and education and how to develop the best metrics for evaluating our success in those areas. We will also consider the hiring of additional communications staff. Champion: Education and Outreach Coordinator. Completion Date: September 2021.

AA4-6. Include information on program decision-making processes in future strategic plans.

Response: We think it is a good idea to be transparent about our decision making and this recommendation encourages more of the same. Action: We will do our best to continue with transparency and agree that we can incorporate our plans and processes into our OAP Strategy and into our Education Implementation Plan. See timelines and champions for the OAP Strategy (High Level Recommendation #1) and the Education Implementation Plan (AA4-1).

AA4-7. Consider an approach for more active communication and delivery of information to stakeholders.

Response: Good idea. Action: The OAP initiated a quarterly e-newsletter (now public) in January 2021. The newsletter encourages subscriptions via digital channels. In addition, OAP is now creating an annual communications plan to engage partners and target specific audiences to expand its reach. Champion: Outreach Coordinator. Completion Date: Initiation done and work is ongoing.