

**U.S. IOOS Advisory Committee
Virtual Public Meeting
Meeting Minutes
May 11 and 13, 2022**

Notification and Availability of Meeting Materials

The Integrated Ocean Observing System Advisory Committee (IOOS AC) was announced to the public by [Federal Register Notification](#) and on the [IOOS Advisory Committee Website](#). Meeting presentations and background material are posted on the IOOS website. All attendees participated virtually by Google Meet.

IOOS Advisory Committee Members Present:

Sara Graves, Ph.D., University of Alabama in Huntsville (Co-Chair)
Jason Biggs, Ph.D., Guam Department of Agriculture
Daniel Costa, Ph.D., Institute of Marine Sciences, University of California Santa Cruz
Catherine Edwards, Ph.D., Skidaway Institute of Oceanography, University of Georgia
Eoin Howlett, Trinnex
Molly McCammon, Alaska Ocean Observing System (AOOS)
Julio Morell, Caribbean Coastal Ocean Observing System (CARICOOS)
Ruth Perry, Ph.D., Shell Renewables & Energy Solutions
Jennifer Read, Ph.D., Univ of Michigan Water Center Graham Sustainability Institute
Daniel Rudnick, Ph.D., Scripps Institution of Oceanography, University of California San Diego
Oscar Schofield, Ph.D., Rutgers University Center for Ocean Observing Leadership
Richard “Dick” West, ADM (ret.), Independent Consultant
Robert “Bob” Winokur, Independent Consultant

Susan Yee, U.S. Environmental Protection Agency (ex officio)
Laura Lorenzoni, NASA (ex officio)
Carrie Schmaus, DOE (ex officio)
Josie Quintrell, IOOS Association (ex officio)

IOOS Leadership and Staff in Attendance:

Carl Gouldman, IOOS
Krisa Arzayus (DFO), IOOS
Laura Gewain, IOOS Affiliate
Schuyler Nardelli, IOOS
Nick Rome, COL
Kruti Desai, COL
Masha Edmondson, COL
Cassie Wilson, COL

Invited Participants (non-FAC members)

Deerin Babb-Brott, OSTP
Bob Houtman, NSF
Jake Kritzer, NERACOOS
Mark Osler, NOAA
Jan Newton, NANOOS

Jim O'Donnell, UCONN
Nicholas Schmidt, OCM
Ashley Peiffer, IOOS Association
David Bigger, BOEM
Adena Leibman, NOAA
Ed LeBlanc, Orsted
Gerhard Kuska, MARACOOS

Public Observers:

Sharon Mesick, NOAA
Ross Timmerman, SCCOOS
Becky Baltes, IOOS
Derrick Snowden, IOOS
Marian Westley, COOPS/NOAA
Melissa Zweng, IOOS
Oriana Villar, IOOS
Brian Zelenke, IOOS
Kirsten Larsen, NOAA
Shaya Heckman, Navy
Jessica Snowden, IOOS
Ralph Rayner, IOOS
Chrissy Hayes, NOAA
Kelli Paige, GLOS
Megan Medina, SCCOOS
Patricia Perez, NOAA
Henry Ruhl, CenCOOS
Katy Bland, NERACOOS
Erica Dintaman
Rebecca Atkins
Shaketa Malone
Daniel Doolittle
Julie Jakoboski
Tom Vinson
Sebastian Velez

DAY 1
May 11, 2022

Meeting Welcome and Administrative Updates (Krisa Arzayus, U.S. IOOS Advisory Committee Designated Federal Officer and Deputy Director, NOAA's U.S. IOOS Office)

K. Arzayus welcomed everyone to the May 11 U.S. Integrated Ocean Observing System (IOOS) Advisory Committee public meeting which was chaired by Sara Graves, Vice-Chair, U.S. IOOS Advisory Committee. She noted that NOAA appreciates the time and diligent work of the Committee in preparing for this meeting and for their forthcoming deliberations. K. Arzayus provided an overview of her role as the Designated Federal Official (DFO). As the DFO for this meeting, she serves as a liaison between the Committee and NOAA and the IOOC. She is responsible for ensuring all provisions of the Federal Advisory Committee Act (FACA) are met regarding the operations of the U.S. IOOS AC. She noted that a critical responsibility as DFO is to work with appropriate Agency officials to ensure that all appropriate ethics regulations are satisfied.

K. Arzayus noted that the objective of this meeting is to receive updates from subject matter experts related to the Committee's work plan priorities and to make progress toward developing recommendations to NOAA and the IOOC. Recommendations are an important outcome of the work of the Committee. The federal government tracks how many recommendations are generated and how many are implemented. The Committee will be presented with the official NOAA response to last year's recommendations report.

Lastly, K. Arzayus reviewed the protocol for questions, public comments, meeting minutes and convened the meeting of the U.S. IOOS Advisory Committee at 10:07 am ET.

Opening Remarks (Sara Graves, Vice-Chair, U.S. IOOS Advisory Committee)

S. Graves welcomed the committee to the public meeting. S. Graves reminded the AC that they are charged with providing recommendations to NOAA and the IOOC. During the last public meeting (Nov/Dec 2021), the committee agreed to take a phased approach to their recommendations this year. Phase 1 closely aligns with Rick Spinrad's priorities for NOAA (Climate Change Adaptation, Diversity, Inclusion, and Service Equity, and New Blue Economy). Phase 2 (Marine Life Program, Enterprise Excellence, Design of FY24 IOOS External Review) will begin after Phase 1 is completed. Preparatory Work Groups (PWGs) for Phase 1 have already begun to meet and have preliminary discussions. The PWGs will provide report outs and help facilitate discussions for Phase 1 priorities which are paired with topical briefings throughout the meeting.

The goals of this public meeting are to provide the PWGs more context on the ongoing efforts within NOAA and the IOOS Enterprise regarding each of these three priority areas, continue to develop and revise work plans for each of the PWGS so that they can identify and draft top priority recommendations to present at the next public meeting, and, lastly, identify other actions and next steps, including preliminary planning for the next public meeting.

U.S. IOOS Office Update (Krisa Arzayus, Deputy Director, U.S. IOOS Office)

K. Arzayus provided an update on the IOOS Program Office (PO). FY22 Priorities for the IOOS Program Office were shared with the committee. In terms of coastal, ocean, & Great Lakes

observing, predicting, and informing, the PO aims to continue delivering, diversifying, enhancing, and increasing accessibility of IOOS products and services for all Americans to meet customer needs. The three areas of focus will be:

- Climate Data & Services - Detecting the climate signal at the coast and understanding its manifestations and helping to prepare a Climate Ready Nation
- Improved Coastal Resilience including coastal modeling / predictions - Enhance ecological forecasting supported by observing, science, and equitable service delivery
- Economic Development - healthy blue economy and growing “new blue economy” and services in the face of coastal hazards - including workforce development

K. Arzayus provided a synopsis of the U.S. Enacted and President’s Budget for FY22. The total enacted is 48.2 million, 41 million for the Regions and 7.2 million for the National Office. The next steps for the budget include tracking the FY22 Infrastructure Bill – the ORF funding (100 million) shall be for supporting improved and enhanced coastal, ocean, and Great Lakes observing systems (spread over 5 years), the FY22 appropriation dissemination, and planning for FY24.

K. Arzayus provided a few highlights of the activities in the IOOS PO. The Surface Currents Program: HF Radar Network in FY21 saw a nationwide expansion of high-frequency radar modeling for U.S. Coast Guard search and rescue, the migration of the HFR network to FCC-approved radio broadcast frequencies, recapitalization and Fill-the-Gaps, offshore wind turbine radar interference mitigation (WTRIM)—research, development, and coordination with other Federal agencies and the offshore wind energy industry, and improved data availability, including “rawer” measurements (e.g., radials, spectra, range series). In FY22, the program will see “Version 1” testing of Wind Turbine Interference mitigation software and continued software development, continued siting for new HF Radar installations and NEPA reviews, data improvements and modeling, retuning, and wave measurement testing. The 2021 Glider program accomplishments include the 1st season glider data assimilated into the operational RTOFS, the most successful season for Navy gliders as part of the NOAA-Navy partnership, funded by OMAO: 14 missions, 80% success rate, first quasi-located / quasi-simultaneous observations from gliders and saildrones, new glider port at the Cape Eleuthera Institute, Bahamas - first glider track in Bahamas waters, hurricane gliders officially a component of NOAA Hurricane Field Program, gliders were coordinated with the rest of ocean observations (Argo, drifters, XBTs, P3s, C130s, ...) through the GOMO Extreme Events Ocean Obs Task Team (EEOOTT), and provided real-time ocean data in proximity to 8 tropical cyclones via the IOOS National Glider Data Assembly Center. DMAC highlights include the 2022 Marine Biological Data Mobilization Workshop (March 2022) which fostered a collaborative effort between OBIS, IOOS, MBON, Hakai, CIOOS & OTN and IOOS Code Sprint (April 2022). The upcoming IOOS DMAC Annual Meeting is planned for June 14-16, 2022. In Coastal and Ocean Modeling, K. Arzayus highlighted the Community Modeling Strategy 2017 in Journal of Operational Oceanography, NOS Vision established 2021, Community Modeling Workshop (October 2021), the NOS Modeling Strategy 2022, and the COMT Awards which were announced in June 2021. For the Ocean Technology Transition (OTT) Program, the NOFO will be published in August 2022, LOIs are due October 21, 2022, the Review Panel will take place from Jan-Feb 2023, and funding decisions will be finalized by April 2023.

Lastly, K. Arzayus provided a reminder of the 2018-2022 IOOS Strategic Plan and announced the IOOS Implementation Approach. For the Implementation Approach, the Core Writing Team is soliciting input from across the IOOS Enterprise including POCs from the IOOS Program Office

Staff, Regional Association Directors, IOOS Association Executive Director, and the IOOS Advisory Committee. The writing team is looking to develop an agile implementation approach that will focus on:

- Processes. Repeatable and predictable systems, tools, and processes will be put in place.
- Cadence. A consistent and predictable cadence of check-ins that focus on strategic planning and implementation efforts for the period ahead will be put in place.
- Priorities. Implementation efforts will be aligned with Office priorities for a more tactical approach and provide opportunities to discuss where limited resources should go.

The IOOS Implementation Approach will be finalized by September 30, 2022. In addition to the Implementation Approach, the IOOS Strategic Plan will receive a “Light refresh” that maintains our goals & objectives and reflects the current status and observing needs of our Nation’s oceans, coasts, and Great Lakes. The refreshed Strategic Plan will be finalized by June 30, 2022. The writing team is considering moving away from a 5-year plan to one that is reviewed and refreshed annually. The intent behind this is for IOOS to regularly revisit the Strategic Plan as part of an iterative, agile, and predictive approach that is responsive to the current events. To exemplify why an annual refresh may be beneficial, the upcoming NOAA Strategic Plan and NOS Strategic Plan will be reviewed for the 2024 “light refresh.” Significant events that could trigger a major review and overhaul of the plan, include New IOOS Director, New Administration, Significant Budget Changes (+/- 20%), Major Legislative Changes, and other major events.

K. Arzayus initiated discussion for the committee with the following questions:

- *What do members think about moving away from a 5-year plan to one that is reviewed annually?*
- *Do member’s agree with the criteria that would trigger a major review of the Strategic Plan? Are there additional criteria that need to be added?*

Lastly, it was noted that IOOS provided a draft of the revised Strategic Plan and requested IOOS AC members review the draft and provide comments by May 27th.

Discussion:

- S. Graves agreed that annual refreshes are helpful to in being agile, but need more strategic, long term vision to go along with it. She asked about the NOS Strategic Plan as well.
 - C. Gouldman clarified that the NOS Strategic Plan will be a 5 year plan.
- D. West asked if NOAA puts out federal annual planning guidance from the front office. K. Arzayus noted that there hasn’t been a memo in years.
- O. Schofield agreed that 1 year reviews are great, but should be done in the context of a 5 year plan.
- B. Winokur agreed with O. Schofield. Annual R&D planning guidance should be reviewed. He cautioned annual revisions of the strategic plan as the strategy could be lost. He noted that it is vital for the IOOS AC to have review opportunities for the IOOS strategic plan.
- M. McCammon agreed with everyone. She noted that even when the 5 year strategic plan was drafted that it was not visionary enough. It should be revisited with support from the RAs and IOOS AC and then should have supporting annual implementations plans.
- J. Biggs noted that budget planning should align with the strategic planning timelines.

- B. Winokur asked if the timeline that was shared with the FAC was mandated by NOAA or if it was self imposed.
 - C. Gouldman noted that it is self imposed.
- D. Costa agreed that we need to have a more strategic and visionary plan paired with an annually reviewed implementation plan. The IOOS AC should be a part of the drafting and review of the plan.
- S. Graves asked if the committee can have a briefing and review at the next public meeting.
 - K. Arzayus noted that we may meet in August and we can dig into the strategic plan and the implementation plan **(ACTION)**.

Response to IOOS Advisory Committee Recommendations Report (Carl Gouldman, Director, U.S. IOOS Office)

C. Gouldman provided an overview of NOAA's response to the recommendations report provided by the IOOS Advisory Council to NOAA and the IOOC in June 2021. These recommendations covered three priority areas: (1) Vision and Strategy for the Future, (2) Creating and Sustaining Strategic Partnerships, and (3) Requirements Management and Infrastructure Investments for Success and Growth. NOAA concurs or concurs with intent to all 21 recommendations, and the full response can be found on the IOOS Advisory Committee website.

C. Gouldman walked through each of the three priority areas and highlighted some of the steps taken to address the recommendations. In the "Vision and Strategy for the Future" priority area, a main theme was to maintain and increase IOOS observing infrastructure. Increased resources in recent years have been critical for maintaining and growing IOOS observing infrastructure, through "Fill the Gaps" funding from Congress and the Infrastructure Investment and Jobs Act (IIJA). FY17-21 "Fill the Gaps" funding invested \$11.6M in glider observations, \$9.6M in HFR observations, and \$8.1M in streamlined access to observations. IIJA provides a singular opportunity to allow NOAA to increase support for key programs, activities, and partnerships that expand delivery of strong science, service, and stewardship to address improved and enhanced observing systems. C. Gouldman was named as lead for provision 11 and the first meeting with OMB is this Friday – C. Gouldman is looped into the reporting structure, which is good news for tracking these funds. Another main theme under this priority area was to advance technology, data tools, and data aggregation. Efforts underway to address this theme include: the Ocean Technology Transition Program that sponsors the transition of marine observing technologies to an operational mode; NOAA's Service Delivery Framework to continuously build a network of trusted experts who engage internally and externally with partners to inform NOAA's product and service development; involvement in conferences, trade shows, and competitions; Data Management and Cyberinfrastructure efforts such as the annual meeting and the recent "Advancing the National DMAC System Architecture" NOFO; and RA involvement in Regional Ocean Partnerships to enhance capacity for sharing and integration of Federal and non-Federal data to support regional coastal, ocean and Great Lakes management priorities. A third main theme under this priority area was to advance linkages and integration of regional and global models. The NOAA Modeling Board, and the Expanding Operational Ocean Forecasting and Prediction Working Group (C. Gouldman named champion of this group), are both working to coordinate and integrate the production of world-leading, fully coupled, Earth System models. The Coastal and Ocean Modeling Testbed program funded five three-year projects in FY21 with a focus on transitioning models from research to operations. There are also changes to marine JEDI infrastructure within the Unified Forecasting System. A fourth main

theme under this priority area was economic valuation of observing systems. Efforts underway to address this theme include: The 2015 and 2020 Ocean Enterprise Studies, the Benefits of Ocean Observing Catalog, a prototype economic valuation study of observing systems within the IOOS regions led by the IOOS Association, a GOMO and OAP funded valuation study by Hauke Kite-Powell, a Marine Economy Satellite Account Statistics report in June 2021 from the Bureau of Economic Analysis, and a study of the potential benefits to society of NOAA's next generation geostationary satellite program (GeoXO) led by NOAA's Office of Performance, Risk and Social Science. The final main theme under this priority area was to enhance the future workforce. Efforts underway to address this theme include: hiring a DEIA fellow through the IOOS Association to help amplify regional work opportunities to improve IOOS' ability to serve and engage underserved communities; IOOS personnel serve as application reviewers and internship hosts for the Hollings Scholarship Program and EPP/MSI; the RAs also host summer undergraduate interns; funding for undergraduates and recent graduates to attend DMAC Code Sprints and the Google Summer of Code; and distribution of the children's book "The Ocean Is Our Home" by Dina Eparkhina and Karri Lehtonen to six local elementary schools.

C. Gouldman walked through major themes in the "Creating and Sustaining Strategic Partnerships" priority area, including examples of key partnerships within NOAA, across different government agencies, private industry partnerships, and partnerships with BIPOC communities, underserved and underrepresented communities. The IOOS Office strives to work with partners across NOAA and interagency to maintain alignment with ongoing initiatives. Examples of NOAA partnerships include the NOAA Water Initiative, the Coastal Coupling, CoP, the NOS Coastal and Ocean Modeling Strategic Plan, the Coastal and Ocean Modeling Testbed, the Climate, Ecosystems, and Fisheries Initiative, Coastal Inundation at Climate Timescales, the Extreme Events-Ocean Observations Task Team, the integrated field campaign with GOMO, and the NOAA Open Data Dissemination Program. Examples of interagency partnerships include NOPP funding for MBON and ATM, efforts through the IOOC, hurricane intensity forecasting (NOAA AOML and ONR), and DOE's "Powering the Blue Economy: Ocean Observing Prize." Private industry partnerships are fundamental to the success of the IOOS Enterprise. Some examples of stakeholder engagement include: the Ocean Technology Transition program, growing the New Blue Economy within NOAA, engagement with IOOS RAs and Ocean Enterprise businesses (e.g., SOFAR, Saildrone, etc.), and the MOU between NOAA and BOEM to advance wind energy responsibly while protecting biodiversity and promoting cooperative ocean use. Partnerships with BIPOC and underserved and underrepresented communities are led by the IOOS Association DEIA fellow, who is connecting with RAs to help them develop plans to establish and grow DEIA efforts within their regions.

C. Gouldman walked through major themes in the "Requirements Management and Infrastructure Investments for Success and Growth" priority area. The first main theme was accessing and tracking requirements. To assess requirements, IOOS is working with the RAs to create a repeatable cycle to identify gaps in each region, and is focused on leveraging across program and matrixing requirements through platforms such as the NOAA Climate, Ecosystems, and Fisheries Initiative, connections to the Weather Enterprise, contributions to the Office of National Marine Sanctuaries conditions reports, partnerships with the National Center for Coastal Ocean Science on HABs, the NOAA Weather Water Climate Board, and the NOAA Modeling Board. To track requirements, the IOOS Office has developed a Community Unfunded Requirements List to catalog gaps and needs of the system – IOOS has already used this tool to help with IJA funding in order to help with planning for three funding scenarios. The other main theme in this priority area was infrastructure investments. Investments in regional

infrastructure are managed through Operations, Research, and Facilities funding. IJA also allocated resources to IOOS to help meet recapitalization needs, with \$150M allocated for “improved and enhanced coastal, ocean, and Great Lakes observing systems” including \$50M of PAC funding.

C. Gouldman encouraged everyone to read NOAA’s full response to the June 2021 IOOS Advisory Committee recommendations for more detail. Although many examples were highlighted, there is always more work to be done to advance and grow the IOOS Enterprise. C. Gouldman thanked the Advisory Committee for helping IOOS with this task and providing thoughtful recommendations.

Discussion

- S. Graves asked whether C. Gouldman wanted to comment on recommendations 3.1.2 and 3.1.4 which were not included in the presentation. S. Graves also asked if IOOS learned things from the FAC that helped IOOS advance and think about things not previously thought about.
 - C. Gouldman noted that it was illuminating to go through the exercise, and helpful for looking forward. He mentioned that the WWCB put together a team to list all ocean observations work to help address recommendation 3.1.2.
- M. McCammon mentioned ties to the recommendations given earlier on the Strategic Plan, specifically that there are so many individual programs in NOAA and it would be helpful to know where IOOS fits in. She noted that a more defined strategy/vision of how all the pieces would work if fully funded would be helpful. She also asked whether the NOAA Water Initiative Service Delivery Framework model was NOAA’s go-to for stakeholder engagement, and whether it was implemented throughout NOAA and not just for the water service.
 - C. Gouldman noted that the Water Initiative Service Delivery Framework is broadly spreading across NOAA. It was born out of the Water Initiative, who wrote up the terminology and definitions, and is now broadly accepted across the large part of NOAA. NOAA is just at the start of understanding what this means for implementation and culture change, and Nicholas “Miki” Schmidt and Ellen McCray are helping with this piece. C. Gouldman is actively interested in working to capture successes and best practices from regions in IOOS’s implementation plan. Better coordination is key.
- D. West asked about IOOS’ involvement in the [US Coastal Research Program](#).
 - C. Gouldman mentioned he had been to some meetings. The program is anchored in the Army Corps and coordinates coastal process studies and research across agencies. IOOS does not try to coordinate with that group, but it’s an opportunity to align funding opportunities.
 - D. West mentioned that there are many groups that could end up competing with each other for funding.
 - J. Read asked whether the IOOC could have served this purpose for the US Coastal Research Program.
 - C. Gouldman responded maybe. Nicky Elco is pushing that group to have better coordination. They are focused on dredging and hardening gray/green infrastructure. This needs to be addressed through the Defense Act. C. Gouldman pointed out resources like the IOOC.

- S. Graves thanked the IOOS team for putting together this response and mentioned that there would likely be several things the Advisory Committee would like further reports on.

IOOC Update (Deerin Babb-Brott, White House Office of Science and Technology Policy and Bob Houtman, National Science Foundation)

D. Babb-Brott provided an update on the Ocean Policy Committee (OPC). The OPC was first established by Executive Order in 2018 and codified into law by the 2021 National Defense Authorization Act (Public Law 116 283; NDAA Sec. 1055), in order to coordinate Federal actions on ocean-related matters. It is co-chaired by the Director of the Office of Science and Technology Policy (OSTP) and the Chair of the Council on Environmental Quality (CEQ). The OPC collaborates with the ocean community on ocean-related matters to advance ocean science and technology (S&T), identify priority ocean research and technology needs, and leverage resources and expertise to maximize the effectiveness of Federal investments in ocean research.

In their 2022 work plan, the OPC will focus on actions to support regional coastal and ocean management, develop ocean-climate solutions to mitigate for and adapt to climate change, connect investment in and application of applied ocean science and technology to management needs, and advance sustainable ocean economies. For regional coastal and management support, the OPC seeks to address support for regions increasingly reflected in policy and budgets (OPC authorizing legislation directs engagement and support for regions (example is \$56m/5 years in the IJA)), and the plans to build on NE, Mid-A, and other sources for lessons learned and engagement practices and data portals as national models. For Ocean-Climate solutions, the OPC will focus on green shipping, blue carbon, and ocean renewables as they provide significant potential emissions reductions and other actions ongoing or under development that provide adaptation benefits (coastal resilience, fisheries, etc.). The OPC will coordinate development of an ocean-climate action plan that builds on agency actions and timelines. For applied Ocean Science and Technology, the OPC will focus on “use-inspired” S&T as opportunity to advance regional management (wind/resource interactions, for ex), show strong support for agency engagement and private sector/regional partnerships in National Oceanographic Partnership Program, and connect regionally identified needs with agency investment in NOPP projects: focus on communicating regional S&T priorities to OPC. The OPC will also be drafting a National Strategy for a Sustainable Ocean Economy. To guide the plan, OPC will consult with Tribes, and collaborate with ocean stakeholders and key regional entities – ROPs, FMCs, R/As, others – to develop a National Strategy. OPC will solicit comments and engage this spring/summer in regional conversations to help scope the approach that advances regional interests. The actions the U.S. is taking and/or will take towards achieving a sustainable ocean economy have advancing regional interests as a key component. ‘Sustainable ocean economy’ is described by themes of ocean health, wealth, knowledge, equity, and finance. The associated outcomes of a sustainable ocean economy includes:

- Sustainable Ocean Energy: Ocean-based renewable energy is fast-growing and on the path to becoming a leading source of energy for the world.
- Harnessing Ocean Science, Technology and Data: A globally shared data revolution has contributed to sustainable ocean management worldwide.
- Protecting and Restoring Marine and Coastal Ecosystems: Marine and coastal ecosystems are healthy, resilient and productive, and nature-based solutions are key elements in developing coastal infrastructure.

Lastly, D. Babb-Brott noted that the SOST released a new report: Opportunities and Actions for Ocean Science and Technology (2022-2028). This report aims to help decision-makers better incorporate the Federal Government's key priority topics into ocean S&T decision-making and implementation. In conjunction with this release, the SOST is hosting an Opportunities and Actions Roundtable. This roundtable is an opportunity for interested parties to share their ideas on how U.S. Federal agencies can 1) Address climate change, 2) Advance resilient ocean S&T infrastructure, and/or 3) Make the blue workforce more diverse and inclusive. Submissions are due on June 10th.

B. Houtman thanked his fellow IOOC co-chairs and members and provided a brief update on the IOOC. The Ocean Societal Indicators (OSI) Task Team has distributed a data collection form to gather information about existing socioeconomic indicators or suites of indicators to assess how they can inform ocean, coastal, and Great Lakes observing products and data. The group is now in the process of analyzing this data using existing frameworks. This analysis aims to identify trends and gaps and inform the prioritization of indicators and potentially the creation of new indicators to integrate into ocean observing systems. Subsequent objectives will involve disseminating identified priority ocean societal indicators to relevant agencies and organizations, refining them based on feedback, and recommending paths for implementation. The Biology-Integrating Core to Essential Variables (Bio-ICE) Task Team's two subgroups completed their final deliverables. Reports include outlines of synergies in terms of spatial and temporal observing requirements and existing observation infrastructure and delivery, including best practices and standard operating procedures. It also includes suggestions to improve pathways for data flow for observations of these variables from Regional Associations of the U.S. IOOS, other non-federal partners, and federal sources. Both reports have been reviewed by the IOOC and are in process of completing individual agency review. Underwater Glider User Group (UG2) has been running bi-monthly community webinars on topics ranging from industry engagement to regional operations. The membership has reached 223 members and expanded their communications to Slack. An in-person workshop is being planned for September 20-22, 2022 at the Botanical Gardens on the campus of University of Washington in Seattle, WA. This workshop will bring together the global underwater glider community to strengthen international collaboration through community dialogue, exchanges of information, sharing of experiences, and development of best practices to support the glider community. Registration and abstract submissions are open.

B. Houtman provided an overview of upcoming activities for the committee. The IOOC is reviewing proposals for new task teams focused on Open Ocean Science (cloud computing) and the Coastal Climate Signal. At the request of the IOOS Advisory Committee and with guidance from SOST/OSTP, the IOOC has taken steps to understand the scope, parameters, and process in undertaking the federal budget crosscut mandated in both the ICOOS Act of 2009 and the Coordinated Ocean Observation and Research Act (COORA) of 2020. When considering the logistics of conducting a coordinated, comprehensive budget there are clear barriers to overcome:

- Definitions: Determining what programs are included e.g. satellites; the inherent challenge of selecting what activities fall under the U.S. Integrated Ocean Observing System.
- Prioritization: Developing a budget crosscut may ultimately put existing programs at risk if decision-makers interpret certain programs being more critical to the System than others.

- Accuracy: Acquiring the capacity and resources to undertake the level of effort for furnishing detailed and accurate budgets is high; along with ensuring there is neutrality and acknowledging that certain classified programs would be impossible to include.

Lastly, B. Houtman noted that the recently held SOST Environmental Justice Workshop led to a few discussions for the IOOC to:

- Increase outreach/engagement (resources)/participation of tribal/indigenous communities in ocean observing and generation of associated ocean knowledge
- Leverage place-based programs to expand community engagement (dialogue) intersections with agency programs.
- Leveraging existing climate equity assessments that have taken place in agencies and how to take advantage of it and how to link them

IOOS Association Update (Josie Quintrell, IOOS Association Executive Director)

J. Quintrell provided an overview of the IOOS Association. The IOOS Association is a small non-profit association located in Maine that supports the IOOS Enterprise through advocacy for IOOS and the RAs, coordination (e.g., identifying common issues of the RAs), building IOOS federal/non-federal partnerships (administration, Congress, national partners like COL, etc.), tackling emerging issues, and pursuing other special projects. The IOOS Association aims to make sure the IOOS Enterprise has the resources to measure and predict the coast, ocean and Great Lakes to deliver sustained information, support decision making, and bring outstanding value to society, with goals such as:

- Increase funding for IOOS by 100%
- Increase ability of IOOS to be responsive and innovative
- Increase coordination across all IOOS agencies and regions
- Increase diversity and inclusivity of network and partnerships
- Increase visibility and reach of IOOS
- Ensure the health and sustainability of IOOS Association

J. Quintrell discussed IOOS Appropriations and Infrastructure bills. There was a tremendous increase in the presidential budget at both the regional and national levels in FY22 that was matched in the House and Senate. If Congress had acted on time, IOOS would have seen a significant increase in funding. Instead, big inflation associated with the war in Ukraine caused budgets anticipated last summer to be cut. The regional budget still increased by ~\$500k, but this was less than expected. Overall this has been a crazy budget year - we usually have the presidential budget by October 1st, but we did not receive it until March this year. This happened to many programs and is not specific to IOOS. There were two proposed infrastructure bills: the Build Back Better bill is fading away, but the Infrastructure Investment and Jobs Act was enacted with \$150M for coastal and ocean observing systems (\$100M in Operations, Research, and Facilities and \$50M in Procurement, Acquisition Construction). IOOS was not specifically named, but Congressional intent is for IOOS to receive funds. The spend plan is still in Congress, but IOOS is trying to help RAs be prepared for when we finally get the spend plan from Congress. Regional 5-year needs include addressing aging infrastructure through recapitalization and modernization (e.g., addition of cyberinfrastructure) to meet future demands. This is an incremental process for the IOOS Association over the next 5 years.

J. Quintrell discussed the FY23 IOOS Associations Appropriations request to Congress. The regional IOOS FY23 request was \$75.3M, which is an increase of \$7.5M over the FY22 presidential budget. This provides \$50M for core regional association support, \$20.3M for infrastructure repair and modernization, and \$5M for innovative competitive grants. The IOOS National Program Office request was \$13M and was the same as the FY22 presidential budget request, with goals to develop a biological and marine life observing program, advance coastal modeling for ecological forecasting and maritime commerce, facilitate integration of non-federal efforts with NOAA, and provide capacity for system management. 72 House members signed the IOOS Association's "Dear Colleagues" letter, which is now circulating in the Senate. This indicates lots of support and shows that the program is making a difference to House members and constituents, and hopefully this will translate into monetary support.

J. Quintrell discussed harmful algal blooms (HABs) and the HAB Observing Network Framework between NCCOS and IOOS released in 2019. HABs vary regional, so a national plan does not make sense. In FY20, Congress provided \$1M for 5 pilot projects in the HAB observing network, which resulted in a HAB Observing Network Implementation Strategy released in 2021. In FY21, \$2.5M was allocated for 7 pilot projects in the HAB observing network, including a Gulf of Mexico Testbed. In FY22, we are expecting no less than in FY21. The HAB Observing Community of Practice is a steering committee that brings together federal and non-federal people interested in HABs. Over 120 people have been attending their webinars. HABs observing is one component of larger ecological forecasting efforts.

J. Quintrell talked about a July 2021 report the IOOS Association released called "Detecting the Coastal Climate Signal: The IOOS Contribution." This report was a product of all the IOOS organizations coming together to address the coastal climate signal, and originated from an idea that came from the FAC. It describes how climate change impacts people differently in different regions (e.g., sea level, inundation, lake water levels; HABs, OA, hypoxia; heat waves; extreme storms), and lays out 5 recommendations the IOOS Association has been working on: (1) Expand coastal observations and support regional-scale models by fully funding RA Proposals; (2) Recapitalize and modernize existing infrastructure; (3) Invest in technological innovation for new types of observing tools and sensors and to improve regional models; (4) Data integration and smart technology; and (5) Service equity. Next steps include a webinar dialog series to learn about certain aspects of the coastal climate signal: 2 have already taken place (Global to Coastal in Fall 2021 and Fisheries in Spring 2022), and 2 are upcoming (Resilience in Summer 2022 and Marine Life in Fall 2022). Additionally, RA proposals under review for climate projects. Finally, we submitted a proposal to host a U.S. CLIVAR Community Workshop with goals to optimize existing ocean and climate observing systems; co-design systems around large-scale oceanographic drivers such as the Loop Current, Gulf Stream, California Coastal Current, Arctic, islands and Great Lakes; develop an execution plan for addressing user needs; and launch an IOOC Coastal Climate Task Force.

J. Quintrell noted a study the IOOS Association recently led in partnership with the Center for the Blue Economy at the Middlebury Institute of International Study called "The Economic Value of Ocean Observing in the United States: A Prototype User Valuation Study." This prototype study used Contingent Valuation (a standard method for estimating value of goods with no price) to estimate the value of IOOS within the regions. The RAs posted an online study, and 3,633 people responded (not evenly distributed across the RAs, and not as many respondents as hoped for). The value of IOOS was estimated to be \$197M per year, with \$156M for

organizations and \$41M for individuals. This study gave a national view of how data is being used, with private industry and government serving as the biggest users, and within the private sector fishing, recreational guiding, consulting, and aquaculture served as the most important components.

J. Quintrell talked about diversity, equity, inclusion and accessibility within IOOS, specifically about the joint IOOS Association/IOOS program office project led by Ashley Peiffer, the 2022 IOOS DEIA Fellow. The goals of this project are to amplify existing and planned efforts to improve DEIA and service equity; research and recommend best practices for improving service equity, training opportunities for staff, workforce development and support, co-development and other activities; facilitate information sharing and seek partnerships; and identify next steps including possible funding opportunities.

J. Quintrell announced her retirement at the end of the summer, although she is planning to stay on for some projects through the fall. A search is underway for a new director of the IOOS Association led by Gerhard Kuska. They are looking for a creative and dynamic individual to lead the organization into the next decade. Interested candidates can apply at search@ioosassociation.org. If you know of anyone, have them apply soon!

Discussion:

- S. Graves noted that the equal treatment across the RAs that J. Quintrell has helped facilitate is great, and that trying to keep this going under new leadership will be important.

Growing the New Blue Economy -

- **Fostering and Building a New Blue Economy** (Carl Gouldman, IOOS Office Director)

C. Gouldman discussed fostering and building a New Blue Economy. He started off by discussing the Blue Economy, and that the ocean and our coasts play an outsized role in the economy of the United States and our way of life. The Blue Economy comprises both the economic uses of the ocean and ocean resources, and the non-market/societal benefits derived from the ocean (two sides of the same coin). In order to continue fostering prosperity, the blue economy must integrate ocean and climate data along with increased prioritization of environmental stewardship to achieve a resilient ocean.

C. Gouldman walked through the definitions of the Ocean Economy, the Blue Economy, and the New Blue Economy. The *Ocean Economy* comprises all economic activities related to oceans, seas and coastal regions. The *Blue Economy* is a more recent term with varying definitions, but in general it comprises all Ocean Economy activities, it includes a commitment to sustainability; and it recognizes non-market benefits, such as carbon storage, coastal protection, cultural values, and biodiversity. The *New Blue Economy* is the information and decision support tools that come from our ocean data, as well as the value in the decisions that are made or enabled. The New Blue Economy enables and informs the ability to meet Blue Economy needs and goals. The “new” in New Blue Economy also represents fresh thinking with an emphasis on the value of a Blue Economy informed by data, information, and knowledge. Dr. Rick Spinrad (U.S. Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator)

coined the term “New Blue Economy,” describing it as “a knowledge-based economy, looking to the sea not for extraction of material goods, but for data and information to address societal challenges and inspire their solutions.” Dr. Spinrad describes IOOS as the “currency of the realm” for the New Blue Economy, as the data we generate, produce, and compile is an underused resource.

C. Gouldman described the main components of the New Blue Economy as *the providers* of the technological means to undertake ocean observations and measurements, *the producers* of core public good ocean data and information, such as for example NOAA, and *the intermediaries* who tailor ocean data and information to support a specific end-use such as ensuring safety, operational efficiency or the protection of ocean health. This data is then marketed or provided for end users either publicly or privately. End user choices have societal benefits, and can also have economic advances. The Blue Economy is expected to double from 2010 to 2030. This will drive growth in scale and complexity of New Blue Economy products and services that need to be delivered by public and private organizations. NOAA will need to effectively partner with academia and industry to deliver this future New Blue Economy, and there is an increased need to coordinate and operationalize the value chain linking providers, producers, and intermediaries of data for society (IOOS every day!).

C. Gouldman described the Ocean Enterprise Study. In 2015, IOOS funded a study to better understand the scale and scope of U.S. Blue Economy business activity. In 2020, IOOS funded a follow up study. The 2020 Ocean Enterprise Study report contains a huge amount of detailed analysis concerning U.S. business provision of ocean observation and measurement technologies and value-added information services. The report found that the number of U.S. businesses engaged in the Ocean Enterprise has grown by around 300 companies since 2015, with a corresponding increase in total employment; revenue has grown by almost \$1B; there has been a marked decline in demand for Ocean Enterprise products and services in support of offshore oil and gas exploration and production, historically one of the cluster’s most important markets; and that the growth in revenue indicates that demand from other Blue Economy markets has more than compensated for the decline in offshore oil and gas related revenues over the period.

C. Gouldman discussed NOAA’s role in growing the New Blue Economy, which is a long-term effort that will last after the administration changes. Some of NOAA’s main roles are to: promote and foster innovation and opportunities for data-driven, value-added services by conducting more ocean and coastal observations, providing accessible, reliable, consistent and accurate data, continuously engaging, and developing “principles” and clarifying roles and responsibilities; conduct and support research, development, acquisition and application of new technologies; promote and develop a diverse and ready New Blue Economy workforce; and to optimize the application of science, technology and data to fulfill NOAA mission, including providing services for an informed and ClimateReady Nation.

C. Gouldman mentioned that NOAA and NOS are drafting new Strategic Plans and both are prioritizing the New Blue Economy as a primary goal. Both seek to define the New Blue Economy, explain how the New Blue Economy will utilize NOAA’s Service Delivery

Framework, and prioritize social inclusion and equity. These documents are useful for framing what the New Blue Economy means within the lens of NOS and NOAA, and will evolve to become a strategy for NOS and NOAA. The major strategic objectives under the NOAA Blue Economy draft Strategic Plan include: Improve ocean-related data and access, strengthen established sectors of the Blue Economy, improve resilience of coastal communities and economies, and protect and restore marine life and ocean, coastal and Great Lakes ecosystems. The New Blue Economy falls within the “Improve ocean-related data and access” strategic objective, and includes strategies such as promoting the development of the Ocean Enterprise, innovating approaches for data collection and forecasting, and increasing stakeholder engagement. The end goal is to align New Blue Economy goals across DOC, NOAA, NOS, and IOOS Strategic Plans.

C. Goldman discussed the importance of data to fuel the New Blue Economy. NOAA wants to help the United States respond to changing conditions with a next generation ocean economy fueled by ocean information and American ingenuity. Data is at the heart of the New Blue Economy and NOAA is working to improve access to its vast data resources, including traditional, tribal and cultural knowledge. Our work at NOAA is also taking place within broader U.S. Administration and Department of Commerce initiatives, including the upcoming BlueTech Discover Global Markets forum, which will take place this coming September in Rhode Island. This flagship event brings together ocean technology, sustainability and logistics to stimulate U.S. trade in the marine renewables, port technology service, ocean science and research, and maritime transportation sectors.

C. Goldman walked through some examples of how NOAA is actively advancing New Blue Economy goals. The first example was Precision Marine Navigation. Mariners rely on NOAA’s weather, oceanographic and navigation data and services everyday. Previously, there was no centralized source for the different data streams and services. To fix this, NOAA made this data centrally available in internationally recognized standards and easily accessible to mariners and developers of value-added services. The result is Precision Marine Navigation, which improves route planning, provides safer and more efficient operations, reduces fuel consumption, and lowers emissions. The second example was the recently released Distribution Mapping and Analysis Portal. NOAA is responsible for the sustainable management of U.S. fisheries. This can be difficult, as the climate and oceans are changing and altering the geographic distribution of fish populations. To fix this, NOAA created a portal to improve access to species distribution information and the ability to identify shifts to make more informed and timely decisions. DisMAP Version 1.0 allows users to visualize distribution changes over time for over 800 marine fish and invertebrate species. The third example was sea level rise science and tools. The recently released Sea Level Rise Technical Report is an authoritative information source for sea level rise projections for next 30-80 years, and is an example of decision support information that NOAA puts out that is in the New Blue Economy. Accompanying this report was NOAA’s Sea Level Rise Viewer, which provides up-to-date sea level rise projections for all U.S. states and territories, out to the year 2150, in an interactive, publicly available format. This format provides decision-makers with the concrete information needed to plan for things like infrastructure adaptation or the siting of new projects at the local level. Technological advances mean that the observations and information that power the Blue Economy can evolve to inform our

understanding of the changing climate and ocean on Earth.

C. Gouldman concluded the talk by outlining 4 major take-away points: (1) The New Blue Economy is a knowledge-based, data-driven economy; (2) Knowledge and data have value, including economic value; (3) The New Blue Economy is grounded in a commitment to basic principles of sustainability, conservation and equity; (4) The New Blue Economy provides the foundation for sustainable economic use of the ocean and its resources, while protecting ocean health and ensuring social equity. Finally, C. Gouldman outlined potential IOOS Advisory Committee Engagement Opportunities, drawn from the “New Blue Economy Background and Options Paper that was provided as a read ahead to the Committee:

- Does the Committee have advice on a strategy for engagement with New Blue Economy stakeholders and partners?
- Does the Committee have any recommendations for adding/adjusting current research to operations approaches to encourage and support innovative ocean start-ups and the expansion of Blue Tech clusters?
- Does the Committee have any recommendations for connections with additional organizations to further support the innovative use of IOOS data and services, and to continue developing STEM expertise in the community?
- Does the Committee have any recommendations for additional activities that will further the understanding of the economic value of ocean observations?

Discussion:

- B. Winokur appreciated the definition of the New Blue Economy relative to the Blue Economy. He mentioned that it appears that NOAA is trying to organize the New Blue Economy similar to the way the Weather Enterprise is organized, and that within the Weather Enterprise is a commercial association. He asked if there was anything comparable on the commercial side for the Ocean Enterprise? B. Winokur noted that the National Weather Service is an authoritative source for watches and warnings, and asked if NOAA is competing with the private sector in this context?
- C. Gouldman asked whether there is a commercial analogy. He mentioned that there are groups like IOSTIA and MTS that can serve these roles, although not a direct analogy. IOOS is investigating the best mix of public service goods and service delivery, using lessons learned from the Weather Enterprise. IOOS is tasked with delivering ocean observations, but needs to add better collaboration with the private enterprise. We already use Weather Forecast delivery machinery in some instances, such as for harmful algal blooms.
- R. Perry asked if Dr. Spinrad’s priorities come with designations of roles and responsibilities, for example, are there parts specifically targeted for IOOS to figure out? Understanding this will help in deliberations to best position IOOS via recommendations.
- C. Gouldman explained that Dr. Spinrad has asked Nicole LeBoeuf to take the lead to create a plan to accelerate the New Blue Economy, and that Nicole asked IOOS to lead this effort. IOOS has formed a team within NOS and hired an LDCP to lead this effort, and the team is building a two part plan: (1) a near term action plan and (2) a longer term “roadmap” for growing the New Blue Economy to support Ocean Enterprise growth and improving public service delivery (e.g., predictions

and forecasting). The team is working to do this within the Weather Water Climate Board and is inviting other NOAA and interagency partners to help. The roadmap will be written within the calendar year, and IOOS welcomes the Committee's input.

- E. Howlett reiterated that the conversation about the parallels between the Weather and Ocean Enterprise was interesting. He was wondering about the producer to provider value chain, and how we make sure that private sector growth is a source of success and not competition.
 - C. Gouldman responded that market development is celebrated, and that if there is increased tension between public and private sectors, so be it.
 - E. Howlett asked for examples highlighting success or challenges.
 - C. Gouldman responded that the Ocean Technology and Transition projects in concept are good and work well, yet there is no operational stream up funding to pick this up. Resources are stretched thin, and there are no new funds to make technology operational once it is available.
 - E. Howlett suggested that this is not IOOS' responsibility.
 - C. Gouldman responded that IOOS should try and fill this role anyway, but we also have to support the presidential budget in each year. Big Data Projects are a challenge in terms of the number of players and bandwidth.
- O. Schofield mentioned the tension between private corporations and federal agencies, and his excitement that there is a team working on these interactions. He suggested that the NOAA Open Sky policy (emerged with satellites and data being sold) might be a nice resource for lessons learned. The policy still developed healthy companies, and did not take tax-payer funded companies being sold back for nothing.
 - C. Gouldman agreed that this is a good example. He elaborated that determining lessons learned from the Weather Enterprise is on the IOOS New Blue Economy team's list, and that NOAA has a public-private policy in place.
 - C. Edwards reiterated that there are two distinctions between the New Blue Economy and the Blue Economy: (1) The role of data to address societal challenges, and (2) who is involved on each side. She asked if the metrics/assessments used in valuation problems change for the New Blue Economy - is there potential for value to be missed or challenges we can anticipate in capturing the value of the New Blue Economy?
 - C. Gouldman noted that overlap and double counting is tricky. He mentioned the Marine Environmental Satellite Accounts work that looked at pieces of the ocean economy in a broader sense, and captured Ocean Enterprise Study numbers. There is some overlap in this, and we need to be clear about methodologies.
 - C. Edwards suggested that underlap might be more of a concern, for example, how data addresses societal challenges. She asked whether this impact was captured or if there are new metrics to identify?
 - C. Gouldman mentioned the Benefits of Ocean Observing Catalog that is compiling use cases to illustrate this. We are trying to compile a list long enough to answer these questions for a certain region or topic area.
 - S. Yee noted that there are economists working on the New Blue

- Economy team, but wondered if there were also decision scientists?
- C. Gouldman replied that there are not enough and more are needed. The team needs social scientists that understand how engagement translates into services. Both economists and social scientists are important in this effort.
 - S. Graves asked when the industrial world might pick up the cost and make money. She noted that the Blue Economy and New Blue Economy are both old and new concepts, which leads to opportunities. She asked whether NOAA is looking at long-term implications beyond the next 2-5 years?
 - C. Gouldman suggested wind energy development as an example of an emerging component of the Blue Economy that needs better data for their operations, which is where the New Blue Economy comes in. Developers need to look smartly at this over the long-term to do this work, and think about how to set up data sharing agreements and gather data to generate renewable energy.
 - B. Winokur asked who is the lead in NOAA for the New Blue Economy, and what the coordination mechanism across NOAA was.
 - C. Gouldman responded that Nicole LeBoeuf in NOS is the lead, and that the Weather Water Climate Board is helping with coordination across NOAA. The next step is to bring this topic across NOAA programs with equities in the New Blue Economy.
 - **Wind Energy Panels** (Moderator: Ruth Perry, Shell Energy Solutions)

R. Perry introduced the agency view of what is happening in offshore wind within the New Blue Economy, and introduced the Wind Energy Panel. The focus of her presentation was on the Atlantic, which is only a small portion of wind energy projects. Offshore wind energy is part of the New Blue Economy through partnerships, ocean observations, modeling, and mitigation planning, and IOOS plays a pivotal role in the observation and data component. R. Perry described the growth of offshore wind, especially in Europe, South America, and the Caribbean. There are lots of interactions between U.S. Agencies and international partners which invites opportunities to learn and share partners. The UN Decade is also focused on green energy. However, offshore wind development has major infrastructure needs including running cables offshore to inshore and lots of turbines with large footprints. R. Perry described the rapid pace of leasing in the U.S. In February there was an auction in the NY Bight that sold for \$4B, there are ongoing auctions in the Carolinas, and West Coast and Gulf of Mexico auctions at the end of the year. An open question is how do we ensure ocean observation capabilities are not negatively impacted by emerging infrastructure? R. Perry described emerging partnerships with the Offshore Wind Industry in terms of data sharing (e.g., real-time and survey data for 35+ years, utilize existing government frameworks), monitoring (e.g., baseline data collection, construction and operations monitoring), and research (e.g., local project efforts, regional fisheries and wildlife efforts). IOOS is positioned to be a data hub for the offshore wind industry. Only 7 turbines are in the water now, but this will expand, and there is an opportunity to utilize new platforms (with a lifetime of 35-40 years) for observing capabilities. Data standards and quality will be important in this effort. R. Perry explained that the Wind Energy Panel will start with national perspectives followed by regional perspectives, in an effort to focus the

committee by sharing lessons learned with the energy industry and how IOOS can best support and leverage this emerging sector.

National Wind Energy Panel:

D. Bigger presented an overview of the BOEM Renewable Energy Program and current activities. He mentioned that two months into the current Administration, President Biden issued Executive Order 14008 that called for the Interior Department to identify next steps to increase responsible renewable energy development on public lands and waters, and established the first-ever national offshore wind goal to deploy 30 GW of offshore wind by 2030, which would create nearly 80,000 jobs. To meet this goal, the U.S. needs to expand wind farms and provide new leasing opportunities. BOEM's renewable energy program includes 33 offshore leases, including 6 new ones in the NY Bight, 2 construction and operations plans approved for Martha's Vineyard, and 14 construction operations plans under review on the East Coast. BOEM is considering new areas for leasing off North Carolina (still in auction), California, Oregon, the Gulf of Mexico, and the Gulf of Maine. The first steel in the water (2 turbines) was in 2020 with pilot projects off of Virginia. Most development is occurring off the East Coast because there are shallower waters and higher winds compared to the West Coast, where deeper waters require floating technology. D. Bigger listed many projects in the pipeline through Atlantic OCS Renewable Energy from 2020-2030. South Fork and Vineyard Wind I are both permitted, construction on land is underway, and environmental review is underway, with hopes of being operational in 2023. D. Bigger showed an outline of the wind leasing schedule from 2021-2025. Lease sales in the NY Bight and Carolina Long Bay were completed in 2022, with plans to complete California lease sales by the end of the year, and Gulf of Mexico lease sales by the end of this year or early next year. BOEM is working to delineate wind leasing areas in the central Atlantic and the Gulf of Maine for sale by the end of 2023 and sometime in 2024, respectively.

A. Leibman presented an overview of NOAA's role in offshore wind development. She mentioned that there is an obvious connection between the burgeoning offshore wind industry in the U.S. and the data that has underpinned its success so far (a prime example of the New Blue Economy). Offshore wind development is happening fast, moving from 30 MW at Block Island and ~12 MW off Virginia, to the President's goal of 30 GW by 2030 (over 2,000 turbines). Offshore wind at this scale is new for the U.S., and we are all learning together. The President has made clear that the sustainable deployment of offshore wind is an important tool to addressing climate change, supporting coastal economics, creating manufacturing and other jobs in the U.S., and bringing clean and reliable energy to U.S. homes. NOAA takes that charge seriously and is committed to working with BOEM to support the increased deployment of offshore wind while simultaneously protecting biodiversity and supporting ocean co-use. NOAA has roles in providing a multitude of forecasts, products, services and tools to support offshore wind and management decisions including weather/climate forecasts, marine spatial planning tools, nautical charts, and other resources; consulting with BOEM and other federal agencies on the permitting and regulatory responsibilities under the Marine Mammal Protection Act, Endangered Species Act, and Magnuson-Stevens Act; and conducting research and monitoring to better understand the potential effects of offshore wind energy on ecosystems, wildlife, fisheries, and communities. In January, BOEM and NOAA signed an MOU that seeks to:

- Identify and using the best-available science, including Indigenous Traditional Ecological Knowledge
- Improve efficiency of environmental review and permitting
- Provide for the advancement of new jobs, improved scientific understanding, equitable economic development, environmental justice, and sustainability
- Spatial modeling and assessments of ocean areas
- Education, communications, and outreach
- Staff exchange and interagency training
- Early and ongoing communication throughout the process
- Data and information exchange
- Mitigation of impacts on agency operations and responsibilities, including NOAA's role in monitoring atmospheric and oceanic conditions and resources

A. Leibman clarified that the MOU makes room for annexes, including specific mitigation efforts like high-frequency radar interference. Offshore wind brings with it many opportunities including: How do we best collect, harness, and share (as appropriate) the data that is being generated about our oceans, habitats, fisheries, and wildlife in partnership with offshore wind? As a vehicle for interagency and public-private partnership itself, what lessons can we learn from IOOS on improving communication, expediting processes, and information sharing? How do we drive home the connections between the New Blue Economy and the emerging offshore wind sector?

National Wind Energy Panel Discussion:

- B. Winokur asked who has the lead in regulation and safety responsibilities in developing offshore wind, and what roles the Coast Guard and EPA play.
 - D. Bigger responded that BOEM is mostly involved in leasing and permitting, and its sister agency, the Bureau of Safety and Environmental Enforcement, is in charge of environmental compliance. They work with the Coast Guard as well.
 - R. Perry added that the process is very similar to oil and gas with the EPA side too. There is work between BOEM and BSEE to define specific roles.
- S. Graves noted that there is lots of collecting, sharing, and analyzing data in planning for the installation of wind infrastructure and asked whether there is a large plan for how this is all going to happen, or if there is more individualization?
 - A. Leibman responded that there are phases of data including early data contributing to site location, developer data including construction surveys, and long term monitoring data once turbines are in the water. In this early phase there are lots of vehicles, including IOOS, between agencies, between NOAA and developers, etc. There is an opportunity to think broader and more strategically.
 - D. Bigger added that this varies with data streams as well, and that there are lots of information gaps. Developers are planning to use the data from these initial projects to help inform future leasing, permits, and mitigation efforts.
- D. Costa emphasized that this is BIG infrastructure being put in place, and that we need to move toward renewable energy, but there are still significant gaps in our understanding of the effects for things like seabirds, marine mammals, etc.

The community wants to see this move forward, but how are we going to address these unknowns?

- R. Perry responded that coordination efforts across regions are happening at a regional level in the Atlantic.
- A. Leibman added that NOAA takes this very seriously, and has a mandated responsibility to worry about these issues (e.g., the Marine Mammal Protection Act). There are technological opportunities to improve quieting, etc. to help mitigation of initial risks, and the effects will be monitored closely.
- B. Winokur asked about the level of state coordination.
 - D. Bigger responded that state coordination is pretty good. BOEM works with states (states usually approach BOEM with interest), and coordinates with neighboring states and local governments. The states receive power from offshore wind directly, so they are interested.
 - A. Leibman added that the states are driving specific projects, and there is data sharing between states and agencies on the federal side. For example, the Coastal Zone Management Act reviews federal projects in coastal waters, and these conversations generate opportunities between states and developers.

Regional Wind Energy Panel:

E. LeBlanc presented Orsted's role in offshore wind development on the U.S. East Coast. Orsted is the largest developer of offshore wind farms, and was awarded ~5,000 NW of offshore capacity on the East. Currently they have 1 operational wind farm on Block Island (30 MW), their South Fork Wind farm is under construction (132 MW), and they were awarded 6 other lease areas for future development. E. LeBlanc showed a map of all the lease areas and wind energy areas on the East Coast. In the Northeast lease area, lease areas owned by different developers are immediately adjacent to each other, which is something unique to the U.S. and provides incentive to collaborate. It is tremendously difficult to obtain permits with different layouts, so there is a consistent layout across the Northeast area: 1 nm x 1 nm layout with 1 mi separation between towers and 0.7 mi separation on diagonals, which provides navigation safety and is conducive to search and rescue. Developers collaborated with each other and with BOEM, the Coast Guard, and mariners that frequented the area to develop a labeling and numbering protocol where each tower has a unique identifier, with additional identifiers available in the case of further expansion. There are many tier 1 search and rescue mitigation efforts underway that developers are working on jointly with input from federal agencies and regional mariners, aimed at taking the "search" out of "search and rescue" within the wind farms. E. LeBlanc also mentioned many other issues of common interest including New IALA Marking Guidance, PATON Process, AIS, Emergency Response Plans, Reflective Paint, UXO/MEC, Fisheries Issues, Jones Act Compliance, Vessel Safety Standards, and HF Radar Mitigation. E. LeBlanc mentioned the NOAA PORTS program in Narragansett Bay, RI that provides real time navigation (met info) to mariners to help with informed navigation decisions, and suggested a similar program be initiated in wind farms ("Wind Energy Area Observing System") with a purpose-built observing system to support safe navigation and operations, measuring variables such as wind speed, direction and gusts, wave height direction and period, visibility, air and

water temperature, and current speed and direction, and providing full accessibility of real-time observations and forecasts to support all mariners.

J. Kritzer discussed charting the course for IOOS in the development of offshore wind energy. Offshore wind presents an unprecedented opportunity for economic development and climate mitigation, but presents new challenges for a variety of economic, environmental, and policy issues, all of which have data needs for assessment and mitigation that are largely unmet at present. J. Kritzer emphasized that IOOS is an end-user driven enterprise, and displayed a table showing the key issues for offshore wind development as well as the agencies and policies involved. There is a complex landscape with lots of dimensions and challenges before us to generate, manage, and deliver the right data to the right users (agency, developer, and researchers). J. Kritzer displayed a map showing fixed sustained observing stations near the MA-RI Wind Energy Area. The existing assets are arguably inadequate even in absence of offshore wind and certainly after development. There is no ecosystem or even full metocean buoys yet, but there is potential to fill spatial and data gaps through partnerships. For example, there are stations coming online in 2024 - can we repurpose those to become sustained observing assets? J. Kritzer displayed a table of offshore wind industry monitoring activities, which show notable and laudable complements to public observing. However, there is not a ton of coordination and consistency and uncertainties in longevity and accessibility of this data, which creates gaps, inefficiencies, and frustration among offshore wind and other users. J. Kritzer suggested IOOS help guide and streamline data collection. IOOS is a ready-made convening of many relevant agencies, and is positioned to develop clear and coordinated guidance and provide and pool resources to support implementation through public-private partnerships. An example of a successful partnership we can try to replicate is the Massachusetts Bay Buoy. Run by the Water Resources Authority (a non-/quasi-governmental public utility provider), it is achieved by cost-sharing with NERACOOS/IOOS, and monitors requirements in EPA permits and aids calibration of hydrodynamic and water quality models. J. Kritzer put forth 4 questions for the Committee to consider:

- What should be the role of IOOS in the development of offshore wind?
- Can IOOS play a role in providing clearer guidance on data collection needs (and requirements?), coordinating efforts, managing data, and mobilizing resources?
- Is offshore wind an opportunity to take the vision of IOOS as a broad interagency partnership in new directions?
- What role can the FAC play in defining and advancing the IOOS role?

G. Kuska also discussed an emerging role of IOOS in offshore wind development. Offshore wind development has been coming down the pipeline for a while, and is a major addition to our offshore coastal waters – from Cape Cod to Cape Hatteras will be covered with development areas. A quarter of our population lives there and these are very busy waters. There is existing data collection associated with offshore wind that is expanding, but there are growing challenges, such as a lack of consistency, lost opportunities to capture and leverage data, and significant time spent chasing data and partners with limited access (due to ad hoc collaboration with no real regulatory or economic incentives for sharing data). In addition, each state and developer takes their own approach to data collection, which could be addressed in part through federal actions. New regional partnerships are being spun up to address some of these specific

aspects, and data sharing agreements are being set up individually and cooperatively (although some are stalled because there is no incentive to share data). Agreements between NOAA and developers, and the NOAA/BOEM MOU both provide a structure and potential for IOOS to become involved, but there is no clear path forward. There are many wind areas in planning phases, such as the Central Atlantic call area zone, which is just shy of 52 sq. km and is six times the size of current leases. But there is no systematic or organized approach to organize data collected in the future, and NOW is the time to address some of these concerns. G. Kuska laid out a few reminders, including: that this public-private partnership has been around for 13 years; that MARACOOS is an extension of a federal agency and works with partners to address data needs across users; that MARACOOS is a platform for data services from collection to archiving with NCEI, including quality control to meet federal standards and pipelines to centralize data and make it publicly available; and that federal certification of MARACOOS lends credibility to its data sources. This is the kind of foundation that we need to coordinate data collection in coastal Wind Areas. G. Kuska attempted to answer J. Kritzer's questions: He stated that the role of IOOS in offshore wind development is as a preferred and publicly acknowledged data source; that IOOS can absolutely play a role in providing clearer guidance on data collection needs; that we have a long way to go expand IOOS' vision to interagency partnerships, but creating value-added services for the data we provide is an exciting opportunity; and that the IOOS Advisory Committee can recommend that IOOS and certified regional associations are designated as preferred partners for collecting data surrounding offshore wind development and participate in data aggregation and management. Including IOOS in an annex for the BOEM/NOAA MOU would be an opportunity to publicly acknowledge this, and this could also be acknowledged in developer contracts. IOOS has 17 federal partners and a consistent framework and approach that is easily replicated, which could help maximize data collection that aids in management and servicing offshore wind development and other stakeholders.

Regional Wind Panel Discussion:

- R. Perry noted that there are a lot of developers new to the United States and that things are moving quickly, presenting lots of good challenges and opportunities.
- D. West noted to E. LeBlanc that medium to large ships will go around the wind farms, and there will be a surface radar problem in the middle of wind farms. D. West asked if a ship was in trouble in the middle of a wind farm, whether ENC will pop up and tell you which turbine you are near?
 - E. LeBlanc answered yes, all wind turbines will be plotted. There will be several indicators of where you are including ENC, AIS, and other electronic indicators.
 - R. Perry asked how we integrated this into NOAA charting that is accessible to mariners?
 - J. Kritzer mentioned that they are working on a mariner's platform.
- E. Howlett mentioned that in the Gulf of Mexico, there are regulatory platforms around ADCPs that are a major success for the oil and gas industry, and asked if this type of model would work in the offshore wind space?
 - R. Perry answered that there is nothing similar yet, and some of that infrastructure was set up by the authority between BSEE and BOEM for oil

spill and response. They are currently having these conversations around wind, and looking at a compliance side, we may see some of that come into this. Wind development requires buoys with LiDAR, and there are BOEM lease stipulations to put MODIS sensors on for tagged bird detection. There is flexibility in some areas for lease stipulation requirements, or working with lease developers on good will. It will be easier for BOEM and BSEE to do this than NOAA.

- E. Howlett notes that wind resource data is commercially sensitive.
- S. Graves thanked the national and regional wind panelists.
- R. Perry mentioned that there will be time to deliberate later in the day.

Public Comment Period

K. Arzyus opened the public comment period. No public comments were provided so the comment period was closed.

New Blue Economy discussion/PWG report outs

E. Howlett shared the report out of the New Blue Economy. The ideas, themes, and subtopics developed included:

- Economic Development
- How are RA assets used?
- Technology development gaps and opportunities
- Opportunities to engage the broader ocean science community, in partnership with the IOOS Regional Associations, to expand and possibly augment the current IOOS observing system footprint
- Supporting industry based observing assets that would be used, likely via “data buys” or data purchase agreements, to complement the existing IOOS network in support of the Administrations 30 x 30, Seabed 2030, Marine Life 2030, and NOMECC
- Explore the politics and implementation around data buys
- Implementation efforts

Discussion:

- R. Perry noted that data to archive is a critical point. The model of hurricane gliders can be used as a testbed for offshore wind. What is the role of IOOS and what are the opportunities for IOOS RAs in Offshore Wind? If we can get the model right, the industry will follow—the agencies do not give the best guidance. With IOOS not being a regulator or science/research side then it can be a better facilitator. Offshore wind offers up an opportunity to show what IOOS can provide.
 - E. Howlett responded that glider DAC is a great example. It’s a collaborative way for people to share data. IOOS has demonstrated its ability to bring people in.
- D. Costa agreed that data sharing and collecting data in a similar way/format and across different platforms is important. It’s hard to integrate plus it needs to be available. You can’t do it after the fact. How can IOOS lead this?
- D. West asked if the presenter could please define the new blue economy. The slide (from the financial world) shows one definition. What is it? Who’s in charge? How do I invest? There are too many definitions.
 - C. Edwards followed through on D. Costa’s point. Let’s make it easy and standardized. All these platforms are opportunities for instruments. Can IOOS

make a “make it easy” kit? Set up partnerships and facilitate the partnerships around them with a design in mind for that.

- R. Perry agreed and noted that a design needs to be thought of. A lot of developers are looking at AUVs but not structures. Someone (IOOS would be great) should look into the operational design.
- J. Biggs agreed with everyone so far. All these platforms are opportunities. IOOS was based on scientific-led questions. We need to figure out continually expanding platforms. We need to look at gaps and needs and not just add things in.
 - E. Howlett thought J. Biggs made a great point. He wonders if we can create jobs and revenue? Hardware/data are areas to do that, but we need to know how and where.
- B. Winokur shared that the FAC needs to look at this as a wider lens; offshore can be an example. Endorsing a port system for wind needs to be broader. The definitions between “new” and regular blue economy is not too clear.
 - S. Graves agreed with B. Winokur. And asked if offshore was in focus in the PWG meetings.
 - E. Howlett shared that it was not. The intent was to pick one example (i.e. offshore wind), but there is growth in many sectors and new sectors emerging.
- J. Biggs asked what is envisioned for IOOS to do, strategically. 1) IOOS should protect marine environments (hazard mitigation modeling) and 2) IOOS can provide baseline information on ecosystem health and protection.
 - M. McCammon added out that offshore energy is a key economic use of the ocean, and wind is a logical emerging sector. It makes sense to take advantage of this opportunity in some regions. In others, such as Alaska, wind energy is mostly terrestrial.
 - J. Biggs reminded the group that he doesn’t think that anyone is saying "forget wind," but rather to make our recommendations broader in their applications to new blue industries, including offshore wind.
- R. Perry emphasized that wind is a huge admin priority. We need to engage with things that help fill observational gaps (so many baselines will be answered, but they need to feed the data into something that helps other things). Offshore is a great opportunity. How does offshore wind fit into the feedback loop?
 - S. Graves asked what recommendations can the FAC give to help this. What are the impacts from offshore to other areas that we work in?
 - J. Read noted that it would be smart to use OSW as a case/template to help us figure out what we could recommend/ask more broadly related to the blue economy.
 - D. Costa added a link, saying NASEM just released a [report on the effects of offshore wind turbines on ship radar](#).
 - E. Howlett agreed that offshore wind is a great use case.
 - R. Perry added that there will be funding and more legislation.
- B. Zelenke added that there is a duality to offshore wind topic: conflicts and opportunity can help us and NOAA. He shared the link to [the offshore wind "background and options" 2-pager](#) R. Perry referred to.
 - E. Howlett agreed that offshore is a great use case. Can we tag the “data/regulatory” as a “new” blue economy?

- C. Gouldman replied that wind is an emerging blue economy sector. The related data can be considered a component.
- E. Howlett asked if it can be tied to job creation and investments.
- C. Gouldman replied that the design is needed and then could design workforce (like NDBC to GCOOS best practice). Domain expertise is needed (job creation piece).
- M. McCammon noted that when we started IOOS we were going to be the weather service for the ocean. That hasn't happened; only at localized levels. The WEF and Climate Center had 100 global corporations and buy the tech needed to lower their carbon emissions. Then the other private sectors would have a market and could invest in the R&D. Could we do something similar? Based on the needs of observations, we can get them to fund R&D (sensors).
 - E. Howlett loved that idea. Implementation is hard and adding a number for the investments.
- J. Quintrell asked if the NERACOOS example is a possible pilot project for what Carl outlined. Industry has expressed interest.
 - E. Howlett replied that there is an industry growing around the concepts.
 - R. Perry pointed out that this is similar to Seabed2030. The framework for other ocean observations could be helpful. Why should industry provide the data (LiDAR)? Mapping is there for Seabed 2030.
 - M. McCammon asked who is funding it? The government? A lot of functions are seen as a government responsibility.
 - J. Quintrell replied that offshore is a great opportunity as well as the other applications of the data.
- E. Howlett asked M. McCammon if the RAs are reliant on IOOS grants, what is your sense on building an economy around the RAs? Building a revenue outside IOOS PO. RAs being testbed incubators.
 - M. McCammon replied yes, we could. We could do so much more especially if the message comes from top down and bottom up. IOOS still struggles with this.
 - J. Kritzer echoed M. McCammon and J. Quintrell that a pilot is powerful. The leases are touching, so we should get the cooperation going. We need the agencies to push a pilot system.

Day 1 Adjourned

S. Graves noted that the read aheads for Friday are available and added that the FAC should discuss the timeline in the work plan. K. Arzayus thanked everyone for their time. She welcomed any feedback on the logistics. S. Graves noted the intertwined topics, PWGs, and development of recommendations across the three. The meeting was adjourned at 4:57pm ET.

DAY 2
May 13, 2022

Meeting welcome (Krisa Arzayus, U.S. IOOS Advisory Committee Designated Federal Officer and Deputy Director, NOAA's U.S. IOOS Office and Sara Graves, Vice-chair, IOOS Advisory Committee)

K. Arzayus welcomed participants to Day 2 of the U.S. Integrated Ocean Observing System (IOOS) Advisory Committee meeting. NOAA appreciates the time and diligent work of the Committee in preparing for this meeting and for their forthcoming deliberations. K. Arzayus also thanked the rest of the team supporting her in organizing this meeting: Laura Gewain, Schuyler Nardelli, Kruti Desai and the COL team, and Torie Ketcham. K. Arzayus explained her role as the Designated Federal Official. As the DFO for this meeting, she serves as a liaison between the Committee and NOAA and the IOOC. She is also responsible for ensuring all provisions of the Federal Advisory Committee Act (FACA) are met regarding the operations of the U.S. IOOS AC.

Also, in this role, a critical responsibility is to work with appropriate Agency officials to ensure that all appropriate ethics regulations are satisfied. In that capacity, all Committee members are briefed on the provisions of the Federal Conflict of Interest Laws. In addition, each Committee member has filed a standard government financial disclosure report. The objective of this two-day meeting is to receive updates from subject matter experts related to the Committee's work plan priorities and to make progress toward developing recommendations to NOAA and the IOOC. Recommendations are an important outcome of the work of the Committee. The federal government tracks how many recommendations are generated and how many are implemented. Agenda times are approximate. So, be advised that we may not be able to keep to the exact times as noted. We have introduced public comment periods throughout the meeting. Please remember to keep your microphones on mute unless you are speaking. Committee members may use the chat or the raise hand feature in Google meet to indicate you would like to speak and we will be doing our best to monitor those. For any members that are on the phone, feel free to interject when you want to make a comment. We will not be recording this meeting. Copies of all meeting materials and public comments are available on the Committee website. For members of the public requesting time to make a public comment, please limit your remarks to 2 minutes and an announcement will be made when the floor is open for public comments. During Committee discussion, if Committee members require greater clarification on an issue requiring participation from the public (including agency participants), they may request such information during the meeting through the Chair or myself. In addition, public commenters, as available during the Committee's discussion, may be asked to provide clarification of their comments to further assist the Committee in their discussion.

The Committee Meeting Minutes: As per FACA, minutes of this meeting will be prepared. The minutes will include a description of the matters discussed and the conclusions reached by the Committee. As DFO, K. Arzayus will work with our support team to prepare the minutes and ensure they are certified by the meeting Chair within 90 calendar days of this meeting. The minutes of today's meeting will be available via the Committee website. K. Arzayus convened this meeting of the U.S. IOOS Advisory Committee and gave the floor to vice-chair, Sara Graves.

Climate Services Session

S. Graves thanked everyone for a good discussion at the last meeting and asked to continue the climate services discussion today. M. Osler began the discussion on climate services and mentioned it is an emerging topic within NOAA's climate ready nation priority. The main focus is to provide a compelling way to convey the combined contributions of NOAA's mission areas and

prioritize where the most impact can be made. The vision is a thriving nation whose prosperity to, health, security, and continued growth benefit from and depend upon a shared understanding of, and collective action to reduce the impacts of climate change. With increased climate funding there is a once in a generation opportunity to execute actions and this vision to carbon net zero. This effort is aligned with the recent report out of climate information and services to the public and has also identified additional challenges and hazard areas. It also aligns with the recent sea level rise report to help communities assess potential changes. The current focus areas are fire, drought, flooding, heat, coasts, marine resources, and mitigation. Initial partner groups include Department of Commerce, Federal agencies, state and local leaders, tribes, academia, private sector, and public. NOAA cannot achieve this climate ready nation without their partnerships and external communications through these groups. The climate ready nation will be implemented through a scalable matrix approach with impact areas. Mitigation efforts and partnerships are the key components. M. Osler provided NOAA's value chain to ensure alignment with existing projects and portfolios and build better connections. It is important to note that the value chain showed that it is a feedback loop with constant re-evaluation. M. Osler mentioned the need for external funding for trainings and end user engagement. Currently NOAA is collaborating with the U.S. Department of Transportation on a climate ready nation to provide information and assistance to planners and stakeholders to enhance safety effectiveness, equity and sustainability of our nation's transportation infrastructure while collaborating on nature-based solutions. Next steps are to integrate a climate ready nation into existing NOAA offices and programs to support cross cutting structure and continue to engage across NOAA and with partners to share, improve and advance the climate ready nation concept.

S. Graves thanked M. Osler for his presentation. Molly asked a clarifying question on the five focus areas: if coastal resilience includes marine resources. M. Osler said yes it does but also considers the National Marine Fisheries Service which allows marine resources to stand on its own. M. Osler also mentioned stand alone add-ons such as GHG mitigation. S. Graves added a comment about how all types of information is important for the user at both ends of the value chain.

J. Biggs asked if this is a general indicator at how the government sees tribes and indigenous communities that are often lumped in with the general public? J. Biggs continued to state it is important that tribes and indigenous communities are specifically called out in the value chain diagram and that pacific islanders struggle with the federal government definition. M. Osler mentioned he will bring that feedback to NOAA to make those distinctions.

Molly McCammon was the next speaker who gave an overview of Coastal Climate Signal from the IOOS Association. Climate change impacts vary significantly by region and asked the FAC to expand coastal observations, support regional scale models, fully fund regional associations' proposals, recapitalize and modernize existing infrastructure, invest in new technology, improve data integration with smart technology, and improve service equity. M. McCammon mentioned the next steps from the Coastal Climate Signal will be webinar events, tier two regional association climate related projects, and the U.S. CLIVAR community workshop that will optimize existing ocean and climate observing systems, co-design systems, address user needs, and potentially launch a new IOOC task team.

M. McCammon also reminded the FAC of their recommendation in 2021 to ensure sustained observations to respond to changing ocean and climate conditions and their impacts. M. McCammon mentioned the regional associations play an important role in detecting climate

systems through gliders and mooring and continue to advance linkages between local and global model scales that was also recommended by the FAC in 2021.

NOAA concurred with those recommendations and this discussion was continued by Dan Renwick at SCRIPPS on how the coastal climate signal connects to global systems. D. Renwick provided background on the importance of observations to understand and predict changes in climate, weather, oceans, and coasts while sharing that information with others to conserve and manage coastal and marine ecosystems and resources. The need for climate observations can determine changes within a society where they live and impact lives daily such as hurricanes or El Nino events. Climate is a priority within the white house, and it is the responsibility of IOOS to respond to this priority by making the contributions we are uniquely positioned to make. D. Renwick provided examples of evidence for the global to coastal climate connection with the marine heatwave off the U.S. west coast which connected to basin scale changes of the Pacific Ocean, variability of sea surface temperature, to local effect steric height and El Nino anomalies. D. Renwick also pointed out that boundary currents are a global priority of GOOS and GOOS currently has efforts towards a cross-network boundary current and ocean glider BOON. Advancing coastal climate observations need to continue its legacy of observations and coordination, collaborate with stakeholders, and create a practical way forward.

Jan Newton, NANOOS, discussed major climate impacts of heat waves, species range shifts, hypoxia, ocean acidification, HABs, sea level rise, and shoreline changes all occurring in the Pacific Northwest. J. Newton provided a marine heat wave example offshore in the Pacific Ocean as well as in the Puget sound estuarine, an example of hypoxia found with gliders, HABs and Dungeness crab fisheries, and shoreline changes along the coast of Oregon. She highlighted the need for user-driven and co-designed apps that harness observations and models to provide society with useful information that is critical to decision making. S. Yee asked about hypoxia in relation to fisheries risk and species range shift and J. Newton responded that there is a need for more research on species range shifts and are looking for both the onset of hypoxia events as well as species range changes.

James O'Donnell from the Connecticut institute for resilience and climate adaptation presented on the Shoreline preservation Task Force and the impact of shoreline flooding and sea level rise on the community. J. O'Donnell presented findings of frequent road flooding, which distributed business and led to the creation of this task force that used IOOS data and user driven needs to map shoreline flooding, sea level rise, and more information to the community.

Climate discussion/PWG report outs

D. Rudnick provided a report out and proposed endorsing the recommendations from the coastal climate signal paper.

- J. Biggs seconded. He added that there is great value in long term observations and data sets.
- S. Graves agreed with J. Biggs. It is so important to maintain long term data records. This is similar to the blue economy.
- O. Schofield agreed with recommendations and supported endorsing.
- S. Yee pointed out that it's a great starting place. We should highlight starting with the end users and their needs – assuming the RA proposals have considered that. We should add physical, chemical, biological observations and socioeconomic factors to this. We should also add the new blue economy to tie these into each other.

- J. Biggs added that we could recommend an effort to identify these long-term datasets and a call to assess how these could be included/augmented in future efforts.
- O. Schofield added that it also provides a basis for getting RAs standardized datasets across the nation.
- M. McCammon asked, as part of our recommendations, if there would be value in adding an OSSE and then seeing the current status and seeing the gaps.
 - D. Rudnick considered that could be an approach, but it is difficult. We have so much but there are so many different interest groups. We need to identify our priorities first. This is definitely an approach worth taking.
 - J. Quintrell built on D. Rudnick's response. The proposal to the US clivar is an attempt to optimize the existing system and identify gaps.
 - D. Rudnick added that page 10 of the paper shows the recommendations in more detail.
 - J. Read liked the idea of endorsing these. Is there anything that would be helpful to keep these activities moving?
 - J. Quintrell answered positively and noted that it's important to highlight IOOS in light of climate. This would show NOS and NOAA that we play a huge role in addressing their mission.
 - J. Newton agreed and noted that we need to influence the recommendations and the aim of what we're doing. This has a lot of value to the Hill and at NOAA.
- D. Rudnick highlighted the second recommendation (the recapitalization one) and noted that it needs to be emphasized.
- C. Gouldman thanked the panel and committee for this discussion. He asked for more context and path forward on each of the recommendations.
- B. Winokur reminded the FAC that recapitalization was highlighted in the last report and asked if we need a plan.
 - M. McCammon responded that there was a plan developed. It was developed by the RAs in response to the infrastructure bill. We're taking the unmet needs to Congress for annual appropriations. She suggested that the spreadsheet gets cleaned up and presented as the "plan."
- J. Newton added that we need to show the long time series in addition to the 5 recommendations, specifically linking it to climate change.
- J. Biggs agreed with J. Quintrell. IOOS needs to demonstrate the strength of its grass-roots, bottom-up guidance. Sea Grant does this well but is fundamentally different in the services they provide coastal communities.
- J. Biggs asked if there is an optimization thing we can do for the RAs assets in the water. It would show the most efficient way to recap and modernize. Is there value in quantitative assessment of the size and placement of observing assets in terms of their contribution to models and findings? Researchers do this to some extent in the initial design of their systems, but often do so with the lens of "the more the better," rather than Value of Information (VOI) analysis.
- D. Rudnick redirected attention to number 4 on the recommendation list. He noted that there needs to be a clear leader in the coastal climate signal. IOOS can be that.
- B. Winokur endorsed J. Biggs' recommendation. Optimization assessment should be added to the plan.

- M. McCammon agreed with D. Rudnick. We need a reflection from NOAA leadership that says IOOS is the leader. This committee can recommend that NOAA endorsed IOOS as the leader of the NOAA-wide initiative.
- K. Arzayus brought up long-term datasets, specifically referencing J. Biggs.
- J. Biggs noted that we need those to be continuously funded. An assessment of other long term datasets could be beneficial in seeking out more data that could help here.
 - O. Schofield noted that we could have nationwide data set standardization.

Diversity, Inclusion, and Service Equity (Nicholas “Miki” Schmidt, OCM and Ashley Peiffer, IOOS Association DEIA Fellow)

M. Schmidt provided an overview of the NOAA Service Equity Assessment with the Office for Coastal Management. This assessment was completed nearly a year ago and provided a summary on the assessment and how it was achieved.

E.O. 13985: Advancing Racial Equity and Support Underserved Communities through the federal government. Under this E.O., NOAA selected three efforts: 1) Weather Ready Nation, 2) OAR-Sea Grant Awards, and 3) NOS digital coast sea level rise viewer tool. The process consisted of an OMB self-assessment questionnaire with five main sections comprised of 26 questions with additional sub-questions. Iterative with staff, external experts, and leadership key findings were identified and recommendations were compiled. They received positive and informative feedback through engagement with several staff members as well as several groups from outside NOAA to review equity of questions. NOAA leadership was engaged throughout the entire process.

M. Schmidt detailed the assessment findings of the digital coast sea level rise viewer tool:

- Insufficient data regarding if and how underserved communities use sea level rise viewers and associated data, tools, and trainings.
- Gaps in characterizing the most vulnerable populations and identifying best practices for ensuring equitable service delivery.
- Minimal systematic or focused work with networks and partners to ensure underserved audiences are benefitting from the data and information resources

As a result of these findings, NOAA has compiled broader considerations such as federal coordination, stakeholder fatigue, public expectations, metrics, evaluation, data collection, and sustained investments in relationships. Throughout webinars a key theme that resonated with participants was “not for me, without me”. M. Schmidt mentioned that NOAA needs to stay engaged and trust what is being developed.

Molly responded to M. Schmidt stating there are a lot of challenges identified in the assessment findings that AOOS has faced with indigenous communities and federal bureaucracy. Molly stated federal bureaucracy doesn’t give flexibility for the tools needed for indigenous community engagement. Molly provided an example of needing to provide prizes or “swag” for indigenous community engagement which cannot be paid with by federal stipend decreasing tools available to engage with indigenous communities. M. Schmidt responded that he is aware of these issues. He mentioned that he will look into stipends.

E. Howlett asked M. Schmidt about the background on the three focal areas. M. Schmidt mentioned he had the same question and received the answer that someone in NOAA leadership picked one product and one grant program. E. Howlette followed up asking what municipality is being used to see end users and where is that data being used. M. Schmidt

mentioned that you can get that data but missed direct linkage to underserved communities. He mentioned connecting to an SVI data layer in GIS would be great to include.

J. Biggs provided a statement to follow up Molly's comment about the fundamental disconnect between the way the country views indigenous knowledge and there are no federal designations shown. J. Biggs detailed that a few seminal works like "words of the lagoon" shows how cultural anthropology can document indigenous knowledge and was seen as an important resource, but someone else profited off indigenous knowledge and nothing was given back to the indigenous communities, which have been burned multiple times.

A. Peiffer outlined the high-level goals which included working with the IOOS Program Office, RAs, and IOOC agencies to:

- Amplify existing and planned efforts to improve DEIA and service equity,
- Research and recommend best practices for improving service equity, training opportunities for staff, workforce development and support, co-development and other activities
- Facilitate information sharing, seek partnerships
- Identify next steps including possible funding opportunities

The progress to date included an outline of existing DEIA efforts, qualitatively assessed needs to identify areas for improvement, compiled an up-to-date list of regional and national activities related to DEIA, and collated best practices in reaching underserved and underrepresented populations (co-design, STEM outreach, etc.). Currently, A. Peiffer is coordinating and documenting monthly DEIA calls, quarterly DEIA Dialogues discussions (April - Engaging with Indigenous Communities, June - Data Accessibility), connecting with IOOS partners to learn more about their DEIA initiatives, and researching funding opportunities for regional DEIA efforts. A. Peiffer outlined her initial findings on the DEIA elements within IOOS and they fell into four categories: 1) Administration and training, 2) Service equity, 3) Co-design and co-development, and 4) Community Engagement. The summary of needs to included an expand regional DEIA toolkit ("exploratory assessment"), research and sharing of best practices (hiring practices, data accessibility, reaching underserved communities), structural opportunities for knowledge sharing between Program Office and Regional Associations, among RAs, increasing capacity (identifying opportunities for funding and capacity building for RAs), and connecting Program Office and Regional Associations in DEIA goals, objectives, language, and action-based next steps.

Lastly, A. Peiffer outlined the goals in the DEIA Work Plan to address the elements and needs. The four goals included:

1. Communicate DEIA activities internally and externally,
2. Facilitate information and knowledge-sharing opportunities between the IOOS Office and RAs and among regional associations,
3. Identify funding resources to support RA diversity efforts including Federal programs, foundation, and others,
4. Provide recommendations to improve service equity, develop long-term activities at both the national and regional level, and create new, and strengthen existing, long-term partnerships.

DEIA discussion/PWG report outs

B. Winokur thanked A. Peiffer for her efforts and presentation. He noted that the PWG met with Ashley and they strongly endorse the strategy and recommendations that will come out of her fellowship.

- S. Graves asked if there are issues or differences in the regional and national levels of DEIA?
 - A. Peiffer noted that the bottom-up insights at the regions are used to meet the national level expectations and needs.
 - M. Schmidt brought up that we need to invest in the people to be engaged (the RAs are in a great position to keep up the sustained engagement. It is slower but it is coming. The priorities need to be set to make an impact.
 - S. Graves noted that the end user needs to be addressed.
 - B. Winokur added that barriers and cultural knowledge need to be heard and understood when engaging with local communities.
 - J. Biggs noted that increasing diversity can lead to brain drain.

B. Winokur and J. Biggs reported on the PWG meetings. J. Biggs noted that the [IOOS map](#) shows the areas observed and served by RAs are much larger than the 48 contingent states. J. Biggs noted that some of the major disparities are in the data itself. A map of assets was displayed. There are more US assets in the Indian Ocean than in the Western Pacific. Decreasing data disparity can be mitigated by addressing the PacIOOS work. Year long sabbatical funding mechanism in Palau, Micronesia, Marshall, Mariana, and Guam. Loaner program, traditional programs.

- J. Read added that we should encourage NOAA to be more upfront about utilizing traditional knowledge in decision making.
 - N. Schmidt noted that this [Rising Voice group](#) is one that NOAA federal is engaged with.
 - J. Read added that she likes [the sabbatical idea](#) too.
- M. McCammon added that Tier 2 should be rephrased. We need to show that this work is not any less important than others.
- J. Read asked if the IOOC is looking across the agencies to see what they are doing.
 - S. Graves noted that we can add that to the IOOC recommendations. She added that we need to look into the Phase 2 topics too. **(ACTION)**
 - [Link to all federal agency plans](#)
- J. Biggs asked if we should fund the best available science or put people in need at the top of the list.
 - J. Read clarified that this is the fundamental challenge with national competitions - they are treated/run with equality not equity.
 - J. Biggs added the [link](#) to NSF ESPCOR.

Committee Work Time/Deliberations

S. Graves asked each PWG to report out on their most important next steps. It was noted that all Phase 1 recommendations are due at the end of the fiscal year.

New Blue Economy Summary:

- A standard definition of New Blue Economy is needed.
- Data standardization (collection, formatting, and archive) is needed.

- IOOS is a great testbed for creating operational designs for optimizing autonomous and in situ platforms for integrated observations. IOOS is a great facilitator and collaborator.
- All recommendations from the New Blue Economy PWG/AC should be broader than Offshore Wind. But Offshore Wind would be a great pilot for IOOS to generate a best practices design for optimizing use of in situ platforms, filling other observational data needs (larger feedback loop), and data standardization. Workforce and investment opportunities should be considered in the pilot as well.
- To ensure recommendations are holistic, the PWG should:
 - review and connect the 2021 FAC Recommendations to NBE
 - identify/review opportunities in the small business and ocean startup community
 - review IOOS Partnership list from previous PWG
 - review of related IOOS initiatives (to be briefed in future)
 - have a 2030 discussion - support of the Administrations 30 x 30, Seabed 2030, Marine Life 2030, and NOMECE
 - consider cross theme recommendations

Climate Change and Adaptation Summary:

- The Coastal Climate Signal White Paper recommendations should be endorsed. NOAA and NOS endorsement can help emphasize the role IOOS and the RA's play in addressing their missions.
 - Rec #2 should be highlighted (recapitalization).
 - The plan for IOOS recapitalization should be refocused, summarized, and shared with the IOOS FAC. (10-15 pages)
 - Start with recapitalization spreadsheet
 - An optimization assessment based on size and placement of observing assets, in terms of their contribution from models and finding, should be considered to ensure that recapitalization is efficient.
 - Rec #4 (regional data integration services) should have a "how" component added.
 - There needs to be a clear leader in coastal climate signal. Suggested recommendation to NOAA to endorse IOOS as that leader.
 - Sustained, long term observations and datasets are vital to understanding climate change. Suggested recommendation to identify long-term datasets and a call to assess how these could be included/augmented in future efforts. This could provide a basis for getting RAs standardized datasets across the nation. Use of OSSEs could also help determine which datasets are most valuable, if they can be leveraged, and where the gaps are.
 - Ask the IOOC to endorse a Coastal Climate Signal Task Team and begin the work through the proposed CLIVAR workshop. The FAC asked the IOOC to express support to the program and submitted workshop proposal. (*Completed*)
- To ensure recommendations are holistic, the PWG should:

- review the response to the 2021 Recommendations Report to understand where the climate recommendations stand.
- consider cross theme recommendations

Diversity, Inclusion, and Service Equity Summary:

- The FAC should endorse Ashley's work. Tracking and maintaining close contact throughout the process. Need to identify mode of contact and tracking.
- Recommend or develop a sabbatical program (as described by J. Biggs).
- Recommend targeted funding for minority serving institutions
- Recommend/identify opportunities with grant processes for minority benefits or involvement.
 - Note: Be wary of brain drain.
- To ensure recommendations are holistic, the PWG should:
 - understand what the IOOC agencies are currently doing within the DEIA and service equity areas.
 - consider cross theme recommendations

C. Gouldman thanked the members for their next steps and summaries. He noted that he will be happy to brief the PWGs on topics relevant to their recommendations. He added that infrastructure may not make sense in the timeline. The spending provisions from OMB are still in progress. When it's available, the committee can be briefed **(ACTION)**. K. Arzayus noted that briefings on the IJA and IOOS Strategic Plan can be planned for the near future.

Public comment period

K. Arzayus opened the public comment period. No public comments were provided so the comment period was closed.

Public Meeting is adjourned

K. Arzayus asked if there were any final comments.

M. McCammon asked if the FAC could send a letter to the IOOC endorsing the task team and noting that the workshop proposal is vital to that process. The members agreed and M. McCammon agreed to draft the letter. **(ACTION)**

S. Graves thanked the committee for their time and noted that there will be a short public meeting in August, focusing on drafting recommendations. Following that meeting, there are initial discussions for a combined interim public meeting with the November IOOS meeting in Puerto Rico. The meeting adjourned at 4:51 pm ET.