U.S. IOOS Advisory Committee
Public Meeting (virtual)
Meeting Minutes
March 17-19, 2021

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:
Scott Rayder, Alabama Water Institute, University of Alabama (Chair)
Sara Graves, Ph.D, The University of Alabama in Huntsville (Co-Chair)
Thomas B. Curtin, University of Washington
Molly McCammon, Alaska Ocean Observing System (AOOS)
Ruth Perry Ph.D., Shell Exploration & Production Company
Doug Vandemark, Ph.D., University of New Hampshire
Jyotika Virmani, Ph.D., Schmidt Ocean Institute
Dick West, Consultant
Bob Winokur, Consultant
Daniel Rudnick, Scripps Institution of Oceanography, UC San Diego
Jennifer Hagen, Quileute Indian Tribe
Josie Quitrell, IOOS Regional Association (ex officio)
Laura Lorenzoni, NASA (ex officio)
Jennifer Read, Ph.D., Univ of Michigan Water Center Graham Sustainability Institute
Oscar Schofield, Ph.D., Rutgers University Center for Ocean Observing Leadership
Jennifer Hailes, NAVY (ex officio)

IOOS Leadership and Staff in Attendance:
Carl Gouldman, IOOS
Krisa Arzayus (DFO), IOOS
Becca Derex (Alternate DFO), IOOS
Laura Gewain, IOOS Affiliate
Catie Tobin, IOOS Sea Grant Fellow
Kruti Desai, COL
Nick Rome, COL
Stephanie Murphy, COL
Sheri Schwartz, COL

Presenters (non-FAC members)
None

Public Observers:
None

Day 1

March 17, 2021

1. **Call to Order (K. Arzayus)** K. Arzayus called the March Public Meeting of the U.S. IOOS Advisory Meeting to order at 1:00pm ET. An overview of the meeting was provided. This public meeting will focus on finalizing the final recommendations report for this Committee term, so that it can be briefed to NOAA leadership and the IOOC in May. Last week, the committee chairs briefed the new NOAA chief of staff and senior advisor on the IOOS Advisory Committee and they are looking forward to meeting the committee and receiving this report. It was noted that 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. K. Arzayus noted that this meeting will not be recorded and all meeting materials and public comments are or will be available on the Committee website.

2. **Opening remarks (S. Rayder)** S. Rayder welcomed and thanked the committee for joining and working to prepare the draft recommendations report. NOAA reports on and tracks all the recommendations from the committee, as well as which ones were implemented. He noted that he knows the committee would like their recommendations to be impactful to improve the IOOS enterprise. In other updates, S. Rayder noted the letters to NOAA and the IOOC have been submitted and thanked everyone for their valuable contributions as the committee introduces themselves to the new Administration. An overview of the agenda was provided with an opportunity to ask questions related to the discussion items and tasks presented.

   B. Winokur asked if the recommendation to not breakout into multiple groups to review the report was going to be implemented. The committee agreed to this approach and the agenda was amended to reflect.

3. **IOOS Program Office Updates (C. Gouldman)** C. Gouldman thanked the committee and staff and began his presentation on the IOOS Program Office updates and priorities. C. Gouldman noted that with the next cycle of regional observing system cooperative agreements, with this new administration, with the new legislation, and with a number of new opportunities, it seems we need to take some time and really consider how to advance things in a coordinated and complimentary way. As a reminder, OceanObs'19 and '29 conferences were and are in the eyeline for future as is the UN Decade of Ocean Science for Sustainable Development.IOOS continues to connect global and coastal observations, developing Essential Ocean Variables and Communities of Practice, and providing support for Marine Operations, Coastal Resilience, Climate Variability and Change, and Ecosystems Health, Water Quality, Fisheries and Biodiversity. C. Gouldman provided an overview of the FY21 administration priorities and highlighted the areas which IOOS can be most impactful: COVID-19, Climate, Racial Equity, Economic Recovery, and Restoring America's Global Standing.

   B. Winokur asked where infrastructure fits in. C. Gouldman noted that an infrastructure bill is in the works and IOOS is standing by with information/needs based on the IOOS

Association and RAs. J. Quintrell added that the Association and RAs are ready with needs through Fill in Gaps and recapitalization investments.

C. Gouldman provided an overview of the FY21 IOOS Program Office priorities and accomplishment highlights. The priorities included: Continue to support weather, water, & climate services via data, modeling, and services (Hurricane gliders, tsunami applications, wave run-up, beach conditions, etc.); Align, inform, and contribute to coastal resilience and climate adaptation and services as plans take shape; Deliver IOOS services everyday to meet customer needs in multiple mission areas—including biology; and Improve Harmful Algal Bloom observing, modeling and information services in partnership with National Centers for Coastal Ocean Science. The FY21 highlights included ICOOS Act reauthorization (Coordinated Ocean Observing Research Act of 2020), Weather Research and Forecasting Innovation Act 2017&19, NOAA Water Initiative, CENOTE Act 2018 (Commercial Engagement Through Ocean Technology Act), supporting the Blue Economy - Ocean Enterprise Study and Benefits of Ocean Observing Catalog, and executing Regional Awards. In research and development, the highlights include: the addition to the Coastal and Ocean Modeling Testbed (COMT) of Water Modeling, Forecasting, and Prediction and new projects for the Ocean Technology Transition.

B. Winokur noted that NOAA has been directed by congress through the SAB to develop a 10 year priorities plan for weather forecasting, which includes investments in observing technologies, such a bsurface radars and satellites and asked if IOOS will be providing input. C. Gouldman noted that no one has asked the office as of yet and noted there is an avenue to provide input through the new interagency group, ICAMS. S. Rayder noted that the committee will keep an eye on opportunities to provide input.

C. Gouldman reviewed several initiatives that NOS/NOAA are focusing on currently and in the near future and provided highlights from the IOOS Program Office report to the IOOC. Highlights included improvements and successes of the U.S. Glider Network, the harmful algal bloom forecasting/monitoring, and the upcoming update of the Ocean Enterprise Study. The IOOS Office is currently working on the second iteration of the Ocean Enterprise Study. It is also collecting case studies for the Benefits of Ocean Observations Catalog (BOOC). The BOOC will provide the community with access to a comprehensive, consistent, and constantly improving view of the benefits of ocean observing that can be easily searched by location, benefit area, and type of observation.
S. Rayder asked on the budget slide if it would be difficult to include COOPS, GOMO/OAR, etc. to the NOS/IOOS line and if we build in a sand chart with USGS, NAVY, and others. C. Gouldman noted that it could be difficult with some programs since they all budget differently, but OAR/GOMO could be easier to find. S. Rayder noted that it would be nice to see addition of non-NOAA partners in the budget and see an expansive observation cross cut. M. McCammon agreed with S. Rayder and note that Z. Willis did an observing inventory in the past, but it is challenging and gets messy to track. D. Vandemark asked if the IOOC could take on the task of a budget cross cut. D. West noted that compiling all the money provided to observations could have a downside, but it could be beneficial for the AC to see.

S. Rayder asked who much the Ocean Enterprise Studies cost. C. Gouldman noted that it was an estimated 190K and 150K in kind.S. Rayder noted that this report is important and that the atmospheric community wants this kind of study as well and should be repeated every 4-6 years. S. Rayder recommended that this study should be paid via cost share every 5 years (REC). J. Hagan added that it is important to get this program information to users. J. Virmani asked if the over target from the study will be higher or lower than the last. C. Gouldman clarified that it is going up and will be between equal to or double and noted that this report could provide an offset to the list of programs getting public funding for ocean observations.

4. **ICOOS Act Reauthorization: Implications for the U.S. IOOS AC (C. Gouldman)** C. Gouldman provided an overview of the ICOOS reauthorization and the changes it included for the IOOS AC. The ICOOS Act was reauthorized in Title I of the Coordinated Ocean Observation and Research Act of 2020 (COORA) which passed in December 2020. COORA also addresses named storm event model and post-storm assessments and the establishment of the Office of Water Prediction & National Water Center in Title II and III. Changes from the ICOOS Act can be found in three sections of the COORA: Purpose, System Elements, and IOOS Advisory Committee. In the purpose section, the act highlights monitoring and modeling capabilities added for: chemistry, HABs, water levels, and other phenomena, a requirement for easy access to data, an ask for IOOS to promote data sharing between Federal and non-Federal sources and with the public, and a requirement to sustain, upgrade, and modernize the Nation's ocean and Great Lakes observing infrastructure. In systems elements, the changes include the removal of the public education program and a new mandate on a product development system with users and the RAs, that enable real-time data sharing for decision making. The additions to the IOOS AC section includes new priorities such as:
    - National Sea Surface Mapping Network
    - Fleet acquisition for uncrewed systems
    - An integrative survey program for application of uncrewed systems
    - Remote sensing and data assimilation to develop new analytical methodologies
    - multi-State integrated sediment monitoring
    - multi-Region marine sound monitoring system

   Implementation of the COORA requirements will include the IOOS Office conducting a classic mission analysis to include new requirements and points of coordination (expected by end of June), a joint meeting with HSRP and IOOS AC (September 1-2, 2021) to discuss National Ocean Mapping, Exploration, and Characterization (NOMEC), and a Congressional Report (due March 2022). The new term of IOOS AC will be focused on the new mandates and priorities.

   B. Winokur asked about a new priority listed for the IOOS AC--Fleet acquisition for uncrewed systems and noted that OMAO is already working on this and there needs to be coordination. J. Hagan asked for clarification on what fleet acquisition means and if it means enhancing the current fleet or if NOAA is acquiring fleet. B. Winokur noted that it is a NOAA focused acquisition plan. C. Gouldman noted that the marine systems will include gliders and if IOOS could centralize the acquisition system. He asked the committee how IOOS can maximize the benefit of the glider fleet within NOAA and noted

that the current mechanism for getting gliders is working. J.Hagan agreed that the program is strengthened through the partnerships currently at play in the glider and data acquisition. J. Quintrell noted that this was put in years ago to support NOAA, but mostly for the IOOS RAs to bring in non-federal glider data. D. Rudnick added that the glider fleet is primarily where IOOS has made investments, but a vast majority are not NOAA owned fleets. He agreed that the RAs need to get onboard with the plan as there is a problem with long term data series and infrastructure issues. He also noted that as all things are converging, IOOS and RAs need to focus on recapitalization right now with this opportunity. O. Schofield agreed with D. Rudnick and noted that this issue is critical and the IOOS RAs and other partners need to still be a part of the plan. M. McCammon supported the comments concerning the RAs and added the recapitalization is important right now. She followed up with questions on the origin of the Marine Sound and Sediment monitoring priorities added to the IOOS AC section of the Act. C. Gouldman noted that coastal shoreline processes in light of sediment could be the rationale for that priority. B. Winokur added that NOAA may start ASBs and that as marine sound cross-cuts NOAA activities (gliders, hydrophones, etc) we need to look into this and the other priorities. K. Arzayus summarized that the IOOS AC needs to scope how we address these new priorities (ACTION). J. Virmani noted that all infrastructure needs to be included in uncrewed systems and not just gliders. D. West noted that this discussion is similar to a report from the U.S. Ocean Commission which should be reviewed by the committee (ACTION). J. Quintrell added that there is some urgency in the infrastructure piece and proposed a letter to the NOAA administrator talking about the importance of IOOS infrastructure and coastal climate signals. K. Arzyaus suggested the recommendations report as a venue to pitch the importance of infrastructure and the climate signal (ACTION).

5. **IOOC Program Updates (IOOC Co-Chairs)** L. Lorenzoni provided an update on the IOOC and reviewed the results of the recent IOOC SWOT analysis, an exercise completed by the IOOC to determine the future of IOOC activities. A survey was designed and distributed through the members to identify strengths, weaknesses, opportunities, and threats. Input from the questionnaire was received and compiled in the analysis. Strengths identified included the IOOC task teams and interagency engagement. Weaknesses included cross-agency integration outside of task teams, a defined scope or vision. In terms of opportunities, the UN Decade of the Ocean was highlighted, as well as messaging and the Biden administration. Threats included the lack of clear vision and alignment, as well as undefined funding or priorities, though it is unclear if these were identified due to a lack of communication. They should still be addressed and communicated. L. Lorenzoni also noted the focus areas that could help the IOOC strengthen coordination across agencies - messaging and identifying strategic objectives rose to the top of the list. Lack of mission and priorities was identified as a potential issue holding the agencies back from investing in future activities. Responses regarding where the IOOC would be in 5-10 years mostly included engaging in GOOS and the UN Ocean Decade, as well as pursuing post-OceanObs'19 activities (a wealth of strong ideas came from this conference). Task teams transitioning into something more operational and used is a strong indication of success and what could be used to measure successful investments. Others included agency engagement and funding (goes hand-in-hand with weaknesses that were identified).

L. Lorenzoni stated that after taking this feedback into consideration, immediate priorities were identified, in terms of scope and vision. The co-chairs are working closely with the National Academies coordinating group for the UN Decade to identify the IOOC's role and areas where IOOC can really contribute. Task teams should also continue to move forward and be strengthened. The Ocean Societal Indicators task team is underway and a bit untraditional, but will look at economic and societal indicators and is an important direction for the IOOC. In terms of messaging, it is important to look across agencies and across documents to really strengthen the messaging. Trying to improve reporting across agencies can ensure good alignment across the IOOC's work. They are also planning to obtain more buy-in from IOOC activities and engage with more senior-level agency officials to expand the work done by different agencies. In terms of integration, identifying priorities will be helpful to improve coordination across agencies. Also looking at ways to co-sponsor OceanObs'19 recommendations and make these ideas into actionable/executable activities. IOOC is also looking to keep a close eye on NOPP opportunities and guide task teams in transitioning to operations. IOOC is also establishing an ad-hoc working group so that members can engage more in the IOOC process if they are interested. It also allows them to drive the processes and help the co-chairs in general. They are also thinking about what the new administration is or could be focusing on, such as climate (ocean observations critical for climate).

L. Lorenzoni noted next steps and priorities for the IOOC which included a strategic working documentation will speak to interagency priorities, the ICOOS Act responsibilities, and charter requirements. This is a work in progress, but it will be necessary to fill in the ad-hoc team's responsibility. The community will also be expected to provide feedback. Interagency priorities will also allow agencies to fit better/align with the IOOC. There is also interest in coastal resilience work and how IOOC can contribute to that work. L. Lorenzoni thanked the committee for their time and invited feedback and comments.

B. Winokur asked who the specific audience for the questionnaires was. N. Rome stated that the questionnaire was sent to the IOOC members (17 member agencies with 12 that are active contributors) and the 12 active agencies were included/represented in the survey. There were several responses from NOAA and an excellent response rate overall.

J. Virmani asked what the timeline for the strategic plan is. L. Lorenzoni noted that the goal is to have it together for the next 5-10 years (which might take a little longer), but they want to have the next plan out within a few months to highlight new administration potential interests. That way the IOOC will be ready to jump on any opportunities that may arise from the Biden administration. Additionally, as the UN Decade is taking off and drawing more attention, it will be important that the IOOC has determined how it can be aligned. There is a short-term strategic plan for items actionable in the short-term and the IOOC will take more time to outline the strategic long-term vision. N. Rome noted that a traditional strategic plan is not the goal here, but rather to collect information on how IOOC agencies can leverage their goals and be included in the work plan moving forward.

T. Curtin asked what was meant by “messaging” and if it refers to content or medium. L. Lorenzoni noted that content would be the primary focus, although the medium could be improved. Messaging came up considerably as a weakness and a threat, so there is certainly a need to identify better what the goal of the IOOC is and what activities are happening. N. Rome added that the vehicle is to be determined at this point. The communication to the senior-level agency officials, connecting IOOS efforts more broadly within NOAA, improving coordination of messaging across different agencies to ensure they’re all aligned on activities with IOOS, and expanding awareness of regional activities across the government.

D. Vandemark asked if anything was surprising to the IOOC co-chairs. L. Lorenzoni noted that she found it surprising that one of the biggest threats was the alignment of IOOC with IOOS strategic planning. This made her wonder if it is truly not clear or perhaps this is an indication of how messaging could be improved. N. Rome noted that the clear direction of mission alignment across agencies as a strength followed by “lack of clear vision” as a weakness identifies why this questionnaire was done. D. Vandemark also asked if there was a strategic plan previously. N. Rome stated that there are two sets of requirements guiding the IOOC efforts (charter from the OSTP and ICOOS Act requirements). These have been the strategic plan at a very high level and transitioned to the business model of commissioning task teams, which became highly successful. The survey allowed the opportunity to identify what were high level strategic opportunities that still needed to be addressed. D. Vandemark added that someone needs to hold the National Vision of IOOS and asked where is the overarching vision that different agencies can look towards rather than their own individual priorities. L. Lorenzoni agreed and noted that the consensus direction that resonates with all the agencies can help build a stronger IOOC.

D. Rudnick asked what IOOC should mean to other people. Currently, he thinks of the IOOC as a group of folks making sure the agencies are working on whatever they need to be working and asked what does a threat to the IOOC mean based on that definition. L. Lorenzoni stated that threats would be to the IOOC itself (the coordinating body). All the different agencies are doing a phenomenal job with ocean observing priorities. A benefit of the IOOC is to bring together individuals and achieve something that is bigger than the individual parts, such as through the task teams which tackle projects that no single agency would ever do on its own. They are also developing ocean science priorities that will enhance ocean observing in the future. N. Rome noted that the answers are uneven and bold ideas apply specifically to the group itself (e.g. “co-chair succession plans”), but there are also threats identified that affect the broader community. Depending on who the audience is, everyone has different expectations of the IOOC and this exercise is helping the IOOC to balance those difference expectations and requirements and how to move forward. B. Winokur asked if there are some threats to the IOOC itself and noted that it would be beneficial to have a list of what has truly been achieved through the years (ACTION).

S. Graves asked how often this survey is completed. N. Rome noted that this was the first formal survey, but a strategic meeting does occur every one or two years to perform a gap analysis of interagency activities. S. Graves also asked if the agencies in general feel that

they need to “check with the IOOC” before taking part in certain activities. L. Lorenzoni noted that it circles back to coordination needs. Agencies sometimes inform the IOOC of certain activities, typically at all-hands meetings. However, there is no requirement for formal communication on this. N. Rome added that it is very informal. C. Gouldman noted that the IOOS Office in NOAA wants the IOOC to succeed (trying to be interagency even though in a box within NOAA) and he highly values the work of the task teams to move programs forward/identify solutions. They do check in often with the task teams to create some sort of regular flow. C. Gouldman also noted he is interested in the ad-hoc WG and could ask subject matter experts to give more information on specific topics in a more formal manner. C. Gouldman asked about how task teams can be transitioned to operations. L. Lorenzoni noted that this is a loose definition of operations. Sometimes the task teams don’t tackle things as complex as a new observing system, but it is important to make sure the work they have done is widely employed by the broader community/different federal agencies. Operational can also mean implementable in this case. C. Gouldman noted that there was the ATN task team strategy and then another task team to develop an implementation plan. It was then recommended that a coordinator within the IOOS office could implement that. However, the IOOS Office has not received an increase in 3 years, so the program is at-risk. This is a challenge that should be brought to the IOOC to find the resources and keep that moving forward.

S. Graves asked which agencies answered the questions in which way and if any specific agencies answered in a surprising manner. N. Rome noted the survey was anonymous so that participants could be more candid in their responses. N. Rome added that the bubble sizes in the presentation corresponded with the number of responses pertaining to those responses.

M. McCammon asked L. Lorenzoni to expand on the slide on environmental justice/science diplomacy. N. Rome stated that the diagram is reflecting guidance from OSTP (Deering Babb-Brott as co-chair). Science diplomacy is a new term that has come from the RCN process that looked at OceanObs’19 outcomes through a different lens. M. McCammon asked if these are the 4 IOOC priorities now? L. Lorenzoni noted that these don’t necessarily represent current priorities, but could be considered important topics moving forward. They want to make sure the IOOC activities align with the new administration’s priorities because IOOC capabilities align nicely with these. L. Lorenzoni added that there is now a wealth of areas where IOOS can contribute (OceanObs, UN Decade, Biden Administration).

M. McCammon asked if there were any comments in the survey about whether the IOOC attracts the right level of participation from the various agencies. L. Lorenzoni noted that it was identified as a possible opportunity. IOOC wants to tackle engaging senior-level officials. Some of the members might have a lot of energy and ideas, but not the decision making power necessary. N. Rome noted that this is something the Advisory Committee should think about because there is not enough senior level representation in the IOOC. When the requirement is to develop a comprehensive budget, the IOOC members do not have the authority and getting it done would require individuals from several levels up. D. Vandemark. asked if there was any formal guidance on requests made to agencies

regarding participation in the IOOC. N. Rome noted it is primarily on a volunteer basis. D. Vandemark also asked if the FAC writes a letter of recommendation to the IOOC, is it typical that the IOOC stays at that level or does it go to another agency after that. L. Lorenzoni noted it generally does stay at the IOOC level. However, these are shared with the broader IOOC and each agency is free to discuss with others in the agency and act on it as they see fit. There isn't necessarily a mandate on it. N. Rome also stated that it depends on what the recommendation is. If it is appropriate within the context of the agency representative taking it higher up, they might do so. C. Gouldman asked if there is a way the FAC can make recommendations to the IOOC to spur them and ensure recommendations are pushed into the agency. L. Lorenzoni noted it would/could be beneficial, but is up to the discretion of the agency representative. There is no obligation for them to share with particular agencies. If there is recognition that a specific observing system or satellite is needed and that falls into the purview of NASA, it is something that L. Lorenzoni (as NASA rep) would take to higher-level officials. It is still up to those individuals in the agency to decide what to do about it. S. Graves added that at certain times, members of IOOC may take up those recommendations and be turned down by senior-level staff.

D. Rudnick asked if the IOOC considers the FAC advisory to them. L. Lorenzoni noted that she wonders how many folks actually knew about the FAC and its role in advising the IOOC. N. Rome added that a lot of work gets done at the co-chair level. The co-chairs are most aware of what the FAC is advising/suggesting and they meet regularly with FAC co-chairs. J. Hagen noted that the IOOC website is indicative of the different people involved in the IOOC as a "rotating door." and asked if there are too many co-chairs. If the FAC puts in energy into writing recommendations for the IOOC, is it still functional or should a different strategy be implemented. L. Lorenzoni noted that her previous answer might have been misinterpreted. Although it is up to individual agencies, when the FAC provides recommendations to the IOOC as a whole, the IOOC takes that very seriously. Implementation of recommendations happens at the IOOC level and can occur in a variety of ways. The FAC is not providing individualized recommendations about what NOAA or NASA should do, but they are providing recommendations that are broader for the IOOC and it is the co-chair job to take those recommendations to the broader group to improve the IOOC function/work. Individual agencies don't take that home with them, although it is implemented as the group itself. N. Rome stated that J. Hagen's was very valid and encouraged all FAC members to think creatively about who should be primary targets for different recommendations. IOOC can't solve all of the problems, but can address some of them. If the recommendation is to elevate this issue up the chain, that is something that should be considered. N. Rome added that it is not traditional to have four co-chairs, but they are the most active and get a lot of work done themselves. N. Rome suggested making any recommendations clear in tomorrow's discussion so that O. Schofield can present them to the IOOC. M. McCammon noted that it sounds like most of the work is done by the co-chairs and if it would be beneficial to see who else can be engaged and be a co-chair. L. Lorenzoni noted that this is one of the reasons the ad-hoc WG is being implemented. They are trying to put the pressure on more people to meet every week and elevate more people to be as active as the co-chairs.

6. **Public Comment Period (K. Arzayus)** K. Arzayus opened the discussion to the public and invited comments and questions that could be added to the record. No public comments for the record were provided.

S. Graves asked if any specific items had been picked up that need to be emphasized moving forward. O. Schofield noted that the report for uncrewed systems is a timely way to send messages that have a shorter timeline for impact. M. McCammon added that there are some new priorities potentially and it would be helpful to have some discussion on Day 3 regarding what will be addressed next. It is important to keep looking ahead and add discussion time around the IOOC report on new focus areas. S. Graves noted there were topics specified in the COORA and asked if they are all of equal importance and if the FAC should revisit them. B. Winokur agreed and added to M. McCammon's point that it is important to look at what the FAC should be taking on and what C. Gouldman thinks would be a priority. If they want to get into uncrewed systems, there is a lot going on in NOAA and would need the background material that goes with it (need to invite people to brief on the appropriate background). B. Winokur added that Marine sound activities are also occurring at NOAA/OAR (Marine Sanctuaries) and they would need appropriate people to engage with if they were to make this a priority. J. Quintrell noted that the IOOS RAs just completed their 5-year proposals and Ocean Sound was a major priority for a lot of the RAs and making that link between the regional and national would be good and timely. C. Gouldman noted from his perspective, Ocean Sound is an important area and the role of IOOS is not exactly clear. The Sanctuary Sound program includes experts that should be brought into the picture to help identify a specific role that IOOS could play. There may be a coordinating convening function and there exists a lot of interest around this. C. Gouldman also added that a prioritization discussion should wait until there is more information on budgets for FY22. D. Rudnick asked what the list of priorities means and if all of these are new priorities or are they already existing ones, or is this the list of priorities IOOS is specifically meant to address. B. Derex noted these are additional priorities that the committee may consider based on what the NOAA Administrator or the IOOC deems appropriate. K. Arzayus noted this list is more specific than the initial list. S. Graves asked how usually lists like this appear in legislation. C. Gouldman stated it was surprising, but unclear on how unusual it is. J. Quintrell noted that the genesis of various things were done a while ago. Sen. Wicker was interested in building glider capacity and that was extended to the HFR. Those were put in because there was interest in IOOS playing a major role in those technologies. D. West added that the list was kind of unusual, but the problem is that it limits the FAC (tells them what to do instead of providing a broad overview/mission). C. Gouldman noted that regarding the fleet acquisition for uncrewed systems, nothing seems to be broken, so review and assistance is not currently needed by the FAC. That might change if they do centralized systems, control, and operations. He would also prefer wind energy, data sharing, ocean sound to be more important areas. Sediment transport was also interesting in the broad context of who's who in the coastal zone and sediment movement monitoring. S. Graves asked that if they need alignment from various agencies, that is not typically accomplished in IOOC. C. Gouldman stated it depends on the issue and who the programs are. They are not discussing this within the IOOC. They should be able to do it at the IOOC but if the players from the different agencies are not there, perhaps that is not the right avenue.

7. **Closing Remarks.** K. Arzayus closed the meeting and thanked everyone for today's participation.

Day 2
March 18, 2021

1. **Meeting Welcome (K. Arzayus)** K. Arzayus welcomed the committee and other attendees back to the March Public Meeting of the U.S. IOOS Advisory Meeting. She noted that the decision made on March 17th, to not break into groups to review the recommendation report, has been reflected in the updated agenda.

2. **Introduction Chapter Review (Full Committee)** B. Derex incorporated the following suggestions into the recommendations report in real time.

   Suggestions for the Introduction section included:
   - B. Winokur: Reference the charter, materials, and prioritized key recommendations in the executive summary
   - D. Rudnick/B. Winokur: Ensure the recommendations and major topics align with NOAA's priorities
   - J.Virmani: Add in the administration priorities: COVID-19, Climate, Racial Equity, Economic Recovery, Health Care, Immigation, Restoring America's Global Standing
   - M. McCammon: Add sentence to the end of exec summary: "The committee believes that these respond to the new administration's incoming priorities of economic recovery, climate, racial equity, and restoring America's global standing." to round out the key recommendations
   - B. Winokur: Add recommendation reflecting the need for adequate funding to sustain and modernize IOOS infrastructure
   - J. Virmani/D.Vandemark: Cut most of the IOOS background and add to an appendix
   - T. Curtain: Add links to websites to easier access to additional information
   - J. Virmani: Ensure the executive summary has key recommendations, a tie into the admin priorities, an introduction to the report, and a short background on IOOS (with longer detailed background in Appendix)

3. **Vision and Strategy Chapter Review (Full Committee)** B. Derex incorporated the following suggestions into the recommendations report in real time.

   Suggestions for the Vision and Strategy section included:
   - M. McCammon: The current strategic plan is nuts/bolts of current activities. FAC was looking beyond to really envision the future - where do we want to put ourselves in next decade? The Strategic Plan (2018 - 2021) is essentially finished so it makes sense to push for a new vision. The current plan is very

time-limited and narrow based on existing activities, and was not very visionary to begin with.

- K. Arzayus: It is very focused on observations/data, /modeling/products, and tools/partnerships.
- B. Winokur: As the IOOS program moves forward, they need to update their vision.
- M. McCammon: New administration and current ocean issues require a fresh look at the vision and its strategies.
- D. Vandemark: By putting the old strategic plan at the start of paragraph, we are drawing attention to it.
- B. Winokur: Can't get into the details of the other activities, but a strategic plan must be updated and it's okay to acknowledge that there is an older version.
- D. Vandemark: Move the old Strategic Plan mention further down into the paragraph to avoid drawing attention away from current ideas.
- T. Curtin: Different words for the plan (roadmap, framework, etc) each have different connotations and meanings. Yet, these are all used in the first paragraph and should be clarified/more consistent.
- J. Virmani: Remove the sentence with "roadmap."
- M. McCammon: Reword "smart coastal ocean" as it is too much shorthand for "technological advances" and not many people would know what that means.
    - B. Winokur agreed that this would mean different things to different people.
    - M. McCammon: The Great Lakes have done more with their Smart Great Lakes initiative and advancing that initiative than other RAs/parts of the country. Add language to show a 5-10 year implementation plan to systematically replace aging infrastructure.
    - J. Virmani: Replace "aging infrastructure" with "technological innovation to enable."
- D. Vandemark: The first recommendation is not something done in his region because maintaining the observations is more important to them; switching hardware would be challenging for them in the northeast region.
    - M. McCammon: The northeast is doing it in the sense that a lot of sensors are changing/improving and advancing and would argue that they are already innovating. HF radars are aging out and need to be replaced, not necessarily with new technologies, but with new radars. As this occurs, there are new sensors, new batteries, and potentially newer ways to do things.
- J. Virmani: the top 2 recommendations (in paragraphs) align well with current priorities, but the table below does not align or follow clearly.
- M. McCammon: Recommendation 1.1 is complete and should be removed.
- J. Virmani: 1.6 should be moved higher up.
- B. Winokur: Prioritize the recommendations and place in that order.
- O. Schofield: Ensuring that a coastal climate record is developed would be a good recommendation.
- J. Virmani: Detailed recommendations are not quite in alignment and are mostly outdated/obsolete.

    - M. McCammon: It would be beneficial to have the committees go back and review these.
- M. McCammon: Provide a list of things that the committee finds important and what should be considered. This could be a laundry list as a separate appendix/attachment, but would allow for prioritization of the main 2 recs/paragraphs.
    - J. Virmani: Have some things along the lines of the committee encouraging these activities, but not have them as official/new recommendations.
- M. McCammon: She and J. Virmani will take the table of recommendations (brought down to 6), complete a suggested revision, and send around to the committee members. They will turn the recommendations into a bulleted list for website/history of committee work and will report with a new list tomorrow for full report review.
    - B. Winokur: 1.8 needs to be reworded and there should be no reference to the OSB report (it is 5 years old and not a foundational document for IOOS).
    - D. Vandermark: The data integration piece needs to be clarified and needs to be cross cut with the climate data assessments with attention to data quality

4. **Public Comment Period (K. Arzayus)** K. Arzayus opened the discussion to the public and invited comments and questions that could be added to the record. No public comments for the record were provided.

5. **Requirements Management Chapter Review (Full Committee)** B. Derex incorporated the following suggestions into the recommendations report in real time.

   Suggestions for the Requirements section included:
   - B. Winokur: Make the suggestion that TPIO update their requirements list; it has not been updated since 2012. The list is dated and too specific – could recommend more broad, overarching requirements. The FAC is not responsible for recommending how NOAA should organize, but we can suggest that NOAA assess its structure in order to optimize organizational structure of observing systems. As IOOS continues to grow, a more formal requirements process be put in place.
   - T. Curtain: Are satellites in NASA/NESDIS included in the IOOS integration mandate. There are huge amounts of ocean data resulting from these satellites. He also suggests that it could be sensitive to say “NOAA Programs routinely use research dollars to fund operational products”.
       - D. West: Remove this sentence.
       - B. Winokur: At least to some extent satellites are included in the integration mandate. They are the primary way to get a synoptic look at a region. Although, autonomous systems are augmenting this need to a certain extent. Satellites need to be included in the conversation—can’t just rely on in situ observations.

    - T. Curtain: There is a large amount of data coming from satellites, so assimilating data into models is a consideration. When talking about IOOS as the grand integrator, we need to examine how satellites fit in.
- D. West: Be careful in recommending putting together a federal budget cross-cut of ocean observing programs. This is not possible. The FAC should be careful in assigning this task to NOAA or the IOOC.
    - B. Derex: Does the FAC want to recommend that someone conduct a budget roll-up.
    - D. West: Take a step back from this recommendation.
    - B. Winokur: This could be a suggestion for the IOOC to take on.
    - B. Derex: S. Rayder is generally enthusiastic about the budget roll up idea, so clear direction is needed.
    - M. McCammon: What is the goal for a budget cross-cut? What would the cross-cut accomplish? We want to avoid a large administrative burden. The task needs to be feasible and lead to something productive If it is going to be done.
    - K. Arzayus: S. Rayder is interested in comparing trends between agencies. Is there adequate resourcing being equitably divided up between the agencies doing the observing?
    - T. Curtain: The goal would be to come up with an investment strategy. That starts by examining the requirement list, particularly the unfunded ones. That is captured in 2.5 and 2.6 of the detailed recommendations.
    - B. Derex: “Tie Requirements Management to the annual Budget Process” section should be reframed as “Develop Annual Strategy Based on Unfunded Requirements”.
        - B. Winokur: You can’t just focus on unfunded requirements, because otherwise funded requirements will go away. It is an annual process of assessment. It was suggested that perhaps IOOS could endorse the annual IOOS requirements letter. The process should define requirements that are traceable back to their origin. The outcome is also an unfunded requirements list, so people know where new funds should go. A budget cross-cut would allow highlights of who is doing what, and what are the gaps.
        - D. West: If cross-cut is the goal, it will overshadow all other recommendations. The ocean commission has tried this, and it was just impossible and they gave up. Ocean observing is a smaller subset, but still would be challenging to get the necessary data. This task is out of the box for the FAC right now.
        - The committee recommends removing this recommendation. The list would start with recommendation 2.2. The committee can review 2.1 when S. Rayder joins the meeting the following day.
    - T. Curtain: It could be viewed as more than just about money. For example, take the EOVs. What ocean variables are being measured, and what are not? What is covered and what are the holes in the data sets? A second task would be looking at the money invested in that.

- M. McCammon: We now have ECVs and EBVs, so the variables measured have been refined and expanded. Perhaps this question isn't just about investments; do we have the adequate cross-agency structures to ensure requirements are being met?
- T. Curtain: The budget is very broad, but this doesn't always translate to relevant measurements. The Navy focuses heavily on optical properties and marine mammals.
- B. Winokur: Agency activities will be heavily driven by their mission and needs. It is important to articulate how NOAA and IOOS fit into the national construct.
- M. McCammon: There is an effort to develop an operational National HAB Network. Additionally there is tension between research and operations in ocean acidification observing. NOAA often couches itself as research as opposed to operations when the RAs are looking for support. This is an issue, though she is not sure how to tie it into specific requirements.
- B. Winokur: Have the recommendation state NOAA/IOOS is part of a national enterprise in ocean observing and NOAA/IOOS is a key element. In that context, it's important to understand the relationship between IOOS and other programs. This way you avoid a budget roll-up recommendation.
    - M. McCammon notes that there is no one entity responsible for coastal resilience in NOAA; one of the tasks is to map who's doing what on resilience activities, and ultimately what are the gaps. So is it more a question of mapping current level of activity to determine structural gaps, funding, and stakeholder needs? Is everyone clear on who's doing what? IOOS has not been identified as the single integrator of observations for NOAA or the federal government.
    - C. Gouldman: If we do a budget roll-up, the concern is "to what end". One reason to do it would be to know specific mission needs of each program, so you can find needs that can be integrated across program activities, or seek network connections to improve your program. You can't direct other programs or agencies to do different work if there are gaps, but there is a possibility to integrate down the road if you know the gaps and opportunities.
    - M. McCammon: A gap has been identified for a National HAB Observing Network. OA observations may also be a place to identify gaps.
    - C. Gouldman: OA does have a strategic outline for sustained observing and monitoring, and a research and development breakdown of what the gaps are. So there is knowledge of where next dollars would go. It is not allowed to be called "operational" because of the line office. It is more focused on deep ocean vs. coastal, and it is a known gap.
    - M. McCammon: There still is a disconnect between GOMO, and GOOS, and some of the regional observations. Most of these are being conducted as parallel programs that are not well integrated.

        - J. Quintrell: Bin recommendations according to the broad IOOS themes. OA falls under the multi-stressor, ecological forecasting approach. Binning will allow a drive to fulfill stakeholder needs. Those themes also help link to global observations. Knowing how all levels of observations are linked would be helpful, and it would be an IOOC endeavor.
    - B. Winokur: Modify recommendation 2.3 to say something more like "assess ocean observing programs in NOAA to be more efficient" to avoid telling NOAA to reorganize. On recommendation 2.5, he recommends deleting "priority on regional requirements". Infrastructure funding can be fit into recommendation 2.6 (which is now 2.5). The key is to develop a plan to fully fund infrastructure needs. Traceability of requirements is important.
        - T. Curtain: The HFR Radar process to fund gaps as a good example of a list of requirements that was addressed, led by Josie and the IOOS Association.

6. **Partnerships Chapter Review (Full Committee)** B. Derex incorporated the following suggestions into the recommendations report in real time.

   Suggestions for the Partnerships section included:
   - O. Schofield: The first theme was to emphasize our current model and maintain partnerships. NOPP and OTT are really effective models and there are a lot of data IOOS initiatives and we can use IOOS to go into areas where big data isn't going like Ecosystem forecasting and showing clear transition pathways.
   - B. Winokur: Edit 3.3 to say "augment and assess new technologies" as potential change (i.e., SailDrone)
     - O. Schofield: That proprietary information (if it includes data) can go against the open enterprise philosophy. The goal is not to replace technology, but to augment an existing network.
     - R. Perry: It should be avoided.
   - M. McCammon: Findings (and then recommendations) should be incorporated to each section. There are potentially new opportunities that could be leveraged and it would make a more cohesive document.
     - J. Hagen: Recommendations should be framed as a way to respond to current findings.
     - M. McCammon and J. Virmani: Will reframe the Vision & Strategy chapter with "findings", B. Winokur will complete the Requirements chapter, and O. Schofield will make the edits for the Partnerships chapter.
       - D. Vandemark: The "requirements" section might flow better with the "IOOC" recommendations, as much of the content seemed relevant to the IOOC.

7. **IOOC Recommendations Chapter Review (Full Committee)** B. Derex incorporated the following suggestions into the recommendations report in real time.

   Suggestions for the IOOC section included:

- N. Rome: These recommendations came out of the last FAC meeting. This is a short section with overview language discussing the FAC-IOOC relationship and emphasizing work of IOOC co-chairs. Detailed recommendations are easy wins that IOOC has already discussed with the FAC and co-chairs on plans to advance a few different topics. These were reaffirmed by the FAC at last meeting and are expected to be in-progress or completed in the next year. Based on earlier comments, it might be beneficial to add a reference to the requirements section.
- M. McCammon: There are a lot of different “essential variables”, would it be beneficial to develop a cross-cutting way to keep them from being convoluted?
    - K. Desai: In the context of the BIO-ICE task team, this is what both subgroups are trying to do. Right now, it is specifically pertaining to coral and marine mammals for each federal agency.
    - N. Rome: A broader recommendation might be useful to go beyond biological variables. The new societal indicators task team will also be looking at social indicators - yet another list. It seems logical for IOOC to consolidate/develop a cross-cutting list that can keep these organized and succinct.
    - M. McCammon: Some physical parameters are well-done, but others will be in-progress and less developed. It would be helpful to include standards so that specific standards are met and can be integrated for different variables.
    - N. Rome: This could be a potential linkage with OBPS - could link variables to the OBPS standards.
- M. Cammon: Recommendation 4.1 should include examples in the text.
    - K. Arzayus: In addition to the task teams as the focus, it is also a good idea to identify broader topics to be addressed.
    - N. Rome: Broader topics were being considered and would be messaging, integration, and other broad, high-level topics for IOOS.
    - M. McCammon: A messaging and communications task team would be a good idea because that came out of the SOO2 workshop.
    - N. Rome: The current IOOC task teams are Societal Indicators, Metrics (sunsetting in May), and BIO-ICE. Typically 3-4 TT are manageable at once, so a new one would fit well.
    - N. Rome: Modeling and data management are also important topics that keep arising.
- M. McCammon: Recommendation 4.4. is very specific and could be removed. It is already underway/being completed.
    - J. Virmani: There is no need to recommend it if it is in progress.
- M. McCammon: Add an environmental justice task team under 4.1 as well.
- T. Curtin: Does NIST have any role in any of the standardization?
    - K. Arzayus: Every once in a while they do pop up and might be working on something in this realm.
- M. McCammon: Reviewing the membership and activity level of IOOC members to ensure the right representation/structure/makeup might also be beneficial.
    - B. Winokur: This might not fully impact what the agencies do/accomplish from the IOOC.

    - N. Rome: While senior-level people do have more influence (which the FAC wants), they are higher up the chain. Perhaps the right recommendation is to work more closely with those bodies and leverage the representation/influence across the different interagency groups. The IOOC reports to the SOST (Subcommittee on Ocean Science and Technology). A new EPA representative is coming on board and there is a possible transition. The agencies on the IOOC do think about this to a certain degree.
- B. Winokur: Consider adding a Top-10 list of IOOC's "greatest hits" as a recommendation.
    - K. Arzayus: This could potentially fit in with a messaging task team.

8. **Closing Remarks (S. Rayder)** S. Raydar noted that these recommendations will be considered and used to inform tomorrow's discussions. S. Raydar and K. Arzayus thanked the committee for their input and adjourned the meeting.

Day 3
March 19, 2021

1. **Meeting Welcome (K. Arzayus)** K. Arzayus reconvened and welcomed the committee. The updated versions of the recommendations report were emailed to the committee for review during today's meeting. It was noted that the background section has been kept as is, the Vision and Strategy section has been replaced with M. McCammon and J. Virmani's text update, and there are some remaining edits for the Requirements section that need to be adjudicated. The committee agreed to review the Requirements and Partnerships sections first and then follow with the Vision and Strategy and IOOC sections.

   K. Arzayus noted that the committee staff will adjudicate all comments and edits and disseminate the final text for a one week review period following the meeting. The final report should be completed by mid-April and ready to brief at the May meeting with the NOAA administration. K. Arzayus asked if there were any questions for the proposed agenda and report timeline.

   S. Rayder asked about the inclusion of the budget cross-cut. B. Winokur noted that that recommendation does not seem feasible at this time. It is important, but we should focus on a NOAA cross-cut before we address a national cross-cut. B. Winokur added that we need to understand the investment in ocean observing at a national level to avoid redundancy. D. West noted that it is a good recommendation, but it will not get done and it will overshadow everything else. B. Derex added that we either want the IOOC to do it or have each agency to work OMB to complete this task. D. West cautioned that this is still a monumental task and the U.S. Ocean Commission was never able to complete it due to roadblock with agencies sharing the information. S. Rayder noted that he would still like this to be included to put people on notice that this work needs to be done. We need a framework with NOAA and OMB (as well as other agencies). He asked if anyone is opposed to the OMB approach. B. Winokur noted that it is difficult to have OMB do itand that they have attempted this in the past; However, we can have IOOC start on it. D.

West emphasized that this is not a worthwhile effort. M. McCammon added that we need a NOAA cross cut at least, and asked if this had not already been completed by Z. WIllis. N. Rome noted that this was an independent cost estimate (10 year out). C. Gouldman noted that IOOS did that as a requirement from the legislation, and could be an interesting place to start. Additionally, the 05-06 NOAA sheets also allude to a baseline as well. S. Rayder asked again if we have an IOOC task team do this cross cut. D. West cautioned that this study could hinder requests to Congress. We need the NOAA cross cut more than the national piece. M. McCammon asked what the goal is and noted that IOOS works with about 10-20 programs which we can focus on for information and narrow the scope. T. Curtain noted that with that effort the satellite programs will dominate in terms of dollars and could skew the study. B. Winokur summarized the discussion and suggested a two step approach moving forward: 1) Focus the cross cut on NOAA only and 2) ask the IOOC to look into what a national cross cut would look like (REC).

2. **Recommendations Report Walk-through (Full Committee)** B. Derex incorporated the following suggestions into the recommendations report in real time.

   Final suggestions for each section included:

   a. *Executive Summary:*
      - B. Winokur: The recommendations don't have context to them within the summary text. Add a paragraph of findings prior to the key recommendations. We need to make sure there is a recommendation that speaks to a plan that sustains and modernizes the current infrastructure within IOOS.

   b. *Requirements:*
      - B. Winokur: The annual budget process does not account for requirements. Infrastructure investment and doesn't always clearly relate to well-defined requirements. Big money must be tied to a clearly articulated set of requirements. TPIO needs to update their requirements list. Link to budget cross-cut.
      - T. Curtain: IOOS has a heavy requirements process coming in from RAs every year. It is a bottoms-up requirements process compared to TPIO. These RA requirements come from users, and should have more weight.
        - B. Winokur: Note the difficulty for the IOOS Program Office in coordinating RA requirements with NOAA requirements.
      - M. McCammon: The NOAA Big Data Project should also include model enhancement for the regional operational forecast program.

   c. *Partnerships:*
      - D. West: The NOPP office will be recompeted. It still requires non-federal partners on projects. Ocean Technology transition projects require IOOS RAs with a non-federal partner. It is almost always a private company investing in technology in tandem with an RA.
      - C. Gouldman: Private companies value partnerships with RAs for their connections to stakeholders. Regions help IOOS select technology that's needed, and so decisions are diffuse and give investors access to networks and needs.

- S. Graves: Broaden language beyond just private industry partnerships (requirement 3.2).
- K. Arzayus: Move table items into respective sections within the text.
- O. Schofield: Which partnership section could include requirements related to traditional knowledge?
    - J. Hagen: Add to the “build and maintain section”.
- M. McCammon: IOOS was previously mandated to work with the private sector, and it’s an important point to emphasize in the text.

d. Vision and Strategy:

- J. Quintrell: Infrastructure has been talked about for several years. There will be an infrastructure bill focused on climate/jobs. They are working hard to make sure oceans are included in this. IOOS and the RAs will be looking at radar (to support transportation) and gliders (to support HAB monitoring, shellfish industry, etc). Strategies are building off of reports. The conversation is broadening to interagency, but they need to get internal ducks lined up.

e. IOOC:

- No suggestions at the moment.

f. Conclusion:

- Committee agrees that no conclusion section is needed.

3. **Public Comment Period (K. Arzayus)** K. Arzayus opened the discussion to the public and invited comments and questions that could be added to the record. No public comments for the record were provided.

4. **Closing Remarks (S. Rayder)** S. Rayder and K. Arzayus reviewed all other business. K. Arzayus noted that the next public meeting will be soon added to the committee’s calendar and asked for topics that need to be addressed by the AC.

   M. McCammon noted that the RAs had a workshop about 10 years ago on remote sensing for coastal issues, and suggests asking Paul DiGiacomo to provide an update on that. D. Vandemark added that there is likely value from coastal observing systems that isn’t being captured and that would be important to know. K. Arzayus suggested that the committee staff develop a list of potential topics for the FAC to address, and can share with IOOC and others for input (ACTION). D. West asked if the RAs are involved in offshore wind development. J. Quintrell noted that it is a big issue on the East Coast and the RAs are involved in planning and data sharing.

   S. Rayder thanked the committee for their time and input over the last three days and adjourned the meeting at 3:35pm ET.