

**U.S. IOOS Advisory Committee
Virtual Public Meeting
Meeting Minutes
June 14, 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
Jennifer Read, Ph.D., Univ of Michigan Water Center Graham Sustainability Institute
Oscar Schofield, Ph.D., Rutgers University Center for Ocean Observing Leadership
Josie Quitrell, IOOS Regional Association (ex officio)
Laura Lorenzoni, NASA (ex officio)
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
Erick Lee, IOOS Affiliate
Kruti Desai, COL
Stephanie Murphy, COL
Maggie Chory, COL

Invited Participants (non-FAC members)

Nicole LeBoeuf, NOS
Karen Hyun, NOAA

Public Observers:

Phoebe Shaw, U.S. House of Representatives Committee on Science, Space, and Technology
Tiffany Atkinson, SAB EISWG
Jane Candy, COL
Robin Czerwinski, NOAA/NOS

1. Meeting Welcome and Administrative Updates (Krisa Arzayus and Scott Rayder)

K. Arzayus called the June Public Meeting of the U.S. IOOS Advisory Meeting to order at 12:09 pm ET. To open the meeting, K. Arzayus introduced E. Lee, who will be joining the support team at the IOOS Program Office. An overview of the meeting agenda was provided; this public meeting will focus on NOAA coastal resilience efforts, a review of the finalized IOOC FAC Recommendations Report, a walkthrough of the FY22 President's Budget Request, and the collective planning for the FAC fall meeting and work plan for the remainder of the charter. 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. The meeting minutes will be certified by the committee chair within 90 days and added to the website for the public. Lastly, K. Arzayus noted that the Committee's charter is being revised for its two-year renewal. K. Arzayus thanked J. Hagen, D. Vandermark, and T. Curtin for their commitment to the Committee and noted that all other members will be staying on for a second term.

S. Rayder thanked everyone for their efforts throughout the virtual setting due to COVID and noted that the goal of this session is to have a dialogue on the recommendation report prior to sending them forward in their final format.

2. Leadership in Coastal Resilience: A Study by the NOAA Science Advisory Board in Collaboration with the Ecosystem Sciences and Management Working Group (Molly McCammon)

M. McCammon provided a briefing, as one of the chairs of the Ecosystem Sciences and Management Working Group (ESMWG), on Leadership in Coastal Resilience at NOAA. A study is being conducted by the NOAA Science Advisory Board in collaboration with the Ecosystem Sciences and Management Working Group (ESMWG) and this briefing will help define what leadership means, which other players are a part of this effort, and where NOAA is going in future.

To put into context the rationale for the study, M. McCammon noted that coastal resilience was identified by NOAA Science Advisory Board (SAB) as potential Long-Term Priority and changes at the coast can have cascading impacts to broader national economy and national security readiness. It was also communicated that the US ocean, coasts and Great Lakes comprise a trillion-dollar property market, provide intermodal transportation hubs for global trade, and support ecosystems, harbors, and facilities essential to fisheries production, including growing interest in aquaculture. To support NOAA's national leadership role in coastal resilience, the SAB is working on developing a White Paper that recommends long-term (3-10 years out) research and development (R&D) agenda for NOAA to ensure that our nation's coasts and coastal infrastructure, and those who rely on them, are resilient to both acute and chronic threats. The R&D needs recommended will be:

- Practical - that supports the future needs of coastal decision makers and managers across multiple facets of coastal resilience.

- Ambitious - that seeks to advance holistic understanding of interacting social, ecological, and physical dynamics and their response to both acute and chronic threats.
- Aspirational - activities that we cannot presently undertake due to limited data, knowledge, or integrative tools.

M. McCammon noted that developing the Coastal Resilience R&D agenda will be driven by future challenges confronted by coastal resilience practitioners; emerging science and technology; and skills and expertise of NOAA and partners. The floor was opened for feedback on the R&D agenda from the committee members based on the following definition of coastal resilience: “The ability to prepare for, absorb, recover from, and successfully adapt to change. Change can be at multiple timescales and change can be physical, biological, or ecological. This can be specific events (storms and hurricanes, pollutant spills, Harmful Algal Blooms) or ongoing change (ocean warming, shifting Great Lakes water levels, sea level rise).” ((Mark Osler, Senior Advisor for Coastal Inundation and Resilience, NOAA)) To help facilitate discussion, the following questions were provided for consideration:

- What is the most important long-term challenge to coastal resilience that NOAA should assist with? How should NOAA assist?
- What are the decisions that need to be made for which the necessary information or tools are not available that NOAA should provide?
- What are vital R&D contributions for NOAA to make in this space, as compared to contributions from other federal agencies, local governments, academia, or the private sector?
- How might emerging and future technologies (i.e., AI/machine learning, innovation in satellite observations, autonomous platforms) be used to further coastal resilience?
- Where do we want the nation to be in terms of coastal resilience in 10 years, and what do we need to get there?

M. McCammon noted that the private sector is taking part, and we need governments to be a part of the conversation as well. NOAA especially can be a central hub for sharing best practices and other resources to ensure streamlined coordination going forward. She noted that the working group is diverse and is looking at resilience from all angles (biology, hazards, storms, etc).

S. Rayder noted that through the IOOS Association there is a certain degree of flexibility within NOAA and asked how the regions can play a role going forward in conjunction with their diverse needs. M. McCammon agreed but noted that the overall big issues are the same, but the manifestations are different in each region. In response, we need to have something flexible enough to respond appropriately to the different needs.

J. Hagen added that the ACE Basin National Estuarine Research Reserve is taking on an effort that is similar to this and is looking at the physiological burden of resilience and other human dimensions. She noted that she would be happy to connect M. McCammon with the group. M. McCammon thanked J. Hagen and asked to be connected.

J. Quintrell noted there are a lot of players in coastal resilience--Army Corps, USGS, FEMA and the regions. She noted it is good to capture what we are doing now, but important to look at what we can and want to do in future. The RAs can help fill in gaps. M. McCammon agreed and noted that the regions want to hear from the Committee where NOAA should be going.

D. Rudnick noted that what we should do to help NOAA with inundation work is keep track of regional SLR effects (most SLR effects have been largely driven by temperature). Since 2014, the west coast of the US has been most affected, but IOOS can help the cities in forecasting these regional changes. M. McCammon asked what the temporal scale of those effects. D. Rudnick noted that it could be decadal and it is further affected by events such as El Nino and other temperature fluctuations. M. McCammon asked what the R&D aspects of this would be. D. Rudnick noted we need to do better in the EEZ with temperature records.

J. Hagen added that one of the challenges that needs to be met is listening to coastal communities and looking at their linkages to ocean resources, their economy, and livelihood. She asked how we can empower these communities to make sound decisions to address these issues. She noted that the biggest way to help is to better inform models. She noted that we are data poor and we need to be able to update models with new data and so the communities can make sound, scientific based decisions for their economies and livelihoods.

S. Graves asked what NOAA believes the role of a leader is in this situation. She noted that we need to look at connecting the current players and taking on leadership roles in facilitating and collaborating.

O. Schofield added that much of what we are doing right now is redundant. He noted that we need to be better at linking data to create better forecasts and resilience efforts (ie adding SLR and other data points to weather/storm forecasts for accuracy). He suggested understanding where all that data exists and how we can connect them for regional and national needs.

J. Virmani agreed that we need to listen to communities, but noted that we also need to listen to industry needs as well so they can do what they do best in the three main components of ocean observations: hardware, observations, and software. She suggested, for hardware, we should push for the creation of an ocean observing black box that is cost-effective, easy to store, preserve, and is user friendly. Fishermen can take with them and collect data while they are out. For software, we need to look to machine learning for automatic translations for the data needed (learning from big data).

B. Winokur noted that NOAA should be a facilitator of those participating in coastal resilience efforts. He added that we (US IOOS) need to be THE trusted source of data from the regions to address user needs (regional data centers).

S. Rayder asked who is doing the best job at coastal resilience. He asked if we need to recommend a Cooperative Institute for Coastal Resilience. He noted that NOAA should

be able to look at who is doing the best job, where they're getting their data, and how they can help connect to them and the other players.

M. McCammon thanked everyone for their input and reminded the members to reach out via email or through one of the scheduled focus groups if they have additional questions or feedback. Schedule of Focus Groups ([register here](#)):

- Tuesday, July 13, 5:30 - 7:30pm ET
- Wednesday July 14, 1:00-3:00pm ET
- Monday, July 26, 5:30 - 7:30pm ET
- Thursday, July 29, 2:00 - 4:00pm ET

3. **Presentation and Discussion of Recommendations Report (Scott Rayder, Molly McCammon, Oscar Schofield, Tom Curtin)**

K. Arzayus introduced the session as a briefing from the Advisory Committee to NOAA and welcomed Karen Hyun, NOAA Chief of Staff, Nicole LeBoeuf, and Laura Lorenzoni from the IOOC.

S. Rayder also thanked Karen and Nicole for joining the meeting. He stated that the advisory committee really wants to have a conversation and a dialogue with them before finalizing the recommendations, so the committee can get to a product that will have some success in achieving its intended goals. The committee's mission is to serve NOAA and IOOC, to be blunt but to do no harm, the purpose of this presentation is for discussion, not decision, and they would love to hear any feedback from the guests.

M. McCammon introduced the first category of recommendations: **Vision and strategy for the future**. The IOOS Enterprise Strategic Plan can be refined to align with national priorities, including climate change and technological innovation. The detailed recommendations include:

- 1) Ensure sustained observations to respond to changing ocean and climate conditions.
 - a) Maintain and increase IOOS observing infrastructure and measurements and ensure they capture the coastal climate signal and its impact through sustained observations and models.
 - b) Advance linkages between regional near-shore and global ocean models and enhance integration with NOAA's Unified Forecast System.
 - c) Continue to undertake economic valuation processes of observing systems to better quantify benefits and enhance messaging for sustained observations.
- 2) Capitalize on technological innovation to enable Smart Coastal Oceans and Great Lakes. "SMART" means using emerging technologies, hardware, and software to more cheaply and more robustly respond to coastal needs. This could include the use of better sensors, new technology like 'omics, and autonomous systems, as well as considering how we better integrate data from all of these various sources.
 - a) Ensure use of 11 federally certified regional data centers to implement advanced data tools and further data aggregation.
 - b) Identify ways that NOAA can use technological innovations to address the

needs of coastal and oceanographic communities and stakeholders, including for outreach and education purposes.

- c) Leverage diverse STEM expertise to enhance future workforce. - tech innovation to better serve underserved populations

N. LeBoeuf clarified the definition of sustained observations - are we talking about real time, archival data?

M. McCammon stated that sustained observations mean they continue over time. This can be real time, or less frequently, for example in Alaska some moorings only get data annually. Sustained is a minimum commitment of 3-5 years of data, which can be real time or not real time.

O. Schofield of MARACOOS introduced the next category of recommendations: **Creating and Sustaining Strategic Partnerships**

O. Schofield mentioned that the distributed nature of IOOS leads to both opportunities as well as threats. It allows each region to customize the data products and stakeholders that they are going to serve, and also allows regional associations to work with small companies. RAs have the expertise to deal with regional problems, and effectively translate data into products people can use. IOOS should maintain that distributed nature, as well as seize opportunities to expand federal partnerships for data products as well as new technology.

- 1) Maintain and build on existing partnership models - particularly to mitigate aging infrastructure.
 - a) A lot of infrastructure is owned by universities and NGOs. This is a challenge and a threat. For example, for the coast guard, one of IOOS' major stakeholders, HR Radar needs to meet a certain standard, and at least half of HF radar is aged out past that standard.
- 2) Use partnerships to accelerate innovation and inclusivity
- 3) Leverage non-IOOS data initiatives to create products to serve IOOS communities.

Sub-recommendations:

- Analyze NOAA initiatives with established partnership models to ensure alignment with IOOS effort.
- Expand engagement with private industries and other entities to rapidly establish partnerships to augment aging ocean observing infrastructure.
- Pursue leveraged support from other agencies and private sources through the National Ocean Partnership Program.
- Collaborate with NOAA Big Data Project, and other relevant entities, regarding IOOS contributions to ecological forecasting and regional ocean forecasting efforts.
- Expand the participation at all levels of BIPOC and underserved and underrepresented communities, including co-production of knowledge and incorporation of local and traditional Indigenous knowledge.

T. Curtin introduced the next category of recommendations: **Requirements Management and Infrastructure Investments**

- 1) U.S. IOOS Office should adopt a requirements management system that begins with high-level objectives (e.g. “IOOS observations will lead to a XX% improvement in hurricane intensity forecasts over the next X years”)
 - a) NOAA currently manages all observing system requirements through the NOAA Observing System Council (NOSC). The Technology, Planning, and Integration for Observation (TIPIO) Office provides a catalogue of observing system components, connections to NOAA mission areas, and a value tree. Over a thousand requirements have been identified.
- 2) U.S. IOOS Office should expand its iterative annual investment strategy to include high-level requirements and create an unfunded requirements list based on a gap analysis
 - a) The IOOS Regional Associations manage requirements through a “Fill the Gaps” campaign that identifies stakeholder-prioritized observing system gaps (unfunded requirements) that can be filled annually with modest base budget increases. In collaboration with the RA’s, the IOOS office issues an Annual Guidance Memorandum with identified priorities.
 - b) U.S. IOOS Office should develop an annual investment strategy based on a traceable requirements management process
- 3) NOAA Leadership should develop a coherent description of the many ocean observing programs within its Line Offices, including associated budgets in a cross-Line Office roll-up
- 4) NOAA Leadership should position IOOS as the oceanographic operational integrator at NOAA
- 5) IOOS Enterprise should develop an Observing System Recapitalization Plan to include maintenance, operations, sustainability, and modernization of the observing system
- 6) IOOS should, where possible without a federal budget cross-cut, assess requirements in the context of the total federal investments
- 7) NOAA should set up budget lines for IOOS infrastructure refreshes and equipment servicing as part of a larger plan to fully fund present and projected infrastructure needs
- 8) The IOOC should conduct the federal budget cross-cut mandated in both the IOOS Act of 2009 and the Coordinated Ocean Observation and Research Act (COORA) of 2020, and ensure their membership has the expertise, resources, and influence in their agencies to accomplish this task.
 - a) IOOS should, where possible without a federal budget cross-cut, assess requirements in the context of the total federal investments

O. Schofield explained that IOOS needs an investment process. TIPIO has over 1000 requirements, and it is difficult to develop an investment strategy with that many requirements. There are a lot of critical observation systems in the ocean that need to be recapitalized and maintained, and NOAA needs to have some serious line items in the budget for this. This will be hard to do but absolutely necessary. The advisory committee is really recommending serious budget cross cutting and assessment.

The IOOC has been mandated to do a 17-agency cross-cut. We recommend that IOOC does that, as challenging as it is. This will provide context for a very rational investment strategy and requirements that are manageable and can be prioritized and afforded.

S. Rayder described additional recommendations to the IOOC.

- 1) Enhance and expand IOOC coordination activities, including:
 - a) Consider new task teams to address critical government-wide priorities such as communications and messaging, ocean climate modeling, resilience and environmental justice (underserved users).
 - b) Generate a list of the IOOC's top ten accomplishments of the past decade, in order to provide context to the impacts of that committee on the federal ocean observing enterprise.
 - c) Align outcomes of Ocean Obs'19 and Ocean Studies Board workshops focused on sustaining ocean observations with emerging priorities, programs, and concepts linked to the UN Decade for Ocean Science and Sustainable Development goals.
 - d) Manage a crosswalk of the status of all essential ocean, biology, climate, and other relevant variables; and suggest best practices or standards to best integrate the data from a local-to-global scale.

S. Rayder added that OMB used to have a nice crosswalk for the essential ocean variables (EOVs), essential climate variables (ECVs), essential biological variables (EBVs) etc. The creation of something like a data repository or matrix would be extremely helpful.

S. Rayder asked for any questions, comments or definition issues about this presentation as well as the report. He asked how the advisory committee can be most helpful in its next term.

L. Lorenzoni thanked the committee for the recommendations. They are very much aligned with some of the activities the IOOC wants to take on in the next 3-5 years. In terms of coastal resilience, the IOOC is keeping its eye on this issue, but developing a specific task team on it might not be timely at this point because there are so many other activities related to resilience already underway. It may be prudent to wait a couple of years, identify gaps and then fill in there. Task teams try to address existing gaps and avoid replicating work. She also noted that a cross-walk of variables is already underway by the BIO-ICE task team between EOVs from GOOS and IOOS variables already collected. Lastly, she reminded the advisory committee that a few months ago they recommended that the IOOC create a top 10 list of IOOC successes. The IOOC has taken that to heart and is going to take that on over the next few months.

K. Hyun thanked the advisory committee for the very thorough report and she is looking forward to this partnership. She asked T. Curtin when he was talking about requirements management, what types of high-level objectives would he like us to focus on and what might they look like? And how do we thread equity into those objectives?

T. Curtin clarified that he gave hurricane forecasting as an example, but it wouldn't be hard to make a fairly short list of the major phenomena, as they have all been listed before. The question becomes how do we improve the forecasting skill for that, and the whole idea of targeted observations. Another dimension of this goes back to M. McCammon's questions about resilience. A next step could be coming up with risk methods - it is one thing if a hurricane hits an abandoned place, another if it hits NYC. The hurricane and the forecasting skill can be the same, but the immediate risk and the response (resilience) to the event or response to risk is something that can be analyzed. There are case studies (Katrina, Sandy) that we could look at and see what could have made the community more resilient in terms of observations. That hasn't been done yet quantitatively, and all of those things could drive requirements. This would consider not just how we make the science better but how we better meet the needs on the ground. Ocean Observations is the starting point.

M McCammon mentioned that there is work being done on developing a white paper on the coastal climate signal, looking at coastal hazards, sea level rise, flooding from storms etc. There is a lot of work being done on the global climate signal, but we are focused on how it manifests itself environmentally on the coast. Using models can help us better integrate between coastal and global models. Equity is also an important consideration here, because the effects of these changes are not distributed equally.

B. Winokur added that he was part of the SAB Review team that provided detailed comments on NOAA's R&D vision for 2020-2026. This report was broken down into sections with goals and objectives. It might be worth taking a look at in the context of IOOS, and see how we fit into that report.

N. LeBoeuf stated that she sees a lot of connection between the various recommendations that the advisory committee has made. Coastal resilience is a state of being, and does not mean one program or activity. In thinking about the communication of requirements, how do we get interagency and others interested? We should identify the outcomes we want and use that as a way to prioritize. She also thinks there is going to be a lot more dialogue about the integration of modeling across NOAA, and one of the things that would help her as a "decider" is to understand the relative importance of various observations to various outcomes. N. LeBoeuf also asked if there is a difference between a recapitalization plan and the contribution of new budget lines? If IOOS does get it, do you mean PPA level 3 budget lines that are outward facing that an appropriator can say - here is where I want to put money?

B. Winokur clarified that the committee didn't feel that it was up to them to tell NOAA how to organize this budget, but there is currently no plan to recapitalize the observing infrastructure in the way that there was for satellites and ships, and there should be.

N. LeBoeuf added that appropriators see it as this or that - the IOOS ability to do things, and then the regional capacity to do things. Building some sort of awareness around what we would need to recapitalize the hardware is a good idea. That would be well received on the hill, that we aren't just trying to replace what we have, but for certain outcomes, we might need new tools.

S. Rayder added that one of the hardest things to fund is long term sustained observations. We can't take ships offline before new ones are in.

N. LeBoeuf added that she wanted to talk about the aging HF radar. 1) Who else supplies HF radar that the Coast Guard can and will use? And 2) if something happened to HF radar infrastructure, what would happen?

S. Rayder clarified that what has happened is that the Coast Guard has been using this radar for search and rescue. The fear is a big step backwards if we don't meet their required metrics for uptime and reliability. The HF radar group projected a reasonable lifetime, and a good part of the network is marching past that reasonable lifetime. We have established in the coast guard a customer for IOOS data which is now trusting it. That took a decade worth of work, and we do not want to move backwards.

M. McCammon added that there is the radar network, but we also have ecosystem moorings, gliders, etc. to provide sustained observations. There are a lot of different networks and observing platforms and the key is that we can integrate data from all of these platforms at different timescales. We are really the only program that is mandated by congress to integrate with private sector and private sector data and that is going to only become even more important over time.

S. Rayder also mentioned National Weather Service data buys. We really need to think about the private sector and how that has evolved. He asked K. Hyun about the observing council within NOAA and if she could ask them what they have, and who is using it. In 2002, that showed us that there were redundancies, which cleared up resources for other uses. A requirement "rack and stack" can help. We did not appreciate in the early 2000s how much IOOS data is being used operationally by NWS, USGS etc. There are a lot of areas where people are using IOOS data yet they think it is free.

N. LeBoeuf responded that we could certainly ask the NOSC to do a topline survey of observing systems across NOAA. She has also been thinking about engaging the IOOC more to find out not just who is collecting what data but who is using what data. We also need to have better integration or coordination across the operational observing systems within NOAA, and figuring out how to better work together seamlessly to achieve research to application.

M. McCammon again raised the needed increased emphasis on equity. Tribal communities are using EPA money to start citizen science monitoring programs, but EPA and BIA don't want to sustain the long-term monitoring. For us in Alaska an emerging need is this lack of sustained funding, and we need to look at what is the role of the BIA and EPA in funding some of these things as well as NOAA.

J. Hagen thanked M. McCammon and stated that the same issue is true on the Washington coast as well. We can get start-up funding (BIA) but not sustained funding for ocean observations that are conducting. We need to have a high-level conversation about this.

N. LeBoeuf stated that she will review the whole report and get back to the advisory committee with any additional questions if necessary.

4. Public Comment Period

No public comments were offered.

5. Overview of IOOS FY22 President's Budget Request (Carl Gouldman)

C. Gouldman gave an update on the brand-new president's budget request. The norm in a given year is for the bottom-up budgeting to happen over a 12-month period but things are happening in a different order this year.

- This is the largest budget request for NOAA in history at \$6.9 billion, an increase of \$1.6 billion.
- Largest increase request for National Ocean Service
- Largest request ever for the U.S. IOOS Office and Regional Observations
- This includes rebaselines for the budgets for each program to meet the FY21 level, plus program changes.

C. Gouldman shared the big “buckets” and features of these IOOS budget increases. They include:

- \$21M for Observations and Science
 - Expanded observations to document climate impacts on marine life
 - Coastal Ecological moorings network build-out
 - Establish IOOS Marine Life Program and Data Assembly Center
 - Partnerships with NCCOS and Office of National Marine Sanctuaries (ONMS) on observation-based climate assessments of MPAs
 - U.S. IOOS Office - Staff, Data Mgmt., Prog. Mgmt., & Coordinating Science and Technology
- \$12M for Modeling and Data Management
 - West Coast OFS Hindcast and Reanalysis
 - OFS development along the entire US Coastline
 - Expanded COMT Award funds and modeling in RAs
 - U.S. IOOS Office Staff
- This is good to see because there is a great need for coastal and ocean modeling, and for increasing the development of the operational forecasting system within NOS.

C. Gouldman reminded everyone that within NOS, IOOS line items are within Navigation, Observations, and Positioning PPA. This PPA also includes the Office of Coast Survey, the National Geodetic Survey, and the Center for Operational Oceanographic Products and Services base budgets. IOOS regions are funded through the IOOS Regional Observations PPA as well as other competitive grant programs. Each time there is an increase or decrease in budget, a program changes summary (PCS) is included in the President's Budget Congressional Justification. This year, there are 6 PCSs that reflect changes to the IOOS budget lines.

C. Gouldman also shared what we know about the budget request for other ocean observing programs. For example, GOMO has a \$21M increase from the FY21 enacted amount to the FY22 budget level. The National Buoy Data Center, which falls within the National Weather Service, is in an about \$230M line item which received a \$4M increase.

Discussion:

S. Rayder noted on the shared graph that the president's budget request for FY22 really stands out.

D. West agreed, and stated that this is also a challenge, because someone has to come up with what the enacted budget will look like for the fiscal year.

B. Winokur asked what is the decision process that the IOOS office will go through to allocate the additional money that potentially they will get, though not appropriated yet? Within that context one of the things we talked about in the requirements discussion would be putting together an unfunded requirements list, which could be used to decide how to spend the next dollar.

C. Gouldman stated that the IOOS office does not have an unfunded requirements list. However, every program manager has a list of what each need, including HF radar needs, MBON, etc. The IOOS items in the current PresBud are a subset of what IOOS put forward that are aligned with Administration priorities. Now IOOS has to decide the exact implementation of these funds if they come through. This has to be executable and also in line with what it was intended for. We have mechanisms within the IOOS office to do a lot without having to do a lot of new competitive funding opportunities.

M. McCammon stated that this is great news for IOOS, but these funds aren't necessarily filling our gaps, recapitalizing our infrastructure, or aiding base observations. J. Quintrell has a slide that illustrates this.

B. Winokur asked if this budget request will now be the FY22 baseline as NOAA and all the agencies are putting together their FY23 budget levels?

C Gouldman said that yes, they will be asking from this level.

B. Winokur asked if there was any language about the priorities that they wanted to see? Any specific items?

C Gouldman answered that the budget request included paragraph descriptions of what needed to get done, and what mechanisms that needed to be used. One pot was just grant funding, the other was not restricted in that way.

D. West stated that using a group like the advisory committee to help you do what B. Winokur just described ahead of time will help you. Using the FAC along with FACA rules to help you more with the budget would be helpful for not only the IOOS office but also NOAA. You should already be almost done with FY23.

S. Rayder stated that the advisory committee is going to talk about what we would like to see in the fall meeting. I think we could really help in this space because it is going to be very hard to hold on to this increase, and there won't yet be an enacted FY22 budget to build the FY23 request from.

J. Quintrell shared a [simple comparison](#) of the Presidential Budget and IOOS' Congressional request from last March.

C. Gouldman showed other pie charts that compare FY21 and FY22 spend categories for both regional and national. He discussed next steps:

- 1) US IOOS Office + RAs work together on implementation scenarios and strategies
- 2) Determine working meetings, workshops, reports etc.
- 3) Coordinate on messaging
- 4) IOOS Office and RAs engage with other programs on other funding increases

B. Winokur stated that "fill the gaps" is the closest thing you have to an unfunded priority list. Do you have any sense on where the hill lands on this? Any signs?

J. Quintrell stated that it is yet to be determined, but we have been working with the house & senate on our fill the gaps campaign (\$16M) . Most offices just check yes or no if they support the president's budget.

S. Graves stated that the IOOS office needs more staff, and in this case, you have the dollars to try to build up your staff. How is the process when you need to get people in? How do you go about doing that?

C. Gouldman answered that we have to make decisions on that front. There is a risk of making movements if the appropriations don't come through. In the meantime, we will get some contract folks, then work to hire the federal people that support those functions. That will take longer, and can hold off until we know what the marks actually are, to avoid committing too much in advance.

C. Gouldman discussed the President's Budget Request for FY22, and noted that NOAA's Congressional Justification has more detail for those interested. He added that he will be working hard to include needs that did not make it into the FY22 proposal into FY23.

S. Rayder asks C. Gouldman how much of his input was considered in the budget request numbers. C. Gouldman responds that while details are not public, he was able to provide some information through frequent conversations with leadership.

B. Winokur asks if there are new initiatives funded with the increased money in the request. C. Gouldman notes that there are three general categories new money is directed towards: expanding current initiatives, funding new initiatives, and making current operations more successful. Fundamentals are required for innovation and improvement across the board. B. Winokur suggested thinking about these categories and potentially putting together a chart to answer this question.

D. Rudnick noted excitement over the potentially higher level of funding. Now, the question becomes what can the FAC do in order to help make the budget request a reality? S. Rayder noted potential conflict regarding what the FACA can advise in regards to advocating for the President's Budget Request. K. Arzayus will consult general counsel for direction.

M. McCammon suggested that the FAC could map the presented recommendations to see if the budget addresses any of them. C. Gouldman noted that if this is undertaken, it's important to count the \$21M for re-baselining to FY21 appropriations.

B. Winokur noted that the FAC should be cautious not to advocate for the President's Budget Request on the hill. Returning to the question of how the FAC can help, he suggested that in future years the FAC could review and endorse/not endorse the proposed IOOS budget. D. West reiterated that they cannot become a promoter of the IOOS budget line.

In regards to the IOOC, S. Rayder asks if the USGS or other IOOC partners got increases in the request. C. Gouldman responded that he mostly does not know, although the USGS Coastal Hazards Program did get increases.

6. Public Comment Period

No public comments were offered.

7. Planning for Fall meeting (Scott Rayder)

K. Arzayus recommended planning a Fall virtual meeting and a Spring in-person meeting, given uncertainty related to COVID.

S. Rayder asked the committee what topics or sessions the committee would like to address at upcoming meetings given the FAC's recommendations and external happenings. K. Arzayus shared the scoping document, and noted that a closed meeting can only be a briefing on certain topics. The FAC could have an executive session that would not be open to the public. However, deliberation must occur in a public meeting.

B. Winokur suggested a more detailed briefing on the investment strategy with the increased budget. The FAC could help examine how to sustain the budget through the appropriations process, and across different administrations and priorities. Some of the mandated expansions don't make sense because of other on-going activities.

S. Graves suggested the same, and suggested an update with feedback related to the recommendations put forth by the FAC. It would also be beneficial to receive an update on staffing changes. A really important factor will be to determine real actions given the increased budget.

B. Winokur commented on the six mandated expansions from the Research Act of 2020. Time needs to be spent on understanding the six expansions and what more is needed.

D. Rudnick echoed the need for comment on the potential new funding. Spending that money wisely could put IOOS on the right course.

T. Curtin noted that he had found previous interactions with end-users of IOOS data and products very valuable. For example, what is the U.S. Coast Guard doing with IOOS data? This sort of information makes the value of IOOS very clear.

T. Curtin added that a potential missed topic of continuing importance is the role and future of big data within NOAA, especially given the role of big tech companies in managing data.

B. Winokur suggested the FAC receive a briefing from Admiral Hann on the fleet plan and the unmanned systems operation center. He also suggested briefings from the IOOS RAs would help provide insight into specific operations in each region.

J. Virmani noted it would be valuable to define the direction of the committee now that the recommendations report is finished. The suggestions are valuable, but what is the next activity for the committee. K. Arzayus commented that the fall meeting would help provide this clarity. J. Virmani suggested an update on the state of technology, in addition to new and emerging technologies coming down the pipeline.

S. Rayder suggested a fall briefing from OMB would be beneficial to understand their thinking as they close out planning for FY 23. Ideally, the branch chief of Commerce from OMB would engage with the FAC for insight on the budget process. The FAC should have the same conversation with House and Senate appropriators. We need to ensure IOOS does not become micromanaged by different parties. Additionally, the FAC should consider how to bring in other IOOC partners to increase investment beyond just NOAA.

D. Rudnick commented on the difference between emerging priorities and existing initiatives. If there is another priority related to climate and fisheries, the FAC should know about it. K. Arzayus confirmed that there is an effort underway to develop a climate-fisheries plan. There is an implementation plan, but it is not yet public. B. Derex noted they can share public-facing white papers on the subject. D. Rudnick noted the FAC should know more on what is being done in this arena. On all priorities, if there are existing initiatives, the FAC should be aware.

K. Arzayus added that some initiatives are farther along because they are working out what the administration's priorities will look like. For example, wind energy and DEI are on the radar, but it is not yet clear what will be tackled and when. Wind energy is a priority, but also poses challenges for siting, HFR Radar, and more.

J. Quintrell noted that the IOOS Association will be hosting several informational webinars on the coastal-climate signal. The purpose is to educate on the ecosystem of programs and see how IOOS fits in.

S. Graves agreed it would be good to hear about current other climate-fishery activities, in addition to climate.

R. Perry also agreed, and suggested framing the topic as climate initiatives across NOAA. The webinars from Josie may help address this. The FAC needs to figure out where IOOS fits in. The siloing of climate activities may have already started. Wind energy is also a timely topic. The offshore wind energy industry is not familiar enough with IOOS. The West Coast and Gulf of Mexico are kicking off with this industry and haven't been involved in conversations. While we may be reactive in regards to East Coast wind development, we need to be proactive in these other regions. The FAC should consider how to use IOOS to facilitate conversations instead of just focusing on impacts. We need to be aware of regional activities, and work with other agencies that may already be facilitating these conversations.

D. West commented that all agencies will be jumping on the climate line given that administration priority. This will include coastal resiliency, with which several agencies are involved. The FAC should consider how to showcase why IOOS is the center of excellence for coastal resiliency.

D. West added that it would be valuable to hear an operational brief from an RA at each FAC meeting. M. McCammon added that typically they could visit an RA at each meeting, if not for COVID. D. West agreed that in-person visits facilitate more engagement.

S. Rayder asked if it would be worth talking to Commerce budget examiners. The NOAA budget has to go through them before it gets to OMB. It would be good to figure out their thinking. D. West noted there is new infrastructure to understand.

B. Winokur suggested this is a bottom-up conversation about a FAC work plan. However, input is also needed from the top-down. NOS leadership should provide input on where they need guidance.

J. Virmani noted agreement with B. Winokur's suggestion. It would also be helpful to have a briefing on the IOOS Ocean Enterprise Report. K. Arzayus stated that the report release is imminent.

M. McCammon suggested that the IOOS Coastal Climate Signal initiative should be at a stage ready for a briefing by the fall. A briefing on this would be beneficial.

D. Rudnick commented on the number of global ocean-planning activities. Perhaps it would be valuable to be briefed on some of these.

S. Rayder noted caution about doing too much planning. Senate appropriators have expressed frustration at so much planning without much execution. It is important to balance these two things. So, what are specific activities that are higher priority?

J. Virmani expressed support for M. McCammon's suggestion to have a lightning round briefing of different initiatives. J. Virmani also commented that something from the Ocean Decade would be good, given recent endorsements of UN Decade programs. It would be helpful to see which the U.S. might capitalize on.

M. McCammon highlighted biodiversity/MBON activities and tying those in with the Animal Telemetry Network. This is a big feature of the climate-fisheries initiative, and is also included in the President's budget.

B. Derex clarified a question on the Operational Conversion Fund. The fund does not currently exist, but this is the idea for a dedicated fund to help transition to new technologies as they become operationally available. S. Graves noted it is not a sustaining fund. This is an area that could be explored as it intersects with other topic areas.

K. Arzayus noted that the staff will go through these ideas and work to prioritize this list of topics for the fall meeting.

8. Public Comment Period

No public comments were offered.

9. Closing Remarks (Scott Rayder)

S. Rayder thanks the committee and staff for their work over the past several years. K. Arzayus asked for feedback from Committee members on the report format and other committee work plan items.

- S. Graves noted that the virtual participation has been wonderful, the staff has been great at keeping the members engaged, and the broad representation on the committee has kept the work well rounded and insightful.
- M. McCammon added that the process of the recommendations report was useful and should be utilized in future efforts. She noted that future work plan items should be more tactical.
- D. Rudnick agreed that the report process was effective and noted that he looks forward to continued work.
- D. West thanked the staff and seconded M. McCammon's comments.
- B. Winokur noted that the prep working groups format worked decently well, and agreed that the committee did great work in the virtual format. He emphasized his previous note that the committee needs more top down interaction. We as a committee need to help figure out how to make IOOS and NOAA forward looking and budget sustained. We need to engage with top level NOAA people while we continue our already great efforts of bottom up interaction (regional needs).
- T. Curtin thanked everyone for their work and noted that the report process and end result was more effective than the letters we've previously sent.
- J. Virmani thanked the staff for keeping everyone on track. She noted that it has been hard meeting virtually and the report has helped keep everyone more guided.
- R. Perry thanked everyone and echoed all the things that have been already mentioned. She added that we should continue to do things that are core to the regions but also grow the IOOS system at large as well. In NOS and other places, we need to figure out top down interaction. The SAB is trying, but it is too atmospheric and not as ocean focused. We need to show through top down interaction how we will grow IOOS and how the FAC's advice is woven into and dedicated to ocean observations regardless of administration changes. We need to look at OceanObs'19, UNDOS, but we should also be proactive in terms of regional needs and have them present their needs to us. We need to keep the

uniqueness of the regions and keep interaction throughout NOAA. She suggested areas we could interact with: wind energy, ocean predictions.

- D. Vandermark agreed with R. Perry and J. Virmani's comments. He noted that IOOS could have started top down, but has become bottom up. With the new money, we need to focus on growth and integration because we can't do everything.
- J. Hagen noted that she liked the report as a product more than the previous letters and added that they kept the committee focused and was an inclusive process. She added that she actually likes the bottom up approach. She clarified that it's good to let people in Congress know what is going on, but we need to hear from the regions and user communities to see if we're working well and delivering what we promise.
- J. Read noted that she liked the working group format, the report process, and agreed with R. Perry's comments on integration and prediction.
- J. Quintrell added that she appreciates all these minds thinking about IOOS and providing advice.

S. Rayder thanked everyone for their comments and provided a special thanks to the departing members. K. Arzayus noted that they will reach out about the charter renewal, upcoming admin call, and setting a date for the fall meeting. The meeting was adjourned at 4:11 pm ET.