U.S. DEPARTMENT OF COMMERCE

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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
(NOAA)

HYDROGRAPHIC SERVICES REVIEW PANEL

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PUBLIC MEETING

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THURSDAY
MARCH 7, 2024

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The Hydrographic Services Review Panel met via webinar, at 8:30 a.m. PST, Sean M. Duffy, Sr., Chair, presiding.

HSRP MEMBERS PRESENT

SEAN M. DUFFY, SR., Chair
NATHAN WARDWELL, Vice Chair
DR. QASSIM ABDULLAH
MARY PAIGE ABBOTT
CAPTAIN ANUJ CHOPRA
CAPTAIN ALEX CRUZ
DR. NICOLE ELKO
SLOAN FREEMAN
KIMBERLEY HOLTZ
DEANNE HARGRAVE
CAPTAIN CAROLYN KURTZ

ERIC PEACE
REBECCA QUINTAL
JULIE THOMAS

NON-VOTING HSRP MEMBERS

CAPTAIN (NOAA, ret.) ANDY ARMSTRONG, Co-Director, NOAA-University of New Hampshire Joint Hydrographic Center
BRAD KEARSE, Deputy Director, National Geodetic Survey (NGS), National Ocean Service (NOS)
DR. LARRY MAYER, Co-Director, NOAA-University of New Hampshire Joint Hydrographic Center
DR. MARIAN WESTLEY, Director, Center for Operational Oceanographic Products and Services (CO-OPS), NOS

NOAA LEADERSHIP PRESENT

RACHAEL DEMPSEY, Deputy Assistant Administrator, Navigation, Observation, and Positioning, NOS
RDML BENJAMIN EVANS, Director, Office of Coast Survey (OCS), NOS, and HSRP Designated Federal Officer

NOAA STAFF PRESENT

AMBER BUTLER, Office of Coast Survey
ASHLEY CHAPPELL, National Ocean Service
ROBIN CZERWINSKI, National Ocean Service
VIRGINIA DENTLER, Center for Operational Oceanographic Products and Services
DR. RACHEL FONTANA, National Marine Fisheries Service
NATHAN LITTLEJOHN, National Geodetic Survey
AMANDA PHELPS, Office of Coast Survey
MEGAN SCHWINDEN, Office of Coast Survey
GALEN SCOTT, National Geodetic Survey
DARREN WRIGHT, Office of Coast Survey

MODERATORS

BRAD KEARSE, Deputy Director, NGS
JULIE THOMAS, HSRP Member

SPEAKERS

DR. CLARISSA ANDERSON, Executive Director, Southern California Coastal Ocean Observing System
DR. YEHUDA BOCK, Lead California Spatial Reference Center, Scripps Institute of Oceanography
CHRIS DIVEGLIO, PORTS Manager, CO-OPS, NOS, NOAA
DR. DOUGLAS GEORGE, NERRS Science Collaborative and Blue Carbon, OCM, NOS, NOAA
DR. CHRIS PARRISH, Lead, Oregon State University

JEREMY POTTER, Environmental Studies Chief, Bureau of Ocean Energy Management

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P-R-O-C-E-E-D-I-N-G-S

(8:29 a.m.)

CHAIR DUFFY: All right. I will take myself off of mute and wish everybody a good morning. As we start Day 3, if you've been here, you've heard me talk about teams, so today is the fourth quarter, big day, we'll finish strong.

And I'm going to even throw in another quote, this is one I like to use from Teddy Roosevelt. "Complaining about a problem without posing a solution is called whining." So no whining, let's have solutions as we move forward. Keep that in mind as we go through the day.

We're going to start off, I don't see it on the script, but I'll always defer to make sure I'm including Admiral Evans. But I know we're going start with a round robin, going, Mary Paige, you'd be up first, going in normal alphabetical order, and you can come on screen. And Admiral Evans, do you have anything to say, please?

RDML EVANS: Nope, just good morning

everybody, and thank you again for being here. We look forward to another strong day as Sean mentioned. And, Amber, do we need to take a moment and just walk through the privacy statement and whatnot again, why don't we do that, just for completeness sake, and then we'll get into the round robin. Sorry, I forgot about that.

MS. BUTLER: No problem, I'll be quick. So good morning, this meeting is recorded today. Here is our privacy statement on the screen that you can read. You can refrain from using the question box if you do not want your likeness recorded, or you can close out of the meeting.

For our meeting logistics today, the Agenda is attached as a resource along with one of our papers that we discussed yesterday. You can use the question box and the menu on the right side of your screen to submit public comments or questions.

And you can contact myself or Virginia

Dentler for any troubleshooting. All comments and questions will be addressed during our technical check-in later in the day today. And here are some alternate connection information if you would like to join by phone. Thank you very much.

RDML EVANS: All right. Thank you, Amber. And with that, Mary Paige, the floor is yours.

MEMBER ABBOTT: Good morning, everyone. Just to kick-off, and make it easy so everybody can just echo me. I won't be so, so verbose, but wanted to again say what a phenomenal round of information that was provided yesterday. Absolutely loved it, loved being able to think outside of the box. As well as to realize sometimes we don't even have a box, so that take away for me was excellent.

I'm a person that as I'm listening and going through everything, I like, and you may have gathered this, one stop shopping. So the NCEI and the Inundation Dashboards and things

that have been presented or, and the data from yesterday, shows me that while we have a cohesive, when NOAA has cohesive and phenomenal data resources available, it's still making things easy for people to get that data in one place, depending on where they are.

And one of those discussion points yesterday, which was excellent, was on the PPU. So would like to just suggest that we continue to educate and advocate our stances. And to remember what the benefits are to NOAA and what roles should NOAA play as we listen the rest of the timeframe, and that's it from me this morning.

RDML EVANS: Thanks, Mary Paige. I think next up, Qassim?

MEMBER ABDULLAH: Yeah, thank you. Good morning, everyone. Good afternoon, if you are somewhere else. Yeah, I'm Qassim Abdullah. And I thought we had really great discussion last couple of days. I would like to highlight some of the issue we raised definitely.

I mean, even going back to the day before, the Director Report definitely was great. All the panel was right on, the speakers, the topics. I agree with Mary Paige, I think we need to, as much as we can, simplify our offering as NOAA to the stakeholder and use it, it is good for us at NOAA.

The more people use our data, the easier access to it, it is better for our position, justify our activity, give us the support to move the services. And I would like to focus a little bit on, I know like Brad mentioned, the NGS role in introducing this great datum, the 2022.

I think we all as panel members, has a role in propagating that message to preparing the industry. And I just want to bring an example, I don't want to brag about myself, but I took it on to myself to support NGS from the beginning, like ten years ago.

I've been working with them on their industry workshop and I'm active with the

American Society of Photogrammetry and Remote Sensing, so what I did, we formed a working group on the modernization of the NSRS.

There, with the support of NOAA, and Galen with me, and giving us the support we need, we doing like a lot of meetings or last time, in February, we have our annual conference, we have a big session on it.

And their idea is to educate the industry, what is coming, and how we prepare them for it. So I think everybody can really do a similar thing to take the message of the NSRS organization to prepare the industry for that transition. That's all I have, Admiral Evans, and Sean. Thank you very much.

RDML EVANS: Thank you, Qassim, and thank you for that note. Anuj, on to you?

MEMBER CHOPRA: Thank you, sir, thank you Admiral Evans. I will echo what Mary Paige said and what Dr. Qassim said. I think the more users we have, the better it gets. And the panels were amazing, the presentations were

great. And we worked closely on the Technology Committee in doing those offerings and looking forward to today. So without taking any more time, really want to echo Mary Paige and Dr. Qassim's comments. Thank you.

RDML EVANS: Thank you, Anuj. I was looking at my list. Do we have Captain Cruz with us?

MS. BUTLER: No. We're going to move on to Nicole.

RDML EVANS: Okay. Nicole, the floor is yours.

MEMBER ELKO: Thank you. Nicole Elko. I don't know if any of you will know, and some of you will, but there is an Eminem song, right, called the Real Slim Shady, we couldn't play it on here because it's like X-rated.

But I often feel like Nicole LeBoeuf is the real Nicole so, you know, will you please stand up, please stand up. Anyway, that was my terrible joke to start off my day. And Nicole LeBoeuf is the real Nicole, and she's probably

not joining us today, so I'm going to channel some of her energy and, my two comments, first, is to thank everyone and the second is related to sediment.

So amazing day yesterday, great energy from the team, HSRP panelists, thank you for the great discussion we had on our white paper, our issue papers, and thank you to everyone behind the scenes for pulling this together. It's really been an amazing event, with virtual meetings. The panelists today look fantastic, and I'm really looking forward to the discussion.

And then related to sediment and my joke with the real Nicole, when I first met her, one of my very first questions to her was, "What is NOAA's position on sediment, and, you know, where do you stand on that?"

And we've had some fun conversations, Mark Osler has come into that, Doug George, he's here from today. So I'm thrilled that we're talking about it. You know, to me it boils down

to HSRP is really in the business of advising on how we measure sediments, right, how we measure water up.

So just wanted to commend the panel once again on thinking about that tough challenge and how we might, you know, wearing our HSRP hats, advise the directors and Big NOAA on how sediment as it relates to coastal resilience and NOAA's mission are very important to us. Thank you.

RDML EVANS: Thank you, Nicole. And on to Deanne.

MEMBER HARGRAVE: Good morning, everyone. I'm Deanne Hargrave, nice to see you again today. I really don't have any additional comments to add, just looking forward to today, having a great session, and some good conversation. So thanks, looking forward to it.

RDML EVANS: Thanks, Deanne. Do we have Tuba with us today? I know it's early on the West Coast.

MS. BUTLER: Yes, Tuba's on.

RDML EVANS: Great. Good morning. Tuba, I think you're on mute.

MEMBER OZKAN-HALLER: I'm having some technical difficulties, can you hear me, no? Okay. I'll try it, oh you can, yes?

MS. BUTLER: Yes, we can hear you now.

MEMBER OZKAN-HALLER: Thank you. Apologies for that. Good morning, everybody. Really happy to be here for Day 3. Yesterday, we had conversations, one of our panels was about resilient ports. I really appreciated the two perspectives that were provided by the two speakers, East Coast, West Coast.

And I could really think about the way those concepts related to the Pacific Northwest that I'm familiar with. And in a couple of weeks, I will actually be in a different meeting in Norfolk, so I will have an opportunity to see yet another port there. So I really appreciate just that context that the session has given me, so much appreciated.

And then as far as today, I am very

much looking forward to the regional updates. I really do wish as we were watching these conversations, that we could have been there in person.

But I do look forward to having my past class, San Pedro, at some point in the not too distant future, so I can see some of these things that we're talking about firsthand. But thank you for really providing a very thorough review of the local landscape, much appreciate it.

RDML EVANS: Thank you, Tuba. And would love to follow up about your meeting in Norfolk at some point, if there's an opportunity to share some more NOAA experience with you while you're there, we would be glad to do so. On to you, Eric.

MEMBER PEACE: Yes, so again, I enjoyed the panel as well yesterday. But what I really have come to realize is how much I enjoy the diversity of the HSRP panel members. And you saw that through the PPU discussion, having that

operational, real-world experience with a device like that.

And then, of course, our economics, so that they're looking at this as a way to improve or whatever, but I really appreciate the diversity. And that's all I really have.

RDML EVANS: Thanks, Eric. Yeah, I couldn't agree more. I think it's really critical to have that wide range of perspective and background and expertise. So thanks, I will echo your thanks. Julie?

MEMBER THOMAS: All right. Good morning, everybody. Pleasure to be here again and see you all. I know we have just a few minutes of time, so I'm going to go into a few more comments that I thought about overnight. One is, I did comment on the Director's presentation about how beneficial I feel that that is to the panel.

And I would propose that for the next meeting, that we do take advantage of Admiral's offer to augment their 10-minute slot to a 12 or

15-minute slot at least. I don't see how they cram so much in 10 minutes.

So I just wanted to put that out there, 15 minute per Director to me would be great. And I really like having it towards the beginning of the meetings to kind of set the tone for the rest of the meetings that we can talk about.

A couple of other things is, I think that Lindsay Gee put in some really good public comments. And I haven't had time to go back and read them, but I wanted Lindsay to know, I think the panel should think about some of the things that he said there. And I will read them and follow up through email and after this meeting, I think it's important.

Regarding Qassim's comment on NSRS, I think, I am kind of in the throes of putting together a meeting with Kim Holtz, if you would join us and Dana Caccasmise with Jacobsen Pilots. And we'll kind of start there in the Port of Long Beach and that's going to happen within the next

month or so.

Regarding issue paper discussion yesterday, I loved the two topics of sediment management or mobility, and I already, Doug George, who's going to be presenting later on this morning, sent me a text and that's one of his specialties, too. I got to know Doug when we were actually flying lidar in Southern California and Doug was then working for the State.

And Ed Saade, who you know from previously, we were all working together. So, you know, he kind of chimed in, too and said he'd be happy, well, I'm kind of putting words in his mouth, but maybe we could invite Doug for one of our working group sessions. We will be hearing from him later today.

As far as the PPU discussion, I kind of have a different take on this, because I feel that that's a little bit out of our wheelhouse to really think about doing an issue paper with it, or focusing on it too much.

There is so much history there with

the PPUs. And as Carolyn has mentioned, every, to me it's a little bit like you buy the best car for your use, you use the best PPU for your port.

And you know, there's the American Pilot station, there's all sorts of organizations for the Pilot. And then there's Jacobsen Pilots, who are completely independent and not part of any Pilot, and will do what they want.

So standardization of PPUs, I feel like it's not going to go anywhere with this, and it's not even applicable to the three divisions that we're responsible to for this advisory panel.

So I love the topic of PPUs that Tom stated, the wave programs first got involved with PORTS back when Darren Wright, thank you Darren, was head of PORTS. We were getting so many requests from Pilots to add the wave data where we had buoys right at their ports.

And one of the paths that I saw the easiest to get it on the PPU was through the PORT system. And so that is when I approached Darren

to actually include the wave data on the PORT site. So I've kind of had a long history with different PPUs, and I just think it's a little bit out of the context of this panel.

Okay. That is all I'm going to say right now. And back to you, Admiral.

RDML EVANS: Thank you, Julie, and thank you for that perspective and history on the PPU topic. Mr. Vice Chair, Nathan Wardwell, good morning to you.

VICE CHAIR WARDWELL: All right, well thank you. Yes, so being at the end of the alphabet with the panel members, I was expecting to be at the last, at the end, and then I realized, woah, there's a lot more people after me, so I am sort of in the middle and that's great.

And Nicole Elko, thank you for the joke this morning, I did get a good laugh out of that one. And then I do want to echo Eric Peace's comments about the just really appreciating the expertise, diversity on the

panel. And really excited about the expertise that the new panel members are bringing, and I think that's going to be great.

As I was listening to, you know, one of the take aways that I got from the sessions yesterday and then the day before, listening to the resilient ports and adaptation and mitigation for climate change, you know I was hearing calls for additional real-time data and increased spatial measurements.

And those are very valuable. But I would, I do want to, and I think it's important to highlight the value of continuous long-term measurements from programs like CORS, the Continuous Operating Reference System and the National Water Level Observation Network, right.

So that provides foundations for the sea level trends that are being used for some of these analyses. I really like the idea of having a panel for the seabed mobility and sediment discussion.

I know that would, that's not my area

of expertise, sediment, and so hearing more about that and how an issue paper would play into that, I would really benefit from that.

And then I'm just generally excited about the session today to hear about the Geospatial Modeling Grant. And I always really appreciate, I enjoy the input from regional experts, so really look forward to that. And I will send it back to you, Admiral.

RDML EVANS: Yep, sorry about that, just fumbling for the mic button. Thank you for that feedback and that input. And now we'll turn to our new members. And I believe we have them all online. Sloan, the floor is yours, good morning.

MEMBER FREEMAN: Hi, it's a pleasure to be back today. Echoing everyone's appreciation for the presentations so far on this panel. My thoughts on yesterday, I was really struck by how valuable are the tools that were described for the Port of Long Beach and Rhode Island were.

It's really amazing to see how the quality data is being implemented in a system that's has a lot more detail, a lot more usability and that's just something to see.

But I was also struck by what a challenge that would be to apply more broadly across small ports and the regions that surround, they don't have the resources to support that type of effort.

And so I think maybe it gets to the center of the complication question that Mary Paige and Qassim brought up as well, and then trying to get to a level of tool that's simple enough for a broader number of small ports could also use and because of their limited resources.

I'm in a small rural area and so that's what I see surrounding us. I think that would be a great use case to consider in the future. I'm glad to get going again today and I can't wait to learn more.

RDML EVANS: Thank you, Sloan. Kim, good morning.

MEMBER HOLTZ: Yeah, good morning. I really enjoyed the talks yesterday and I'm just learning more and more about the Committee. And that's pretty much it. I mean, I'm very excited to talk today about or to listen to the talks today.

Because all this would be in a larger port with the this, you know, I'm real concerned with like the datum change, you know, how it's going to be, how the ports are going to deal with this. So I am interested to hear some more talks today. But I'm really enjoying my time so far. Thank you.

RDML EVANS: Great. And we very much value your input already, even as a new member, so thank you.

MEMBER HOLTZ: Thank you, I'm not sorry.

RDML EVANS: Nor should you be. Carolyn, good morning.

MEMBER KURTZ: Hi there, good morning everybody, afternoon. Again, going near the end,

just sort of echoing the same appreciation for the Committee and the panels.

I thought the panel on port resilience was so interesting. And was really struck by, you know, even though the ports were on different coasts and are different sizes, the issues are not that different. So you know, solutions can be applied, of course taking resource availability piece into consideration.

I want to thank Julie, I had no idea that you were the one that got the wave data put on the PORTS screen. And as a pilot, that is such a super important piece of information for, you know, shutting down the port and when to re-open the port and all of that. So a big personal thank you for having done that.

And as far as the PPU thing, I can share position papers from APA and IMPA. And you know, any other information outside of this, because it does seem like it's kind of an overly technical and maybe not appropriate thing to be even approaching, talking about standardizing any

of that.

But there's a lot of good information and stuff that I can certainly share if anybody's interested. So thanks, and I look forward to today.

RDML EVANS: Thank you, Carolyn. And last, but certainly not least, and I promise we will mix up the order here and keep people guessing at some point. Rebecca, good morning.

MEMBER QUINTAL: Hello. So I also really enjoyed the resilience, the port resilience talks yesterday, loved the East Coast, West Coast examples. For Justin's talk, I was interested that one of the focus areas is working on the power system resilience.

You know, one thing, I actually looked up the definition of resilience for this when this panel, and it says the capacity to withstand or recover quickly from difficulties.

So we know that the difficulty is, you know, large weather events, increase the temperatures which puts pressure on the power

system, et cetera, those are going to increase in frequency and magnitude, and you know, so how do we toughen up our ports?

And I noticed that he mentioned one of the things they are looking at is renewable energy including offshore wind. And I'm in Rhode Island and that's been a hot topic, offshore wind in my area, including lots of local town meetings, et cetera, but I won't go into all of that.

And so Rosemarie's talk, I really enjoyed learning about the learning about the modeling that is going into determining the best, to help them evaluate what should be the best plan for implementation going forward.

I did not know about the RI-CHAMP database before this and I've already checked out that website, so I thought that was great, the modeling that they have going on there. And I'm looking forward to today's talks as well.

RDML EVANS: Great, thank you, Rebecca. I was just typing some notes, because I

think your thoughts on that closely mirror my own, so thank you.

With that, we'll turn to the non-voting members of the panel. Andy, you're up, good morning.

CAPT ARMSTRONG: Yeah, good morning, everyone, and good afternoon for some of us. So I did enjoy yesterday very much and I thought they were, we had a really excellent panel. And I also enjoyed the HSRP panel discussion on priorities in papers, I thought it was a very rich discussion. And looking forward to today. Thank you.

RDML EVANS: Thanks, Andy. Dr. Mayer, are you on?

DR. MAYER: Can you hear me okay, we didn't get a chance to --

RDML EVANS: Loud and clear, sir.

DR. MAYER: Oh, good, okay. Thanks. You know, I too enjoyed yesterday. I, it was interesting to me, I thought about resilience a lot, and like Rebecca, I went and looked up the

definition again.

And in a sense I was wondering how much this related to the task of the HSRP when we talk about port resilience, well, it's clear. But I think what I recognize is that what we're seeing is really a remarkable continuum, you know, from precision navigation to port resilience to coastal resilience, in a sense. I mean, and it's all tied into the data streams that NOAA is providing.

And we increased the constituencies with each step. But I think that's a very powerful thing to observe, and again, just supports the tremendous value of the kind of data streams that are being provided, both from the modeling side and the raw data side.

And again, I think that starting with prevision navigation and just growing from there. So that impressed me. I was also really impressed by Rosemarie as a Ph.D. student. As an academic, I say we all get Ph.D. students of that quality, that would be, that would make our life

a lot simpler. And finally, the PPU discussion I found intriguing. I'm going to take Julie's side on this one.

And I guess, I looked at NOAA's role is, you know, somebody said the analogy is you're not going to, everybody's going to get their favorite car. But NOAA's role is to provide the fuel, and make sure that the fuel that drives them is compatible with each one of them. So the standardization shouldn't be in the PPUs, it has to be in the data streams provided.

And it's the responsibility of the PPU manufacturers to assure that they, well, it's a lot of things, I guess one or two can all accept that. And I say that with a caveat, though, because I've witnessed this in the past, and that's that at the same time, I think NOAA has to be very aware of new demands from users for things that maybe the standards don't allow.

And that kind of flexibility and rapid update needs to somehow be brought into the system. And I'll stop there and look forward to

today.

RDML EVANS: Thank you, Larry. And I will just amplify you to say that I think that each sound that the relationship of the PPU manufacturers as well as the ECS, the Electronic Chart System, the non-type of ECDIS manufacturers has been really fruitful for exactly the role that you suggest.

If we can try and align data and standards early, that haven't made their way into the type approval, the INO type approval process yet. So definitely appreciate that comment. I think next up we have Brad.

MR. KEARSE: Yeah. Good morning, actually almost good afternoon for folks on the East Coast. Yeah, interesting discussions yesterday. The discussion about sand waves, and then I had a remote sensing folks send us images my way just to look about the topobathy lidar collections in which you could see.

So Mike Aslaksen, who a lot of folks know here, sent me quite a few images of where

you could see the sand waves just so I could learn a little bit more.

Qassim, I want to thank you for your comments on the National Spatial Reference System, you're right.

We've got to get engaged in many levels and always be a part of the discussion when folks are talking about geospatial data.

Even starting within NOAA and working our way up, FGDC, all the different groups, the group you are leading. I know we're going to be engaged a lot this summer, and other communities that we're not thinking about.

We're in the process of developing an engagement strategy now. So as we roll in the next year, we can get out among all the different communities with the resources that we have and the folks. So thanks for that.

I know Nathan brought up some things about the Spatial Reference System, thank you. Kim, great to have you a part of the team, and really understand the whole aspect of reference

systems and how they are so important.

And also, really intrigued at the whole resilient ports. As I talked about briefly in my brief, we're really trying to get engaged in the Norfolk area.

With the academic institutions down there, and as most folks, if you don't know, we have three different field operations teams between Office of Coast Survey, CO-OPS, and NGS down there.

And we will be participating in the Maritime Symposium there in the April timeframe, which we're going to talk about observations and products required for more resilient, to be more resilient in the ports.

So looking forward, that's being hosted at Old Dominium University. And we hope the timing of all that and selecting our new interns that we will bring in that they can get more engaged in that. And we know they have a lot of studies down there in the area. So really excited about that and where we go with that

engagement.

So I will stop at that. And I look forward to the Geospatial Modeling Grant discussion today, I'm leading that. This is excitement. You all read the paper on this and we're moving out in many different ways to start addressing that. And you'll hear a few of those academic institutions today. So that's it on this end. Thanks, Ben, back to you.

RDML EVANS: Thank you, Brad. Dr. Westley.

DR. WESTLEY: Thanks so much. So I also really found yesterday very stimulating and enjoyable. I am personally, and my organization's very interested in the concept of resilient ports.

Because we've always straddled that line between tight gauges that help you get a big ship in and out of a harbor, and also being the National Sea Level record.

But I want to give credit where credit is due. I was having a conversation with Captain

Sal Rassello, when you guys were in D.C. for the HSRP meeting in 2019. And he was telling me a story about when he was captaining a Carnival Cruise ship into Galveston and Galveston was completely under water and he couldn't offload any of his passengers.

And, you know, these are cruise passengers, so there's all sorts of mayhem breaking out on the ship, because none of them could get off the ship because the port was completely underwater.

So I really think very much about our services to the navigation community don't stop when the ships tie up. It's also, you know, what services are we providing for that entire port infrastructure to be safe and resilient and to serve, you know, the land side of the ports as well.

So I just wanted to give credit where credit is due. That was a great conversation with Sal all those years ago. Kind of put the idea in my head of kind of joining our, kind of

more land-based mission while we're focused on sea level rise with our navigation mission.

So very excited to have this topic coming back up to this group, because you guys were the leaders back then and I think you can lead us through it right now, too.

RDML EVANS: Thank you, Marian. And thanks for that perspective and that reminder we can all keep in the back of our heads. As you said, our mission doesn't stop when the ship ties up, it's still floating, it's still there in the port. NOAA Deputy Assistant Administrator Rachael Dempsey has joined us. Good morning, Rachael. Your comments?

MS. DEMPSEY: Good morning. Good morning, everybody, I won't take too much time. I think I want to first thank the panelists for all their comments and their participation, whether you are a voting member or a non-voting member.

You know, from yesterday, I just want to say that this adaptive and resilient ports

project is an important one, particularly for the Directors that are participating here.

It emphasizes the importance of our observations. It emphasizes the importance of NOAA's data as authoritative. Whilst they, in making sure that we balance the additional data that we can use to make it accessible to all of our constituents.

I think Justin Leudy, who gave us that perspective regarding their preparation for 2080, was extremely apropos. And, you know, I wonder how much we can do as part of this adaptive and resilient ports efforts to emphasize that important sharing of information from port to port of lessons learned, things that have been executed successfully and those that didn't work as well. So that we can, you know, become resilient together.

So I appreciated Justin's perspective there. And I'm sorry that I didn't get out there to L.A.-Long Beach, I'm looking forward to the opportunity to visit that port because I haven't

been there yet.

I also wanted to point out Rosemarie's, you know, perspective regarding the stakeholder engagement. You know, one of the main goals for NOAA and for NOS is equity.

And she demonstrated a perfect example of the importance of community engagement, understanding changes in port infrastructure and what that means to the community that is immediately surrounding a port.

And so I hope that everyone had some good take aways there, that sparked some ideas of ways to incorporate that, and to what we are all doing in our respective areas of expertise.

I also want to acknowledge Rebecca, and the impact that she's mentioned on power infrastructure for sea level rise. I just want to add to that, that it's every bit that it's underground, whether it's drainage systems, electrical systems, communications systems, our sewage systems.

You know, all of those things are

going to be impacted tremendously with sea level rise. And that is one of the biggest challenges that we have when we talk about the infrastructure planning that Rosemarie mentioned yesterday. Having every local, state, national infrastructure manager and contributor as part of that conversation is absolutely critical for us to get it right.

So thank you, Rebecca for mentioning that. Thank you all, and I'm looking forward to the rest of today's discussions.

RDML EVANS: Thank you, Rachael. Yeah, those are, I think, are all very powerful comments. And I will just add before I turn it back to Sean, I will just add that I too, was struck by the relevance of the adaptive and resilient ports conversation.

I was very curious to hear the panel's take on this in today's comments and I've not been disappointed. I think it really, to me, I came away from that conversation thinking a lot about the requirements to synthesize NOAA's

observations and predictions across a wide range of time scales from the immediate through the very long term, out to 2080, as was shared.

I also was struck by some of the comments about the, or the points made about what do we need from NOAA. And, you know, in Long Beach, the main thing, the main issue was heat. And it might be tempting to think, well, that's not our job, that's Weather Service's job, to understand heat and its impacts.

But as Rebecca pointed out, well, okay. Yes, certainly Weather Service has a role there, but we do too, we start to think about, okay. Well, what are the impacts of that, how do we help the port and the community become more resilient and to adapt to these rapidly changing conditions?

And, you know, our work to sustain, to enable offshore wind may be a part of that. So I think we have to think beyond kind of the first order to the second and third orders that affect this. And similarly, in relying on and thinking

about the models that they presented.

Well, okay, how does, you know, we're not going to get into the business of figuring out and modeling the effects of having a warehouse door or a basement door on one side of the building versus another in the port zone.

But our foundational observations, and our water level models certainly drive those models. And so how can we create that connective tissue to ensure that what is within our responsibility, is connecting and supporting the work that the local communities are doing on behalf of their specific needs.

So that, and then, you know, how can we line up those requirements in an era, frankly, of flat or possibly declining resources. How can we, you know, think about this mission as a way to build understanding of the value of those foundational products and services that we provide?

I think there was a lot to unpack there that I found very, very compelling and I

appreciate the comments of the panel on this as well. So with that, I will stop talking and turn it back to Sean, Mr. Chair.

CHAIR DUFFY: Thank you, Admiral. I want to just make a couple of really brief comments, deferred because a lot of the panel members and Directors have covered a lot.

I continue to come back and I think it's really an advantage in that Andy Armstrong, at the center of excellence. I won't make a personal appeal, I know Andy has a connection to the City of New Orleans. I, as we talk about climate change and weather change, I've seen, been around the country, and seen water mains breaking all across the country.

We're seeing some real challenges that do have connections to the maritime industry. We still have kind of the inability to locate pipelines buried below hard sand.

And I realize technology is coming along, but I'll mention Nicole Elko hit us with a song. I could mention one, not live, and it was

a band with a really cool name that I worked with back a long time ago in a different life called the Tragically Hip, and the song is "New Orleans is Sinking."

And there was a line that says, "New Orleans is sinking, man, and I don't want to swim." Well, over the last few years, that has come back to me a good bit. Just authored an article that will be published soon, and I will make sure everybody gets it. But we're seeing relative sea level rise, saltwater encroachment, crevasses, the Mississippi River really being active, all the things that have been talked about with the PORTS system.

We have glaring gaps in data. And I'm reminded of the old adage that the customer always wants more and is willing to pay less for it. Although in this case, the customer really always wants more and doesn't really have any funds to add to it, you know.

And it has been mentioned here many times before that NOAA PORTS system should be

federally funded. I liked Eric Peace's mention of imagine traffic lights, if those were up to neighborhoods to fund and how wonderful our road transportation would be.

We face a lot of these challenges. There's a lot to PPUs and air gaps. I do want to mention the lidar incorporation of air gaps as kind of the future on the river. We're trying to get more air gaps on the bridges. We have a total of seven, two of those are twin bridges, one of them has an air gap sensor.

We'll be getting the first new air gap sensor at the end of, in April, by the end of April. It will be the first one in 20 years, which leaves three bridges without sensors. It's a very complicated situation. I realize it's Mississippi River, unfortunately, that's where I live and operate.

And I just wanted to say excellent panels. I appreciate all the team members, look forward to working with the new members. And yes, there's a lot we'll have to discuss in the

working groups.

With that, I want to just say I appreciate everybody. It's amazing the brand name bandwidth, it just goes up when we all get together and talk about things and understand different perspectives.

Hope none of that was out of line, but I've been thinking about it a lot. I want to share that paper, and it's related to sediment transport, there's a lot of connections.

So "New Orleans is sinking man, and I don't want to swim" is the ending line of that song. And again, my friends are passed away from that band, but Tragically Hip was an awesome group. With that, I'm going to, think we are a little ahead of schedule. I don't know, yes, sir. Admiral, I will turn it over to you.

RDML EVANS: Thank you, Sean. And thank you for those comments. I think what we'll do here, because we are running a tiny bit ahead, is we will just take a quick ten minute or so coffee break. It's tempting to just plunge right

ahead, but we want to be respectful of the agenda because we know that some attendees may be coming in specifically for the next session.

So I think we do have all our presenters available. But we'll take a ten minute break and reconvene at 12:25, at which point we'll jump into the conversation on the Geospatial Modeling Grants.

So the line will stay open, please don't disconnect. But just mute your mics, and turn off your cameras, take a quick stretch break and we'll back in about nine minutes.

CHAIR DUFFY: Thank you, sir.

(Whereupon, the above-entitled matter went off the record at 9:15 a.m. and resumed at 9:26 a.m.)

RDML EVANS: Welcome back, everyone. We're back and headed to our session on Geospatial Modeling Grants. Sean, I will turn it to you.

CHAIR DUFFY: Thank you, sir. I appreciate that quick break. And I'm going to

not go into any kind of detail and just introduce Brad Kearse for the next discussion. The floor is yours.

MR. KEARSE: All right, thanks Sean. Good morning to those on the West Coast, and good afternoon to those on those on the East Coast now. My name is Brad Kearse, I'm the Deputy Director of the National Geodetic Survey.

And I'm so excited to moderate this panel session today. A great opportunity to have two of our distinguished academic partners talk about what is happening in regard to NGS's Geospatial Modeling grant.

The grant has a great opportunity for NGS and also our geodesy community of practice membership. It has created a lot of excitement and discussion among those partners.

We are honored today to have Dr. Chris Parrish from Oregan State University and Dr. Yehuda Bock, from the University of California-San Diego SCRIPPS Institute as part of the panel session today.

Both panel members will provide an overview of their plans and how these plans will assist NGS and the National Spatial Reference System modernization efforts. And also, helping address the geodesy crisis as we talked about numerous times. We will save time at the end for questions and discussion amongst the whole panel.

Dr. Bock is a distinguished researcher and senior lecturer at UCSD at the SCRIPP Institute of Oceanography and the Institute of Geophysics and Planetary Physics.

Dr. Parrish is a professor and a Plasker Faculty Scholar in Geomatics at Oregon State University where he also served as director of the Geospatial Center for the Arctic and Pacific. And also a former colleague when we were taking on challenges of lidar in the development stages of that great technology we have today. So good to see both of you.

I'm so disappointed that we didn't get a chance to see each other in person and catch up. And I look forward to having this session

again here, the Geospatial Modeling Grant Program panel session that we're going to have at the UESI and Geomatics Conference this June.

And I think, Chris, you're going to talk about that later on. And also, we have Qassim is going to be the keynote speaker for that, so we'll look forward to that.

So let me just go over some background before about this before I turn it over to Dr. Bock. One of the drivers of the Geospatial Modeling Grant was the Geodesy Crisis white paper which was released in January of 2022.

Subsequently, in December of 2022, the Federal Geographic Data Committee adopted the National Geospatial Advisory Committee Resolution on Geodesy, formally acknowledging the geodesy crisis and providing recommendations on how to address this issue.

During the spring, 2023, HSRP meeting at San Juan, you may recall that the HSRP issued its own resolution on geodesy to address the Geodesy Crisis white paper.

And then the fall 2023, HSRP meeting at Silver Spring, the HSRP submitted an issue paper on Geodesy Crisis, which provided several recommendations for NOAA action, joined the other government leaders in academia in raising the geodesy crisis to the highest level of government to warn of impacts to national security and economic growth.

Support increased investment in the Geospatial Modeling Grants that promote an increased academic and government relationships, training, and research activities of geodesy surveying and related geospatial areas.

And rebuild the pipeline for students to follow a geodesy and geomatics career path. Promote the modernized National Spatial Reference System and communicate the value of an updated, consistent national coordinate system.

In the spring of 2023, NGS released the Geospatial Modeling Grant funding opportunities to address these challenges. The Grant has two main objections, one, to modernize

and improve the National Spatial Reference System and address emerging research problems in the field of geodesy.

And among our academic partners, and within our federal partners, we call that the hard problems. To address the nationwide deficiency of geodesists and improve the coordination of the use of geospatial data for all of us.

The outcome of the Grant is to train geodesists in the U.S. and to modernize geodetic tools and models that will improve the accuracy and accessibility of the National Spatial Reference System to all.

This is a five-year Grant, and it was issued to four different academic institutions. Two are here, the other two academic institutions are Michigan State University and The Ohio State University.

The funding will support the newly established Geodesy Community of Practice, stood up by NGS, NGA, NASA, and USGS last year. And

will also leverage funds being forward by those other federal agencies going to academic institutions.

We hope these grants will also be used by other institutions in the future to help build a robust geodesy workforce and improve the Spatial Reference System resources in the future.

Today we have the opportunity to hear from two of those on the specific activities they are conducting to modernize the National Spatial Reference System and the next generation of geodesists and geospatial professionals out there in the field. Dr. Bock, the floor is yours, I turn it over to you. Welcome, sir.

DR. BOCK: Can you hear me okay?

MR. KEARSE: Yep, hear you loud and clear. Thank you.

DR. BOCK: Okay, very good. So good morning, everybody. I want to thank the organizers and of course, NGS colleagues for inviting me to contribute to this session.

I want to, I was disappointed a bit

that it wasn't in person, since I wanted to combine this trip up the north with a visit to our family in the L.A. area, but that's the way it goes.

Anyway, I will describe the new geodesy track at SCRIPPS Institute of Oceanography and UCSD and its contributions to the modernized National Spatial Reference System. Next slide, please. Okay. Just one second.

I work at the Institute of Geophysics and Planetary Physics in La Jolla, where I'm one of several faculty members who are active researchers in geodesy.

An IGPP and my research group operates the SCRIPPS Orbit and Permanent Array Center, or SOPAC, and the California Spatial Reference Center or CSRC.

The CSRC is a support group of the University of California-San Diego and is an outreach program with a oversight by an executive committee represent the academia, federal, state, and local agencies and the private sector.

We are responsible for defining and maintaining the California Spatial Reference System or CSRS, and its connection to the National Spatial Reference System, realized and maintained by the National Geomatic Survey.

We are primarily funded to operate CSRC by federal grants from earlier NASA, now NGS, state agencies, California's Department of Transportation and Water Resources and other groups. Next slide, please.

So we are fortunate to have been chosen along with three other universities to receive the 2023 Geospatial Modeling Competition Award from NGS.

And as you can see at the lower left, there are ten faculty members listed as co-investigators who together formed the critical mass or Geodesy Program in our department.

And you see our collaborators on this Grant are BWI Caltrans and a local city college. Next slide, please. So the first objective of our award is to create a formal geodesy program

at SIO to address the nationwide deficiency of geodesists by leveraging our current geophysics curriculum and faculty.

To support this objective, the award provides us with funding for five graduate students over the next five years. Next, please. The students are expected to follow the new geodesy track and have a geodesy related thesis.

And one or more of the students will focus on the other two components of our award that I will describe later. They include an Intra-Frame Deformation Model, which is a time dependent component of the National Spatial Reference System for users in areas of the nation with active ground deformation, which is the western U.S.

And the third component is to work on a unified marine terrestrial vertical reference frame using in this case, measurements of seafloor topography and remotely sensed satellite observations.

The fellowships will cover tuition and

a monthly stipend, including benefits. With the first students or ones on the path, the citizenship our goal is to address the nationwide deficiency of geodesists. Next slide, please.

Geodesy is a broad discipline. And here, I slightly modified the title of this graphic from the EarthScope Consortium and added a few space missions on top to display the different research areas that require geomatic observation from methods.

And you can see them starting with Sea Level and Geoid, going in counter-clockwise, here are different applications that require geodetic observations and methods.

Each of our geodesy faculty do research in one or more of these applications. Our main focus is they are educating students on geodetic principles to support our research and a range of scientific applications. Next slide, please.

Living in California, we experience, I would say too often, a wide range of natural

hazards represented in this slide. Geodetic infrastructure, methodologies, and reference frames are essential to help mitigate the effects of these hazards on society and to understand the physical processes that drive them.

We expect there are students who have acquired the tools to tackle related investigations and appreciate the practical applications of geodetic science. Next slide, please.

So here I'm showing the proposed geodesy curriculum. There are nine classes that build upon existing geophysics courses. And we add three new ones that will be taught starting next academic year.

The students will be required to take three core courses and others as electives according to their interests and those of those of their advisors.

We are establishing an external education committee to advise us on the curriculum and ways to promote geodesy. A

subject matter expert for this part of the project is Jacob Heck of NGS.

Next slide, please. I don't expect to explain all of this but this and the next slide contain the topics that we plan to cover in the Geodesy course alongside the name of the course. We expect that we will refine these topics as the program gets under way and based on feedback from our students, collaborators and external communication committee. Next slide, please.

This is just a continuation of the courses and a description of the curriculum. And next slide. A really busy slide, but let me go through it. Although the geodesy program is geared to graduate students, we are proposing an undergraduate course in geodesy and spatial information.

The course will serve as a pipeline to the geodesy track in our department and to other academic institutions. An objective is to provide basic knowledge of geodetic concepts for earth and data scientists and the underlying

geodetic framework for precise spatial information.

And of course, we want to get young people interested in geodesy as a career. So let me just quickly go through the objectives just to acquire basic concepts of geodetic science, provide overview of geodetic instrumentation and observations, develop elementary skills in geodetic data analysis, explore existing geodetic infrastructure and data repositories, experience hands on visualization and manipulation of geospatial information, understand the underlying geodetic framework for precise spatial information systems, and to provide examples using data science applications in solving of geodesy problems. Next slide, please.

The next -- a second activity of the NGS grant is to develop what we call an Intra-Frame Deformation Model to supplement their NSRS for users in regions of significant ground motions using GNSS and InSAR data and methods and underlying geophysical models that have been

funded by several past and current NASA projects.

THE CSRC's role is to exercise the IFDM through its community of public, private, and academic users of precise spatial referencing in our region of significant secular and transient crustal movements. In this case, our subject matter expert is Rick Bennett from NGS. Okay, next slide, please.

When we describe the current realization of the California Spatial Reference System, under contract to Caltrans, we estimated geodetic coordinates and geoidal heights with respect to our California Spatial Reference Network (CSRN) which consists of about 900 stations.

And this is defined as the "Epoch Date," in this case, 2017.5. And we expect to release a new Epoch Date in early 2005. The coordinates & heights represent the CSRS according to the Public Resources Code in California.

And as I said, the CSRS is aligned

with the National Spatial Reference System published by NGS. In addition, these coordinates are also transmitted to users of our California Real Time Network for positioning. Next slide, please.

Let me go through this one. This slide shows the daily displacement time series that we've produced at SIO with our partners at the Jet Propulsion Laboratory in Pasadena. And that provide the underlying framework for precise geodetic positioning and spatial awareness.

Shown are the time series spanning about 25 years, shown here for a continuous GNSS station called DHLG near the Salton Sea at the southern end of the San Andreas Fault Zone. There are about 1,500 such stations in the Western U.S. and Alaska designed to measure crustal information across the plate boundaries.

Here they're transitioned between the North America plate and the Pacific plate. The blue arrows denote station velocities or linear motions showing a transition from very small

motions less than a few millimeters a year, to the right, increasingly larger motions up to about 43 millimeters per year, at another station on the lower left of the map.

The balancing between the two plates is several hundred kilometers wide and we use these station velocities to construct models of the amount of slip on the geologic faults that make up the plate boundary at depths about to tens of kilometers.

We call the linear motions interseismic. And so from these models, we can compute the changes in position at any location from one time to another, they are the basis of the reference frame.

However, you see on three of the plots on the right that station motions deviate from linear and need to be taken into account. We estimate the nom in the areas from the observations of the daily time series shown on the right, the plats are on the left, excuse me, detrended.

That is the estimated velocities are subtracted from the data to make the deviations from the linear more apparent. So the transients shown on the left include sudden coseismic offsets speed to magnitude 10.1 earthquakes that became postseismic motions that decay over time.

And to give you an idea of the precision, we include the square error for each component reflects the position of a single daily displacement here, about 1 millimeter in the horizontal and 3 millimeters in the vertical over a 25-year period. And the velocities have a precision of less than a tenth of a millimeter per year. Next slide, please.

So we take the median values of a week's worth of daily displacements from this time series, and when you interpolate them, you see the blue and yellow blobs on the lower left map, this is viewed as postseismic motions in the blue region at the upper left due to mismodeling.

The upper flat shows the effect of linear motions as they accumulate over time which

is based on a physical model of the interseismic motions. We then merge the two graphs to obtain a displacement grid that includes the effects of both linear motions and transients in order to reference it. Next slide, please.

The results shown here are weekly grids of a combined displacement time series showing the effects of steady state motions and transients, here at April 15th, 2023, relative to 2010 of January 1st.

You see on the right, those are misfit grids that indicate the difference interpolated at displacements at the stations. The weekly grids have been stored in a publicly accessible archive at SOPAC. Next slide, please.

So we've created a web application called SCIP that allows the user to determine expected changes in position from one day to another for any location within Western North America with respect to the North American datum.

So in 1983, it's 2010 realization or with respect to International Terrestrial

Reference Frame. The map clearly shows the abrupt transition across the San Andreas Fault System as well as the nonlinear effects site I just described.

There's a time bar to view changes in position as we scroll through the weekly displacement grids. And this is one way to realize an intraframe deformation model which referred to as a dynamic datum. Next slide, please.

Since the process I've described is based on GNSS stations, these are spaced about 20 to 30 kilometers apart and uses interpolation, so we're limited in spatial resolution.

Therefore, we're introducing imagery from integrated synthetic aperture radar measurements with pixel sizes less than a kilometer to increase the spatial resolution providing a much sharper focused picture of crustal motions. At the same time, we're using these data to improve our underlying physical models. Next slide, please.

Here's an example of displacements estimated by combining the GNSS and InSAR observations to detect on the left, interseismic motion.

That is the motion between earthquakes, the coseismic in the middle to detect offsets that occur during an earthquake, and postseismic motions on the right that will decay over time and then inverse back to the interseismic rates.

And so this, adding the, combining these two methodologies will improve the realization of the Intra-Frame Deformation Model. Next slide, please.

And so the third aspect of our project is to investigate a unified vertical reference frame. Next slide. So this part of the project will unify a vertical reference frame by improving our measurements of the sea surface topography to better align the marine and terrestrial geoids.

So I hope I gave you a -- next slide.

Gave you a good overview of what we're planning to do with the NGS award over the next five years. Thank you very much.

RDML EVANS: Dr. Bock, that was great. I took lots of notes along the way, and I'm so excited about what's going on with IFDM and working with Rick and other folks at NGS.

It's just an extension making our project even better as we modernize. And all the things going on with that curriculum and, I know you got Dana there, Dana Caccasmise, a regional advisor who does the system.

DR. BOCK: Right.

RDML EVANS: And at the university, another connection, so, and working with Jacob Heck and as he works with folks within NSPS and the young surveyors and to hope and training them too as a mentor. I'm so excited about where we're going with this. And Dr. Bock, thank you. I look forward to meeting you.

DR. BOCK: I should just say that Dana is really an excellent resource, he serves on our

executive committee for the CSRC. And is a great connection to the public that we're trying to reach through our center; really appreciate his contributions.

RDML EVANS: Thank you, thank you. All right. Well, with that, we're going to turn it over to Dr. Chris Parrish, a former colleague as I said, and we've worked together for many years, and look forward to his presentation. I'm going to turn it over to you, Chris, it's all yours.

DR. PARRISH: Thank you, Ben, and thanks everyone. I so wanted to have the opportunity to present to HSRP. And I'm going to tell you about our Geospatial Center for the Arctic and Pacific or GCAP, based here at Oregon State University and highlight the progress on our NGS Geospatial Modeling Grant. So, next slide, please.

First, just to tell you a bit about who we are. These are the faculty in our Geomatics group here at Oregon State University.

I should mention that recently we've been referring to our group more broadly as 3xGE for geodesy, geomatics, and geospatial engineering.

We're a large group, I don't have any stats on this but I'm pretty comfortable saying that we're one of the largest geomatics faculties in the U.S. When I first joined a decade ago, there were three geomatics faculty, now we're up to fourteen.

And that group is accelerating. The people whose photos are highlighted in red are new within the last year. We're currently in the process of adding one new faculty person and hopefully bringing on a couple new tenure line faculty positions within the next year. And next slide.

So these are our graduate students, and a few faculty snuck into the photo. I'm not sure this is quite everybody, but this is everybody who showed up a couple weeks ago when I sent around an email saying, "Free pizza for everyone who meets on the stairs out front for a

group photo and extra points on your mid-term if you wear your geomatics shirt."

This is a really outstanding group. I think we currently have nearly 30 graduate students, and they're a really big part of the success of our program. It's important to note that these are just graduate students. We also have a lot of undergrads who are pursuing a geomatics minor.

And we're in the process of trying to start a new undergrad major as well. And I will talk more about that later. Next slide, please. And if you could, maybe hit forward just a couple times to bring up the highlighted text, great, thank you.

So these are our graduate classes, the ones highlighted in yellow are the ones that are most relevant to our NGSG Spatial Modeling Grant. You can see in that block in the upper left, we have a geodetic surveying track with Least Squares, Geodesy, GNSS, Advanced GNSS, and Control Surveying.

I also highlighted on this slide here a couple of other classes that I thought might be of interest to the HSRP. I teach a Kinematic Positioning and Navigation class, and we also have a Hydro Surveying class.

If Sam Greenaway is here today, my thanks to Sam for letting us use -- on full credit of course -- submitted materials from the NOAA Basic Hydro Survey training. And this year it was Matt Sharr who is a NOAA Corps Officer who is based here with us, is going to be teaching the Hydro Surveying class. Next.

So this is our center, the Geospatial Center for the Arctic and Pacific. GCAP is based here at Oregon State University, and includes members from the University of Alaska-Anchorage, the Columbia River Intertribal Fish Commission or CRITFC, and the Yurok Tribe Fisheries Department.

In explaining our mission and some of the things that Yehuda was talking about, Alaska and the Pacific Northwest are areas of tremendous physical beauty, but also a lot of seismic

activity. We're located along the Pacific Ring of Fire.

And here in Oregon, we're located along the Cascadia Subduction Zone where the Juan de Fuca Plate is subducting beneath the North American Plate. Cascadia Subduction Zone megathrust earthquakes happen about every 300 years, and the last one was 324 years ago.

In spite of this, I'd say we're a bit underserved in this region with respect to geodetic infrastructure and workforce development. So with that in mind, GCAP's goals are to address those needs and at the same time to conduct cutting edge research supporting NGS and modernizing the National Spatial Reference System or NSRS. And next slide, please.

As Brad mentioned, there were four Geospatial Modeling Grant recipients and GCAP was honored to be one of those recipients. Our Grant is broad in scope. We have eight separate tasks, and each of those tasks is essentially its own project with a task lead, a technical team, and

an NGS subject matter expert.

The tasks fall into these three broad themes which are shown here. And currently our full Geospatial Modeling Grant team consists of eight principal investigators or co-investigators, three graduate research assistants, and we're in the process of adding a fourth, one Project Manager, two faculty research assistants and one education coordinator.

And I think I already made that last point on the bottom, so if we could move on to the next slide, please.

Okay. Unfortunately, I don't have time to go into detail at all on the eight different tasks within our Geospatial Modeling Grant. Each one could easily be its own presentation, but I'm just going to try to give a very brief overview of each.

So Task 1 is real-time precise point position or PPP within the NSRS. As you probably know, NGS has a lot of existing GNSS processing software tools and utilities. You may be

familiar with Pages, and OPUS, the Online Positioning User Service and OPUS projects.

So the goal of this task is to develop a lead PPP, sorry, a bit of noise on the line, I wasn't sure if somebody was asking a question there or maybe just picking up some stray noise. Sorry.

So again, our goal here is developing new PPP-RTK model for potential use in NGS software tools and to achieve centimeter level positioning for a single JNSS receiver, meaning that reference station observations are not needed. Next slide, please.

So Task 2 is hydrodynamic modeling of the Columbia and Klamath Rivers. And this task is being led by our partners in the Columbia River Intertribal Fish Commission, CRITFC, and the Yurok Tribe Fisheries Department.

So the goal here is to benefit, or I'm sorry, demonstrate benefits of NSRS modernization on hydrodynamic modeling, and to test how these improvements can support salmon decision making.

By using NGS's new geopotential datum, NAVGD2022, and new geoid model, GEOID2022, we hypothesize that we can improve hydrodynamic models which are very sensitive to river bed heights. And although I have limited time, if I can, just a really quick story.

We heard a lot the past couple days about under keel clearance. The photo in the upper right there is my 12-foot fishing skiff and that's Charles Seaton of CRITFC. Charles and I spent a full day collecting data at the mouth of the Klickitat River where it meets the Columbia River.

And I think during that entire day, our under keel clearance was a maximum of four feet and maybe one foot for most of the day. And thus, with the fact that my boat has a draft of about one foot, you can work out how shallow just this entire river mouth is.

But these are precisely the areas in which CRITFC really needs very accurate height data for analyzing salmon migration and where we

think NSRS modernization is really going to help. Next slide, please, there we go, thanks.

And so Task 2 leads directly into Task 3, which is New Datums in Geospatial Applications. And this also relates to comments from Qassim Abdullah in the opening session.

So briefly, the broad geospatial community really stands to benefit from NSRS modernization. But we also have a lot of work to do to get ready. And by broad geospatial community, I mean users and software manufacturers that go above and beyond just the big surveying companies.

I'm talking here about everything from airborne lidar to photogrammetry including Structure for Motion photogrammetry that is often used these days with drone imagery, mobile mapping, sonar, point cloud editing, just the list goes on.

Unfortunately they're already some pretty big challenges with respect to how reference frames, geoids, NAT projections,

transformations, are handled within geospatial software.

NSRS modernization is going to introduce some new challenges for geospatial software users, but also tremendous opportunities for improvement. And so our goal here is to help the geospatial community prepare for NSRS modernization.

And at the same time, to begin gathering crowdsourced NSRS modernization success stories using our CRITFC salmon migration, our work as an example.

And just quickly, in the upper right, that's an announcement from the ASPRS NSRS Modernization Working Group that Qassim mentioned earlier. All right, next slide.

So Task 4 focuses on developing and evaluating tools for supporting NGS's OPUS projects, which is a web-based PNSS processing and network adjustment package. OPUS encompasses a lot of different tools and a lot more enhancements are planned.

So that's clearly the Task 4 team, and they are working on evaluating different tools and processing techniques. An example is evaluating combined network adjustments using GNSS, Total Station, and leveling data.

So a couple plots over to the right on this slide, those are from the MS thesis work of one of our graduate students, William Ohene. And here William was comparing residuals from different GNSS processing techniques. Fortunately for us, William has decided he is continuing on to a Ph.D., and he is going to continue working on a couple of these tasks. All right, next slide, please.

So task 5, this task goal is directly from ongoing work with the Oregon Department of Transportation and NGS on developing procedures for aligning Oregon's real-time GNSS network with the National Spatial Reference System.

The Task 5 goal is to extend that work and develop a national service for RTN managers to align their networks with the NSRS. Some of

the specific tasks or sub-tasks that we're working on here include developing methods for monitoring health, RTN continuously operating resident stations or CORS, developing semi-automatic methods for aligning RTNs to the NSRS and then developing a web-based interface to facilitate all of this. Next slide.

So Task 6 is all about multi-constellation, multi-frequency, GNSS. By multi-constellation, we're referring to constellations including GPS, GLONASS, Galileo, Bedu.

And this slide shows a few of the research packages developed by Professor Jihye Parks, a GNSS research group here at OSU. One example is the Oregon State University cycle slip detection and repair software.

And our hope is that these new software tools will ultimately support NGS's end pages and be integrated into OPUS. Next slide, please.

So education is absolutely critical to GCAP's mission. This is Task 7 and the

overarching goal there is to develop the next generation of geodesists, surveyors, and geospatial professionals. And really importantly, to broaden participation in these fields.

So in this task, we're leveraging geomatics, underwriting grad programs at University of Alaska-Anchorage, and Oregon State University. And we're really trying to engage with external stakeholders and gather their input on what are the skills that are most needed for the future workforce. Next slide.

A mature graduate program, one of the things that we're exploring here at Oregon State is adding a new undergrad degree in, again what we're calling 3xG, which is geodesy, geomatics, and geospatial engineering. This is still in the early exploratory stages, but it's really gaining momentum.

And you can see on the bottom of the slide here some of the proposed courses, both a core curriculum and elective courses. Some of

these are existing courses, and some of them are ones that would be created. And next slide, please.

So when making the case for this new bachelor's program, we're highlighting the extremely broad range of applications and technologies that we cover which are summarized on this graphic. And really just the point that we're trying to make and in pitching this, is that the demand for graduates of our program is very clear.

Just a few weeks ago, I was at the Geo Week Conference in Denver. And in walking through the exhibit hall, I found I couldn't make it more than about 15 feet without somebody stopping me to ask if we had any graduating students that they can hire.

So it's just really nice to see the demand for our graduates. And again, I think this emphasis the importance of what we're trying to do in expanding our programs. Next slide.

We're also doing a lot of work in

outreach. So this is the final task, Task 8. This task includes engaging with stakeholders at conferences, at local events, professional workshops.

We're envisioning outreach broadly, so basically covering all levels from K through 12, through current professionals. And in this task we're leveraging our existing workshop and professional training series at both Oregon State University and at University of Alaska-Anchorage. And next slide.

This was something I wanted to highlight quickly just for our NGS partners who are part of this meeting. So recently we polled our stakeholders to see what workshop topics they would be most interested in. You can see the questions that we asked our stakeholders and then we provided that QR code so that people could go to the poll and complete the survey.

We absolutely did not try to skew this in any direction, but it was really interesting to see that the answers that we got back were

very well aligned with our NGS Geospatial Modeling Grant.

So among the top things, oh, actually if you hit next, I think it's going to highlight a few of those categories. GNSS, geodesy, and least squares were among the top topics that our stakeholders said they were interested in. Next slide.

So GCAP and our Geospatial Modeling Grant have been highlighted in a number of recent news releases, including a local TV interview. And actually, this is just a partial list. On our website, and I'll put up the link in a few minutes, has a full list of our recent media coverage of GCAP and NGS Geospatial Modeling Grants work and NSRS modernization. Next.

I think Brad mentioned this briefly, but for those interested in learning more about GCAP and our NGS Spatial Modeling Grants, please consider attending this conference, this is coming up this summer on June 2nd through 4th, here at Oregon State University.

We are going to have a session on the NGS Geospatial Modeling Grants. We've invited representatives from all four institutes that participate. And then in addition to that, there's also two NGS-led sessions, one on VDatum, and another one on low distortion projections.

So again, please consider attending, and the link is down at the bottom of the slide there. And I think next is the final slide, we can jump ahead.

So just additional contact information and ways to get a hold of us. I've listed my email there. Jenna Borberg is outstanding, she's our GCAP's Projects Manager and then a link to our website is there at the bottom of the slide. And hopefully I've left time for questions if there are any. Otherwise, Brad, back over to you.

RDML EVANS: All right. I think, everybody hear me? I think we do have time. Thank you, Chris. I look forward to seeing you in June, and leading this discussion again with

all of our partners in the Geospatial Modeling Grants. So thanks for the invite, and it's going to be a great session.

All of our, the great work you all are doing in SCRIPPS, I mean, it is, this is kind of a, this is a game changer for us in this industry in this field. So you can see all the great work and all the great work that's going on.

And you can see that the NGS staff is connected with their folks, SMEs, and a part of that, and they're really an extension of our modernization projects that are ongoing today. So I'm going to open it up. How should we open this up? Dr. Bock, do you want to jump back on?

DR. PARRISH: Looks like Qassim has a question.

RDML EVANS: All right, Qassim?

MEMBER ABDULLAH: For me, yes?

RDML EVANS: Yep, go ahead, Qassim.

MEMBER ABDULLAH: Okay, thanks. Thank you very much, both of you, Dr. Bock and Dr. Parrish. This is very enlightening. I mean, I'm

so happy to see NOAA and NGS regional to, what I consider a stakeholder, university a stakeholder, but definitely for the datum service of NOAA. And that's an example really, we want to multiply in NOAA. I'm always impressed with NGS progressive oriented direction. Like I mentioned in there, I've been with them for ten years.

They reach out to the industry every year like they're, the 2022 datum, we started maybe ten years of that or more, they bring the industry the manufacturer of the insulin. They didn't say we don't have anything with the manufacturer, or they can go to our worksite and download data, because that's not the safer road.

They bring them to what's possibly, to every year, then that's reward shows them where they feed them with the software, with the code, anything they want.

And things in the released software before even the public knows about they're coming changes, so that's great. And, Dr. Parrish, those research line is so important, you know,

with they're PPP or because everything is right on. Thank you very much for steering that, and I appreciate your work with me on the ASPRS, NSRS organizations.

DR. PARRISH: Likewise, thank you for leading that group.

MEMBER ABDULLAH: Yeah, thank you very much. And then for Dr. Bock, I have a question. At the end you mentioned to the integrate vertical reference of frame, I just want to understand, is that going to be different from the NAVGD2022, or along that line? Thank you.

DR. BOCK: Yeah. Thanks for that question. Yeah, I mean, we're working with the NGS folks to integrate that effort with them. And our main focus is to just improve our knowledge of the sea surface topography and thereby reducing, you know, uncertainties and tying into the geoid. And working with NGS on that project, Shachak Peeri is our point of contact.

MEMBER ABDULLAH: Thank you.

MR. KEARSE: Kim, we're -- yep sorry. I was trying to get offline, so Kim, fire away there either, all three of us here.

MEMBER HOLTZ: Okay. Well, Dr. Bock and Dr. Parrish, I loved hearing about, you know, the program being created at UC-San Diego and Oregon State University expanding. I'm curious if either of you have considered offering these degree programs virtually to have a further outreach of students.

You know, because not, I have, like in my personal office, I have a lot of young surveyors that have B.S.'s in engineering, a lot of them, or geomatics, but would like to go on, but they're not going to quit their job and move to another area.

So I'm just curious, if you know, are either of you considering that or offering the degrees virtually or online?

DR. BOCK: Oh, I was going to say, is it okay if I go first, but I --

MEMBER HOLTZ: Yeah.

DR. BOCK: Okay, go ahead.

DR. PARRISH: Sorry about that. In our case, absolutely. It's a big part of when I mentioned that one of our focuses in our education and outreach tasks are broadening participation in these fields, that really includes reaching people that currently don't have access to the education programs. So definitely we're looking at taking some of our educational content and moving it online.

That includes both, you know, offering online classes officially through the University. But then also, when we can, just creating sort of open access educational opportunities.

And hopefully engaging people that, you know, whether they're in remote areas, or, you know, just people that wouldn't otherwise be able to come in and start a undergraduate program at our university, to still have access to some of those opportunities.

And actually, something that came out of COVID, during COVID we had to move a lot of

our classes completely online. That did actually provide a bit of an opportunity to -- now we can leverage some of those online materials and help make them more broadly accessible to people.

MR. KEARSE: Dr. Bock, did you want to respond?

DR. BOCK: Yes, sure. We actually, we discussed that yesterday and we have a geodesy education committee and we're focusing, we're focusing on Ph.D. and master's degrees. We've realized that there are opportunities to provide education opportunities remotely.

And for, to give you an example, as part of this GEO-ESCON move at Ohio State, they've brought to our attention that people at the NGA would like to do remote master's programs.

And there, one of the restrictions is that they do it at their institutions, at they're at the offices, rather than bringing somebody in physically. So yeah, so we're definitely considering doing that.

I think with, you know, with the technology that's available today, Zoom, and other applications, it's much easier to contemplate something like that than it would have been, you know, ten years ago.

So yeah, and we also talked about, you know, accreditation rather than a particular degree, or some certification. So yeah, yeah. It's something that's definitely on our agenda. And we look forward to input from people like you, Kim, to kind of develop that kind of opportunity and what it should encompass, and things like that.

MEMBER HOLTZ: That's great, and like you said, too, offering certificate programs or certificates and those students that want to take just specific classes get a certificate, I think would be useful.

But, I'm doing my master's online in conservation management, mainly because it was one of the few that I could fine online. But I mean, it works. I mean, I've been very impressed

with the last two years doing it online, and interaction with the professors.

So, you know, I'd like to see, you know, that's the way to get access to more people that want to commit to geodesy or any, you know, field. Thank you.

MR. KEARSE: Just to let you know, on NGS side, we are connected with NGA. And as Dr. Bock said, in GEO-ESCON, we do, we had somebody just complete an online course with them. We did it in 2020, so they were working part of the time and going to school, and then we let them go full time to finish up at the end.

So we've been working with NGA on that, how to do this in a real setting from this end with professionals that have full-time jobs and giving them the flexibility, so just want to let you know, we've been working on this too. So Nathan, I think you're up next.

VICE CHAIR WARDWELL: All right, great. Thank you. Dr. Bock and Dr. Parrish, thank you very much, that was great. I love

hearing about this. You know, I -- as NGS continues with the modernization and we have improved measurements, increased measurements, and positioning developing the workforce, it's just going to be more and more important and this will really help us get there.

I have so much to be excited about there, right. So in Alaska, we're dealing with so much vertical motion, right. And I'm happy to hear about all the work on the deformation models and modernization that will help us with positioning in southeast nether regions that are moving. The multi-GNSS processing, that's going to be great.

Something that we, that we've been noticing in Alaska is as these multi-GNSS tools are developed, we can't necessarily leverage them because we don't have stations that are observing all of those signals, they're still GPS and GLONASS only.

So as we continue to build these tools, we need to also build out the network so

we can leverage the capability of these tools, right. And Alaska is putting in a lot of effort to build out the Alaska Continuous Operated Reference Network, ACORN, and that is one of its priorities to make sure it has multi-GNSS receivers.

The work with precise point positioning, that's great. The CSRS, so what I hear of CSRS, I've always thought of the Canadians' spatial reference system, because they have a precise point positioning tool that we use a lot to just validate and run their check or use as the control.

And so to hear about the California Spatial Reference System, I've learned all sorts of acronyms all the time, this is great, right. But with the PPP, I'm kind of curious the thought on rolling that in to OPUS.

And I mean, it's a big shift from the way OPUS is, and it's great that those continue to move along, but it would be a different shift to processing, managing the network and is there

-- you might not be far enough along on that, but that's part of the tasks to understand that piece. But do you have any input there?

DR. PARRISH: Yes, in fact, thanks for all of those comments, all of them were great. And I'm with you on all of that. Including the fact that in implementing new geodetic infrastructure and, you know, within our states that have real time networks, making sure that those new stations can support multi-GNSS, that will be really important to supporting the multi-GNSS work that we're doing.

Oh, and you also mentioned that CSRS PPP, which we use a lot. And one of the things that test team has talked with our NGS subject matter expert with this, is maybe creating a U.S. version of the CSRS PPP.

That will be a big lift, because that's a, that's a great tool. But it gives us something to end towards. You asked the question of will this ultimately be implemented in OPUS.

Our hope is yes, but at the end of the

day, those will be questions for NGS. We will do the, do the research, and we are doing everything we can, both working through our NGS subject matter experts. Who in some cases, are meeting with our task teams regularly, you know, keeping them up to date on the progress, and ultimately demonstrating to NGS the results of these different tasks.

But ultimately it will be, it will be up to NGS to determine which of the things that we develop they actually want to take and implement in OPUS and other software utilities.

VICE CHAIR WARDWELL: Yeah, that makes sense. Qassim, I've got one more thing here before you jump in. And I just wanted to clarify with the PPP, so one of the really valuable things about the Canadian service is that it provides a kinematic solution, and not just a static solution.

And that is currently a bit of a limitation of OPUS, right, we're getting static solutions. And so hopefully that's being talked

about in the development of a PPP process, I know you're working on it, highly encourage it.

DR. PARRISH: Yeah, thanks for that. And I should have actually introduced Dr. Brian Weaver. I'm not sure if Brian is on, he was planning to travel down to San Pedro with me if we were able to do that in person. But Brian is leading two of these tasks. And then in Task 1, he actually is looking at RTK-PPP in Task 1, recognizing exactly what you just said, the importance of not just static, but kinematic solutions.

VICE CHAIR WARDWELL: Great, thank you very much, wish I could have seen both of you in person, enjoy the rest of the discussion today.

DR. PARRISH: Thank you for your comments.

MR. KEARSE: Qassim?

MEMBER ABDULLAH: Dr. Parrish had mentioned something and I really want to elaborate on. Recently in the Geo Week Conference which Dr. Parrish mentioned, I was

invited to be a part of the panel with another four ladies on EDI, the equity, diversity, and inclusion for spatial arena. So I'm wondering between both of you and this grant, is there room to put focus on it.

Because we have, you know, in the geodesic crisis that's part of, and recently I was invited to give a speech in Netherland Professional Surveyor Society and believe me we were in the room, about 400 people. And I look around, maybe there is two to three females, and maybe five or six non-white males, you know, I mean, and I wonder why.

I mean there is a lot of, you know, of resources from other ethnic backgrounds, why don't we encourage them. So it would be great if there is a room where you put emphasis on the under-served population to spread the word about geospatial, geodesy, surveying, and so on.

My second question, Chris, and you are a part of the developmental for ASTLS Activities Center with me, we ask this regularly, to find

out the accuracy of the survey. You know, like we thought it's very simple, right?

Because in the new set down, we added that to be factored in when we compute the product accuracy, because we ignoring what we should not. And believe it or not, when we looked at the manufacture of the parts, surveying, processing the parts, adjustment, nobody produced absolute accuracy of the survey. Is it one RPK, is it one centimeter, two centimeter, they all dealing with the precision zero, zero, zero and things like that.

So I wonder if this, your research, can help us to, for they use a render manufacturer how to produce. Back in the old days when we have network and triangulation and cryoturbation, we can easily, you know, the closure, we can come up with.

But with the claim now with the GPS, you know, on single observation, on one station, it is difficult to come up with absolute accuracy. Thank you, thanks, Brad.

DR. BOCK: Brad, can I say something about Alaska and then maybe catch up on what, the question. So first of all, you know, we were on group process data throughout, basically throughout the world, but Alaska is a very complicated location.

And there is a lot of transient motions that deviate from the linearity. So one of our objectives or plans is to assign students, some of our geodesy students to different locations, one of them being Alaska, and the Caribbean and the Western U.S., Hawaii.

And to integrate those areas, to basically tying this IFDM to include those areas as well. Another point is that recently, and actually yesterday, the NODA that run 1,200 stations, they announced that they are now going to release PNSS data. Up to now they've been releasing GPS and GLONASS only.

And as now we need to register in order to have access to the full constellation, which will really improve the precision of these

observations, and allow us to tie in these areas. Because some of the, one of the problems is if you can do precise positioning, but the point is how do you then relate observations to the NSRS in an area that's deforming, such as in Alaska.

So those are open questions. It's not only the precision of the instrument, but it's also how well can you tie it into the NSRS.

MR. KEARSE: Thanks, Dr. Bock, appreciate that. Does that answer your question, Nathan?

VICE CHAIR WARDWELL: Yes, that was, that was great. I really appreciate that, especially your last comment there of using a PPT and then tie it into the NRFS, that's definitely something to consider. Thank you very much.

MR. KEARSE: Thanks. That is Dr. Bock. All right. For the sake of time, I know we're wrapping up here because we're at time, I want to try to keep on time here. So I'm going to thank everybody for all their great presentations and this discussion today.

I know we're going to continue this a few more times here this summer and hopefully folks can join us as part of that discussion up in Oregon. I know we're going to have a discussion when GEO-ESCON's here in October in Boulder.

We'll get that out, and I don't know if you all have heard about that, with being hosted at the university there. So there's a lot going on related to this. And thank you for all the great work and look forwarding to the continuing partnership. And thanks for the great questions from the panel. Back to you, Admiral Evans.

DR. BOCK: Oh, I one more --

MR. KEARSE: Yep, oh, one thing, Dr. Bock, but that's okay.

DR. BOCK: I just wanted to say to Chris, that again, I enjoyed his presentation and I expect that there's a lot there, be a lot of discussions between the four groups that have been funded. I'm looking in this work and I'm

hoping to attend your workshop and get to meet you in person and the other people on your faculty and students.

DR. PARRISH: Thank you. And likewise, look forward to working with you going forward on those grants.

MR. KEARSE: All right. Admiral, back to you.

RDML EVANS: Thanks, Brad. And thanks Dr. Parrish and Dr. Bock. Chris, good to see you as always. Dr. Bock, good to hear from you for the first time, and hopefully not the last time.

And I have a list of questions as well, but I'm glad that there's robust conversations with the panel to go ahead there, so thank you again. At this point we're going to transition to a public comment period. This is a request for public comments, I invite the attendees to put comments in the question box.

Please target your comments to the HSRP members and to NOAA to focus on what NOAA can do to improve for navigation observations and

positioning. This is not an opportunity to directly ask the presenters questions.

So I will turn this over to Ashley to put the comments that we've received up on the screen and summarize. We will show the comments, they will be collated into a document, shared with the HSRP members at NOAA.

And after the meeting, the comments will be posted to the HSRP website within the public record. Ashley, can you pop those up on screen?

MS. CHAPPELL: I'm not sure if I can get them on the screen suddenly. But I can read them.

RDML EVANS: Okay.

MS. CHAPPELL: Right now, and hopefully they will come up as I am, well maybe I can.

RDML EVANS: There we go.

MS. CHAPPELL: Let's see. Amber, I don't know what to do about that tab.

MS. BUTLER: No, we can, we can see

it. We can see your screen.

MS. CHAPPELL: You can see the comments?

MS. BUTLER: Yes.

RDML EVANS: We can, yes.

MS. CHAPPELL: Oh, because I can't see anything, I couldn't see anything up there, so thank goodness.

MS. BUTLER: No, we can see comments.

MS. CHAPPELL: All right. So we just have a couple of comments really directed to the HSRP. So Jon Dasler, former HSRP member, and a longtime fan, follower of the HSRP, reverts back to our PPU discussion from yesterday, it will be helpful to have a paper focused on NOAA data in support of PPUs.

The issue being getting active data more frequently in key ports to support pilots. So, you know, continuing the thread from yesterday on PPUs.

And I think we will hear more about that perhaps, in our working group discussions

later today. Jon also wrote in to talk about V-Day models and the updates for V-Day and whether they would be extended further inland than current models.

He notes specifically that the Port of Long Beach, there are coverage gaps and a special model is needed to be generated to fill these data gaps.

So you know, that too, we may either discuss later today or in future working sessions with the panel, as we think about precision maps and the contributions of individual ports with hydrographic survey data.

Colin Becker, with NOAA, I think was actually directing this question to the Geospatial Panel that we just heard, "Can you speak to any emerging trends in the geospatial industry over the next five to ten years."

And likewise, Lindsay, who knows that these comments are supposed to go to the panel members and not the speaker panels, but he couldn't resist, asks if the proposed UC-San

Diego geodesy undergraduate course could extend further to other specialties, specialisms such as hydrographic survey.

So I think those questions we can send to Chris, Dr. Parrish and Dr. Bock for response and follow-up and share those answers with the panel as well.

And it this point, Admiral, if you want to turn to just to ask if any of our attendees, I think we have a couple of minutes if you want to ask if anybody wants to verbalize a comment.

RDML EVANS: Yes, thank you, Ashley. And I agree, I think those comments from Colin and Lindsay are important but we'll relay those to the panel and then share that.

So yes, if we have any attendees online who would like to raise their hand virtually, we can open the mic for you. We have a couple minutes here if there's anyone who would like to make a comment or ask a question of the panel verbally.

MS. CHAPPELLE: We have one from Sam, Samuel Debow. Admiral Debow, hang on, I'm going to unmute you. Go ahead, Sam.

MR. DEBOW: Yeah, hello everyone. This is for Dr. Parrish. Chris, great presentation and congratulations on setting up the GS and the geodesy at the OSU. I was curious that when you graduate from that program, do you also sit for like a certification, you know, like the hydro certification that they put out to the hydro society and ACSM? Is there some type of certification that can come along with that? Thank you.

DR. PARRISH: Ashley, I don't know if you want me to answer that now or just keep going?

MS. CHAPELLE: Well, you're on, just answer it in 30 seconds or less.

DR. PARRISH: Okay. I will try to make this super quick. Thanks, Admiral Debow for the question. So our undergrad programs are ABET accredited, and hopefully our new bachelor's

program would be as well.

We actually have talked about doing an IHO certification as our colleagues at CCOM/JHC know, that's a pretty heavy lift, with IHO, through the IHO certification, but it is something that we've discussed as well.

MS. CHAPELLE: All right. Thank you, Chris. So Admiral, there are no other hands up at this time, and I think this is our last public comment period.

So anybody else, if you do have public comments, if you do have thoughts that you want to share, we will be collecting those comments through the end of the meeting, we just won't have one more of these open periods. But they will be included in the record and shared with the panel and we'll provide responses back where we can. Thank you.

RDML EVANS: Thanks, Ashley. We're running about five minutes ahead here, we're coming up to a 15-minute break. I, with the Chair's concurrence, I propose that we go to

break and come back five minutes early and dive into our next panel. So that would bring us back at five to the hour, whatever hour happens to be yours. Sean, any concerns with that approach?

CHAIR DUFFY: No, sir, not at all. I appreciate the adaption this morning and your assistance, everything running smoothly. Fine with that suggestion, so five before the hour works fine for me. Thank you, sir.

RDML EVANS: Okay, very good. And thank you for the quick change of the slides. So see everybody back here in about 15 minutes.

(Whereupon, the above-entitled matter went off the record at 10:40 a.m. and resumed at 10:56 a.m.)

CHAIR DUFFY: Okay. I'm going to turn it over to the next panel, to our former Chair, Julie Thomas, to introduce the panel members. Julie, thank you for all your help putting this all together, we've done a great job recovering but you really did a lot of work with the California folks and I wanted to make sure I pass

on my thanks to your help for that.

MEMBER THOMAS: Thank you, Sean. It is my backyard, so I love -- I'm very disappointed we didn't have it in person, but I love the energy that we have seen in the talks and a lot of them have been from California. So with that, we are going to have some regional experts from California talk in the next few minutes, and Dr. Anderson is going to be the first. Dr. Anderson is the executive director of the Southern California Coastal Ocean Observing System, which is one of my former positions. So Clarissa has been a great friend and colleague, and she has a broad area of expertise. She runs a very successful harmful algal bloom program, I'm hoping that she'll show us one of the pictures, she's going to kind of give an overview of some of the projects that SCCOOS and CeNCOOS, we're the only state that has two ocean observing systems, and you know these are part of IOOS.

So Clarissa, I'll turn it over to you, because I'm sure that you'll go into depth a

little bit more on this. Thanks so much for coming.

DR. ANDERSON: Absolutely. Thank you, Julie, and thanks for having me here. Really sad to not be there in person and to see a lot of you, including Captain Kip Louttit, I'd love to see all of you, and here we are virtually.

So, without further ado, I will advance slides here and jump into telling you a bit about SCCOOS, and I will point out too that as time marches on here at Scripps, I'm taking on some new roles including the director of our NOAA cooperative institute. If you know much about that system, this one's called the Center for Marine Earth and Atmospheric Systems, and also doing some research on harmful algae, I'll tell you a bit about that in a minute.

So, let's advance. As you know, and as Julie just told you, we have two of these regional associations of IOOS in California. There are 11 in total and we are a little bit different from the regional ocean partnerships

you may also be familiar with, which is more part of the OCM group and not IOOS. Next slide. And when you look at the assets that we have shared across our two regional associations, it's quite a lot of not only just instruments in the water, data being procured by those instruments, but institutions, educational institutions that we support and are incredibly embedded within in terms of our reach and our capacity that is leveraged by these institutions. Next slide.

We've also come together because we want to have one voice in California, and not have this sort of every region is a unique butterfly approach, but merge our collective data catalogues into one portal. Really advantageous not just for communicating with our state users and stakeholders but also at the national level. So we encourage you to take a look at that, I will not being doing any kind of a tutorial today, but there is quite a lot of information in here and it should be readily accessible and easy to find, and if it's not, please let me know.

Next slide.

And if you know Julie well, you know that one of the really huge strengths of SCCOOS, but also all of the regional associations of IOOS, has been our ability to partner and form strong and meaningful relationships with a lot of different users across that local even hyper-local to national and even now global arena. And we do work with all 76 groups you see here. I won't dwell on it, a lot of NOAA groups, these are pretty routine, relationships that have a routine component, and they certainly all have a meaningful aspect to them in the sense of, we have data products that are important for all of these users, we deliver them and we make sure we understand how they would like those products delivered and visualized so we can co-design these things together over time. Next slide.

Very quickly, just point out that we aren't NOAA, but we are highly engaged and connected to understanding and meeting the strategic goals of NOAA for Climate Ready Nation,

of course equity now, we are working very much in the DEIA space, and we are working on accelerating the blue economy. Next slide.

I'm going to start out with a flagship program, you've heard I think a bit from Dr. James Behrens earlier in the week about the CDIP connection here, and we have worked for many, many years with CDIP, this is Julie's legacy, to bring together aspects of what SCCOOS can do in terms of data and information delivery and dissemination, and work with CDIP and the team at the Marine Exchange of Southern California and partners to do what we can to contribute to moving vessels in and out of the port of L.A or Long Beach.

And this has been an incredibly fruitful collaboration with Captain Kip Louttit, and I think that as a result he's on our board. We get a lot of great feedback about what we can do to improve all kinds of operations at the port and we hope this continues, but for now it's been pretty focused around under kill clearance, and I

think we're starting to understand how we might improve upon, I would say, not necessarily assets that we might place at the port, but figuring out what other products we create could be really valuable for some of the more offshore navigation that is critical to bringing ships in that direction. So we can touch on that later if you have questions. Next slide.

So this is one of the other flagship programs, radar has been a major backbone of SCCOOS since its inception in 2004. The high frequency radar network is really kind of our biggest budget item, we have more radar in California than anywhere else in the world. So between SCCOOS and CeNCOOS we are supporting a really vast array of well over 60 radar. I think there's an animation here. I'm not sure if I realized it's an animation, so please advance. And these data for surface currents, they have wide reach. One of the ones that is pretty well known would be the use by U.S. Coast Guard for the short-term prediction system. So this, from

some of the analyses that have been done, we can get to someone or something lost in the water 40% faster than we might if we did not have these radar being assimilated into those models that go into the short-term prediction system. This is an incredible partnership, we were really careful to nurture this and make sure that all of the best and most real time current data are going into these important downstream models. Next slide.

Oil spill response is another one of those major important use cases, the NOAA GNOME model, but also some of the sub-models that are used by CAL OSPR and mostly plug into NOAA GNOME though in the case of a spill. These are using the radar data, it's not -- it's certainly automated the way it is with the U.S. Coast Guard short-term prediction system, however we do find that in cases like the Huntington spill, it is important to have the relationships we have with folks at NOAA and then NOAA R&R as well as OSPR, because they don't always have the best data and

the access that they need. There are issues with these pipelines that change over time, and we need to constantly be on the scenes to not only figure out if they're getting exactly the perfect instance of data, but if there are gaps in those data and how can we answer those gaps.

In the case of the Huntington oil spill, we did this by diverting wave gliders with anemometers into the region because there was a gap in NDBC buoys there, we didn't have a lot of wind data. This became a really important collaboration at that time to have on the ground, real time estimates of where the oil slick was moving. Was it moving south, turns out it was fairly contained by this eddy that you're seeing right here offshore, until winds picked up and did push the oil slick south of the sort of Huntington, Orange County area. Next slide.

I won't dwell on this one, we have so many things we could talk about. The radar go into so many downstream models, including harmful algal bloom modeling, which I'll get to, but

critically at the border because we face such a major pollution crisis with the Tijuana River sewage plume that gets incredibly active during atmospheric river events. We've been using these radar for a long time to do this kind of Lagrangian particle tracking and push the particles forward in time, get estimates of where they will make landfall throughout the San Diego beach area. And we're currently pushing this forward with new money from the state. I don't have a slide on it, but this really gets towards more near shore, resolving the waves, getting a little bit higher resolution than we can get with the radar, but also embedding some pathogen modeling into that in order to tell communities whether there's a high risk of pathogens like norovirus, vibrio, et cetera. Next slide please.

So, with each of these platforms, whatever you want to call them, major programs within SCCOOS, we are at a crossroads in terms of funding, we are trying to recapitalize these systems many of which go back as far as '96 in

terms of when they were installed, we've been doing this for quite some time with radar, thinking about how we recapitalize. We're doing it with all of our systems now, and Inflation Reduction Act money, as well as the Bipartisan Infrastructure Law has given us an opportunity to revitalize, modernize, and future-proof these systems, and we've been doing this, starting with many of the oldest radar systems and moving our way through. Also dealing with new things that are coming online, like the offshore wind impacts to the radar network, which is changing and obscuring the radar signal for extracting surface currents. Next slide.

So gliders, another really important one. This work is led primarily by Dan Rudnick here at Scripps who builds these spray gliders in house. He pretty much manages them end to end. We've been adding along shore and cross shore transects for some time, but there are some really important legacy transects like Line 90, which is a reference to the CalCOFI life that

this runs on. These are autonomous, they're out 24/7, there's always one that is operational, it's the most operational glider program that I know of in the United States, and we've really been working hard to increase the payload, move from physics which are great at getting state estimates of the ocean understanding, mostly low frequency but low and high frequency variability in the California current, outfitting these now with bioecosensors and thinking broadly about biogeochemistry and the subsurface. Next slide.

Yes, so as we build this out, we're changing over to those Spray 2 gliders, which is the next generation, capturing really important phenomena like El Nino and marine heat waves, which you can capture a glimpse of here in this Hovmoller diagram, seeing that we're capturing large changes in temperature and salinity that are incredibly tightly coupled with what's happening in the equatorial pacific. Next slide, please.

So to recap there, as I said, Spray 2

gliders, biochemical sensors, we're putting pH dissolved oxygen, even thinking about new technology like eDNA and acoustics for zooplankton, which includes taking our ADCP time series and translating that into a zooplankton biomass product. Next slide.

I know that you will be hearing more from Mark Merrifield at your lunch meeting, and you have already heard from Jim Behrens, so I won't talk about this too much, but we do work in close coordination with CDIP and with the climate change impacts and adaptation group here at Scripps to deliver information on flooding forecasts and other data that come from the CDIP buoys to our public users and our end users, and you can access all of this through our website. Not the portal, but our own SCCOOS website. Next slide please.

And I have a few slides on this, but again I don't want to talk too much beyond what Mark is going to tell you. What I really want to impress upon you is that there are a lot of

sensors that go into doing this sort of inundation flood casting, flood forecasting. We want to get highly accurate forecasts at the beach level. This moves past a lot of the NOAA procured models, it uses CDIP data for initial boundary condition data, but I think in the end, what we have to do is due process studies beach by beach, and this is what SCCOOS is funding. We're moving up the coast, getting really great calibration and validation data, fine-tuning models like the Stockton model, and then moving on to the next beach and hoping that we will continue to capture that variability moving forward. Next slide.

We can advance, I think you all know that it's been very rainy and that this is all very critical work. Next slide. Again, we've been working to fine tune some of these models in part because of recent storms that flooded areas like southeast San Diego, quite devastating, and this has given us a lot of motivation to use Inflation Reduction Act funding to invest heavily

in our flood network and flood forecasting. Next slide.

All right, so some of the things we're doing there, you'll probably hear from Mark. We are adding in new CDIP buoys along the coast, water level stations, we're also working with groups like SECOORA in the southeast to improve and expand to the webcam WebCOOS network for IOOS, and this will be a real national level endeavors that all of the regions are undertaking. Next slide.

We have another flagship program which is our automated shore stations, these are at all the piers in Southern California, we've got a myriad of sensors on them, everything from physics to biogeochemistry, we look at ocean acidification, hypoxia, as well as harmful algal blooms at these stations. They're very important, the public loves them. If there's one thing that we hear about when it goes down the quickest, it would probably be the automated shore stations throughout the region. Next

slide.

And I know I don't have a lot of time, so I do want to give you a little sense of how things are moving into this ecosystem arena, we're doing a lot of modeling, a lot of extramural projects associated with SCCOOS that build off of SCCOOS legacy and help us think about how do we push forward things like next generation eco system models? Next slide.

And so as we've taken this one, we've sort of thought about how do we integrate all of the observations we've invested in, which includes weekly measurements of harmful algal blooms at all of those sites where we have automated shore stations, it now includes nine operational imaging FlowCytobots, which are robotic microscopes that are capturing the entire phytoplankton community structure every hour, and we are pushing these into products that go immediately to all of the state health, marine mammal, you name it. Whoever needs to know something about harmful algal bloom data or

changes in the environment, those stakeholders and managers are going to get that information in real time. Next slide.

And so how this connects back to the modeling is that we are also producing forecasts of the risk of toxin in the water. There's a long history here, I can't talk about the model itself, just know that it's now operational at NOAA NESDIS CoastWatch, and we use this for a lot of information and delivery of risk to our stakeholders alongside the data that I just described, the institute data. Next slide.

I won't dwell on the sensitivity analysis, but if you are talking about the West Coast forecast system, we're evaluating its impact on a lot of these types of ecosystem forecasts. We've done enough sensitivity analysis to know we are going to need to improve things like salinity and the inclusion and assimilation of glider data into these models, and we can talk about that more. Next slide.

We have a bulletin, if you want to

subscribe, let me know, it's been useful for some of the major harmful algal blooms that we've had in recent years, and we're continuing to push that bulletin forward. Next slide. We bring together a lot of different information on a monthly basis, and this is really meant to help the community put together the pieces that comprise a harmful algal bloom early warning system. Next slide.

So this is really wrapping up that we're trying to position ourselves to be ready for mCDR, next animation, sorry about that, floating offshore wind, we're working tightly with CeNCOOS on new initiatives like Synchro, to think about how we can offer monitoring and forecasting services to these industries. Next animation. As well as aquaculture, we're seeing some burgeoning offshore aquaculture in California. We'll see if that advances, but we're really hoping to inform on siting. And I think this is my very, very last slide.

Really build this out, all of the

black icons are things we are going to do now with Inflation Reduction Act funding, we're taking our system to the next level and I hope we end up with something that could really be called end-to-end and holistic in terms of physics to fish to mammals and beyond. And I really thank you for your time.

MEMBER THOMAS: Thanks so much, Carissa. That was great, you had a lot in your slot here, because SCCOOS is very broad. And I just want to say for those on the panel, IOOS, these regions SCCOOS falls under NOS, so it is -- but it is an external program like Sea Grant is, so the IOOS regions are very much the same structure within NOAA, because they do sit at different academic and nonprofit institutions. Okay, thanks Carissa, we're going to hold questions to the end.

Doug, it's a real pleasure to see you, Dr. Doug George is now with the National Estuarine Research Reserve, I met Doug several years ago when we were flying LIDAR for the coast

of California and Doug was working for the state at that time. So I also know I mentioned your name this morning because you also have done an awful lot with sediment management, so we look forward to hearing from you, and maybe in the future also. It's all yours, Doug.

DR. GEORGE: Great. Well thank you so much Julie, and yeah, it's kind of like a walk down memory lane to see some of these names. Dr. Mayer, a long time ago we were doing stuff in the Adriatic Sea, about 25 years ago back. So anyway, thank you so much for making time in the agenda, I'm going to be talking about marsh plains and abyssal plains, just kind of giving some perspectives from our two marine protective area systems here within NOAA. I am talking from OCM, but you will also hear some information from ONMS as well. Next slide. There's going to be a lot of connections with the topics that have come up from the panel. Not just sediment, although it's near to my heart, but also mapping and coast resilience. So we'll launch here.

So the first topic, marsh plains, I just want to give a little bit of context before I jump too deeply into it. For the last 15 to 20 years, the NERRS have been working with NGS and CO-OPS to really deepen our relationship around elevation and water level data and how that information, which is coming from obviously the navigation services, is also being applied in ways for coastal management and estuarine understanding of our systems. So we really depend on the information coming from both NGS and CO-OPS, so we're going to walk through some of those examples of how we're using that information as well as where we might be heading next. So next slide.

There's a couple of overarching drivers for our relationship. Certainly the modernization of this physical reference system is a large driver, we also have a phenomenal amount of investment in coastal resilience, through OCM from the Bipartisan Infrastructural Law as well as IRA and other funding sources.

And it's a good problem, however our reserve staff, our 'ologists, ecologists, biologists, bird-ologists, et cetera, not surveyors. And so one of the key things that we've been relying on in our relationship has been for that professional complement and training for our 'ologists. However, there's always going to be a limitation there. So one of the key components of all three of these bullet points on the slide is that all of this investment coming forward is being designed right now with the current reference system. And if we want these investments to have longevity, which naturally we do, we need to look forward and be using that next generation of reference systems, but we don't have the capacity and staff expertise to do that. Next slide.

Just a quick pause to talk about what the NERRS are, for those who are not familiar with it. The National Estuarine Research Reserve system, it's one of the two national MPAs, the other the sanctuary system of course, and the

NERRS are a little bit different than the sanctuaries. They're partner-based relationships with a state or university host, we have one non-profit that's a reserve in Maine, there's 30 of these across the country, you can see where they are on the map. At the moment we have a little more than a million acres protected, but with Louisiana coming on, with Atchafalaya coming on, designated last year, we're over two million acres now, and a few more reserves are in the hopper.

So we are growing, but on the scale, we're small spots in the big scheme of the coast line. We like to think we punch above our weight. The foci area that we focus on, these are our three current focus areas of environmental change, habitat protection, and water quality. Next slide.

So amongst the many components of the reserves, what I'm going to be focusing on here is they're designed for observation. As I said, these are small spots, but they can have outside

influence in what they can provide in terms of information. So the way we gather information is through our system-wide monitoring program, this was established in 1995 as a system-wide attempt to standardize constantly flowing information. I think parts of it, we could talk with Clarissa, I don't know where some of this might connect to the IOOS program as well, but right now you could go on our website and you could see real time water quality and meteorology data.

We are building more capacity for what's coming next, which is elevation data, vegetation and habitat classification. I want to be a little clear that many of our reserves are doing those, the coming ones already, but it's the standardization and consistency across the nation that really builds that strength of analysis, and the more consistent we are across the country, the more powerful our analyses can be to talk about environmental change. I'm going to talk a little bit more about elevation in a moment, we can do just -- go forward.

Those national impacts beyond the reserves, I think some of these elements have really expanded what we are -- our impact, beyond just our reserve boundaries. We have helped with satellite algorithm developments around methane and turbidity. So, the information coming for, supporting climate change initiatives as well as sediment management. A lot of our work has been innovative research to then move to estuarine management more broadly, so a small estuary in one place can figure something out, and then that can be applied to all the estuaries regionally. We have a lot of examples of that throughout the country.

Another large impact both in the northeast, the Pacific Northwest, and now in the Gulf Coast, is looking at how carbon sequestration and carbon stocks in wetlands within the NERRS can be tracked. And so all of these components are kind of painting a picture of how the reserves are providing information for the nation. Next slide, sorry.

So I want to connect this slide with continuing the gratitude for NCS and CO-OPS. These two examples are from the Science Collaborative, this is our competitive research program within the NERRS larger program, that drives research based on user needs. So these two I picked out, this is the program I happen to run, even though I'm speaking from the NERRS, generally, but these two examples really connect to some of the information that has come from elevation water-level data. The one with the map is looking at water, wetland surface elevation trends, and using a surface elevation table, a SET, to track that. I don't expect you to understand all, you know, I'm trying to dive into the graphic, but we wouldn't be able to do this exact analysis without that input and reliance on known physical points in space.

Similarly, the wetlands, sorry, the water level monitoring system example here. This is eight reserves across, along the east coast, from the northeast down to the southeast, and

this was only possible because we had the water level information coming in. So Sapelo Island in Georgia, which is, you can't see on the map there, but there was a CORS station established, that is part of all of this work to downscale water level monitoring, because deeper inside the estuaries, things are going very different than what's going on on the coast and in the near shore. So shifting the data streams and understanding what's going on inside the estuary, how that's being affected by the outer coast is really key to management decision related to stewardship of the land, endangered species management, community engagement, all of those elements. So these are just two examples of how we've been tapping into the system. We'll go to the next slide.

Where we're going now is a new program, which is called Wetlands and Water Levels Program. This is our new signature program related to coastal resilience within the NERRS system. This was voted on by all 30

reserves as the next step in our evolution in monitoring for climate change impacts to estuaries, and then that led to support by the management of this system and then ultimately by NOAA. So we're really excited about this, you can see there's four components to it, and in each one of these there's something related to elevation and water levels. I'm not going to read these, but you can see that we're really relying heavily on understanding how the marsh plains and water levels are co-evolving over time. You can go to our next slide.

And the applications of this program really span the whole gamut. From the stewardship of the land, such as restoration and conservation, which is a great arc of sediment there for some thin layer placement, to interacting on the policy side to inform our coastal decision makers, to the other really key pillar or NERRS activity and NOAA broadly of course, education and outreach. So bringing this information and knowledge to the K-to-gray

community. Next slide.

So of course with anything there's going to be some barriers. We've done a lot of research with the reserve staff to understand what it is might be perceived as barriers to success of the Wetlands and Water Level program. So kind of bucketed them into these three big categories here. On the people side, as I've mentioned already, the staff time and expertise of our reserve staff is not in surveying, the places are extremely varied. We have Kachemak Bay, with ice up in Alaska, we have mangroves in Puerto Rico, at Jobos Bay and everything in between. We have the broad plains of the estuaries on the east coast, and the really short systems here on the west coast. So a lot of variability. We also have, on the instrumentation side, we have productivity I would say barriers or questions, about how we're going to maintain the quality output from all of our instruments and sensors, as well as maintaining the vertical control networks. So

what could be a solution could be connecting the 'ologists with enough knowledge that they can do some surveying, but then relying, continuing to deepen our relationship to maintain that cross check, so over time, especially with all of these investments, what we're doing is sustainable.

So I'm going to take us now offshore, on the next slide, and talk about the other MPA system, our sanctuaries. So this is, I said marsh plains, I wanted to bring the plains in somehow, so I say abyssal plains, don't hold me too close to that, it's going to be a little closer to shore. But first I'm going to just give some context about blue carbon in the ocean. Next slide.

Okay, I will get through this as quickly as I can. So just context for our global sea bed carbon stocks, the marine sediment in our ocean stores nearly twice as much carbon, organic carbon, as terrestrial soils. About 2,300 Petagrams a year, add 15 zeros after that number, and that's as much grams as we're holding in the

ocean. Most of that is in the shallow seas and continental shelf, which is what that graphic is showing you, but only four percent of that is in areas that are protected, to prevent the disturbance of the sea floor. Next slide.

So in 2020, the Greater Farallones National Marine Sanctuary embarked on a three year project to understand, a multi-year project to understand the blue carbon in its reserves. So we're going to click through this. We start off with a literature review, came up with a case study assessment within Greater Farallones, and one of the main recommendations of that assessment found that understanding the carbon stock on the sea floor was one of the primary gaps in our knowledge. So this led to a collaboration between ONMS and OCM, and I want to present some of the results from our work now, but just a couple points. The marine sediments that we found, that we are speaking about, organic carbon marine sediments, it comes from both marine life as well as from terrestrial

delivery from rivers. So those sources, ultimately it's the largest non-fossil pool of organic carbon on the planet. Next slide.

This is the only data slide I have, I promise. So we started with gathering online database information to identify the sediment types on the sea floor. I wish we had gone out and taken all these cores, but we didn't, so what you're looking at it is the browns are going to be the muddy areas, the clear or the whites are the sandy areas. We relied on our relationship between fine particles, so mud transporting carbon, similar to DDT or heavy metals or any of the other undesirable components that move around through the system. Relied on that relationship, and next slide, or just forward, came up with a surface of our carbon percent. So the red areas are high carbon, the blue areas are low carbon percentages on the sea floor. This is covering our steady area of the Farallones, Cordell Bank, and Monterey Bay.

And then we came up with our carbon

stock analysis. I'm almost done Julie, I promise. Go forward. The punch line here is just in the top ten centimeters of this region, we calculated a stock of three and a half billion gallons, the equivalent of three and a half billion gallons of gas burned, so nine million metric tons of carbon. Next slide, we can go forward, we can skip this one, and get to this one.

That talks about where this is going, how this can be applied. The U.K. has done much more work on this front, they actually are designating MPAs now for sea floor protection, because disturbing the sea floor can liberate that mud and then the carbon that comes along with it. Next slide. I think I should be almost done here.

Okay, what's next? We've got data and technical needs, due to spatial data gaps, methods that I'd like to explore, more advanced analyses, how we're going to apply this information, and the coastal management programs,

how they're going to deal with this on terms of wind infrastructure, aqua culture, fiber optics, and then leading to a national assessment, would be really the large goal, similar to the U.K.

All right, last slide. And this where I think we are really optimistic about what comes next. So while we have those data gaps from the individual samples, filling in those gaps is pretty impossible, we're not going to be able to do every single spot, so doing some more characterization, broad characterization of the substrate would be a really fantastic step. So a couple of ideas, if we kind of grilled into just the sanctuaries or if we targeted muddier areas around the nature, or we targeted the sanctuaries broadly, Stellwagen, Flower Garden Banks and Monterey have all expressed interest in doing similar analysis, and eventually getting to the EEZ.

I think Jeremy is going to be talking about the EXPRESS program next, so there is going to be more coming, but I think that's it. Just

want to thank you all, I think the next slide, just a big thank you for all of the collaboration over the years, on behalf of both of us here at ONMS. So looking forward to our conversation.

MEMBER THOMAS: Great, thank you very much, Doug. I know you have so much information to share, that's all so important, but we will move right on. That was a great presentation. We're going to have Mr. Jeremy Potter next, Environmental Studies Chief at BOEM, and he is going to talk about some of the mapping characterization campaign. Thank you Jeremy for joining us, we'll jump right into you here.

MR. POTTER: Thanks. Good afternoon and good morning everyone, I am Jeremy Potter, I am the Department of Interior's Bureau of Ocean Energy Management's Pacific Region Environmental Science's Section Chief. I know that's a lot of words, but I am here with you today on behalf of all EXPRESS partners, including partners from the Monterey Bay Aquarium and Research Institute, U.S. Geological Survey, NOAA and BOEM. We want

to sincerely thank you for your time today and your interest and attention on the topic. I know you all are exceedingly busy, so I will do my best to make sure the next few minutes before the lunch break are a good use of your time. Next slide please.

This is an outline of what I'd like to briefly speak with you all about today, essentially what is the Expanding Research and Exploration of Submerged Systems Campaign, why should you care about it, what has it done, and perhaps most interesting, share with you the story of one day that in my opinion directly and indirectly led to hundreds of days at sea and counting of collaboratively planned and executed mapping and characterization work off the west coast. Next slide please.

So what is EXPRESS? That's a fundamental question that many of us have struggled to articulate since its inception in 2017. At its most basic level, EXPRESS is simply a small informal network of primarily federal

scientists and managers who have worked to facilitate more effective and efficient survey and mapping of undersea habitats in the California current large marine ecosystem. EXPRESS is not and was never intended to be a coordination mechanism for all survey and mapping in the region. The impetus have never been about doing as much as possible or being as big as possible, it's been about finding the synergies where -- could you go back one slide please? Where working together made sense to achieve value where limited funding is available. I think I'm missing a slide.

Participating personnel have their own unique set of science and management drivers for engaging in EXPRESS, but the original motivation really comes down to need. We realized that we have a large number of shared data and information needs, similar geographic areas of interest, and limited resources, that being funding, ship time and expertise, however a substantial amount of mutual trust generated

slowly over time, and we have a willingness to share resources and pool them for mutual benefit. There are no formal MOUs, agreements, charters that codify what express is, how we operate, or that even exist, we just do it.

Approximately six years after starting, EXPRESS remains largely a grassroots efforts involving the active participation and engagement of representation for more than 20 different offices and programs, within three although now close to four different federal agencies, those being USGS, BOEM, NOAA, and now the Bureau of Safety and Environmental Enforcement, and one private oceanographic institution, that being MBARI. Many other organizations have participated in EXPRESS expeditions or contributed to EXPRESS efforts. Ocean Exploration Trust, Schmidt Ocean Institute, Marine Applied Research and Exploration, a number of academic organizations. How about we skip ahead to the next slide, please.

Okay, so why is it relevant to

California HSRP, NOAA, and the nation? This has been a grab bag of topics, issues that EXPRESS supports, is relevant to or has helped inform. EXPRESS actually predates many of them. From EXPRESS participants' perspectives, the drivers have been pretty straightforward. For NOAA, the combination of priorities associated with coastal mapping, identifying and understanding hard bottom habitats, including deep sea corals and marine protected area management. For USGS, the advance and improvement of hazard assessment associated with the Cascadia Subduction Zone. For BOEM, better understanding of potential environmental impacts of offshore energy development.

I don't know if we were smart, fortunate, or simply lucky, but in hindsight the impact of the work has been more significant than anticipated. Direct relevance to the state of California and Biden Administration's clean energy and off shore wind goals, many of you know the state of California's goal for 100% clean

power mandate by 2045, and the goal of producing 25 gigawatts of off shore wind by 2045. I'll give some specific off shore wind specific examples in a minute.

Prior to NOAA's announcement in 2021 of beginning the designation process for the Chumash Heritage National Marine Sanctuary, EXPRESS mapped most of the area. We were also just getting started with EXPRESS with the Nippon Foundation at GEBCO announced Seabed 2023 in the summer of 2017. NOMEC, the national strategy for mapping, exploring, and characterizing U.S. EEZ was announced in the summer of 2020. Many of you know the strategy and implementation plan highlight the importance of regional mapping campaigns. EXPRESS was well underway when the strategy was announced and was considered a model for regional campaigns. That said, it's certainly not appropriate to say that EXPRESS was perfect, and it does provide a number of meaningful lessons learned about what has worked well and what could have been done better. Next

slide please.

So what has been done so far? This gives a very high level overview of what the group has collectively accomplished. Of the 13 NOAA ships, five NOAA vessels are included, including fair weather and mariner. Next slide, please. There's no need to focus on the specific numbers here, but the major message is about distribution of resources, in this case days at sea, funded by various entities. All previous campaigns that I have been associated with have been largely conceived, organized, and funded by one organization, but with the involvement of multiple others. EXPRESS has been fundamentally different. EXPRESS is a huge distributed team effort, it is not led by one agency or organization, there are no ships or platforms dedicated to supporting it. The left graph is simply broken down by funding organization. The right graph is the same information, but also divided by purpose. So multibeam mapping, more benthic habitat characterization, such as ROV,

AUV, and coring operations.

So a few things to note on this slide. The NOAA numbers represent the total of all component NOAA organizations, whether associated with NOS, OAR, or NMFS. COVID obviously had a huge impact, we were right in the thick of the field effort when it started in 2020. You'll note that essentially right after COVID started, the next year and a half of the field office was all done by MBARI. However, COVID is certainly not responsible for all the drop off in days at sea, there's also been a dramatic decrease in available funding. Next slide please.

All of the mapping and survey data isn't helpful unless all the data is made publicly available. I fully admit that we didn't think through enough about data management early in the effort, our approach was that each agency has requirements to make the data publicly available, so individual project leads as component parts of EXPRESS have a responsibility to follow through. However as the field effort

evolved, with surveys by one agency being used to inform follow on surveys funded by others soon afterwards, the faults in our original strategy became clear. We used a long pause in field work during COVID to try to play catch-up on data management. On the plus side of our challenges, we think we helped inform the Seascape Alaska's campaigns much more proactive approach to data management. Next slide please.

So Cascadia Margin. So now back to the specific examples about relevance that I mentioned a little bit ago. The next three slides give you a sense of the annual progression of work done under EXPRESS. Unfortunately if we put a map covering the entire operating area, you wouldn't be able to see really any detail, so we picked a subset of the Cascadia Margin to focus on, since it involves a substantial amount of work conducted by all the participating organizations. The black inset rectangle on the left image shows you the area that I'll be focusing on, essentially extending from the

Mendocino region in the south, all the way north to the Puget Sound. Next slide please.

This is what was accomplished in calendar year 2018. You can see the multibeam coverage accomplished through EXPRESS that year. The small purple squares are AUV dives, the red triangles are ROV dives. When we kicked off EXPRESS, the potential for California offshore wind existed, but it was unclear if or when, let alone where offshore wind would actually happen. All this EXPRESS work was already in motion before the first California callers were even announced. The black polygon to the south is the Humboldt call area that was announced later that year. From a BOEM and from an offshore wind perspective, we are incredibly fortunate that EXPRESS has happened, because we now have much more information to support offshore wind decision making than we would have had otherwise. Of course there is still much to do. Next slide please.

So this and the next slide are adding

to the multibeam survey polygons and the point data for AUV and ROV dives to the maps from the prior year. The numbers on the left represent just the new or additional work accomplished during that period of time. So next slide, please. You'll see that the habitat work, again this was the work that was all done by MBARI during COVID, whereas the mapping work done by Fairweather happened before COVID happened. Next slide please. 2022 and 2023, this reflects the change from California caller wind energy areas to the actual lease sale at the end of 2022, as well as the start of offshore wind planning in Oregon. So next slide please.

The story of how EXPRESS got started is not very well known, but I figured this would be a very appropriate venue to share it. I can tell a long version, but I'll try to keep this one quick. In the fall of 2017, BOEM was trying to get basic seafloor information off of central California, to support environmental information needs related to potential offshore wind

planning. There were a number of challenges, but we were making slow progress with help from USGS. At the time, our primary offshore wind contact at the California Ocean Protection Council suggested a call with MBARI. He though their scientific and engineering expertise would be a huge help. I think we all get those kind of matchmaking phone calls periodically, few of them pan out to much. This one was an exception.

A small group from three organizations spoke several weeks later, and MBARI leadership made it clear that they were interested, willing, and able to dedicate expertise as well as ship time and undersea assets to help characterize the geology of the sea bed of offshore central California. Moreover, there was a small ship time window just six months in the future when MBARI could get started. However, there was a significant challenge. MBARI's vessels do not have a multibeam system, and MBARI needed high resolution multibeam map of the operating area before conducting any undersea operations.

Moreover, MBARI had to make funding decision for the coming year within the next month. So to take advantage of MBARI's near term window, BOEM only had a few weeks to ensure that a survey could be conducted, or the opportunity would be lost.

Back then, BOEM would typically have no idea how to arrange a multibeam survey on such short notice, however the timing was incredibly fortuitous. BOEM knew that Rainier was scheduled to be passing through the area on route to Channel Islands' National Marine Sanctuary, approximately one month later. So immediately after the phone call, BOEM representatives contacted Channel Islands and Coast Survey to inquire about the flexibilities in the Rainier schedule, the also contacted USGS to discuss MBARI's interest.

Fortunately, the stars aligned over a subsequent month. USGS, MBARI, and BOEM identified the priority area for the prospective multibeam survey. Coast Survey and Channel

Islands agreed to carve out one day of ship time to map the prospective area. MBARI leadership allocated resources for the MBARI ship time based on NOAA's intent to map the area. October 4, 2017, the weather cooperated, the photos on the left. Any of you that have worked offshore Morro Bay know that that's a pretty calm sea, and NOAA ship Rainier mapped the entire target area. NOAA quickly provided USGS and MBARI scientists with the preliminary data, USGS and MBARI jointly planned and executed an April 2018 AUV mapping survey on MBARI's Rachel Carson, based on the Rainier data. The timeline really gets down to February 2019, but there were subsequent three or four cruises in the area, based on this data as well.

So BOEM, NOAA, USGS, and MBARI personnel used the small but very significant success as a model for what a campaign could do at a regional level. While there's no specific road map for what EXPRESS should do or how it should operate, the initial Center California

Collaborative Mapping Effort provided several lessons learned that have continued throughout the formation and execution of EXPRESS. Next slide, please.

So who's responsible for creating that first initial success off the central coast of California? I'm sure that at least a few folks on this slide are very well known to everyone in this meeting, particularly the chief of HSD at that point and the CO of Rainier at that point. It's pretty clear that EXPRESS has evolved into a great IOCN example, and I would be remiss if I didn't say a special thanks to Ashley Chappell. It's one thing to talk about interagency partnerships, it's a whole other thing to figure out how to make it happen and happen well. Ashley's guidance and support have been incredibly helpful at navigating NOAA processes and figuring out how BOEM, USGS, and NOAA can do meaningful work together. Next slide please.

So what's next? Two upcoming cruises this fall, one likely on NOAA's ship Shimada,

followed soon thereafter hopefully by Fairweather. Also we're working on an overarching interagency EXPRESS report to summarize all of the work to date, but it could be a while before that's finalized and publicly available. So I think I'll stop there for today. Next slide, and thank you for your patience and attention.

MEMBER THOMAS: Thank you Jeremy, that was a really nice overview, and I know you could have gone on for a long time talking about some of those data. Okay, so we are going to open it up to the panel for any questions, if you just want to unmute yourself and come on with your video, that would be great, if there are any questions that we have. And Qassim? Qassim are you online? Your audio isn't working. No. Okay.

MEMBER ABDULLAH: Yeah, I didn't have control on it, sorry. Yeah. Thank you very much, that's very impressively definitely. I love science, and you guys do great science there

with all of this work. My question to Dr. Doug George on all of this modeling for the sanctuary and the marsh plains, how important is the inland data to your model and measurement in this marsh and sanctuary for example? You know, if I have a marker next to me on the coast line, with the mud or the carbon, the one you brought, do you incorporate this data in the modeling, beside the sensor measurements in the local sanctuary? Thank you.

DR. GEORGE: Yeah, I appreciate the question. At the moment, we just have those about 4,000, more than 4,500 data points that we've incorporated into that geospatial model, to that surface, and those were from the U.S. sea bed data set. So if we had more data to add into that, we would. Just as an aside, the data span from 1965 to 2022, so that's a really large range of time. Conditions may have changed in some of those locations, that might be getting at what you might be referring to as sort of the terrestrial input and how that might be affecting

some of our local geostatistics that we calculated. So it would have an impact to incorporate more data, I think a positive impact.

MEMBER ABDULLAH: Thank you.

MEMBER THOMAS: All right, thanks Qassim for the question. I will throw out a question both to Clarissa and Doug, while we are waiting. So Clarissa, you mention that with the IRA funds that you hope to install a couple more tide stations, is that correct?

DR. ANDERSON: Correct, yeah.

MEMBER THOMAS: And so can you just talk about that? Because I know you've been working with Mark Merrifield too. Are these going to be NWLON stations or the UFH stations, or can you just tell what your plans are there?

DR. ANDERSON: Yeah, I think a bit of it is still to be scoped out, and we're doing some of this in collaboration with Bill Thompson at InterSea Hawaii, this sort of I would say maybe test or bring online some of his newer water level sensors. There's different

technology throughout the RAs on this, and we're going to be working pretty closely with CO-OPS to better understand how this new technology is going to work and integrate with existing systems and what those data pipelines are going to look like.

So in terms of locations right now, that's a little bit TBD. We know that we're trying to work our way into some of the coastal zone where we haven't been adequately capturing flooding, and this includes Santa Barbara, we're working closely with the municipality there. So maybe ask Mark if he's gotten further on it. We're still kind of scoping it out, and I think that along the west coast, when it comes down to like CeNCOOS and SCCOOS as well as PacIOOS, we're all trying to push some of this similar technology forward, however groups like NANOOS are a little more focused on SOFAR buoys and putting Backyard Buoys all the way up against the coast and various areas where the communities can run the buoys themselves and kind of maintain

those buoys, as opposed to like a CDIP data well.

MEMBER THOMAS: Okay, thank you. And Doug, in the wetlands and the NERRS, are those inland stations? Or what are you using for water levels?

DR. GEORGE: They are inland stations as well as right on the interface with the water. So all of the NERRS have different transects, depending on their geographies. So like Tijuana, for example, has a very different array than Elkhorn Slough, et cetera. So the arrays are all from the water edge inland to where the high marsh sort of starts to give way to upland habitats.

MEMBER THOMAS: Okay, thank you. Nathan?

VICE CHAIR WARDWELL: Yeah thanks, I had a question for Dr. George. On one of your slides you talked about calculations of inundation and tidal datum to understand change, and I'm curious, are you computing tidal datum from data that you're being collected at these

NERRS? And then when you're trying to understand change, you know, datum, the center of current tidal datum epoch is like 30 years ago, and how, you know, is that relevant to your work? Would updated datums more frequent be of value? Yeah, could you talk about that a little bit?

DR. GEORGE: Sure, I'll take the second question first. So updated ones would be very valuable, and our oldest reserve is 50 years old and then our youngest are, you know, Connecticut came on last year, Atchafalaya is coming on now, so we have a range of ages within our system. And so I just mention that as a touch point that more frequent the updates are that we're getting, we can track more accurately how these systems are responding. That slide, the map that I flashed really quickly with the different pie charts around the nation, some of our reserves are doing quite well in terms of maintaining their marsh plains with respect to sea level rise, but that's using what we have now. With an updated set of datums, we might

have different results that are more accurately demonstrating what's going on.

For your first question, I might have to get back to you on that, because how it's done in different systems, how it's done across the system somewhat varies. So I'd hesitate to give you a, this is how we do it across the entire nation, period. So if we want to communicate offline, I'm happy to give you a more robust answer.

VICE CHAIR WARDWELL: Yeah, great, thanks for that, I mean CO-OPS provides an online tool for computing tidal datums, which you're probably aware of, and so I was curious if you were using that, but it sounds like it varies from region to region, so.

DR. GEORGE: It does somewhat, yeah, yeah.

VICE CHAIR WARDWELL: All right, thank you.

MEMBER THOMAS: I'll go with another question for Jeremy, if you have a minute. So

you -- okay. I live in San Diego, hear all about the wind farms discussion. Actually I don't hear everything, but I try to follow it somewhat, and you, I know that those surveys are so important to the wind farm community off of Morro Bay and Humboldt and Noyo, those areas. How much are you really interacting with the wind farm groups to, I guess my question is, do they still need more mapping and characterization surveys, or do they feel like what you have done is sufficient?

MR. POTTER: So to follow through with our process, there is a lot more data that is required before they can develop anything. So there's a long, it's about a 10 year process from the beginning of planning for offshore wind through the various planning stations, until there's a lease sale, and then even from a lease sale until there's construction and steel in the water.

The lease sale was essentially over a year ago, a year ago in December. It's going to be five years before -- they are required by law

to do additional mapping and characterization and environmental research and provide that information to BOEM so that there can be a decision about whether or not they're allowed to move forward. Which is several years away.

So right now, many of the developers -- there's four leases off of California right now. All of those developers are in the process of developing their survey plans which they have to submit for approval, and those are in discussion with BOEM and we have to discuss them with other agencies, and they also need to discuss them with the communities that live on shore near where they are going to be operating.

MEMBER THOMAS: Ah, I didn't realize that they had to do their own mapping and then provide you the information, I actually thought BOEM provided that mapping to them, at a cost, but I didn't realize it was two different groups there. Okay, thank you.

MR. POTTER: Sure.

MEMBER THOMAS: Nathan, do you have

another question?

VICE CHAIR WARDWELL: I do have another question, I thought of it after I got on, and it's for Jeremy. I was curious, where do you see the EXPRESS campaign going? Is there any chance it might head up to Alaska, or yeah, where do you see it going?

MR. POTTER: So that's a great question. I wasn't necessarily thinking you were going to go geography. So I think geographically we are focused off of the west coast just because that's where most of the people engaged in the program are working, but there is a somewhat of a, somewhat different flavor, but a similar campaign going on in Alaska that is called SeaScape Alaska, and actually Ashley Chappell could provide you more information about that, so that, but they are trying to coordinate mapping efforts and survey efforts off of Alaska waters.

For EXPRESS in the future, we have don't a lot of work, the funding has been drying up, but we are trying to figure out how we evolve

into the future, whether or not evolving makes sense. To me, one of the focuses, certainly for BOEM is appropriate environmental monitoring for offshore wind. So that's going to involve a lot of folks, not only the developers in those areas but looking at a more regional perspective, certainly beyond the federal agencies. So I think that might be an avenue for how EXPRESS evolves in the future, but that remains to be seen.

MEMBER THOMAS: Thanks Jeremy, and Marian, I think that you have a question too and then we'll wrap it up. Thank you.

DR. WESTLEY: Great, I actually just wanted to comment on your question and actually this relates to a question that Nathan asked me yesterday about, is it a NWLON? So, we are very excited to see a whole bunch of new water level sensors and technologies kind of coming into play over the next few years. Largely we're following the IRA investments that are going through the IOOS regional associates.

We invite everybody to join an emerging community of practice on water level measurement, and what we're very excited to work with partners to display that kind of data on the inundation dashboard and use it for other things, and we will be using data to look at tidal information and areas where we don't have an NWLON gauge. An NWLON gauge is a very specific thing with a very specific set of requirements, and one of the things that I spoke about at the IOOS meeting in November is just, you don't have to meet those requirements, those are our requirements. You can install gauges for other purposes than NWLON and we will welcome kind of looking at those data as they come in. So I just wanted to sort of clarify that thing, and I know it's a very specific thing, we are very interested in more water level data, anywhere and everywhere that people can collect it.

DR. ANDERSON: And I was trying to say that by, we will work with you, we will work with you to figure out how to interoperate. And the

community of practice is an incredible point, Marian, thank you for bringing that up.

DR. WESTLEY: Yes and we are slowly integrating more non-CO-OPS, non-NWLON data into inundation dashboard for that resilience mission that we're trying to meet.

MEMBER THOMAS: Okay, and that was where I was kind of going with my question, I was curious. Thank you very much to our three panelists here, it was great to have a little bit of California perspective, we really appreciate all of you. We wish it was in person, but thank you all very, very much.

CHAIR DUFFY: Julie -- Dr. George, if you could stay on for a second so I can, you almost completed my bingo card with swamp in Louisiana, marsh in Louisiana, I was missing swamp and etouffee, but of course the discussion in adding Louisiana, I'd very much like to follow up at a later point. Won't belabor it right now, I know we're pressed for time, but thank you, I was very interested to hear that, and there's a

lot of water quality wetland stuff we do, if you have a field trip in your future, I'd love to get you down and show you some things up close and personal. Thank you.

DR. GEORGE: Thank you, thank you.

CHAIR DUFFY: All right so, I had my question ready and then lost my place in the script. So I think we're going to break for lunch, and the panel members will join on the other set up. And with that, very excellent panel. Julie, thanks again, a lot of great stuff, it reminds me of how little information we have across the Louisiana coast and along our river system. It's great to see some information that we are, technology that we will hope to learn from. Thank you very much.

MEMBER THOMAS: We're very lucky actually in California, because we have some wonderful coastal academic institutions and people and federal and state partnerships, and industry. So we have a lot of wealth here that ties together. Thank you all.

CHAIR DUFFY: Off for lunch.

(Whereupon, the above-entitled matter went off the record at 12:04 p.m. and resumed at 1:15 p.m.)

CHAIR DUFFY: All right, welcome back, everybody. We're going to start off, I see Chris had a lot of discussions about NOAA PORTS going on, also some stuff I'll probably need to just before I forget, speak with you tomorrow about on local operations. Chris DiVeglio, Program Manager for NOAA PORTS, under CO-OPS, NOS. I heard him a minute ago, so I know he's around.

MR. DIVEGLIO: I am here, Sean. Good afternoon.

CHAIR DUFFY: All right. Good to see you. Thanks for the rescue there. Just for all the panel members, we're into the fourth quarter. Appreciate your attention and focus here to carry this over and, Chris, really look forward to your update. The floor is yours.

MR. DIVEGLIO: Thanks, Sean. Again, good afternoon, everyone. My name is Chris

DiVeglio. I think several of you may know me. I'm the Maritime Services Program Manager within NOAA's Center for Operational Oceanographic Products and Services, so I work under the leadership of Dr. Marian Westley, who you've seen a number of times on this call today. I'm ready for the first slide.

What I'm here to talk to you guys about today is tied to our Physical Oceanographic Real Time Systems, the PORTS Program, which we know has come up several times and it's been alluded to on various panels throughout the last couple of days. Again, sorry that we weren't all able to get together in Long Beach, but what I'm going to share here is a brief update on something that we mentioned to the HSRP back in September and others may be aware of an external assessment of the NOAA PORTS Program and that was looking at a couple of different things. One of them was the scope of the program as if it were to be fully built out, but also the existing governance framework of the program. I'm going

to take you through some brief background for those of you who are not familiar with PORTS, but also highlight some summary and take home of the things that came up through the assessment. Next slide, please.

A little bit about the PORTS Program. Again, it stands for the Physical Oceanographic Real Time System. It's a domestic shared responsibility partnership program between NOAA and the maritime community. It provides the focus on real time observation so meteorological and oceanographic information in and around seaports all across the United States and all of the data from PORTS is quality controlled by NOAA 24/7, 365 days a year.

To summarize, NOAA's PORTS is a program again to focus on real time information, to improve safety and efficiency of maritime commerce. But the data and the products are utilized for environmental protection and planning assistance, improved forecasts, but also publicly available so folks like recreational

boaters also have access to the data and, of course, long term data sets which are available for scientific and educational research. Next slide.

I wanted to give a little bit of background on the need for this assessment. As many of you may be aware or for those of you that don't, the program has been around for more than 30 years now and we've seen nothing but exponential growth, especially in recent years. Unfortunately, with that large increase in growth, it's only come with modest increases in appropriations that are specific to the PORTS Program. So, what we wanted to do is better understand what a fully built out system would look like as if PORTS were serving all seaports around the country to better position us for future budget justifications, for new funding and just program planning in general, if we're on this upward trajectory.

There are various stakeholders who have advocated, even people on the HSRP over the

years who have advocated for a wholly owned federal PORTS Program, given that navigation safety is federally mandated, so really wanted to get a pulse and understanding of how the stakeholder community feels about the current governance option and the way the program is run now or what other flexibilities there may be in the future.

Another component which we've heard a couple of times through panels in this meeting this week are about equity considerations. Really understanding how the current program governance structure affects smaller or more shallow water seaports and seaports without access to sustained cost share funding, because again the shared responsibility also comes with a local cost share component. We've had strong support for NOS leadership to do this assessment in order to better engage with leadership at DOC and even above that at the Office of Management and Budget level, so we will be reporting these assessment results up the chain soon through our

NOS leadership. Next slide, please.

With the shared responsibility model, as mentioned, in the left hand side NOAA receives an appropriation annually to allow us to conduct our program management, but also all the data that we're ingesting in the data collection and infrastructure. That appropriation also covers data dissemination, but quality control, that 24/7 quality control of the data, as well as keeping up with national standards and future enhancements for instrumentation that's operating in harsh marine environments.

Our PORTS partners across the country really have a lot of say in where the gauging goes. They know what their local navigational challenges and needs are so it's really a user defined system, but our partners are also providing funding for the up-front equipment, installation as well as operational maintenance over the course of the year and recapitalization efforts for their gauging. Next slide.

This particular slide shows right now

as mentioned in a couple of other briefings, we're now at 38 operational PORTS Program. Our system in Hawaii which is up and coming will become just our 39th, and we have 40 and 41 also on the horizon. Over the years, you can see that steady growth. Our 38 existing port systems are serving 87 of the top US seaports and that's because in many cases, one NOAA PORTS system represents or serves the needs of multiple individual seaport complexes. Next slide.

The other part of this, just another way to visualize this again, showing exponential growth, but here's an image of the stations, the number of stations that are partner sponsored. Over the course of the past 30 plus years, we're now at over 240 real time stations that are integrated into PORTS systems and, again, those are generally locally sponsored. In addition to that, in areas where we have some of our NWLON stations we have also leveraged the use of nearly 60 NWLON stations into various PORTS systems around the country. That number continues to

grow. Next slide, please.

Lastly, just on the background front for PORTS, our PORTS partners are great. They're diverse and made up of different groups, such as harbor pilots, port authorities, marine exchanges, state agencies like Department of Environmental Protection or Environmental Emergency Management and then private industry partners, like in the oil and gas industry as well as private shipyards. Other federal agencies where we continue to grow our partnerships with who are supporting PORTS, such as the US Army Corps of Engineers as well as the US Navy. Next slide.

I want to talk a little bit now about the assessment and some of the key takeaways again, just given the time. We can't get too, too into the weeds, but I'm proud to share that the final report that accompanies this assessment is soon going to be available, so I'll work with the appropriate folks to get that out here in the very near future.

I want to say that this CO-OPS, my office, worked directly with a company called Eastern Research Group, I'll refer to them as ERG, and they did a wonderful job over the past year helping us with conducting this assessment. As mentioned, there were two major objectives that were part of the assessment and those were to better understand the requirements of what a fully built out PORTS system looks like, but also better understand the stakeholder sentiment regarding the governance structure model. For the approach, we worked with what we consider 175 in-scope seaports and really tried to make a connection with folks at seaports all across the country. When I say the top 175, that's based on about 150 top seaports across the country by total tonnage and then another 25 or so that have ties with military or fishing or the oil and gas industry. I just wanted to mention that.

What we did or what ERG did was over the course of the summer, we held 21 workshops that focused on some background of the program,

discussed station needs, discussed the governance models and also conducted a really cool integrative mapping exercise. So, I'll talk a little bit more about the workshops, but about half of them were targeted geographically, but we also allowed for flexibility in various makeup sessions where anyone was able to join, keeping in mind schedules and time zones. There was a lot of followup for folks who either joined these or weren't able to make them, so especially when it came to the mapping data portion and then, the major outputs included a map and a database of additional stations needed and a really comprehensive report that we're going to be happy to share with you in the near future. Next slide, please.

You can proceed from here. Just a little bit about the workshop series overview. I know we gave a brief update about this at last fall's HSRP meeting, but every workshop was structured just the same. There was welcome and introductions from folks on the ERG team, but

also on the NOAA team. We provided background information with various reportings about the program itself, the history, PORTS sensor types and then there were discussions through lots of great interactive tools that focused on sensor needs, the financial and the governance side of things and just really kind of educating folks on hey, this is how the program's been run for all these years.

The later part of these two hour workshops focused on a really cool mapping activity through a program called Felt. You can see there on the right hand side, these were strategically scheduled throughout the summer from the beginning of June through middle of September and we highlight the regional ones and, again, there were various makeup sessions in between. I was able to be part of most of them which was great. Next slide.

As far as workshop attendance, we had about 285 folks. This list here on the left hand side shows the 11 regions that we came up with.

There was pretty good representation across the board. Of course, every one of those geographic regions included a subset of those top 175 seaports. For the most part, there was great representation of all different seaports of shapes and sizes and, again, each workshop was also followed up with an email to all attendees sharing slides, links to the map as well as contact information and still the opportunity to contribute additionally if people had to cut off or were unable to join for the entire meeting. Next slide, please.

So, attendee background, one of the open-ended questions that we had asked as part of our introductions were if attendees had direct experience with the PORTS Program. Of course, knowledge of the program varied by region and areas like the Pacific Islands, the Caribbean or Alaska and even parts of the Great Lakes don't have a large number of PORTS systems so there were fewer people in those regions who were familiar with the program. Some attendees didn't

necessarily identify how familiar they were, but this just gives a general breakdown across those 11 regions. Next slide.

There were several questions that were tied to the sensor needs so I will just highlight some of them, but there is a great breakdown in granularity of all of the answers. Not everyone was mandated to answer every question, but there was great interaction and participation in all of these workshops. One of the things that was asked are what are the types of real time PORTS sensors that don't exist that may enhance vessel safety and transit efficiency, so a couple of things that came up included ice depth and coverage, marine mammal sensing as well as precipitation measurements. Then we asked folks, you know, what were some of the more common existing PORTS technology needs and currents, visibility and wind were some of the larger popular tools if you will. We also posed the question tied to maybe some needs for gauging that weren't directly related for navigation

itself.

Certainly one that has crept up and I know has crept into a lot of our requests for partnering have to do with things we've heard on this call tied to high tide flooding or storm surge data, but people who might want to understand the data for seaport infrastructure, usage of nearby anchorages as well. Next slide.

Most critical safety issues vary greatly from seaport to seaport so I can talk to you offline. There were certain types of data sets that were needed more in some region over the other, but as you can see here, the ones that were glaring, were certainly currents and wind data as part of PORTS, so those are often cited or were throughout the workshops, often cited as the most critical safety needs, but you can see a breakdown there of types of data that people need. Next slide.

We asked people what was the biggest barrier to being able to add real time PORTS observations in their area and the one that stood

out which was not a huge surprise was certainly that barrier with funding. That's something that we've heard through different products and initiatives throughout the HSRP meeting this week, but that was the biggest thing that stood out that is preventing people from being able to stand up additional gauging, even around their seaports. Next slide.

So this question talks about, we wanted people to answer what were the realized and anticipated benefits emphasized from the importance of real time data as far as how that applies to navigation and safety and decisions in their seaports. This was a bit of an open ended question, but these were binned into some general categories, of course, some of the common things like better planning and improved scheduling, of course, efficiency, real time decision making, navigational safety and other was a pretty large response there. That, again, because this was open ended, included a lot of miscellaneous and generally positive comments about specific

gauging in their areas and how the reliability and trust in PORTS data certainly increased over the course of time. It's just that reliability and trust as time goes on. Next slide.

In this section, what was presented was about the cost share model and highlighted some of the equity considerations with the current program. We went into a discussion with the workshop participants using that Slido tool which is interactive and people who were taking notes to capture all of this concise feedback. The bullets on the right hand side summarize our Slido discussion questions for this section of the workshop and we wanted to understand what the strengths and the limitations were with the current cost share model, the anticipated strengths and limitations on a wholly owned federal program and then, of course, those equity considerations that I had mentioned.

We asked people flat out, should the PORTS Program continue as a cost share model or move to some iteration of a wholly owned federal

program model. I'll summarize some of these on the next couple of slides just keeping the time in mind. Some strengths of the current cost share model, one thing that people across the board really emphasized was having say, local control and decision making on the gauging that goes in and collaborating on planning the best places in the channel to meet their needs.

Of course, again, local ownership and buying of the program and also the opportunity to, with this particular existing model, helping to build local partnerships of seaport users. Next slide or actually the next part of the slide, I should say. Some of the limitations just summarizing for the current cost share model, of course, as we saw in one of the previous slides here, funding, so difficulty in finding funding at the local level. Of course, the data is publicly available so if one person is carrying the weight of an area sponsoring that gauging, is there a lack of incentive for others to contribute or other non-paying users to

contribute? So that leads to an inequity between few funders and many users of the data and then also right now, just given the cost share model limitations for entering into partnerships with NOAA from those who might represent smaller seaports in maybe underserved areas. Next slide.

Some anticipated strengths if we were eventually to ever go to some iteration of a wholly owned federal program, more consistent and accessible funding, more of an equitable cost distribution, equitable access. But, of course, a more standardized approach which would maybe lead to additional program efficiencies, but some of the limitations that people noticed with more of a wholly owned federal program would take away that local control and that local say.

The local needs may not be able to be prioritized with a different standardized approach, slower response time for installation or even repair, of course, uncertainties as we're hearing about these days in the federal budgeting process and smaller ports may still be

underserved because it might be deeper draft ports and larger seaports would still sort of be prioritized. Next slide.

This particular thing here, this is sort of the big thing that was eye opening. So, there were north of 115 respondents for this particular question, even though more had the option to answer it. We asked people flat out, not all workshop attendees answered this, but it's a little bit broken down. If you look at the bottom two of the quadrant, that would equate to about 40 percent or so people or a little more than 40 percent of people who do feel that the program should be wholly federally owned or partially, but there was still about a quarter of respondents here who felt that they wanted to either continue the current cost share model and another nearly 30 percent who were unsure or needed more information. This was a little bit of a surprise given some things we've heard, but it was an interesting breakdown.

I will say some of the sentiments were

varied by region, so these variations might provide insight into regional differences and partner availability for funding, or the general sentiment about PORTS, it might be worth digging into some of these a little bit more. More familiarity with the program and more information might have a lot of people to be able to answer, especially where they were unsure. Next slide.

One question that we posed is are there only specific aspects of a current cost share model that should transition to a wholly owned federal model. This was evenly split. People who thought that maybe just the equipment and the up-front installation should be a federal responsibility, others who felt hey, maybe the O&M side should be just the federal responsibility. There was a bit of a breakdown, but aspects here included in the other category included maybe certain data types, certain sensor types, like the air gap or tide gauges should be sponsored federally or certain support services. There was a lot of different, but wonderful,

perspectives that led us here and, again, it does go into more detail in this report.

I just want to go into a couple of more slides briefly highlighting the mapping activity, which yielded nearly 350 additional data points on the wish list across the country. You could proceed to the next side, please.

Of course, this is zoomed out, but areas that have existing PORTS and areas that don't were well represented throughout this mapping activity. It was great for me being part of those workshops to also have the chance to hear from people or engage with people while ERG built out this great model and this database for us to have highlighted some of the things that we were hearing. We also feel that that 350 additional stations may not necessarily even paint the full picture. Next slide.

This was just an attribute table that was part of the database that was built out. I can skip over that, but we were able to get a lot of great information. The breakdown on this

slide of the nearly 350 additional stations certainly, again, currents and that type of stuff, currents represented about 35 percent of the new station additions and other aspects like wind, visibility, waves, and water levels as we've been hearing this week were also well represented. The report does break this down a little bit more. Next slide.

For the assessment as a whole, again, it was great. I think we're going to learn a lot from it and be able to utilize it within NOS to help us better plan for the future of the program. Just some limitations and considerations, there was lower participation from some regions. Were we getting feedback from the right context? Sometimes people would join the workshop and say hey, I'm not necessarily in the operational side, I might not be best suited to answer this. Through the mapping activity, I think people were mostly specific, but some of them were just approximated and, as we all know, every seaport is different. The minimum data

needs do vary from port to port and as we know also, stakeholders may receive data from other sources. Next slide.

This is just the key takeaway and I know that I went past my time, but some of the things that I mentioned, like I said, the need for real time sensors is strong. The new sensor technologies that I highlighted and then again, just some additional context of site specific case studies might better help those out.

That is all, and I don't know if I'll have time for questions because I went over, but I'll toss it back to you, Sean.

CHAIR DUFFY: Thanks, Chris, and I'm not sure if we have time for questions either, but I'll talk for a second and someone will chime in. The one thing that I think surprised me the most was the air gaps were the least number of sensors. As we talk about the criticality of bridges being that invisible infrastructure that we've talked about with ships getting bigger and tight squeezes under bridges, that seems to be an

area we should be concerned about, but as I said, I know we'll catch up. We speak a lot. I appreciate all your help. Admiral, I'll let you decide if we have time for questions. If not, I'm ready to move on. I hope that's fair.

MR. DIVEGLIO: Yeah, no, I appreciate that. Thank you for your time, guys. I'm happy to work with Marian or I if you guys have additional questions and we will find a good way to get the report out to anyone who is interested. Thank you again.

RDML EVANS: Thank you, Chris and Sean, I'm just looking at the agenda and trying to see if we've got space, but I think that might be the best approach is if panelists have questions regarding PORTS to share those with Chris and Marian and we can reshare the answers around and kind of have a bit of a virtual discussion around that. Just in the interests of using our remaining time to get to the priorities matrix and the other items that we do have on the agenda.

CHAIR DUFFY: I agree and I realize sometimes maybe I should make that decision. I'm just trying to be respectful, make sure we're all on the same page. Nathan Wardwell, our Vice Chair, is going to lead the working group discussion. Nathan, are you coming on? There he is.

VICE CHAIR WARDWELL: Here I am. I'm leading the working group discussion, that's news to me. I guess I should have paid more close attention to the agenda.

MEMBER THOMAS: Nathan. That should really be Qassim or Anuj because oh, you're leading the Arctic Working Group. (Simultaneous speaking.) Isn't that under the (Simultaneous speaking.)

VICE CHAIR WARDWELL: (Simultaneous speaking.) The last couple of meetings and we had talked about rolling the Arctic Working Group into just the Planning --

MEMBER THOMAS: Right.

VICE CHAIR WARDWELL: And Engagement

Group overall and then there's Paige and --

MEMBER THOMAS: That's what I mean.

VICE CHAIR WARDWELL: These were leading the Planning and Engagement and then Qassim, Anuj and Deanne were still doing the Technical.

MS. CHAPPELL: If I may, Nathan, I think it was just that you were just going to sort of moderate this.

VICE CHAIR WARDWELL: Okay.

MS. CHAPPELL: But Mary Paige and Eric will talk about planning and engagement and Qassim, Anuj, and Deanne will be talking about technical, the technology working. So, we aren't making you having to talk about everything here.

VICE CHAIR WARDWELL: Well, that's fine. I mean it says the Arctic is up here. I won't talk a lot about it because I wasn't totally prepared, but I say this a lot, I see a lot of information in these panels and sessions with the data around the country and I'm just looking forward to getting -- a lot of data gaps

in Alaska and so looking forward to getting those gaps filled, getting the geodetic infrastructure for the state so that we can provide some of these additional services that are being provided nationwide.

With that, I will hand it over to Mary Paige and Eric Peace for the planning and engagement piece.

MEMBER ABBOTT: I know we started yesterday in discussing this side of it and got kind of skipped over, I don't want to say skipped over, but put aside the priorities and priority matrix at the time because we were talking issue papers and ongoing interests and such and got into a great discussion. We proceeded to over talk the working group opportunities, so Eric and I chatted electronically today about stepping aside and letting the Technology Working Group go forward and then we would return to the priorities and priority matrix. Does that make sense?

VICE CHAIR WARDWELL: It makes sense

to me. Qassim or anybody from the Technical Working Group, does that work for you?

MEMBER ABDULLAH: No, no, we don't mind. We don't mind stepping in, that's fine. Thank you.

VICE CHAIR WARDWELL: Great, I think that's a great idea. Yeah, we didn't get much time yesterday for this group so thanks.

MS. CHAPPELL: We have your slides, Qassim.

MEMBER ABDULLAH: Yeah, I think actually Amber should have it. Yeah, here you go. Is Anuj around? Do I see him there? I see Dianne. Anyway, we'll start. Thank you, guys.

We just want to brief you on the technology group what's on our agenda please. But really listening to all of these talks in the last couple of days, I mean we got a lot of ideas for the future probably. We can discuss it today, but I will walk you through what we have on high level. Next slide, please.

The focus was really on, like I

mentioned earlier, on some of the interoperable land and sea elevation data. These talks, especially today, I mean they highlight the importance of the modeling with our sanctuary, with our floodplains on the importance of what is coming from inland to these waters. I mean all of them, most of them, missing access to this information, for example. Connecting the bathy coastal data to the 3DEP here will, on the next slide, that will explain it more. That's really the way to go for coastal resilience and everything else around that for accurate modeling.

Precision navigation, and we'll have a detail in a little bit, and Dianne will brief us on the wind energy and the way we see it, it's an opportunity for NOAA to take advantage of all the data that's going to be available for that. Next slide, please.

Again, the interoperable land and sea elevation are connected to explore the national benefit of connecting NOAA shoreline, barometric

data and they will GS3 that data which is accurate lidar to the coastal resilience, storm surge modeling, seabed mobility and climate change impact. Most speakers today it's kind of access definitely. Is Anuj around? No?

MS. CHAPPELL: No, he's not on. (Simultaneous speaking.)

MEMBER ABDULLAH: So, precision navigation that's, like I said, dear to our heart. We've been talking about it for a few years now and we really want to make sure because I was listening to Darren's presentation, I just want to ensure NOAA understands all the cameras are compatible with the one used here, because we might have less understanding what we mean by it.

Encourage the development of a standard definition of the current because everybody seems to be talking about it differently. Highlight the benefits of such capability, which is critical for food and energy security, optimization of assets and economic security. Optimization implies global greenhouse

gas emission and adds as well the climate security. So that is a lot of advantage. The precision navigation from the last couple of days definitely is important, but how we approach it, and what roles NOAA has into it definitely. It really takes us to the branches to the PPU discussion there. I just want to clarify for everybody because it seems everybody here, not everybody, but a couple of people they thought we shouldn't do anything with it, that's not our business. We're not talking about developing a standard for PPU, but the opportunity is to make sure those PPU use NOAA data the right way. That communication between the industry and NOAA is very important and just doing it on a daily basis with the manufacturer Trimble, like all of them, because that way it ensures my data is used for the citizens the correct way and that's what we are calling. We need NOAA to moderate that discussion. We don't want it to be manufacturers. We don't want to develop a standard but we just need to bring people around

that table, user of the recreational or big boats, technology manufacturer of this PPU and sensors and NOAA data providers, so we make sure they are using it the right way and not misleading by any way. I just want to comment on that.

Did anyone talk about the wind energy?

MEMBER HARGRAVE: Yeah, so I mean it doesn't really, we're the Technology Working Group so I'm trying to fit talking about wind into that working group. It's not a perfect match, but I think it could be of interest to this group though to hear a little bit about the expansion of offshore wind or what the states' target is, what each state has a target. What the US target is for offshore wind. It's some pretty big targets that have been set. Eighty-four gigawatts by 2040 for the US. Of that, 50 gigawatts have been leased so there are leases that have been sold, optioned that could produce up to 50 gigawatts of that 84 gigawatt potential. There are 10 states that are participating and so

very relevant to this HSRP session.

Of course, California is one of the newer states who's participating and in California the offshore wind projects are floating and it turns out that for the US, about 80 percent of the potential for offshore wind is floating offshore wind. Fixed offshore wind can only be built when the water depths are less than about 50 meters and so there are only a few places around the US where the water depths are less than 50 meters and the wind potential is there and it's near an area of a lot of population, where the energy need exists. So, all those things have to line up.

With all of these projects, I mean we heard a lot from Jeremy Potter about the BOEM EXPRESS Working Group, amazing. That's a great example of interagency partnership and really leveraging the data and bringing it together and there, he talked a lot about how that's integrating with offshore wind. It looks like a great example for how we could do it elsewhere.

I'm not aware of anything like that on the east coast.

I do know that on the east coast there's a regional -- it's called the Regional Wildlife Science Collaborative, the RWSC. That's formed recently and it's a collaboration for evolving wind developers as well as universities, states along the east coast who are working to do integrated science all tied around understanding the environment and the environmental conditions as we advance the offshore wind projects. They have developed their integrated science plan so that's something that's really interesting to look at.

I wanted to show, I think, there's a next slide. Is there a next slide? Just to show I just saw this on the internet, along with the development of offshore wind is development of a lot of things that we've been talking about, ports, new ports are being constructed to support construction of these mega projects. Vessels are being built with Jones Act, a lot of this work is

all being centered around the US, manufacturing in the US and so, of course, research opportunities are there. I think this was an interesting graphic to me and that big orange dot, that's not too far from where we should have been this week.

I just wanted to kind of talk about that a little bit. I don't know if there's any questions in anybody's mind related to the offshore wind. Of course, as we've been talking about the mobile seabed, the changes to the seabed that are happening that we can't as easily see. Changes on the coast we can see a little bit more apparently, but there's changes happening to the seabed as far out as 50 meters of water depth. Really understanding that better, I think that's a lot of the root of the seabed mobility discussion that we're talking about progressing this next year as we have our working group sessions and potentially leading to an issue paper, if we think it warrants that.

MEMBER ABDULLAH: Nathan, can I

comment on what Deanne just said or ask her a question?

VICE CHAIR WARDWELL: Yeah, absolutely go right ahead and if there's any other panel members please go. (Simultaneous speaking.)

MEMBER ABDULLAH: Deanne, do you, you know, because all these projects and you are involved in some of them, have very detailed surveys they have to undergo, right? It's very high resolution, very accurate. Do you see this accumulation of all of this data can help NOAA's data if it's added to it for the bathy or the deep bathy ports?

MEMBER HARGRAVE: Absolutely and it's already happening. You know, bathymetry data is kind of the easiest place to start when you're talking about sharing data. Offshore wind developers seem pretty amenable to sharing as much as possible. Some information can't be shared because it's sensitive to archeological resources or things like that. I think that the data that's being created is large data sets and

that most of the data is migrating to the cloud and being in formats that are more accessible and shareable so that's kind of been a hindrance in the past is well, we'd love to give you our data, but we'd have to mail you a 10 terabyte hard drive, what's your mailing address, right? So, I think that that's progressing and that's facilitating that a little bit more.

Also, as time progresses, all the information huge, huge volumes of survey data are being passed to the government. UEM is the consulting agency, but over time that is being released, but in the meantime, a lot of research is being done, a lot of papers are being written, a lot of information is moving to the public sector through partnerships with universities in the area, where this work is being done. I think there's really a lot that's going on in that space and it's super exciting, but NOAA specifically, the standard, the requirement for the bathymetry data that is acquired for all of these projects exceeds the IHO's standards, so,

yeah definitely an opportunity.

VICE CHAIR WARDWELL: Nicole Elko, would you like to go ahead?

MEMBER ELKO: Yes, thanks. Deanne, thanks for bringing this really important issue up. I think that NOAA and all federal agencies, maybe this needs to even be an interagency collaboration of encouraging the wind energy developers to share their data. I've had this conversation with a number of federal agencies now so just one quick example. We work with BOEM, we work with their Marine Mineral Service, like their offshore leases for sand for our beach nourishment project and then they lease the wind obviously, which is much farther offshore, but their energy cables, their transmission lines are running across their open sand patches, but nobody thinks they're important, but we care about them, right. So, that's just one example of a lot of the data that they're collecting so in addition to bathymetry for us, in this case it's the sediment data. It's not classified,

it's not archeological data, but just grain size and things like that.

The quality of the data that they're collecting for bathymetry and other geotechnical purposes are high quality and excellent and they would significantly, I think, improve federal data sets. Do you know if any type of organization is existing or forming to kind of coordinate federal agencies and discussions with the wind energy developers about data share?

MEMBER HARGRAVE: The RWSC, I think is maybe the first real collaboration that's been established and bridges that gap. Other than that, I think it's really at this stage, individual developers who are volunteering and I see that happening a lot, but that I'm aware of, there's nothing similar to express, that'd be great.

VICE CHAIR WARDWELL: I'm not seeing any other question, oh here's Mary Paige, why don't you go ahead.

MEMBER ABBOTT: Well, I really didn't

have a question. I was just going to see whether Deanne and Qassim were kind of wrapping up because then I was going to save you, Nathan, and step in. (Laughter.)

VICE CHAIR WARDWELL: Yeah, I mean I was just going to -- I didn't have any questions, but I didn't know what the next steps were if we wanted to think about presentations and some of our monthly meetings for the Technical Working Group on these ideas so then maybe flesh out an idea for a panel in the next session or next public meeting I mean.

MEMBER ABDULLAH: Yeah, I think it's a good idea, Nathan, line up a few speakers on the topics we discussed in the last couple of days and the coast line mobility, whatever that's called. We can brainstorm on a few speakers and whether from NOAA or outside. We'll put it over the monthly meeting. Any topic you can help us with, anybody from the panel to adopt or add for the future direction, besides what we -- or if we're suggesting one of these three directions to

steer away from it, we will be happy to consider that.

VICE CHAIR WARDWELL: I mean I like all the topics. I'm not going to steer you away from any of them so, I would encourage you to further develop those. Julie, I see you are on here, do you --

MEMBER THOMAS: Well, I was just going to make a comment. The precision nav comment, I think that was one of the topics that you had up there was precision nav, is that right?

MEMBER ABDULLAH: Yeah.

MEMBER THOMAS: And defining it and whatever and getting up, you know, I feel like and Darren and Ben can correct me here, but as I heard it there's still some standardization that needs to happen with the S products and then there is -- I mean the precision nav name has evolved 20 times since I heard it the very first time with Rick Brennan way back when. I mean it's like a moving target to me, but I don't want to get focused on that. What I feel is that it

might be better to, as an HSRP, to wait until the future meeting, the meeting after, to really maybe look at the precision nav a little bit more or do some issue paper for it.

I'm not quite sure it's ready for that, particularly if we're going to tie in the S products. That was my only comment on that. Then the other topics I all like. I like seabed mobility. I think we could all, many of us, could contribute an example or a paragraph to that. This intersection between the topobathy is so important. I think that it's important enough for both of those that that could actually be two separate issue papers, but I'm open to others who have more expertise than I do on that. That was all I was going to say.

VICE CHAIR WARDWELL: All right, thank you. Qassim, do you have anything else or -- and we have, what three minutes, I think, for this and then I pass over to Sean for a discussion.

MEMBER ABDULLAH: I think we are okay, Nathan.

VICE CHAIR WARDWELL: Oh, maybe not. I see Kim just gone on here and she would like to add. Go right ahead, Kim.

MEMBER HOLTZ: I need my mic on. But the precise navigation that has been rolled out for the Port of Long Beach, the Port of L.A.. Port of Long Beach is completely switched to it. I don't believe our pilots have found any issues with compatibility with S files at all and it's working very successfully. I think whether we wait to do an issue paper, but I mean it's actively working in the Port of Long Beach. Port of L.A. is using it in a section of their port. They had no issues either.

Talking with our consultants that work with Jeff Ferguson and Jacobsen Pilots, they seem to think it's going to be compatible with any pilot's data the way that NOAA's already set it up. I just wanted to throw that out.

VICE CHAIR WARDWELL: Great. Thanks for that, Kim. Rear Admiral, I see you're on here. Do you have something to add?

RDML EVANS: I was just going to note that I think per the agenda, we have until half past the hour to continue this conversation. So we're not constrained, but I'll just note, I think Kim is correct.

The primary PPU manufacturers are used by the majority of pilot groups, namely Trelleborn and SEAiq, both can read S1 and 2 data in its current non-final format form if that makes sense. I think we certainly expect that once the IHO freezes that operational standard later this year, that others may pick it up but I don't think that there's a compatibility issue currently, but we do note that is not a -- because that standard hasn't been finalized, it remains kind of a trial product that we're making available for test evaluation.

We are not officially recommending that as an operational product at this point, just because the data standard is still in work and could be adjusted. That could lead to compatibility issues if folks are relying on it.

MR. WRIGHT: This is Darren. Just one other point I wanted to make to Constance's comments is we are interacting directly with the PPU manufacturers and the local pilot groups in the area that we have test data, which is L.A. and Long Beach, which was mentioned, but New York, Boston, Savannah and Charleston to see how the new data is being portrayed and working with the pilots to make sure they understand it. If there is an issue, which we have had a few issues, to work with them, to work through those issues and we will continue to do that as we expand this data out to other locations. But we're not going to do that until the standard is finalized later this year. Thanks.

VICE CHAIR WARDWELL: Thanks for that, Darren. Sean, I saw you hopped on there for a minute.

CHAIR DUFFY: Yes, so I didn't want to cut anybody off. I may have a different shot clock, but I saw this as wrapping up at 4:15 Pacific and was really wondering how much time we

had left. I'm sorry. I don't have anything to add and I don't want to delay it.

VICE CHAIR WARDWELL: Yeah, I think we actually may, correct me, I think we have like until 2:30 Pacific for this discussion here so we still have a little bit more time.

CHAIR DUFFY: Okay.

VICE CHAIR WARDWELL: If you want.

CHAIR DUFFY: (Simultaneous speaking.) Another 19 minutes, yeah.

MS. CHAPPELL: You have more time and I think Mary Paige and Eric are waiting in the wings to continue. So, if we want to move over there to Planning and Engagement, we could do that now.

VICE CHAIR WARDWELL: Sounds good. Mary, I can see you chomping at the bit to say something, why don't you go ahead?

MEMBER ABBOTT: To begin, I just would like clarification. When are the next working group meetings planned? What are the dates and times because I know for a while there we were

alternating months. Technical was on one month and Planning and Engagement the following month and then we kind of combined them so is there a schedule some place that I need to refer to?

VICE CHAIR WARDWELL: That is a good question. I'm not sure if somebody on line has an answer to that.

MS. CHAPPELL: I can weigh in, Mary Paige. This is Ashley. Right now, we have Technical and Planning and Engagement blended together once a month. The next meeting is actually on the books for next week on the 12th and they just follow from then on. But, if you all want to take a look at maybe that date is no longer working out or you want to adjust it or, you know, we've just met this week and you'd like to push it off, we can adjust those dates very easily and try and get a quorum, the most of you possible able to attend. We do have the very next one coming up next week and if you hold it, you could, of course, continue this kind of conversation about thinking on different

subjects.

MEMBER ABBOTT: That was my thought, was to -- it sounds like there's a few of these topics and, Eric, you led it yesterday, but there's a few things that we could flesh out, frame out, whatever term you want to use on it and then the following months, continue to narrow down the focus or the direction on it. But it might serve a useful purpose to go ahead and have a meeting next week specifically on just these, I think there's five items or five topics that were just discussed. The three that Qassim and Deanne brought up and then the two or three from yesterday that we discussed, but I turn my mic off and give it to Eric.

MS. CHAPPELL: Well, Eric needs to turn his mic on.

MEMBER ABBOTT: Yeah, I was going to tell him. He can't have it until he clicks.

(Laughter.)

(Simultaneous speaking.)

MEMBER ABDULLAH: I think on the 12th

our meeting, we can take this discussion of discussing topics into that and free the time here for the matrix here.

MEMBER PEACE: Agreed. I think we can talk about the semantics of it later, but I do think that the meetings are a little bit confusing, but we'll figure that out as we go forward. And I do think that I would like to see a little bit more presentations done during those meetings, you know, some educational stuff for us that we don't have to do here. I think that would be totally advantageous for all of us and save time at the meetings.

The other piece of it is that, at this point, I'm going to turn it back to Mary Paige as far as the priorities matrix, but I do think we don't really have an issue paper at this point. I think we have a lot of things in the wings, and there are a lot of good ideas and I think we just need to focus those ideas during those working groups so that we can have an issue paper come next time.

Hopefully, here in the Great Lakes. So, it's not a seaport; it's a Great Lake, it's freshwater, the largest freshwater reserve in the world. So I just want to make sure we don't always focus on seaports, we also focus on Great Lakes ports. I'll turn it over to Mary Paige.

MEMBER ABBOTT: I just love, this is like playing tennis, but I don't play tennis, nor do I play pickleball. Anyways, the matrix, if you are as keen as I was yesterday, at times, my focus was on whomever the little mysterious person was who was typing in the updates to the matrix while we were talking, which was awesome.

I was, to a certain extent, looking to have a few things to review yet today, but the big thing that we covered and in the matrix we can move from one column or one shade of coloring to another shade was the fact that we voted yesterday on the digital twin paper. So that can, in the current or in the current status or the status bar, can be noted as completed and that it was, yes, approved and then we can move

that into our archive and it looks like that has been done.

The geodesy paper, I think, was already moved similarly because we voted on, presented the paper in December, I think, or published it in December, and then that can be moved to the archive section.

MEMBER THOMAS: Mary Paige, this is Julie. Can I interrupt here?

MEMBER ABBOTT: Yes, absolutely.

MEMBER THOMAS: Just to be consistent with how it's been done, we actually never were moving. I don't think we were moving the issue papers into the archives. That's because people wanted to see, they often referred back to the issue papers like the precision nav we've already done, but do we want to do an update, you know, at some point. I think we were keeping all the issue papers just a running list of those, whereas the priority topics we would move down to the archives. And those were as we felt that they were completed discussion more or less. I

think the digital twin, what I remember is that we just kept everything, all the issue papers in one. Amanda, do you know is that true? She's the one that's magic fingers here that's updating this, I believe.

MS. PHELPS: That's not completely true, Julie. I will move the one approved yesterday back up.

MEMBER THOMAS: Yeah, we just keep them in the issue papers because we reference them so often, we didn't want to have them lost in the archives, that was the point of that. If that's okay with you now going forward.

MEMBER ABBOTT: Yeah if that's tradition, I don't have any problem with that. That's fine. My recommendation from yesterday is that, never mind.

(Laughter.)

MEMBER ABBOTT: There are also some listings from our September meetings on some items that we were contemplating and so that we can clean up as to particularly if we have a call

next week on framing out exactly what we'll pursue and what we'll just cross off that list.

And those items were seabed mobility, maritime workforce crisis, underserved communities and data connectivity. And I think those have been kind of woven in to some of the discussions that I listened to today and this week as well as -- oh yes, and the blue topo that was definitely one that we're continuing on. But after next week, we can even make this a little more tight and send out a notice to everybody that it's been updated. If that makes sense, I hope.

Hearing none, we'll move on. I see another --

VICE CHAIR WARDWELL: That sounds like it makes sense so I'm hearing we'll discuss the priority matrix more in our next Planning and Engagement meeting, is that what we're talking about? Okay?

RDML EVANS: Agreed.

VICE CHAIR WARDWELL: Works for me.

MEMBER ABBOTT: The last thing under Planning and Engagement and the Admiral brought up a discussion that I didn't know if this would be appropriate to talk about future meetings and if there's time available which I do believe there is, to continue that conversation or not.

VICE CHAIR WARDWELL: That's a good question. I'm sure there's a lot of opinions on how to move forward. Admiral, why don't you take the floor. I don't know, what do you think about discussing that here?

RDML EVANS: Sure. Thank you, Mary Paige, and I think if we've got time in this section we can address that. I think we've got a list, I think, if I'm remembering correctly. We've got a list of the potential places or locations that the panel has expressed interest in visiting. I don't have it at hand. Ashley, do you guys remember what I'm talking about? There's a list, I think, it's a matrix of where the panel has visited and what we had identified as priorities for the future. Am I making that

up?

(Simultaneous speaking.)

MEMBER THOMAS: Yeah, that's it. It's Cleveland next and then possibly DC, I think.

RDML EVANS: Sorry. We did not have anything specific identified for '25 yet. Right. So, we had identified -- well, the original plan obviously was to be in L.A. this time and then either Great Lakes or virtual to be determined in the fall. You know, recognizing that that's a decision that's going to have to be made based on budget realities, I think we can hear an affirmation that yes, if we are able to travel that Great Lakes is the location we'd like to focus on in the fall. I assume so just based on the tenor of the meeting so far. I think that's consistent with a lot of what we've heard about and a lot of our plans, NOAA's plans, looking into the next couple of years, so I continue to think that that makes sense, but I'll pause there just if there's dissent or other discussion

around that.

VICE CHAIR WARDWELL: I was just going to -- I'm in favor of something in the Great Lakes. I know there's a bigger discussion of whether or not we can actually do something in person or not. I'm sure most all the panel members are in favor of trying to figure out a way to do it in person and everybody understands the value there. We do understand the constraints of funding in the budget to be able to do it, but hopefully we can be creative to figure some way of making it happen.

I know the Great Lakes makes sense. There's been a lot of discussion about it over the past few meetings and also I believe there's a couple of the awardees for the NGS Geospatial Modeling Grant are in that region. I brought this up in one of the last meetings, but they could then potentially get an opportunity to discuss the work that they're doing to support that grant. Eric, I see you're on here, why don't you go ahead?

MEMBER PEACE: The Great Lakes are great, right, in fact, that's their first name, so regardless of whether or not it's in person or remote, I guarantee we can have a robust panel discussion even if it's remote and that's something we can put together. Obviously, we have the Great Lakes Environmental Research Lab here and numerous other organizations throughout the Great Lakes that are dealing with tremendous amounts of water issues, whether it's navigation, etc. It's a pretty robust amount of interest in what happens here on the Great Lakes navigation wise or otherwise.

MEMBER ABDULLAH: One thing for the Admiral, maybe we can look into how we can reduce the costs. I mean I wasn't aware it costs 200-something, it's a lot of money definitely, but like the venue costs, I'm not sure on its own. I know you mentioned between the hotel and the venue like all of them are $170,000 or something in one of them, but can we do it in a government places, like we do the TRB? We go to their

meeting where they have a building and everything is done there for free, whatever in DC or California. I mean that's one way maybe to cut, I don't know how much it saves. The other thing participants, I mean do we need everybody to go there for the meeting? Can't some of the staff support, where you leave only a few on site. Those are other things we can -- before we maybe just cancel it if we can.

MEMBER PEACE: Not to cut off the Admiral, Qassim, but I would just kind of help him out here a little bit. We are dealing with government contracting and everything else. It's a very different situation than the budgeting issue, it's very complex. I think it's a sidebar discussion sometime later and not necessarily for the public meeting. Understood that we'd all like to have it together, but there's also budget constraints, a lot to figure out.

RDML EVANS: I appreciate that, Eric, and Qassim, I think your points are outstanding as well. I will simply say that we will look at

every feasible option and I will commit to you that we will look at every feasible option. I will note that oftentimes options which appear to be cost advantageous turn out to have hidden costs. For instance, and I'm not saying that this is necessarily the case here, but for instance, were we to have this in a government facility, then we've got to figure out how get people into that government facility. We've got to manage the IT and so -- not that it's an impossibility, but it's not always one for one. There are often hidden costs associated with what might appear to be cost advantageous things. But what I will absolutely commit to is that we will look at every feasible option and we'll prioritize if at all possible an in person meeting.

I just want to be very clear that where we stand right now, again, kind of rewinding to what we talked about back in the fall, the possibility of a virtual meeting this fall was always there and remains there.

MEMBER ABDULLAH: But really if you want the truth, it's not bad. I mean we achieved a lot in the last couple of days, right? I mean it's definitely different, but we got used to it for three years now.

RDML EVANS: Yeah, agreed, but I also think Nicole's point from earlier, which is that the reason we're able to do this is because we've built personal relationships based on the time that we have had --

MEMBER ABDULLAH: Yes, that's true.

RDML EVANS: Together and the longer that we go without that, the harder this interaction becomes and the less productive it becomes, so I'm absolutely sensitive to that.

MEMBER ABDULLAH: No, that's very true. I feel sorry about the four new members, yeah.

VICE CHAIR WARDWELL: Yeah, I know that's a great point. I mean I think we're much more productive in person. We are productive in this platform, but more productive in person.

Sean, I see you're on here. Why don't you go ahead?

CHAIR DUFFY: Yeah, I just want to say one thing, I'd be remiss if I didn't. Looking for potential sites, I would like to throw out returning to New Orleans at least to be considered down the road. As I think about it, I don't know the ins and outs, but the Port of New Orleans has a large administration building, an auditorium. I'm pretty sure we could grab that if there was a way to do it, I feel like we're kind of the epicenter for sea level rise and saltwater encroachment, precision navigation, wetlands restoration, all of the above and I'd be remiss and not really representing my organization if I didn't say we'd like to at least be considered in the future. Thank you.

VICE CHAIR WARDWELL: As I'm looking at that schedule, I'm curious. So, 2025 is blank, but we do have to be determined for some of the following years. Is there a specific reason for that?

RDML EVANS: Not that I'm aware of, Nathan.

VICE CHAIR WARDWELL: Okay.

RDML EVANS: I think -- sorry, go ahead.

VICE CHAIR WARDWELL: No, sorry to interrupt, why don't you go ahead, Admiral.

RDML EVANS: I was just going to say that I think for a while we missed -- I may be wrong about this, but we had a number of meetings that were kind of in the queue but just kind of got kicked down the can during COVID and I think we've kind of caught that up at this point and that may be why it looks a little chunky because we haven't, for a couple of years, I don't think, have had to really plan our meetings out because we had so many in the queue that we were planning on and just weren't able to execute. So, that may explain why this isn't as fleshed out as it might be.

Nathan, I would just note that we're kind of at break time here and I don't want to

cut off Kim, but I just want to make sure I understand one thing, which is that for our fall meeting, what I hear is that we want to be focused on the Great Lakes. And if we can do that in person, we absolutely will and if we have to do it virtually, or if we have to do some sort of a hybrid situation, we'll do that, but it will be a Great Lakes focused meeting. I just want to make sure I understand that correctly.

VICE CHAIR WARDWELL: Yes.

(Simultaneous speaking.)

MEMBER ABDULLAH: I'm sorry I

VICE CHAIR WARDWELL: I guess I just throw that out there, I don't know if it's my place to do it, but if anybody objects, maybe voice an opinion there.

RDML EVANS: This is the sort of thing that would be a lot easier if we were all in the room because you can watch body language.

MEMBER PEACE: If you object, send me an email so I can followup with you.

(Laughter.)

RDML EVANS: He can convince you otherwise. Okay.

VICE CHAIR WARDWELL: Going once. Twice.

MEMBER ABDULLAH: Sorry, I support Eric and his need for that area, definitely.

RDML EVANS: Okay. We'll take that as a decision. I think we'll followup on it further, but I do want to get to Kim here. I just wanted to make sure we got that at least out of this conversation.

VICE CHAIR WARDWELL: Yeah, thanks for locking that in. In the interest of time, since we're running over, I'll give it to Kim. Why don't you go ahead?

MEMBER HOLTZ: Yeah, I just wanted to say if you guys ever decide to come back, actually come to the Long Beach/L.A. area, the Port of Long Beach, we have meeting space, we could definitely provide for the public and for you guys at no charge, I would take care of that.

MEMBER ABDULLAH: Thank you.

RDML EVANS: Thank you, Kim, that's generous and appreciated.

VICE CHAIR WARDWELL: Great, well, so we're up at break time. I don't know, Admiral, does it matter? Why don't you take the floor and send us to break. I'll do that.

RDML EVANS: Thank you, Mr. Vice Chair. I will take the floor and send us to break. I think we've got nominally 15 minutes so let's try to be back at quarter til and we'll get started as quickly as possible after that.

(Whereupon, the above-entitled matter went off the record at 2:33 p.m. and resumed at 2:45 p.m.)

CHAIR DUFFY: Admiral, I'm kind of lost on my agenda if you can pick up and I'll take it from there.

RDML EVANS: Sure, Sean.

(Simultaneous speaking.)

CHAIR DUFFY: -- or some kind of adjustment and --

RDML EVANS: Yeah, I think you're

right, there's one possible misprint here, but we are, I believe, at the point where we need to be looking at the recommendation letter suggestions. Identify what the panel would like to include in the message to the NOAA Administrator. I don't think we need to have like a clean draft coming out of this, but generally a list of suggested topics that the panel and the team behind the scenes can work on cleaning up after the fact.

My read of the agenda, I think there may be a mis-synchronization between the script and the agenda, but my read is that we have about the next 45 minutes to work on that.

CHAIR DUFFY: Happy to move forward with discussion of the recommendation letter. I'm kind of lost on following other than following those directions. We're just going to go through panel members to come on?

RDML EVANS: Yeah, I think that's a fine approach. There may be some things that have already surfaced that folks want to get into that discussion. So, if we can capture those,

give voice to those and capture those now, I think that would be helpful.

CHAIR DUFFY: Okay, panel members, I know we've had a lot of discussion and a lot of notes and I don't know if we were going to start with As, but I'm glad to see Mary Paige chime in at the wheel to help us recover. I apologize for any mix up on my part.

MEMBER ABBOTT: I was going to kind of cheat and utilize our agenda as going through and looking at those topics. The coastal resiliency and the use of NOAA products and maintaining or forecasting data is something that, in my humble and unbiased opinion, is a topic that should be supported, emphasized, underlined, bolded, you name it, as one item.

MS. CHAPPELL: Mary Paige, this is Ashley. Sorry to interrupt, just I missed the second part of what you said, coastal resiliency and use of products to maintain, adapt or was it to?

MEMBER ABBOTT: And forecast.

MS. CHAPPELL: And forecast.

MEMBER PEACE: So, I guess, if I may, I don't know necessarily what the protocol is here regarding funding. I do think that obviously NOAA needs to ask for increased funding from the federal budget, but at the same time, are we allowed to copy our letter to members of Congress to say that we endorse the fact that NOAA needs additional funding? I mean safety of navigation, etc., I just want to make sure that I'm not overstepping our bounds, but I do think it would be a powerful message coming from the HSRP to your customers to say that NOAA needs additional funding.

RDML EVANS: As DFO, I think, and Ashley, you can correct me if I am off the rails here, but I would say that it is the role of the panel to provide advice to the NOAA Administrator. That said, the recommendation letters are public documents and if individuals in their private capacity choose to share those public documents with others, then they are free

to do so. The recommendation letters are posted on the website and what members of the public in their personal capacities choose to do with those letters is up to them.

MS. CHAPPELL: Yes, we just heard that in our ethics briefing on Tuesday, to maintain that line between your role here as a panel member and providing advice to the NOAA Administrator and what you do elsewhere. So, yeah, everything that the Admiral just said is true. I think that this discussion, Eric, probably shouldn't be one where you're thinking about Congress. This is really your letter to the NOAA Administrator.

MEMBER PEACE: No, I understand that and I'm not saying we necessarily send it to Congress, but maybe it can be shared by individuals. My point being is that the Maritime Transportation System is underfunded at numerous levels and the issue here being that we're talking about navigation safety data with NOAA and so the fact that the budgets aren't going to

get any better, but we've got to remember to focus on the fact that funding needs to come through for places like NOAA, the Coast Guard, etc., to improve the transportation system. I mean I have some notes here I'll talk about here in a little, but we here on the Great Lakes saved 3.9 billion dollars in transportation savings moving rail off the rails and trucks off the roads.

So, to me, this is an important aspect if we're not getting funded to what we need to be funded at to make sure we have safety in navigation, we've got a big problem. I think it should be brought up, just like we did with the geodesy crisis, right? This is a national issue. It's a supply chain problem.

MS. CHAPPELL: Certainly you could direct that comment to the NOAA Administrator.

MEMBER THOMAS: Ashley?

MS. CHAPPELL: Uh-huh.

MEMBER THOMAS: I hate to -- can I jump in here?

CHAIR DUFFY: Please, Julie.

MEMBER THOMAS: If you look at the number one recommendation from last meetings, I can read it to you because I have it up on the board. Increase funding for core products and services. The National Ocean Service is a leader in precise water level information, geodetic measurements, mapping and nautical charting. The recent increase in funding for coastal resilience projects will increase the demand for Ocean Service's core products and services. Continue to focus on these efforts, delivering high quality data to its users. As an example, National Bathymetric Source, which primarily supports the electronic navigation charts production. With additional resources, has potential to offer further value to NOAA and external users. It is recommended that NOAA communicate, educate and advocate for the benefit of these products in addition to recognizing that additional external sources also be important for non-navigation users.

So, that was the first time we did actually use the funding word because always before, we said continue and increase the core products and services but we didn't actually put the word funding in there. So I'm surprised that we got away with that. I'm just saying that that's what was in one of the last ones.

MEMBER PEACE: We should get away with it again.

MEMBER ABDULLAH: That's a great reporting, Julie. I was going to bring the example which goes along with this of Long Beach and L.A. to all these presentations and their need for this kind of support, which I call precision navigation, but some of us have a different opinion what I mean. It's not really just about S-100 and 102 were useful or not. That's what I mean, I mean those people they need frequent -- they want dredging, they want to be able to bring these supertankers, for example. So, this point you brought from last time, it doesn't help to repeat in maybe different

language, but same contents. I mean it's a great recommendation.

MEMBER THOMAS: Since I'm up, I just wanted to make one more comment. I said this to you, Mary Paige, but always before we've gone through the top part of the priorities matrix and filled that in because that actually we pulled some of the recommendations to the Administrator out of there. And the advantage of doing it here, is that you have an audience. You have everybody here. At the meeting a week from now, you're not going to have everybody, I doubt it. I just am putting that out there. It's you guys' show, but there is an advantage to doing that top part of our priorities because that's kind of where a lot of times our priorities to our recommendations to the Administrator are derived from.

CHAIR DUFFY: I wanted to just say I think it would be a good recommendation to the Administrator that the members of the panel believe that it is vital for the panel to meet in

person. That we have been adaptive and in many ways related to COVID, but we all need face to face time so instead of talking about funding there, just reiterating the importance of meeting in person. I have some other things but I wanted to get that in. I'm going to go offline for a minute so others can speak, but I just wanted to try to make sure I got that in there.

MEMBER ABDULLAH: Just to add to what Sean said, it's not only for us the face to face and getting to know each other, but even the local community experience is so much different when you visit the port and talk than bringing people online. It's a totally different impact on them and on us to see it in person, definitely. I think, if I can suggest here, I think we need to applaud NOAA grants, the NGS grant for example, and maybe propagate it to other activity because what NOAA is doing by that is expanding NOAA scientifically and if I have limitation, I'm going to go the professor and let them research for me and do the leg work for me.

I think it is a great thing we need to note and we need to ask to expand it. That's my opinion.

MEMBER ABBOTT: With regard to the priorities matrix, I don't --

MEMBER HOLTZ: Can I make a comment real quick before you get too far.

MEMBER ABBOTT: Absolutely.

MEMBER HOLTZ: I wanted to make a comment to Julie and I keep getting them. When you're talking about asking for funding and stuff, I was reading what Julie read was great, but if you had added in there the amount of commerce brought in by the ports, the Great Lakes and actually put a dollar amount, that's going to get people's attention, Congressmen, Senators, that's going to get their attention because they see. You're not putting dollar amounts of how much commerce is brought in, I think that would help when you're asking for funding because all these NOAA products are necessary for the funding.

MEMBER THOMAS: But this is a letter

to Dr. Spinrad. This is not a letter to Congress. If he decides to share it, then that's one thing, but really we're doing it for Spinrad.

MEMBER HOLTZ: But by still putting numbers there, I think you're giving people talking points by knowing how much commerce is brought in and having that number readily available. I mean the Port of Long Beach is very successful, getting a lot of grant monies because we can show dollar amounts for how much commerce moves through the Port of Long Beach.

MEMBER ABDULLAH: I tend to agree with Kim because, Kim, we had a lot of information on that. We brought speakers from universities and it is mind boggling, you know, if you look at these billions of dollars and how many millions a day or an hour with closure of a port for example, whether due to fog or something. So, it doesn't hurt to give an example. Commerce and demand go as far to bring in this billion dollars for example.

MEMBER THOMAS: I guess my only

comment there is that a lot of those numbers also come from Spinrad. Like he didn't talk at this meeting, but if he was to start out an introduction, he was at our last meeting, he was at our separate one. He's the one that always throws these numbers out so I know he knows them very well. But I get your point. So, whatever works for everyone.

MEMBER ABBOTT: Okay, if we go back to the matrix per Julie's suggestion, as to using that as our cheat sheet for topics to be put in the letter.

The first item has to do with metadata standardization. We did address that in part and Qassim, et al, were talking about the approaches for standardization of it in the cross referencing or the cross usage of that. Whether it's something that goes in with regard to the discussion we may be having next week on standardization of the data that goes into PPUs versus the manufacturers declaring it, that can be just, yeah, it was talked about and nothing

was decided or we're continuing dialogue on that.

Then the second item has to do with the NOAA and Army Corps of Engineers partnership which we had a note that they were going to have a role to be involved in this meeting. They were in a background sense as far as I could see as to the different efforts were discussed and multiple times, Army Corps of Engineer and that cool logo of theirs was evident on slides and on other data. I don't know what you would want to say, if anything, about that.

The third item has to do with coastal resilience, so we've got that.

MEMBER THOMAS: Mary Paige?

MEMBER ABBOTT: Yes, Julie.

MEMBER THOMAS: Do you think we should just -- usually we just go to topic one all the way over to the right, update it and then it's checked off.

MEMBER ABBOTT: Gotcha. Okay.

MEMBER THOMAS: You know if you just go up to number one. I know this is such a

cumbersome spreadsheet, but this by the way, the number one here was our second bullet to Spinrad last time, but if you go over here and then all the way to the right. Are you going to try to make a little bit smaller?

MS. CHAPPELL: I was trying to make it so you could see a little bit easier, but I'm just going to have to toggle over, sorry, everybody.

MEMBER THOMAS: Yeah.

MEMBER ABBOTT: I know.

MEMBER THOMAS: Okay, so right there, this column G, Mary Paige, is really what we're updating each time at this meeting.

MEMBER ABBOTT: Right.

MEMBER THOMAS: And so then we can just put a comment here and then it's done. We're going to submit this to the Administrator, to Dr. Spinrad, so we just want to have some, say acknowledge update, ongoing discussion something like that for 3/24, do you know what I mean? Like ongoing discussion 3/24. I mean that's

fine. It's just so that they know that we addressed it because we're going to submit it to him.

MEMBER ABBOTT: Okay, I didn't realize that we submitted him. I thought this was kind of our cheat sheet, but now that I know --

MEMBER THOMAS: No, it actually goes to him.

MEMBER ABBOTT: Our new members like now understand that whatever goes in here, goes to Dr. Spinrad.

MEMBER THOMAS: Yeah and then we just go onto the next one, which --

MEMBER ABBOTT: That's the partnership.

MEMBER THOMAS: Yes the partnership. And ongoing, continue to encourage, yeah. I mean role for STB, okay so this is like the spring meeting so we can take that part out and just say that key role at the Port of Long Beach for spring 2024 meeting or something like that. Next one was the coastal resilience, I did talk with

Mark Osler and Nicole, but this where this should be replaced because this is -- Nicole LeBoeuf moderated a port resilience talk here for the March meeting, so we can just put for 3/24 meeting or something.

So we want, like in the letter of recommendation, we want to make sure we mention this port resilience and the good job that Nicole did in putting it together. Then I just kind of would go down here, this is kind of how I filled a lot of things out. Mobility.

MEMBER ELKO: Quick comment on the resilience.

MEMBER THOMAS: Yes.

MEMBER ELKO: Well, this is the other Nicole standing up. That panel was fantastic and I really think we've been talking about coastal resilience now a little bit, during my tenure at least, but I really feel like that one helped to solidify the importance of it across all of NOAA's sectors that we focus on. I wonder -- I'd be happy to help write something to add to the

letter. I think Larry Mayer described it perfectly about the bright line is now drawn --

(Simultaneous speaking.)

MEMBER THOMAS: Continuity, right.

MEMBER ELKO: And that would augment this.

MEMBER THOMAS: Actually, Mary Paige, what would be good is to send the priority matrix to Nicole Elko afterwards and have her update this current future action needed and then, Nicole, I just volunteered you there, but I would just say Nicole update and then let her do that part. You know what I mean?

MEMBER ABBOTT: Absolutely. I already jotted down that Nicole had already volunteered to do it.

MEMBER THOMAS: Yeah. Yeah.

MEMBER ABDULLAH: So, going back to your comment to Julie about the first point of recommendation of our last letter, are we going to leave it in? Maybe just change the language?

MEMBER THOMAS: My feeling is the core

products of NOAA, we've already, I mean, we've seen how important they are. All three of the divisions have core products and I think it's always good to put that as number one, whether or not we mention the word funding or not, that's up to others, but I think it's always good to say please continue those core products.

MEMBER ABDULLAH: I know, absolutely. I'm going to put in the chat so maybe she can grab it from there, but we need to reword it, if somebody can do that.

MEMBER THOMAS: Right.

MEMBER ABDULLAH: Because this can be always because all we are saying is continue to focus on these efforts, delivering the high quality data, which is always going to be unique for NOAA to be doing.

MEMBER THOMAS: I couldn't agree more. I mean to me that's the real essence of this committee, that's the real essence of what, I mean, we've seen how every single presentation uses water levels, charting, hydrography, it's

just all of the core products there. The geodetic part of it. And I think that we can add a -- okay, I'm getting ahead of myself. Go ahead. Mary Paige, I'm going to turn it over to you. I think we're on number six.

MEMBER ABBOTT: But you were doing such a good job.

(Laughter.)

MEMBER THOMAS: I just blast right through these.

VICE CHAIR WARDWELL: I was going to try to add something if I could.

MEMBER ABBOTT: Go on. Sorry, Nathan.

VICE CHAIR WARDWELL: Just two things, so, with that first bullet, I mean, for our recommendation from the previous letter, yeah, I mean I fully agree that we need to keep that in, but like reword it somehow, right? We don't want it to be the same thing.

MEMBER ABDULLAH: Yeah.

VICE CHAIR WARDWELL: As I was kind of working up my takeaways, I know we're not in the

roundtable piece of this, but my first takeaway over the past three days is these three offices do too good of a job. I mean -- and the demand signal for their service data and products and services continues to increase, right, and we mention it in the bullet, but like with the BIL and IRA funding, that's going to continue to increase, but there's a timeline to that, right.

So then what happens when that is no longer there and there's a significant demand on these offices and how are they going to continue to support those core missions, right? I mean I'm fully on board with keeping that recommendation in there and then I wanted to -- another recommendation for the letter, I mean I flat out asked one of our speakers, like, what do they need and he said heat data. I don't know how we work that into the letter for a hydrographic services panel and if it's possible. Ben spoke to it earlier as some ancillary data that is valuable, but that was something that somebody specifically said that they needed more

of, right?

Then I wanted to come back to the matrix on the first item just because I think that first item was really something that Lindsay Gee and Bri Hillstrom were shepherding along. We no longer have either of those. Lindsay is not on the panel, unfortunately. He brought a lot to the table, right, and there's a big gap there. Bri is no longer there, but maybe that's something, I'm not going to -- maybe Sam Greenaway picks that up a little bit. But if we have it on the matrix, we need to identify how we're going to continue that going forward.

MEMBER THOMAS: That's a good point, Nathan. I know that Ashley, I kind of saw Ashley's name right there on Row F, but yeah, we can definitely identify that. By the way, I mean one of Lindsay's public comments was just about this so my intent was actually to go back and read Lindsay's comment and then come back into this priorities matrix and update it because I want to see what he said about that.

I think that this number one, I didn't really sign off on it or in my mind I didn't, but you're right.

VICE CHAIR WARDWELL: I think I see that Ben has his hand up. Admiral?

RDML EVANS: Yeah, thanks, Nathan. I just wanted to since you invoked my comment from earlier, I wanted to amplify a little of that and the idea and I think this relates to the coastal resilience concept and resilient and adaptive ports concept that Nicole laid out for us yesterday. But one thing the panel might consider and using the heat example as an example because I think you're absolutely right, we asked well, what do you need and one thing, the one specific thing was better information about intense heat.

Well, okay, that's not a hydrographic services thing, that's a Weather Service thing, but let's peel that onion a little bit, right? Okay, so the second part of the statement was well, it's not just heat, but it's resilience in

the power grid. Okay, well, in Southern California, offshore wind is anticipated to be a significant enabler of a more resilient power grid. Okay, what's the application of hydrographic services? What's the relevance for hydrographic services to offshore wind? Well, okay and then we can -- so, I think this notion of adaptive and resilient ports is going to require us all to peel the onion a little bit and look for those linkages.

Just like what Larry was talking about earlier, the connection through from precision marine navigation all the way through and so I would just invite the panel to think about those second and third order connections where the hydrographic services programs properly resourced could potentially add value to these larger issues where, again, data products and services rooted in navigation have broad application to requirements that might not be immediately be obvious.

MEMBER ABDULLAH: I'm glad you

mentioned Larry's comment actually. If I remember what Larry said was the importance of the data supreme to really connect resilient navigation, coastal resilience all and NOAA in the middle of it, I mean, to provide that live support, the data stream definitely.

MEMBER THOMAS: Yeah, so Nicole when you update that bullet maybe you can, because there's a coastal resilience line there, that you could so nicely update and actually make it a little bit tied into the port resilience and that whole chain, so it is a broader one. That would be great.

CHAIR DUFFY: I just want to speak on that, I'm sorry, Nicole. I think the heat is related to me to really this is all under climate change and I think we're all actively seeing climate change, more extreme weather, more droughts, atmospheric rivers, the whole gamut and just for thinking about it. I know heat was asked for and I agree with Nathan. We should include that but I think it's a bigger topic and

something to truly be laid out in the recommendation letter.

MEMBER THOMAS: Nathan, is that heat that they actually said? Like water temperature heat?

VICE CHAIR WARDWELL: The air temperature because their power grid --

MEMBER THOMAS: Air temperature of the power grid, okay. Got it.

RDML EVANS: Yeah, I think as I understood it, Julie, yeah it was heat, intense heat driving demand for electricity because of air conditioning and also affecting the efficiency of port infrastructure, like cranes and electrified trucks and stuff like that, all of which then drags down the power grid.

MEMBER THOMAS: Now I've got it. Thank you.

MR. KEARSE: Can I just say something real quick? I was just in a meeting with New York City and they are actually -- the Weather Service is working on a project and has, his name

is Joel Cline, from the Weather Service, who's working on heat with cities and infrastructure and all that. I know there's a connection, maybe we can just put something in there, but I kind of -- they're looking at that and even related to heights and elevation and all that kind of stuff. I thought I'd bring that up.

MEMBER ABDULLAH: Are we ready to mention something about what we discussed earlier about the interoperability of land and sea? Because the last letter, we hinted about the digital twin. We asked the Director for NOAA to explore the feasibility or whatever in that language for digital twin. Should we just put similar language to this important topic, which all the speakers really needed, for example, for their modeling, for the interoperability of land and sea elevations to connect the blue topo with the 3DEP?

MEMBER THOMAS: Yeah, Amanda brought up Row 6, 28. We already added that in last time, Qassim, because we talked about doing a

paper on that and so this is what I think next week, the idea was to discuss these papers and probably the Administrator letter would be written after these so that we could say something about what issue papers we're going to do. Is that the idea?

MEMBER ABDULLAH: Yeah, so you're saying we have time for --

(Simultaneous speaking.)

MEMBER THOMAS: It was in there from last time.

MEMBER ABDULLAH: Yeah.

MEMBER THOMAS: And as an issue paper and I think that everybody was pretty onboard.

MEMBER ABDULLAH: Yep.

MEMBER THOMAS: That it was important so I think that would be one that would be discussed next week at the meeting.

MEMBER ABDULLAH: Sure.

MEMBER THOMAS: That was my understanding.

MEMBER ABDULLAH: Yeah.

VICE CHAIR WARDWELL: Yeah, I mean I think that's a great topic, whether it's a recommendation in the letter or an issue paper. I mean there was like a 10-year, it was part of 3DEP, but a 10-year program to get updated elevation data for Alaska and that was with the Alaska Mapping Executive Committee and that's been rolling into the coastal mapping implementation plan for Alaska to now get the wet parts of the state mapped and there's a lot of value in doing that nationwide. That's it, that's a great comment --

(Simultaneous speaking.)

MEMBER THOMAS: That would be a good thing to tie into the paper, Nathan, examples.

VICE CHAIR WARDWELL: Okay. I can provide some information about both of those examples.

MEMBER ABDULLAH: Is there anything we can mention about the new data and NGS and it's important to all these ports resilience and the flooding for example?

VICE CHAIR WARDWELL: It's going to represent mean sea level way better and we're going to have way better elevation information in Alaska.

MEMBER ABDULLAH: Yeah.

MEMBER THOMAS: I think if you go up to the top section, there might be something about the modernization of the NGS, I think, unless we -- so let's see, let's go down to number four now. Yeah, digital twins. Okay, so we're on this wind farm, number four. What do we want to do with that? Oh that's the seabed mobility, okay, we're actually on Row 7 then, the next one. This is the one that's the digital twin. Qassim, that's for you to update there. And we could send it to you and you could add more in there if you want.

This next one was the maritime work ports. I don't know how we left that, Ben, if you --

RDML EVANS: Yeah, I remember the discussion in the fall and we were a little wary

of straying too far afield from the geospatial work force because at that point we were very focused on the geodesy crisis. As I recall the discussion and the panel, there was recognition that yes, there's an acute geodesy crisis, but that's really part of a pressing geospatial crisis and then there was also recognition because of some of the loss of productivity in the NOAA fleet last year and in years previous that -- well, there was also a maritime work force challenge and so I think this is a vestige of that and perhaps a little bit of co-mingling of the two.

So we started down the path of kind of lumping all those together and then we backed away from it and split them out again, recognizing that now we really wanted to focus on the geospatial work force which was squarely within sight for the mandate of this panel, which the panel did with the issue paper and the recommendations letter, I believe in the last memo.

I continue to think that the panel addressed this, but there's more to do there. I would continue to caution the panel about getting dragged into the maritime work force piece because while that is a critical enabler of the mission, certainly in my office, and I think the Nav Services in general, it's harder to do anything about that from our perch. But perhaps continuing to hammer on the geospatial work force and the hydrographic work force on the need to build that expertise within NOAA both in the fleet and the shore. I think there's one way there for sure and we talked about the Center of Excellence earlier this week. We talked about the work and aligning that work with the work that OMAO is doing to generate and sustain its work force. I think there's runway there if that is something that the panel wanted to pursue.

MEMBER THOMAS: Do you think we should move this down to the archive session with a comment that the appropriate NOAA divisions are proceeding to, I don't know. I'm just thinking

that really the HSRP isn't going to do anything about this per se and so if we're not, unless we do want to do something, but if we don't, then we should move it down to the archive that's all I'm saying.

By the way, Kip asked me about this and he said, are you getting the work out to Cal Maritime and I might forward you some comments from him on this work force because we were talking about it over dinner.

RDML EVANS: Yeah, I --

MEMBER THOMAS: I'm not sure that the HSRP is going to take an action on this is all I'm saying.

RDML EVANS: I think that's appropriate just given the, again, trying to keep my DFO hat on here, given the mandate of the HSRP, I think a strict focus on the maritime work force probably, we've talked about that. I think setting that aside for now could be appropriate. I do think that if the panel wanted to continue to focus on the geospatial work force and pieces

of that, that's very much within the mandate of the panel, should the panel choose to make that a priority.

MEMBER ELKO: I agree. I think we need to keep pushing on work force development for the people that are going to work for all three offices in the future, but the geospatial crisis, sorry, whatever it's called, paper reflects that, right? And that's something I think we need to mention every time we write a letter.

MEMBER ABBOTT: I agree with Nicole. Putting some sort of verbiage about monitoring it on a regular basis.

MEMBER ELKO: I'd add that there's a little bit of a cross over with the offshore wind development industry as well because there's a lot more demand for these geospatial data processors, data acquisition. It's a growing demand and a shrinking supply and so I think that's going to hit NOAA and it's going to hit the private sector at the same time.

MEMBER THOMAS: Amanda, can you scroll to the left because I can't remember how we worded this number nine? Oh, foundational, okay to underserved communities. Right. Nathan, what do we want to do with this? You, Nicole, Tuba were all going to -- this is kind of in your --

VICE CHAIR WARDWELL: Yeah, that's been in my ballpark or on my list for probably a year or so and I haven't really done a whole lot about it other than talk about it in these meetings. I mean we haven't written the issue paper. I mean in all of these meetings it comes up and I forget the gentleman's name in one of the first sessions on the first day, didn't have a Power -- Jim, I believe was his first name. He covered a ton of material, everything from sediment but also to underserved communities in California and ports, remote ports there and Sloan brought it up also earlier in the -- I don't remember if it was today or yesterday, about small ports there, too, so definitely we continue to talk about it and I probably should

take an action on this.

MEMBER THOMAS: We might just change the comment there at 9, 29. Should we just say that keeping our focus and see if as the panel progresses, what we could do for future issue papers, something like that, you know just to kind of -- I would take out our comment on 9, 29 there under it, under Column F.

MEMBER ELKO: We did try to chat about this a couple times when we were pulling together the panels for the last meeting and I think one of our ideas was to wrap it into the next Arctic paper as kind of a section and note that it is a national challenge, not specific to Arctic, but there are great examples there.

VICE CHAIR WARDWELL: Yeah. I mean, I think it was, the discussion was framed around, yeah, it's not specific to the Arctic, right, it's, you know, it's the Pacific, it's CONUS has under-served communities.

And just and so it was that's why we were sort of using, I forget the terminology that

we had exactly, but remote, under-served communities just to be more inclusive of the need for that in general. I mean --

MEMBER THOMAS: But, remember --

VICE CHAIR WARDWELL: -- that when we were in Puerto Rico, too; right?

MEMBER THOMAS: Yeah. Exactly.

VICE CHAIR WARDWELL: There was a lot there. And then in the Pacific islands I know that comes up all the time.

MEMBER OZKAN-HALLER: Yeah, my recollection mirrors what Nicole was saying. I feel like that's where we landed. And I still like that idea.

MEMBER THOMAS: Do you set up a panel for the future that addresses the underserved? Is that what the idea --

MEMBER OZKAN-HALLER: No. No, to fold it into the Arctic issue folders.

MEMBER THOMAS: Oh, fine.

MEMBER OZKAN-HALLER: There are some just profound examples from, in Alaska that

really make the case. I mean, I can even imagine that we'll find different examples, stories, or something like that.

MEMBER THOMAS: Okay. So, that could be a future action for another meeting or for later. Yeah.

VICE CHAIR WARDWELL: Yeah.

MEMBER THOMAS: Okay. So, we've got one more row here, row ten.

Mary Paige, I didn't want to usurp your things here, but I know how this is difficult to get through, so.

Okay, sustainability. Oh, yes, and Ed Saade raised, you know, he'll always bring up the ships, and sustainability, and green energy, and emissions.

And I'm not sure what the role of the HSRP would be in this actually, but it seems like Anuj -- I don't know if Anuj is on -- talked about it, too.

Ben, do you have any comment?

RDML EVANS: Sure.

So, I think that, as I recall that conversation here, there both Ed and Anuj rightly pointed to, for instance, European contracting practices which are -- required basically a full accounting of the, of the carbon footprint of rapid surveying activities, or really any contracting activities, so any activities undertaken under contract by governments in Europe.

And, you know, the challenge we face here with our contracting mechanism that has not adopted those practices yet. And so, trying to continue to nudge us along towards that, I think that was their intent.

At the same time identifying the recapitalization of the NOAA fleet as an opportunity to incorporate lower greenhouse gas emission systems.

I think the latter is a bit out of, it's harder, it's similar to the maritime workforce in that it's not bore sight for the, for the panel. And it's also being worked.

The issue of incorporating sustainability and, specifically, greenhouse gas initiatives into our, an accounting of that into our operations is something that we remain sensitive to. Certainly within first survey -- I don't want to speak for the other offices but I think they would agree -- there is no agreed-upon way to measure this.

But that is where I think the Europeans are ahead in that they have established criteria and metrics for this that the U.S. Government has not. And that makes it very challenging for us to just dive in with both feet.

This is, this would be a very significant effort, too. And I think at one point Sam Relay estimated that we'd need something between five and ten people who are just trying to figure this out. That's all they're doing. They're not doing hydrography, they're trying to figure out what our greenhouse gas footprint is. And that's expertise that we

don't have.

So, I think we, frankly, felt a little caught here in that we don't disagree but the infrastructure is not in place for us to, the infrastructure is not in place for us to practically address that.

I say that without, without -- I'm not trying to influence the panel one way or another in how they pursue that, that topic, but that, that's kind of where we are. That's a summary, I think, of our conversations with Ed and Anuj going back to the last meeting.

MEMBER THOMAS: All right. Well, so -- sorry about that ringing.

Yeah, I think this should be moved down to the archives section to meet my recommendation, with a comment that Admiral Evans will keep this on his horizon and follow up, and keep it tuned as necessary.

RDML EVANS: Julie, if I may, I'm saying this at the risk of making work for ourselves, but I think if the panel wanted to

keep some sustainability focus, one place where, where there probably is a little bit more space to maneuver is, you know, how, again, thinking about bringing back the precision read navigation, how, how -- and this was in Darren's talk the other day -- but how can these, how can high resolution data processing services, navigation data processing services, how can they drive efficiency and thereby increase sustainability within the maritime sector, and beyond?

But I'm thinking particularly about ports; right? We heard some of this in the presentations on Tuesday that, okay, well, if we have high resolution data, well, that, that allows us to, that allows us to bring deeper draft ships in, and it allows us to utilize more of the harbor. It allows, it basically reduces the loiter zone.

So, again, thinking about peeling that onion a little bit. So, if we wanted to keep a sustainability focus I think there's, there's

room there, focusing strictly on the greenhouse gas emissions of the hydrography itself. As you say, that, that's probably a tough one.

MEMBER THOMAS: So, I almost think that's two different topics. I think that might, I mean I almost feel like we should move the emissions one down to the archives so that we have a record that we did address it and decided it was out of the purview of the HSRP, and then create another line of sustainability.

And I couldn't agree more that these NOAA products really do improve efficiency. And, I mean, it's so obvious at the Port of Long Beach when they found, you know, they're, environmentally, when they get offshore and they can't get in for one reason or another. And found the more data we can give them, the better.

MEMBER ABDULLAH: Yeah. Even increasing the draft by one foot decreases it. Where he said it's a 13,000 barrels, not gallons, barrels of oil, you know, that's a whole ship sometimes, you know, a small ship.

MEMBER THOMAS: Well, it's more than that, too. When they lighter offshore they are onsite for four or five days at a time. They're offloading from one 1,200 foot tanker to three smaller ones. And those vessels are stationary, more or less, for four or five days right off of San Diego.

So, yeah, there's all sorts of examples of how in environmental sustainability can be accrued with, you know, a product.

So, I think that is a good point.

VICE CHAIR WARDWELL: Hey, I just wanted to throw something out there going back to the maritime workforce, if I could.

MEMBER THOMAS: Right.

VICE CHAIR WARDWELL: I know it's not, it's not an issue that we're going to take up. And it's not really my expertise. But a thought I had about it was, I mean, it's somewhat connected. You know, we're not going to put a recommendation into a letter, I don't think. We're not going to do an issue paper.

But if there's other panel members that are directly related, connected to this issue, it could be a way for the panel, for HSRP to write a letter of support for that sort of thing because I do see some connection. And there might be a benefit, might be beneficial for other groups; right?

And we did something, I thought we did something similar with the geodesy prices when we had --

MEMBER THOMAS: Of course.

VICE CHAIR WARDWELL: -- very tight connection to that one. Right? That's directly related to all the core missions here.

But, I mean, just a thought I had as we were talking about it. And, you know, again, it's not my area of expertise, but there's a lot of pilots on this, on this panel who have that expertise and those connections, so.

MEMBER ABBOTT: So, Mary Paige.

That's the end of that section, which is great. I think you all appreciate getting

that updated because that's a real pain, and it's nice to do it while we have the Admiral here and everybody together.

MEMBER THOMAS: I appreciate that. And it's a learning experience for me. So, thank you. And each time just be aware, I'm really good at delegating, so.

(Laughter.)

MEMBER ABBOTT: Okay. I'm going to go offline now.

MEMBER THOMAS: My question, though -- don't, don't go away -- is this data then goes to Sean and Nathan. Are they the first draft people, ones who write the letter? Who starts a draft then?

MEMBER ABBOTT: Sean writes the director's letter.

MEMBER THOMAS: Okay.

MEMBER ABBOTT: He will be writing the director's letter now.

And but it's and then he kind of writes the first draft. And then we'll circulate

it or send it to Nathan, probably, and then circulate to the rest of the panel for input.

But it's kind of then it would be your responsibility to work with Amanda and just clean this priority matrix up and make sure that everybody sees it that needs to. And then you can send it to the group and make sure of that, and then Sean would include it with, when he submits the administrator letter.

MEMBER THOMAS: One last question.

Turnaround time on this: max like 45 days, 30 days? What's our, what's our target?

MEMBER ABBOTT: You know, I tried to get it out within the month. But that's up to Sean now, so. I kind of set that. Nobody ever told me when to get it out. That was kind of, like, okay, I just have to do this while it's fresh in my mind.

MEMBER THOMAS: Yes.

CHAIR DUFFY: I think it was very valuable to go over the priorities matrix. But I also think it would be good to go through the

panel members just to make sure that we haven't left anything out for the recommendation.

We're kind of starting with the priorities, but I want to make sure before we all sign off that everybody had a chance to just focus on things they believe should be included in the director's letter, which would be very helpful.

And I don't know if we can go to a round robin. I know the agenda kind of changed. But I think that would be very helpful for me, if nothing else, if we could do that.

And if we did, I guess we could start with Nathan to go first.

VICE CHAIR WARDWELL: Yeah. Well, I mentioned all my recommendations in the past discussion. But I'll, I'll hit those again.

I, you know, I think it's very important for us always to have some sort of recommendation about support for the core mission that the offices are -- the core mission for the offices, right, whether we have the funding

language in there or not. But that's, you know, I'm seeing increasing demand for the services' data products that they provide. I don't see how they're going to meet that over the coming years once BIL and IRA fronting is no longer around.

I think it's important for us to peel back that onion and figure out how to communicate something about heat data or intensity of heat to support these ports. And I think we can, with the panel members, I think we can do that. That was something specifically requested for.

I like the idea of some sort of recommendation of connecting land and the sea floor, Qassim's idea of the interoperable data. And there was -- I don't know if we want to include something about signal twin. We have that issue paper now and we have recommendations in the issue paper. I don't know if it would be redundant to include recommendations in the letter itself, but looks like we're getting to a point where we have actual recommendations there.

And definitely something about

continue to communicate the importance of supporting post-resilience and geodetic crisis and the value of those grants that are out to building our geospatial and geodetic workforce.

CHAIR DUFFY: Thank you, Nathan.

VICE CHAIR WARDWELL: My pleasure.

CHAIR DUFFY: Julie, you would be next on the list. I know we've gone through a lot, but if you feel like anything was lost or forgotten, I'd be happy to note it down.

MEMBER THOMAS: I think one of the biggest success stories that I've heard during this panel are really those geodesy grants that, the four of them that are at the universities. I think that's really fantastic news.

So, I think that making sure that we, we comment to Dr. Spinrad how NOAA has, you know, really done so well with getting geodesy grants out.

As Qassim said, that was really good, really good to hear. And I bring in academia and industry partners. And I just think it's great.

Core product, I really like this Larry Mayer idea of tying in the port resilience to coastal resilience. It's a continuance.

And, actually, we didn't hear from Mark Merrifield today, but I'll just say that he's very involved, too, for the DoD contract. The military has asked him to do, to do some assistance and help them with their port resilience.

And as you saw, he is also very aware of the coastal resilience. So, it's like we have these researchers, and we have these federal employees that just have this expertise of a continuum across the board. And I think that that's really important. If we can tie that into a recommendation to, you know, tie it into Nicole's presentation as far as the port resilience and how this is so applicable to the -- across the board to coastal.

And, you know what, I have so many notes here, let me go through them, Sean, and see. You know, I'll send you a note if there's

other things.

But those are the three that just rise to mind right now.

CHAIR DUFFY: Okay. Thank you, Julie. Good, good points.

Eric. Again, please come on and tell me you've covered everything, or something you forgot. Trying to get to last call.

MEMBER PEACE: Just so I understand, is this closing comments as well?

CHAIR DUFFY: Yes.

MEMBER PEACE: Okay. So, a couple of things.

You know, one of the things that I take away that I see here daily on a daily basis is waterways are crowded. And they're becoming more and more crowded. So, my friend Mary Paige there is not helping the fact that there's recreational users within commercial ports. But what we're talking about is precision navigation becomes more and more important.

And that data that goes into whether

it's recreational users or it's going into commercial users is never more critical than it is now.

The last thing we want is a modal shift. So, with the increased waterway usage we don't want a modal shift to shore. We don't want a modal shift to shore. We don't want increased rail. We don't want increased rail in underserved communities which is already there. We don't want increased trucks on your roads.

So, we have got to advocate for increased information for the navigationcy team. And this comes down to navigationcy. I know we talked a lot about commercial and everything else, but it really comes down to safety.

I'm an operator, so that's where I come from. We're talking about safety. And so, you can talk about academia, and you can talk about studies, and everything else. And that's all great. But the last thing you want is an oil spill in Los Angeles-LB-LAB; right? You don't want an oil spill in your port.

So, we have to make sure that we're providing that information. And part of that piece is PORTS, NOAA PORTS. That is not a luxury. That is not something that we individually pay for. That's a government obligation. And I will stand by that till the day I die. We have got to make sure that that is funded by the government. It's navigation safety.

Just like you don't pay for your snow plow out on the road, you don't pay for the same thing here. That's navigation safety data. And it's critical to make sure we protect our ports, we protect our facilities.

And, finally, yeah, I think it covered it already, harassed everybody about seaports versus Great Lakes fresh water ports, which are just as important with thousand foot ships and $3.9 billion in transportation savings, along with $36 billion, the third largest economy in the world behind the U.S. and China, here on the Great Lakes.

So, I hopefully look forward to welcoming everybody up here at our next meeting. We'll see how it goes. And, yeah, thank you very much.

CHAIR DUFFY: Thank you, Eric.

Tuba, are you still with us? Oh, there she is. All right.

MEMBER OZKAN-HALLER: Yes, I am. I am.

Eric, I really appreciated the passion with which you brought those comments to the floor. And, yes, I mean, I think I agree with you wholeheartedly on both points.

Safety is really, that's, you know, life and death, that's just the ace, that's the most important thing we should be looking out for.

And then I'm also going to echo Julie's comments. I, too, felt really, I mean, just it feels really good to see that this particular group has impacts in this way, in the sense that seeing these grants come alive, seeing

how the administrator responded to what this group communicated over the course of the last two meetings.

And those of you, I'm relatively new on this board panel, I know many of you have been working on this for quite a while, the geologist crisis issue, and so you all should feel really proud for really having moved the needle on that topic.

And then, lastly, I'll just repeat something that I said, I think it was maybe yesterday or the day before, I really want to congratulate everybody from NOAA on the amazing work that you're doing. You all are making real progress on some really important problems. Clearly, without a doubt you're savings lives. And the progress you have been making over the course of this last year is just, just awesome.

And so, really, thank you for this work. Yeah, just really you should feel very proud.

CHAIR DUFFY: Thank you, Tuba. I

appreciate it.

Did we update the list? I'm not sure who comes next. There we go.

Deanne, are you, are you with us? Nicole, I see you.

MEMBER ELKO: Okay. Thank you.

CHAIR DUFFY: Nicole, please go ahead. Thank you.

MEMBER ELKO: Can you hear me?

CHAIR DUFFY: Yes.

MEMBER ELKO: All right. So, to wrap up my comments and recommendations for the letter, I think that I'll start with the letter and state that I have three topics, I think, that I want to make sure get included.

And the first one is, sort of has three parts to it, but they're so interrelated I'm struggling with how to separate them out. And that is foundational data collection. In my world one of the most important is hyperlocal water level data.

The funding to sustain that. And I

think the language that Julie read is excellent, and we should definitely lean on that.

And then the connection to coastal resilience that, you know, the foundational data collection is necessary to, you know, complete that mission of NOAA as well.

So, that's the first one related to data collection.

And then the second is communication on the datum conversions. So, again, I really enjoyed that part of the meeting. And there's, I mean we've heard it from so many different speakers that there's a lot of anxiety out there around this. So, you know, we need to let them know that for what we're hearing from stakeholders. And the communication needs to be, that's the forefront.

And then the third is the training workforce element. Definitely think we should mention the geography crisis complication, which I know we will.

So, those are the three that I

recommend, Sean.

And then just two other comments on the letter, and that is related more to the organization. That matrix I think is useful for us, but when I heard we were sharing it with the administrator I got a little freaked out by that. I'm not sure that's the best tool to communicate. And I probably just need to know more about what that means.

But I had actually a chat about the strategic where I'd asked Admiral Evans about the administrator's priorities. And he suggested taking a look at the strategic plans. So, I refreshed my memory and clicked on that link. Thanks for putting it in there.

It's awesome. There's a 10-page summary and there's a really clear outline of three items with a couple of bullets under each that might be a nice way to organize these things that we're recommending, if we're looking for something like that.

So, that's all my comments on the

letter.

And then just overall, I want to thank everyone. I do recognize the need to reduce costs but, you know, with the virtual meeting we do have some folks dropping off. And so, in person is, at least once a year I think would be preferable. But great job pulling it all together virtually.

Thank you so much. I look forward to a potential meeting in the Great Lakes. And we can talk about lake level changes and sea level rise. That's another one that I get corrected on a lot.

And then I think I'll stop there. Just very grateful for everyone's monumental effort in pulling this off.

CHAIR DUFFY: Thank you, Nicole.

I think we will go to Anuj next on line of who's left.

And I'm not sure that I see Anuj.

Qassim, are you up and ready?

MEMBER ABDULLAH: Yes, sir.

Yeah, I think, I think the way between all the panel members who have spoke already covered really what I have in mind, too. But in general, the precision navigation and how it connects to the coastal resilience and sustainability, if we can in one, one recommendation. Because, and one recommendation, they're really tied or connected definitely.

In terms of land and sea elevation, maybe we can recommend for NOAA to explore ways and means to talk to the USGS. And we can, I can bring them into the role as needed, the people who are involved with the sea level program, because that's what we need. We need to explore that with the USGS.

Encourage the NGS grants, similar to the four universities, that will bring us a good model.

And one thing that I'm thinking of, do we need to mention about, I mean, like, the PORTS survey is a great stakeholder engagement. I mean, that survey where they brought everybody.

Maybe we need to emphasize the importance of stakeholder engagement. Because I saw some -- I noted from some speakers they need something from NOAA. They need that.

And there is a lot of science going definitely there. Are we having NOAA inform with them somehow, or let them turn for them for help.

So, basically, a kind of statement about stakeholder engagement, grants, or look for new ways or creative ways. We always need involvement.

That's, Sean, so far what I have in mind. That's everything we can communicate it later here.

But it's a great meeting definitely.

CHAIR DUFFY: Thank you, Qassim.

Mary Paige. Mary Paige, I know you did a lot of talking and typing. You got a final word? Anything we left out?

MEMBER ABBOTT: Absolutely.

I loved the case studies today. That helps bring reality to me as to the different

components. And to see those married together for certain things really, really, really helped.

I think we should include a thank you to our former teammates for the work that they provided and knowledge they gave in order to get to certain parts of just the geodesy paper and such. Let's not forget giving kudos to where it's due.

And I also want to support the talk about safety in navigation. It's kind of been my shtick. And we can't quantify, we can't quantify when it works.

I had a meeting right before the start of ours today with District 8 and District 7 of the United States Coast Guard. And part of it was talking about National Safe Boating Week, which is coming up in May. And the thing is that we listed I think it was seven deaths just this month in the state of Florida on the west coast, just goofy, kind of stupid stuff, people making poor decisions on their behalf.

I don't like reading about that. But

we don't read about how many times what we do, the data we provide, how good it is, because we don't have those "hey, I lived today, I survived today."

So, I picked up that increased safety by reduced risk. Love, love that, those five words. And that's what the PORTS programs does.

So, keep moving on that. That's a huge thing that ties in with all sorts of organizations and such.

The other item that I wanted to share was you talked very, very, very early on, I think it was the first session on Tuesday, and it had to deal with outreach opportunities. And the different directors were discussing the quantity or what they were doing outreach-wise.

And I was just going to throw a hint that the American Boating Congress is coming up May 8 through 10. It's in Washington. It's the recreational boating industry's annual advocacy opportunity.

And that event I -- if one of our

peeps, a couple other peeps can be there to walk it, and talk it, and have that White paper, I think this is where the National Marine Manufacturers Association has a huge input. And they've already collected the people together. So, take advantage of it. It's open to us or to the public.

And that's all.

CHAIR DUFFY: Thank you, Mary Paige.

And I don't want to forget our new members here. And I'm looking, I know Sloan Freeman would be next if we're going alphabetically.

Sloan, would love to hear from you. Glad to have you in New Jersey. The floor is yours.

MEMBER FREEMAN: Thank you very much.

And thank you, everybody, for a really productive meeting. I feel like I've certainly learned a lot. I think I've seen how the sausage is made a little bit here at the end, which is awesome.

As to the letter, and obviously I'm new to this, but something that Nathan said was about how the digital trend was a, you know, recommendation in the last letter, and we didn't want to restate ourselves. And it seems to me that it may be an opportunity to start to provide recommendations on how that digital trend can be used productively moving forward so that we can start to provide, you know, next steps with using that really amazing tool.

That's my only comment for that.

And the other thing I wanted to mention is I think this has been a really attractively productive virtual meeting. And thank you to everyone that made this happen, especially at the last minute.

But with four new members and I think some other recent members, as we think about planning in-person and virtual, whether or not this fall is possible or not, I think it would be really important that we don't hit three in a row virtuals. And, obviously, they can happen by

surprise. But I would hate to see a situation where we've got new members rolling in with three, three virtual meetings in a row.

So, as long as we're planning kind of long-term, while we're incorporating these virtual meetings let's try to get every other I think would be an important thing to do.

And that's all I have. Thank you very much.

CHAIR DUFFY: Thank you.

Kim Holtz, I think you're still here. And happy to have you.

Maybe Kim is not.

And I'm not going to look at the list right now. I'll see --

RDML EVANS: Sean, I'm sorry, I'll jump in there to say --

CHAIR DUFFY: Yes.

RDML EVANS: -- Kim did have to jump off. But she left a note in the chat which says she has a medical appointment but she really enjoyed participating the last few days and is

excited being part of all this, so.

CHAIR DUFFY: Okay. Wonderful.

Great to have you, Captain Kurtz, on the panel. And look forward to your comments.

MEMBER KURTZ: Thanks. And you can call me Carolyn.

I don't really have anything to add. This is, like, such a brain trust. And I have learned so much in the last couple of days. And dots have been connected that I didn't really understand before. So, thank you for, for all of that.

My husband likes to say every day is a school day. And these last three days have certainly been school days for me.

So, again, really honored to be on the panel, and excited and hope I can contribute in some meaningful way. And I look forward to meeting all of you in person someday, I hope soon.

And that's it. That's all I have.

CHAIR DUFFY: Thank you. Welcome to

that New Jersey.

Rebecca, are you with us?

MEMBER QUINTAL: I am here. My video is not working again.

But I just wanted to say I think it was an incredibly productive three days. I think while there were some public requests and also from some of the speakers on, you know, what could, what could NOAA provide, I think there weren't very many, which is a testament to how good NOAA is doing.

But whenever there was something, it was "we want more." Right? We want another sensor on a PORTS system, we want heat data, et cetera.

And, you know, with looking at the budgets, that they're flat, and really interested in understanding how we can maximize automation to the best extent possible to help with that. And I am very much looking forward to getting more in depth in this and being able to contribute more in the next meeting.

Thank you.

CHAIR DUFFY: Well, thank you. And very good to have you. Again, happy to have your teammates.

We'll move on to non-voting members, directors. Andy Armstrong.

CAPT ARMSTRONG: Thank you, Sean.

So, I'll pass on the recommendation letter as a non-voting member.

But I guess I have a comment that I'd like to add in closing. And Deanne is not here, and she might have had something to say about this as well.

But, so, I was pleased that we recognized the importance of sea floor mobility and sediment in the hydrographic services. And particularly it's important in how we set priorities for repeat surveys and where we apply our limited hydrographic resources.

So, I'm pleased that the panel will be looking into this part of our mission a little more in the future.

Thanks.

CHAIR DUFFY: Thank you, Andy. And I meant what I said about the Center for Excellence. And hope to include some Mississippi River talk later on.

CAPT ARMSTRONG: Yes. Thank you very much for that, Sean. Much appreciated.

CHAIR DUFFY: Cueing up your cohort, Dr. Mayer.

DR. MAYER: Yeah, I think most everything has been said. And I can't, you know, as non-voting members we shouldn't comment on the letter.

But I will kind of touch on just a couple of things.

I think from today's presentations I was super thrilled. As a academic and director of a center that's trying to train hydrographers, I was just so thrilled to see these geodesy programs coming along. And I think this is something that the HSRP should also take some credit for and certainly praise NOAA for. It's

critical to us, and it's wonderful.

And I'm going to push them to do the undergraduate program so we can get graduate students in here that have that geodesy background.

A couple of comments, and just so things aren't lost. And I'm not suggesting these rise to high priority.

The sustainability part, and Ed, Ed saw these questions about more sustainable ships and things like that, has another component, too, and that's the introduction of uncrewed vessels, not major large ships, but in NOAA's survey role. It's something that I touched on a little in my presentation. And that's a real sustainability question, too.

And I think it may come back as we look at that more, the role that uncrewed systems might play in the hydrographic community.

And, finally, and I think Julia would bring this up because it was something brought up by Lindsey, and that's, you know, how can we

think about trying to take advantage of capabilities like they have in the Port of Long Beach and their own internal survey capabilities, and see if we can use that to somehow get a much more rapid turnaround to the official products.

Now, again, that's something I think for a longer term discussion, but I just didn't want it to drop off the table.

And so, that's all I have. It was a great meeting. Again, you know, I've been here a long time and they're getting better and better. And I think, as I said, much more positive in terms of the constituents and their response to what NOAA is providing. So, I think it's all really good.

CHAIR DUFFY: Thank you, Larry.

Next up. Thanks, Brad.

MR. KEARSE: All right. I was going to try to get out in front of you there, Sean.

CHAIR DUFFY: Proceed.

MR. KEARSE: Yeah, thanks for the opportunity to be able to sit in for my, really

my first full HSRP. And it was a -- I'm glad we got the opportunity to get our academic partners here in front of you all to show how things are moving out with the geospatial modeling grant. We've really been working hard at the piece on the crisis in geodesy. And I hope you all recognize it.

I've taken it as a personal initiative of mine, and really been out there really talking to the academic institutions. So, we're getting there.

The other thing is, as we talk about everything we've talked about, it is all related to geospatial data. And one thing I want to put a big advertisement out there for is that the National Spatial Infrastructure Strategic Plan is coming out for, here real soon, for review through the federal digest that's coming out.

I hope you all get a chance to look at it and making sure that all the pieces we're talking about are somehow recognized in that strategic plan moving forward. Because it's

everything about transportation and all of where we're heading.

And don't forget that the National Geospatial Advisory Committee that's out there is chaired by one of our former HSRP members Gary Thompson.

So, just remember that. Take a peak at it. When we see it come in we'll make sure that folks get out when it's in the Federal Register. Make a comment. Because everything we've talked about, everything related to climate, everything we've talked about heat, it's all got to be -- if we can get to the point that it's all referenced to a common reference system, we're going to be so much better as an organization.

We want to make sure the pieces are in there in that strategic plan, including that we're using a common reference system. Because we've spent a lot of time working on that reference system.

So, those are my couple of comments.

And appreciate all, all the briefings that happened today.

CHAIR DUFFY: Thank you.

Marian.

DR. WESLEY: Good evening, everyone. So, since we're not in California, you guys get to enjoy evening music practice in my house.

So, I just want to reflect on Captain Kurtz's comment, every day is a school day. I am still very new in my position, and I have learned so much from you through the years that I've been able to sit in on meetings, and then joining the meetings last year. So, it's just really tremendous.

I thank you all so much for your generous kind of bringing your expertise to this group. It's just really amazing and refreshing. And I always leave these meetings with all sort of new ideas and kind of new thoughts, and very energized.

So, I just want to say thank you for everybody putting in the time. This has been a

great meeting to me.

CHAIR DUFFY: Thanks. Wonderful to have you. Thank you.

MEMBER ABDULLAH: Can I just add one second, if you don't mind?

I've been remiss. I meant to mention for a second Nathan's opinion on the digital input. It's slowing the project down with vivid words.

I think we should have in the recommendation because we're sending with the letter our issue paper, and I think it is the right time to start emphasizing the topic, you know. And how NOAA can focus on looking for benefit or how to use it, something like that.

But we should mention something in the letter about digital input, as it coincides with sending the issue paper.

Thank you.

CHAIR DUFFY: Thank you, Qassim.

Admiral Evans, would you have any closing comments? And I've got to get used to

going after you. But since being the chair, I --

RDML EVANS: Subject to your approval.

CHAIR DUFFY: -- respect you.

RDML EVANS: Thank you, Sean. And thank you for everything. Thank you to everyone here for your comments.

And I'll just note to Marian's comment about music practice. My children inform me that they would never interrupt an important meeting going on. And so they have sacrificed themselves to defer music practice this evening. Yeah, it's a tremendous sacrifice on their part.

But I, I have a couple thoughts. I mean, I think the notion that every day is a school day, and I couldn't agree with that more. And today was certainly no exception to that.

And just a few. One thing that really rose to the top for me was when we were, you know, hearing the presentation from the geospatial modeling grants and the work going on in OSU and Scripps. I, like Larry and others, am really excited to hear about the focus not just

on graduate students but on undergraduates as well.

We've talked in this forum before about in hydrography the need for undergraduate level education as well as graduate students. And I've kind of joked for everyone of Larry's Cat A hydrographers I need ten people from an undergraduate program that are ready to go out and do this work in the field.

And I suspect that in geodesy the situation may be similar.

So, seeing that pipeline created and focused not just on the graduate students but also on the undergraduate pipelines is great to see. And I congratulate NGS on getting those out and on the academic institutions that implement those.

I want to acknowledge, I think Rachael had to, Rachael Dempsey had to excuse herself after Chris DiVeglio's presentation, but I want to acknowledge that she was with us for almost the entirety of this meeting, which is, is not

usual for a member of the NOS leadership. So, I think we're very fortunate, again, to have her in that role.

I thank Sean and Nathan for their leadership on the panel, for stepping up into the leadership roles, Sean particularly for chairing us through this meeting under challenging circumstances with the transition to virtual at the last second.

I would be, I would be remiss if I didn't acknowledge -- and I think this has been mentioned -- but I particularly want to specifically note that the retirement, the upcoming retirement of Juliana Blackwell, the director of NGS. Been a long-time participant on this panel.

So, I would, you know, offer and encourage those panel members who work with Juliana, who know Juliana and want to extend good wishes to her in her upcoming retirement to take the opportunity to do so this month before she rides off into the sunset.

And then, also, in thanks just, just my personal thanks to the staff behind the scenes, Ashley and her team, who have kept this running smoothly, who have cued me, cued Sean and others to keep us on track here. But, really, again the entire panel for all stepping up together, both the established members and the new members, as well as the other directors for making this last few days as productive as it could be under frustrating circumstances.

And I think the diversity of thought, I'm already impressed by what the new members are bringing to this, to this panel.

I used to, you know, it's something you get used to as a ship CO is that every 6 months or so, you know, a big chunk of your crew is going to rotate off and you're going to get a bunch of new people, sometimes more frequently than that. And every time people you know leave, you think to yourself, oh, my goodness, how am I going to, how, how is the show going to go on? How are we going to continue to operate without

the people that just walked down the gangway?

And, you know what? It works. It keeps working and on the deck. And, you know, we all have a role to be filled in this panel and in this community. And when you reach into the jar and pull out some of the marbles and pour in some new ones, shake it, well, guess what? You know, the marbles still rise to the top of the line, and sometimes higher. And I think that we're absolutely seeing that here with this panel.

So, again, congratulations to our new panel members. And thank you for stepping up into this important role. We really value your time and your input.

And, lastly, I do, I want to also mention, you know, the next meeting. And, you know, message received loud and clear on the virtual. I'm not surprised, that was the answer I was expecting, frankly, I was hoping to hear, that the panel values in-person gathering.

And, as I mentioned, you have my absolute commitment. And I believe I can speak

to the other directors on this, that we will, we will examine every option to continue in-person meetings, you know, perhaps looking at some different modes, some different methods than we have used in the past.

Because I do believe in the value of this panel but that we're stretching ourselves thin when we aren't able to gather together and we're not able to see firsthand the communities and infrastructure at stakeholders that we're trying to support.

So, I'll leave it there, turn it back to Sean. And, again, just say thank you again for everybody's input and engagement over the last three days.

CHAIR DUFFY: Thank you, Admiral.

One of the things I say a lot, probably haven't said here before, is we win and lose as a team. I consider this a victory for all of us.

I'd like to also think about some of our former members and former staff, people who

have moved on. As the Admiral did say, we have seen some bright new members come onto the team. Welcome. Everybody's jersey may not be the same size but has the same importance.

There was a great deal of work that went on. The view from the press box up here, you might be amazed at the number of screens I have open and texts going forth. Lost the playbook for a little while there.

And just wanted to come back to the fact that this was a success. We're not where we intended or wanted to be, but we have really accomplished a lot.

I have a lot of talking points, a lot of things to review preparing for a trip to D.C. very quickly. But I wanted to thank you all for sticking with us. And just say that there is a value in what we do.

And I come back, again, to coastal resilience. We're seeing climate change happen on the Mississippi River. We're seeing metrics change. And I like to play a little word game.

Sometimes when I'm having trouble and stuck I like to mix up the letters. And I find that perspective often helps give me a little different perspective, kind of helps me get through it, and maybe I'll get lucky and find the word.

But at the end of the day there's a lot to go through, a lot went into this. And as we see Peter talked about, and water heat and, you know, connecting that El Nino impacts the Mississippi River, La Nina impacts the Gulf Coast, the importance of what NOAA does.

And I refer to NOAA as my Swiss Army knife because of the multiple tools, and maybe not always knowing exactly the difference between CO-OPS and NOS, or I'll leave it at those two for now. But knowing that the team members are connected.

And, you know, the technology is really critical. We talk a lot about sensors. And then a perspective talked about changes on the Mississippi River, things like a gauge being

really impacted by encroachment from the Gulf of Mexico where the river stage is higher than it would have been in the past.

And Nathan Wardwell said, you know, Sean, I understand that but we don't even have that historic sensor. We don't know what water level was.

And, again, just a little different perspective. But something that it's great to hear from everybody.

I'm not going to go on. And, Eric, I see you are on and I will let you speak. And I'll think about my last 30 seconds of goodbye.

MEMBER PEACE: So, I just want to say one thing, which is thank you to the American Sign Language interpreters who have been busting their butts and working the last three days. And we appreciate it.

Thank you, April. I know you are one, but there's many others.

Now Sean.

CHAIR DUFFY: Thank you, Eric.

Mary Paige.

MEMBER ABBOTT: No, I was just, I was just trying it. I don't know how to sign.

So, I just want to give a thumbs up to the American Sign Language people. Eric, kudos there for bringing that up. That was remiss of us.

RDML EVANS: I don't think we made it easy for them either, so.

CHAIR DUFFY: Oh, we didn't. I think I mentioned etouffe, jambalaya, gumbo, daiquiri, hurricane, to add a little New Orleans flavor. How about some Tabasco for a little spice?

Again, I'm going to need to wrap up. But, Julie, I see a former chair. She's the fill. My feet are worn out and I've been sitting out all day.

Julie.

MEMBER THOMAS: I just want to say thank you to all the NOAA staff and NOAA directors. And, really, in three days they pulled this meeting together.

And I don't know how they did it. Because I've been involved in other virtual ones, and let me tell you, we have a practice session two weeks out. We do this, we do that. It's, like, we do all sorts of things. So, how you did it in three days I have no clue.

But a big thank you to all of the NOAA staff.

Thank you, and I do hope I see the panel in another 6 months or so.

CHAIR DUFFY: All right.

MEMBER THOMAS: And, Sean, you were great. You did perfectly. You and Nathan did that job.

CHAIR DUFFY: Thank you. Thank you, Julie.

Admiral and I did really communicate, work well together. It was very interesting and we made it through.

Again, I said we win and lose as a team. This is a win.

Thank you, everybody. I'm going to

sign off.

RDML EVANS: Good job, Sean. So long, everybody.

(Whereupon, the above-entitled matter went off the record at 4:27 p.m.)

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C E R T I F I C A T E

This is to certify that the foregoing transcript

In the matter of: Hydrographic Services Review Panel

Before: DOC NOAA

Date: 03-07-24

Place: webinar

was duly recorded and accurately transcribed under my direction; further, that said transcript is a true and accurate complete record of the proceedings.

Neal R. Gross

Court Reporter