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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HYDROGRAPHIC SERVICES REVIEW PANEL (HSRP)

SPRING PUBLIC MEETING DAY 1

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>> SEAN DUFFY: I had to start the webinar on mute. Live now hopefully. Happened before. I don't think I'm the only one.

Well I want to make an introduction. There's a lot of work that goes on. To the HSRP this may be one of the more challenging ones. But we're here. It's game day. I know the panel members and government officials will show up and make this a great event.

I think it's important to remember the focus of the Hydrographic Services Review Panel which is NOAA's federal advisory committee. I am going to read to advise on improving the quality, efficiency and usefulness of NOAA's navigational related products, data and services. The HSRP advises the NOAA Administrator about its navigation, physical oceanographic, geospatial positioning, and coastal and shoreline programs, products and services. I would also like to say that this Federal Advisory Committee is made up of experts that all have a great interest and career, there's a lot of knowledge here. With that I'll basically turn it over to Rear Admiral Ben Evans to take over the introductions. And welcome, everybody. Thank you for being here. Appreciate the sacrifice. It's game day so our NOAA Jerseys are all on. Thank you.

>> BENJAMIN EVANS: Thank you, Mr. Chair.

And welcome, everyone. My name is Ben Evans. I am the Director of NOAA's Office of Coast Survey and also the designated federal official on the Hydrographic Services Review Panel.

Before we dive in I'd like to ask Ms. Amber Butler who is one of our HSRP executive secretaries to come on and take us through some administrative matters right here in the first couple slides.

>> AMBER: Hello. Thank you very much. So this meeting is recorded today. You can refrain from using the questions box if you do not want your likeness recorded or you can close out of the meeting. Here is the privacy statement. For our meeting logistics, the agenda is attached as a resource to your resources in the menu on the right side of your screen today. You can use the questions box. And you can submit public comments or questions using this box. Please contact myself or Virginia Dentler using the emails below for any troubleshooting today to connect to the webinar. For other accessibility you can use the phone numbers provided. All comments and questions will be addressed during our public comment periods which are scheduled for each day of the meeting.

And I will now hand it back to Rear Admiral Ben Evans. Thank you very much.

>> BENJAMIN EVANS: Thanks, Amber. I would like to echo Sean's acknowledgement of the late change to the environment. We were looking forward to our in person meeting in San Pedro and we're sorry that is not possible. I would like to thank our local partners on line today who worked hard to set up technical site visits, panels, discussions with those in the action to be there in San Pedro. I would also like to thank the panel members themselves. I know many folks were inconvenienced to one degree or another by the change. I would like to acknowledge the hard work of the HSRP staff. Many of whom worked late Friday night and over the weekend to reset this meeting to the virtual environment. Fortunately, our COVID virtual meeting skills are still with us, and I'm sure this will be a productive few days. Just as a reminder, please mute your microphone unless you are

speaking. And I ask that our presenters and speakers please turn your cameras on.

With that, I'll turn it back to the Chair, Mr. Sean Duffy, to officially open the meeting. The floors yours.

>> SEAN DUFFY: Okay, sorry, mute button issue again.

With that, I appreciate Admiral. Good to be here virtually. And that may be relevant in different ways later on. But I would like to introduce my friend Nicole LeBeouf who is the assistant Administrator for ocean services and coastal zone management for the National Ocean Service. Nicole, Louisiana has a special place for you in its hearts. And I hate we missed D.C. Mardi Gras but it's game day and I know you are ready to roll.

>> NICOLE LEBOEUF: Thanks, Sean. It's really good to see you all. Good morning. Welcome to the spring 2024 Hydrographic Services Review Panel meeting. Echoing Sean's words and Admiral Evans words, I really wish we were all together in San Pedro. But I am so glad we're able to come together virtually. Being together is good. As Sean has heard me say in the last couple days I am going to miss the handshakes and hugs, but the most important part of this meeting is hearing from the HSRP and we're still going to get to hear from you and local stakeholders from the broader L.A. and Long Beach area. So I am grateful for that.

I do sincerely appreciate in advance everyone's engagement this week, making the most of our time together. I know that we will do that. And I want to thank Sean as our Chair and innovate Wardwell for your leadership of the HSRP. I know you are going to run a great meeting this week. And of course thank you to Admiral Evans for kicking us off. Lots of echoes here and

apologies for the redundancy but I want to thank our team for working so hard in the background to make this meeting possible. I want to extend my gratitude to everybody who is going to be with us for the next few days.

It has been six months since we last gathered in Silver Spring. And give than we were anticipating being in Southern California this week, I wanted to go ahead and start off like I was intending to which was to mention that region has faced some extreme weather events of late including those related to atmospheric rivers and more recently snowfall and other things. And I extend my gratitude to the National Weather Service for all they do to predict these historic events, the rain and the flooding, and to share lifesaving information with the public. Beyond my gratitude for the National Weather Service, it is absolutely foundational that NOAA's data is available for these modeling efforts and predictive capabilities. Because it's the work of our National Geodetic Survey as many of you might imagined that contributes to our understanding where that rain is going to go and who will feel the impacts of the floods. It's absolutely essential that that data be available for those predictions. And whether you are in California or somewhere along the gulf coast or east coast or somewhere else, our foundational data at NOS, like the kind that the HSRP is going to be talking about this week, is very important, not just for operational and near-term capabilities but for the long-term preparations for climate change including change along our coast.

At the last meeting I shared that I had taken on the role of chairing the committee on the marine transportation coordinating port or CTMS, and I said I was eager to update the workplan of the CTMS. Well update we did

and the team is hard at work seeing what we can do to increase the climate resiliency of our ports across the country. I'm really excited to introduce a panel tomorrow on adaptive and resilient ports and to share with you all what we've been up to and to get your expert perspectives on where we should be focusing our efforts. Port resiliency is going to take partnerships and a real team effort and we're going to need the private sector, academia, as well as the expertise from across the Federal Government. I absolutely welcome the HSRP's input on this because you've got expertise and real-world experience that we need to hear from.

Speaking of the HSRP and our partnerships, some of our critical partnerships highlighted, were highlighted in Dr. Spinrad's visit to the gulf where we participating in a number of engagements. One of the notable visits although he missed seeing Sean Duffy was to the port of New Orleans. I don't know how that happens, where port leadership and Dr. Spinrad got to talk about everything from risk reduction to community engagement to the importance of building out our real-time observation networks. They also talked about specifics like current meters and air gap sensors and how important it is, how costly it is really when we don't have these observational networks in place. As a testament to NOAA's partnership with the U.S. Coast Guard, Dr. Spinrad met with the district commander where they talked about ocean observations, marine forecasting and much more. They committed to getting back together and getting NOAA and the Coast Guard out on the water more often to share information about ocean science and operations, and so that is really encouraging to do more with the Coast Guard.

Beyond our work with the Coast Guard NOAA is looking to enhance our

public/private partnerships, promoting ocean and coastal-based information services. And I want to tell you about the ocean risk climate resilient accelerator awards that we just issued under the Inflation Reduction Act. Our IU's team just recently and in New Orleans also announced Phase 1 awards just a few weeks ago and got together with those award recipients. These awards are going to support the development of business accelerators. They're going to provide mentorship and training and other resources to small businesses and startups in the ocean tech space focused on ocean solutions to climate change and climate adaptation. Current Phase 1 grants are going to really get these accelerators going. Phase 2 grants are going to help them implement their plans later this summer. It's really going to help us build a new generation of information services. And I'm excited about how these awardees are going to bring to the table innovation, tech savvy, marine-focused workforce, and really just a lot of other cool things that are going to support the U.S. Ocean Enterprise. So happy to answer more questions about that later on.

I also want to just briefly shout out the work that we're doing with the Center of Excellence for operational ocean and Great Lakes mapping with NOAA, university, and private sector partners. This is based in New Hampshire. This year the center has been working diligently on increasing training and student opportunities. Admiral Evans is going to tell us more about it later today.

Your agenda this week at the HSRP is packed covering from geospatial monitoring grants to currents and the update on the ports assessment. As always I want to thank you for all the work you do for us in your federal

advisory capacity role. You keep us on track. You keep us informed. You help us set priorities. And I really do invite everyone to engage in this virtual setting throughout the next few days. And I'll be dipping in and out to hear those presentations. And again, we'll get to talk tomorrow about port resilience.

Thank you, Sean. I'm going to turn it back over to you. The floor is in your capable hands.

>> SEAN DUFFY: Well thank you. I had to call a couple of audibles along the way as we move forward with the script so I appreciate the update. It was very interesting. I did apologize to Dr. Spinrad. I was very much in the meeting there because the port of New Orleans had a lot of information that came from the big river coalition which you forgot to mention my role as Executive Director of big river coalition and the Chair of HSRP. I was at a meeting with our very entertaining Lieutenant Governor. And on that day he out ranked Dr. Spinrad, but today I would take Dr. Spinrad's call gladly.

With that, I am going to move on. Thank you, Nicole. I look forward to keeping up with you over the next couple days. With that I'm going to introduce Rachael Dempsey who I haven't known near as long but who has been impressive over the course of the last few months in meeting her. I look forward to getting to know her better. Rachael is the Deputy Assistant Administrator for navigation observation and positioning of the National Ocean Service of NOAA. I wish I had a funny joke to tell you, but I don't have that audible available right now, but I know Rachael is coming online.

>> RACHAEL DEMPSEY: All right, good morning everybody. Hopefully you all can hear me okay. For some reason my webcam is not working so my

deepest apologies. Sean, thanks for that introduction. We will get to know each other better over time, trust me, and I fear that you will have more stories than I would care to have to manage in the coming years.

That being said, good morning, everyone. It's great to be here virtually with you and participate in my second HSRP meeting. I wanted to provide you all with a few notes on some progress within the navigation, observations and positioning portfolio since our last meeting last September. During that meeting we heard a lot of discussion about saltwater intrusion. And so my team and I were able to take that problem and dig deeper during our nav ops and positioning retreat. Using that as a case study to identify how NGS, CO-OPS, and GS work together to discuss a common issue. This underscored the importance of the data that the programs bring to the table. We've seen success and improvement of our observing systems. In Hawaii our work continues on building out a new Pearl Harbor port with an estimated completion goal of the end of fiscal year 24. NOS has entered into an agreement to establish a Seattle ports for fiscal year '25. And the last several months we've continued to enhance a number of existing ports by operationalizing several new stations. Our Milan has had several station enhancements. In 2023 we completed an upgrade and rebuild of the Charleston, South Carolina Milan station and will be conducting a planned upgrade this year of the New York station due in part to basic infrastructure law funding. We further continued installation and transition of microwave radar level sensor technology not thirteen stations since fiscal year '23. These include sea ward and port Alexandra Alaska and Hawaii. Enhancements and expanded capabilities in our coastal inundation dashboard

have been focus. This is in order to obtain valuable historical data and information for future planning. Other recent involvements include refined page layouts for ease of usability and the integration of National Weather Service coastal Florida advisory and warning language shown geospatially when applicable.

Next we completed our first phase of the gravity for the redefinition of the vertical datum or Grav D project in which our NGS team measured the gravity field from aircraft over the entire nation including the U.S., Alaska, Hawaii, and all U.S. Territories. Elevation data from the current datum has areas ranging from sixteen inches to six feet. The separate ensure that's our national spatial reference system will be accurate to less than an inch in most areas. We shared our success with the public and with the Hill earlier this year. Our class B ships have also now received funding to replace the Rainier and the Fair weather. A contract has been awarded for the design and construction of these ships. And this is happening in response to Congress's appreciation of the value of hydrographic data and expertise produced within the NOAA fleet. It's really important for us to be able to share this good news but I won't go out saying that we also face our share of challenges. Flat budgets are making it difficult to maintain the scope of our foundational data collection. Data collection is necessary but it's not free. And equipment needs to be maintained. This includes everything from sensors to ships. All data requires quality assurance and quality control. And with inflationary costs, a flat budget can't keep up. Finally, I wanted to take this opportunity to thank Ms. Julie Thomas as well as the rest of the review panel for your advocacy regarding the importance of developing the G Odyssey workforce in our letter

to Dr. Spinrad. This is an effort we continue to focus on from a variety of angles. We're launching our first pathways internship program this summer in the Norfolk, Virginia area. For the National Geodetic Survey and the Office of Coast Survey and hope to grow this workforce development opportunity over the coming years.

Again thank you all. It is a real pleasure to be here with you and I look forward to the great discussions this week.

>> BENJAMIN EVANS: Thank you, Rachael. Thanks for those insightful remarks and highlighting many of the activities going on across the navigation services and hydrographic services within the ocean service.

We're now excited to hear from Congressman Nanette Barragan representing California's 44th district which is centered in the south Los Angeles and Los Angeles Harbor region. Please note this is a recording that was made prior to the change to a fully virtual meeting so she does reference some of our in-person activities which will be no longer taking place.

>> Welcome to San Pedro and California's 44th district. I am sorry I cannot be with you today to welcome you in person no NOAA's Federal Advisory Committee. NOAA's work is critical to our response to climate change and other environmental challenges that threaten our economy, natural resources and public safety. Last Congress democrats and the Biden-Harris Administration delivered $6.3 billion in federal funds to NOAA through the Jobs and Infrastructure Law and the Inflation Reduction Act. These funds will advance several of NOAA's key objectives, including habitat restoration, coastal resilience, and climate research. NOAA has been a great partner in

my district. We have partnered to secure federal funds for the research and development of ocean based climate solutions and Alta Sea at the Port of Los Angeles. The rescue and rehabilitation of stranded marine animals led by the marine mammal care center in San Pedro and the deep ocean surveys to help us better understand the extent of DDT, byproduct and other waste dumped in the San Pedro Basin. I also want to thank the staff and Advisory Committee for your efforts to advance hydrographic services. These services are essential to maintain the safety of maritime trade and the maritime transportation system. This is especially important near the ports of L.A. and Long Beach where forty percent of seaborne imports enter the country. Finally, thank you to everyone for participating today. And for your feedback on how we can best utilize federal resources to support our environmental and economic goals. I look forward to our continued collaboration between the public, private and nonprofit sectors to advance NOAA's missions and equitably and efficiently as possible. Thank you and have a great meeting.

>> BENJAMIN EVANS: Thank you. We appreciate the Congresswoman's comments and her support of NOAA through the BIL and IRA bills recognizing the importance of the maritime transportation system and trade, as well as keeping climate science and coastal resilience at the forefront.

As you may know the HSRP is engaged in coastal resilience and regularly discussed the data back bone that navigation, positioning and the observations portfolio provide to the Southern California and in fact all of the coastal zone of the United States. During the next couple days we will look forward to hearing more from NOS about the navigation portfolio and services.

Now as designated federal official of the HSRP it does fall to me to cover more administrative topics and amongst those is an ethics reminder. This is the required reminder for our HSRP members. When participating in HSRP public meetings, you serve as a NOAA special government employee in your personal capacity as a Subject Matter Expert. Please remember that you do not represent any group, industry, association, or other entity, including businesses you may ordinarily be affiliated with. Please remember to take off your regular work hat and replace it with your NOAA hat as you provide your expertise, questions, comments, and guidance to NOAA and to the NOAA Administrator. Thank you for your service to strengthen NOAA's hydrographic and navigation positioning services portfolio. NOAA and I greatly appreciate your vision and help.

Next some notes on public comments. Thank you to all the participants who have provided comments in advance. To the stakeholder staff and others, I encourage your public comments and input. If you have a comment, please type it in the webinar under the questions box. Your comments will be read or summarized into the public record and/or put on the screen if time permits. All the comments from the meeting that are on topic will be included in the official meeting minutes. When comments are received in advance, they will also be shared and highlighted at the meeting as well as become part of the public record. I welcome and encourage comments from any group directly or individuals during the public comment period.

Just a second reminder about privacy. These sessions are being recorded, transcribed and posted to the NOAA HSRP website. The speakers have provided written permission to do so. Your individual permission is required

for the use of your photo, video and voice on audio. The meeting webinar will be retained and disseminated on the meeting website and accessible to the public. You can decline by abstaining from speaking or dropping off the webinar.

With that, I will hand it back to Sean to introduce the HSRP members and NOAA leadership. Sean?

>> SEAN DUFFY: Thank you, Admiral. I was worried about pronunciation and learned I've been saying San Pedro wrong. So anybody want to challenge me on some Louisiana words, I can say Capitulos and probably spell it most of this time. I am calling a little bit of an audible in that I forgot to thank Julie Thomas our past Chair. Julie, it wasn't meant on purpose and had we been in person it would have been easier to remember. But you set a very high bar I hope to be able to follow. I also mention that I probably have a better Vice Chair can you do in Nathan Wardwell who will be hopefully able to join us. Julia, I know you did a lot to help set up this meeting. I wanted to express my thanks to you for all your hard work.

And with that, you will find in the speaker bios and advance materials, and we'll go through the members Mary Kay Abbott I'm sure with that A you are sure to going first. If you can start with a quick intro and then we'll go next to Qassim and go through in order.

>> MARY PAIGE ABBOTT: Yes, you did catch me off guard. I'm Mary Paige Abbott and a newer member of the HSRP. My forte, if I may use that word correctly, is that of the recreational boater. And I'm here to help and listen and advise from that capacity.

>> SEAN DUFFY: Thank you, Mary Paige. The graphic is very helpful.

Qassim, you are up next. Good morning. I guess that is relative to where you are.

>> QASSIM ABDULLAH: Thank you, Sean. Hi, everyone. I'm Qassim Abdullah. I'm visor to scientist (?) And also to Penn State and New York. I've been with NOAA, this is my starting my second term I guess. And leading with the technology work group. I will be looking forward for this meeting. As always I expect it to be very productive. Thank you.

>> SEAN DUFFY: Thank you, Qassim. Anuj you are up next.

>> Anuj is not on at the moment. So we're going to move on to Captain Cruz. Captain Cruz is not on others. Apologies. Let's move on to Nicole Elko.

>> Good morning my name is Nicole Elko. I am delighted to be here today. I am also -- I sit just outside of Charleston, South Carolina. And I'm the executive director of the South Carolina beach advocates. So we are excited to bring to you concerns from the communities and share with you new resilience challenges that have popped up even just in the last six months. So I very much look forward to this week's discussion. Thank you.

>> SEAN DUFFY: Deanne, I'm having trouble. I'm muting in and out so if you can start please. Nicole, I'm sorry but I love seeing the surf board.

>> DEANNE HARGRAVE: Nice to see you. I am Deanne Hargrave. I am the geoscience manager for Atlantic shores offshore wind. Into my second term on the HSRP panel. Looking forward to another great session. Really miss seeing everybody in person but I know that we'll pull this off successfully as we have in the past. Dealing with adversity is something that we thrive on. I'm based in New Hampshire. Looking forward to bringing kind of the geoscience data acquisition management and benefits perspective to how we

can really optimize that for our Blue Ocean economy. Thanks.

>> SEAN DUFFY: Thank you, Deanne. Next up, we have Tuba.

>> TUBA OZKAN-HALLER: Tube good morning, everyone. I am a faculty member at Oregon State University. My expertise is in coastal stenography and engineering. That's the lens which I engage in this work. I am also the Dean of the College of earth, ocean and atmospheric science at Oregon State University and I look forward to a productive meeting. Thank you.

>> SEAN DUFFY: Thank you. Next up Eric Peace. Good morning. I think you are on the same time zone.

>> ERIC PEACE: Greetings from Cleveland, Ohio. I'm Eric Peace Vice President of lake carriers ocean which represents the U.S. flag fleece on the Great Lakes. Looking forward to a great meeting. Thank you.

>> SEAN DUFFY: Julie.

>> JULIE THOMAS: Thank you, Sean for that acknowledgement of being past Chair. I'm very fortunate, I'm probably extremely fortunate because the Captain has offered the Marine Exchange to take this call from. So I'm in San Pedro. And the under kill clearance panel will be joining us here this afternoon. Most them. So I am fortunate. And usually I sit in San Diego. I worked for many years at Scripps Institute of Oceanography and was Executive Director of SCCOOS. Thank you.

>> SEAN DUFFY: Next up we have Nathan listed but I don't believe he is with us. With that, we would move to introduction of the non-voting members. And Captain Andy Armstrong. Andy, you are up first. There you are. Hello, Andy. I'm not sure if it's morning or afternoon anymore. Hello.

>> ANDY ARMSTRONG: Well I'm not sure either, Sean. I am Andy

Armstrong. I am the NOAA Co-Director of The NOAA University of New Hampshire joint hydrographic center. I've also recently been tasked with bringing the new Center of Excellence that Nicole mentioned online and making it a reality in NOAA. So I'm very much looking forward to this meeting. Thank you.

>> SEAN DUFFY: Thank you. That is wonderful news in capable hands, Andy. And I see your cohort Larry is ready to go. Good morning. Hello, Larry! How are you?

>> LARRY MAYER: Hello! I'm fine. I'm Larry Mayer. I am Andy's cohort. Director of the center for coastal and ocean mapping at the University of New Hampshire and the Co-Director of The joint hydrographic center. I've had the pleasure of watching Andy really work hard to bring this new Center of Excellence to fruition and we're very, very excited about it.

>> SEAN DUFFY: Thank you, Larry. Next up and my New Orleans pronunciation would be Marian Wesley. I am not going to try to say her title because I would mess it up. I don't have it written down. My friend, Dr. Marian Wesley.

>> MARIAN WESLEY: Thank you, Sean. I am the Director of the Center For Operational Oceanographic Products and Services here in the National Ocean Service. We basically do tide gauges and currents. Very delighted to be here. The HSRP has been a great source of advice over the years. Happy to be with you this week.

>> SEAN DUFFY: Great to see you. On my script I have Nicole LeBeouf and Rachael Dempsey who we've already met. And I see Rachael Fontana also listed. And if she doesn't pull up I guess we will just move on. And again

thank everybody for being here. In this set up as we work through the agenda, looking I believe Admiral Evans is up next.

>> BENJAMIN EVANS: I was going to propose we go back and introduce Mr. Brad Kearse the Deputy Director.

>> BRAD KEARSE: Good morning to folks. And I guess we're afternoon for some of those folks on the east coast. So, Sean, Juliana regrets she couldn't be here. We are trying to cover many tasks. There's the maps federal meeting going on. Also there's a civil application meeting. So we're trying to tackle both things from West Coast to east coast this week. So I'm the Deputy Director here. And I've been around for a while. I haven't participated in a lot of HSRP meetings, but I am well aware of HSRP. And in my past life I did used to attend when they first started up. So I've got a long history around NOAA. So look forward to the discussions and really look forward to updating you all on all the great things going on with modernization of the National Spatial Reference System and the crisis in geodesy. Good to see everybody and look forward to the discussions.

>> SEAN DUFFY: Well done. Thank you. Didn't mean to skip you earlier. Admiral?

>> BENJAMIN EVANS: I'd also like to recognize the NOAA staff in our meeting. The ocean service and NOAA have a variety of staff who provide subject matter expertise and program and administrative support to the HSRP. There's about twenty NOAA staff that follow the work of the HSRP year-round. And they can assist you with their expertise throughout the year. I'd also echo Sean's thanks to the staff who are helping with this meeting, as well as the others providing ongoing HSRP support. A small selection of those

include Jeff Ferguson, Ashley Chappell, Amanda Phelps, Andrew Butler, Virginia Dentler, Megan, Melanie and Nathan Littlejohn. In addition there are a few experts from my office. The Office of Coast Survey. With us today we have the Deputy Director. Captain Greenaway who is chief of the highway services division. Our precision navigation Program Manager and I suspect several others have joined as well. I encourage the panel members and attendees to engage with not just the coast survey experts but the experts across NOAA who are participating and available.

I'd also like to share some exciting and somewhat last minute news that we have for new members that are slated to begin their terms on the HSRP at the fall meeting. However we did just receive their confirmation letters. And I believe many of them are joining us here today. As was previously mentioned, I do want to also congratulate Qassim Abdullah who has been re-appoint for a second term on the panel. Thank you, Qassim, for sticking with it and continuing to support this work. If any of our new members are online and would like to introduce yourselves, just a quick intro with your name, organization, job title and where you are from. I'll just work through the list that I have. Sloan, are you with us?

>> SLOAN FREEMAN: I am. Can you hear me okay? All right. Hi, everyone. I'm Sloan Freeman. I'm a co-founder and CEO of geodynamics which is a hydrographic survey farm that has specialized in shoreline mapping and coastal chart updates for plants including NOAA, Corps of Engineers, etcetera. We're based on the East Coast. I'm in the southern outer banks. As part of the larger NV5 geospatial I'm helping integrate the vessel based fleet services with Lidar. Great to be here. Thank you very much.

>> BENJAMIN EVANS: Thank you, Sloan. Kim Holtz?

>> KIMBERLEY HOLTZ: Hi I'm the Director of surveys for the Port of Long Beach. I'm a professional land surveyor and geologist. And my expertise is in gee Odyssey. I've worked closely with the California spatial reference center and our coordinate system. I am very excited to be on this committee and start working with you guys. Thank you.

>> CAROLYN KURTZ: Good morning from Tampa. And I have been a Tampa Bay pilot for the past twenty eight years. Recently retired but not not working. Still doing lots of things. Big fan of NOAA. And very enthusiastic user of all the ports products. And really looking forward to participating on the committee. So thank you for having me.

>> BENJAMIN EVANS: Thank you. Rebecca?

>> REBECCA QUINTAL: Hello everyone. Rebecca Quintal. I'm with sea corps coming to you from Rhode Island. I also have a background in geology which led me to geological oceanography which led me to ocean mapping. I've spent the vast majority of my career supporting NOAA's mission, the oceanographic office and the Army Corps of Engineers dealing with safety navigation products. Thank you.

>> BENJAMIN EVANS: And I just have to say once again I'm incredibly impressed by the quality and experience and expertise of these new panel members as I am with all of our panel members. I am deeply appreciative these folks have taken the time to provide their expertise and advise us on how hydrographic services. We appreciate your engagement and support of the mission and look forward to learning more with you.

So we have a great meeting planned. And I'm going to jump ahead a little

bit. I look forward to coming back later this afternoon and providing an update on the goings on in coast survey since our last meeting. Along with the other directors. But before we do that, we have a number -- a couple of panels lined up. First we'll hear from a panel of local stakeholders and experts who will share their perspective on the application of NOAA's navigation products and services, the challenges in the region of Southern California, and how we can expand this to meet national requirements. Then later, former HSRP Chair Julie Thomas and Captain Kip Louttit will moderate a panel and discussion on under keel clearance. This is increasingly important particularly in the L.A. Long Beach region as ships continue to grow and every additional inch of draft as thousands of dollars of additional cargo. We'll hear from Darren Wright the navigation Program Manager who will update us on NOAA's next generation products and services. After the director's updates at the end of the program today, tomorrow we'll spend the first part of the morning focused on the concept of adaptive and resilient ports in an era of accelerating climate change. Then we'll have a kick off from Nicole followed by a panel discussion moderated by Nathan Wardwell our Vice Chair. Thursday kicks off with another staff panel discussion on NGS's model rates addressing the geology crisis. And as Brad teased a moment ago he'll be leading that. Then our last major session will be a panel of regional experts on navigation applications of ocean observation and mapping Davis by Julie Thomas. We'll finish our discussion on issue papers, the quality matrix, and drafting the recommendations.

So with that, I'll just turn to a couple last housekeeping items. The HSRP is required by law to meet twice a year. We appreciate the time dedicated to

this and the Chair, Vice Chair and I intend to honor your time and promote collaboration by running the meeting as efficiently as possible. This will ensure adequate time for robust discussion among the panel members and with the guest speakers and comments from the public. I look forward to discussing issues of national importance, recommendation for issue papers, and the members advice for the NOAA Administrator. I encourage all listening to consider making public comments to the HSRP to enhance this dialogue.

Sean, I think next up is a break, but I'm turning it back to you for any last comments.

>> SEAN DUFFY: I will just say well done everybody, and I hope we can enjoy our quick break. Lots of work here. We will slow down a little bit. Enjoy your break and we'll be back shortly. I believe we have fifteen minutes scheduled. And then we'll start with our next panel.

>> BENJAMIN EVANS: We do have fifteen minutes scheduled. I am going to propose we come back at five past the hour. I'll let you guys decide which hour that is. Because we're all in different time zones. Just shy of twenty minutes. Five past the hour.

>> SEAN DUFFY: Excellent audible, sir. Thank you. Break time.

(Short recess)

>> Hello, we're going to return to our agenda in about two minutes. Thank you.

>> BENJAMIN EVANS: Hello again, everyone. Sean, are you available to come back online and we'll get this kicked back off?

>> SEAN DUFFY: Yes, sir, I am. I think we have one change. I believe

we're going to -- Nathan Wardwell, our excellent Vice Chair, the brains and looks of the operation should be able to join us soon and introduce himself. There he is!

>> NATHAN WARDWELL: Hello. Thanks for that introduction, Sean. Brains and looks huh. All right I guess you will be keeping me around. So my name is Nathan Wardwell. I am managing partner of JOA surveys. And I'll keep the introduction short. Passionate about Alaska water levels, vertical bedims and NOAA. So thank you very much and looking forward to today.

>> SEAN DUFFY: Thank you, Nathan. Good to have you.

We're going start our first panel. A local, regional, state, stakeholder and partner perspective opportunities and challenges for NOAA's navigation, observation and positioning programs. I see a lot on the team Mississippi includes our government partners, we rely heavily on them, and I'm sure that's the same everywhere. So we have some of our excellent government partners from California. Mr. Derek Davis, Deputy Chief engineer for the U.S. Army Corps of Engineers in the Port of Long Beach. Captain Ryan Manning, the sector commander from U.S. Coast Guard. Captain John Betz, the chief port pilot of the Los Angeles Pilot Service. Always great to have pilot representatives. I deal with a lot of them on the Mississippi. Then a friend I've known for a long time, Mr. Jim Haussener, Executive Director of California Marine Affairs and Navigation Conference. I've known CMANC a long time. I don't know that I've ever read it all out but just for you, Jim. Another old friend. Kip Louttit, Executive Director of the Marine Exchange for Southern California.

With that, I will turn it over to Rachael Dempsey and move forward and

look forward to the panel.

>> RACHAEL DEMPSEY: Thanks very much, Sean. And I want to say hello again. Glad to actually see you all this time now that I got my technical difficulties out of the way just in time for our panel. Welcome to our panelists today. I'm really looking forward to our discussion here. I will tell you since my time reporting in to NOAA as the nav, ops and positioning DAA, I've had the opportunity to tour a number of different ports. Each port, as you all know, has its own set of challenges. I recently visited Pearl Harbor in Hawaii back in January. And I found it fascinating because the DOT harbors in pearl is in the process of planning for a pier restoration and construction. They're using NOAA data right now on which to base the height at which they're going to build this pier. And they're experiencing some challenges on how to use our data. Because if they build it too high, they build it too low, it's going have negative impacts with reference to projected sea level rise to communities and industries that are immediately North of that area. So I appreciate the fact that they're using our data, and we have some work to do to help them with that interpretation. Because we want to make sure that we help you get it right the first time. So, you know, whether that is considering rising sea levels or extreme weather events, you know, when planning for infrastructure in port, it's important to have that right information.

NOAA and National Ocean Service and the nav, ops and positioning portfolio can provide that foundational data and information that will help you get it right. So since I have not yet had the opportunity to tour L.A. and Long Beach, I'm personally eager to hear about the challenges and concerns these stakeholders are facing. Because we want to be responsive to their needs as

they arise.

So with that, our first panelist is Mr. Derek Davis. I'd like to turn it over to you for your perspective.

>> DEREK DAVIS: Good morning and thank you very much. My name is Derek Davis. I am a Deputy Chief Harbor Engineer in the program management division of the Port of Long Beach. It is my pleasure to present before you today. I apologize for the technical difficulties but the camera is not able to work through our webcam. So I'll go through my presentation.

My talk will address collaboration between the United States Army Corps of Engineers and the Port of Long Beach to construct navigation improvements that will reduce constraints and increase transportation efficiencies. The Port of Long Beach is the nation's second busiest seaport moving more than two hundred billion dollars in goods each year, working together the United States Army Corps of Engineers and the Port of Long Beach completed the Long Beach deep draft navigation improvements feasibility study. The Army Corps and Port of Long Beach have had a long-standing relationship that has developed over the years. Our partnership has not only helped the port to improve navigation within the harbor, it has also helped the port to achieve environmental goals through the removal of contaminants on the ocean floor and the construction of infrastructure to promote clean air as well as the creation of new and leasable land. The port's deepening project has been in the works for many years and is an essential component of the port's master plan. The feasibility study identified improvements in navigation safety and efficiencies for national commerce. These improvements are needed to address some of the existing channel depths and widths that do not meet the

draft requirements of the fleet of vessels that currently call and are expected to call at the Port of Long Beach.

Identified the navigational constraints and inefficiencies. Tied restrictions, weather conditions, light loading where shippers limit the number of containers that are loaded on the vessel at the point of origin, and lightering, which is when liquid bulk vessels unload product to a smaller vessel before entering the port to reduce the vessel's draft. The focus was on improving conditions for current and future container and liquid bulk vessel operations in regards to safety, reliability and waterborne transportation efficiencies. The study recommended widening and deepening portions of the harbor and approaches.

I see we've already moved on to the next slide. Feature to the deep draft navigation study include deepening the Long Beach approach channel from seventy six to eighty feet, easing bins in the main channel by widening the man channel to depth of 76 feet. Constructing an approach channel and turning basin to Pier J south to depth of 55 feet. Deepening portions of the west basin from 50 to 55 feet. Deepening the Pier J south slip and berths to a depth of 55 feet. Performing structural improvements to the Pier J south of break waters. And to be in compliance with the port's green port policy. The study includes the construction of a new electronic dredge sub-station to facilitate electric dredging. Dredge material would be deposited in near shore sites for re-use or federally approved ocean deposit sites. The design vessel for containerized cargo is a triple E generation 4 cargo ship with maximum draft of approximately 52 feet and ability to transport 18,000 to 19,000 twenty foot equivalent units or TEUs. Navigation improvements or container

vessels include deepening the south approach turning basin and slip and deepening the west basin area. The west basin Pier J approach and slip will be dredged to a depth of 55 feet which will provide approximately three feet of under keel clearance or container vessels drafting 52 feet. The design vessel for liquid bulk product is a very large crude carrier for VLCC with maximum draft of approximately 70 feet, length overall of 1,100 feet and tonnage of 325,000. Navigation and improvements for bulk vessels include deepening the main channel, that is the area within the port's harbor, and two mile stretch the approach channel outside the Queen's Gate. The main channel will undergo to a depth of 76 feet and the Long Beach approach channel dredged to 80 feet.

So why 80 feet? Several years ago the Port of Long Beach participated in Charta's pro-tide study along with stakeholders and learned that pitch and roll has been experienced of vessels into the Queen's Gate from the Long Beach approach. For a 1100-foot long oil tanker one degree of pitch results in approximately increase of 9.6 feet in draft. If the oil tanker is drafting 65 feet and the water depth is 76 feet this leaves only approximately 1.4 feet of under keel clearance for the tankers. During the feasibility phase port pilots went to the marine lab at the Army Corps' Engineer, Research and Development Center in Mississippi to simulate navigating oil tankers into the port's harbor. For the simulation, the marine lab was modeled to match the geometry of the port's harbor. The simulation determined that smoothing out the sharp edges along the existing main channel is needed to facilitate safe navigation of the very large crude carriers calling it the port. The port pilots will return to the engineer research and design center to refine the proposed

channel geometry. Potential benefits include Operational reduced lightering of liquid boat vessels, results in increase transportation efficiencies which reduce transportation costs, safety. There is enhanced safety with improved ability for vessels to maneuver and environmental improving navigational efficiencies reduces the emissions of air pollutants and greenhouse gases by facilitating the newest and cleanest vessels calling it the port fully loaded. Less time waiting for tides means less idling not alongside a berth which could help reduce air emissions. As an economic end environment benefit there's an opportunity for beneficial reuse of the dredge material and port landfills. Where are we today? Approval occurred on October 14, 2021. The record of decision signed on July 6, 2022. The board of harbor commissioners approved the environmental impact report on September 12th, 2022. The project was included in the water resources development act of 2022 and was signed by the President. And on March 27, 2023, the board of harbor commissioners approved the design agreement with the department of the Army for the pre-construction, engineering and design phase and authorized funding for the port's class year. The design phase is expected to take two years to complete. The deep draft navigation improvement project will widen and deepen portions of the port's harbor and approaches and is expected to generate approximately 7.4 million cubic yards of dredge sediment. The current estimate costs cost shore between the corps and the port is approximately $200 million. Construction of the deep draft navigation project is forecasted to start in 2028 and expected to take three years to complete. Consistent with the Army Corps' focus and directive for beneficial reuse of dredge sediment the project will identify opportunities for use of the

material. There are three opportunities currently in consideration for beneficial reuse. First there's an opportunity to place approximately 2.5 of the 7.4 million cubic yards of the material dredged for the deep draft navigation improvements project into the pier G south slip. The pier G south slip provides a disposal site within the harbor for potential unsuitable material and provides for the construction of a new port landfill. Work to construct the containment site is forecasted this begin later this year. If the quality of the sediment meets the required criteria, the port and Army Corps will evaluate beneficial reuse of material for beach nourishment here in Long Beach. Also there is a potential opportunity for beneficial reuse for construction of the proposed pure wind facility. Dredging for this facility may start in 2027 and is being evaluated and the EIR is under development.

So thank you very much that concludes my presentation. And thank you for your attention. I'm happy to address any questions that you may have.

>> RACHAEL DEMPSEY: Thanks for that. I think we're going to hold our questions to the end. But really informative information regarding your plans for Long Beach. Thank you very much.

Next we're going to go over to Captain Ryan Manning at Coast Guard sector. Captain, Manning?

>> RYAN MANNING: Thanks so much. We definitely will look forward to giving it to you when you are able to get a trip out here to San Pedro. Would have liked to have shown you all around the port area. It's a great place to serve. And I'm privileged to be able to be the second commander here in Los Angeles Long Beach. Thanks to the HSRP and NOAA leadership for extending the invitation for me to be able to speak to your group. As a past

DFO for FACA I know the input you get from those members is extremely valuable so thanks to everybody for their service in this committee.

So here in sector Los Angeles-Long Beach we've got a crew of about 550 active duty, reserve and civilians. We employ volunteer workforce of about 750 Coast Guard Auxiliarist. In addition to the sector personnel here we have four hundred 450-foot fast cutters. Three small boat stations staged along the coast. A navigation team. Marine safety detachment. And team of vessel traffic specialists that are going to be here. Kip Louttit is going to speak later today in many other things here throughout your panel and you will hear about the services that they offer here in the port area. So all these personnel and resources are gainfully employed in our area of responsibility that spans about 350 miles of coastline, three commercial ports, countless harbors, and out to hundred nautical miles of open ocean. I'm responsible for wearing five different federal authority hats so to speak in my role. The first one being the Captain of the port probably the one I am using most often on a day-to-day basis that authority extended to me as Captain of the port. The other four include the federal maritime security coordinator. That's the one that is depicted as the police officer hat there. I would say that came about as part of the after post-9/11. I co-Chair that committee with a partner from the FBI. The federal on scene coordinator which is depicted by the firefighter's helmet there is really our role as the lead federal agency by the national contingency plan as the oil spill response organization for the coastal region. Whereas the EPA has the inland areas. The OCMI, the officer in charge for marine inspections, that's depicted there by the hard hat. That's rather than inspecting buildings on land we've got inspectors of ships.

Whether it's the container ships down to the forty-five foot passenger vessel that we do inspections on. The last one is the search and rescue mission coordinator. Just consider us the 9/11 of the sea as we take calls for folks in need.

So actively participate in ten of the Coast Guard missionaries. And these include, you know, search and rescue, counter drug, migrant interdiction, safety inspections and much more. There's only one of the Coast Guard statutory missions we don't do. And had he had this in person I would have thrown a command coin out to the person that could tell me which we don't do. I'll give you a hint. I think we had a late carrier association member on this panel. As you know it doesn't really get below freezing here in Southern California so the ice breaking mission has yet to appear in Southern California. I'm hoping it never does. We can roll on to the next slide.

So as is apparent from our previous slides we and our port partners here in Los Angeles-Long Beach are responsibility for the safety and security of a very large complex and ever changing complex. We provided summary statistics for the port complex here in Los Angeles and Long Beach. Primarily dealing with the container focus. If you would have had the opportunity to travel here to San Pedro it would have been undeniable when you drove into the port complex and started seeing the stacks of containers sitting around you knew this really is a very massive computer port complex. But it's not the only type of cargo that happens here. We also have lots of cruise ships arriving in both the part of L.A. and Port of Long Beach. Patrolling the chemical tankers, auto carriers is commercial fishing and countless other commercial entities here locally. So layer in the recreational boaters,

swimmers, countless other waterways users, and it further as to the complexity of our marine transportation system.

So not only is the traditional water way usage increasing in scope and complexity but we're coordinating major events. The first picture is Sail Grand Prix and brought national attention to Los Angeles for a multi-day sailing race for the first time this past summer. I imagine that's probably going to be coming back given the success they had. Fleet week brings attention annually. Then the Pacific air show is the largest in the United States. It just restarted again off the coast of Huntington Beach after hiatus due to COVID. The biggest event in four years, which will be here before we know it, is the summer Olympics are hosted in L.A. in 2028. Certain there will be lots of on air activities, as well as close to the waterway activities that we'll be coordinating with all of our partners on. So you can also find the latest and greatest in technical use. SpaceX launches out of Vandenberg which is three or four hours from here. And other space flight commercial companies are continuing usage in the port area here as well. We've got mariculture products to look to produce sustainable food products. The picture on the left is a fully operated container -- automated container terminal over in the Port of Long Beach where Derek just gave you a brief about. And, you know, that terminal if operated at full capacity has the throughput that would rank it as the sixth largest container port in North America. The terminal itself. It's eighteen ship to shore container cranes. So quite the marvel and amazing to see that operation run.

So all these events and technological events create opportunities. They also require increased care, coordination and facilitation with our port partners

which brings me to the next slide.

So although I've got a huge team here at the Coast Guard I'm thankful for the federal, state, local and private industry stakeholders and partners that we have. We've got great partnerships. And some of them may be called out by statute and policy as well. We have the area committee that we Chair that was established by the oil pollution act of 1990 that is in a role as I was telling you about oil response. EPA is lead on the inland areas. The maritime security committee that I mentioned being a Co-Chair with the Federal Bureau of Investigation on as well as a committee you will hear are about in the next panel, the Long Beach Harbor Safety Committee. Which helps us have a, I would say safe waterway around this area. So I'm not going to steal any of John's thunder. He is a great chair on that committee. I'm glad that I have the opportunity to work with him and sure I'll be seeing him in a couple weeks with some of you I think at the national Harbor Safety Committee. So that will be an interesting event.

Another couple partnerships that we have here is there's one called the regional coordinating mechanism which helps us get after some of the cross-border smuggling issues we're dealing with as well as a number of search and rescue missions. For federal partners just even within the Department of Homeland Security primarily dealing with Customs and Border Protection, Homeland Security Investigations, TSA, Secret Service, FEMA. We work with the FBI, DOD partners. I will highlight the most -- in this panel anyway the most important federal panel we have is NOAA. And then the last of the federal partners that we deal with frequently especially we did during COVID and really any pandemic that's happening throughout the world as we

get international sea fares and ships arriving here into the port area is Center For Disease Control. So definitely an important partner. For the state agencies we deal with, you know, California Highway Patrol, the California National Guard, Department of Fish and Wildlife and organization within that is the Office of Spill Prevention and Response that we deal with quite frequently. California Office of Emergency Services and the State Lands Commission. Then kind of local entities that we're dealing with. As you can imagine huge components of both L.A. and Long Beach police and fire, you know, the port authorities. One of the ports I didn't mention in the previous slide is the Port of Hueneme which is a couple hours North of here and a unique port that is a naval port and a commercial port kind of all in one. And it's kind of a unique presence for the Navy. It really is the only, you know, between San Diego and Washington State the only place where you have a Navy presence. So it's a unique port up there. Then obviously the Sheriff's Departments, public health, bay watch, and city emergency managers. I think the joke is if you are in my position at the end of your assignment of two or three years that you are here, if you've met all of the partners that we work with you succeeded. And hopefully it's always in a positive environment and not a you're responding to a casualty or emergency of some sort. So the idea is that we meet those folks before we're in that type of environment. But we have great partnerships through and through. So it's fantastic.

If we can go to the next slide. So speaking of all those partnerships without the partnership with our NOAA colleagues as well as the products and services that NOAA provides our mission to keep, life, property and environment safe and secure in our area of responsibility would be all but

impossible. The navigation chart products provided are constantly in use with our sector command center that's running our search and missing operations. Our emergency management as well as the water management divisions are using those products for marine planning and permitting processes. And then obviously those, you know, cutters and patrol boats that I spoke about are using the NOAA products every day in their missions. So something else to talk about would be kind of these recent heavy weather events we've been seeing increasingly in Southern California to include, you know, the first hurricane since I think 1939 last August when Hurricane Hillary made its way up the coast. So we have a port coordination team, which is another partner and stakeholder committee that we chair, that's used episodically for events receive daily weather briefings from NOAA. It really shapes the way that we're responding to that weather incident that came up the coast. And then the last thing is we've got, and I'm sure that Captain Kip Louttit is going to talking about this in some sense or fashion, is in anchorage regulation in the works for the, basically the anchorages outside the harbor. As you heard Derek discuss the ships we're getting here in the last ten, twenty years have greatly increased in size requiring not only larger depths as we talked about in the dredging projects but also larger watch circles in the anchorages. We want fit the amount of ships we have designated for those ships to anchor. So it's sure it's something we will be using NOAA and they've been engaged on the project. I'm sure they've provided input and will be helping us as we move forward, you know, given the new charts that will be, you know, established based on that rulemaking.

I think we can roll to the next one. I'll just kind of close out with saying,

you know, the partnership of our port partners and specifically NOAA's support and services, the Coast Guard's, we wouldn't be able to do our job without it. So just thanks again for HSRP and NOAA for having us be part of this. Would have really liked to see you all in person but we'll catch you the next time you are out here. That's all I got. Thanks so much!

>> RACHAEL DEMPSEY: Thanks, Captain Manning. Greatly appreciated. You know, I have a lot of sympathetic feelings when it comes to the heavy weather that rolled up the coast last fall having almost gone through it. And I know that we, the San Diego community, is not always prepared for that kind of weather. Unless we want to use it to find out where the leaks are in our roofs. That's how we normally figure that out at that time right. But I think we are going to get to see each other here at the end of March at the Harbor Safety Committee meeting so I look forward to seeing you there. Thanks.

All right, so next I want to go over to Captain Betz. Sir, over to you.

>> JOHN BETZ: Thank you, Rachael. My name is John Betz. I want to thank you, Rachael, and Sean for inviting me to serve on this panel. I guess I qualify as a local stakeholder. I am a chief port pilot with the Los Angeles Pilot Service. I'm the Chair of the L.A.-Long Beach Harbor Safety Committee. Today I am going to talk about the Port of Los Angeles and our pilot service and our port partners such as NOAA and how they help us operate more efficiently while maintaining our safety standards.

First I'm going to talk about something near and dear to my heart which is the Los Angeles Pilot Service. We're founded in 1907. Services a team a thirty dedicated professionals, pilots, dispatchers, deck hands, boat crew. Our mission is to move vessels safely and efficiently in the Port of

Los Angeles. Service works around the clock piloting roughly four thousand arriving and departing vessels per year. NOAA is a big contributor towards us being able to accomplish your mission of moving these vessels safely and efficiently. People ask what we do, you know, nobody know what's pilots do, I tell them I valet parking lots attendants on the water. Puts everything in perspective.

Port of Los Angeles as Captain Manning said is the seventeenth largest container port in the world. Hardly anybody that lives here in Southern California really knows that. A more interesting fact is when we combine with Long Beach, because we're really just one complex, we're the tenth largest container port complex in the world. The only ones that are bigger are in Asia. The Port of Los Angeles, we're the primary gateway for international commerce and business in the Western Hemisphere. We feature passenger and cargo terminals including crews, container, dry and liquid bulk. We manage billions of dollars of cargo each year.

Our top dollar volume varies. It's upward of $400 billion annually in total cargo moved through the port. Our biggest trading partners are China and Japan, Vietnam, Taiwan and South Korea. Breaks down to the dollars amounts there. I think that's from 2022. Roughly forty-three percent of our throughput is from China. Twelve percent from China. Ten percent from Vietnam. And about six and five percent from Taiwan and South Korea respectively.

Benjamin Franklin. We'll talk about the Ben Franklin. It was representative of what people have been talking about -- bigger ships and bigger ports. As Captain Manning said, the trend over the last decade is towards bigger and

bigger container ships. And this is a picture of the Ben Franklin alongside the AP Mueller terminal in L.A. harbor. This picture was taken in 2015. The Ben Franklin is 400 meters long, which is 1,300 feet. It's longer than the empire state building is taller and wider than the largest aircraft carrier the Navy has. When it came to Los Angeles it was the largest vessel to call any port in the Americas. It's 18 TEU. Twenty foot equivalent units. Which is twenty foot containers. Now it's getting almost a little small. We're up in the -- over 20,000 TEU as far as container ships. The same length a little wider. But the capacity keeps going up and up as they find more convenient ways to store containers on deck. And so why bigger? I mean the carriers, they want to realize scale economies. They want to maximize capacity and minimize slot costs. The end results is better efficiency. That's what supply chain economics is all about -- moving things more efficiently at less cost. These ships have typically been designed to maximize capacity. You can see on this ship here the house, if you can see it in the picture, it's been moved forward. The reason for that is so they can stack containers ten high behind the house on deck without obstructing visibility from the wheelhouse. With older ships, the more you stack containers higher on deck to maintain visibility you have to taper the stack. And that meant you had to keep pushing the wheelhouse up. Of course then you couldn't fit under the bridges. So this is the smart way to maximize your deck load without increasing your height and maintaining visibility. But when these ships keep getting bigger they start creating issues with infrastructure and navigation. Some of the structure issues are water depth, crane height, fendering capacity at the berths, and of course waterway dimensions. Some of the navigation issues are sail area.

The bigger the ships get the more sail area they have, the more the wind acts on them, the more wind force we have then the more tugboats we need to safely manage them. Also restricted visibility. Whenever we say "restricted visibility" people think we're talking about fog. We are, but we're starting to encounter restricted visibility just from the design of these vessels. Because the container stacks are so high, from the station you can't even see the waterway anymore. And that's another form of restricted visibility, is being able to visually see the waterway is one way pilots can ascertain where the ship is in that waterway. So that's a problem in and of itself.

So when thinking about solutions to these issues we got to keep in perspective what our overarching objectives are. We want to be busy. We want to run a clean operation. I mean environmentally clean. And we want to above all maintain safety. Busy, clean and safe, which leads to safely efficient operations. Next slide.

I'm going to talk about clean first. The biggest thing with clean, when we talk about clean is clean air. Clean air is a huge issue in California. Towards that end, the ports implemented programs to reduce pollution from ship's exhaust. A lot of you have heard about the AMP program. It's an acronym for Alternative Marine Power. It is a system where ships when they come in to dock plug into a shore connection and that allows them to basically access the shore power grid. And they can shut down onboard power generation equipment which is typically much dirtier and rely on the grid. That way the ship sits idle at the dock, pulling power off of the shore grid emitting -- basically it has no exhaust into the air. It is a good system. But one of the problems -- there are couple problems with it. One, it requires a

tremendous retrofit on a ship. Some ships have to spend upward of a million-and-a-half dollars to retrofit their systems aboard so that they have the capability of plugging into the shore grid. That's a lot of money. I mean if you are in liner operations, you got twenty years of running the L.A. and Long Beach you can justify that expense. But if you are a tramp a system might come once in a while, a tramp carrier is what they call it, it's hard to justify that capital outlay just to plug into L.A. Some other problems with the AMP program is it relies on the shore grid. And that can overtax the shore grid which is already overtaxed with all of our home air conditioning use in the summertime. So that's another issue. But it is a good system and it does contribute tremendously to clean air. In fact I'm looking out my window and I can see the mountains. Which twenty years ago was a rarity in Los Angeles so we are making progress.

Another system is the one pictured here. They have a different acronym. They call it AMAX which is alternative exhaust capture system. It is a different approach. Instead of shutting down the ship's power generation equipment and rely on shore grid a barge comes alongside with processing equipment aboard it that basically has this big arm that reaches up to the staff and vacuums the exhaust out. As exhaust is emitted it captures it, pulls it down on the barge and processes it. Some advantages to that. It allows the ship to just continue using its own equipment. You don't have the problem of having to stop and transfer over to the shore grid. It's also a little quicker to connect than trying to connect to shore power. So we anticipate we're going to be seeing more and more of these barges in L.A.-Long Beach.

Another part of operating little cleaner is Electric Yard Automation. Which

goes hand in hand with, excuse me -- which goes hand in hand with automation. As they switch over to automated yards, electrification eliminates a lot of the fuel-driven yard equipment. So we realize some clean air objectives that way. Trapac terminal in L.A. is fully automated. Same thing with the terminal in L.A. harbor.

Next slide please. So how do we address these navigation issues? Here is a picture of the FIB going up the main channels. It gets to the point where you can't see the water anymore. The port spent years making infrastructure improvements in anticipation of these very large container vessels. They've dredged, made deeper water. They brought in bigger cranes. They've updated the (inaudible). But what do we do about the waterways? I mean the waterways are the waterways. What do you do about the increased sail area of the ship and increased windage that we have on these bigger, larger vessels. And what do we do about large ships meeting in these narrow channels? That's another issue. You know, do you want to go to one-way traffic or do we have to develop ways that we can actually meet inside these channels with these bigger ships. For many of these issues we're not able to easily engineer our way to a solution. It requires a different sort of approach. Next slide please.

We need to modify our operating practices. And we'll talk about how we're doing that. But before I do, about ten years ago someone asked me what our ships were just -- when we were just starting to see bigger ships, someone asked if we could take a ship bigger than three hundred meters above the Vincent Thomas bridge in the Port of L.A. And I thought about it and my answer was, we can do it, but we can't do it the way we've been doing it.

We've got to find new ways to do it. Of course now we're taking 365-meter ships above the bridge and someday will be take 400-meter ships above the bridge. But we need to find different ways of doing that. And the operation solutions requires for these bigger ships take contributions from many stakeholders. You can see the U.S. Coast Guard is one of them. Thank you, Captain Manning. Vessel traffic service is another. A lot of the effort comes together in the Harbor Safety Committee where we have a harbor safety plan that addresses best practices. It also builds stakeholder relationships and engagement that provides a forum for discussion. So when we have problems around some of these operational issues the Harbor Safety Committee becomes a good forum for working out solutions. We also have partners like NOAA that can provide a lot of the data that we need to implement some of these best-practice solutions.

So how do we work through this? This is nothing new. Environmental occurrences have always negatively affected navigation. Things such as fog and wind. But with these bigger ships, these negative effects are magnified. What was a small problem is now a big problem. So what do we do when navigating one of these behemoths through a combined waterway and encounter fog? In the past we would decline to enter a fog that was foggy which caused delays and affected efficiency. Risk was elevated, sometimes beyond acceptable levels. So the question becomes, what's the solution to remain safe and efficient?

I see my one minute sign here.

The solution is to create best practices. And we call on the Coast Guard, the Harbor Safety Committee and GTS to do it.

I'm going to go fast. One of the ways that NOAA helps is through our port system where we obtain real-time information about wind and that helps us understand how much force is acting on the vessels and how to effectively mitigate that through using more tug boats and things of that nature. This kind of information is critical for us.

This is a picture, I'm going to zip through this quickly. This is a picture, basically the old school way of piloting where we just use our eyeball. You can see the leading lights, the light from a buoy.

This is the exact same picture using a pilot's carry-on unit which displays navigation information right at the pilot's fingertips. This is the exact same picture. You can see the ship on its user drawn track line entering the Port of Los Angeles. You can see there's a lot more information available here than there was in the previous slide. This is kind of a new way of piloting ships. And when we encounter things like fog or restricted visibility, basically we can just keep operating. We couldn't do that without the information from NOAA.

So when this happens we able to maintain our levels of safety and meet our goals to operate efficiently and couldn't do that without the information provided by partners like NOAA. It is a huge help for us. Thank you, Jeff Ferguson.

Sorry to rush through that but thank you, everyone. I want to thank all of our partners. Thank the Coast Guard and BTS. And thank you, NOAA, particularly for keeping our ports safe and efficient. And I'll be happy to answer any questions later in the program. Thank you.

>> RACHAEL DEMPSEY: Thank you so much, Captain Betz, that

was -- pictures were a thousand words right. You could go through many of us have a great appreciation for exactly you know what you are talking about and hopefully our public audience can reference them as well. You know, these are very descriptive of exactly why we need to put ports wherever our audience and particularly our harbor pilots need them. So thank you very much for that description. Much appreciated.

Okay so our next panelist is Mr. Haussener. Over to you, sir.

>> JIM HAUSSENER: Good morning. Or good afternoon depending on where you are. Thank you, Sean, earlier for the nice comments you made about me. I was looking at my notes and I spoke before this committee in 2008 and then in 2015 and now 2024 and wondering maybe you guys forget what I'm like at each time and then you invite me back. I appreciate the courtesy.

CMANC is a regional port organization here in California that has everybody that has a federal navigation project is a member of. So break waters, dredging from Crescent City to San Diego from San Francisco to Stockton. And California's unique. There is no state port agency. Generally the state does not help fund any of the capital projects. Up until last year the state had a great deal of upon money and provided $1.2 billion to some of the port programs. Maritime trade through California touches all 435 Congressional Districts. As most folks know, California is one of the largest economies. 35 percent of the nation's waterway trade by dollar amount goes through California which creates 4.3 million jobs, generates $30 billion in personal income, and provides federal revenue over $10 billion annually. Last year 21 million TEUs, equivalent containers, went through California. Currently the

ports are investing over a million dollars a day under capital infrastructure. Captain Betz commented about the ships are getting bigger. They're getting bigger faster than the ports expected them to. That's why we're having to do crane raises, raising cranes by seventeen feet, strengthening wharves and some of those. Captain Betz talked about plug-in ships. The ports of Long Beach-Los Angeles for over two decades have been working towards that program even before the IMO developed standards for vessels to do that. We're working towards zero emissions to allow all cargo and passengers to be in a zero-emission framework as well as making sure all the harbor craft are zero-emission as well. You heard Derek earlier stalk about electronic dredging. We're working that way to get to zero for everything that we do. There's a dredge that's permanently down in Santa Barbara one of our members that is electric and plug-in and it dredges twice a year for the Santa Barbara entrance. $17 billion economic, 300,000 industry businesses supporting 45,000 jobs. Our commercial Fishermen land over $200 million of fish per year. And our agriculture production is really grow as well. Over 10 million pounds of oysters annual. And kelp and seaweed is the fastest growing form of agriculture in California. Just going back on Captain Betz's comments. In San Francisco Bay where I am a member of the Harbor Safety Committee as well we have navigation channels that were designed pre-World War II. So you start thinking about how large ships are today versus what they were back in the 30's.

I want to talk about our system, what we call interdependent ports. We have two major deep draft container locations -- San Francisco Bay, the Port of Oakland, then San Pedro Bay, the Ports of Los Angeles and Long Beach.

Large volumes of cargo. Land is valuable. So the cargo owners want to make sure they're getting their bang for the buck which then causes other products and automobiles, agriculture, petroleum, bulk cargo to go elsewhere. So we have port of Hueneme, Redwood City, Richmond, west Sacramento, San Diego and Stockton doing that. Which leaves the smaller guys handling fishery, recreation, maritime support, security, search and rescue and research. We have an integrated transportation system the agriculture system. Fertilizers imported ninety percent of the fertilizer for the central valley comes through the Port of Stockton. We export food and wine through Stockton, west Sacramento and Oakland. Cotton as well. Those sorts of things. And I talked about how it's interdependent. The Port of Hueneme has entered into agreement with the Ventura port district to take on the squid landings. Because land is so valuable. You heard the Captain talk about constrain port with the commercial port and the Navy and as a result there's not enough room. They were looking for places ten miles away to bring automobiles into down there. They're having a great growth. Port of Stockton is another story of great growth. About twenty years ago rough and ready island got transferred from the Navy to the Port of Stockton. They've doubled their throughput. And with a new tenant they got last year they're expecting to double their throughput again. And they will be in the top fifty ports in the United States by end of this decade.

Significant amount of petroleum product is moved by ship and barge. Example is gasoline is moved by barge from San Francisco up to Humboldt bay. One of the things we're looking at here in California is moving away from petroleum products. When we talk to refineries they believe they're

going to be moving the same amount of cargo as they are currently by ship. It's going to be animal feedstock. We have two refineries in San Francisco Bay that have made this transition which is creating a regulatory problem for us as we determine what sort of tug escorts they need and non-port pollution permits they need. One of the things -- one of the other groups I work on for the Harbor Safety Committee is I am Chair of the dredge working group. There's a desire for -- to support more on more channels. NOAA worked with the corps to get the corps to achieve a CATZOC one channel which reduces insurance cost for cargo owners. Some of the owners have been asking the corps and NOAA to see if they can't work on doing that again for some of the other situations. And they will be in the top 50 parts in the United States here by the end of this decade.

Significant amount of petroleum product is being moved by ship and barge. Example is gasoline is moved by barge from San Francisco up to Humboldt Bay. One of the things we're looking at here in California is moving away from pet number products. What we have talked to the refineries, is that they seem -- they believe as they currently on by ship. It is different kind of cargo like animal feedback. We have two that have made that transition which is creating a regulatory problem for us as we determine what sort of dug escort these need and pollution support they need. Those sort of things. One of the things, I work on Harbor Safety Committee and care of dredge working group. There's a desire to support more zone of confidence NOAA worked with the Corps to achieve the CATZOC, and some of the owners have asked the Corps if they can't work on some of the other situations.

Similar to the Port of Long Beach's presentation on last drafting clearance, the same issue takes place entering San Francisco Bay, resulting in some tidal delays for vessels coming in. We have a 50-foot channel and 10-foot swell behind you and that means that ship cannot come in. It has to sit out and wait as we come in. We have had instances. Where a ship has to wait for low tide to come into the bridge and high tide to go into the port. Some of the larger containerships like Captain Betz talks about, can only come in and out of low water. We certainly need to know what is going on instantaneously, especially years we have a lot of water moving and see snow melt going on into July this year. These a crucial thing.

I want to touch a little on off shore wind. Boehm awarded some leases here in California. Offshore wind is -- we're looking to meet the state goals,ing look at 1300 off shore wind towers that are approximately 1100 feet towel and that wide as well. Draft of 50 to 75 feet. Angered by three one-mile long roads attached to 80 to 100 foot anchors, nobody has built these before. This is all speculation to a certain extent but we're certainly moving forward with that.

The state has a goal of 25 gigawatts by 2014 to achieve this. The state said it will require $12 billion in upgrades to existing port infrastructure. We had a recent start with the Biden-Harris Administration where they provided a grant to Humboldt Bay for construction and maintenance of terminal for offshore wind and offshore wind engaged with long teach to the Port of San Francisco. The Port of Long Beach looking at $7 million terminal tied to their program. Port of San Francisco, Richmond looking to be partners. Port of

Los Angeles. Crescent City harbor industries and small hash bores, what is their role going to be as they do that.

California is looking at more leases than what Boehm has, and will probably require more dredging, places like Humboldt Bay, a few years ago, the Corps contractor was not able to dredge Humboldt Bay, and ships could not get into Humboldt Bay because of the breaking system. We had coastal harbors, I remember stopping in one time to sneak in and have dinner. They closed the harbor while I was in there and three days later they finally let me out.

We're going to have major spatial issues in the maritime as we move forward. The state has system and marine protected areas, 17 percent of state waters currently and pursuing a conservation goal of 30 by 30 which include state watt IRS and will include more no fishing zones we assume. The military has extensive use for coastal waters, there's agriculture, commercial and recreation fish, eco-touring including whale watching, native and cultural offices, offshore wind and kinetic energy as back door traffic. It's a crowded ocean.

I'm a recreational boater and cruised on my own boat on all four coasts of the United States. Eight years ago I counted on the value of pocket charts and how I carry one on sea bag when I go out. Now we're going to electronic. I found there's a steep learning curve. A take a lot of folks out sailing, you can drive the boat or look at electronic, you can't do both. Generally folks can't keep steer when doing something else and can't keep a proper lookout. I want to applaud the navigation chart and paper charts that's a great step to educate recreational boaters as we move.

The thing I talked about was centralized data depository for depth date it. I'm glad to see NOAA starting to embrace the concept of crowd-sourced data for depths and that sort of stuff. We have recreational areas in San Francisco Bay, and other places that don't get surveyed because there's not enough time, not enough equipment, but we were able to start getting some crowd-sourced data from some navigation companies and others. We might be able to provide that to somewhere, it will be interesting to see if we can't figure out a way to capture some of that and provide it to the public to collect, process, use and share the data.

I also want to give a plug for high frequency radar, we're going to be expecting changes to upwelling and surface current was the offshore wind and certain letter need to know more about what's going on in HF and what the surface currents are especially for slower boats doing 6 or 8 knots. California is different, we have harbors of refuge, if you can wall that them because of braking bars. I know we can't do it the private sector. Having radar, surface winds in someone spot. Making it pretty nice. The picture Captain Betz had was pretty nice.

Coastal buoy network, West Coast is much different than East Coast. Talking to a Captain stuck in Puget sound,ing ask my at vice how to get down the coast because every time the campaign wanted to leave it was good here and bad there. Didn't have the legs to make it down. We rely on the coastal buoy network. Right now we have numerous buoys on the Pacific coast that are down and TBD if in terms of when we get them repaired. I'm a firm believer knowing what swell height is and what the period between as well as in order to make a decision whether we go or not go.

Sediment, sediment has always been one of my biggest issues. Dredges is part of sediment. But from a larger perspective, I encourage the panel to be more aggressive in stating there's other beneficiaries than your height or graphic survey, Jeff Ferguson had done work with NOAA a couple years ago in north San Francisco Bay. California has an eroding coast line. You have other speakers that will speak on that tomorrow. That but our knowledge of sediment transport especially fine grade sediments is willfully lacking. Similarly, I mentioned there's a need for better understanding of upwellings, they are probably going to change as all of this floating offshore wind goes into. Which create highly productive biological areas and how to replicate them.

NOAA helped fund something called the multi decadal sediment program called seamless, which supports decision related to resilience planning and coastal management, estimating future sediments and dredging within sediment. You did this for new port bay, and it would be nice to expand that for other places. We have an awful lot of the places in California where the natural environment is going to sink. It's not going to get enough sediment and as a result wetlands go under water. We need to protect them. We also have communities of lower income than others, and they don't have any way to get out of the way or retreat and we need to do something and sediment is what we're going to need in order to protect both the natural and built infrastructure as we move forward. So, anything you can do to help will be greatly appreciated.

Thank you for your time.

>> Hi, Rachael. You're muted.

>> JOHN BETZ: I got your last second. Nope?

>> RACHAEL DEMPSEY: Okay, there we go. Can you hear me now?

>> JOHN BETZ: Yes.

>> RACHAEL DEMPSEY: My apologies, something is going wonky. My sound is not working properly. My apology, Jim I took a ton of notes and ran out of room on my note paper. I want to say thank you for mentioning the equity piece because that is certainly something that we have been looking at on how we can make those considerations for our partners in the communities that we work with. So, thank you very much for that.

I also appreciate you mentioning the Port of Stockton. Shortly after I arrived last year I had an opportunity to go up there after the previous year's snow and snow melt that transported all of that sediment and cut off the Port of Stockton for some ships. Yeah, definitely a huge concern. Not necessarily something that everybody that deal was the maritime industry thinks about, you know, those upstream, so to speak, effects on how that is going to impact the shipping and timing, and when you get stuck in port, and how quickly you can get a dredge there. So, I appreciate very much you bringing that up.

Okay, so, with that, let's move ahead to Captain Louttit. Captain Louttit. Over to you, sir. Thank you.

>> KIP LOUTTIT: Good morning, Administrator Dempsey and members of the HSRP. I'm here with Julie Thomas and Captain McCloskey, and Jeff Ferguson, here at our beautiful building on a hill. And I'm not going to talk much about the marine exchange itself, because I've got some fabulous other input from other partners.

Next slide, please. So, you saw this picture before, but I quickly wanted to point out in the lower left hand corner of the satellite image is where the marine exchange is. It is right where you should have been, where this meeting was in person. But I'll also point out just the blue line that I drew down the middle of the slide, Los Angeles on the left to the west, Long Beach to the each on the right, and so while the two ports are side by side, it is important, the old memory, you've seen one part, you've seen one port. There are differences even though they are side by side and connected.

With that, next slide, please. So, this was the input that I got when I said, hey, I've got to brief the HSRP and does anybody have any input. So, I got input from the Battleship Iowa museum, Los Angeles Pilot Service, Chevron offshore marine terminal El Segundo. Jacobsen Pilot Service and Los Angeles Port Police. Captain McCloskey is with me here today. Next slide, please.

Captain manning mentioned the fact that the ships were getting bigger, and that we're going to have a -- or, there's a project in progress now, to expand the Anchorages. So, the image on the left is the current configuration of Anchorages, the circles on the chart and because we now have ships that are 400 meters long in Anchorages, which are 600 yard radius, that doesn't allow enough space between the ships. If you see the ones shaded purple, that's what we're calling the checkerboard. So with the commission of the Coast Guard and Harbor Safety Committee we're not using purple Anchorages. We're spacing the ships out by using only half of the anchor arches. And the image on the right is from a survey done in 2013 of the anchorages, thank you, Fairweather and Ranier for coming back. We

need to know where the bottom is, so you thank you, NOAA for that. Next slide, please.

So, the next two slides go together and my talking point is, thank you, NOAA, for having electronic charts that could input into a variety of different geographic information systems. So, in this case, it is the Kongsberg system that we use for the vessel traffic service. The image here was in the height of the backup. You can see the blob of white in the upper right hand corner, that's the 55 anchored ships at the time and all of the circles were 62 drifting ship, so, a total of 114 was the maximum that we had under our care, and, thank you, NOAA for having accurate chart that can plus into a Norwegian system that we could keep everybody safe.

Next slide, please. So, here's another image, again, with NOAA's electronic charts plugging into what's called the pacific tracking 2.0 system. It is primarily used by the marine exchange of Alaska, but in this case, the audience we needed for this image, we needed depths turned on, so it is basically the same thing you saw before but into a different geographic information system, so, my just requested NOAA, my recommendation to NOAA, as you move forward, make sure that all of your electronic systems can be integrated into a variety of different geographic information systems.

With that, next slide. So, this was input that I got from the Battleship Iowa, which is here in the main channel, and the -- thank NOAA from the information that they have already in terms of tide, but what the Battleship Iowa needs is improving the current surge measurements in the bay and channel. The surge back and for impacts the mooring system they have for this 1900-foot World War II battleship. So, I'll leave that to NOAA, if you can

do anything about that but that's the input we got from the museum ship. Next slide, please.

So, Captain Betz Mr. Spoke, so, I won't spend much time on this slide. I'll just go down to the bottom where it says a happy pilot, and I'll point out in the image, the picture on the right, this is actually Captain Strong of Jacobsen Pilot Service I was riding with. That's the example of the portable piloting unit Captain Betz mentioned which is brought aboard by the pilots to help con these huge ships in fog and what not. Basically what Captain Betz said, he's happy what NOAA gives for the Pilot Service.

Next slide, please. So, this was an interesting one where you can see the circle up the coast from the ports of Los Angeles and Long Beach, is the Chevron offshore marine terminal in El Segundo. The bow ties to anchors the stern ties to buoys and there's a flexible pipe that goes ashore. So, Mr. Sedla is sailing they are getting what they need in terms of tides and underground clearance in the terminal up in El Segundo. It's interesting he said charts are considered antique, NOAA should show distinctions between the use of terms and functionality of ICDIS or ENC with regard to safety of navigation. I thought it was an interesting comment you can do with what you want.

Next slide, please. So, next half a dozen slides go together and I got them from Jacobsen Pilot Service. Captain Betz mentioned when Ben Franklin arrived in 2017 was the biggest ship that came into port. Then eclipsed by a ship that came in in 2020.

Next slide, please. So, I thought it was important here to show just how tight the town are. It may look like there's lots of water for the image to

float in. The image you see on the right is when the pilot put in the depth of the water, you can see how close the shoal is to the bottom of the ship and see how close the rock dike is to the stern of the ship and how the pilot can get the ship into the berth with the tight tolerances using the NOAA charts. Thank you for the accuracy of those. Next slide, please.

So, Captain Betz briefly covered the visibility issue, and I'm going just touch on that one more time. So, here's a big container ship with a house forward where you can see the arrow and smock stack back aft. This is what they've done with the bigger ships so you can see over the bow.

Next slide, please. In the image on the right you can see what the pilot is actually able to see when they are looking aft. So you can see the smokestack sticking up. There's this huge away of container, image on the right with the ship going into the Long Beach container terminal. This may be the newest contain her terminal optimized for these ships. Notice on the port side, where there's a tugboat circled and starboard how close it is to adjacent ship. These moves can only be done because we have accurate NOAA charts and equipment to display it. Next slide, please.

So, here's a tanker going into the Port of Long Beach inner harbor, again, the picture on the right makes it look like there's lots of water on either side of the ship but image on the left from the PPU you can see how tight the tolerance is between the ship, shoal and water deep enough to float the ship.

Next slide, please. Next half a dozen slide go together. These from Captain McCloskey of the Port Police, what aim going to do here, up to now we've been talking about latitude and longitudinal and ships moving horizontally on the surface of the water, what Captain McCloskey and I

encourage you to read the slides with all of the word, what they are often doing under the water to conduct proper port operations in the Port of Los Angeles.

The last bullet is also interesting regarding datum, when landing survey markers are moving as they are in the area. Who and how decides here to move the survey markers to say where things are, or shift to GPS, I thought that was interesting input from the Port Police. Next slide, please.

So, this was the case during the backup where you can see in the image where it says lost anchor, a ship pulled up with anchor one day, and said, the anchor was missing and had been left on the bottom. The chain broke. Unfortunately, this is one of our prized Anchorage, and you can see the image where we colored it red when the anchor was still in the Anchorage and on the bottom, and unfortunately it was prized Anchorage. Thank you for the Port Police to have the right underwater robot to go out and find the anchor and then have the sensitivity to know where it was latitude and longitudinal, plus the height off the bottom gave that information to Mr. Ferguson, thank you, Jeff, who was able to put it on the chart and working with the Coast Guard, you can see the image on the right, with the green circles where it said lost anchor obstruction, we moved Anchorage to the anchor left on the bottom is outside of the circle and we can get that Anchorage back so we can use it for the ships waiting off Los Angeles and Long Beach for a berth.

So, anyone, here the fact that the chart was able to be used by the Port Police and you say their success working off common charts, depth, tide and weather data, and you hear that theme through the next couple of slide.

Next slide, please. So, Captain manning mentioned sail at grant Grand Prix these are 50 knot catamarans that go around the world. This is the first time they have ever come to Los Angeles in 2023 in July. So, next slide, please.

One of the challenges is they want this to be a spectator sport, so you can see on the left side where the little blue box where I put grand stand, so, originally this is where they were planning to have the sail boat races so you could have a good spectator sport, but -- next slide, please -- the problem is, if you look at the chart, and I know it is kind of hard to see, but there's a rock dike right where they were thinking of having 12-foot draft catamarans when they are not foiling off the water. They were able to use the chart and reorient where they put the race course and maybe it in a safer place.

The other thing was interesting, there are day boards you see in the picture I which is to be an aid to navigate to show the mariners where the rock dike is but you can see with the yellow arrow on the right people whack into them. That's why they had to move the race course because the aids to navigation would be a hazard of navigation to the racers.

Next slide, please. So, another big challenge you have high speed racing in a busy commercial waterway, when they were having the races they didn't want to disturb everything else going on. The event control was bifurcated as it said between Los Angeles and London. But the action taken was essential barge and draft traffic was taken out of the channel and slightly altered the large ship schedules and working off common chart, depth, tide and weather data.

So, next slide, please. Next two slide go together. This was a case, unfortunately of a mid-airplane crash in 2016 where you can see the big arrow where it says 1, reporting source fishing boat, that fishing boat reported to us, reported to Coast Guard we saw a plane crash in the water where you see first plane crash. First responders went out to try to get the plane and people off the bottom. There was loss of life. But we didn't know at the time, because nobody saw the mid-air collision and nobody saw the second plane go in the water until Torrence Airport called saying they are missing a plane. Then we knee there was a second plane because nobody saw it go in the water. Several days the Port Police and others mowed the lawn looking for the plane on the bottom.

What my vessel traffic people did was say we saw the first plane go into the water because of the reporting source, actually the radar was sensitive enough to see the splash. They looked around and found someplace elsewhere they had the green image, which was radar showing the splash, they said look here and Port Police was able to find the plane on the bottom of the ocean. Again, because of latitude and longitudinal and accurate chart they were able to do that.

So next slide, please. Here you can again see the images of the two planes on the bottom from the Port Police's equipment and latitude and language toot of the two planes on the chart so they could recover them with proper equipment. Again with success due to working off common charts, depth, tide and weather data.

So, just two more slides for me. Next slide, please. So, this being an important outload port for the Navy, one of the things that happens

periodically, is the Navy coming up to do mind sweeping exercises, so, after it chart was objects on the bottom help the Navy and Port Police determine what is new, so, by mapping everything every now and then, they can determine what's down there today, for example, refrigerator, a 55-gallon drum or sunken boat, they come back, they can know what is saves time checking what is new rather than checking what is old.

Next slide, please. This is a tragic case you may have heard about with the dive boat Conception which experienced a fire and loss of life in 2019. There's a couple point. One is this is 80 miles from where the Port Police normally does business, they took their dive boat up there. Had the proper equipment and selected after the vessel sank to do the survey of the bottom and find where the debris field is. They were working with multiple partners in unfamiliar waters, but the Port Police remotely operated vehicle was able to map the location and debris field so you can see the image on the right in Platts Harbor going back and forth with the mow the lawn analogy, they were able to work with multiple partners in unfamiliar waters, due to common char, able to integrate with different navigation systems, depth, tide and weather data, and next slide, please.

So, just in closing, in the Port of L.A. and Long Beach, the challenges on the huge ships getting bigger as mentioned before, deep truck tankers at 69 feet, we'll talk about this afternoon, narrow channel, tight schedule, bad weather, everybody working together. The image on the left is the Port of L.A. and Long Beach on a busy typical morning and we talked about before, we have the high sided container ships mixed with the deep draft tankers

and vessel traffic surface, record of success for 800,000 safe transits in actually 30 years as of last week of operations.

That's all, and I'm ready for your questions.

>> RACHAEL DEMPSEY: All right. Many thanks, Captain Louttit. That's a fantastic brief and really comprehensive, when talking about, you know, all of the other issues that L.A. Long Beach is managing external and in addition to the major shipping coming into the port. So, we really appreciate that perspective.

Now, it is time, I want to open this up for questions. I would ask a little bit of Hughes keeping here just briefly, that if you have a question, please come up online for our panelist, and I'll go ahead and call on you.
We -- unfortunately in this venue, don't have a hand raising but if you don't mind coming up online and putting your hand up, we'll go ahead and call on you. We'll have about 20 minutes for questions. With that, I'll open the floor.

Okay, so, I'll go ahead and break the ice, I have a couple questions. I want to go back to -- let's see, I want to go back to Captain Manning. So, I have -- you mentioned that you're wearing five different hats at different times. I have a great appreciation for that. I just wanted to ask you, you know, it must be really challenging to meet all of your partner's needs. You're dealing with different time scales.
>> Dealing with different spatial skills. Dealing with different authorities. What is your biggest challenge supporting your mission when it comes to the environmental side of the house?

>> RYAN MANNING: So, I think my biggest challenge is, I need more than 24 hours in a day.

[Laughter]

But from all of the challenges that we face, like I said, our team is comprehensive. We have lots of capabilities, but in the end, as you just heard, a number of the folks from this port community, it's about collaboration and really engaging the stakeholders so that you're getting all of the information that they -- that they're having and using in their daily operations.

You know, from our operators of the cutters and small boats, I think the things they are using with the NOAA tools provided to them, are just one element of -- risk management. And so, you know, it is a number of things that go into making sure that they have a safe evolution, and I think probably one of the most important is to engage with the stakeholders and other port -- and waterway users to make sure that they've got the whole picture, because things happen here quickly. If you're not staying in touch with everybody, something could probably happen that you didn't know within the port complex which leads to accidents. So, I don't know if that sufficiently answered your -- or, scratched the itch of your question there.

>> RACHAEL DEMPSEY: Thank you very much. A appreciate that. Now that we've successfully broken the ice. I Mark Mannis has his hand up.

>> MARK MANNIS: I have three questions. I'll start with the biggest one first, that is, we've had effort meeting was Scott Humphreys with the marine exchange here in Northern California, in regard to I believe, Rachael, you were at a meeting with me at our office, if I'm not mistaken maybe a year

ago, we're looking at in creasing NOAA port system in San Francisco Bay. We have the Port of Stockton and Port of Sacramento, which -- and we have very little data up there. Matter of fact, we have zero harmonic NOAA station. We have no NOAA station in the Port of West Sacramento, which is where the ships are. The NOAA station that is referenced is actually on the other side of a dike that is closed off. On the old sacramental river it is not connected to the port whatsoever, because the port is on a cut. So, we've asked for NOAA to add a NOAA harmonic station to use to figure out drafts for ships, max drafts loading, things like that. Port of Stockton, same issue, we don't have a harmonic station there either. The nearest harmonic station is about eight miles away from the port and can vary pretty significantly, because that's where the river runs into the port and that's when we had all of the problem with the dredging, with the sediment coming in.

So, what we're trying to do and I had a meeting maybe a few weeks ago with Scott and several other big players within the system, we want to try to set up a port district where we have sort of all of the ports in a way, contributing into a fund, to help us pay for ports systems, ports maintenance, improvements, maybe security camera, maybe visibility camera for us is really important, and we're wondering if -- we know there's some ports in Texas that have already done this, this type of thing for security, and we're looking for help in coming up with ideas how to get all of the port players involved to sort of contribute to almost like an HOA or a fund to basically pay for the port sensors and increase in the ports, and as far as the harmonic stations, that's a NOAA issue, and we really need you guys to

solve, Rachael, getting some proper NOAA stations and I think getting the port sensors would help you also get the harmonic station in dark accurate.

I'll end at that one for now. I've probably taken up too much time.

The other two real quick are we --

>> RACHAEL DEMPSEY: Mark, are you still there?

>> So, we need to make these be questions from the HSRP members only and not from the public, mark, if you would like to submit a question to us as a public comment, please e-mail us, and we will gladly read your comment into the public comments during that time. Thank you.

>> RACHAEL DEMPSEY: Okay, I just want to jump in. Mark your question is appropriate and I really do appreciate it. This is something that has not fallen on deaf ears force sure. We are sensitive to the need. I appreciate the comment regarding the ports district that we discussed. So, happy to have that conversation with you, and appreciate any input you provide to the panelists.

So, with that, I want to go ahead and go to Julie. I believe Julie had a question.

>> JULIE THOMAS: I do. Thank you. What great presentations for everybody, I really like to thank them all. And I have a couple comments, questions. So -- but I know others on the panel probably do, too. So, I'll go first, and then Mary Paige, I see you on there, too. Captain Betz, good to see you, and several years ago, I think I heard one of your presentations talking about automation of vessels within the ports. Can you just comment on that? Like is that still a thing, or what's happening there?

>> JOHN BETZ: Automation in what sense, Julie?

>> JULIE THOMAS: I think these were vessels coming into the port. Or, ah, I don't know, self-driving vessels? Something you were talking about.

>> JOHN BETZ: There were theoretical conversations about that, in anticipation -- we keep hearing about vessels that basically have self-driving capability. We have not seen anything like that yet, nothing like that that I know of is actually on the drawing board. I probably just had delivered the eWOLF, which is all electric tugboat which is I believe in San Diego right now, that will have that capability, as far as I understand, to be controlled pretty much in an automated sense. Now, whether can operate with no one aboard, I'm not sure. I think it's got that capability designed into it, but I don't think they're going to be actually using it that way.

>> JULIE THOMAS: Okay. I'll ask one more real quickly. There was a lot of -- you commented on the ENCs, the transition chart now to the ENCs. We've had a lot of discussion within the HSRP, too, about this, and how best to get the word out to navigation in the maritime community on the ENCs, and I guess Captain Manning, Captain Betz, I wouldn't mind your two-second comment on that if you feel it's really going well and if these are really -- like what are you feeling as far as the integration of ENCs now?

>> RYAN MANNING: I'll go first and then let John give you the correct answer. So, just from feedback from our boat operators and our ship driver, one of the inputs or requests kind of they had was with the updates, if it was -- in an understanding they will be episodically based on things that change. But if there's an update on the periodicity, put on the calendar to make sure okay, all of the updates are on there and working. That would be something that would be nice. I also got some input from our cutter COs

that said they are working perfectly, and I think for the generation of folks that we have operating our equipment, it actually is welcome. I would say there's still some old school folks out there that wouldn't mind having a paper copy in the back of their pocket. But definitely, ENC has definitely worked for them. That's the input I'm getting from my team.

>> JULIE THOMAS: Thank you. Next, Captain Betz?

>> JOHN BETZ: Yeah, Julie, I guess the biggest thing there's hand wringing over is elimination of paper carts. But Jeff Ferguson is doing a good job keeping the local stakeholders keeping apprised of the phase-out that's occurring and move to electronic charts. With that informal poking around and talking to people how they feel about this, most of the feedback is positive. I haven't heard anybody express too much consternation over the fact that paper charts are going away. And I originally had the most concern about the direct boat sector, because I thought, what are they going to do, and I did a little bit of informal surveying amongst my contact, in that sector, and found that most people weren't concerned about it at all. They are already relying most exclusively on electronic charts, and I think part of that is when you're on a rec boat or fishing boat you don't have a chart table big enough to fold out a paper chart.

[Laughter]

So, they weren't using those products anyway, so... so far it's going well.

>> JULIE THOMAS: Thank you. Rachael, I'll turn it back to you and let others talk on the panel.

>> RACHAEL DEMPSEY: Thank you, Julie. Qassum, over to you, please.

>> QASSAM ABDULLAH: Thank you very much. Thank you for highlighting NOAA's role in the ports navigation, and incoming vessels. My question relates to what Julie brought up for Captain Betz. You showed the slide, with the fog and provision navigation. And that's a topic we've been tackling for a couple of years now, and HSRP is very dear to all of our heart. I was wondering, we expressed the barrier, I got the impression many boats are coming in using the provision navigation instrument precision role we call it in navigation, but in your opinion, all of you, like Captain Betz and others, what do we need to make it happening? Is the PPU not ready for it? We have great ENC, we have a great GPS, and navigation now. How close are we from a driveless boat as opposed to precision navigation tool? Thank you.

>> JOHN BETZ: I think there's two issues there. The way I understood Julie's questions, are we seeing fully automated ships that have the capability to operate without a person on board, and the answer to that is no, not yet. And the other question is, are the people that are on board the ships right now using these provision products to be able to navigate a ship saying restricted visibility with comfort and confidential, and I would say a qualified yes because -- it's going to depend on the piloted ground, and geography. And circumstances. I don't want to speak for a pilot saying a different pilotage ground. In Los Angeles, our issue is not current. We do have wind at times. But the real issue we have is big, big, big, big ships and smaller, smaller and smaller places. And as Captain Louttit showed you slides, some of the tolerances are getting very small. The answer from my perspective, yes, we can use precision products on our PPUs to drive these

ships in and out of these areas with very, very, very small toll Renes as Captain Louttit showed. And depending on pilot comfort and Captain comfort, master comfort, some Captains don't like it when they can't see, but we do have the cape ability between these ships and all of the way to the dock, and very restrictive visibility conditions using these precision navigation tools, the chart and PPUs.

We've been doing this t in Los Angeles for a long time, they've also been doing it in Long Beach. So, the answer to that question is yes, we couldn't do it without the precision tools. There's two things. We have to have the precision position and the precision chart and then we have to have the software and the -- you know, a PPU system that is reliable. And if we have those three things, and I feel that we do, then we're fine.

>> QASSAM ABDULLAH: Yes, thank you very much.

>> RACHAEL DEMPSEY: Okay, I'm going jump in real quick. We have three more questions. We're going Kim, Mary Paige, and Nicole then we have to wrap things up. Miss Holtz over to you.

>> KIM HOLTZ: I was curious Captain Betz has the port moved over to precision navigation bringing in the ships yet? Are you in the process of doing that?

>> JOHN BETZ: In the process service we have PPUs for each pilot. Now, when you say precision equipment, we have not put the S100 charts on the PPUs at this point. We have the cape ability to do that. And at some point we probably will start doing that, when we see a need for it. We got one area we're looking at right now that's extremely tight, for lack of a better word, and it's a slope that's underwater that we're dealing with, a grounding

line that's under water that we can't really see, so, we're probably going to bring in the S100 charts and put them on the PPUs just for that particular piece, but, you know, if we're driving the ship in, like we want to say in most drafts in the Port of L.A. being a dredged channel there's not a lot of places to go around you can bump right into the dock. It's deep at the fender line.

[Laughter]

So, having very precise soundings is important in a few areas of the port but not every port. But it is available if we want to use it.

>> KIM HOLTZ: Thank you.

>> RACHAEL DEMPSEY: Mary Paige?

>> MARY PAIGE ABBOTT: All I can say is just wow. As a recreational boater you showed me the recreational side is similar. It depends where you're doing your boating. Mine is West Coast of Florida so 20 feet is deep. I can't imagine what you're going through. At the same time, the pictures that you showed, told us a lot. Looking across the forward on one of those large container ship, and seeing the waterways, and it all looked good, I had to remind myself, if you see a bird standing there, it doesn't mean it can walk on water, it is shallow. So, I assume there's similar things that you have visually. My question is not with regard to depth. It goes back to Derek Davis if he's still available.

>> DEREK DAVIS: I'm still here.

>> MARY PAIGE ABBOTT: Yay. We're just an instantaneous society. Our expectations now, for work you've been working on and getting permits probably and input and feedback and approvals and whatever, you're looking at maybe 2031 for a project to be done. Data is changing as we heard.

Equipment is changing. How do -- what tools do you need to make your job more efficient and safe?

>> DEREK DAVIS: Well, that's a great question, and we're -- as I mentioned, we're currently in the design phase working, collaborating with the Army Corps of Engineers, and they actually are going to be doing the design for the deep def navigation project and will be doing the work as well. So, we'll be coordinating with port pilots and port survey staff as well as Army Corps hydrographic surveys to complete the work but it will take time to complete the work and do pre dredge and post dredge telemetry surveys and coordinate the maps. So our port survey team as well as Army Corps survey team, as well as any new equipment and new techniques that may be employed in that time to provide the accurate surveys, but the time will take to complete the work will be about three years, so, you're correct, about 2031. I don't know if I can answer the question exactly, but hopefully that information can give you some idea we do have the flexibility and time to make adjustments and refinements to work on the design.

>> MARY PAIGE ABBOTT: All right. I feel for you.

>> DEREK DAVIS: Thank you.

>> RACHAEL DEMPSEY: Our last question goes to Nicole.

>> NICOLE ELKO: Thank you for the excellent summary, really interesting information, Captain Manning, I don't deal with ice breaking activities, as you can tell my office. My good friend Jim Haussener said a word that you didn't say which is sediment. And how that relates to resilience. Interesting when you look at California's performance in terms of managing sediment. California placed more sand on their beaches than any other states over the

last hundred years as we've been managing beaches and shore, and I mention that because it is directly related to Mr. Haussener's comment which is most of that came from the development of these harbors, right, back in the '40s. Nowadays we use sediment from maintenance dredging in other ways to increase resilience, building marshes, to restore beaches. My question is, do you have any comments upon where California and your ports in particular are going with that, and how it might impact resilience and how you might work with NOAA in terms of, you know, understanding where that sediment is, measuring it and monitoring where it is going.

>> RYAN MANNING: Was that question to me or Jim? This is Ryan.

>> NICOLE ELKO: Jim my note but any answer is good as others.

>> RYAN MANNING: I'm not sure, but it is something I can get back to the committee with and checking with program offices. From the local commander, I don't have a real good ball on that.

>> SEAN DUFFY: Sorry, Nicole. I didn't mean to speak over you. I am just going to wrap up the panel, and I will say, we've -- beneficial use is really critical to Louisiana. Jim, your comments about height and relative sea level rise, and impacts we've seen them this -- the last couple of years, we've seen a lot of salt water encroachment related to relative sea level rise. There's a lot of threats, really appreciate all of the presentations, a great panel. I have a bunch of questions, I'll say that I would like to compare some numbers because Louisiana has been doing a great deal of beneficial use, but it's great to see us hopefully moving toward General Spellmon's directive to try to reach 70 percent of beneficial use by 2030.

With that, I thank everybody. I really think it was just an excellent panel. I think we've challenged the American Sign Language interpreters with some fast talking and Cajun word thrown in here and there. It might be time for some beignets, as we have some lunch coming up. But I don't have exact time references in front of me, if somebody more in tune with the schedule would comment, I see it -- there you go,

So, with that, excellent panel, we'll wrap up the morning session, break for lunch, and I'll turn that over. Admiral, good to see you. Play-by-play is your, sir.

>> BEN EVANS: Thank you, Sean and to the panel members, I'm echo the comments as outstanding local perspective on the requirement of the community and L.A. Long Beach region and utilization and opportunities for NOAA data products and services, I have lots of questions, too, but I'll hold those. And I'll just note that we're going to take a quick break here. The -- the main session will reconvene at -- where is my schedule -- main session reconvenes at -- in an hour and 15 minute, I believe. And -- but the HSRP panel members coming back on the Google Meet link at 1:15 Pacific time, so, roughly in 15 minutes from now. Again, on the Google link, not this -- not this session, for our working lunch. So, take a break, stretch your leg, grab a bite and we'll see you on the Google Meet in about 15 minutes.

[Lunch recess taken until 1:15 Pacific standard time.]

>> SEAN DUFFY: Testing, one, two, three. Sean Duffy, Chair. Seem to be having a technical issue. Okay thanks, Virginia. I see you can hear me. I'm just looking at a different screen. Thank everybody for an excellent morning. Great sessions. A lot of really good information. Happy to have everybody

back. And I'll work on the tech issue but I'm going to turn it over to the very capable hands of Julie Thomas and Captain Kip to take over the under cue clearance panel.

>> JULIE THOMAS: Thank you, Sean. Great to be back after lunch here. So I am very honored to present this panel. These esteemed people on the panel. This is for the under keel clearance presentation that we're going have now. And this is really an ongoing project that was started in 2016. It went through many tests and validation years. And I think when operational in 2019. So let's just go through the people.

Captain Kip Louttit is executive Director of the Marine Exchange. The Captain handles all the finances for the project and I think he's like the glue that holds us all together and is building a zone between a lot of the entities. What you are going to see is how this partnership of federal, academia industry has come together. And I think we can have the next slide. I'm just going to flip through the people. Yeah.

So Captain Tom Jacobsen. I know you are third generation pilot here -- company. And Tom is also a prior member to the HSRP. I think he was the one that first introduced me to it many years ago. And of course it is really, this really project really is to provide them with the best information for safety, and to keep their operations going.

And next we have Mr. Jeff Ferguson who is NOAA. He is part of the Ocean Coast Survey. And a lot of the local stakeholders rely on Jeff as the California Navigation Manager.

And then Ryan Kittell is with the National Weather Service. He sits in Oxnard. The weather service is a key player because there's a wave forecast.

And Ryan really customizes that with the local winds and for the local conditions. So that's a very important piece of the puzzle.

And going on to the next slide we have Dr. Jim Behrens. Jim sits at Scripps Institution of Oceanography in San Diego. And he also provides wave observations and wave forecasts with very high-resolution wave buoys.

And then Karsten Uil of course is the managing Director of CHARTA Software. Sits in Rotterdam. Thank you for flying over from Rotterdam with your co-founder who is also here. And Karsten is really the one that handles the integration and distribution of the data and the information.

And we want to thank Marathon for allowing us to work on this project. As you will see, it's really in support of bringing in their deep draft vessels.

So with that said, I'm going to go ahead and turn it over to -- is it Kip? Okay, Captain Jacobsen is the next person here.

>> KIP LOUTTIT: Thank you, Julie. And good afternoon, everybody. Good to be back with the HSRP.

I'll just touch on the partnership right here of our dynamic Under Keel Clearance Project. You are going to hear this throughout the presentation, but it's a wonderful partnership. That's what it makes it work. But we have the State of California, OSPR, Port of Long Beach, our company. We have Marathon and the Marine Exchange. And of course CDIP, Army Corps and everybody working together to make project work. It's successful and still working well.

The whole project is rein in the deep draft VLCCs. These ships are roughly 100 feet long. 200 feet wide. Some 230 feet wide. There are over 300,000 dead weight tons. And they're bringing them in at 50-foot draft. These are

the largest that comes into the United States into a port.

So it's important to note fifty percent of California's oil comes through the Port of Los Angeles and the Port of Long Beach. And we only have a five-day supply of oil ashore. So this means that we have a lot of oil tankers on a steady and regular basis that come into the ports to feed the refineries. Long Beach berth 121 is the only VLC berth in the West Coast that can handle ships of this size. Again, mostly it's the draft at 69 feet that stands out.

What you see on the right-hand side of the chart here, critical area, is the approach channel of 76 feet. That's a dredge channel of about two-and-a-half miles long of seventy six feet. So we board the ships, pilots board the ships five miles offshore. And we get lined up. And once we're in the two-and-a-half mile 76-foot deep channel there's no turning around. There's one place we can go and that's berth 121. That's why this project is so critical. We have to show the ship won't touch bottom. And that's what we've accomplished. The approach channel is critical, the turn at the breakwater and just inside the breakwater is all critical. Once we get inside we're protected by the breakwater and it's calm water to the dock.

So I'm going to pass this off to Captain Louttit and you can take over.

>> KIP LOUTTIT: If you don't care a bit about tankers or the Port of Long Beach I encourage you to listen to the presentation about how to organize a complex partner with federal, state, local and industry partners and how Captain Jacobsen said we were able to organize all these people into the successful project today.

Derek this morning mentioned the deepening project that the Port of Long Beach is thinking of doing and talked briefly to the math that's on the slide.

So I'll just explain it one more time since you now have the picture. But the problem is that Captain Jacobsen was talking about bringing these ships in the last two-and-a-half miles to the Port of Long Beach is the pitch problem in a long period southerly swell. So you are going basically North into the port. So this is a following sea that would lift the stern of the tanker and cause it to pitch. So until this project started there was a gentlemen's agreement between the captain of the port and the pilots and the port to only bring ships up to 65-foot of draft into the Port of Long Beach. In a static condition because the channel is 76 feet deep, 11 feet under the keel, that's great. The problem is if you can do the trigonometry in your head, but I'll do it for you here, with one degree of pitch in that 1,100-foot tanker you get a 10-foot increase in draft. So 65 feet would go to 75 feet and you'd only have one foot under the keel. If the ship pitches two degrees you would be in the mud. So how can we predict this pitch motion and ensure a safe passage is why this project was born. And the reason that we want to bring in the deeper draft tankers is the channel was originally dredged to 76 feet with the idea of bringing in 69-foot draft tankers. So for every extra foot, 65, 66, 67, 68, 69, it's 30,000 barrels of oil basically for free. You are bringing in the ship anyway, so you can get more cargo per movement if we can predict the pitch motion to ensure safe passage.

So before we had this project the go-no go decision was made by the pilot and ship's Captain using CDIP swell warnings, buoy reports, experience, seaman's eye, and observed pitch and roll far enough offshore to permit a bailout before the channel. So before this project, the only thing the pilots had to go on was an email that they got from CDIP which when certain

parameters for height of the swell and direction of the swell and period of swell were met they would get an email warning. And I cut pasted an example of one of those warnings from February. And there are different sites outside of the harbor where you can see the green and the red boxes of where this forecast is of this swell condition that could result in significant pitch which could result in significant under keel clearance problems. What you don't want in these cases is for the pilot to go out to the ship to get lined up and say no we don't feel comfortable with this. So it is a waste of time for a pilot. It's extra movement. Then the ship has to bailout and go to anchor when everybody was expecting it to go into port.

So the present, which I mentioned has been in effect for about the past six years, we have Pro Tide. That's the name of the software product that Karsten's company created. So we have safer and more efficient ship movements based on precision, science and technology. So if you can see in the upper right-hand corner of the slide is a pilot boarding the ladder. What we're trying to do is make sure that pilot only has to board the ship when it has a reasonable expectation of going into port and eliminating the bailout conditions. Jacobsen Pilot Service even before this project team pilot procedures to enhance safety. This is one more tool the pilots have to take to the ship's Captain to enhance safety. That's what Pro Tide does. It provides input to the captain for the go, no go decision. This is input. It doesn't have the throttle or the steering wheel the decision is by the captain. It reduces or eliminates the number of aborted runs. Because as we had over the past couple weeks with storm Pro Tide would protect in advance the ship would be out of limits. So the captain would be told you are going to be out of limits

from this time to this time. You've got two choices -- slowdown and arrive at the right time or prepare to go to anchor but you don't have aborted runs they used to have to do. As Captain Jacobson mentioned only five -- if you can't bring in one of these tankers the oil company can bring in a smaller tanker with a smaller draft in the favorable conditions for the big ship.

So the three goals of the project were started at the very beginning. As I mentioned if you are ever going to do something like this with multiple partners get the goals straight and contribute to success. So the first one was to increase safety by reducing the risk of an accidental grounding caused by the pitch or roll of a large vessel causing it to impact the bottom. Second is increase efficiency by enabling ship owners and masters to adjust their arrival times based on the pitch and roll program being able to predict when the pitch and roll will be out of limits to enter port due to unacceptable under keel draft currents. Third is to reduce emissions by enabling the larger ships to carry more cargo to enter the port which could reduce overall stack emissions per ton of cargo arriving in the port. That's the notion for every additional foot of draft there's 30,000 extra barrels of fuel, not gallons of fuel, barrels of fuel that come in in a sense for free.

So more benefits to industry and to the public is reducing the overall risk of transporting oil on the West Coast. What was going on more than now has to happen is what's called lightering. So you can see in the pictures there's a big tanker that's too deep to enter Long Beach, comes alongside a hundred miles or so off of San Diego. They more the two ships together out at sea and pump enough oil off the big tanker to a smaller one that the big tanker can enter port. But now that we can bring the tankers into Long Beach with

up to a 69-foot draft we're doing less of this lightering operation offshore. So number one, that increases safety. Reducing personnel exposure and injury such as to the line handlers tying up the ships and reducing the hours that the crews are in these demanding operations. Second, is economics. A more efficient use of the port infrastructure in tugs. Again a big tanker is out of limits to enter port, you can bring in a smaller tanker using the berth and available tugs. And third is to the environment, reducing the risk of oil spills. So there are fewer oil transfers because you can bring in these big ships and eliminate some of the lightering. Second, the transfers are in protected harbors rather than offshore lightering. A ship just gets in and as Captain Jacobsen said ties up to berth T121 in Long Beach. Third, reduced emissions due to less loitering and more barrels per ship moving.

So as of last October 139 tankers have entered the Port of Long Beach. You can see the math in terms of the 66, 67, 68, and 69-foot draft. 67 and 68 are the sweet spot. Because in addition to the under keel clearance, because of the team piloting and the risk averse nature of Jacobsen Pilot Service and the oil companies, they only for example do these movements in the daytime. So by having the less draft and the max of 69 it gives a bigger window that you can get the ship in.

To recap, the goals from the project from the very beginning and today is increasing safety, efficiency and reducing emissions. And the goals of the success of this project continue to be demonstrated.

With that I'll turn it back to Julie.

>> JULIE THOMAS: Thank you, Kip. Okay so Jeff Ferguson, you are next on the line there. Thank you. And once again Jeff is the California Navigation

Manager for NOAA.

>> JEFF FERGUSON: Good afternoon, everybody. So I'm here to talk about NOAA's role in supporting this project. So I'm be talking about some of the NOS products and data we're providing. Then I'm going to pass it off to my NOAA colleague Ryan from the National Weather Service who will talk about the wave forecast and wave models which is critical to this project.

Just want to throw up the simple equation. We're here to compute the under keel clearance of a vessel. It's pretty straightforward. It is the depth of the water minus the draft of the vessel. Static drafts are real easy because we usually have numbers painted on the side of the ship so we know what the static draft is. When we start talking about dynamic draft things get complicated real fast. And this project is especially interesting because we're computing and estimating a dynamic draft for a point in the future. So there's a lot of data that's needed. And Karsten is going to spend the bulk of our presentation talking about all the magic he does to compute those dynamic draft estimates for future points in time. But what I am here to talk about is we can't do any of this without knowing the depth of the water. So I am going to talk about that variable in this equation.

So we want to know what the depth, of course we conduct a hydrographic survey. In 2013 specifically to support this project we sent the NOAA ship fair weather down here to conduct a complete survey of the port areas. That included the entrance channels, anchorages offshore and all the berths and areas inside the breakwater. This was just a standard NOAA service with high-resolution multi-beading. When we're done the next question is how long will this data be good for right. So how often does the bottom depths

change? How stale does this get over time? And we're lucky in L.A.-Long Beach the bottom is pretty stable. But to check it woe sent the NOAA ship Rainier back in 2018. We did some entrance channels and inside the breakwater and confirm the bottom doesn't change that much. L.A.-Long Beach is pretty stable. But after big storms you can get some shoaling in the channels from the steep core channel edges sloughing into the channel. So we need to come up with a system where we can ensure we have accurate depths over time. And if we can accept different data sets from different people then we don't have to send a big NOAA ship down here every few years to check on the depths.

So the process we developed to do that is using a national documetric source. So our National Bathymetric Source or NBS is when it's built out NBS is going to be a national database of all the latest and greatest bathymetry in an area. That has three different outputs. There's a public facing website which we call Blue Topo. The vertical dates are not chart data. Maybe some surveys that don't meet specs. But is it's more than good enough for modeling and public uses. In the middle we have internal access to that database. Sometimes we receive surveys that are sensitive and we're not allowed to make publicly available but they're good enough to use for internal planning purposes. Of course for this case most importantly up on top we have our navigation products which is our ENC and our S-102 data sets. If you have never heard of S-102 before know that is high-resolution, graded bathymetry that can be used in conjunction EMC. As part of our precision navigation projects and Darren Wright will be giving his precision nav updates after the break this afternoon and he will explain all the S-100

layers and how we're rolling that out. But for right now you just need to know that's high-resolution bathymetry.

We have the database in the middle. On the left shows all the different sources of surveys that we can get. Obviously our NOAA surveys, including our NOAA contract surveys, are designed from the ground up to meet NOAA specs and deliverables and be in the right format that they can be easily sent into the NBS. But we can get surveys from a lot of other places, too. The Corps of Engineers being our biggest source of surveys. Every time they do a post-dredge survey or condition survey that data becomes available to us and can go in the NBS. Other government agencies doing surveys, universities, and all other sources. If it is a non-NOAA survey those surveys have to go to our external source data group so they can validate those. They usually have to work with the person who did the survey to get more metadata and get the data in a format that's suitable for the NBS since they may have done the surveys for a variety of different reasons.

For this project specifically, that other box includes surveys from the Port of Long Beach survey department. The Port of Long Beach has a great survey team who has spent a lot of time and effort in the last few years to make sure their surveys meet NOAA specs and deliverables and meet our CATZOC A-1 quality control. One of your newest HSRP members is Kimberley Holtz and she's the head of that department. So at a future meeting I hope she gives you a good briefing on the work they're doing in that space. I think it's unique to the ports I deal with on the West Coast. We get a lot of good data from the Port of Long Beach survey department and other sources, it goes in the NBS which we can update, then we can extract quickly and easily data to

update the ENC and provide precise navigation products.

So if you want to know where the NBS is built out right now you can go to now-coast and click on the blue TOPO button and see where it's build out. Right now it's in the Gulf of Mexico and southeast. There's data there on the northeast. We're working on filling in the Mid-Atlantic right now. Once that's done we'll move to the West Coast, the Great Lakes, then Alaska and the Pacific Islands.

Now for this project you are probably going but there's nothing on the West Coast yet. If you were to zoom in to L.A.-Long Beach you would see specifically to support this project we set up a little tiny piece of the NBS so that we could accept surveys from multiple sources and then output these high precision map products.

And so this is showing the multiple sources of data we have now in the NBS for L.A.-Long Beach. The dark blue is the areas from the original Rainier and fair weather survey. The light blue are the Corps of engineer surveys for all the channels and areas that are their responsibility that have been conducted since the NOAA surveys. They're newer and have superseded the NOAA survey. To the right you see a green area, that's a Navy survey. The Seal Beach naval weapons station. The red along the shoreline is Lidar from the Corps of Engineers. In the middle it's Lidar from the Port of Long Beach. That helped us supersede some areas filled in due to development at the port. The orange is a survey from the Port of Long Beach survey department. So again we get surveys from all sorts of different users. It goes into the NBS. We have super session rules and newer surveys supersede the older stuff and we can extract navigation products from that NBS.

So what that allows the pilots and folks to do is if you just look at the ENC, and if I wanted to draw a safety contour at 42 feet the ENC just has basic standard contours. A 30-foot contour and 60-foot contour. Those are kind of hard coded in the ENC and drawn by a cartographer. So if I want a safety con at 42 feet the nav software has no choice but to draw at the next deepest contour which in this case is 60 feet.

If I have an S102 file I used in conjunction with the ENC I have that high-resolution, graded bathymetry. So it can draw the line at exactly 42 feet on the fly because it has the data. If I want to see contours at every foot, it can do that. Contours at every meter, it gives the user a lot of extra flexibility. Now the land area, the breakwater, the buoys, that's all coming from the ENC. The S102 overlay just replaces the contours and depth area. So now Jacobsen Pilots can load the S102s in that are portable pilot units and navigate with the higher resolution detail as they need it. And when we update the S102 Karsten and take a look and if there's a new shoal spot in the channel he can use that depth when he complete his under keel clearances.

So that's all the depths in terms of surveying. But of course we have tides and water levels that affects the depths. Here we have a great system. For any information they need in the future they use predicted tides but as it gets closer to real-time they can see if there's any difference between the real-time water levels and predictive and apply the difference if they need to.

So this is an overview of the ports in the area. All the yellow buttons are just weather stations. The red is the tide gauge on the Los Angeles side. There's two air gap sensors -- one on the Vincent Thomas bridge on the L.A.

side and one on the international gateway bridge on the Long Beach side. Then the three blue pins offshore are the wave buoys that Dr. Behrens will talk about later.

And there is also an operational forecast system in the area. If you want to see what the water levels are doing in the future based on weather effects and so on. I just wanted to throw that in there.

So I think that's about it. Next slide. So that's what I have. Just always like to remind people wherever you go in this beautiful country near the ocean there's a friendly neighborhood nav manager to help you out if you have any questions.

And now I think I'll pass it back to Julie or on to Ryan to talk about the National Weather Service. Thank you.

>> JULIE THOMAS:

>> RYAN KITTELL: Hello my frame is Ryan Kittell. First talk about our part of NOAA. We are the National Weather Service. We fall under NOAA. And we are not all NOAA. We were just the weather side of the house. We have over 120 offices throughout the country. Our local office is in Oxnard. We cover the Los Angeles county, Ventura county, Santa Barbara county and San Luis Obispo County which includes the St. Peter/Long Beach area. We're responsible for monitoring and forecasting the coastal water areas out to 68 nautical miles. We are open 24/7. That is a view of our operations area there in the bottom right. And our mission, the whole purpose of our existence is twofold. One for the protection of life and property. And secondly it's for the enhancement of the national economy. And as we talked about the Under Keel Clearance Program and really informing and helping reporting our

marine partners you can see how really both of those aspects are handled in marine partners in both the protection of life and property and enhancing the national economy. Our strategy, the way we do that is to really give the decision makers best information possible, so they can make the best weather related decision possible. We have a buzz term called "integrated decision support services" that encapsulates that strategy for our mission.

So we do this through routine forecasts. So forecasts that talk about the weather coming up and marine conditions. We also do as needed routine forecasts. Email briefings, webinars. We even directly, all partners and marine users, key marine users when there's impending weather coming up. Sometimes I'll put deploy if there's any big events. Part of the non-weather period work that we do is developing relationships with decision makers. Which includes a lot of people on this conference today. One of the big tools we have to predict the future especially when talking about waves is the near shore wave prediction system. This is a computer model that is very high-resolution, especially as you get closer to the coast. It's run by our national NCEP, National Centers for Environment Prediction Back East. They're our main part of the National Weather Service and NOAA that does projections in modeling for both the atmosphere and the water. This NWPS system is critical for talking about what we use it for. We use it for our forecast. It is the main driver for our official marine forecast when we talk about waves. It guides our messaging on wave related impacts. When this first came out it was all locally modeled and run at our local office. Every local office would run this computer model locally. But it has since moved the super computer Back East and run at a national level. But it still has

influence from the local offices as well.

So it's not only a tool just for us to provide the information to decision makers but it's also a tool available directly to our decision makers. One such example is the whole Under Keel Clearance Program. And you can go to the next slide.

So, if you can go back one more slide I'll explain our process and how NWPS and the data comes out. The local weather office has a part in the whole wave prediction system in that we provide the data for the local winds. Winds are the drivers for swells and waves. And a lot of the big waves we get are from storms well off the coast. But there's a local wave component that drives local waves. And we are the main source for that. Especially in the local area here. So we provide the wind data that goes -- that we ship Back East that will drive the near shore winds for the prediction system. The global models, the GFS system which includes wave watch 3 provides the global waves and the winds offshore. And so all those come together to produce the output for this near Shore Wave Prediction Center. It's very high-resolution as it gets closer to the coast and that's where we get to the next slide.

The wave data is freely available to anyone, to the public. But for tide system and Under Keel Clearance Project it was needed in a different format. A spectral file for pre-base forecasts. Since the inception we have been producing special output from this model for the Pro Tide software and Pro Tide team. Now it's all done from the national super computer output. This whole project supports our mission. We are providing this information to really help those decision makers like the pilots and the Captains of the ship to figure out when it is safe to enter port. And this is a big part of that whole

equation that Karsten will expand upon later.

Our local office now is involved with this project primarily as, again, the wave source that goes into the NWPS model which has been used by the Pro Tide software for the wave input. Then we also function as the local liaison and contact for the whole system. Whenever there are systems we can provide support to them.

So if we go to the next slide. There are some changes coming to the NWPS system. It's been around ten years. The original developer who really developed this whole system, Andre, left our agency for greener pastures a couple years ago. And the development of the system has been on hold since last year. The main reason for that is that there's a new vision for NWPS and it's called the regional wave prediction center. The big change for the future wave system and modeling wave project is to expand it not to cover the near shore which is what this system does. It really just covers the waters near the post. The regional wave prediction center will expand that to the entire ocean domain. Which NOAA, National Weather Service and centers have responsibility for. It really expands the coverage while still maintaining the highest resolution near the coast. It's still in the early stages in development and planning but the goal is to have it ready at least for parallel testing for it running with the current system sometime in 2025 or 2026. There are advantages to end users which includes ourselves but also for the under keel clearance project and Pro Tide in that it will increase the update times. Right now NWPS updates every six hours. The goal for the new model is for it to update every three hours which will refresh all the Pro Tide calculations which is really good. So there are some unknowns in that, you know, the

goal for this model to be at least as good as the current model and hopefully better. So that's certainly a standard that everyone is hoping for and really needs. We need the new system to be better than the current. And we do see some potential, you know, advantages which will be helpful.

I think that's the last slide I have and I can move on to Julie.

>> JULIE THOMAS: Thanks, Ryan. And we are going to move on to Jim Behrens now. CDIP.

>> JAMES BEHRENS: Hello. Thanks for having me. And as mentioned, I am the Program Manager for the Coastal Data Information Program. I'm also one of the principle investigators. And we observe the waves in California as well as other parts of the country and generate models to forecast the wave activity both on short and longer-term scales.

If you couldn't tell that was one our yellow buoys on the back of a vessel heading out of the Golden Gate. Over there on the top right is one of them floating near the Port of Long Beach.

The program was established in the 1970's with initial funding from the Army Corps of Engineers and the State of California and has continued. We are now up to nearly ninety stations across U.S. waters worldwide. The map on the right shows the extent of the area these days. We have about a fifteen-person team at Scripps Institution of Oceanography with employees of the University of California San Diego. The partners, in addition to Army Corps of Engineers, the Navy and the State Parks of California, involve many IU regional association. So this is a direct connection with NOAA and some NOAA priorities for observing needs around the country. And then many of our stations are funded through collaborations with ports and industry. The

Marine Exchange obviously. Marathon is behind some of that funding. Chevron is a long-standing partner at the port area. And going up the coast, the Columbia River bar pilots, and PG&E at their canyon plant. We also work with agencies like the Department of Energy's National Renewal Energy Laboratory as they look to install testing and production locations for offshore energy.

And then just a little, I guess some of the wording got rearranged while converting from PowerPoint. But the gist of this is that we reach a wide variety of stakeholders with our wave observations. And the coastal engineering aspects are directly related to port planning and improvements. We provide the real-time conditions for operations. And then there are aspects of nuclear deterrent and national security which rely on the high precision wave data. The climate record is now being accumulated over the decades of persistent observations at many of these stations. We're going on thirty years of half-hourly high precision observations that are research grade and useful for meaningful operations.

The instrument of choice is the data well wave rider. They provide the wave energy spectrum. The direction of the waves. We measure displacement path of the buoy which gives wave by wave information. The water temperature, the air temperature, and the surface currents are now also being measured.

Wave motion circular. As you can see on the left over there the waves far from shoaling move in circular patterns that these buoys are designed to couple to with high fidelity. Then when the waves approach the shore, we have concerns about run-up, erosion, infrastructure damage. Next slide please.

The application here at the Port of Long Beach which has funding through the years from NOAA's Southern California Coastal Ocean Observing System industry's partners and U.S. Army Corps of Engineers backing. Buoy information about the current wave conditions are used to predict the conditions at the entrance to the Port of Long Beach. The bathymetry around the Southern California bite is more complex than many coastal regions around the world with all of these island, shoals, and bases. These all effect the longer period waves in particular. Which you will see soon.

Just a glance at the nuts and bolts end of the job. Keeping the stations instrumented is a major focus of our day-to-day efforts. We calibrate the instruments at our facility for height and direction. We anchor them in place and use acoustic releases to remove the materials when we're finished.

We distribute the data through NOAA's national data buoy center seamlessly with the NOAA managed and other partner observing platforms. We provide the data through our own web portal. Up to date as well as full archives. We provide the data through the port system in many locations around the country, too. And then for the quality control aspect we calibrate our instruments, we set up automated messaging for malfunctions that are detected to keep our team appraised and respond to problems quickly.

The wave data over on the left, the spectrum is a measurement of where the energy is as a function of frequency and/or period. However you want to look at it. This is an example from yesterday at San Pedro buoy. We have some energy at around seven seconds, six seconds. That's typical for the wind chop. And then there's a little bit of a longer period swell component there at about thirteen, fourteen seconds. The directional spectrum is

provided in this radial plot in the center. If you look at these for a few minutes you can start to understand intuitively how the swell and the wind chop are represented here. The individual waves can be teased out of the displacement path information. And this is a popular product, especially with our pilot friends. So they understand the sizes of the largest waves coming through.

The wave model that we run combines the bathymetry of the California coast with data from the buoys themselves, both ours and the reliable ones from the weather service, the NOAA observing stations there as well. Wave physics is then used to predict the conditions along the coastline. Here's a representation from our website with a zoomed in version of the Southern California bite.

Here's an example of how waves of different periods are affected as they pass through the Southern California bite from different incidents angles. Now here's from the south. We're looking at wind chop on the top left and sort of gradually transitioning to long period swell on the lower right. Red areas are where the waves are focused and wave heights are larger, greater than they would be otherwise. Then the shadowing is evident in the darker images. The Port of Long Beach area, let's take a close look on the bottom right, as this now swings through. There are strong gradients in the wave activity which our wave observations and modeling in particular from the south here where they will have a strong impact on decision making.

We provide a display of the wave observations at these three stations near the port entrance along with model forecasts from NOAA, NWPS in green there, and our CDIP wave model which is a forecast run off of the European

model these days. We switched to that about two years ago and just published a paper on the update in Coastal Engineering Journal. So hot off the press.

Over time the comparison between the buoy readings and the CDIP model have been analyzed. Here's an example looking at the full spectrum for a year of data up to the present essentially. The data don't fall on a perfect line there, and so there are events and conditions where the model and the data won't necessarily line up exactly, and this is where the interesting stuff happens.

On the top right this is an example of in May 2023 a southern long period swell. I think this was Hillary. Maybe the remnants of Hillary coming through. And the buoy station in the top center there, 215, is the Long Beach channel, and we see the intense focusing there right. Station 092 and 213 to the Southwest and south don't have this intense of wave activity at this time. This is not typical of a plainer, more boring quote/unquote coastal region, but here in the Southern California by these high gradient effects are dominant. On the lower right we see what happens when we have a strong west swell. And the banding, the intense wave activity into Huntington Beach over there on the right. Also one last thing to notice is when you look at the top right image where there is the break wall there is not a reflection coming off. So the attempt here was to use the buoy data to make real-time adjustments to the wave model at points nearby. But the punchline here is that this needs to be done with a lot of care. Observations at one location in this area don't necessarily help you, if you adjust to other locations by that amount. So that's what we're showing over here on the left.

Now the next slide, we're getting close to the end here. This is the wave height, significant wave height at that San Pedro station dating back to 1997 or 8 I think we are every half-hour. The thing to notice is in recent years we've measured the most intense wave activity events across that period of time. One reason to continue to make observations, the wave climate reveals itself over decades.

When wave events of significant infrastructure impact or historic energy come through we issue these bulletins. And maybe some of you have seen them. Here's an example of a El Nino type long period strong wave event. This is what caused all of the coastal impacts that were in the news in late December. This is available for analysis and review on our website. And we provide these as a portal into these significant events. Looking over on the right-hand side you can see the time shares comparison between the buoy and model for San Pedro there and close to the shore in the bite the global incept model is not particularly helpful. So we need to provide some of these added-value modeling products to better understand the situation.

I think this is my last one. There was mention earlier about the lightering in Kip's presentation. We work with Chevron to help them understand when conditions for lightering are unsafe. Similar to the warnings for long period in the area off of the port entrance.

That's it. Please visit us at our website. We have this new button here for extreme wave events that will take you to the most energetic buoy readings in the country in recent days. And takes you also to our analysis of significant impacts. Thank you.

>> JULIE THOMAS: Great. Thank you very much, Jim. Nice presentation.

Karsten, you ready?

>> KARSTEN UIL: So I'm Karsten Uil. Thank you for having me. Thank you for the panel for addressing this topic. And thank you Admiral Evans for the invite to talk here. And talk a bit about this beautiful project we've been doing here. It's about dynamic on under keel clearance. And my topic is the data and modeling with Pro Tide. So Pro Tide is the application. CHARTA is the company. It starts with something a little bit different or maybe the challenge we're looking at is we're actually building a model based on best data we have. But recently I was in the speaking with a dear friend of mine and the topic was all models are wrong, some are useful. And I think that's a challenge we're looking at today with this model. So the challenge is how can we actually use the data, use the model and prove that it works and possibly improve the model to make it work in real life. And that's a challenge we're facing. So I don't think all models are wrong, but at least we have to know how precisely they are and work towards making them use in practice.

A little bit about the company. As said before, we're a Dutch company based in Rotterdam. We're also the biggest port of Europe is. That was our first clients. The company contains many mathematicians and computer scientists and we like to build models for the domain of maritime logistics domain. Pro Tide is one of our biggest applications. And we started in Rotterdam with this program. And we customize it for all the different ports we work with.

So the challenge actually is pretty clear. We've heard it, that the industry wants of course the goods coming in to port. They come in even come in big ships and they get bigger and bigger all the time. The traditional ways of

looking at it if it's safe or not safe at some point it just doesn't work anymore. You can work around it by saying you get more safety measures like less deep ships. Maybe you could lighten the smaller ships. Or you can have block out periods of time. But our challenge is how can we actually use the data and model that ships can come in more often. And of course like we've heard before today, reduce waiting times and bringing bigger vessels, make the port more efficient, and use the resources that the port already has available to bring in bigger ships in a more efficient way, and that's the challenge we're working on. That's what we try to do with Pro Tide.

I underlined a few parts we're looking at here today. The minimum dynamic on the keel clearance, Pro Tide is made to do a lot more than just keel clearance. We also look at overhead clearance, maneuvering, maximum cross current winds. But the topic we are addressing today is dynamic under keel clearance. Ships are planned as two to twenty-four hours before the actual transit. That's the focus point of the presentation today. Of course you can also look at it as to make more strategic decisions about your ports. Maybe look for months ahead. Optimize safety, increase draft, reduce waiting times. Everything on the right here of the slide are the bonuses. I think it's a good idea to do it this way and share the data we have available, share the outputs of the program, discuss it with the experts to make sure we're all on the same page, and such a complex domain that we're looking at to make sure the experts know what we're doing and if we're doing it safe and actually that way improve what we're doing. The continue evaluation is the mark of the presentation. We use the data. We have the modeling. And it's our job to prove it actually works. So we evaluate the data we're getting in

and want to prove it works on a day to day basis.

So what is Pro Tide. On the left we have the input for Pro Tide. On several presentations we've been seeing today we already discussed the input we're using. We of course need to know the route. Which route will the ship take going into port or going out of port. And we need the best available data to work with it. So the tides, currents, winds, waves, possibly salinity that might affect the circumstances we have to work with.

We have to decide what actually is safe. So we need a kind of minimum under keel clearance we think is safe. And discuss it with industry and looking at other ports, looking at maritime safety regulations. We can do safety restrictions up here for the minimum dynamic of keel clearance we look at is 1.5 meters. So just about five feet. The ship will never have less under keel clearance less than that coming into port. The final input is not just the circumstances but actual vessel coming in. How big is the vessel. What type of vessel are we looking at. How deep is it of course but also its loading conditions. A ship a certain length and a certain beam and draft can behave totally different if it's loaded differently. So we ask the Captains, we ask the agents to give a copy of their loading computer to show us how it's loaded. And that gives us trust if we know we model that ship correctly coming into port. That's on the input side. That's the majority of what we're talking about today. Pro Tide considers a certain time window for every location during the transit for every time during the transit what will happen. Model the circumstances. Simulate the circumstances. And it calculates what the ship will do at that point. So we're looking at roll, pitch, heave and determine what the dynamic is. If we know the dynamic on the keel

clearance we can show when it's safe to do this particular transit. The results that you see in Pro Tide is mainly title windows. That's the safe window in time to come in with your window. And we test the actual planning of the ship coming in. To give the pilots insight what possibly can happen we give insight into the calculated roll, pitch and resulting dynamic on the keel. By using the system the planning can be made and just before the actual transit we use the best available actual data to give the final go/no go decision to make sure we're doing it safe.

To go briefly through the inputs. We're fortunate to have a lot of data sources available. And one we just showed by Jeff Ferguson was the tides and currents imports. This is the domain on the right that we're looking at. The port on the blue highlighted circle is the area we're interested in. In the darker blue you see the channel. The red flags are the model output for waves that we have in the system. And we have one tide gauge in this area which is on the L.A. side of the region. We use the astronomical predictive tides but of course they can be wrong. By definition they are wrong with the current conditions. So what we do is we monitor the differences with what we see at the tide gauge with the actual predictions and constantly correct what's happening. So that we try to get the actual tide of every transit coming in.

On the top right we see a tide graph. The dark blue is the predictive tide. And the light blue is what is actually seen by the tide gauge. And the right lower graph shows how Pro Tide uses it. So we use the predictive tide but we correct for the differences between the two, and that's why we can come up to a certain accuracy. We think about two to ten centimeters accuracy during

each transit. We still use fifteen centimeter deviation. So error margin around our predictions. Because the simple reason is we don't have an actual tide gauge in the channel so we have to make sure that we use the water level with an error margin to correct for if we use a different location.

In the future what we like to have. Better increased model. So hydrographic model that could certainly improve the tide and current information around the channel. Points closer to the channel. And finally the data simulation to make sure that the tides that we use are constantly corrected for the measurement in the neighborhood.

Next to tides and currents the main input is waves. We're very fortunate we have a lot of different wave inputs here and we have a lot of local knowledge of what's actually happening. So we just saw the presentation of Jim Behrens from CDIP. They have a lot of local information of what's actually going on in this region. They made sure that we have the best buoys available here to look at to measure what's actually the wave conditions are. And we have the NWPS model we discussed earlier today which gives a long-range forecast, six hours up to 144 hours or up to six days. We have an estimated or projected or predicted wave field in our relevant domain. Based on those six hours to 144 hours prediction, we can make our tidal Windows for the next half a day to six days ahead. So the graph in the lower end we see the five-day or six-day period. And in the colored band we see three transits being planned. So there were two plans just on January 15th. And we see one planned on January 19th which is the yellow band all the way on the right. That actually is the tidal window the Pro Tide calculates with the wave conditions and the tide conditions and for that transit that is supposed to

come in on January 19th. When we look at the January 15th, maybe this screen shot was made on January 15th. So those transits will be a lot closer. So those are, the pilots almost planning to go on board for those. In that case the whole model switches to the CDIP buoy driven forecast model which we saw in the previous presentation. And with this model we actually have the opportunity to, based on readings, look into the future of one or two hours to see what's going to happen based on actual buoy readings. And this gives us a very reliable, final check to see if this transit will come in. After the buoy-driven forecast we also of course have the actual buoy observations. So when the buoys jump up and down in a matter that we did not see in the models, we still have a final build out moments and that's to use the actual buoys.

And this has proven to be a challenge. So we have all this input, great data, great modeling, but the challenge is to find out how good is this data. Is it good enough to use for dynamic ship motion modeling. What can we do to improve it. So these are a few things, a few challenges we've been working on. So in the left top graph we see the tide level. There's one of the NWPS model. We have one line of the CDIP short-term forecast model. And we have the top line that shows the actual buoy reading which is very erratic. You might notice that the buoy observation here is a lot higher than the two models. In this case even one to two feet of difference between what the buoy shows and what the models thought would happen. This is something we have to work with. We model the ship motions based on the wave motions. So any error in the wave motions or the wave predictions will also be in the output of the ship motions. So that's why we calculate certain error

margins. On the right lower end we see an awkward Pro Tide. It is the red area and the blue area. It's not the lines but the areas. The blue is the pitch during transit and the red is expected to roll during this transit. It's not a line it's a an area because we have an error margin. So the lower end of the bend is the expected roll. And the top high end is the maximum roll we expect during this transit. So we try to give insight into pitch and roll but we also have an error margin around this. And during evaluations we try to fit this error margin around what's actually happening. If we have the roll and pitch on the right lower end, the left lower end will give us the dynamic under keel clearance. This is the three areas, the yellow one is the static under keel clearance. So in the simple formula of having a water level available depth of the channel, and having a drop of the vessel then you have static under keel clearance. Then you get all these dynamics coming in like the ship (?) The roll pitch and heave which is the lower blue area of this graph. In this case the lowest dynamic on the keel clearance is about two meters. When we think about these vessels being about twenty meters deep this is just roughly about ten percent under keel clearance. You see that Pro Tide also has a dashed blue line in the left lower end. That is the main dynamic under keel clearance we would like for this vessel. With all the uncertainty in the model, with all the best data and modeling, we calculate the dynamic on under keel clearance, and we cut it off as that every vessel should have at least 1.5 meters of dynamic under keel clearance. So the last 1.5 meters is our hard deck safety margin to make sure we are always on the safe side of our calculations. The right two graphs are also the wave drops that we've seen today. The left one is the model. Shows the wave field is coming from the

south. The right one is from the buoy at the same moment. And it shows the same wave fields coming from the south. But we also see waves coming from the North. And that's actually the reflection of the waves that's reflects against the hit of breakwater and come back and also affect the ship margin. This is something we have to look at in this constant evaluation.

The other input is the depth of the channel like we've seen that we have these from the higher resolution surveys. We import them, we check the channel is up to date as we expect it to be. Next slide please.

The input of ships. So we receive data sheet of the ship we're expecting and also get a snapshot from a loading computer to know how it's loaded. We check them, the pilots enter them into the system, then we model the -- how the ship will respond in the wave conditions that we expect it to have in this area. So move forward again to the next slide. I'm going through these slides a bit faster because I want a little bit of time for the final validation.

So we have the wave models which we use as input. We have error margin so we know that the waves are not perfect. We know the tides, and we know they're not perfect. We know the channel. But how do we know that what we model is actually going on. And that's what we do with the final step is that we put an onboard motion sensor. The pilots take it onboard. They put a motion sensor on the vessel for a transit. And it actually measures what the ship is actually doing. So it measures the roll, the pitch, and the leave, and that's the final lines you see on the graph on the lower end. And this gives us the comfort that what's actually measured on board is within the error margins that we use. And this is the final check of our model. And this way we constantly improve what we are seeing.

One last slide. A bit about the lessons learned in this project. So yes models aren't always wrong but I think we've shown by using data, modeling it and constantly validating it and taking time to improve it, we can actually deliver a system that operations can depend on and is constantly available. It can only work with the partners we've had here. So we give the model but we make use of the NOAA expertise in the region, the CDIP expertise and bring that altogether to make it possible to deliver this product and also take the time to make necessary improvements.

So I would thank you all for the time and I'll go back to Julie.

>> JULIE THOMAS: Thank you, Karsten.

You know what, we have one more slide. Do you want to put that up. The very last slide. We kind of brainstormed yesterday about some requests to NOAA. And I just want to put it up here and go through it real quickly, if you have it. Yes. Okay. So I am going to go ahead and this is really to Captain Evans or Admiral Evans and Marian Wesley and Brad because these were items that came up in the discussion after their meeting yesterday under the under keel clearance. One is how important that channel bathymetry is. And I think Captain Jacobsen you were saying there are some slopping at the edges and you are concerned a bit.

>> Yeah we have to keep one the sounding of the channels. When we have them coming through it will slough off the sides of the channels. Right now we've reduced the channel depth to 75 feet from 76 to 75. So we take that into account for the deep draft tankers coming in.

>> JULIE THOMAS: Thank you. So even though -- yeah there are, as we saw and it's great how many different opportunities there are for getting

surveys in this area. I think that high-resolution NOAA channel survey is just gold to the whole project. I am just going to zip through these. The current meter installation. What we don't have are currents for this project. And there is a current meter in RPS 1 which is on one of the docks possibly that could become available in the future. Then it would be to figure out how to install it near the breakwater. And ideally they would like to integrate it with port system once that is done.

This one, Marian, I did give you a heads up on this. Of course they would like a tide gauge right there at Long Beach. And any hydro dynamic modeling that can be done along the channel entrance there at the two-mile channel. I don't know about the OFS system there. I know there is a tidal output but I'm not sure it's for prime time in this area. So maybe if you have any comments on that. But let me just also say the very last one was to improve the accuracy of the near shore wave prediction system that as Ryan nicely pointed out that system is in transition now to a regional wave prediction system. And the whole program I think is kind of frozen until that region one comes online. So that would be the time to really assess the accuracy and the resolution of it.

Marian, do you want to comment on the tidal questions there?

>> MARIAN WESLEY: Sure. So the potential new instruments to be integrated into ports. So Number 2, Number 3, those would be fairly standard ports requests. Chris Divigleo (sic) is on with me but that would be a set of standard ports requests to add to. I was looking at the port system in L.A.-Long Beach there's a lot of integrate the buoy, there's air gaps that would be adding to that system. I would say the model we want operationally

on the west coast, West Coast OFS is not designed to go into the navigation channels at all. It's kind of an offshore, large domain. The innovation with that model is its data assimilating. So that was a first for us. But we don't have sort of navigation suitable for navigation focused model there. So again that makes it difficult for us to provide services. We can predict the tide based on the sun and the moon and gravity, which are very well known, but what you actually experience in a near shore environment is going to be largely influenced by weather and other things. And we don't have a way of capturing those in a model simply because we don't have an LFS that serves that specific need. But again there's requirements process. You could work with your local nav manager and kind of get that in the requirements list as a future OFS or a different OFS that would serve that navigation need. West Coast OFS is a very large domain and wasn't designed to do that.

>> JULIE THOMAS: Greats. Thanks for clarifying that.

I am going to open up to questions for the panel now.

>> BENJAMIN EVANS: Can I jump in for a second? I have a clarifying question regarding point number one here. In 2018 my name is probably on those surveys because I was here at that point. As I recall much of that entrance channel is Army Corps, a federal channel. I'm curious about where things stand. If I am remembering that correctly. And if so, where do things stand with the techniques with which Army Corps is surveying that and what's your recommendation for how we integrate potential NOAA read survey into the Army Corps program there?

>> JULIE THOMAS: Kim, do you have a comment on that? I can tell you are ready to jump in.

>> KIMBERLEY HOLTZ: I do. The port, we've done surveys on that main channel. It's 2020. Our contractor is going out there next two weeks to do the main channel again and we're going all the way out past the buoy. Much further out than we did basically for the whole main channel. And we are going to meet with the Corps of Engineers to ask them -- because they just came in in 2023 and did their survey after we did ours. Ours is a little higher quality. It's a cat SOC A1. We're going to repeat the main channel every two years. Can we give them the data so they don't overwrite our precise data.

>> BENJAMIN EVANS: I didn't realize the port surveys were going out through the gate.

>> KIMBERLEY HOLTZ: This will be the first time we go all the way out and will do that from now on.

>> BENJAMIN EVANS: That's great. We have established in our really starting to grease the process for ingesting that data into our external source data pipeline. Ultimately be portrayed in the national source which Jeff highlighted that in his presentation once we have that built out on the West Coast. I think a lot the pieces are coming together that will enable that to improve that situation. That said, if there is a requirement for a NOAA survey in the area, you know, we can certainly enter that into the prioritization system. Jeff can handle that. But if there isn't an explicit requirement for NOAA survey and there are other assets available that allows us to dedicate our very limited ship time and other resources to other places. So I would just ask that we think about the totality of assets available, opportunities available, when we make though requests.

>> JULIE THOMAS: Thanks.

>> KIMBERLEY HOLTZ: Yeah because the -- sorry. The Corps definitely if we need to change some of the processes we're doing so everybody would feel comfortable we're more than willing to. We have been working with Jeff pretty closely. Our consultant DEA has. So anything we need to change we will do, you know, right away.

>> BENJAMIN EVANS: Lastly, Julie, one last note. On the requirement for modeling. I think we need to dig into this further. Again I point to Jeff. But we do also have the surge and tide operational forecast system model which is due to be upgraded to 3D status if you will, a 3D model this year. And again I wouldn't want to make any promises but it's conceivable that could provide the hydrographic coverage that's desired under .4. We need to dig into that further. I don't want to promise that but we do expect to have a major upgrade for that model this year.

>> JULIE THOMAS: Perfect. I'm writing that down to follow up on. Because I think that would be really helpful. Karsten, I know those points along the channel there sometimes can vary quite a bit.

>> KARSTEN UIL: Yeah indeed. I think having extra hydrographic model could be a very good idea. So sounds like good news. And also having insights in the expected currents in the region.

>> BENJAMIN EVANS: I would suggest working with Jeff and we can get you connected with Subject Matter Experts in our model and shop to -- again I don't want to promise that's going to meet your needs but I think it's conceivable.

>> JULIE THOMAS: Great. Thank you.

Okay let's go to panel questions. I think the process is just to put your

video on so I can see you. And if anybody has any questions? Tuba?

>> TUBA OZKAN-HALLER: Can you hear me? What an excellent set of presentations. Thank you so much. I felt like I learned a lot and this was a very, very excellent representation of what it looks like to really do engaged research that's inspired by real need. And so I congratulate you for pulling it together like you did because there are a lot of pieces that have to come together to do what you did.

I'm familiar with this problem from just working at the massive Columbia River which has additional complications, you know, in addition to what you all have had to deal with including things like very rapidly changing bathymetry. Very strong currents. Things of that sort. My question, and maybe you covered this and maybe I missed the detail, tell me more about how the funding came about for this work. You know, how it all kind of came together. Who provided the funding. How much funding we're talking about to stand up a system like this, like you have.

>> JULIE THOMAS: We're going to turn it over to Kip for that.

>> KIP LOUTTIT: If you rewind in time to 2014 visionaries at the Port of Long Beach and at California Osberg each gave 25K. At the time the question was can a company in Rotterdam that designed a system for Rotterdam, North sea short period waves take inputs from CDIP, take inputs from NOAA, and the concern about a long period south swell. So that was the first study that was done. The study was successful that then yes you can take NOAA and CDIP inputs into a Dutch model. And yes what was the short period wave that they have, the long period swell we have, yes it works. So then the funding for the buoys came up for -- there was only one buoy when this

started. NOAA funded a second buoy for a while. Now Marathon at the time funded the third buoy. And then over time now Marathon is funding two buoys plus they are completely paying for Charta Software. I don't want to quote. We pay you basically by the year now for a subscription, if you will, to X number of transits that they will perform the calculations. Then we have a second contract with CHARTA for the validation. And I remember the first time that came up I'll say NOAA was a little offended. That may be too strong. That you going to hire this Dutch company to validate our models and to validate our wind. But everybody said no this is a good idea. If we're really going to trust the system. So we're paying by the subscription. We're also paying for the validation. The third piece as Karsten mentioned is I believe that the motion sensor is roughly 100 grand. It is the size of a one-pound coffee can that pilots bring aboard. It hooks to a laptop. So that records the actual motion of the ship coming in so you can compare it to the forecast. So we had to both buy that thing and do the implementation. And in fact now getting ready to re-capitalize that motion sensor. So hundreds of thousands of dollars, but the simple answer is to begin with Osper and Port of Long Beach put up the money to see if it would work. When that was success now Marathon is paying the complete rest of the bill for Charta Software and for two of the buoys.

>> JULIE THOMAS: And Tuba I know that you've been really involved with Captain Jordan on the Columbia River and they're running the OMC from Australia, more or less the same thing. But I think that, I thought about this because I'm kind of on a lot of those emails, too. One thing that's really different is that Marathon, the crude oil tanker is coming in here to Long

Beach. And it's so crucial of course because nobody wants a spill. And in the Columbia River I think it's mostly bulk that comes in. So it is a little bit different because there isn't like one company is that passionate about funding this up in the Columbia river. By the way Tuba there is a world class wave modeler herself and you've done incredible work up there.

>> TUBA OZKAN-HALLER: Thank you, Julie. Again I feel like this is a really great example of a public/private/university partnership. So thank you all for giving the presentation that's so nicely coherent.

>> JULIE THOMAS: And I also, Captain Louttit mentioned the funding for those wave buoys but we also have to give the State of California credit. Because that San Pedro buoy that's been there for twenty seven years or something has been consistently funded by Cal Boating in the State of California.

>> TUBA OZKAN-HALLER: Even better.

>> JULIE THOMAS: Does anybody else have on question on the panel?

My goodness you are quiet today. Nathan?

>> NATHAN WARDWELL: I figured I'd ask one since it's been so quiet today. Yeah I mean so I was just curious, you know, so this is a lot of precision navigation, elevation determination. CO-OPS is going through and going to be updating the national tidal map here soon and GCS is modernizing the system. Do you see challenges with those updates that will benefit the navigation in this region?

>> JULIE THOMAS: Do you know what that is Karsten? Explain it a little more for Karsten.

>> NATHAN WARDWELL: Man, it might be NGS's place to better describe

the modernization that they're doing. But re-defining the horizontal and vertical datums that are used to define positioning in the U.S. And then on the CO-OPS effort it is redefining mean lower level water and tidal data based on a new nineteen year period. And some of those things might have real small changes in this region and may not matter. But I'm just kind of curious if it's something that you are thinking about and have any input.

>> JULIE THOMAS: You know what, thank you, Nathan, for actually bringing that up. Because, Brad, you know -- Brad is the Director of the National Geodetic Survey. And do you know about the changes? I know that it changes the amount of change that we're going to see is different throughout the whole coastline. Do you know anything about Southern California?

>> BRAD KEARSE: Yeah I do. And what I would recommend is our regional advisor to work with you all closely. And I know Dana might be on the line. We have regional advisors throughout the country who know the local issues. Kim, I'm sure that you probably know Dana, and he could tell you any particulars. He's well aware of that region in anything. I think he is supposed to give us an update on some of the challenges here. So I'll make sure that -- I'm not sure he is on right now, but any particular interest in our regional advisors are there to support anything that's going on. That's what their role is. So I would recommend that we get Dana involved in this. And at least to respond to any local questions or concerns. High's well aware of the whole modernization effort. He's actively involved in all that. And that's what I would recommend.

>> JULIE THOMAS: Dana, are you on?

>> BRAD KEARSE: I don't think he is. I just looked.

>> JULIE THOMAS: I'll be talking with him this morning. We were going to carpool at one point. Kim, do you want to say something here?

>> KIMBERLEY HOLTZ: So basically, horizontally and vertically has always been a tied to passive monuments. The new system is going to use GPS satellites for the vertical and horizontal. And so we're moving -- it's moving more away from passive monuments. I mean that's the biggest deal. Vertically the West Coast or at least I should say Southern California will go back to an elevation that was very similar to the 1929 mean sea level elevation. So it's going to change like 2.7 feet in like Long Beach. So we changed when we went to NVA to 88 and now we're going to change back. Those are concerns that will have to be dealt with. Then convert to mean water for anything with the shipping industry. But it is definitely going to be a challenge. I mean, I work really closely with Dana and we both sit -- he hits at Scripps and these are things we're all talking about at the different county agencies so it's going to be a big change. At least for the surveying industry.

>> JULIE THOMAS: Thanks, Kim. I'm glad you brought that up, Nathan, because that is an important piece to the puzzle.

>> NATHAN WARDWELL: Yeah and couple things. I mean if it's going to, you know, improve the determination of the under keel clearance or reduce some of those uncertainties at all and be able to bring in more cargo then that's a big advantage. And then in one of the presentations earlier today there was that question of like hey are we using control or GPS right. Which was we're using passive or active control right. So it was a question so one of

the panelists brought up earlier. So thanks for bringing that up, Kim.

>> BRAD KEARSE: Nathan thank you for bringing that up. Because what we're trying to really emphasize in the modernization effort is everybody is connected to the new reference system right. That everything is. So when we get to modes of transportation and like Nathan was saying under the keel, bridges, everything in DOT's that are all tying to it, now we got a consistent reference system that we can take out any of those biases from passive control and whatever. I mean we've spent a lot of time modernizing the foundation of the georeference system. And it's going to be as accurate as we can get. And I'll talk about that when I give my presentation later on here this evening. But that's what we're truly trying to push. That folks understand it, what it means, and folks are moving in that direction and help you transform even your current data to get it to that new reference system so.

>> JULIE THOMAS: Okay. Thank you. You know what I think we're out of time. It is 3:00 here anyway. Let's see.

Sean, back to you. This has been a fantastic experience the last several years working with this panel. I always appreciate their attention to detail. And their focus on safety. It couldn't be more of a pleasure working for you. Sean?

>> SEAN DUFFY: Thank you, Julie. Reiterate, another excellent panel. We have a break. And as it shows on the screen, we'll reconvene in just under 15 minutes. 3:15 Pacific. Thank you.

[Recessed 3:01 P.M. PT]

[Resumed 3:15 P.M. PT]

>> SEAN DUFFY: I guess we're ready to roll. So I would like to introduce Darren Wright for the next presentation. I've known Darren for a long time. Now with manager precision navigation program. Do not think he needs much introduction to the members of the panel. And look forward to listening in. Darren, the floor is yours, Sir.

>> DARREN WRIGHT: Thanks, Sean. Our next slide. I think the last time I addressed this panel was right when I was switching jobs from national marine program manager to this position. About a year and a half ago. So, it's good to be back. Again, I'm Darren Wright, the Precision Marine Navigation Coordination manager. Back one slide, please. We've heard the term precision marine navigation thrown around a lot today. I like to start with a definition of what I consider precision marine navigation. What pilots and other mariners do on a daily basis. The ability to navigate a vessel in close proximity to other vessels, seafloor, bridges, narrow channels and other marine hazards like weather. Next slide.

The maritime economy is continuing to grow. What that means is more goods and services. Which means increased traffic. And, of course, the ships are not getting smaller. We've seen several examples of that this year. I might hit up Captain Betz for the image to replace Ben Franklin. That one is even bigger than this one. Next slide, please.

So because of this, the waterways are getting more and more congested. We're having clearance issues under bridges. Incidentally, the picture in the upper right, I got to do a ship ride with New Orleans pilots on the Mississippi River. And we were bringing a tanker southbound. And there was a tanker coming northbound on our right. And a barge on our left. And we went right

between them. But they were both moving. And I'm sure this is not just common on the Mississippi River. But in other busy port areas as well. Because of this, we need to integrate environmental information to help mariners navigate more safely. Next slide.

And NOAA has great data. We've seen a lot of that today. We have water level information. We have weather information. Electronic (unintelligible). High resolution bathymetry. At the moment it's all over the place. You have to go to different websites to get it. It's on different platforms, in different formats. Next slide.

So this is what the precision marine navigation program now is trying to solve. We want to take NOAA's great navigational information. Put it in this international standard format called S-100. Which we'll talk about in a minute. Put it on a dissemination system in machine readable language. And dissemination service we're using is the Amazon cloud. And you can go and find out more about this program. And also how to get access to this information. I'm going to talk about it in a second. Next slide.

So these are the data products we plan to offer up NOAA in this S-100 data framework. I'm going to touch on each of these as we go through. So you'll see what I'm talking about. Next slide.

So, we're going to kick things off with S-102, high resolution bathymetry. Jeff did a great job of going in-depth with this. I'll breeze by this. This is electronic navigational chart or ENC. You can see the depth -- excuse me. You can see the soundings throughout the channel there. And I intended at this point to point out the window. And say this is the entrance to the Port of Long Beach. Right out the window, in that direction. But I can't do that.

Because I'm in Maryland. Anyway, this is an electronic navigational chart. That picture to the right is a ship that's about to make that entrance. Thank you to Tom and the Jacobsen pilots for that image. Next slide.

This is an image of the portable pilot unit. PPU. Called CIQ that the Jacobsen pilots use. It's overlaying the S-102 data. As Jeff mentioned, it's gridded data. You can see not just the soundings. But you can do depth contours. You can adjust those to whatever contour you want. And that ship to the right is a specific depth. You can set your safety contour, which is what you see in red. And you can design that specifically for that particular ship. Not just the ones in a regular ENC. Next slide.

Now here is where it gets good. If you take that safety contour and you add in a water level forecast, as the tide is going in and the tide is going out, that contour is going to change based on the depth of the water. In this particular waterway, you can see at different times during the day, that particular vessel is not going to be able to make that transit. You can utilize this dynamic information to plan your transect so you can navigate safely. Next slide.

If you integrate surface currents on top of that, now you're starting to get a complete picture of what's going on environmentally when you're transmitting to help you better navigate safely. Next slide.

Here is another screen shot from a portable pilot. Again SEAiq that the pilots use. This is a basin. It looks like no problem. But if you do an overlay of the high resolution bathymetry, that particular vessel will have trouble making that turn. They're outside of their safety contour. Next slide.

But the portable pilot manufacturers are getting ahead of the game. NOAA is

not providing the information in S-100 format yet. But they've built in an ability to do tidal adjustment in their software. It's manual at this point. But in this particular case, they added two meters. Which better represents what's going on at that time. You can see the vessel is now going to be able to navigate safely. Next slide.

As I mentioned, all this stuff is configurable in the PPU software. You can set up your safety contour. You can set how many contours you want. Jeff talked about. You can set up a tidal adjustment. All of that is configurable in the software. This is how people are already starting to utilize some of this S-100 information. Next slide.

We also plan to offer weather information as well. We will focus on weather and wave warnings in the upper right. Next slide. So this is a weather chart. What it would look electronically. Next slide. Now if you take the wind warnings and overlay for gale force, storm force and hurricane force based on that weather system that's going on there, you get to see what the conditions are surrounding that weather system. Just than having to interpolate that weather map. Next slide.

This next slide is waves. So now you're beginning to see with the bathymetry, we're making it easier. You say within the lines for the bathymetry. And then you stay outside the circle of the conditions you don't want to deal with. If you don't want to deal with 14-meter wave, you stay out of that circle. I don't think there are many people who want to deal with 14-meter waves. Next slide.

So now you're beginning to see. If you utilize this environmental information together and it's all integrated, you now have the ability to potentially bring

in larger vessels. Next slide. So the Korean hydrographic and oceanographic agency. 104 is water levels, 102 is bathymetry. The graphic on the right is the normal route they take in transit during knight nice weather. If there's bad weather, they used to take that route to the south, the bottom of that image. And through utilizing water-level information and high resolution bathymetry, they determined even during bad weather they can hold to that route and alter the end of that route making 55% shorter, saving them $124,000 a year. Next slide.

With the transit they operate on the left they put the vessel on a fixed speed to get from port to port. On the right, they utilized an optimal view, utilizing currents and weather information. Again, they were able to save 14.6% fuel consumption and emissions. Next slide. You can go to marine navigation@NOAA.gov. That will take you to this interface. Many of you are familiar with this. Jeff showed this. And showed getting access to blue topo. But we also have S-100 product availability here as well. And if you turn on that tab, this is what you will see. Next slide.

And if you zoom down into an area of interest and click on it, it will give you a legend of what information is available. And it will give you links that will point you to the Amazon cloud. Where we have this information. And a lot of the PPU manufacturers, the electronic charting system manufacturers, once they figure this out, they go straight to the Amazon cloud and get the information they need. Next slide.

We've also built in some discovery metadata. Approximate you know what your transect is, you can set up, totally download the tiles of information you need. Bandwidth is a big issue when you're at sea. So rather than doing a

big data dump you see on the left, you can customize it to just the information you need. Next slide.

So where are we with all this development? S-102, we've seen some examples of how that's being used in Long Beach. We also have test evaluation data. That's what it is at the moment. In New York, New Jersey and most recently Boston, Charleston and Savannah. You'll notice it's in edition 2.1 with another edition coming out shortly. I'll touch on that in a second. We hope to offer up water level forecast information. So we can start testing that dynamic capability later this year. Surface currents, we actually have the most of. We have the most locations. Where we have an operational forecast system around the country. Again, it's in a version -- not the final version yet. Which I'll talk about here in a minute. The weather information, that's actually not going to be coming out for a couple of years. The polygons I showed you were derived from some of the weather models. But the ability to disseminate data in a polygon format, that infrastructure is not conducive to the weather service. We're working towards that. That will be another couple of years. ENC, we have a plan in place to transition from the old standard S-57 to S-101. But, again, that will take us a while to get there. And we hope to have S-101 data available for the major ports by 2026. Next slide.

There it is. So, this is what I was talking about. All the data standards we just showed you that we've done all this development work, these standards are not finalized yet. They're international standards. They're still working to put out the final versions. I'm told they will be finalized by the end of this calendar year. Because of that, we're not going to do any further test

evaluation, S-102 resolution, bathymetry data until that standard is finalized. Next slide.

So here is kind of the timeline. That column on the left is 2024. That big red line you see, that's when the S-100 standards for all those data types will be finalized. You'll see the ones that NOAA plans to offer, bathymetry, water levels and currents, we hope to have our version of that done pretty quickly. We've done a lot of development work to get us close. This final version will just be a tweak. We hope to offer that data early in 2025 in the major port areas. As you can see, the weather information will be a little bit further down the road. And then the electronic charting system, again, 2026 is when we hope to have this data available. Why does everything point to 2026? Next slide.

So this is why we're doing what we're doing. We're building to this deadline here. The International Maritime Organization has amended its electronic chart system. They've updated that standard to leverage those S-100 capabilities I was showing you earlier. And starting in 1 January 2026, the ECDIS manufacturers can start to utilize these capabilities. We need to have this data set right for that. 1 January 2026 is less than two years away. It's not far way. And then starting in 1 January 2029, any new ECDIS system manufactured is going to be required to utilize these S-100 capabilities I just showed you. I think that is it. Next slide.

So thank you very much. I don't know if you're doing questions, Sean, or not. Or whether we do them later.

>> SEAN DUFFY: I think we'll hold questions later. So that we can move on the time. As you know, the Mississippi River is going to be challenging. I will

say we were not on a tanker. That was the only thing I heard you get wrong that I knew of. You know somebody from NOAA is going to let you know you got that wrong. Heads up there. All right. We've got to move on now to the Director's panel. And have questions for Darren later in discussions.

I'm going to introduce, once again, Rachael Dempsey. Deputy Administrator for Navigation Observation to lead the director's panel. If I got that right, I hope. Thank you.

>> RACHAEL DEMPSEY: Thank you, Sean. Good afternoon. Good evening, everyone. It's good to see you all again. I'm happy to bring to you the second panel this evening that I'm hosting. Which we're going to discuss opportunities and challenges for the National Ocean Services positioning and portfolio. For those of you who may not be familiar with the offices in this portfolio, it consists of four offices. Three of which are represented and advised by the HSRP. Represented by Mr. Brad Kearse, the National Geodetic Survey. The fourth office is the IUS program many of you are familiar with. They do not fall under, but are great solid partners for us. Both internal to NOAA and external to reaching HSRP goals. I wanted to round that out for you all.

It's been a real pleasure being able to participate in getting the larger audience. Both inside NOAA and external to NOAA familiar with what we call the foundation for programs. The reason we call them foundation four is because they are, in fact, what NOAA was founded on, honestly. And so bringing this observation information to the public is extremely important to us. Right now, we've done a little bit of shifting. And focusing on our strategic goals. Largely because our administrative, miss Nicole LeBoeuf has

done the strategic plan for us. We're focused on meeting those strategic goals. Meeting our fiscal challenges. And how we're going to, you know, make sure that we continue to provide the stellar products and services based on our observational data in the near future. And the way that we get to do that is really by telling our story. So I want to tie that in with the panelists from this morning's group, with our local stakeholders. Who did such a beautiful job in helping us with that.

So all that being said, I would like to introduce Dr. Marian Westley, who is going to give us an update on CO-OPS programs and outlook for the future. Marian?

>> MARIAN WESTLEY: Thank you so much, Rachael. Just a warning, I'm in my office. And the light is managed by a motion detector that is very far way. If I'm in the dark, don't take it personally. It's more important you see my slides than you see my face. With that, let's go ahead and get started. This is sort of routine annual update we provide you on achievements and accomplishments coming out of the Center for Operational Oceanographic Products & Services or CO-OPS. For those of you new to the HSRP or new to this kind of meeting, we are the national authority of tidal currents and tidal datums. That's just to give you some context. Let's go ahead with the next slide.

So the updates I'm going to provide to you today are where we are with the National Tidal Datum Epoch update. I'll give you an update on the mandated operational program. The new tool we're about to release called the oceans map that provides coastal forecasting. Where we have forecast models with observations. For those of you who are not familiar with coastal inundation

dashboard, it's the main entry point to our data for resilience purposes. Where we go when we're watching a storm coming in. And I'm going to mention some of the observing system improvements we've been making. Not exclusively, but largely with funding from the bipartisan infrastructure law. And I'll give you an update on the PORTS program. PORTS stands for the Physical Oceanographic Real-Time System. This is a public/private partnership program we've been running since 1990 where we partner with navigation entities and add sensors to a region with their partnership. Those sensors that are needed specifically for navigation needs at that port.

Okay. Let's go ahead with the first one. The NTDE, the National Tidal Datum Epoch update. There's a cycle that's the longest of the gravitational cycles we pay attention to. We really try to update and define that as tidal datum epoch. So the sun, the moon and the tidal wave have gone through their whole system in the 18.6 years. We try to update the tidal datum. Mean Higher High Water, all of those, we try to update those to acknowledge we've gone through another tidal datum epoch. The current one that we're in. The current update we're doing is based on data from 1983 to 2001. The new one will cover data from 2002 to 2020. So the next epoch. That will be released after 2026. It involves analyzing over 2,000 active and historic tidal stations. And recalculating the tidal datums in all of our locations. We will be doing a lot of outreach and rollouts. If you are interested, we've developed some training invoice. We're doing regional webinars. I believe Eric Peace is going to help us with the lake's version, which is related. We'll be doing a lot of presentations. If you, as a stakeholder group, would like a presentation, please let us know. We would be happy to include you in that

rollout. This will have big impacts. Any stakeholder that needs to know where mean sea level is or chart data. It will affect our system, our ports. We'll update our web pages and NOAA SLR will be updated as well.

Let's move on. So every year, why tree and make progress on NCOP, the National Current Observation Program. So these are very intense field campaigns. Where we'll go into a tidal estuary or tidal area. And place tide gauges -- not tide gauges. Current meters on the sea floor. Leave them over the summer. Collect them again. And analyze all that data. So we're done with Delaware Bay. We finished the field work for Columbia River. It's a very long river with violent currents. And we think we'll have predictions completed for that in 2025. We started working on Savannah River. We did observations last year. We'll start the analysis soon. That's an area that pilots have been requesting updated current information for over ten years. Our next one coming up is Charleston Harbor. The survey is planned starting this summer in May. And continuing through September. Again, the requirements for these are largely based on navigation needs. As you're all well wear, as harbors change and evolve over time. The way the tide interacts with that, the bathymetry changes and the currents need to be updated and reanalyzed. We also provide this data for model validation and just general oceanography. That's where we are with the NCOP surveys.

Next slide, please.

So, this is a new tool. We're about to roll out. It's in its final testing right now. It's going through all its IT security checks. This tool we developed in partnership with IUS. And this tool basically is a visualization tool that allows you to look at all of our OFS data, ocean forecast system data. As well as

observation data signature together in one place. And a sophisticated user can make the view pickup already decided you're in Chesapeake Bay system and all the observations there, you can create a webpage that will update that for you. I think it will be a great tool for people to look in real-time and have sort of that environmental intelligence of what's going on between both the sensors and the ocean forecast systems in those regions we have the systems running. So that's Oceans Map. We'll send notes out to the HSRP when it's finally fully public. I have a beta version. I play with it a lot. We should have this over the finish line by the end of this month. Next slide, please.

So, as you know, coastal inundation dashboard is the main way into our website for when you're looking for that situational awareness that a storm is coming or something unusual is happening in your area. We really developed this product very much in collaboration and coordination with the weather service. We share our tidal data with the weather service. Minor flooding, moderate, major flooding thresholds in the same regions as our tide gauges. The things we've added -- because this is a place where people -- often it's their first Port of Entry, so to speak, for an incoming storm. It's very important we have all the national weather service text associated with those active flood watch, warnings and advisories. The website also directs you to the weather service for that actual kind of forecast, life and property guidance. We also improved the layout to make it easier. To sort of move between these different products. More seamless between the coastal inundation dashboard and our tide and currents pages. I'm sort of addicted to this website. I look at it on my phone a lot. We had

optimized for phone viewing a few years ago. To update situational awareness, if you have a storm coming to an area you care about, this is a great place to go look at it. Next slide, please.

Okay. So this is showing, you know, how we will have the pop-up of that National Weather Service authoritative text when there's a situation coming. Go ahead, next slide. Great. So here is the observing system improvements we've been able to make thanks to the bipartisan infrastructure law. A budget to recapitalization and modernization of our gauges. This isn't just for standard annual maintenance. This is for upgrades and evolution. We rebuilt the Charleston, South Carolina, station. I believe it had been hit by a ship at one point. We've moved it. We also put the wind gauges for this station up on the pilot house. They're up out of the way. This is an area where cruise ships will come. The wind gauges and cause a wind shadow. So they were kind of useless. We also added in partnership with the local weather service station, we've added a custom green gauge to this. Again, because we already built the platform. We built all the communications equipment that goes with these platforms. Usually look for opportunities to add meteorological systems to them as well. One thing we've been doing -- oh, and what we've done for the pilots here is we've hardwired the wind gauge data into a unit inside the pilot house. So they can look directly at the wind gauge as opposed to looking at the wind gauge data as it's come through the satellite back to our website. That was something they requested. And we were able to handle that request for them. Another thing we've added to this station is a high-resolution WebCOOS web cam. R & D program that is being run to put web cams around the country for situational

awareness. This one is looking at Charleston. And it's now -- we initially had a single view. Now it has six different viewing angles. Every minute, it will go around and look at these different viewing angles. Next slide, please.

One of the reasons we really like web cams, reliable web cams, and why we're often looking for web cams in areas where there's been a storm is for that situational awareness. So these two images, the top one shows what was happening. There was a December east coast storm in December. And so we were all watching, you know, that big system come through. And watching as it went through those weather service thresholds of minor flooding, moderate flooding. And the bottom one, I believe, is Hurricane Idalia as it came through Charleston. What we find helpful with these is we can show you a tide gauge plot. For sophisticated users like yourself, that's perfectly meaningful. For your average member of the public, it's helpful to be able to match when the plot looks like this, this is where the water is on the ground. So, again, we've done a few of these in different parts of the country as opportunities arise. Kind of on an experimental trial basis. Just to really enhance the communication ability of the tide gauge. This is what it looks like on the tide gauge. This is what we measured. And here is what it looks like in real life. Next slide, please.

So another real benefit of having a web cam there is for visibility. A lot of our harbors' major hazard is fog. This gives a real-time view. This is what's going on around the harbor. This isn't a visibility sensor per se. But it gives that situational awareness as they're making safety forecasts. This is testimonial from Jonathan Lamb at the Charleston office. Saying it's always been difficult to find high-quality, reliable web cams with good views of

Charleston Harbor. We absolutely love the NOS web cam and use it regularly on the forecast shift. Not a sensor, but gives that extra situational awareness to our weather service partners of what it really looks like on the water when they're making marine forecasts. Next slide, please.

So another thing we've been focusing on is website improvements. We do have BLI money to hire IT help. We've been looking at high and low water conditions. Low water is a major hazard to navigation. It used to be subtle. You had to go looking for the low water. We have a page for high and low water conditions. Now we actually put that same sort of banner that we put when there's a big storm or flooding. We now put that banner when there's low-water conditions. That's one upgrade in the web design. Another update for low water, instead of having our CORMS watch standards, manually figure out and put it in, now it's automated. So in the future we could develop custom thresholds for when a group wants to determine that this condition is low water. And there needs to be some hazard warning about low water there. The low water criteria right now for tidal stations is 18 consecutive minutes where the water drops below 1 1/2 feet below mean lower low water. That's across the board. That can be tuned or altered if that's not a meaningful definition in that region. For Great Lakes also low water is a critical navigation hazard in the lakes. And so the criteria there is 12 consecutive areas below low water data. Again, this is not a major change in our website. Just an upgrade to make that information easier to find and more visible. Next slide, please.

Okay. So the PORTS program I introduced earlier in the conversation. PORTS stands for the Physical Oceanographic Real-Time System. And this is

a program that we stood up after the sunshine skyway bridge in 1980. Around the '90s, we started this program. It's a partnership with various maritime entities where an entity will come to us. And say, we like your tide gauges. We like your current surveys. But what we really need to navigate safely in our harbor is a visibility sensor and air gap sensor, current meter. Some combination of those. We have, I believe, 38 active port systems right now. And these are the enhancements we did this year. These are not new systems. These are just adding sensors to an existing system. We added visibility and wind to Fort Morgan, Alabama. Water level station in Kalama. Two current meters in Port Everglades. Jacksonville, current meter. Mobile Bay another current meter. Port Fourchon, upgraded water level station. And initially we were looking at putting the air gap sensors on the other spans in the Bay Bridge. Now we have two fully redundant systems be that same span. New PORTS in the work, hopefully we'll get Pearl Harbor. That's a system in partnership with the U.S. Navy. Honolulu, they've added water level station inside Pearl Harbor. I think at the NOAA facility there. There's a meteorological station, two current meters and integrated in the CDIP wave buoy. And then working on Seattle in partnership with the Northwest Seaport Aligns. That's what we've been up to in PORTS this year. Next slide.

Okay. That was my last slide. Terrific. I will go ahead and hand it right over to Admiral Evans.

>> RACHAEL DEMPSEY: Before we move on, Marian, thank you very much. I want to make one correction. In the introduction, I realize I failed to acknowledge Larry Mayer, who is here, supporting us. He is the director for

the center of coastal mapping. Larry, we look forward to talking to you and hearing from you about unmanned systems. For now, we're going to go to Admiral Evans. To talk to us about OCS strategic planning.

>> BENJAMIN EVANS: I would be happy to go straight to Larry. I'm sure for those of us particularly on the east coast, where it's getting late, Larry has something that's much more interesting than anything I have to share. You'll have to suffer through me -- suffering through me and Brad is the price of getting to Larry's presentation. Again, panel members, thank you for the opportunity to speak to you today. And for your continued engagement. There continues to be a lot of incredible work going on in Coast Survey. I'll dive right in. Next slide, please.

So, we are in year two. We're moving into year two of our new 2023 to 2027 strategic plan. I spent a fair amount of time in the last update in the fall talking about this. Those of you who haven't had a chance to look at this, I encourage you to hunt it down on our website. Our strategic plan Coast Survey aligns well with the west strategic plan that Nicole mentioned in her remarks Earl today. Army plan and Coast Survey lays the course to complete from a solely product-based to one that's focused more on data and the products and services that data enables. The plan lays out how we'll meet that challenge to provide that to the users who need it in the right format in a timely fashion. For those of you who haven't heard me rant about this previously, I encourage you to take a look. But really, completing that Coast Survey strategic plan was one of our many accomplishments last year. You may want to take a look at our year in review story map. There's a QR code on the side to dig deeper into our accomplishments in 2023. Feel

free to take a look at the beautiful pictures and read some of the vignettes to learn a little bit more. As we continue to move on in this plan, I would like to take a moment to highlight changes in our leadership team since we last met. First of all, Captain Sam Greenaway taking over Commander Brianna Hillstrom, who will retire later this spring. Sam is with us today. I encourage you to pick his brain over the next few days. I'm pleased to announce that Captain Hector Casanova will be reporting in June as the chief of the navigation services division. Currently finishing his assignment. Matt Kroll continues as acting chief of NSD until Casanova arrives. Supported by Mr. Mike Annis. Lieutenant Commander John Kidd, the branch responsible for our navigation response teams. Which many of you interact with. I also would like to acknowledge that Mr. Craig Winn, a long-time Coast Survey employee has been selected as deputy chief. And Dr. Ed Myers is taking over as acting deputy chief of our Coast Survey Development Lab. We continue to see a steady changeover in leadership. And look to solidify that team here shortly. Next slide, please.

Just to remind you of our strategic plan, I grouped our updates this evening according to the elements of our strategic plan. First up, we have goal one. Which is to expand and strengthen U.S. capabilities to acquire high-value coastal view and ocean data. We'll talk about our 2024 field season. Discussion with contractors have begun. We do anticipate another exciting year in FY 24. You see the areas we're planning to have survey projects there in the graphic. We expect to have NOAA Thomas Jefferson, Fairweather working this season. Significant progress has been made toward addressing the staffing short falls we experienced last season. In our new

center for excellence Great Lakes mapping through that, we've trained a cohort of new hydrographic technicians. We hope to have a better staffing situation than we did last year in the middle fleet. It does remain a challenge industry-wide. Other highlights include survey in the transit quarter from the Bering Strait. We have a contracted project in southern Lake Michigan. NRT and NOAA fleet work planned along the northeast and gulf coast. When our hydrographic story map is shared later this spring, we'll have more. This is getting the final appropriation. Which we are hoping for in the next couple of weeks. At that point, we'll be able to nail down what we'll be able to support with our contractors and what the fleet will be able to support. We'll have more details at that time. One thing that isn't a major update that I wanted to share is that we do expect that the -- will be returning to the hydrographic survey fleet this year. That's very exciting. You may recall that vehicle operated from the Thomas Jefferson in Lake Erie in summer 2022. That was moved over to the fisheries fleet where it supported in the bearing sea. We do have it back this year to resume hydrography. Which is exciting. Rachael also mentioned the contract ward class B ships to be replaced Fairweather. Those are operating in their 56 field season. Last fall, we discussed major fire that was suffered at sea American Samoa. And I am pleased to share after a rigorous cost effectiveness analysis supported by Coast Survey, NOAA determined it did make sense to repair Rainier and return her to service. The ship will be ready to operate early this fall. Next slide, please.

So on the national ocean mapping, exploration and characterization front, the major news is the release this week of the fifth annual report on progress

toward mapping the U.S. ocean and Great Lakes waters. We'll share the link when it is out. You can follow the link to the IOCM webpage there. It will be updated as soon as the report is finished later this week. We've gone from 50% unmapped in 2023 to 48% unmapped in 2024. This represents a substantial amount of mapping work. But it's still slow going when you remember our goal is to finish waters deeper than 200 meters by 2030. And shallow waters by 2040. I mentioned earlier we're working with interagency partners to increase the understanding of the urgency of this effort. We're having some success with that messaging. For instance, Michigan Congressional delegation have introduced a Great Lakes mapping bill. Which would authorize $200 million through the end of the decade. This is an authorization, not appropriation. But it does indicate that Congress is beginning to understand the importance of this work. In other positive news, House Natural Resource Committee staff requested a briefing on Coast Survey, which we gave last week. We anticipate further intersections with our mission and member actions. We hope to be able to focus more on the Great Lakes at our next HSRP meeting in the fall. One of the focus areas that we strive to support, map and chip away our goals. I mentioned lake bed 2030 for the Great Lakes. Sea escape Alaska is the regional campaign mapping in Alaska. As you see, Alaska remains a significant area of unmapped waters. And we'll hear from Jeremy Potter on Thursday about the express regional mapping campaign off the west coast. And Ashley Chapel was just at the Gulf of Mexico Alliance conference to build support for regional mapping campaign in that area. Another update is the release of final version of the ocean mapping protocol. We're giving it one last look

before it goes public in late March. We're putting imagery in Crowdsource as another way to fill these gaps. Coast Survey and NOAA are supporting the effort, including Crowdsource working group. And its work to establish Crowdsource bathymetry guidelines. And the report tool. Which can tell you how much gap area you fill as you transit. And also working with our academic private sector partners in acquisition technologies. And finally engaging with different communities to support submissions to the national hydrographic. Next slide, please.

This brings us to goal two, to deliver products and increase data decision making. Chart offerings. We remain on track to cancel the last of our paper charts by the end of this year. At the last meeting we discussed the NOAA custom tool upgrades in 2023. We continue to build on these enhancements. Expecting a possible version 3.0 release later this year. And the tool is getting better every day. We continue to work closely with the Coast Guard and pilot associations to support transition of pilot's licensing to the custom chart tool output as well as Mariner training and certification in general. Again, we don't see the custom chart as replacement for our paper charts. But rather a valuable tool to augment and complement our navigational charts. We've been heavily engaged with stakeholders, discussing products and services with be a particular focus on the lower Mississippi River. Including the Coast Guard, Army Corps around a range of issues. These issues are not unique to the Mississippi River. Will be applied to what we learned there to other locations. Also turning out product updates. One of those was new open sourced of NOAA's now COAST. NowCOAST is a modeling visualization for coastal, meteorological hydrographic all on a single

picture. With service running in the cloud. Reducing response time for users. We also are offering a new mobile-friendly web app for the nowCOAST tool. I want to highlight in the picture on the left, we had the opportunity to visit the Tampa Bay weather service office. And we saw nowCOAST prominent use on their biggest monitor. They promised that wasn't just because the ocean service folks were there. It's a tool they use every day to combine and visualize data from a range of NOAA sources. Next slide, please.

Another focus area is coastal mapping. We expect 3-D Pacific and Alaska is in development. As part of our ongoing engagement on modeling, six of or modelers presented their work at the American meteorological society meeting and ocean sciences meeting in New Orleans. That was very exciting. It really is exciting to see how these models, rooted in the navigation mission really have broader application to a range of coastal resilience. Next slide, please.

Goal three in our strategic plan is to sustain and enhance a highly skilled, diverse, and thriving workforce prepared to adapt the change needs. A lot of activities in this space. The main thing I want to focus on today is the standup of the center for excellence of operation ocean Great Lakes mapping. I'll pause and emphasize this is for ocean and Great Lakes. Folks often hear Great Lakes and skip over the ocean part. It's across waters inclusive of the Great Lakes but not limited to them. Center of excellence will be a NOAA focal point for transitioning systems to operations. Providing technical support for mapping and survey operations. Developing and diversifying our mapping workforce. And throughout all of that, leveraging

partnerships with public, academic and private sector partners. Now it is the NOAA focal point, not just Coast Survey. We're doing this work with partners across the agency, including the NOAA fleet and office of exploration. We received funding in FY 23 to begin this, stand up this center. It looks like we're hopeful to be able to continue that with support in FY 24 and beyond. We have a phased approach, adding staff under the leadership of Andy Armstrong. Who is serving as acting director of the center. In addition to his regular full-time job as codirector of the center at the University of New Hampshire. We awarded a three-year construction grant to the University of New Hampshire to begin building a facility that will house the center and other partners. I want to emphasize that it's far than just a building. We're moving out on programming right now. Focusing on workforce development to start. Because that's an area of critical requirement. We're transitioning and expanding our training offerings to the center. We just wrapped up a three-week hydrographic training program. Which taught a cohort of students from Coast Survey and inform OAA. Space intelligence agency and the Marine Corps. Thanks for a reminder on time. I'm probably going to go a tiny bit long. I'll keep this moving. Another center of excellence opportunity we'll be expanding is the successful training cruises we had last summer aboard the ship Nancy Foster. Dedicated ship time to focus on training undergraduates in ocean mapping. We expect to expand that under the center this year. We have a full business plan under which we'll continue to expand the center's activities. As we expect to build the center's work with other academic institutions and the private sector to expand our reach and success. Next slide, please.

And that brings us to goal four. Which is to evolve coast survey systems and processes in timely product development and delivery. A big part of this is external engagement. Since last I met with you, the coast survey team and I have been engaged with many critical partners. Including in the international sphere as hydrographic offices worldwide work to finalizing the S-100 standards. S-100 transition is the focus of every meaningful engagement we have. Whether it's well-established hydrographic offices such as UKHO or the Japan hydrography and oceanography department. You can see pictures that took place a month ago there. Or smaller nations such as those we work through the Caribbean coalition that met just before Christmas. Looking ahead, this work on international standards will continue. The hydrographic commission meeting and the ISO meeting, all of which are coming up in early May and June. And we work with our international pardons to ensure our vendors are receiving a clear, unified signal. It's also the way we build capacity to ensure all nations progress down the path to electronic navigation. To ensure worldwide coverage without leaving any country or region behind. Next slide, please.
Also under product development and delivery, I'll breeze over this quickly. The national bathymetric source.
[Silence]
>> ERIC PEACE: I think we're frozen.
>> RACHAEL DEMPSEY: Ben, you're back up now. Ben, we can see you. Can't hear you.
[Silence]
>> BENJAMIN EVANS: Can you hear me now?

>> SEAN DUFFY: Yes, Sir.

>> BENJAMIN EVANS: Okay. Apologies, Sean. The national bathymetric source is sea floor high resolution model. Sea floor resolution models compiled from the best data. We have that built out now on most of the east coast. Frankly, we expected to have the midatlantic complete by now and moving on to southeast Alaska. We have funding to do so under the bipartisan infrastructure law. And to be perfectly frank, we've run into frustrating delays, bringing personnel aboard to do this work. We do expect to have the east coast and gulf coast completed by later this spring. At which point we move on to southeast Alaska, the Great Lakes, the west coast, and the Pacific. On the right you see our progress toward transitioning our ENCs to regular grid. When first built 20 years ago, they were tied to the footprint and scales of paper charts. That made sense at the time. With paper charts in cancellation status, we're transitioning ENCs to a regular grid at five regular scales. This will make our system much more efficient. And we're also continuing to build out S-100 suite. As Darren mentioned. We have S-102 test products from Long Beach to New York, New Jersey, Charleston, Savannah, and Boston. Next slide, please.

I think that brings me to my last slide. I'll conclude by saying -- can I skip that one? That covers what Darren covered. I appreciate the opportunity to share these updates with you. We've had a great, really outstanding panels today. Tying the local perspective to the products and services that NOAA is creating. I'm proud of what we've accomplished. We're not slowing down. Look forward to our discussions over the rest of the week. With that, I will hand it over to Brad.

>> BRAD KEARSE: All right. Can everybody hear me?

>> RACHAEL DEMPSEY: Go for it, Brad.

>> BRAD KEARSE: Thanks, Rachael. Thanks, Ben. And to follow all this up and continue the conversation, one thing that I was told when putting these slides together is that I only have ten minutes. I'm going to keep to my ten minutes. And if I need to do it sooner to get us on track, I'll do that. Let's jump right into this. I'm Brad Kearse. I'm the Deputy director of the National Geodetic Survey. You can go to the next slide.

What I want to go over is our modernization efforts that are ongoing. Everybody has heard about it. Give you some quick updates. GRAV-D. As Rachael said, we made updates with that. And backbone in the system moving forward. VDatum updates, a collaborative among the three organizations here with OCS and CO-OPS, NSO. Coast a mapping updates, mostly OCS and other things. And moving out on geodesy crisis. New strategic plan and leadership under way. Next slide.

So, let's jump in to the modernization effort that's ongoing. If folks don't know and are new to HSRP, we've had this modernization effort ongoing for many years. The reason is, as somebody said earlier, the current datums were defined before GPS technology. So now we've relied on old techniques and the way we did things. Basically with physical survey marks in the ground. Now it's based on Global Positioning System. Continuous reference systems. It will be better alignment with all of our geospatial data in the future. We hope everyone is aligned with that. It will improve accuracy, access, and alignment of positioning systems. And then it's just going to be better as we move forward to enable better alignment of NOAA's data to

support climate ready nations. It will give us a way to be more equitable or give equitable access across a fourth of the earth. When you look at the area from the United States all the way out to the Pacific. That does cover about a quarter of the earth. Next slide.

So let me give you some quick updates. Now we're getting closer to this finish line of modernization timeline. There's a lot going on. Our teams are still heads down. But the great news is, we're getting closer. Lick we've said, there will be a beta release of the National Spatial Reference System modernization data and sets of tools in mid 2025, next year. We'll test that for six months. Once we get those tools, we'll test them to make sure everything is working. We'll work with all of our users. Then we'll go to the federal geodetic subcommittee. Which is under the federal geodetic committee FGC, making sure to get adoption for 2026. These are the timelines we're running on right now. We expect there won't be any issues or concerns to get there by that timeframe. The biggest thing is getting out and really talking to our constituents. Working with all our federal agencies and private firms out there to move forward. This is great news. We're getting closer. And, like I said, we're getting really excited about what is going to happen next year. And the real work and explaining to all the folks out there about moving to the new datums. In 2024, we just released a new research plan. Which will plot the course for us moving into the future. We do have an alpha release of our new GEOID. We've collected all the data related to GRAV-D. I'll go more into that. By this Midsummer, we'll have a beta release of our CORS station pages with the data delivery system. We're going to have a beta Reference Epoch Coordinates adjustment. The first set

of new coordinates on 100,000 marks this summer. And then we will have dynamic heights from GNSS tools that will be available. They will be great tools to be able to use for management. Let's go to the next slide.

So, let's get into a little bit more detail of things that are going on in the timeline. Mid to late 2024. ITRF. As folks now, our modernization system and our reference system will be aligned to the international terrestrial reference frame. As we talk about all these different acronyms, that's what that means. Coordinates or CORS, continuous operating reference stations. That's a NOAA continuous operating reference station. That is a partnership across the United States with many different organizations, academic institutions, state transportations and many others. We'll have coordinate functions to describe the dynamic nature of how stations in the NOAA CORS network will move over time. This dynamic situation of showing you how those stations are moving with time. We've got a VDatum release for the west gulf coast by this summer. We're doing contract work to build out our new foundation CORS. That is through BIL money. GRAV-D reflights. We collected gravity across the United States and all of its territories, including Alaska. We're going back and doing some clean-up, mostly in the gulf coast areas. The reason for that, those were corrected kind of right from the beginning. So we're going back since our techniques and the way we collect that data has gotten better over time. And then by 2024 and 2025, we're going to start rolling out these beta products. As they say, in domino style. They'll be right behind one another as we build out our beta website. Look for that, as things come out. And then we'll start doing the official testing next summer of the modernization or modernized National Spatial Reference

System. We'll be getting feedback from folks for six months. Any adjustments, changes we need to make along the way. Once things look good and we've made those adjustments, getting feedback from folks, we'll take that to a vote. And then we'll claim that -- once that vote and everybody is comfortable with that, we'll call that the modernized National Spatial Reference System for the official purpose. That doesn't mean everything is done in modernization. We will continue on in many different ways to continue modernizing the National Spatial Reference System. Once 2026 happens, we will continue on to the next steps. We'll continue to work with our constituents and federal agencies about what they need. All right? Let's go to the next slide.

So, with that, you're going to see us in many different places. Trying to explain the importance all the way from the National Science Teaching Association. So we can start getting in at the grassroots level of explaining it to folks at the high school level, as teachers teach things about the importance of the National Spatial Reference System to NSGIC. Getting out there among the geographic folks. To Utility Engineering and Surveying Institute. Looking at underground utilities. And why that should be tied to the National Spatial Reference System. And we'll be working with folks on all the geo industries, the geo summit that will be taking place in the fall and September. We'll be working at all those different outreach events. And there's many more. That's where you're going to see us. If you have other ideas and places we should be, we've only got so many resources. We're putting together an engagement strategy of where we should be, when we should be there. And making sure we can get with all of our constituents in

explaining the importance of the National Spatial Reference System. Next slide.

As I said, GRAV-D, we're excited. We're going to celebrate. 100% complete. Like I said. That's going to help with our new Geoid in updating that. It will go into production soon. We have the data we need for that. Which is a wonderful excitement. And we're excited about that. But we continue to collect. To make sure this product can be the best it can be. We're going to refly select regions. We're going to look at a Geoid monitoring service to collect additional information. And several terrestrial gravity campaigns. Including working with our partners in NGA. Next slide.

All right. Foundation CORS update. Like I said, this will be the backbone of the National Spatial Reference System. We did get BIL money to accelerate this and build it out. 12 of the 15 stations, the recon has been complete. Designs are under way and installations are starting in 2024. This is being done by a private firm in conjunction with us. And we're looking at other ways to get other folks involved in helping us build this out in the future. You can see the map of what the new foundation CORS -- where it's going to be. Where those stations are being built out over the next few years. Next slide.

All right. VDatum models. This is a cooperative among all three of our organizations here that are on the line. The VDatum work plan from 2025 to 2028. The coverage area is based on marine grids generated from coastal ocean modeling in reference to tide stations and benchmark observations. The next releases we have are in Texas and Louisiana, within the west coast region down there. And that's going to be mid 2024, here this summer. And

Alaska will be in late 2025. You can see the Atlantic, gulf, and Caribbean in 2028. And the Pacific Islands in 2026. Let's go to the next slide.

Coastal mapping highlights. We're definitely in support of the NOAA ENCs. And we have a shoreline -- a lot of our work that's done under coastal mapping is done under contract. Under an IDIQ contract that is a $40 million, five-year contract renewed in 2025. It's got a recompete that's happening next year. The ceiling was just raised to $114 million. So we've been moving out on that. And there's lots of money. We're using this for BIL work, supplemental work after hurricanes. Shoreline mapping piece to continue to help out with OCS. Also for GRAV-D collection. And then in '24 this year we'll also be using to help build out our CORS stations pending FY 24 appropriations. Let's go to the next slide.

So these are just a lot of projects we have going on. And what's planned, acquired and completed. You can see, we have some of this inland mapping that is going on. I'll explain that when we get to it here in a minute. And just for the sake of time. So everything from out and completing in the northwest Hawaiian island chain to Guam and the Marianas, Alaska, American Samoa and where we see domestically. Let's go ahead to the next slide.

Here are some of the acquisitions done going along the northwest Hawaiian islands. I like pretty pictures. Including all the way to French Frigate Shoals. Let's continue on.

>> RACHAEL DEMPSEY: Brad, in the interest of time, would you mind jumping to the BIL and the geography crisis so we can make sure Larry has enough time?

>> BRAD KEARSE: Yeah, I will.

>> RACHAEL DEMPSEY: Thanks.

>> BRAD KEARSE: Yeah. I'm just going to jump to this slide -- let's go to slide FY 22 BIL. There you go. So, you can see under BIL funds something different we've been collecting is ravine areas. And really working with our partners at the National Weather Service. And looking to help out with -- this is a new effort by the NGS and OCS to help support the next gen water models. These are some of the areas that have been collected from Florida up to New Hampshire, Maryland and Virginia, and down to southern Texas. Let's go to the next slide for the sake of time.

You can see, we're also working in River areas within the Ozarks and Harper's Ferry. Collecting the river areas, which will help out in looking at the river bottoms for the new models as we work forward, helping out the National Weather Service with their hydrology pieces. Next slide.

And then here are some of our hurricane supplemental for Ian. And then also the Typhoon Merbok up in Alaska. This is in partnership with USGS. And leveraging all of our money together to be able to get the collection. And really to collect even more using the resources from each of the organizations. All right? Let's go to the next slide.

We are addressing the geodesy crisis. We have a community of practice established. We're going to talk more about the geospatial model grants coming up in the next couple of days. And we do have an undergraduate internship pilot program under way. Let's go to the next slide.

This community of practice is moving out. This is a collective group between ours, NGA, NASA and USGS to talk about geodesy issues. Everything from

data sharing, equipment sharing, software. We are moving out with, I'll call it, a plan of infrastructure for geodesy across the United States. And we've got some meetings coming up. We've got one in April. And also in October. Let's go to next slide.

You'll see more about this in our modeling grants. We're really excited about this. We hope it continues. Scripps and Oregon State in the next couple of days. Next slide. We're hiring four pathways. I know Rachael talked about this. Coordination between NGS, CO-OPS and OCS. That announcement should be out in a couple of weeks. We're really excited. We have three offices in the Chesapeake area. We hope to get them into our field teams. And really at the undergraduate level. Get them involved in all the different work that we do. We're really excited about that.

>> RACHAEL DEMPSEY: Brad, this is great. Because it's going to go then into the new strategic plan that you guys plan to release later this year, right?

>> BRAD KEARSE: Absolutely. So the workforce piece, we're really excited about this. It goes along with our research plan. We're working on that. Should be out at the end of the year. And let's go to the next slide. Which is everybody should know that Juliana is retiring at the end of March. So we're going to have a celebration for her here next week. The selection process is under way for a new director. I will be acting starting April 1st. And Brett Howe, if you know Brett maybe along the way, he will be the acting director. I'm going to call it at that for the sake of time.

>> RACHAEL DEMPSEY: Awesome. Thank you, Brad. Last, but certainly not least, Larry, we want to hear all about your unmanned systems. Thank you

so much for your patience.

>> LARRY MAYER: It's not a problem. I'm just thrilled I'm still awake. This is very close to my bedtime, I have to say. Okay. I'll try to be as quick as I can. This is going to be a little different. It's going to kind of be a philosophical discussion. Talk about the efficiency of uncrewed systems. There's been a lot of excitement about the use of uncrewed systems. In our business and beyond. We've heard some of it today. And that excitement is often focused on the cost savings and other benefits that uncrewed systems can provide. I also have seen a lot of harsh surprises, as people start to use them. And see maybe it's not as cheap as we thought. Maybe there are other issues we haven't thought about. I want to discuss what we're doing in the lab to try to look at these issues. I don't have the answers now. I want you all -- if I can leave you with a message, just have an open mind. Let's not close the case on this one way or another. So next slide, please.

As you can see from this slide, we've been using a number of systems. I'm going to look at a couple of different situations. We were looking at their application. And the first is very relevant to Coast Survey. This example I'll show was out in the middle of the Pacific. It was in shallow water. And it touches on what Brad talked about. Some of the lidar work in the mid Pacific islands there. And it's using an uncrewed system as replacement for NOAA crewed launch. Next slide, please.

A lidar survey was done around this small island. And it gained cover as much as was hoped. And so we happened to be out there on another mission and we thought this might be a good opportunity to see whether we can really use the mother ship and the Drix. And can we double the

collection data? And what would the trade-offs be? Next slide, please. There was early data in there. You can see some of the data. The goal was to cover the wide area there. Could we do that in a relatively limited time? Next slide, please. I'm going as fast as I can here. So we can catch up a little time. The problem we faced when we got out there is that the weather was relatively rough. And we basically found out that given the launch and recovery system, the heavy weight of the vehicle, we could not launch safely the vehicle. And particularly not recover it. So I think -- Andy was out there with us. A number of NOAA Coast Survey people. They'll also say we couldn't have launched a manned -- a crewed launch either at that time, given those conditions. So what to do? Next slide, please.

Here is one of the advantages of the uncrewed system. High speed and long endurance. We were able to -- you see the dark area in the upper left there is where the small island is. We were able to run 120 miles back into the bigger islands. Launch the vehicle and then run back to the survey area and still have enough fuel for three continuous days of survey work. And that's something we couldn't have done ever with a manned launch. There was a clear advantage there. But, again, what about the Manning? What about other issues? Next slide. What about the quality of the data? Next slide, please.

We did find that it was quite straightforward to run the vessel and the launch. We could separate, in that case, as far as 20-kilometers, using what we called marine broadband radio system. Simultaneously collecting data from the mothership and the uncrewed vehicle. And now with the star link, that separation could be even further. We also found that the data was of

high quality. Next slide, please.

About 95% of it meeting or exceeding NOAA's specifications. This will all be the subject of a thesis, an officer in our program. Lieutenant Airlee Pickett. And she'll look at this type of operation versus a NOAA crewed launch. We're hoping when she's finished with that, we'll have hard facts about the relevant benefits or not of this approach. Next slide, please.

In an upcoming situation, it's a different and exciting situation. We are planning now a survey of about a 2546-kilometer squared area in the Gulf of Maine. Unmapped area. We are planning to do this with two vehicles simultaneously. One from Portsmouth and one from Rockport, Maine. We've not tried multiple vehicles at the same time. And also shore-based operation from remote operating centers. And we're just going through the planning stages now. Next slide, here. Please.

Our approach is going to be to have two teams signature in each of the remote operating centers. They'll operate the vehicles 24 hours a day. The vehicles can stay out for about 72 hours at a time. And come back in and need to be refueled. As we were sitting and planning on this -- again, this is our first time. We're being a little conservative. We started to think about how many people we need to support this operation. You'll see that list there, what we think we need to run a 24-hour operation like this. It's up to 16 people. This was a week or two ago. I show this picture with the permission of the director of the uncrewed systems operating center. This is not a picture of him. This was the expression on his face when he looked at the number of people needed to operate this. Next slide, please.

There it is. He goes, oh, my gosh, I thought we were going to be saving

people. It will take me 16 people to run two systems. It may or may not. We're going to learn. We may be able to have fewer people. We may be able to run three or four vessels at the same time. We don't know yet. These r again, the trade-offs we're looking at. Next slide, please.

The final situation I want to look at is a little different one. This is now where data is provided as a service. In this case, the Saildrone people call it a service. You pay a straight day rate for the use of the vehicle. They provide the data. Here, we had some test trips in a very remote area in the Aleutians and then off the coast of California. We've done a quantitative assessment of this effort versus what it would have taken with a crewed survey vessel. Next slide, please.

What we've looked at is the coverage that the Saildrone provided. Lots of analysis of the quality of the data. The most important metric is really how much overlap is there? How much coverage is there? The more overlap we get, the higher the quality of the data. It took the Saildrone for this particular area, 15.25 days to the survey. It averaged 3.95 knots. That's relatively fast. Covering about 26.65 square kilometers an hour. Getting about 58.6% overlap. Next slide, please.

We found near the area where the Okeanos Islands, crewed survey vessel no one uses in deeper water. The ocean exploration program. Did a survey. It was not the same size area. I can't compare time. But we can say that it covered 44.2 square kilometers per area. Almost twice the coverage rate. And it provided 76% overlap. The amount of overlap usually alludes to higher quality data. Next slide, please.

We then did an analysis of what it would take to do the exact same area that

the Saildrone did. 15.25 days with 58.6% overlap. If the Okeanos Explorer did it with the exact same system, it would take it only 7.3 days, about half the time, to do that and achieving 100% overlap. The best potential for high-quality data. It would only get the same overlap that the Saildrone achieved, it would be 5.5 days. About a third of the time. And if a 12kiloherz system had been used, the same data could be achieved in 3 1/2 days. So what's the relative cost? This doesn't address issues of true safety carbon footprint. And I can't tell you what it costs for the Okeanos Explorer to do a survey. I'm not sure anyone can tell us. Someone internal is looking at that. I'm just trying to make the point we just don't know yet. I'm very confident, personally, that we'll find great efficiencies. But way need to look more closely and understand more about where, when, and how to use them in the most appropriate way. Let me stop there. I know we're totally pressed for time.

>> RACHAEL DEMPSEY: Larry, thank you so much. This is -- unfortunately, we're at the end of the time, like you said. But such a rich discussion topic that I think all of us can benefit from. We're always looking at what options we have to get the mission done. And so really looking forward to what your team finds out. Thank you very much. And thank you to all the panelists this evening for your great information. We'll try to find some time again tomorrow. We're going to have to cut off the questions short. So we can get to the public commentary. Sean, over to you. Thank you.

>> SEAN DUFFY: I'll do a quick hand-off over to Admiral Evans so we can get to the public comments. Really appreciate all the directors' time and reports. Lot of great information. Made a lot of notes. I'm sure other panel

members did as well. With that, Sir, I'll turn it over to you.

>> BENJAMIN EVANS: Thank you, Sean. Thank you, Rachael. I'm just trying to find my notes on this. I believe we do have a number of public comments that have been shared already. I'm going to ask Ashley to read -- let me back up a second. This is the public comment period, required public comment period. Encourage all attendees who are not members of the panel to put public comments in the question box. Please do target your comments to HSRP members. And focus on what NOAA can improve for navigation observations and positioning purposes. This is not the time to ask individual presenters questions. I'll ask Ashley to read and summarize the questions we received. They'll be collated into a document. After the meeting comments will be posted to the HSRP website. And included in the public record. To the extent we can, we may address some of these briefly. Or suggest follow-up. But my guess is we will not have time to get deeply into the answers. Having taken a quick look at some of these already, there's really good questions here that deserve a lot of time. We may have to follow up after the meeting. Ashley, could you pop them on the screen? You got them up.

>> ASHLEY CHAPPELL: They're on there.

>> BENJAMIN EVANS: Walk us through them.

>> ASHLEY CHAPPELL: Sure. Sorry about my camera. I have a monitor thing happening. So it's a little bit different. But, yeah. We've sort of grouped these comments not in the order that they came in. But kind of by subject matter. Mr. Manes spoke. We need to get his comment clarified there. That was some thinking on Harmonic sensors. And PORTS district

fund in Sacramento and Stockton area. We'll get that question sort of detailed out for you a little bit more effectively. We got some advanced comments. When you register for the webinar, you can supply comments if you like Ann Kinner, former HSRP member asks about -- she wanted to hear updates on the custom chart tool. We will wait for the next couple of days. If that question is not answered, NOAA can provide a response to her. You may want to factor that into your discussions later as panel members. That's the thing about some of these questions, actually. Some are really more directed or easily answered by NOAA people. Some are really directed at you, the panel members, to think about these as issues that could be addressed by you. Mr. Manes also commented on vector charts and what's missing from vector charts versus Raster charts. With scale minute turned off, we're missing basic information. How do we get NOAA to please put those details on the vector charts? Something for you to think about. And consider.

>> BENJAMIN EVANS: I'll address that very quickly, if I may, Ashley.

>> ASHLEY CHAPPELL: Okay, sure.

>> BENJAMIN EVANS: I want to be clear. There is a known issue with some information on geographic features not being fully collected from the Raster charts on the ENCs. We're working with pilot associations and others to identify those spots. And to prioritize those updates. And so I would encourage Captain Manes to connect with Jeff Ferguson. I already alerted Jeff with this. He may be in San Francisco next week, which may provide them an opportunity to talk further about that.

>> ASHLEY CHAPPELL: Okay, thank you. Kind of a following on question

from Mr. Rabena, Virginia Pilot Association. This question may relate to human use of products. Mariner use. Captain Betz was talking earlier today and this question came in. He refers to the problems on ENC cause bid layering. Mariners are not all aware of how to use it. So, we might follow up a little bit more with Mr. Rabena on this question. Admiral, I don't know if you want to chime in on this or we'll explore it more with him to get more detail.

>> BENJAMIN EVANS: I don't know enough about the source of that question or context of that question to address it. I would be happy to talk to Mr. Rabena. And certainly recommend he and Captain Betz connect.

>> ASHLEY CHAPPELL: Okay. We'll provide some follow-up on that one. Next question is from Lindsey G, another former HSRP member. Thank you for being on. This comment one came in during the under keel clearance session of the day. If you jump to the third paragraph really, this is where he focuses in relating to timely updates of data. And on the chart. How is this plan -- how are we planning to do this more frequently? Port expansion in L.A., Long Beach area will need permanent update -- frequent updates over a prolonged period. How do we keep this current for the pilot? Is the plan to receive these updates directly from the expansion project for updating their PPUs, local notice to Mariners, or will it be routed to more frequent update the ENC?

>> BENJAMIN EVANS: There's a lot here, Ashley.

>> ASHLEY CHAPPELL: There is.

>> BENJAMIN EVANS: I would be happy to talk to Lindsey or anyone at greater length. In very broad strokes, I will say the high resolution product

pilots are using in PPU is called S-102 high resolution. Darren talked about this in his presentation. And highlighted that the international standard for that product remains -- it is not finalized yet. The first thing for this to go operational is for that data standard, product standard, rather, to be finalized. Which we expect later this year. But it should be. And it is possible to produce S-102 bathe overlay in an automated way from a bathymetric source. If we haven't established pathway for that external source data from, say, the Port of Long Beach, and Port of Long Beach with a trusted node, which I believe we have, it's a quick process for turning around an S-102 product. Now, looking more broadly, first we have to build out the NDS. We're working to do that. To some extent that's a resource constraint operation. I mentioned the requirements to have S-102 finalized. And then once those are in place and we have relationships with different providers, it should be a very simple matter -- not a simple matter. It is automatable to produce S-102 on a quick turnaround. I will add, though, that for other mariners, other pilots to use this, they need not only S-102 overlay but the S-101 base chart. And those are the next generation charts we expect to release in 2026. But they'll also need a in connection generation system. There are a number of layers that commercial mariners on large vessels will need to have in place. And we will need to have in place in order to derive full value from the high resolution overlays. To bring it back for the portable pilot units, the timeline for establishing that is much shorter.

>> ASHLEY CHAPPELL: Okay, great, Admiral. Thank you. Some of what you said may relate to this second comment of Lindsey's about turnaround time for new bathymetry data from external sources in S-102 and scaling this

approach with NBS to support U.S. ports in this way.

>> BENJAMIN EVANS: I would love to offer the opportunity to go further into this. But broadly my previous comments stand.

>> ASHLEY CHAPPELL: Yeah. So, we got some good questions from Bob Moshiri, Johnson Outdoors. Asking what our plans are to survey near-shore coastal waters to serve the 50-million plus recreational boaters. Along the same lines, plans to survey over the next six years in the Great Lakes. And I'm actually featured in this country. Noting that Bob was at the Lakebed 2030 conference in September. Thank you for attending that and listening to what I had to say. I was talking about where we were at the Great Lakes. We're not at 13%, not at 8%. But still pretty low. Bob is noting that, contrasting it with other areas. If you want to comment on surveys, near-shore surveys for recreational boaters and then the Great Lakes in general, please do.

>> BENJAMIN EVANS: I was actually going to -- is there any way we can bring Captain Sam Greenaway into the conversation here?

>> ASHLEY CHAPPELL: Sure. One moment.

>> BENJAMIN EVANS: To address this one.

>> ASHLEY CHAPPELL: Hopefully, he's still there.

>> We spend a lot of time on Chesapeake Bay. If you look at current year and recent survey plans. I believe -- linked to those in this presentation. Two years ago, we did all of eastern bay. And so I think there's a lot of those. A lot of those have junctions with -- also support innovation work. That has a real meaning for those shallow areas that aren't commercial traffic. A second piece of that is I think in the presentation of the bathe lidar

we're doing, that fills a gap where recreational boaters fail. I'm fine sailing 10-feet of water in Chesapeake Bay. Totally fine sailing in six feet of water. But five feet of water, I'm stuck in the mud. I totally get there's a community out there that really cares about that two to 12-foot area that's really difficult to get with traditional hydro methods. Renewed emphasis on those areas will make a difference. Thank you.

>> BENJAMIN EVANS: Thanks, Sam. That's super helpful. I'll also address the Great Lakes question briefly here as well. I agree. I appreciate Bob for raising it. Up-to-date modern survey data in the Great Lakes. It's not unsurveyed. It's simply not surveyed for modern standards. There is data there. But, again, not data that reaches the quality we would like. Now at 13%, looking at the 2024 report. Certainly very low compared to other areas. There's huge demand. Not only for navigation. But to support management and other applications in the Great Lakes. Which is part of the reason we increased the frequency with which we're sending NOAA ships to the Great Lakes. We have response team working in the Great Lakes. We expect -- plans are still forming. We expect to have NOAA ship Thomas Jefferson back in the Great Lakes next season, 2025. And the Great Lakes mapping, authorizing the $200 million by the end of the doc aid. That's all very exciting. It gets to the same questions that Bob is raising here. We hope to be able to be able to talk more about this in the future in the Great Lakes.

>> ASHLEY CHAPPELL: Okay, great. Thank you. Sorry, I was just chatting. I realized my typing might have been a little loud. All right. Thank you for scrolling down. Next question, Mr. Manes again asking about getting an

anchorage resurveyed in San Francisco Bay. I would just say -- can you hear me? You can hear me, right?

>> BENJAMIN EVANS: We can hear you, Ashley.

>> ASHLEY CHAPPELL: Thank you. Sorry. I would just say for San Francisco and really any other port area to -- as Jeff put it earlier, get in touch with your friendly, local navigation manager. And make sure that that request is noted and captured. As we collect requirements around the country for this kind of survey requirement, survey need.

All right. Quickly moving on, Guy Knoll was listening to the precision Nav panels. And wanted to ask about the funding effort through Scripps for CDIP and the PORTS work. Is it duplicative or coordinated? I don't know, Julie, if you want to jump on and speak to this briefly or follow up.

>> JULIE THOMAS: Right. Let me make sure I understand the question. Is the effort funded through Scripps for CDIP and PORTS work duplicative or coordinated? PORTS doesn't do waves. CDIP is the Army Corps of Engineer with other state, industry and academia funding for individual buoys. If PORTS is installed in a port harbor where CDIP happens to have buoys, then they will integrate our buoys into the port system. PORTS does not pay for any CDIP buoys. But if we have them in that region, then they will integrate them on to the port side. If the former should CDIP from IOOS be part of the scaling necessary? IOOS does pay for some CDIP. And we rely on IOOS regions heavily for doing field maintenance in that region. We coordinate very closely with all the IOOS directors. They know exactly -- we have feedback from them as far as the location. And whatever support we can get. CDIP does do some of the their own field work. We coordinate it with

IOOS, too. I hope that answers those questions there.

>> ASHLEY CHAPPELL: Thank you. We have two more. One very brief. I'll get to that in a second. One from mark Manes about the possibility -- it's really a comment. The possibility of installing weather stations on some new boats that are being built for San Francisco Bar Pilots for weather data. They're in the planning stages. They could incorporate that into the installation plan if there is interest. So, something else that we might follow up on with Mr. Manes. Very nice offer. Thank you. And the last comment, I put this last. Because I really think it relates to the discussion tomorrow. And just a comment from Kate Nielson at NOAA. She's interested in the portfolio here and the resilient port session tomorrow. That's what we have for public comment at this stage. And we will follow up with Mr. Complete answers for some of these comments where we can respond in writing, too. So that closes out our public comment portion of the day.

>> BENJAMIN EVANS: Thank you, Ashley. As I understand it, please correct me if I'm wrong, we need to bring this to a firm close by half past the hour, correct?

>> ASHLEY CHAPPELL: Yes, 5:30 Pacific Time.

>> BENJAMIN EVANS: Okay. So what I propose is that -- we did have planned here a round robin with the panel members to reflect on the day. What I propose is that we hold that for the morning. I believe we have time on the agenda first thing tomorrow for a round robin as well. So rather than doing that twice, I think we could just -- I propose we all mull over our notes a bit overnight. And come prepared to share our reflections on today. And our look ahead into tomorrow with first thing tomorrow morning. Sean,

Mr. Chair, if that is suitable, if that's okay with you, perhaps we pause for a moment. See if anybody has anything they would absolutely like to get in at this point.

>> SEAN DUFFY: Yes, Sir. I think that's a very good option. If anybody objects or feels that they need to go over anything from today. Otherwise, hold it for tomorrow. Think on it. And we'll allow a second for somebody to raise a hand or speak up.

>> BENJAMIN EVANS: I also would offer that although we don't have time probably to get all the way around the room now. If there were questions for myself or any of the other directors, we could probably address some of those in the time we have remaining. I know we burned through that pretty fast.

>> ASHLEY CHAPPELL: Ben, this is Ashley. If there are questions for you all, this is a great time to do that. If you're not doing the round robin. Let's fit it in now.

>> BENJAMIN EVANS: Nathan, I think you were first.

>> NATHAN WARDWELL: I've got a pretty simple question, Ben. Rescheming for the charts aligned with the griding for the national bathymetric source.

>> BENJAMIN EVANS: Let me make sure I understand the question. Transitioning the charts to the grid. It's a separate effort at the NBS. But the two link together. Ultimately the NBS will -- ultimately the NBS will supply the charts with the bathymetry. There's a process linkage but not necessarily a time linkage, if I understand the question correctly.

>> NATHAN WARDWELL: Since we're doing this virtually, I can snoop around

and look at things as people are talking. I was seeing the grid in the national bathymetric source and the bounds for each grid. I wondered if that's aligned with the chart. Just kind of a curiosity.

>> BENJAMIN EVANS: That's a good question. I think that the NBS is intended to cover all U.S. waters. We have chart coverage that in some cases goes beyond U.S. waters. So there wouldn't necessarily be one-to-one alignment there. But the -- maybe we should chat about this, Nathan. I'm not sure I'm 100% following the question. I don't want to answer it incorrectly.

>> NATHAN WARDWELL: That sounds fine. While I'm on here, one other question for Marian. About the Coastal Inundation Dashboard. The dashboard is great. I like to look at it. It has both NOS water level stations and then other water level stations. And as I was looking at that, I noticed there's very few other water level stations on the west coast, Pacific and Alaska. Can you speak to the reason for that? Fewer water level stations? Or can't get the collaboration? Or yeah, can you just speak to that?

>> MARIAN WESTLEY: So, I would have to kind of look into that for you and get back to you with more detail. But I would say what we're doing right now is pulling those water level stations that are in AHIPS through the weather service, we're pulling those through the service. Those seem to be the U.S. gauges integrated into the water level. That was our first foray into partner data. But I will take this home and do some research in how we could populate -- I've been very focused on the lower Mississippi River. We have a lot of interest there. I will look into the west coast for you.

>> NATHAN WARDWELL: I always have my eyes on the west coast and

those remote areas in Alaska.

>> MARIAN WESTLEY: Yep.

>> NATHAN WARDWELL: Okay, thank you.

>> ASHLEY CHAPPELL: I think Nicole had a question.

>> NICOLE ELKO: Yes. This is Nicole Elko. Thank you for those updates. I'll make most of my comments in the round table tomorrow. I had a question that would be nice to ask now. And that is related to -- I guess two questions. These very much focus on driving and improving future performance. Even though they may sound more like performance review. I just want to start with that. So, Marian, the Coastal Inundation Dashboard updates are amazing. Thank you for the updates to the Charleston gauge. The cameras are super cool. But the way we're looking at it right now, the stakeholders, we're getting that information from two different sites. Sort of like the Secora site. And then the tides and currents. The way you showed it was fantastic. Because we use that to -- we use the photos a lot to engage with stakeholders. Kind of in the way you were saying. It's so much more helpful to have a picture when we're talking about sea level rise and planning for resilience. We'll use those. This is what a foot looks like. This is what two feet looks like. Question number one, where did that come from? Can you give us a link? I don't know how to get there. And our stakeholders don't. It's hard to find. And the second is related to the tidal epoch update. Curious if you all have a very young maybe staff person dedicated to, like, lessons learned, how-toes and everything you're going through right now. So the next time this could happen more, like, in real time-ish, faster.

>> MARIAN WESTLEY: I'll start with the web cams. You're looking for those

kinds of graphics that I showed? I don't know how many of those are posted on our website yet. We're doing web cams as an R & D site project. So data is hosted by Web COOS. We don't host it ourselves. We have BIL funded scientist assisting with our engineering team in Chesapeake. Whose job it is to play around with it. So, again, I can have someone send you some of the better things. These are all things we've just been making to sort of demonstrate to ourselves that this has real utility. Inundation dashboard is trying to have a collection of impact graphics. So when we say this is what we're expecting. Here is a picture of what that looked like the last time it was at that level. But again, this is all still sort of in the forming stage. You can ask. I'm sure we have a pretty lively cadre of data scientists. There's stuff kicking around. If you go to a scientific conference, you'll see a bunch of them. I'm sure we could share some with you. The second question is about the tidal epoch update. Yes, I think we're kind of pretty far along in this process. We've talked about ways to accelerate it. Ways to be more innovative with the data processing. We're close to the end. It's hard to make a big course correction right now. But one of the things that our scientist has been leading, and we're trying to get a resource to help him. How do we do this with machine learning? You can say AI. Everyone freaks out. I like to say really sophisticated statistics for all of our data processing needs. Because computers are really, really good at seeing patterns. You need a human when the pattern is violated. So right now, we don't really have -- you know, Greg has done some kind of preliminary work with that. We've done work in partnership with others. We're in partnership with Conrad Institute. They're very deep in AI kind of research. But there's got

to be a way to do this a lot more smartly. So that our human brains can be used for the things that human brains are really good at. And we can use machines to do all the rest of it. So, yes. We are watching, listening, lessons learned. We're just at a point where we're too close to the finish to really kind of try new things. But we can't wait this long. We do it on this 20, 25-year cycle because of the progression of the nodes of the moon. We know that cycle. We also know climate change and sea level change is happening at a much more rapid rate. And we have to update data much sooner than just every tidal datum epoch. How do we plan for that future? We hope to do more R & D on.

>> NICOLE ELKO: Thank you very much.

>> ASHLEY CHAPPELL: Julie?

>> MARIAN WESTLEY: Another thing over on the horizon is we'll be a little ahead of NSRS. So we'll need to go back and kind of update all the datums to the new spatial reference systems. That will be an added step as well. Everything needs to be tied together on a single geodetic system that's intra-operable between the tides and the whole bit.

>> ASHLEY CHAPPELL: Thank you, Marian. Julie, do you have a question? You're muted. Sorry.

>> JULIE THOMAS: I am muted. I have a quick question for Larry, if he's still on.

>> LARRY MAYER: I am.

>> JULIE THOMAS: You are there, okay. When you talk about the data quality. And then you talk about energic sea states, it must degrade with the sea state after a certain point. What I'm really interested in is if it's

uncrewed or crewed, like which one -- if it's a large sea state, do you get a better quality in uncrewed, crewed, or does that not really play into the factor?

>> LARRY MAYER: It absolutely does. And there's not a single answer. If we look at the Drix vehicle, it's a wave piercing hull with a -- keel. It is not terribly susceptible to sea state to a point. If you look at the Saildrone vessel, it has the behavior of a sailing vessel. And this creates a number of issues in terms of its ability to maintain heading. They're all very small, though, relative to a large crew vessel. So dynamics are exaggerated. I don't think you can apply a single answer to all systems. You have to take it system by system. That's part of what we're doing, is looking from system to system about the quality of the data produced, too. It has to go to the equation at the end of the day as to whether it's more efficient or not.

>> JULIE THOMAS: Okay, thank you.

>> SEAN DUFFY: Okay. I believe we're going to wrap up. I'm not sure, Admiral, if you're able to come back on. I'll proceed -- there you are, Sir. I would like to make a couple of comments and then turn it over to you, so you can have the final say, if that works. I want to say, I talked earlier. I always say jersey. Other people talk about hats. I don't wear hats. I've worn a lot of jerseys in my day. I was really proud of the team today. Lots of great members. Some of the things that I thought about were some of the former members that recently left us. I hate to mention names. But I did see a question from former member Lindsey G and my good friend, I have to mention, Lynn McIntyre. We have some replacements kind of through the draft process, if you will, to fill some big shoes. Today has been

a challenging day for a lot of folks technology-wise, time, commitment, keeping things moving. I'll just say I was proud of everyone. I think it was a great effort. Look forward to reconvening in the morning. Know there will be a lot of good comments from the panel members when we do the round robin. And I would just like to say thank you for your commitment to the service today and with that, I will turn it over to Admiral Evans.

>> BENJAMIN EVANS: Thank you, Sean. And thank you for your leadership today. You and everyone else who pivoted to the virtual environment. I don't like the term former members. Members emeritus is perhaps more appropriate. We deeply appreciate the engagement of the current members, the former members, members of the public, all of whom have taken the time to engage on these important topics. As you noted, I think we had some really outstanding panels today focused on the local requirements in the Long Beach area and the way NOAA's products and services can help meet those requirements in some cases in very innovative ways. I look forward to that being a continuing theme for the rest of the week.

With that, I'll close. And just note we'll be reconvening, I believe, at -- I should know this.

>> ASHLEY CHAPPELL: We start at 8:30 Pacific Time, 11:30 eastern.

>> BENJAMIN EVANS: An hour -- half hour earlier, thank you, Ashley. 8:30 Pacific. I'm sorry. Yes, 8:30 Pacific, 11:30 eastern. We have an hour set aside for recap and discussion of day one. Hopefully, that will be plenty of time for folks to share their impressions and engage in good discussion before we dive into the next -- into the session led by Nathan. In which Nicole will introduce the concept of resilient ports. With that, I think we'll

close, Sean, unless you have anything further. It's up to you to officially gavel us adjourned here for the evening.

>> SEAN DUFFY: I think you outrank me, Sir. But I will be happy to close this session. Thank everybody. And appreciate -- Captain Miller often says I'm the play-by-play and he's the color commentary. We can think about that description later. Thank you. Appreciate everybody's time.

>> BENJAMIN EVANS: Have a good night, everyone.

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