U.S. DEPARTMENT OF COMMERCE

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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

(NOAA)

HYDROGRAPHIC SERVICES REVIEW PANEL

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PUBLIC MEETING

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TUESDAY

AUGUST 27, 2019

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The Hydrographic Services Review Panel met at the Hotel Monteleone, 214 Royal Street, New Orleans, Louisiana, at 9:00 a.m., Ed Saade, Chair, presiding.

HSRP MEMBERS PRESENT:

EDWARD J. SAADE, HSRP Chair

JULIE THOMAS, HSRP Vice Chair

CAPTAIN ANUJ CHOPRA

SEAN M. DUFFY, SR.

KIM HALL

DEANNE HARGRAVE

EDWARD J. KELLY

CAPTAIN ANN KINNER

DR. DAVID MAUNE

CAPTAIN ANNE MCINTYRE

CAPTAIN (ret. USCG) ED PAGE

GARY THOMPSON

NON-VOTING HSRP MEMBERS:

JULIANA BLACKWELL, Director, National

Geodetic Survey, NOS

RICH EDWING, Director, Center for Operational

Oceanographic Products and Services, NOS

NOAA LEADERSHIP PRESENT:

REAR ADMIRAL TIM GALLAUDET, Ph.D. (ret. USN),

Assistant Secretary of Commerce for Oceans

and Atmosphere and Deputy NOAA Administrator

NICOLE LEBOEUF, Acting Assistant

Administrator, NOS

REAR ADMIRAL SHEP SMITH, HSRP Designated Federal

Official; Acting Deputy Assistant

Administrator, National Ocean Service,

National Oceanic and Atmospheric

Administration; Director, Office of Coast

Survey, NOS

CAPTAIN ELIZABETH KRETOVIC, Acting Director,

Office of Coast Survey, NOS

NOAA STAFF PRESENT:

GLENN BOLEDOVICH, Policy Director, NOS PCAD

CAPTAIN RICK BRENNAN, Chief, Hydrographic

Surveys Division, OCS, NOS

VIRGINIA DENTLER, Center for Operational

Oceanographic Products and Services

JOHN G.W. KELLEY, PhD, Physical Scientist,

Coastal Marine Modeling Branch, Coast

Survey Development Laboratory, OCS

LYNNE MERSFELDER-LEWIS, HSRP Coordinator

TIM OSBORN, Navigation Manager, OCS, NOS

STEPHEN WHITE, Remote Sensing Division, NGS, NOS

CRAIG WINN, Portfolio Manager for HD

Mapping, Marine Chart Division, OCS, NOS

DARREN WRIGHT, National Marine Program

Leader, Marine, Tropical and Tsunami

Services Branch, National Weather Service

ALSO PRESENT:

PAUL AUCOIN, Executive Director, Port of

South Louisiana

CAPTAIN MICHAEL BOPP, President, Crescent River

Pilots Association

BRANDY D. CHRISTIAN, President and CEO of the

Port of New Orleans; CEO, New Orleans Public

Railroad Belt Corp.

CAPTAIN STEPHEN HATHORN, President, New Orleans

Baton Rouge Steamship Pilots Association

(NOBRA)

MATT LAGARDE, Assistant Vice President, Health,

Safety, Security, and Environment, Ingram

Barge Company

CAPTAIN KRISTI M. LUTTRELL, Commander, Sector New

Orleans, 8th U.S. Coast Guard District

CAPTAIN MICHAEL MILLER, President, Associated

Branch (Bar) Pilots

COLONEL STEPHEN MURPHY, Commander, New Orleans

District, U.S. Army Corps of Engineers

LIEUTENANT GOVERNOR WILLIAM H. NUNGESSER,

Louisiana

DR. JACKIE S. PETTWAY, Chief, Navigation

Division, Coastal and Hydraulics Laboratory,

U.S. Army Engineer and Research Development

(ERDC), U.S. Army Corps of Engineers

MIKE STEENHOEK, Executive Director, Soy

Transportation Coalition

CLAIRE TROKEY, Legislative Director, Congressman

Steve Scalise R-Louisiana)

MARK WINGATE, PE, Deputy District Engineer for

Programs and Project Management, Executive

Office, New Orleans District, U.S. Army

Corps of Engineers

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

9:01 a.m.

CHAIR SAADE: Okay. We're going to call this meeting to order for the HSRP here in beautiful New Orleans. My name's Ed Saade. I am the current chair of the HSRP and my co-chair is Julie Thomas over here. We're going to get everyone introduced at some point. It looks like a really good crowd of attendance from the stakeholders, so that's great to see.

So I'm Ed Saade, the HSRP chair. I'm happy to get to welcome you to New Orleans. The stakeholder turnout is excellent obviously and thanks for coming. I know some of the HSRP members have offices in the region.

We did a little show of hands this morning and virtually everybody on the HSRP that's not a government member has an office or a lot of staff here in Louisiana and in New Orleans. So it's real meaningful to all of us that we're here and the connections are really close.

In fact, Rick Brennan and Admiral Smith actually have a current contract running right now on the survey backlog in the Mississippi River we're going to hear about. So there's a lot of activity going on. The next three days we have an amazing lineup from local and regional experts, so we are looking forward to excellent sessions and discussions as our output -- we'll have time to edit and get consensus on three issue papers, as well as comments from the HSRP to the Office of Coast Survey on their draft strategic plan, and a recommendation letter to the NOAA Administrator.

Nearly all the materials are on the HSRP New Orleans web page. So with that, I'm going to hand over the discussion to Rear Admiral Shep Smith. He's the Acting Deputy Assistant Administrator, National Ocean Service, National Oceanic and Atmospheric Administration. He's the director in the Office of Coast Survey, NOS.

RDML SMITH: Thanks, Ed. Thank you for your continued leadership of this important Panel. So I'm Shep Smith. I'm the Designated Federal Official of this Panel as well, and I'm looking forward to this meeting this week. A few housekeeping details. If you've not already signed up to make a comment or signed into the meeting, the sign-up sheets for both are coming around.

Emergency exits are all around the room. The preferred is out to the -- out into the hall and left to the parking garage. Bathrooms are across the hall. So I'm coming to this meeting straight off of a week on the Mississippi River Commission, where I had the honor of seeing many of the participants here today in the context of the Mississippi River.

So for those of you, I do want to just say a few words about the sort of confluence of the river and the sea here in New Orleans, because it's a really unique -- this is a unique meeting in a unique place.

So the Mississippi River carries 41 percent of the drains, 41 percent of the continental United States, all in a huge system that all ends, goes right by here. There's a flood control and navigation project that started right after the 1927 flood. That flood knocked the U.S. GDP down by 25 percent in one year. So the stakes here are really high for the management of this river.

And at the same time since then and then, the economic growth and industry along this river are crucial to the economy of the United States and the region, and our place in the world through our trading relationships. So the stakes are even higher today than they were in 1927.

And all of the infrastructure necessary for both the seagoing portion and the land, the inland portion all come together in this stretch of river. So the participants here in this meeting sort of represent both halves of that. For the Panel, which is mostly a very coastal-oriented Panel, I'm thrilled to give them some insight through the course of this week into the river, and I think it's going to be a really interesting meeting.

A lot of the same topics that we've been stressing with precision navigation and sea level rise, subsidence, all have some of the very thorniest and most important examples right here in this region, and we will be, you know, we'll be discussing those as well over the course of the week.

So we have a really great session this morning on precision navigation, this afternoon on stakeholder priorities, and I hope that as many of you can stay for those as possible. A couple of key points for navigation services including unmanned systems and subsidence, sea level rise, coastal resilience later in the week.

So before we get started, I'd like to acknowledge the following individuals who have made time to speak or attend the meeting. Lieutenant Governor Billy Nungesser. Thank you sir for being here. From NOAA, Rear Admiral Tim Gallaudet and Nicole LeBoeuf. Captain Kristi Luttrell from the United States Coast Guard. Colonel Stephen Murphy from the Army Corps. Claire Trokey from Representative Scalise. Thanks, Claire.

Brandy Christian, president of the Port of New Orleans. Claire -- I already got Claire on here twice. Are there any other congressional staff in attendance? All right. The stakeholder session will be led by HSRP member and well known New Orleanian Sean Duffy, I'm sure a stranger to no one here, and NOS Navigation Manager Tim Osborn. So as I say your name, raise your hand, Tim. There you go. Also probably not a stranger to many around here.

Mark Wingate, Matt LaGarde. I'll do this slowly. Matt I know is here. Jackie Pettway, Mike Steenhoek and Paul Aucoin. The unmanned systems session chaired by Neeraj Saraf. Neeraj? People raising their hand I can't catch. I can't catch them. Ed Saade, Deanne Hargrave and with speakers Michael Starek, Brian Connon, Thomas Chance and Lieutenant Damian Manda. This is a long list, so flip your hands up quickly.

The subsidence sea level rise session on Thursday will be led by HSRP Member Julie Thomas, with Audra Luscher from NOS and including Rick Leuttich, Windell Curole, Brian Lezina, Cliff Mungier and Renee Collini. Suzanne Van Cooten, in the back here, is the rock star from the Weather Service here in the region.

So I just have to brag on Suzanne a little bit, because the Army Corps, which operates the river on behalf of the Mississippi River Commission and the American public, rely on the forecast from the National Weather Service and from the Slidell Lower Mississippi River Forecast Center that Suzanne leads. So Suzanne, a big shout out for your great work over the course of this year.

The Greater Lafourche Port Commission, deputy director David Breaux, and I think that's it for the panelists. In addition, there are NOS and NOAA directors, staff and subject matter experts in the room who can reach out during -- who you can reach out to during the meeting and during the year to delve deeper into Navigation Services' mission.

I'd like to introduce some of them. Rich Edwing from CO-OPS, Tides and Currents, part of the National Ocean Service; Juliana Blackwell, Juliana, National Geodetic Survey. Unfortunately Larry Mayer and Andy Armstrong could not be here at this meeting from the University of New Hampshire, and our non-voting members of the HSRP.

Captain Liz Kretovic and Lynne Mersfelder-Lewis serve as alternate designated officers, and Lynne is the HSRP program manager. Both can help you with finding experts and answers. Liz Kretovic will serve as your DFO for Wednesday and Thursday, after I leave to attend my sister's wedding. So excellent turnout, and there's so many folks to acknowledge here, and I hope that you will all get to know each other through the course of the week.

Some additional subject matter experts from each of the main program offices that are advised by this Panel. From NGS Galen Scott, Mike Aslaksen, Stephen White and Denis Riordan. From CO-OPS, Audra Luscher, Virginia Dentler and Grace Gray. From Coast Survey we have Rick Brennan, Chris Van Westendorp, Neeraj Saraf, Lucy Hick, Craig Winn and John Kelly.

The NOS Policy Office is here, Glen Boledovich, David Ermisch and Joanna Peth. Onsite, if you have any problems with the organization of the meeting, et cetera, Lynne Mersfelder-Lewis, Ginny Dentler, Amanda Phelps, Christine Burns and David Ermisch can help. And with that, almost having lost my voice with the introductions, I'll turn it back to the Chairman.

CHAIR SAADE: Thank you. So as the speaker and HSRP member bios are in your materials and posted publicly, we'll only do very short intros.

So I'd like the HSRP members to introduce themselves with your name, organization, expertise area, geographic area of expertise if you have one, and then also your current home town. So if we could start with you Deanne and we'll go around this way.

MEMBER HARGRAVE: Good morning, I'm Deanne Hargrave. I'm a hydrographic surveyor with Shell Oil Company and we primarily do work in all the Americas. Currently we're focusing on wind farms on the East Coast, which is new for us. A lot of challenges there, and as well as continued operations for oil and gas in the Gulf of Mexico.

My current home town is Houston, Texas, so I'm very happy to be here in New Orleans. Thank you.

MEMBER RASSELLO: Okay. Sal Rassello, Nautical Director, Carnival Cruise Line Miami. I'm dealing with precise navigation and electronic navigation.

MEMBER KINNER: Thank you. Good morning, Ann Kinner. I am based in San Diego. I am chair of the San Diego Harbor Safety Committee. My expertise is primarily small craft. I am a chart agent. I've been selling charts for over 20 years, and have a lot of on the water experience as well, again with small craft.

MEMBER PAGE: Morning. My name is Ed Page. I'm from the Marine Exchange of Alaska, executive director. I started that organization about 18 years ago. It's information. We have about 130 AIS sites and 50 weather stations, and provide information to mariners for a safe, efficient environment of sound maritime operations.

We are the AI System for the Coast Guard actually in Alaska. Prior to that, I've served 30 years in the Coast Guard, as -- for a variety of marine safety assignments and Captain of the Port of LA-Long Beach, chief of Marine Safety, Pacific Area and Alaska. I've got 30 years up in Alaska, so I guess my expertise is running kayaks, rowing shells, sail boats, power boats, fishing, crabbing in Alaska. That's my expertise, so thank you.

MEMBER CHOPRA: Good morning, Anuj Chopra. I lead the Americas Team for RightShip regarding marine assurance and operational risk. So we are blue water and brown water, and that's where the expertise is on navigation, cargo systems for merchant vessels. Thank you.

MEMBER MAUNE: Morning. My name is Dave Maune and I'm with Dewberry Engineers headquartered in Fairfax, Virginia. We do have a New Orleans office. I personally write books on digital elevation models from photogrammetry, lidar, IfSAR and sonar, and have written a lot of standards pertaining to those things, and I also manage production projects where we map with lidar and IfSAR to include my favorite project, IfSAR mapping of the whole state of Alaska, which we are completing this year.

MS. McINTYRE: Good morning, Anne McIntyre. I'm a maritime pilot with the Columbia River Pilots, and my area of expertise would be the navigation of commercial vessels in situations that require precision navigation subsets.

MEMBER DUFFY: Good morning. I'm Sean Duffy, the local Panel member. I will tell you it was very hard to schedule that rain downpour yesterday. But we managed to pull it off, so you're welcomed here in the wettest year in our history, and you will hear about a lot of challenges based on that.

The Big River Coalition represents deep draft navigation interests, represents pilots and ports and things that keep commerce moving on the river, and it's been a very challenging year. Welcome to New Orleans.

MEMBER KELLY: Ed Kelly. I'm the executive director of the Maritime Association of the Port of New York and New Jersey, and first Sean I'd like to thank you for that deluge. I had a good chance to work on my back stroke. I'm a graduate of the Merchant Marine Academy. I'm a licensed Coast Guard officer that sailed internationally for quite a few years.

My background is as a CEO-level in commercial shipping operations throughout North America and in international trade. Currently in my position at the Maritime Association we concentrate on safety, navigation and operations in ports and local waterways. We are also, as Ed Page had mentioned, involved in the New York-New Jersey Marine Exchange.

MEMBER HALL: Hi, I'm Kim Hall. I am the Principal of Brizo Maritime Consulting, which is a woman-owned small business, specializing in maritime security and nautical operations. I just moved, so Sean you are not the only local member, from Alexandria, Virginia down here to beautiful Mandeville, Louisiana and have gotten used to the deluge, the daily deluge, and I'm looking forward to meeting some folks down here. Maybe I can help you out. Thanks.

MEMBER THOMPSON: Good morning. My name is Gary Thompson and I'm from Raleigh, North Carolina. I work for North Carolina Emergency Management, and which also houses the North Carolina Geodetic Survey. So I'm chief of the North Carolina Geodetic Survey and deputy risk management chief, and my area of expertise is geodetic surveying and flood plain mapping.

VICE CHAIR THOMAS: Julie Thomas. I have been at Scripps Institution of Oceanography in San Diego, and I'm a former director of the Southern California Coastal Ocean Observing System, which is part of the IOOS Program, and also one of the principal investigators for our program at Scripps run out of there installing wave buoys. So that was the Coastal Data Information Program, CDIP. So my expertise would really be in ocean, instrumentation and observations.

CHAIR SAADE: So hello, I'm Ed Saade. I'm the president of Fugro USA. I'm based in Houston, but I'm also the group director for all that Fugro does here in the Americas, which makes my area of focus and expertise all of North America and all of South America.

We have a number of NOAA contracts for charting and data collection in both deep water and shallow water studies. We maintain offices in Lake Charles and Lafayette and Baton Rouge, and we really like being here in Louisiana, and I'm looking forward to a really good meeting. So thanks everyone.

We don't have time to do audience introductions during these, but if whatever we can do during the breaks to get everyone to meet each other. I'd like to ask you to introduce yourselves to someone you don't know, and see where the conversation goes. So with that, a warm welcome to the NOS Acting Administrator Nicole LeBoeuf, who has remarks to share. Her full bio is in your materials, and Nicole, I'll hand it over to you.

MS. LEBOEUF: Thank you Ed, and thank you for inviting me to speak, help kick off this meeting this morning. It's great to be here, heat and deluge and all of it. I guess for me I feel like this is just part of the package. Being here in New Orleans along with the art and architecture and the food and the culture and everything else that makes Louisiana so special.

I know probably, however, I'm accustomed to these fine attributes because I am a native of the Gulf Coast of Texas, just a stone's throw away from here. So not quite the same. I am a proud Texan. But Louisiana is in my blood. I wear my fleur-de-lis every day, and as you can tell by my surname we have been in this part of the world for some time. When I was a kid, we traveled back and forth to Louisiana about once a month to visit family in Morgan City and Jennings and Alexandria and all parts.

I remember the tunnel. That was the funnest part of the -- I knew we were going to Louisiana when we hit that tunnel, and I was so excited. But I feel very lucky to be a transplanted Cajun. I was raised Cajun if you know what that means. We pretty much ate everything that didn't run or swim fast enough.

So just ask about what I've eaten or cooked. But I'm very proud that my upbringing straddles both states, and if we have any time this week and you get me talking, you might hear a little bit about my family's storied history here in Bayou Country, but I warn you. It is not for the faint of heart. Just look up my last name, and you'll know what I'm talking about.

Louisiana of course is more than about ancestors in the past. It is about our current conditions and our future and the future of our nation's economy. I don't have to tell this crowd how important Louisiana is to our economy. The ports and waterways here are incredibly impactful, not just the complexity of spanning multiple jurisdictions, but the complexity and the diversity of the activities here, whether it's tug and barge, containerized cargo or support for the energy industry.

In addition, Louisiana ports and waterways are absolutely essential to export of our agricultural products. So that gets in some of our northern state cousins. It also is a place for recreational boating, fishing, Sportsman's Paradise, commercial boating, all kinds of things. So Louisiana's waterways are incredibly important and they are changing as things do in the coastal zone. It's because of all of these reasons that I have asked the HSRP to consider the application of our navigational and positional programs in association with coastal adaptation and coastal planning, and some of the changes that we're experiencing.

We had a great panel on sea level rise at the last meeting in D.C., and we're going to talk about sea level rise, subsidence and coastal resilience later this week. I'm looking forward to that. NOS really recognizes the challenges of coastal communities and are committed to continuing to provide the data, services and products.

As the needs change, our products need to change. And so along those lines, we're here to hear from Louisianians, as well as other coastal communities, about what we can do to help their livelihoods and communities and cultures continue as these changes occur. That's what we think of when we talk about coastal resilience, and we know that nobody can do that alone, not even Louisiana.

I've also encouraged the Panel to investigate and provide advice to us on innovations and technology that will help us stay current. You'll hear about some of NOS' programs this week on precision navigation, as well as the use of unmanned systems, and the modernization of the National Spatial Reference System.

I encourage everyone here on the Panel and in the audience to pay close attention to conversations associated with VDatum and the National Spatial Reference System because the impacts from that program are profound and will stretch into every one of our lives, and we all want to be ready for that.

Before I conclude, I'll give you all a couple of budget updates from inside the Beltway. If you haven't heard, Congress reached a budget deal. It got us part of the way there. It gave us some top level numbers for the next couple of fiscal years. That budget deal gave us some opportunities, gave us some direction, but it doesn't provide programmatic level spending and so we're still waiting to hear back from Congress on that.

The Senate, I'm sorry, the House has weighed in. The Senate has not yet. So with the next fiscal year starting in not so long, it probably means September's going to be a little crazy, but we'll look forward to hearing what Congress has to say there.

In addition, you may have heard NOAA received FY '19 supplemental funds to help deal with damages caused by Hurricanes Florence, Michael, Typhoon Yutu, as well as the wildfires in the West. NOAA overall got $145.7 million in sup funds. NOS received $11 million for the marine debris program, as well as $50 million for Title IX grants, also called the National Ocean and Coastal Resilience Fund.

Of particular interest to you all NOS received over $31 million for mapping, charting and geodesy. All of that is publicly available information. We are still working on the spend plan with Congress. That spend plan is still under review, but we hope to have it finalized soon.

With regard to other aspects of this meeting, we've got some great speakers as were introduced already. I want to welcome you all and in advance tell you how much we appreciate your participation in this meeting. Here in New Orleans, you'll get to hear from local stakeholders and constituents about their needs.

They're going to be participating in the panels throughout the week. So really looking forward to that. That's how we learn about the opportunities you're facing and the challenges you're facing, and the changes that we might need to enact and stay current with your needs. But in short, your input is why we're here, so be sure to give it, be vocal about it and thank you again, Ed. I want to thank Sean, our de facto host here in the great state of Louisiana. I'm looking forward to spending some time with you all this week.

And at this time, I'd like to introduce Rear Admiral Tim Gallaudet. As you know, he is our Assistant Secretary of Commerce for Oceans and Atmosphere and the Deputy Administrator for NOAA. Since he's been here at NOAA, his deep appreciation and support for NOS' programs has been fantastic. I appreciate that very much, sir.

I think he's attended every HSRP since he arrived, yeah. So his support and his enthusiasm for what you all care about is going to be evident in his remarks. So I'm going to not introduce him any further and just say thank you for being here, sir.

RDML GALLAUDET: Thank you, Nicole. That was a very gracious introduction. No pressure, I guess. Well good morning everybody. It's great to be here and I'm a big fan of the HSRP as I am of the National Ocean Service. Being here on the Gulf Coast is like coming home for me. My Navy roots brought me here two separate occasions.

I lived on the Mississippi coast at one time and then on the -- in Slidell, Louisiana another time and I just loved it. It was just a wonderful place, and look at this venue. I mean come on. This is probably one of the better ones we've had.

Interestingly, it's also the 14th year anniversary of Hurricane Katrina, which I lived through and helped rebuild through as well, losing my home but also seeing the community bounce back and supporting it when I was in the Navy, now afterwards at NOAA doing the same. So it's as I had breakfast with Lieutenant Governor Nungesser today, we talked about the resilience of the people here and their strength, and it's a wonderful thing to witness and to see.

So going through here, I'm pretty ‑‑ I'm very excited for the rest of the week by the way. I want to -- I'm really excited visiting you, Kristi today at the Coast Guard sector, as well as Brandy, going to the port tomorrow. That's going to be a real treat for us, so I'm excited for that.

But I'll talk about a couple of things that NOAA is doing in the realm of hydrographic services, and the bottom line is this, that the American blue economy is booming and it's doing that because of the data and services that NOAA provides to ensure maritime commerce is safe and effective, and all the great activity and tourism and recreation and others that occur along our coasts and Great Lakes continue to thrive and advance.

So a few things that NOAA is doing that I'm really proud to report. First off, we are advancing our unmanned systems activities, and in fact the Office of Coast Survey is one of many offices that are doing this in a great way. Just recently the NOAA Ship Rainier automated one of their hydrographic survey vessels and did a pilot demonstration.

We also had a test out in the Gulf of Mexico for REMUS 600, and we collected some good survey data there. Actually pardon me, that was actually the Atlantic. But we have a number of gliders right now deployed with the Navy, and they're all running a picket line for this Tropical Storm Dorian. So that's some really important activity there that affects navigation safety in a big way.

We're also advancing artificial intelligence for applications involving disaster response, also relevant in terms of navigation and hydrography. We're doing this with the Department of Defense's Joint Artificial Intelligence Center, automating response time lines and activities and plans using all the type of data that NOAA collects. That's a really awesome example that we're just starting to do, and the pilot project for that is just getting underway.

We also, as Nicole mentioned, are advancing the National Spatial Reference System, which I have some experience in supporting as I was the superintendent of the Naval Observatory like my old ship mate, Captain Brian Connon. We understand how important that system is to tying our charts and navigation data.

We are also advancing our precision navigation capabilities and we're going to hear a bit about that, I believe, during the meeting this week. One of the things I'm very excited about, that is implementing the 2017 National Charting Plan. I actually went and visited our Marine Charting Division in Silver Spring, Maryland, just to sort of look under the hood, and the advances we're making in terms of really making a 21st century charting suite is really impressive.

Our Remote Sensing Division, led by Mike Aslaksen over there, I know I probably didn't get your name right Mike. But it's probably like Gallaudet; it's pretty tough to get. At any rate though, thank you for the work you do. His team surged right after Hurricane Barry in the Gulf, and we were able to provide aerial images to support disaster response. He's ready to go again in case Dorian does anything that we have to worry about.

And then lastly, our PORTS system, the Physical Oceanographic Real Time System. This is a great, great capability. It's doubled in the last 10 years. We have 34 of our major ports covered, and we're just now going to complete with the Coast Guard being able to put out PORTS data via AIS in early 2020. That's really going to advance our capability and keep mariners safe, something I know we're all interested in.

So just to wrap up my very brief remarks, let me point kind of in the big picture to three main efforts if you will this year. The first off is I have the privilege of chairing the Coordinating Board for the Committee on the Marine Transportation System. Under that, I've laid out a set of priority goals, five of them and a main one, which is like a forward pass for NOAA, is advancing MTS data and technology.

And so with the chairmanship we're going to improve our navigation services with this larger interagency authority. So I look forward to the HSRP's recommendations on how we can do that in detail. And then the second piece is I was recently quoted in an E&E article about pursuing a maritime moonshot, and what I was talking about there is our Ocean, Mapping, Exploration and Characterization Program, which is getting a lot of interest from the White House, and we are hoping to grow that program as we move forward. More to follow there, very exciting.

And then lastly, we are working with the White House to host an Ocean Science Partnership Summit in the fall in November. With that, we're bringing in more private sector interests and cooperation, and that's just really the way moving forward is that. We want to see ‑‑ we see a bigger role for the private sector in advancing our hydrographic services.

So I look forward to the Board's recommendations again on how we can really up our game in that area. So thank you all, and I hope you have a great week.

CHAIR SAADE: Thank you, Admiral Gallaudet.

(Applause.)

CHAIR SAADE: Great, inspiring words as always, and we're looking forward to fulfilling all those challenges. I would like to have a warm welcome to Lieutenant Governor William Nungesser. Thank you for coming, sir. I'm going to turn it over to Sean to do the formal introductions.

MEMBER DUFFY: I think you just made Billy sweat, huh? So of course a Lieutenant Governor is an ambassador for our state. I've worked with him, next to him and had his support on a lot of important projects to the river. Going back to work after Hurricane Katrina, during Deepwater Horizon, and a lot of local people yesterday texted me because the fake Sean Duffy, the Congressman from Wisconsin, announced that he was not running for Congress.

I'm here to tell you, Lieutenant Governor, I'm not running for Congress either. I'm also not writing any books. But if I do, I know you'll take care of a couple of them, right. With that, so Lieutenant Nungesser is very familiar with our coastal challenges. He's promoted the beneficial use of dredged material in the lower river. So Plaquemines, for those not aware, is really the front line for coastal land loss along the Mississippi River.

And every beneficial use project that we have proposed and worked on, and there is the navigation connection as the beneficial use helps to fortify the channel. That lower river is right there when storm surge comes in with hurricanes and storms. It washes away material. So we've really worked to kind of, you know, protect that with the beneficial use.

But other than that, I will tell you that Billy is a friend of our industry, of our state and does a great job, and I'm going to tell you you're in for a treat as he speaks. Please welcome our Lieutenant Governor Billy Nungesser.

(Applause.)

LT GOV NUNGESSER: Thank you, thank you. Thank you. Wow. I don't know if I can live up to that. Welcome to New Orleans, Louisiana. I'm here twofold. One is I'm very passionate about this industry, but my job as Lieutenant Governor is tourism. So in my short introduction, I'm going to try to cover both.

You know, as we approach the anniversary of Katrina this Thursday, my political career began because of that storm. I did not heed the warning of the National Weather Service that gives us such great information for storms, and I rode out Katrina 14 miles from the eye. Not a very smart thing to do, so I'm sorry.

Me and my wife had a riding center for special needs children, and I had 26 specially trained horses that I was not leaving behind, and could not find anywhere to evacuate them. So my home was built overlooking the Mississippi River, about six feet above the levee. We dug a lake in case it ever flooded, and we took the horses there, rode out the storm, rescued 34 people by airboat the next day, hundreds of animals and never saw a politician.

So I decided to run for parish president. Five hurricanes and an oil spill later, frustrated, I decided to run for lieutenant governor. So it seems like every disaster has taken me a step closer to in the political world. But I truly, as everyone that's from Louisiana knows, I speak my mind in what I believe, and I'll tell you. After I won parish president, then I didn't know what I was going to do.

But an old timer, Earl Armstrong, took me out in the mouth of the river, and is there anyone from Louisiana knows who that is, and showed me a ridge at South Pass that was pumped before Hurricane Betsy. He said out of 2,000 head of cattle, the only cattle that survived Katrina were on that ridge. I said take me in, I know what we need to do.

That ridge, with all that died and everything it was still there. So with our partners at the Corps of Engineers in Vicksburg, we paid them to work with us to design a plan to lower storm surge to Plaquemines Parish. We designed a 1,000 foot ridge, eight foot down to the marsh with trees that we would build behind the levees in Plaquemines Parish.

The lady at the Corps said when we ran the models it lowered storm surge 8 to 1 over a mile to marsh grass. "This is scary good," to quote her. So we knew we had a plan, but to spend tax dollars to build that plan, we knew we had to show reduction in flood insurance and cost savings to the public.

So after two and a half years of working in Washington, Craig Fugate finally wrote a letter to Congress saying we will now recognize berms and things as flood protection, as long as they're certified. So we cracked open the champagne. We're going to build these ridges with three dollar sand out the river instead of $50 clay behind the levees of Plaquemines Parish, lower storm surge five feet and in some cases, those levees would increase the flood protection and 100 year protection by lowering that surge before it hits the levees.

Unfortunately, as I finished my second term in office, the Parish supported it with $50 million, and when I left office the berms never got started, so that's the bad side of politics. But the good news is in January I'll be back on the CPRA and hopefully implement some of those plans along all of coastal Louisiana, so we can see our coast saved in our lifetime. That's another whole day of talks about pumping sediment versus diversions.

But I want to also recognize the importance of dredging not only to the river but all the navigable waterways in Louisiana, and not having to do that on an emergency basis every year. We have to spend so much of our political capital to try to get money to do something that ought to be automatic in the budget every year.

Navigable waterways. They should be maintained to that level. What it does to the Port of New Orleans when it silts in and the second pass down the river that has been silted in less than three feet that is unnavigable now. In the time of a problem on that main channel, that other pass should be dredged for national security, keep it open, and we've all got to work to do that.

I also want to give a shout out to the Port of New Orleans, because not only do they run so much cargo in such a vital part of Louisiana's economy, but on my tourism hat I still don't know how they get all those passengers on and off that ship every week safely. You know, cargo doesn't complain. People complain.

They do an incredible job in the tourism industry with those cruise ships, and wherever else in the world you hear about delays for fog, well our river pilots bring those cruise ships with all those people up the Mississippi River, and never get delayed for fog. They do it in incredible conditions, working with the Port of New Orleans and all of the people on the river.

So the Mississippi River and the Port of New Orleans and the river pilots do an incredible job for the City and the State of Louisiana and twofold, in the tourism industry and of course in the industry. But I will, in my last two minutes, welcome you to New Orleans and tell you tourism is my job. We had a record-breaking year. We saw a 9 percent increase last year in tourism. Never since we've been tracking numbers have we ever seen that kind of increase. 51.3 million people visited little old Louisiana to sample our food, our music and as I travel the world and ask people why do you send people to Louisiana, well it's the food, the music. But the most incredible thing I hear from people is Louisianans treat strangers like they're family. Where else in the world do you invite a stranger to your backyard to eat crawfish? And you usually leave with a friend for life when you visit Louisiana. So the reason those tourism numbers are incredible is because of the way Louisianians treat people. And if you're not from here, I hope you'll experience that before you leave.

I'm going to close with a short video of our new brand, "Louisiana: Feed Your Soul." You can feed your soul with so many ways in Louisiana, so hopefully you'll get around our state and visit some of these sites. Thank you.

(Video plays.)

CHAIR SAADE: Thank you, Lieutenant Governor Nungesser. That was great. It was a really nice video too. Your team did a really good job. I'd like to continue now with a warm welcome to Captain Kristi Luttrell, Commander Sector New Orleans, 8th U.S. Coast Guard District, and thank you for keeping us safe offshore.

(Applause.)

CAPT LUTTRELL: Well Sean, you're not going to introduce me? I'm just kidding. I'm only kidding, sir. I know you so well. I'm happy to be here, and that video officially made me hungry. I could eat crawfish any time, any day. On behalf of Rear Admiral Nadeau, John Nadeau who's our new 8th District Commander here in New Orleans, welcome, I am Kristi Luttrell, the sector commander here in New Orleans.

I'm one of seven of Admiral Nadeau's sectors. He has a very large district. He has almost all of the Mississippi River. District 9 takes the very upper-most part of that river. So I'm happy to be here and tell you a little bit about what we do here in New Orleans, and how important this river is to our nation's economy.

I'm also in the minority. I think I might be the only one that has a PowerPoint, and I'm not sure who's going to be changing the slides for me. Right here, got it. Okay. I'm assuming the green means go. That one, okay. Very well. We're going to find out.

What I'll do today and in my short seven and a half minutes that remain, I'll let you know what a sector commander does in the Coast Guard, how we in New Orleans manage the waterway with the help of a lot of people, and how we work with NOAA and what a great partnership we do have with NOAA.

I love this slide, and it might not be the first time people have seen it, but this why Coasties fight to be sector commanders. We get a lot of authority, and it is so much fun not only to be a commanding officer in the military, which a lot of things come with that including not so good things like holding people accountable in accordance with the Uniform Code of Military Justice. But sector commanders get to do these five authorities, and it is a blast. What this slide shows you is how our authorities in the Coast Guard mirror a local municipality's authorities.

I'm the Captain of the Port, and that might -- that is my biggest authority that I hold. That allows me to close the port, it allows me to open the port, it allows me to restrict traffic. I have a lot of authority with the Captain of the Port, and you can consider a doctor, a maritime doctor. I'm here to keep that port safe and the waterway safe.

I'm also the Search and Rescue Mission coordinator, which a lot of you know the Coast Guard's bread and butter is search and rescue in the maritime region, and I have the authority to run search and rescue and suspend search and rescue cases when the time comes. I am the federal on-scene coordinator for pollution and hazmat spills like a fire chief would do in their city.

I'm the federal maritime security coordinator for this area. Liken that to a police chief, where I protect the port from security threats including terrorism, and lastly I'm the officer in charge of marine inspection in this port, which requires me to inspect not only deep draft foreign vessel traffic that arrives in New Orleans, but also domestic vessels including tugs, barges and the like to make sure everybody's safe to be operating in the port.

As a lot of you know and I certainly won't steal Colonel Murphy's thunder, because I am not as qualified to talk about high water as you are, sir. But we have come off the longest, the record number of days above flood stage here in New Orleans, and that brought with it a whole bunch of challenges.

Back in the winter, we had some pretty bad mishaps with tugs, and we lost a couple of tug boat captains. So we had to do -- we had to increase the restrictions on the river. With the help of industry, we came up with tow size restrictions and some horsepower restrictions on the tugs, just to ensure they could keep up with the current, which was running at about seven-eight knots at the time, and that is really tough to manage, especially in a river of this ‑‑ sometimes it's really narrow in certain spots. Having a lot of horsepower allows you to compete with that current.

What's already been mentioned is during high water, Southwest Pass silts in really bad and that is the opening, that is the mouth of the Mississippi River. That's the main channel all of our deep draft traffic come up, and there was a lot of challenges with silting down there as well.

Low water. It's hard to believe I'll be talking about low water, but it does appear we're on our way to that after a record number of days above flood stage. We're about at six feet on the Carrollton gage right now, and right about five feet and lower, we're going to be talking about some low water restrictions.

I get asked every now and then what would you rather have, low water or high water? Well, I'd rather have neither. I'd rather have about eight foot on the Carrollton gage all the time. But since I can't, low water is less of a threat in my mind. When you have high water, you're worried about neighborhoods and water overtopping the levees and that is a bad day. At least low water, we can keep the water in the river.

I'm going to have to hurry up. I think I've only got three minutes left. Hurricanes are a major challenge for us. When do we close the port? When do we open the port? When do we enact our regulated navigation areas on east and west side of the Mississippi River? I'll show you here.

Next slide is going to be the regulated navigation area on the east side of the Mississippi River. It runs from the Seabrook Bridge down to the Inner Harbor Navigation Canal all the way out to the east closure complex.

That allows us, if we enact the RNA, to move all vessels out of there, to protect the levee system and neighborhoods that are on either side of that levee system from being breached. This is the west side of the regulated navigation area, so the west side of the Mississippi River. Roughly the Harvey Canal down to or over to Algiers and down to the west closure complex.

How do we do this? How do we get everybody on the same page when it comes to opening and closing the port during hurricanes? We call port coordination team calls. You're going to have local industry there. You're going to have other government officials there. A lot of stakeholders are going to call in and help me, as the Captain of the Port, figure out when the opportune time is.

A lot of times you cannot wait until your hurricane plan tells you to do something. We've noticed in the past couple of years, we don't always have 96 hours before gale force winds are going to reach Southwest Pass. We have to make the call sooner, and these port coordination calls, of which NOAA is a member, are very critical to us when it comes to making those hard decisions.

It's also harder to open the port than it is to close it, so if I don't have to close the port, that's a wonderful hurricane. I'd rather have some restrictions in certain areas than closing the entire port. It's very challenging to open it back up.

How do we communicate that? We communicate these decisions, any decision through the Marine Safety Information Broadcast, and I'll show you what that looks like right here. This is one I just recently released when Baton Rouge was on 35 in the fall, and it just backs down on some of those restrictions I had when we were at highest, the highest water. This is how it gets communicated to the industry.

Working with NOAA. The Coast Guard, as I said, has a wonderful partnership with NOAA. When we have these port coordination team calls, I rely very heavily on the weather forecasts that are out of Slidell and the Lower Mississippi Forecast Center for tides, currents, river levels, winds. What is the forecast? We always ask: what is the forecast? It goes into informing our decision about when and how to close the port and reopen it.

The PORT System, as the Admiral has already mentioned, is a wonderful partnership between the Coast Guard and NOAA. I took the moment to write the objective of the PORTS Program, to promote navigation safety, improve the efficiency of U.S. ports and harbors, and to ensure the protection of coastal marine resources. That sounds like the objective of a sector commander in the Coast Guard. I think that's going to be really fun learning more about how that data transmits through AIS.

I, in my area, I don't have any oceanographic research vessels, but the Pisces and the Gordon Gunner in the Gulf. It's not my zone; it would be Mobile Zone. I just thought I would list that as a Gulf partner with NOAA. We also have great scientific support coordinator here in New Orleans, specifically Brandy Todd. I work a lot with her on pollution trajectories, with my federal on scene coordinator cap on, where spills are going to be moving to in the maritime environment.

Lastly, the MC 20 Oil Spill Response case, which Brandy's been a wonderful partner in that oil spill as well. I am out of time. Thank you all very much, and later if you have any questions for me I'd be happy to answer them. Thank you.

(Applause.)

CHAIR SAADE: Thank you, Captain Luttrell. Okay. Now we're going to be hearing from, I got lost here, Colonel Stephen Murphy from the US ACE, and take it away. Thanks.

COL MURPHY: So good morning. I'm Colonel Steve Murphy. I'm with the -- I'm the commander of the New Orleans District Army Corps of Engineers. I'd like to start off with a little humor. Admiral Smith, it's good to see you again. I just saw him last week on the Mississippi River Commission.

But why did God create economists? So that weather forecasters won't feel so bad. Tough crowd. But it is a real honor to be here with you this morning. I am presenting on behalf of Major General Toy, who is my boss. He is the regional commander for the Mississippi Valley Division, Army Corps of Engineers. If you didn't know, the Army Corps of Engineers, our district boundaries, our division boundaries are based on watersheds, not political boundaries.

So for the Mississippi Valley Division, we cover from the head waters up in the northern United States all the way down here to the Mississippi. So our entire focus really is the Mississippi River and its tributaries. On behalf of General Toy, again who was called away for another meeting, I'd really just like to tell you about kind of what we do and just deliver a couple of key messages.

One of the key messages is just the absolute importance of partnership. One of the encouraging things for me is I've been in command just over six weeks. So this is my second district command. I had another command on one of the Mississippi's tributaries in the Nashville District.

But looking out and seeing familiar faces in just six weeks of command in this room, just really to me is evidence of the importance of, you know, it takes a village to do what we do. The Corps of Engineers certainly cannot execute its two primary missions here, which is navigation on the Mississippi River and flood risk management.

One of the things that I've especially seen just in a short period of time, and probably four days in the command, after I assumed command Hurricane Barry hit. It was high adventure. I was down at GOHSEP and Baton Rouge with the Governor watching it, and I will tell you just one thing that struck me very quickly was the importance of the relationships, and I would say especially the folks in this room.

Like every meeting for that event started off with a National Weather Service update from the River Forecast Center, and then as I'll discuss in just a minute, how unique the weather has been. And I would tell you from the Corps of Engineers' perspective and I'm sure no different with NOAA is Mother Nature is not making this any easier.

Earlier this month, as Captain Luttrell mentioned, we just closed the longest flood fight response effort in the District's history at 292 days. And just figure 292 days, it's nine months -- over nine months. Four and a half of those months for my District were at 24/7 operations, and with 1,000 people who are doing engineering jobs, geologists, all the different things we do, that means one in four people was doing above and beyond what they normally do to help manage the river.

But I've heard terms like historic, unprecedented, the new normal for having a hurricane come in while we still have and we're still at flood stage on the river. And I know Sean's mentioned this, others, 124 years, it's the wettest year in 124 years of recorded weather history, river at flood stages longer than ever.

USACE, we operate at Bonnet Carre, just in record frequencies and amounts this year. We operated it twice this year, never happened before. We've operated it two times, or twice two years in a row. Just why that matters is we've operated it more in the last eight years since 2011 than in the previous 70 years from 2011 before.

So just significant changes in weather that we're seeing that are forcing us from a flood risk management perspective to operate our spillways. And what that means is, to give you a little perspective, we're at New Orleans. That's 10,470 Superdomes of water being pushed into Lake Pontchartrain, which is a lot of fresh water. That's one of the things that I would tell you, is that for the Corps of Engineers, especially down here on the river and certainly here in New Orleans, where we're receiving all this water, there is a lot of tension between competing interests.

You have flood risk management, which is our top priority. Mississippi River levee system, which for a nine and a half month flood fight has performed incredibly well. No crevasses, no overtoppings on the federal. It performed incredibly well. Let me tell you, it's a 40 to 1 investment of your tax dollars -- a 40 to 1 return on your tax dollars.

But we do this very closely. One of the things very closely in sync with NOAA and a lot of the folks in this room. And I know on a daily basis, we work with the National Weather Service. Like I said, that River Forecast Center, their Hurricane Forecast Center and NOAA's Hydrographic Services, but also a lot of our local partners.

On the navigation front, which definitely is a concern for this room, we've also seen a lot of challenges like we haven't seen before, just with nine and a half months of the high water.

The channels operated under restrictions for a quarter of the year, and the deputy governor talked about fog delays, fog delays. We've seen more fog delays to our dredging operations in Southwest Pass this year than we've seen in the last 30 years, so just a lot of significant changes.

We've seen a record showing and just with the river the way it is, especially as it's dropped out so quickly in the last 30 days, the volume and buildup of material have just been an incredible challenge to keep up with. He talked about hey, we've got to get away from this emergency dredging, and that's something that the Corps, the Corps headquarters, in conjunction with General Toy's headquarters and my headquarters, looking at a regional contract, like how do we ensure that every year that this isn't an emergency, when we finally figure out hey, this is where the shoaling is in Southwest Pass.

But just for perspective, in an average year we dredge about 19 million cubic yards in a 30 mile reach on the Mississippi, and so far this year we've already doubled that, and we anticipate almost tripling that by the year's end. If cubic yards don't resonate with you, so about 70 million cubic yards by the end of the year, I think $800,000 a day probably would.

Right now we have three dredges working in Southwest Pass. We have another five working on the crossings, and for the first time in a long time I'm happy to report there are no draft restrictions. Now later this week, the good news is we'll be sending one of the dredges in Southwest Pass up to the Port of New Orleans.

So as Sean always says, and I would add really flood fighting to this, is waterway management is a team sport. So the Corps of Engineers is happy to be here with you. I personally look forward to hearing about best practices and lessons learned, especially as it applies to our surveying efforts and how we work with you.

So please when you get a chance during breaks, come up to me. I'd love to hear about any suggestions you might have or concerns you might have with how we do business. So thank you very much.

(Applause.)

CHAIR SAADE: Thank you, Colonel Murphy. The HSRP has been following USACE and NOAA relationship and working together. So it's a top interest of ours. So this is great timing for us. Okay next I'd like to introduce Brandy Christian, President and CEO of the Port of New Orleans, CEO of the New Orleans Public Railway Corp. So please proceed. Thanks.

MS. CHRISTIAN: Thank you.

(Applause.)

MS. CHRISTIAN: Well good morning. Welcome to New Orleans. You know, it's interesting. I'm actually a West Coast transplant myself to New Orleans. So came out to New Orleans in 2014, and people often ask me why in the world would you leave San Diego -- arguably the world's best climate?

And first of all, I said well no matter where I moved, it was going to be a downgrade, because you can't get better climate than in San Diego. So welcome to some of my San Diego peers to New Orleans. But honestly from a maritime and a port perspective, the opportunity to work on the Mississippi River is a complete dream, and I had watched and studied the Port of New Orleans and saw their trajectory from a business perspective and what a huge opportunity that is from a maritime perspective.

Now I can tell you, experiencing deluges like yesterday, probably get more rain in one day than California gets in a year. So it's definitely a difference. But I'll tell you I'll take it any day to operate on this river. It's a complete dream. But as Sean Duffy spoke to, as Captain Luttrell has talked about, it's an extremely complex and ever-dynamic river that we operate on. So I was just going to touch base today from a business perspective, give a little bit of background on what the Port of New Orleans does, and I know some of you are scheduled to actually physically see some of our facilities tomorrow at the Port of New Orleans. So I wanted to touch on the importance of what you do from a standpoint of both weather services and the tools and navigation that keep us operating safely and help our pilots and captains to be able to navigate this tremendous waterway.

But also the importance of dredging that I'm sure you'll hear a number of panelists throughout your sessions talk about. But this industry certainly is evolving, as much as the river is evolving. So your work is becoming more and more important, and really one of our biggest dynamics and challenges we have in our industry from a port perspective is ships are getting bigger. They're not getting smaller. That's not going to happen.

And volumes are growing dramatically, and our customers in this just-in-time Amazon world is tremendous pressure on the supply chain. So for them time is money, and they expect their orders to come in, to be able to navigate safely, quickly up a waterway that is challenged at times with whether it be draft or it be weather circumstances, you name it. So what you all do is extremely important every day to that commerce.

Some of the topics that you're going to be discussing -- precision navigation, better mapping, expanded use of air gap sensors on bridges -- is extremely important in what we do every day, and really is what's going to keep us competitive here on the Mississippi River.

Just go give a backdrop to the Port of New Orleans, we are just one port of many within Louisiana. But as you know as a nation, and arguably I'd say the Port of New Orleans is one of the most diverse ports by what we do in terms of the diversity of business. But if you take the five ports that are from Baton Rouge to the mouth of the river, and you take the amount of cargo that is moved just by those five ports and if we were say one entity, we would be the largest complex in the world -- bigger than any other port in China, you name it.

That is the complexity of what Captain Luttrell and her team, the Army Corps is managing in terms of the amount of economic development that's moving on that waterway system.

Now for the Port of New Orleans, obviously cargo is kind of our bread and butter, what we do every day. About 50 percent of our business and our revenue is cargo. We are -- about 50 percent of that cargo moves by container; 50 percent of that moves by what we call break bulk -- things that don't fit into containers.

Primarily on the container side, we are an export port. You see a lot of frozen poultry, but also chemicals, plastic resins, and you see those chemical plants up and down the river system, the petrochemical plants. They produce little plastic resins that get shipped off to Europe and Asia, and they come back as Barbie dolls and water waddles. Tremendous amounts of exports coming out of the river system in containers.

The other 50 percent is about 90 percent break bulk, and that's big natural commodities like steel coils, rubber, lumber, all coming into the river system. And about 90 percent of that comes directly off of a ship, directly onto a barge, and moves up the entire Mississippi Waterway System. So again, more traffic on the Mississippi River getting into our Midwest markets.

And from a business perspective, we grew 12.3 percent in containers last year. We have doubled our volumes in the last 10 years. We went from relatively a new container port over 10 years ago to about 650,000 TEUs or 20 foot containers.

We definitely see no signs of slowing down, to the point of now where we are actually looking and identifying a site for a second container terminal that will be before the Crescent Connection Bridge, which will make the Coast Guard very happy to not have to navigate that bridge with the larger and larger ships.

Right now, we can handle up to a 10,000 TEU container ship with the air draft restriction that we have there. On occasion, we're working 9,400 TEU ships. So as you can imagine, when we have high water, that becomes a real issue, and the importance of air gap sensors, et cetera, become very important.

Second line of business for the Port of New Orleans. We acquired the New Orleans public railroad two years ago. That's a short line that actually connects to six Class 1s here in the New Orleans Gateway. That puts us as a port in a very unique situation, that we are the only port in the United States that can actually deliver six Class 1s directly to our docks.

There's only four gateways in the country that actually have all these Class 1s converged. We took over that short line that connects those Class 1s directly to the City and region of New Orleans.

We have over 1,200 acres of industrial property, the map that Captain Luttrell showed, along the Industrial Canal. A lot of that property that they're protecting, a lot of that activity is where a lot of our real estate sits, where we have companies that service the maritime industry, everything from trucking and packaging to warehousing of all those cargoes. That's where those facilities reside.

And lastly, as the Lieutenant Governor talked about, we are the sixth busiest cruise port in the United States. We just recently announced Royal Caribbean, a second year-round ship for us. That will put us at about 1.5 million passengers a year. That will be 300 cruise vessels coming up the river system per year.

Obviously, the safety, you could have over 4,000 people on these ships. So navigation and safety is extremely important, and particularly if you have any issues with fog or dredging situations. So as I talked about with the complexity and the opportunity of the business expansion that we have just at the Port of New Orleans in itself, continuing to invest in the maritime facilities in the dredging obviously has a huge economic return.

But obviously we have to have tools that make sure that navigation is safe, and unfortunately the tools that help mariners navigate haven't always been, haven't -- how would you say -- changed as significantly and progressed as quickly as maybe the natural environment has or the industry.

And so keeping up the pace with those technologies and tools and investing those into the river systems is extremely important, because what that translates to our customers typically is when you have navigation restrictions, it's decreased loadings of their ships and wait times, which is all a huge economic impact and loss to those industries.

But it also hurts us from a competitive standpoint that we not be seen as a waterway that can stay competitive. So we very much appreciate being only one of two precision navigation projects here in the U.S. That keeps us very alert to the changing water levels, low under keel clearance when we have draft issues, air gap clearances as I talked about.

Really, the biggest challenges for water depth are the oil and gas tankers and the container ships. Those will be the vessels that are really pressing up against size. A good example is contractually at the Port of New Orleans, I am obligated to keep the container berth at 45 feet.

I'm one of I think only two ports in the United States that actually owns my own dredge and keeps that dredge out there every day, and yet with the challenges of the river, as mentioned by Army Corps, is we will actually be sending out another dredge just to continue to combat any of those challenges.

So it is a very dynamic situation that we operate in, and as mentioned this last year, we actually have a lot of challenges with fog. It was definitely a convergence this last year of different factors, and really we would not have been able to do that and be that dynamic in the environment without the partnerships we have between the pilots, the Army Corps, Coast Guard, with NOAA and having that information available to us to help our pilots, help our captains to be able to navigate.

We absolutely support the idea and a push for more investment into those technologies, the navigation tools. The bank to bank surveys have been extremely valuable for the Port of New Orleans. More air gaps on bridges. I can tell you when we bought the railroad, we actually bought the Huey P. Long Bridge, which is the major bridge that goes over the river in Jefferson Parish.

I can tell you this last year how many times that bridge has been hit by barges, you name it. We are very fortunate that we haven't had something major, but it's a reality of the environment that we operate in. So we very much support to make those -- support making those continued investments.

And lastly, the importance of dredging of the river. We have been fortunate that there has been increased funding, but the investment, the challenges are still there, and access to dredges is a continued challenge for the river. The state has really made it a priority to get to 50-foot draft, committed to the three years funding, 24 million a year.

You know, what's important when you think about it from an economic perspective, you know, the typical staff that they use is that for every foot of draft, you are looking at about $1 million of impact per ship. So either a loss of a foot or a gain of a foot has that kind of impact.

Just from Hurricane Barry alone, just the Port of New Orleans, we lost six container ships. They basically had to skip the river out of any concern of having air draft restrictions or any restrictions at the mouth. So obviously getting to 50 foot is extremely important because it gives us wiggle room, so to speak, but also really keeps us competitive and the Midwest competitive.

And if we could achieve 50 foot draft, and particularly from a container perspective, having a terminal that is prior to the bridge, we will be the only Gulf port that actually has that type of infrastructure and that kind of flexibility in this ever-changing dynamic waterways systems that we're dealing with. Not just here; we're seeing challenges in other waterways, as well as the Mississippi River.

So again, the work that you all do really helps us be more educated, and to be able to predict and navigate the waterways safely. So again thank you, and we look very forward to having you out and actually see some of the physical facilities that I talked about. Hopefully, this gives you some context to what the business perspective looks like for the Port of New Orleans.

(Applause.)

CHAIR SAADE: Thank you, Ms. Christian. I too am a San Diego transplant, but I only made it as far as Houston. I think you got the better deal. That was excellent, and thank you for hosting our group on Wednesday. We're looking forward to it. Sean, would you take over introduction duties? Thanks.

MEMBER DUFFY: So I feel like Captain Luttrell, Colonel Murphy, President Christian. I owe you an introduction. Just let me know when I can do that, and I think it was just based on a matter of time. I'm very happy to introduce my friend Claire Trokey from Congressman Scalise's office. Captain Miller is in the back of the room. He's the president of the Bar Pilots and he's the chairman of the Big River Coalition.

One of the things that we often do is take members from the Corps, members of Congress, staffers, people interested in talking about Southwest Pass to ride a ship. We had met Claire really before she came down when she was first starting out, and I will tell you both Captain Miller and I were impressed from day one.

She did great on the Jacobs ladder, had a lot of background that prepared her for that, and ever since have leaned on her for a lot of the things that make us successful. I was with Congressman Scalise and Claire yesterday. I'm a member of his maritime task force, and a lot of the success that we have and help that we get comes from that office.

All I can tell you is Claire is a star in that office. She works very hard to help us, and I have in more than one place talked about the importance of staffers. Claire is definitely one of our all‑stars and I have called a super‑staffer before. I will do it now and I'm very happy to introduce Ms. Claire Trokey. I'm sorry, but one thing that I have to say is, and I know Billie would get mad at me if I didn't notice it, but I'm impressed at the quality of ladies that we have at the head table today. You all do a lot for us and it shows how far we have come in this industry. So thank each of you. Ms. Trokey.

MS. TROKEY: Well, thank you Sean for that very generous introduction, and I will say the day that I went out with you and Captain Miller, I learned that I did not have much upper body strength as I was doing the ship‑to‑ship connection. But appreciate that, and it was a great view to see of the river and, really, the gateway to the world.

Part of my job is to work with many folks that are in this room and many folks that are on this distinguished panel, whether that be at the federal government level, our partners in the federal government, our partners at the state with local governments, and as well with private industry, to understand (a), how we can keep the people and communities of Southeast Louisiana safe, but also to understand what the needs of the Mississippi River are.

The Mississippi River, as many of you know, is important to the economy of Louisiana, but from a national perspective it's important for the national economy and our trade capacity. We know that there's over 500 million tons of cargo that move on the Mississippi River that contribute to our international trade.

That includes 60 percent of our nation's grain, 20 percent of our nation's coal. In the state of Louisiana, our maritime community means 70,000 jobs and more than $18 billion into our state's economy. So the maritime industry, all the jobs that support that and what the work that the maritime industry does means a lot to our state and to our nation.

You know, one of the things that we work on in Congress, we look at annual appropriations and we look at what we're been doing on a biannual basis of our WRDA bills for authorizations. So a lot of that means communication. Like I said, once again with our partners within the federal government, within the state of Louisiana, within our local governments and private industry to understand kind of what the needs are.

Last year in our fiscal year 2019 appropriations, we had a ten percent increase in the Harbor Maintenance Trust Fund funding available, and we also increased the Corps' budget by $172 million. We're still working through fiscal year '20 appropriations right now. It's going to be a busy September once we get back in session for Congress.

But in Louisiana, you know, I really want to highlight what many folks have said, that dredging on the Mississippi River enables us to move that cargo and keep our nation's economy going. But it also is really important for our coastal efforts in Louisiana, as well. It's a big priority and, you know, you've heard many of the estimates of a football field length of land per day.

So that is one of our top priorities, and it's a really unique situation where industry comes together with the government, whether at the federal or local level, to rebuild our coast. I won't say too much more, you know. Many of the folks on this Panel, you know, are the experts and we rely on them, you know, for input as we are making federal policy decisions and appropriations decisions. So I appreciate the opportunity to be here with you guys today.

(Applause.)

CHAIR SAADE: Thank you Ms. Trokey. Shep, I'm going to turn it over to you.

RDML SMITH: Thanks Ed. Just a couple of observations. First of all, thank you to this fabulous panel for setting the stage for discussions this week, and I hope that some of you can stick around for some parts of the day today and the coming days to hear from our other experts.

A couple of ‑‑ a couple of notes that I think are worth stressing. I wanted to thank Admiral Gallaudet for raising the blue economy as a framework for all of this, and I think many of the speakers afterwards echoed some of the same sentiments, sometimes with the same words, sometimes not. But the resilience and growth of our shipping industry and the importance of our services to the shipping industry really cannot be overstated. Here it's combined with the dredging, which is not unique to this port but is perhaps the biggest example in this port.

The second one was the ‑‑ I wanted to thank the Governor for noting cruise ships as an important part of the tourism industry. I'm not sure that we flagged that in blue economy as an important way that the American people experience the ocean and the services we provide to ships also apply to those cruise ships.

So I wanted to thank you for that, but also the smaller recreational vessels are ‑‑ the United States has about half the recreational vessels in the world, and quite a few ‑‑ Louisiana is not the highest per capita, but it's right up there as a really big boating state. It's a huge part of the local culture and economy.

And lastly, just the integration of these tools and information to really be able to make the most of our built infrastructure. That's going to be the focus of our next panel with precision navigation after the break. So thank you, thank you all and of course to our political partners in the panel, to thank you very much for the support of these programs and the recognition that we get in the halls of power. So thank you.

(Applause.)

CHAIR SAADE: Okay. In the interest of time, we're going to go ahead and take our break right now. So I want to thank the panel members again. It was really great and a great way to start the whole Panel meeting. So you all back at 10:45. Thanks.

(Whereupon, the above‑entitled matter went off the record at 10:25 a.m. and resumed at 10:43 a.m.)

CHAIR SAADE: Okay. We're going to continue. Two quick items. We missed something really important to announce earlier, and that was the East Bank River Ridge Little League World Series champions are right from this area.

Applause.)

CHAIR SAADE: And also I want to compliment everybody. The energy in the room during the break was fantastic, so let's keep that up, and Sean, I'll turn it over to you.

CAPT KRETOVIC: Hi. I'm not Sean. I'm Captain Liz Kretovic with the Office of Coast Survey. I'm the deputy hydrographer and the precision navigation program manager. Today, we have a really exciting panel with a mix of both NOAA experts and also experts of the river. Ms. Christian really teed us up nicely when she talked about ships getting bigger and investments that are being made in different infrastructures.

We're here to kind of represent the information infrastructure that's necessary for the safe navigation of these larger vessels. So we're going to hear from three different pilot association presidents, as well as Dr. John Kelley's going to dive into exactly what it is that we're doing at NOAA with precision navigation.

So just to give a quick overview, we call it precision navigation but really these three gentlemen in the middle and others in the room, they're the precise navigators. As a matter of fact, Captain Bopp told me a couple of weeks ago that when he began his career in 1980, he was really worried about being a smooth operator, and now he said with this new technology, I have to really be a precise navigator.

Anyway, what we're doing at NOAA is we are integrating all of our different data streams that are important for navigation services into one place, to make them discoverable and interoperable with other equipment and tools that are developed through private industry. So these are things like portable pilot units, under keel clearance management systems, electronic chart display information systems, electronic chart readers, and other software.

So we're doing this because we see the need. We see technology as the future, and we want to get ahead of the times. Just as Ms. Christian said, she couldn't put it any better, today is a very just‑in‑time supply chain with high demands, big ships, and we are really focused on trying to deliver a better information set to the mariner.

So I'm going to turn it over right now to Dr. John Kelley, who is our precision navigation dissemination manager, and he's going to go a little bit deeper into exactly what it is that we're doing at NOAA. Thank you.

DR. KELLEY: My name's John Kelley from the Office of Coast Survey. Thank you. All right, thank you. Yeah, I'm a meteorologist by training. So I'm kind of tempted to get up in front of the screen and point, but I'll try to sit at the desk this time.

I won't take Colonel Murphy's comments earlier about meteorologists versus economists too personally. So this morning I wanted to describe the NOAA Precision Navigation Dissemination System, and this is a critical part of NOAA's efforts to support precision navigation.

So Liz ‑‑ Captain mentioned, precision navigation is the ability of a vessel to safely and efficiently and operate in an environment when ships are close to the sea floor. We have bridges to worry about, narrow channels and other marine hazards. So to accomplish this, we need to provide the mariner with information from NOAA.

Most mariners, of course, rely on nautical charts. But increasingly and to support precision nav to operate in these really confined spaces, we need other information from NOAA such as real-time observations of oceanographic and weather information from the Weather Service or National Data Buoy Center, CO-OPS, or our regional IOOS associations.

So how do we try to make this information easily accessible and in data formats that the manufacturers of PPUs and ECS can easily integrate into their systems and make that data and information available to the mariner. So that's what we're trying to work on and I'll describe here briefly today.

So to achieve this, we have two major initiatives. The first is developing and testing and implementing International Hydrographic Organization S‑100 framework, which you might have heard about already, to allow for the consistent integration of NOAA data sets. NOAA is a really the lead organization in the world working with other countries to develop this standard and test it and then implement it.

NOAA personnel are on many different working groups working on these different standards, and it's quite an effort as you can imagine. It's an international effort. We have to go through the different countries and make sure it's applicable to their hydrographic offices' standards and also for their customer needs.

The second effort is to develop and test initially a prototype dissemination system to provide a single location for users to access the NOAA data sets, initially with a limited set of S‑100 products and also OGC compliant web mapping services. That diagram on the bottom just shows you the different types of S‑100 data sets we're talking about in the coming years.

It will probably take many years and probably over a decade to really fully implement the different standards, and then actually put it into operations.

So what is really the outcome of doing this in NOAA? It is to make it again easier for ECS and PPU manufacturers and under keel clearance software companies to ingest, process, and display NOAA's marine navigational data information to enable precision nav at major U.S. seaports.

Recently, earlier this month in fact, we had a workshop, a NOAA workshop at the NOAA‑UNH Joint Hydrographic Center with manufacturers of PPUs and ECS, to bring them in early on the design and development of this Precision Navigation Dissemination System, you know. Probably in the past NOAA did not do that, to bring industry in at the early stages. So we wanted to make sure that was done this time.

So we got many, many good suggestions and recommendations from these manufacturers on how to proceed and what would make it easiest for them to ingest our data sets, and many of these have volunteered to be beta testers for us as we again design, develop, and test dissemination system.

So the two main deliverables in the next few years is again dissemination system, and again the goal is to provide one location for commercial and recreational mariners to obtain NOAA S‑100 products suite. We try to do this in a commercial cloud environment for many reasons. One is of scalability, higher availability, and also the ease to develop, test, and implement new data sets from NOAA for our customers given the need and the ever‑changing environment in terms of data sets and also technology.

On the diagram on the top there, the two initial data sets that we're focused on, providing via the dissemination system are the S‑111 surface currents from our NOS oceanographic forecast systems, as well as S‑102, which is gridded bathymetry and a variety, again through a commercial cloud environment and through a metadata discovery exchange catalogue for ‑‑ again, for the manufacturers to be able to discover when the data has sort of been updated and to ingest them and make them available on their units.

The second one is a new website called Marinenavigation.noaa.gov. Provide one site for commercial and recreational mariners to discover, find, learn about the extensive amount of information we have from NOAA. Again, as you probably all are aware in this room, it's difficult to find all different types of data sets, information that we provide for marine navigation.

So we're going to try to have one location that will provide information about that, as well as point to other agencies, like the Weather Service or NOS or even our satellite service.

This is just an example I pulled showing the water current forecast guidance from the NOS Northern Gulf of Mexico Operational Forecast System, and this is making the information, the forecast available in tiles. On the right is a display of the vectors of the surface currents at probably a 24 hour forecast, and again, making the tiles available at a certain size, that makes it easier, easy for the manufacturers to pull, as well as to make them available on the pilot PPUs or ECS.

So again, this is what we're planning to do in the coming years, and this is our contact information if you'd like to ask us questions in the coming months and years. Just on the top there, just kind of an illustration of what we're trying to gear towards. We're trying to have a consistent format using the S‑100 standards that a user can be able to overlay different types of data sets.

Whether it's nautical charts, gridded bathymetry, water currents, water levels, and also weather overlays, which will be provided by NCEP, Weather Service NCEP, the Ocean Prediction Center, of marine weather hazards, marine weather warnings. So a marine customer will be able to have all this information from NOAA in a consistent format, and hopefully it will be easier for the manufacturers to access and display. So thank you very much.

(Applause.)

MEMBER DUFFY: Good morning again. So I have the distinct pleasure here in the next couple of minutes of introducing three pilot presidents, and what's really tricky for me is that each of them is a member of my board. So please make sure you give them proper respect and let them know on the line that you do appreciate what I do.

Colonel Murphy took one of my lines that I use a lot, that waterways management is a team sport, and it's a really big team, and that we depend on each other to deliver in our own way. Each position has a little bit different role and are all very important. Captain Kretovic pointed out that Panel members, if you can hold questions for the panel after the last speaker, we'd appreciate that.

With that, I have what I will call a Shep story, who always likes for me to add a story to kind of frame things. So I know Captain Hathorn, who I'll introduce, is going to speak a little bit about air gap sensors. So in the great flood of 2011, I was over not too far from here on the river and there was a large container ship coming up.

My son in there was with me and I was showing him the power of the river, crazy high, a 17 foot river, and here comes a container ship. Well, all these people are running by me and my son with their iPhones out taking pictures. Like a lot of them had a drink in another hand. It took me a minute to focus on that, but what they were doing was they totally saw the optical illusion that that container ship was going to take out the Crescent City Connection, and they knew it was going to happen, and they all sat there and filmed it.

But one thing I will never forget is their response when it cleared the bridge was like "awww." So you have to remember that in that what we do, the public is not aware of. The count on us to do what we do and keep things safe. So you know, my son looked at me and I was like son, it's going to be okay. There's an air gap sensor. He's looking at me. I said pilots wouldn't bring it up. They know what it is. They are sure it's going to clear it.

And then went it went by, my son looked at me like dad, you knew what you were talking about. Well with that, I'd like to introduce Captain Steve Hathorn. So he's the president of NOBRA Pilots. For those that aren't local, the NOBRA pilots move ships from New Orleans to Baton Rouge. Each route has a lot of their own complexities.

You have the experts in the room to talk about it, and with that I will turn it over to Captain Steve Hathorn, my board member. Thank you.

CAPT HATHORN: Thank you, Sean. I'll tell you anybody that's been on the bridge of a ship going under a bridge, you know when you're looking at it, you swear you're going to hit it no matter how much room you have. But mariners out there know what I'm talking about. It gets kind of tight.

Today I'm going to talk to y'all about air gap sensors and velocity meters that we have here in the river, the ones we have and ones we don't have. First of all, I was going to start off by just going a little background on the three groups like Sean was saying. There's three groups here that operate, the State Commission pilots that operate here on the Mississippi River.

The Bar Pilots, Captain Miller, operate from the sea buoy up to Pilottown. Captain Bopp with the Crescent Pilots, they operate from Pilottown up to New Orleans. If it's going above New Orleans, then my group NOBRA gets on them. We'll take it all the way to Baton Rouge.

Our route is, like all pilot routes, is different. Each one of them has its own challenges. Our route is particularly long. It's 140, approximately 145 miles. In that area, we service three main ports, the Port of New Orleans, which is the number seven port in the U.S.; the Port of South Louisiana, which is the largest port in the United States; and the Port of Baton Rouge, which is the number nine port in the United States.

Combined, we're talking about over 374 million tons of cargo. So it's quite a lot of business out there, and at times as you can see from this slide, it gets quite congested on our end when you have ships and tows and everything else. At any given time on our route, you know, you're looking at scores of ships, thousands of barges and hundreds of boats. So it is quite congested out there.

NOBRA will dispatch from time to ‑‑ each year. Last year, we dispatched over 16,000 of pilot turns. So like I said, we're quite busy. One of the unique things about our route here is we have 13 deep water crossings in the ‑‑ between New Orleans to Baton Rouge. Those are shallower areas where you're crossing from one side of the river to the other.

The channel, they can average two to three miles long and only 500 feet wide. So when you're meeting traffic in these areas, two loaded ships, it's quite not much room for error. It's not much room up there when you divide it up. The other thing that we have is ‑‑ that I wanted to get into today to speak on is the bridges that we have in our area.

We have six bridges. We have the Crescent City Connection here in New Orleans; Huey P. Long Bridge, which is in Jefferson Parish; Luling Bridge; Grammercy Bridge up in the Grammercy‑Lutcher area; Sunshine Bridge in Convent‑Donaldsonville area; and then the I‑10 bridge in Baton Rouge.

As a general rule, the Huey P. Long Bridge is the controlling bridge. It is the lowest. It's 153 feet minus the Carrollton gage. So it has approximately from high river, extreme high river to extreme low river possibly a 17 foot range that we're talking about. Most of the time, it is going to be the lowest.

But just like recently we experienced high river for a long period of time, the Luling and the I‑10 bridge will actually become lower than the Huey P. Long Bridge.

So it's challenging to at different times the river level, to gather this information and have it all correct, because various charts have ‑‑ believe me, we've looked at all of them and put out different information. Depends who's printing it, when, and so we do have some issues with that. You're talking about high steel versus low steel. It gets, it gets pretty challenging.

One of the things that people ask me all the time is the changes I've seen in my 40 years on the river. I would have to say in the last ten years we've seen with the PPU units, technology coming aboard the bridge because really a bulk carrier looks pretty much the same on the bridge as it probably did 40 years ago.

But you have technology now with the PPUs, AIS, and GPS. The other thing is the size of the ships. The ships have gotten taller, wider, carry more cargo, more draft. But the bridges haven't gotten any taller and the river hasn't gotten any wider. Hopefully we can get it deeper.

So we do have sensors on two bridges now. We have on the Crescent City Connection and the Huey P. Long Bridge that give us ‑‑ it's a laser and it gives us real-time data on the air gap. We would like to see sensors on all bridges quite frankly. The cost I understand is not that much. It's about the maintenance on the sensors, about $10,000 a year.

I've heard the number ten million would take care of every planned sensor, every site in the U.S. So overall, it doesn't look like it's a whole lot of money, and it would bring mariners, give them that information they need to guide the vessels safely. Back October 12th, up at Convent, you had a tow boat with a crane barge. He hit the Sunshine Bridge, did a significant amount of damage to it.

It was millions of dollars, and then you had all chaos up there with the traffic. When you shut that bridge down for months, it all had to be redirected toward Baton Rouge, which is a nightmare for traffic anyway. So we think these sensors would be a good thing if we could get the funding to fund all of the precision navigation.

One other thing, I'm running out of time, but we also have two velocity meters that measure the current here, one in New Orleans and one in Baton Rouge. They are almost useless, because they've been put in places next to the bank, but they don't get a true reading. We would like to see those also updated and put in areas where we can ‑‑ where they'll benefit people, because it's ‑‑

You know yourself, the current's going to be out in the middle of the river, it's not going to be next to the bank. And so thank y'all for having me.

(Applause.)

MEMBER DUFFY: Thank you, Steve. So I will not add that new nickname that Captain Kretovic gave you, but we can talk about that later. My good friend Captain Michael Bopp. So Captain Bopp is the president of the Crescent Pilots who move vessels from Pilottown to New Orleans, and Michael again is one of my board members. So please treat him well. But he's the perfect person to talk about the challenges and really looking at pushing the technology. So I'll look forward to hearing that. Michael, the floor is yours sir.

CAPT BOPP: Thank you, Sean. I would like to really thank NOAA and the Advisory Board for having us, and involving the navigator as a spoke in the wheel. I want to elaborate on a couple of things that Brandy Christianson said about cruise ships, and the business that we're having in the Port of New Orleans right now.

I think that the pilots have really facilitated and managed increasing the business. I know Captain Sal is here, and we've had many, many discussions. I don't think anybody is doing what we're doing in this port. You get on a cruise ship sometimes at Pilottown, and the Bar Pilots do the same thing. You never even see what color it was, you know, and you get off here at Julia Street.

We do it in dense fog without seeing a thing, all technology, all radar, all PPU. I don't think any port in America is doing that, and as far as pilots are concerned, when you start talking about pilots and you start talking to lay people and you tell them you're a pilot, the first thing they ask you is what airline do you fly for.

It's really a common thing. They always do that. So and they don't ‑‑ even people in New Orleans, they know the river is here but they don't really know the importance of what the river is. When I start to tell them that every thing you touch, 90 percent of the things you touch, whether it's your clothes, whether it's a computer, whether it's Tupperware, it doesn't come from Walmart. It comes on a ship first.

So it's very important and I think your forefathers very, very long ago decided that they wanted to make a strategic purchase of Louisiana, and the reason they made that purchase was that body of water, the Mississippi River and how globally important it is. So you know it's important and like I said, I thank y'all for having us.

Liz, it is my birthday today. I'm 61 and I feel like I'm less of a smooth operator and hopefully a more precise navigator for sure. I did go to a workshop, because I didn't know what the term reference to precision navigation. So at the University of New Hampshire two weeks ago, Liz and John's team had a workshop. There was a lot of scientists there, and we were the only two navigators.

Ryan Scully is in ‑‑ he's one of my pilots, and he has written, designed, and created a PPU and software that we use navigating called MRTIS. So almost everything they were talking about was for us, the end user, the navigator. So that's how important it is to us to have this, and so I thank y'all for having us.

I made some notes and the challenges of what pilots deal with. One of the main challenges is we want to get the most draft possible out of our deepwater channel. So under keel clearance, and under keel clearance is a quantitative measurement which represents the distance between the bottom of a vessel and the river bottom in a very restrictive body of water. The difficulty in accurately taking this measurement could be based on many factors. But doing it in the very dynamic Mississippi River bottom complicates the accuracy of this measurement even more.

Within the Mississippi River Basin, our delta can cause many changes. During high water conditions, the amount of debris that flows throughout the entire water column dispenses spoil in some places where there could be a loss of three meters overnight. Therefore, updated daily surveys are an imperative piece of data a navigator must utilize in order to maximize the deepest draft during these specific conditions.

The method of these surveys the Corps of Engineers have utilized for many decades has always been a single beam survey method. After the Crescent Pilots doing a month‑long test of utilizing a multibeam survey method during this last high river period, it became obviously apparent a more superior and accurate method going forward. The surveys eliminated huge areas that were just being interpolated by a computer in a single beam method, to actually surveying every square five feet of the bottom with a multibeam.

For pilots, it was like all of a sudden looking at a CAT scan detail, when in the past we've been looking at an X‑ray. Guaranteeing a minimum under keel clearance is literally impossible during some conditions we encounter, which must be understood by the ship's owners and managers. Both the pilot and the master must mitigate the risk of proceeding in these conditions and utilize every tool available to safely navigate the ship to its destination. Knowing on a daily basis exactly where these lumps are building is one of those necessary tools in order to maximize available draft.

That being said, our river bottom is what we term "a friendly bottom." It's made up of soft sand and mud, and many times a vessel's squat, speed, and river current velocity can affect the maneuvering characteristics differently based on a ship's individual characteristics. The water pressure built up between the ship's hull and the river bottom can slow the ship down to a near stop, but with enough power, can still get through.

Ships being built today seem to be built for fuel efficiency, not the treacherous river conditions we endure, with enough engine power to push through the top layer of sand. They're on computer control and when there is a certain amount of pressure detected, the engine attempts to save itself and reduces power on its own. This actually becomes a hindrance in these conditions and really a safety issue.

The pilot has multiple challenges they are dealing with when piloting the Mississippi River. Their extensive experience from years of dealing with multiple ships in different river stages conditions a pilot to access the threat of each ship differently. This allows a pilot to apply different levels of standards of care to different vessels. This is the definition of precision navigation that we are trying to achieve in our port.

In order to succeed at this goal, the pilot must have a multitude of these tools at his disposal. Keep a full mandated channel by dredging is mandatory. Having very detailed multibeam survey technology overlaid on a PPU is an invaluable tool, allowing the navigator daily, up‑to‑date depth data, where they have a go and no‑go zone on a PPU.

Allowing a pilot to have these tools at his or her fingertips will help facilitate navigation with precision, which every ship that calls the Mississippi deserves. As pilots, we take our mission very serious, which consists of safely and effectively moving thousands of ships yearly to and from their destinations, while keeping one of the most globally important bodies of water flowing without incident.

There are many stakeholders that are very dependent on us succeeding in our mission, and we intend to do everything in our power to maintain our safety record that is second to none. Now I can tell you that we're on the heels right now of one of the most treacherous years I've seen in my 40 years.

I've seen higher river stages that the river has acted more tame than it has now, and we're on ‑‑ it's just been such a crazy year because we've had fog where multiple times fog set in, and usually fog will set in in this area in the south. It will come in at night when the humidity and water temperature is right, and then it will dissipate in the morning.

So everything stops, and then everything starts back up in the morning. Well, there were multiple times where it stayed for seven days. So at one point we had over 100 ships outside trying to get in, and over 100 ships inside trying to get out. So for us to manage that was very difficult, you know.

So I think that having NOAA getting involved in this precision navigation and giving us the right tools is going to be invaluable. So I thank y'all so much. Appreciate it.

(Applause.)

MEMBER DUFFY: Thank you, Captain Bopp. I get to wish you a happy birthday.

CAPT BOPP: Yeah.

MEMBER DUFFY: Thank you. Happy Birthday, sir.

CAPT BOPP: Thank you, Sean.

MEMBER DUFFY: All right. So I'm going to turn it over to Captain Michael Miller, who is the president of the Bar Pilots. He's also not only a board member but the chairman of my coalition. So we work together a lot. Sometimes we even talk alike, but I will turn it over to Captain Miller.

So the Bar Pilots bring vessels from the sea buoy to Pilottown, and Southwest Pass has been in the news and discussed a lot for the challenges this year related to high water, dredging, record amount of shoaling, some of the things you heard Colonel Murphy discuss. Captain Miller and Captain Bopp on that lower end have to deal with all those challenges. With that, I'll turn it over to my chairman, Captain Michael Miller.

CAPT MILLER: Thank you Sean, and thank y'all for having us today. I appreciate it. A lot of familiar faces in the crowd; it's good to see everybody and I appreciate the time. I'm going to kind of focus on what I call a dynamic port system, a dynamic river, a dynamic channel and how that relates to precision navigation and how they go hand in hand.

And some of the things in my slides, I just have a few slides, you've already seen today. But I think it's worth repeating because of what we have here. Just on the dynamic types of ships we have. This is just a breakdown of the Bar Pilots. We handle every ship, every foreign ship that comes in and out of the river. This is the breakdown of the different types of ships.

As you can see, bulk carriers and tankers, so the dry and the wet cargo make up primarily most of our business. Container ships are in there as well. But what we have seen is the size, and we've talked about this earlier, the size of the container ships now are common to be over 1,000 feet long, 140 feet wide, bulk carriers, post‑Panamax and we're even seeing some Baby Capes, which are 1,100 to 1,200 feet long, 150‑160 feet wide, all wanting to load as max draft as they can.

This has been a challenging year. We had less than project dimensions, project transit drafts from January through August. So that's a record for us as well. Again, I'm not going to repeat too much here. Y'all know what these slides are. We've talked about the five ports. That's very dynamic. I don't think there's another river system in the world that has five ports that it serves.

Number one, number seven, eleven and thirteen are right here. Throw Lake Charles in there. It is the most ‑‑ the biggest port complex probably in the world, if not the western hemisphere, so far as tonnage and volume.

This is one of my favorite slides. This is the very end of Southwest Pass as it exits into the Gulf of Mexico, which is again the area of the Bar Pilots service. It's dynamic in the sense that we deal with river conditions and sea conditions all at the same time. So we transit from a river condition to a sea condition or from a sea condition to a river condition, depending on if we're outbound or inbound.

Off on the left‑hand corner you could see ships that are sitting in the Southwest Pass, tankers waiting to enter the channel. This year again has been record. We talked about this. I'm not going to go into too much detail, but already we've spent $244 million; average a year is about 155, and we're only funded for 85 to 95 every year. So we have to constantly go fight for money and emergency dredging and call outs of the Corps dredges.

We have already dredged 67 million cubic yards. 42 of that is from Venice, which is about Mile 10 above Head of Passes to the Gulf, which is about a 30 mile stretch. That is almost, almost two and a half times the five‑year average. Thankfully though, a lot of that material is used for beneficial use, we're rebuilding the coast, which is not a well‑known fact.

But we are trying to make that a well‑known fact because the state has written off the delta, so far as saving it. Maybe it can't be saved, but we're going to try, at least to stabilize the banks in Southwest Pass so that we can deepen to 50 feet and keep the shoaling to a minimum.

This is just another slide. This is Head of Passes. This is kind of where the Bar Pilots, it is where the Bar Pilots and Crescent Pilots hand off. So we come out of Southwest Pass into the main part of the river and hand off to the Crescent Pilots. As you see in the bottom of the picture, that is a cutterhead dredge. That is an extremely tricky place for a cutterhead dredge to be because of the turn in the Southwest Pass.

But it gives you a perspective of the traffic volumes and what we're dealing with almost all year this year. We've been dredging, I think, for eight months, nine months Sean? And we're not done. That's all my slides.

Now I will ‑‑ I'll go back to say Steve talked a little bit about what's changed in 35. I've been around 35 years, not quite as long as Steve. But when I started, you know, having a gyro in front of the ‑‑ a gyro repeater in front of the quartermaster that made a clicking sound so you could tell how fast the ship was swinging in the fog was a big deal.

And then we got a rate of turn indicator. And then we got GPS, and then we got ECDIS, and then we got AIS. Then we got VTS, and now we have portable laptops and now we're talking about precision navigation and multibeam surveying that could be downloaded to the pilot while he's on the ship.

This is precision navigation as it's changing in a very dynamic port system in a very dynamic river with a very dynamic bottom. You know, we're moving this year, again we only touched the ships one time. So we're moving 12,000 vessels, between 11 and 12 thousand vessels in and out of Southwest Pass every year.

Combine that with five to seven dredges. It's a short area, but it's a very congested area, very tight area. They're dealing up river with the amount of traffic and the bridges and the air gap sensors and the current meters, so they can tell whether or not these ships are going to hold any anchorages. All this is very important, and it's a matter of how we're going to fund it.

For us as a pilot, when I look at this, that's not the ship's responsibility to fund. That should be coming from either Harbor Maintenance Tax Funds or from the federal government and it's not, as Steve said, it's not a big price tag. When the big picture, when you look at the whole U.S., if we can fund the PORTS system for precision navigation, which gives the pilot, the mariner, anybody, whether it's a tow boat operator or a steamboat operator, whoever it may be, a pilot.

If it gives you real-time information to help you do your job safer, more efficiently and we can load these deeper ships, bigger ships through deeper cargoes, which will benefit the Port of New Orleans, the Port of Plaquemines, the Port of South Louisiana, the Port of Baton Rouge, wherever it may be, then we really need to look into investment, because it's an investment ‑‑ if the private companies are investing in the infrastructure, which is what they're doing by building bigger facilities, expanding their container crane capacity, expanding their grain docks to accommodate bigger ships and more cargo, then we need to do our part to provide the infrastructure for the mariner to make sure we can service those ports and that infrastructure, the physical infrastructure with precision navigation.

I'm using less than eight minutes, but that's all I got. Thank you.

(Applause.)

CAPT KRETOVIC: Thank you, Captains, for the unique perspective that each of you bring to this panel. Next, we're going to shift gears a little bit and we're going to hear from some of the innovative technologies that are happening at NOAA. The first speaker will be Darren Wright, who is the Marine Program Lead for the National Weather Service.

A lot of you in the room in the back may recognize Darren from his previous role with the PORTS program, and with that I'm going to turn it over to Darren.

MR. WRIGHT: Well thanks, Liz. You just took my first line. So yeah, again Darren Wright. I'm the National Marine Program Leader for the National Weather Service and yeah, looking around the room I see a lot of familiar faces, and most of you know me as the previous PORTS program manager.

I've got a slide here of the new guy. His name's Chris DiVeglio. Unfortunately, he couldn't make it here today, but he is the new PORTS manager and I encourage you to get to know him. I personally was on the panel that helped select him, and he's going to be a great fit for this position. I felt like I was sending a kid off to college, handing off the PORTS program to him. I'm a huge supporter of the PORTS program now and will always be.

This picture here was a precision navigation trip to Savannah, where we got to meet with the port, getting their requirements for precision navigation. This was a ship that was going down the river and it's literally, you know, 50 yards away. It was just amazing.

So I'm going to tell you a little bit about the Marine Program in the Weather Service. There's 11 programs in the Weather Service. You can see the list there. I'm responsible for all the marine and coastal products within the Weather Service. So anything that's marine‑related that happens I get a phone call. El Faro was one of those.

So this is a plot of the U.S. with all of the Weather Forecast offices around the country. There's 122 Weather Forecast offices. The ones that are in red are Marine Weather Forecast Offices, and folks that I deal with on almost a daily basis. So the marine program is responsible. Let's see if I can use this pointer, for all the coastal zones right along the coast, the offshore areas, and the open ocean forecasts.

So OPC is the Ocean Prediction Center. They're in College Park, Maryland. They're responsible for the Northern Atlantic and Pacific. We've got National Hurricane Centers' Tropical Application Forecast Branch is responsible for the Southern Atlantic and then the Southeast Pacific, and then our Hawaii Forecast office is responsible for that area around Hawaii.

So now into the good stuff. So I think this topic has been brought up at the HSRP several times. The Tampa Bay Marine Channel Forecast. This was a project that the National Weather Service and NOS worked together on, because the pilots were interested in getting, you know, all the information from NOAA in one location instead of having to go to three, four, five different websites.

So we partnered up and put together a product down in Tampa where you can click on any of those red dots, and you can get water levels, currents, visibility, waves. So we kind of combined everything together. The Weather Service actually developed a new product. We had visibility forecasts around the country, but Tampa office developed a probability of visibility product that will give you a probability of what your visibility is going to be within a nautical mile. That was kind of the parameter we got from the pilots that hey, we want to know what the probability, the visibility is going to be a nautical mile or less.

So that's what this product puts out, and this graph over here shows you what the visibility is going to be up the channel, and then the graphic is color‑coded based on what the chances are. So this is showing you that pretty much there's a 50‑50 chance that your visibility is going to be a nautical mile or less.

So this is something that, you know, the pilots and anybody else using the waterways really needs to pay attention to. So as the National Marine Program Leader in the Weather Service, you know, we only offer this in Tampa. The pilots down there love this. We've gotten great feedback from them.

So now it's my job to expand that across the nation. So we have a product called the National Blended Model. It's a model that has the capability of developing probability of different types of parameters, visibility being one of them. So I got my national modeling folks talking with the modelers who helped develop this, and within three minutes they were talking model speak that was, you know, way over my head.

But it was great. They both got energized from the conversation, and now the National Blended Model folks are intending to incorporate this capability in their next version, which should be coming out next year. So once that is out, then we can expand this capability elsewhere.

And so this next product is a present for Captain Miller here. So I don't think the Weather Service has done a great job of talking about this product here on the right. It's a Nearshore Wave Prediction System. So we have the ability to doing a wave forecast out 144 hours from anywhere along the coast, and that URL right there will take you to a viewer of the United States. You can zoom into whatever area you want. You can get a wave forecast out six days, which is, which is really great.

Now I don't know how good a job we've been doing of advertising that, but the folks who developed that model actually took this to the next level. When I first saw this, I immediately thought of my pilot, my pilot friends, is that you can get a wave forecast along a certain transect. So this transect here is ‑‑ actually, this is an old one. I need you to update this photo, but I actually got them to do one right at the mouth of the Mississippi, right outside the Southwest Pass.

But what this is if a forecast of that transect out to six days, 144 hours. So to say they have ‑‑ they're scheduled to meet a ship tomorrow at four o'clock, they can look at this forecast and find out what the wave conditions are going to be when they're boarding the vessel at that exact location where they're boarding the vessel. So this has kind of taken that wave forecast to another level.

This is showing what the significant wave height is. This isn't a great one. I had to find one that has a little bit more wave action going on. But between now and when I put this presentation together, there wasn't anything exciting going on. But you've also got, you've got wind speed and then you've got peak wave direction. So this is a great product we're trying out. I'm going to send Captain Miller the URL for the Southwest Pass and get his pilots to pick it apart, which is exactly what we want.

And we've got a couple of changes. I'm running out of time. These are a couple of changes coming up in the Marine Program. We are reformatting our text products to a what‑where‑when, to try to be a little bit more concise. So folks can know exactly where to get the information they need in this what‑where‑when format. We're doing this across the Weather Service. It's the Marine's turn coming in December.

Likewise, you know, the Weather Service has been accused of having too many products. I know that's a shocker. But Marine is doing our part. We're actually going to be consolidated small craft advisories, all the different flavors of it, into a single small craft advisory. Then in that what bullet on the previous slide I showed you is where it will be, you know, a little bit more descriptive of what flavor of small craft advisory it is.

And then finally mariners, if you have not been to the Weather Service or weather.gov/marine website, the one on the left is what it looks like right now. It's very old and antiquated, but it's got ‑‑ it's chock‑full of great information. So I recommend you go check it out. Starting September 17th, it's going to look like the one on the right.

So we're developing a new website. It's the same information. We just kind of retooled it and reorganized it so it's a little bit easier to navigate. But that is it for me.

(Applause.)

CAPT KRETOVIC: Thank you, Darren. Many of you in the local area may know that we contracted with a company called David Evans and Associates to conduct a full coverage multibeam survey from null to null, bank to bank of the Mississippi River, from Baton Rouge to the Heads of Passes. This has really been a monumental undertaking, and I don't believe that you're 100 complete; is that right Jon? You have a little, just a little bit left, yeah.

MR. DASLER: About that.

CAPT KRETOVIC: But there's just a little bit left to do and with that, we also ‑‑ I guess in response to the survey, we now need to make a product. So in our Marine Chart Division program, we have here today to talk about HD mapping is Craig Winn, who is the portfolio manager for HD charts, high definition charts, and he's going to show you what a little bit of that preliminary data is going to potentially look like. So I'm going to turn it over to Craig Winn. Thank you.

MR. WINN: Hi, thanks Liz, Captain Kretovic. I just wanted to say thank you to the Committee for letting me present. So I'll start my presentation off with setting the stage a little. At the end of last year, I was in a meeting with Admiral Smith, Captain Brennan and Captain Kretovic, and we were talking about this HD chart concept.

I remember very ‑‑ soliciting, you know, an unsolicited opinion I provided was that you need someone to make this their job every day until we can realize these new charts. Little did I know at that time I was volunteering to be that person. So shortly after everything settled out at the beginning of the year, I was moved into the HD charting portfolio.

So in the Marine Chart Division, this is new for us, you know. We have several drivers that we see as being things that are pushing us in this direction. One is ‑‑ and it's already been mentioned, but it's the use of deeper draft vessels that seems to be growing. For us internally, it's the realization of more advanced ENC, electronic navigation chart production systems.

We have the increased availability of high quality data, and lastly it's our perception that there's a consumer desire for data rich products. So that led us to start investigating the concept of an HD chart. I have heard HD means one of two things: it's either high density or high definition, depending on who you talk to.

So I've tried to use the term HD whenever I'm referring to it. But really the root definition is that it's going to be more bathymetric data in your electronic navigational chart. That's what we're using as a definition. So just to go over a little bit about some of the specifications for these products is that we build ‑‑ ENC is using S‑57, which is the IHO standard for electronic navigational charts. I know John Kelley referenced S‑100, and we're certainly looking towards that in the future.

But for us, these ENCs are built to what we've always built our ENCs to, which is S‑57. They'll be validated against IHO S‑58, which is essentially a fancy way of saying that the IHO has developed a set of tests and warnings that an ENC has to pass, to make sure it operates appropriately and in ECDIS. So we'll be ‑‑ it will conform to that as well.

They will be 1 to 5,000 in scale. They will be built to our rescheme. That's a separate topic that I think would be worthwhile to have at one of these forthcoming HSRP meetings. But we are in the process of rescheming our ENC suite, consolidating scales and make the scales more uniform. So these Band 6 ENCs are being built with an eye to that project, and they will conform to that rescheme effort.

These will be an official NOAA chart product, meaning ‑‑ and I want to go back a little bit. What prompted this project too was the LA‑Long Beach project out ‑‑ precision navigation project out that's being going on for a couple of years out there. Those are also built to S‑57 as well, but the key difference is they're a subset of features and objects. They're S‑57.

Ours will be a fully‑fledged ENC, meaning that it will not only have the bathymetric data, but it will also have those Group 2 features such as aids to navigation, land areas, everything that someone would need to use it as a full‑fledged ENC.

So we are working with three main initial test areas. Those are New York, Mississippi River and the ports of Long Beach and Los Angeles. In this initial phase, we focused on the Mississippi River and the ports of LA and Long Beach. We'll be bringing up New York right behind these.

I want to say that the data we're using for Mississippi River is preliminary data. We worked with our Hydrographic Surveys Division to get some of the data from the ongoing survey, and we brought that in. So what you see, the visual you will see is based on that survey, but we really can't build these Mississippi River ENCs until that data is finalized and put through the proper vetting process.

The Ports of Long Beach and LA we will start working on, and that is with data that's already been put through that process. So they will probably be the first ones that once approved will come online. So for the Mississippi River, this is just a subset of the ENC cells that we're looking to build, and I will show you one of these. We've built four of these already.

I want to stress that for us, as I said, this is new. So it's not only the concept is new; we're also using this as an opportunity to improve how we do our work, and one of those is to bring more automation into our process. You know, I've been doing this for about 20 years and we do stuff very similar to how we did it when I first started.

But with these, we've actually used existing tools to automate the process so that the compilation process is 100% automated. We then bring in a cartographic reviewer to review the work. It cuts down their time and we also are using some automated processes when it comes to validation or testing process I mentioned, that allows him to focus on that. It cuts down the errors and warning significantly before it even gets to the reviewer, so that we can spin these up a lot faster.

Because our view is that we were initially building these with data we're getting, but that in time as data access improves, we'll hopefully be able to spin these up faster to meet consumer need. Oh thanks.

So here's a visual of what we're talking about, and just to give you some concept of where this is, that bridge is the Sunshine Bridge. It was kind of arbitrary of picking this area. I did feel that this would be a good example to start with, simply because I'm not saying that it's not dynamic here, but our view was that it's less dynamic than the mouth of the Mississippi which we're going to get to, but we feel that may bring in some challenges that we have to explore and address at that time.

So I'm going to close now. I do want to state that, you know, this is initial ‑‑ these are the ‑‑ it's at the initial phase of this project. So for us, it's about learning about these products because to our knowledge, there's none of them that are commercially or that are available in international hydrographic offices. We do know that a lot of hydrographic offices are working on them.

But I welcome any feedback. I'm going to be here all week, so if you're interested in this topic or if you want more information, or if you can give us some information on how to proceed, I would welcome that. So once again, thank you for your time.

(Applause.)

MEMBER DUFFY: Thank you. So Dr. Kelley, I'm going to come to explain one thing that I think you'll appreciate. So as we've looked at this higher river and this record year, and I've talked to people about increased precipitation, they always tell me oh well, they get the weather wrong, blah blah blah.

But what I tell them is what they're telling you is it's going to rain more. They're not telling you it's raining more in your backyard or your neighbor's backyard, but that it is going to rain more. And that we live in this world where cups of coffee have to have hot labeled on them, so that the information is very important and we appreciate our meteorologists.

So I had a question and I'm going to start with my old friend Darren Wright. So I remember going to an opening ceremony in Mobile on a visibility sensor that a lot of people were calling a fog sensor. Now I see the discussion related to Tampa. Is the one in Mobile, and what I remembered most specifically was that at that time, it had about a 30 mile range. Have there been technology advancements? What's the ‑‑ can you explain the difference?

MR. WRIGHT: Yeah. So the difference is the visibility sensor in Mobile is part of the PORTS System. It's actually an observation. So it's different than what you might think for a sensor, a visibility sensor because it's actually a point measurement. It's not actually looking out. So it's ideal to have several of these, and Mobile I believe has two now, and I think they're bucking for a third one.

What I was proposing is actually a fog forecast. So the Weather Service puts out a fog forecast. It will hopefully tell you what the fog is going to be, you know, down the road like tomorrow if they're visiting a ship.

MEMBER DUFFY: Okay thank you, and I'll say that I have a question for the pilots, but that I think that's very important, and Captain Bopp I believe touched on it, that we had this crazy period of fog in January and February, like 21 days of blackout fog where I mean typically, fog was like gone by nine, ten o'clock the next morning and that wasn't the case.

So dredging operations, vessel movements, everything was shut down. So as we look to incorporate more in technology, we have the right users here to discuss those advancements. I have a question, and I'll be very quick. But this came through on my trusty Apple Watch. So I thought it was just telling me to breathe, and I seem to remember that.

But the question was related to a pilot perspective on a need for high resolution, large‑scale maps of shoreside infrastructure. My understanding would probably be for Captain Miller in the Bar Pilots area that's maybe not so important as it is to the other two. But if you can, each of you chime in on that, I'd appreciate. Need for high resolution, large‑scale maps of shoreside infrastructure. So docks, terminals, some of the obstructions along the way.

CAPT HATHORN: As far as the mapping, I don't think, you know, there's areas of the river, the whole river hasn't been redone in decades and we were just looking for fresh information. As far as docks, it could be quite valuable when we start looking at going to 50 feet draft. You're going to have areas where the docks are going to be ‑‑ have to do dredging to benefit any of that.

So we ‑‑ in fact, last week in Baton Rouge they had to kick a ship off because there wasn't enough water to get alongside the dock right now. So all those things will be quite valuable I feel.

CAPT BOPP: First, I want to comment on the fog probability. I think it's one of the greatest tools I've seen in a long, long time, and our PPU, Ryan Scully and MRTIS, we have and we have such a long river that to have that at your fingertips, because we don't want to prematurely anchor a ship due to restrictive visibility. So and you can almost set your watch to it, and it tells you the wind, the temperature, the humidity and when they collide, you know it's going to fog. We have like five different spots, stations that you can, you can see. So I love that tool.

As far as docks and high density maps, I think for a navigator sometimes it can be too dense. But I think as long as you can clear it up. Like Steve said, when we go to 50 feet, you need to know where the bottom or alongside berths are, and even in the Port of New Orleans they have a problem because their face. You can't dig too deep, because I have problems right now.

We have container ships coming in today that are just touching the mud, and they've got to kind of bulldoze them in alongside the dock. So I think all of this technology is getting more and more at ease for the navigator to use.

MEMBER DUFFY: Thank you, Captains. Chairman Saade, I'll turn it over to you and the Panel.

CHAIR SAADE: Thanks Sean, and thanks everyone on the panel. So we're going to open it up to questions from the Panel. I'm going to start with Shep.

RDML SMITH: Thanks, Ed. I had a question for Captain Bopp, and that was you mentioned that you bring in the cruise ships even in low visibility with extended protocols for navigation systems and you use different tools. Can you describe a little bit what changes and protocols and technology you use in low visibility?

CAPT BOPP: We have been talking about this for a really, really long time and historically, we've always have done it. As a pilot, you get on a ship, on a foreign ship. You're the only American on the ship and when you have multiple plates in the air, you're looking at the radar, you're dealing with the quartermaster giving rudder commands. You're making sure you don't leave rudder on and you're watching a whole lot of things.

So when 9‑1‑1 happened, way back then the security was so tight that we were having to report to VTS, which is like an air traffic controller here, every hour because they were really concerned about, you know, the security threat. And at that point, I started realizing me as a pilot on the bridges of the ship have a great, always the cruise ships have excellent equipment, excellent, very professional bridge crew.

I felt like there was too many things that I was trying to manage. So at that point, we're sort of talking to the cruise industry saying that we're going 90 miles in dense fog, and the pilot needs another asset, which was another pilot.

So now what we've done we've engaged a two pilot system, and we've improved on it along the way. We just had a seminar, Captain Sal was there, and we invited all the cruise industry to actually come in with the pilots that actually do it, and criticize in the spirit of improving. So what are we doing right, what are we doing wrong. And it's been very, very successful to date, so we're very proud of what we've done.

MEMBER DUFFY: Any other questions from the Panel? Ed.

MEMBER KELLY: As always, Ed Kelly, New York. As always, I question the money. There's a lot of things that can be done. Who is the private partner in funding your PORTS program?

CAPT MILLER: Yeah. Initially, the Port of New Orleans put up some money for air gap sensor, but right now the foreign flagships are paying for it, which I don't think is right.

MEMBER KELLY: How are the foreign flagships paying for it?

CAPT MILLER: Through a surcharge through our tariff.

MEMBER KELLY: Oh, so you put it on your tariff?

CAPT MILLER: Yeah.

MEMBER KELLY: Okay.

CAPT MILLER: And I think that is absolutely wrong. They're already paying a tax for channel maintenance, and I would consider this to be part of maintenance.

MEMBER KELLY: Technically that's probably illegal under the trade treaties, but you know, we won't go there right now. But what I'm saying is we're hearing that, and we hear this all over the place, that there is a need. There's new technology. It's very welcome, it works, we want it and the obstacle continues to be the funding.

So I was just wondering how you folks are dealing with that. I know Sean is and we have worked through several organizations to push for federal funding for this because it is integral to safety, the economy, et cetera, ship disaster and unnecessary ship disaster in a major channel in a major port has a crippling effect on the U.S. economy, so we're really concerned about that.

One other thing I might add with this is to what degree is there collaboration with other interested parties in the port, i.e. most notably the Corps of Engineers? The reason I'm asking that is because we up in New York, New Jersey completed a 50 foot channel, but we've got very restricted channels.

As we've brought in the larger vessels, the 14 and 18 thousand TEU container ships primarily, we're running into issues that the pilots are really having a difficult physical time remaining in very narrow channels. When you take out now the 162 foot beams on these things, 1,200 foot lengths, it's ‑‑ we have an 800 foot channel running through Kill Van Kull, but we've created no meet/no pass restrictions on that because by the time you take the beam of the ship and you add tug space on either side, and you know, any crabbing really just makes that beam requirement, you know, can be double or triple.

So are you running into operating restrictions on that type of thing because of the larger vessels? We're running into mandatory no meet/no pass scenarios right now.

CAPT MILLER: We haven't, on the Bar Channel and Southwest Pass, we haven't put anything mandatory in yet. Pilots regulate that themselves. They may wait on a ship outside, may board it to see if we can wait an hour for a ship to cross out. They see two, like I said, say two Suezmax tankers that are deeply loaded or Post‑Panamax or a cruise ship, whatever it may be.

Right now we're doing it ourselves, but as we saw this year with compression of work in a very short period of time, and seven dredges working and shoal conditions, it's ‑‑ and these bigger ships, what we saw this year was a lot of ships hitting, more ships than we've ever had touch bottom, which we don't like to talk too much about.

But we've seen it more because of displacement. Ships are bigger, they're wider, they're deeper, you know. They've got more depth to them. So it is a concern. It's something we look at. But we do a lot of modeling. As a matter of fact, we're modeling right now an LNG terminal. We don't have one yet, but they're coming. We've done two, I think two of them right?

MALE PARTICIPANT: Yeah.

CAPT MILLER: Two modelings. I know NOBRA does some in the docks up river. So you know, we look at it ahead of time.

MEMBER KELLY: Our concerns also include we've seen a big spike in engine failure as a result of the introduction of different fuels.

CAPT MILLER: Absolutely, absolutely.

MEMBER KELLY: And in these constricted areas, there is no room for error. Now when you had said the near shore, you know, high definition for piers and et cetera, we'd also be very interested in that because there's several sections in New York and New Jersey, particularly coming into some of the oil facilities up in Port Elizabeth, where we have ‑‑

If you ride the ships, it's terrifying. On some of these ships, as you're coming into the pier facilities, you cannot see water. All you can see is Bayonne or you can see Staten Island, you know, because the width of the ships and how close some of that is. So if we would have really accurate high resolution on berths and land fixtures, you know, it would help to replace the reliance on buoys and things that right now a lot of the pilots can't even see anymore.

And what I'm ‑‑ and at the end of the day, I'm really looking for the double lines at the bottom. How do we pay for this? Because the price of not getting this stuff done is enormous right now.

CAPT BOPP: Well, you know, what you're talking about is displacement, and you think you're scared? We're scared too. No, I know exactly what you're talking about. But I've got to give it to New York. New York knows the economy, and New York raised the bridge for a billion dollars, because of the container trade.

So they need that container trade. It's what makes the world go round. So as far as the ‑‑ the beautiful part of our river, and the Southwest Pass is a very defined, very restrictive waterway, after Southwest Pass, the rest of the river is fairly wide, where you can take a lot of displacement, because that's what the ships do.

It's displacing so much water, and he says that sometimes it's like being in a gutter. You shove the ship in a gutter and it ends up coming out the other end. But we have current. You have, you have wind and when you crab, you go sideways, and so you have to do it that way. But what I mentioned in my notes, that today, they're building ships that are ‑‑ can go to sea buoy to sea buoy fuel efficient.

So when they come into our river and they experience a little pressure in even turning with the rudder, the engine immediately on a computer starts reducing. When you're meeting a ship and you lose revolutions and you don't have any control, we're really scared about that. So ‑‑

MEMBER DUFFY: Ed, I wanted to touch real quickly on the first part of that question, about the relationship with the Corps. As I speak for my board, I would say we have a great relationship with the Corps. We have a great relationship with the Coast Guard, Customs, NOAA, our government partners. A lot of times the problems that we have, it all comes back to the funding, and with the PORTS program, for instance there is a new air gap sensor that was approved, and at what appears at least to be a very minimal amount of operations and maintenance.

We're unable to find a partner at least so far, and as we work at it, and one of the things that's important with the bar pilots is that mechanism that the PORTS program, as Darren knows and Tim Osborn started here after Hurricane Katrina. So we identified the sensors and there was an agreement for I'll say the first six or seven years, that the Port of New Orleans put together with some partners.

As that started to fall apart because what you hear and I'm preaching to the choir, but there's a lot of people that use the PORTS program. There's a lot of people that benefit from it, you know, in different places, and that it's all being funded. So the industry met with the pilots and went to the Pilot Fee Commission and worked to have that added as a way.

But one of the things that's key is that Baton Rouge I‑10 bridge is over 200, right around 200 miles above Captain Miller's route. So there's a lot of challenges we see with funding and I'll stop. But the partnerships, we have great relationships with the Corps and our government partners.

MEMBER KELLY: Yeah, because one of the things, again bringing it back to our experience in New York and just, you know, best practice or whatever, when we finished our 50 foot channel, it was well‑designed on the biggest ship there ever would be, the Regina Maersk at about 9,500. So we no sooner got the 50 foot channel done when we started saying well, you know uh‑oh, we've got 10,000 and we've got 14 and 18 thousand TEU ships and we had to raise.

So we're now working with the Corps, which really ties in very closely, and we're really pleased that our NOAA navigation manager, Colleen Roche, is doing a great job. She was in all these meetings with us for simulations and also taking a look. So toward what needs to be done to fix the channels to accommodate the larger vessels and, you know, where it needs to be eased, bends need to be eased or, you know, depths need to be done or widened to allow turning or passing zones.

So you know, we're very happy with what's working for us, and we see a good collaboration there and just point that out, perhaps just to make sure everybody's doing the same kind of thing, because it really paid off for us.

CAPT MILLER: My comment here, we worked very closely with whatever government agencies there are, NOAA, the Corps, Coast Guard in dealing with these things, as the ships are getting wider and deeper. Again, billions of dollars have been invested on the Mississippi River by private industry. The government, in my opinion, needs to do their share now.

I mean we talked the private partner. The private sector's already done their work, and what hasn't changed either is the infrastructure of our channel. It's the same channel. If we go deeper, it's still the same width. It's not going to be any wider. You can't make it any wider in the Southwest Pass. It's as wide as we can go. So we got it workable, we got ‑‑ well.

CHAIR SAADE: Sal.

MEMBER RASSELLO: Yes. A lot has been said about Precise Navigation and in our industry we are thinking to install visibility sensor, laser sensors to announce the safety of the navigation in close water. I think the high resolution of the pierside, you know, building and stuff like that is helping, but you still need some sensor to measure the distance from that building. It's not just on radar that there is a building there.

You need to know how far the building is and how fast you're approaching the building. But anyway, I will take this opportunity to invite everybody to give a round of applause to the pilots associations of the Mississippi River. I think you're doing a great job on these important waterways, and we really, we really appreciate what you do. Thank you very much.

(Applause.)

CHAIR SAADE: Thanks Sal. Any other questions?

Off mic comments.)

CHAIR SAADE: Okay. I guess we're going to finish up right on time, which is notable by itself. So thanks everyone. It was obviously very educational for us, and it was really nice to have the follow‑on about fog and all the issues, because we talked a lot about that the last time we all got together. So appreciate it and one more round of applause please.

(Applause.)

CHAIR SAADE: So before we break, Nicole LeBoeuf has an announcement to make, so if we could keep everybody's attention for a little bit.

MS. LeBOEUF: Thank you. Just a very quick point of order, to issue some congratulations to folks here in the room and some not in the room. First, I'd like to congratulate Chairman Ed Saade, Lindsay Gee, Captain Ann McIntyre and Gary Thompson for their reappointment to a second term on the HSRP.

(Applause.)

MS. LeBOEUF: I would also like to congratulate the two new HSRP members who will be joining as members at the next meeting, Dr. Qassim Abdullah and Dr. Nicole Elko. I believe Dr. Abdullah may be in the room. Yes, welcome.

(Applause.)

MS. LeBOEUF: All right, thank you all.

CHAIR SAADE: Okay. We're going to break for an hour and a half. We'll be back here at 1:30. Thanks everyone.

(Whereupon, the above‑entitled matter went off the record at 12:02 p.m. and resumed at 1:32 p.m.)

CHAIR SAADE: We're going to go head and get started. I'm going to turn the stakeholder session over to Sean Duffy and Tim Osborn.

MR. BOLEDOVICH: I'll start off here with introductions of the first two speakers, and then Sean will introduce the others. But I'd like to just say that the panel here is very, very important, because it talks about the blue economy actually in terms of real numbers, real dollars and real people actually making this happen on the Mississippi River.

Dr. Jackie Pettway is the first that's going to be speaking here today, and she's the Chief of the Navigation Division for the U.S. Army Corps of Engineers Coastal and Hydraulics Laboratory, and or otherwise known as ERDC, the Engineering Research and Development Center. What you don't know is she's a Mississippi State graduate, and she's going to be here this weekend as Mississippi State comes and invades New Orleans and plays in the Superdome against UL. If you don't know the experience, think cowbells and that says everything about Mississippi State.

Next to her is Captain Matt LaGarde, who spent 27 years of a career on the Mississippi River within the inland navigation towboat industry. He's been a captain for 24 years, and Matt and I became very, very good friends with his work now with Ingram Barge Lines, on his service within the U.S. Coast Guard's Towboat Safety Advisory Committee.

Matt was subcommittee chair dealing with the issue of electronic chart displays and their use on towboats and navigation for the inland waterways. He was a terrific advocate in advancing electronic navigation into the towboat and navigation industry, and he has a lot to share about that plus also the issues that the towboat industry faces in terms of bringing product and cargo down the river in terms of the ports here. I'll turn it over to Sean for the other intros.

MEMBER DUFFY: Thank you, Tim. So I'd like to introduce Paul Aucoin. He's the president, deputy executive director of the Port of South Louisiana, so the largest tonnage port in the western hemisphere. Of great importance to me is that he's also a board member of the Big River Coalition. So we spend a lot of time together and work on dredging funding and river deepening. Paul's been there through a lot of the battles.

I'll segue over into my good friend Mike Steenhoek, who although he's not on my board, we work together a great deal. I'm not on his board either, but we know how to find each other and support each other. One of the things that I don't think many people know is the U.S. Soybean Board, with Mike's support, has contributed funding to deepen the river.

I won't take away any of his thunder, but it's very important sort of a stakeholder engagement to help move us forward. And I'll finish up by my good friend Mr. Mark Wingate. So you know if you've heard me speak before I'd like to add a little humor. So Mark, you're my buddy you know.

But so in the spillway opening last year, Mark and I are going out on a little rail car, and you know I've never had a man in my mind when I get dressed for things. But this lady said, the lady says ooh, look at that guy he's got Corps supervisor shoes on. So every time I go to the Bonnet Carre Spillway now, I'm like no, I'm not wearing my dress shoes. I've got to get my work boots on, and I know he's got his supervisor's shoes on. So I hope you enjoyed that laugh with me, Mark. I think about you when I get dressed sometimes. Dr. Pettway.

Laughter.)

DR. PETTWAY: Okay. Good evening, good afternoon. Thank you for having me. I am with the Research and Development Center, which supports the U.S. Army Corps of Engineers. But we also do joint work with other Department of Defense agencies, other federal agencies. We have a lot of partnerships with NOAA and Coast Guard and others, and I'll highlight a few of those during this presentation.

(Pause.)

DR. PETTWAY: Okay. So we listed a few of the ways that we use some of the data from NOAA and I apologize. I'm going to discuss it a little bit in more detail later so you don't have to try to read this. But hydrographic surveys utilizing the nautical charts, river forecast, using water levels, hurricane data. We use that for some of the models that we build, observed weather, fisheries and marine mammal information.

And so a lot of the things that we do is we develop tools that focus on navigation or flood and storm damage reduction, operation and maintenance, some design and emergency response type of tools. So one example of that, here you have one of our wave models. It's an ADCIRC model. We're looking here at Sabine to Galveston, and we utilize the tide and current data to establish these models and to validate them to the data that's collected from NOAA.

Once those are validated to historical events, then we can move forward and look at predictive analysis of waves and water levels for future storms or looking at hurricane paths, things like that. We use this information to feed some of our decision support tools.

One such tool is our Coastal Hazards System, which is a web‑based system that uses forecasting. It uses historical events. It will use synthetic storms and extreme events. So we run all of this information to get these waves and water levels, and we provide that through a web base. So if an event is coming through, if we haven't modeled that specific path of that storm, we can use probability and statistics to predict what it might do if it's a storm that's between something that we've already modeled.

We can use that information to provide back waves, winds, water levels, ice responses, meteorological data, so the people that have to make the decisions of whether or not to close the sector gates for a storm surge or, you know, when to limit navigation, so they'll have some additional tools for making those decisions.

We have an entire group that does a lot of research using AIS data. Some of that is looking at developing the channel portfolio tool box. With that, we look at ‑‑ I heard discussion earlier. You have the approved navigation channel, but you have some preferred paths within that. So being able to look at those preferred paths and make some critical decisions.

If we have some shoaling in an area and we need to limit the depths for navigation, we can look at those tools and make decisions based on the highest trafficked areas and look at that impact to industry on that. Additional things that we can do with some of these tools, with AIS, we have a LOMA system that we're installing on a lot of the Corps of Engineers logs, and we'll transmit NOAA data through that LOMA system to the industry as they're coming through the system.

An additional thing, there was a paper published, I believe it was 2018, a collaboration between Dr. Ned Mitchell and I believe it was Eric Wolfe with NOAA, and they were looking at utilizing that channel portfolio tool that Ned and his team developed, and using that to inform the PORT tool and the best locations to install those PORT tools. That publication was in the Journal of Ocean and Coastal Economics.

Other data that we use as we're looking at optimizing dredging, meeting the environmental windows and looking at with the fleets that's available, using scheduling around those environmental windows, using scheduling around availability, and looking at the overall operations research methods to determine more cost effective dredging strategies within the Corps of Engineers. We also work closely with the dredging industry on some of those as well.

Recent work that we've done through the Mississippi Valley Division was looking at utilizing bathymetric data to monitor bedform changes, and that becomes very relevant for us because when we're developing these computer models, we need to understand what the roughness is in the ‑‑ of the bed and along the rivers.

If we can do that looking at the bathymetric data and infer what the bed roughness is, then that improves the quality of our numerical models in predicting the movement, the velocities as well as the movement of debris and sediment through the system.

We are partners with several organizations in the Joint Airborne Lidar Bathymetry Technical Center of Expertise located in Kiln, Mississippi. The director of that, Jennifer Wozencraft, is actually a Coastal and Hydraulics Laboratory employee. So through that effort, USACE and NOAA collaborate on data collection, processing and formats for final products.

We have a National Coastal Mapping Program data that NOAA has access to. We've done post‑event surveys in the Great Lakes areas and along the coast. NOAA lidar data collection for charting uses some of this post‑storm change analysis that we have, and some additional things. So when you're talking about the JALBTCX Center, some of the things that you can do when you're flying and getting that imagery is you know, of course, look at changes along the shoreline. But you can also pick up things as far as habitat and in some cases other environmental things like maybe some algal blooms or some other, some vegetation and looking at the progression of that and monitoring the impacts.

We had an employee from the district who I believe previously worked with NOAA spend several months with us, and she was looking at the multi‑spectral backscatter multifrequency bathymetry, and looking at how you can utilize that to do things like identify soft bottoms and hard bottoms, other objects that may be at the bottom of the river or the water body, and transferring, translating that into decisions about navigation, you know, identifying those soft bottoms and increasing the level of confidence and navigability through those systems.

The information, the previous slide where it talked about looking at ‑‑ understanding the roughness of the bed, some of that work started when we were looking near Vicksburg, Mississippi, and we were doing bathymetric surveys. We looked at several swaths of that and we were able to develop some tools that could model the movement of the sediment.

So in some areas you get movement of sediment almost like waves moving along the bed of the river system. So we've developed some tools looking at that, utilizing that bathymetric data.

This is kind of just an overview. We have a ship simulator within the Coastal and Hydraulics Laboratory. Our ship simulator is utilized for engineering and design. It's not a pilot training center. But what we do is as we're looking at changes to the navigation channel, we will invite the pilots from that area to come in and navigate through the system, and validate the current model and also give feedback on the proposed design.

Then the bottom slide, the bottom picture on that just talks about our regional sediment management. Again, some of the data that NOAA has, we can utilize that to look at the movement of that sediment through a regional system instead of just the localized movement.

Just a few examples of some of the things that we've done. We'll come in and use a lidar and multibeam scan, and when they dewater some of the locks and dams, we can use those to do comparisons from year to year or every couple of years, to see if we can determine any changes in those structures, as years have gone by with the use, maybe detecting some shifts in the gates or maybe some of the walls adjusted.

A couple of these are videos, but I don't know how to get it to play. So this ‑‑ this is just an example of lidar in a multibeam survey and there's a fly‑through where you can see how that data can be utilized to look at some of the structures and pick up a lot of the changes in the bed. My time is up.

So I'll just leave you with a few examples of where we think some future collaboration efforts are between the research and development center and NOAA.

MEMBER DUFFY: Thank you, Dr. Pettway. Mr. LaGarde, we'll get you queued up and we'll hold questions until after the panel. I think Tim covered that. Thank you.

MR. LAGARDE: How you doing? My name's Matt LaGarde, and I'm a captain on the Mississippi River, have been a number of years. I've been working shoreside for the last few. I started as a deckhand, kind of came up through the ranks. Most of my time has been inland, Ohio River, Illinois River, Mississippi. Even been up some tributaries like the Yazoo in Arkansas and the Ouachita, and there's not many people you can find that have been up in those areas.

I'm going to talk a little bit about how our industry uses these tools, because I found that there was a little bit of a rub when we were working with the TSAC Subcommittee on trying to get electronic charts approved for use as navigation charts on the inland side of the house. There was some misunderstanding on where the way we use charts differed from the ECDIS users offshore.

One thing that we do do is we do operate in close quarters. There's places on the Intracoastal Canal where boats literally pass within feet of each other. On the Yazoo River, I remember the southbound traffic would have to stop and you always had to have the port side of the tow smooth and the northbound traffic would literally just slide up the side of your tow to get by it was so narrow.

So that's the type of, you know, situations that we have. The channel conditions change constantly. So like after this extended high water, the water comes up at every year. When the water drops out in the summer, our bad spots move. We don't know where it's at. Somebody's got to go find it, and you always hope it's not going to be you that figures out which spot it's going to be.

It's usually going to be at Chico, it's going to be at Lake Providence. This year's it's Victoria seems to be our problem spot. We've got boats just stacked up and everyone is afraid to go up through there, especially anybody with a tank barge in tow because they don't want to be that guy.

Another thing that's different with barges, with the ECDIS systems offshore there was always you plot a set of wake points. You navigate from way point to wake point. If you got off a path, alarm buzzer goes off. Well, we don't work that way. I liken driving towboats down the Mississippi River to driving an 18 wheeler backwards down an icy road. These things just turn sideways and they slide until you get enough inertia to get them going in the other direction.

We often have to flank points on the Mississippi River. A lot of people think high water's bad. Sometimes high water's good, because it gives you more room to navigate. The only thing that doesn't get wider when the river comes up over the sand bars is the bridges. That's where we have our challenges.

Southbound, we have to get as close to the buoy line, as close to the sand bar as possible to be able to navigate or steer southbound around some of these bends on the Mississippi River. You just try not to slide out of the bend into the bank on the bottom side. The closer you get to the sand bar, you're better, which is opposite of where you operate offshore.

You try to stay as far away from the sand bar as possible. With us, it's like The Price is Right, as close as you can without going over.

Upbound trips. You don't want to operate in the middle of the channel because you're going to be making two miles an hour. You want to try to get off towards the bar a little bit, off towards the dikes, try to maximize your time. You need to stay out of the eddies. If you get 80,000 tons of cargo into an eddy, you look over at the GPS and all of a sudden you're making seven miles an hour and you shouldn't be.

Well when it comes out of that rear eddy, everything is going down, so you have to moderate your speed. I remember the first time I got a GPS put on board a boat back in probably the late 90's‑early 2000's, and I was so excited just to be able to tell if I was stopped in the fog, because the current's ripping by at five knots. You're trying to get to the bank, because we don't have anchorages and we don't carry anchorage. You have to find a parking spot.

So you try to get as close to the bank as you can, figure out if you're stopped or not before you get to the bank, because if you get into the bank doing two or three miles an hour, it's not going to be pretty. Contrary to popular belief, all of the western rivers pretty much are pilotage waters. You know, the common sense would be you could give a guy a chart, tell him to go to Point A to Point B and he should be able to navigate from Point A to Point B.

We don't do that. Every guy that's loose on that Lower Mississippi River has had to master the craft of reading the river, to be able to look out there and tell where the water's breaking, what's the set off to buoy, you know, is there a hydraulic effect that I can only tell by looking at a log spinning in a circle up underneath the point.

That's ‑‑ during the daytime, that's, you know, optimal. At night time, it's hard to tell that stuff. You can flash that searchlight over there for a little bit and it will light up a little section of the river, but it's hard to get a good grip on what's going on.

The tools we use in the wheelhouse. So that's the other thing with the electronic charts. Now we've got all these lights in the wheelhouse and we depend on night vision to be able to see where we're going. So I remember running around the wheelhouse, sticking little pieces of tape over every light I could find, and then at two o'clock in the morning something goes beep, and you've got to figure out what that was, because there's a lot of electronics in the wheelhouse as you can see from the picture.

Traditional paper charts, the coastal charts. It's these big folding charts. The wheelhouses on these boats aren't that big. There's not a flat surface other than the settee back there that you can lay the chart out on. Weather forecast, river gages. It's all stuff that we reach out to, and right now that stuff's in multiple areas. We have to go to one site to get the river predictions, we have to go to one site to get the weather, we have to go to another area to go get the tide, the tide tables.

Eventually, we want to see all that stuff kind of integrate itself into the electronic charts. Here's the benefits we have to the electronic charts. You never have the new guy now trying to figure out exactly where he's at, because the Mississippi River is not a scenic river. It's sand bars and trees, and after a while if you don't learn to tell the little knick‑knack places to tell where you're at, there used to always be some new guy lost.

With the electronic AISs and the GPSs, now those guys know where they're at. They can tell you exactly where they're at. They can't lie to you about where they're at. So I'm coming up below Togo Point and there's a guy who says "I'm almost southbound, almost to The Steer," and I can look at the chart now and tell he's way away from The Steer.

I might be able to make the jump around the corner, depending on a known location where they've got guys at. The level of detail is great. The one thing we do struggle with a little bit is our chart producers put out a chart, and a lot of times the names of points on the charts and the dots on the charts don't coincide with what the local mariners use.

So anybody that's operated in the Lower Mississippi River in the New Orleans area will hear somebody occasionally say they're southbound at Old Public Grain. If you don't know where that's at, you're going to be lost. We also use 26 mile point, 50 mile point, 100 mile point and those don't necessarily always make their way to the charts.

Two minute predictions is another thing I love about the electronic chart systems that we use. It will tell me where it predicts I'm going to be in two minutes. Generally with boats, like I said, they slide. It's not in a straight line; it's somewhere off sideways somewhere. So you can tell if you're moving, if you have lateral movement. Closest point of approach, the same way. We're trying to figure out meeting situations.

Most places on the Mississippi River, you can't meet in a bend. So it really becomes critical to figure out where you're going to be expected to meet this gentleman at. Here's what we've lost with the electronic charts. Now I had one of my boat guys, one of my captains send me a picture, just a snapshot of a paper chart.

Now we have these guys write on these things not for navigation use. But you can see the amount of scribbling that we throw up there, the name of the lead boat of this particular fleet, the fleet channels that the boats stand by on. So if we get in trouble, we know who to call and how to get hold of them quick. We'll also mark down eddies; we'll mark down points where we have to flank, call‑in points for the locks which change, depending on the river and the lock master.

Future asks. This is the things we'd love to see integrated in charts. Integration of weather, river forecasts and lock info in a single data source. So I know that there's a build up of lock queue at Smithland Lock. I don't know where the end of the lock queue is, unless I'm really paying attention to what's going on with everything.

The weather forecast, we still have to go look at. Empty barges are like a sail. If you've got four empty barges and you're out west of Corpus Christi, Texas, you're not going anywhere, you know. You really need to know, and I've had a dispatcher call me and say well the wind ‑‑ wait until the wind quits blowing. I said it's Texas; the wind doesn't quit blowing.

Real time bridge clearance data. As evidenced by some of the issues we've had in the last couple of years, I did serve on the subcommittee looking at overhead bridge allisions and it is tough to get a good idea of how tall a bridge actually is on a river where you could have 30 or 40 foot differences in height. It makes a big difference.

And then often you just get the center span clearance. We're trying to look at some other stuff. 3D bottom contouring like they were demonstrating earlier on the Lower Mississippi River is unbelievably helpful. I had a 3D radar on one of the boats on a coastal boat, and it's fairly static on a canal. But just being able to see the bottom contour was unbelievable.

And that's pretty much all I have. The wish list. If anyone's ever played video game golf and they have the putting green and they have all the little arrows that tell you what the ball's going to do, I want to see that. Google glasses, just show me what's the current's doing, and detailed information about current characteristics.

The same thing as if anyone has ever seen the movie "Twister," where they drop the golf balls and you could see exactly what everything's doing. That's what we'd love to see in the future. That's our long term wish list, and I think that's all I have for today.

(Applause.)

MR. AUCOIN: Okay. My name is Paul Aucoin. I'm the executive director of the Port of South Louisiana. I appreciate this opportunity to be here this afternoon. I want to tell you a little bit about the Port of South Louisiana, and then we're going to talk about the river. I often, this is a new PowerPoint for me, so bear with me. I'm not that familiar with it; it's not the one I usually use.

I usually begin by saying the Port of South Louisiana is probably one of the most important ports you've never heard of and a lot of people probably have never heard of the Port of South Louisiana, but I'll be happy to share this information with you today.

We are the largest tonnage port in the western hemisphere. If you remember your geography, that means we are the largest tonnage port in the United States of America and we should be. Our jurisdiction is 54 miles of the Mississippi River. When you count both banks, that's 108 miles for us to develop. There are presently 53 industries on that river right now, and we'll talk about some of those.

We're the largest grain exporter in the United States of America. Over 50 percent of the grain that leaves the United States leaves through the Port of South Louisiana. We accomplish that with our seven grain elevators that operate out of the port, that handled 104 million short tons of grain in 2018.

We're the number two energy transfer port in the United States of America. We handle 34 million short tons of crude oil. We have four refineries in the port and ten crude oil storage terminals. We also handle 59 million tons of petrochemicals. We're the top foreign trade zone in the United States. We are Foreign Trade Zone No. 124. The Trade Zone handled $49.5 billion of cargo, and employs over 10,000 people.

We also handled 303 million short tons of cargo last year. That was accomplished through 4,402 vessels coming into the port, ships coming into the Port of South Louisiana, and 63,638 barges, mostly grain barges from the Midwest and our friend Mike is from here. Just recently we had a visit from 38 Iowa soybean farmers. They come down to see ‑‑ they want to see where their grain goes after it leaves their fields.

Also because of the Mississippi River, which I'm going to talk about later, that I consider this country's greatest natural resource, we have companies that still want to locate within the port district. As I sit here with you today, we have $24.5 billion of new investment coming in. That's 17 new industries coming into the Port of South Louisiana. A lot of it is what they call foreign direct investment, FDI.

What's going on is we have the Mississippi River, again this country's greatest natural resource and it's important to the whole United States, not just Louisiana. But we have the Mississippi River. We have cheap and abundant natural gas. Natural gas last year was selling ‑‑ two years ago was selling for 7.50 a cubic foot; now it's 3.50 a cubic foot.

So what we have is companies from foreign countries coming in and building their company here, and shipping the product back home. For example, a Russian fertilizer plant is going to be built here in the Port of South Louisiana. A Chinese methanol plant is going to be built here. When they make the methanol using our natural gas, they're going to ship it back to China.

The same thing with New Zealand. We have a New Zealand methanol company building a methanol plant right next to the Chinese one, and they're going to ship their methanol back to New Zealand. So all of that adds up into about $83 billion in trade annually; 30,000 jobs within the Port of South Louisiana; 1.8 billion in earnings; 14 billion in revenue; and 72 million in state and local taxes.

I want to mention that the numbers I just recited to you were provided by Dr. Loren Scott, an economics professor at LSU.

Now the river. As I said earlier, I think it's this country's greatest natural resource, and one person who would probably agree with me is an author by the name of Peter Zeihan, and he wrote a book, you might want to read it, it's called "The Accidental Superpower." But his opinion is that any great country that's a superpower today is because of the river system, and he gives credit to the Mississippi River is why the United States is a superpower today.

More than 30 states rely on the Mississippi River for export, 30 states. The Mississippi River Basin produces 92 percent of the ‑‑ turn this thing around ‑‑ 92 percent of the nation's agricultural exports, and 78 percent of the world's export of feed, grains and soybean. In the United States, 1.1 million jobs are supported by agricultural exports. Every additional one billion in exports creates 8,000 jobs.

We're connected to 14,500 miles of inland navigable waterways, and the Lower Mississippi River is home to four of the nation's top 50 ports that move more than 500 million tons. Over 21 billion in agriculture exports are shipped through Louisiana ports. Each foot of cargo, each foot of cargo, I'm talking now and there's a restriction at the mouth of the river; this is how important it is.

Remember I told you we had 4,400 ships come to the Port of South Louisiana. When you take Baton Rouge, Port of South Louisiana and New Orleans, St. Bernard and Plaquemines, those five Lower Mississippi ports, that is the largest port conglomeration in the United States, in the world. Not in the United States, in the world, those five ports together.

We had 4,400 ships. All total we had over 6,000 ships come into the river, and if those ships can't fully load up, if they can't load to 45‑50 feet, then it's about a million dollars a foot that it's costing the shipper. So if you have a draft restriction saying you can only be 42 feet into the water instead of 45, that's $3 million.

What's going to happen? We're going to become unreliable and uncompetitive. When you lose that, it's hard to get it back, trust me. So we all have to go back home and talk to our Congressmen and our Senators, and tell them how important it is to address the mouth of the Mississippi River.

That's what I want to talk about on this next slide. Oops, back. At any rate, okay. At any rate, our goal is to provide a 50 foot draft from the Gulf of Mexico upriver to Mile 256. The Port of South Louisiana is Mile 114.9 to 168.5. The dredge material will be used to create an estimated 1,462 acres of new marsh habitat. We call that the beneficial use. So that's getting beneficial use out of all this silt that's being dredged up.

The Corps identified the benefit to cost ratio of the project at 7.2 to 1, calling the dredging of the mouth of the river one of national and international significance. What about your transportation cost savings? Remember, if you have no depth restrictions, if every ship can load to 50 feet, then we're having a great cost savings in shipment because of the $1 million a foot projection.

This also would increase flood protection of businesses, farms and homes, and it would provide navigation reliability and safety, and that will attract future investment. As I mentioned earlier, the alternative is we become less competitive and less reliable.

This is some of the projected benefits if we should dredge the mouth of the river to 50 feet, and you can see in 2019‑2020‑2021 the increase in tonnage and therefore the increase in value. So that's your cost to benefit ratio, a very important cost to benefit ratio.

I'd like to talk now a little bit about this dredging of the mouth of the river. A lot of my friends think I'm daydreaming because I believe that eventually Congress is going to act. I was called by the American Association of Port Authorities to go to their offices in Washington. Congress has said if we come up with a plan that all ports of the United States agree to, they would put it in the form of legislation for dredging.

We met, we came up with a plan that all the ports agreed to, and Congressman Peter DeFazio has authored a bill. What it calls for is dredging the mouth of the river to 50 feet every day, all day, and including all the sections of the United States as well. But that's the only part that I was really interested in was the mouth of the river.

We have a harbor maintenance tax which generates about $1.8 billion a year. The tax is dedicated to dredging and it's not being used. There's $9 billion sitting somewhere, if it's still there. But that $9 billion would go a long way. The plan we came up with is called "Full Use, Full Maintenance." It means use all the money and maintain all the navigable waterways to the authorized depth, and hopefully that bill will one day be enacted by the legislature to take care of dredging for the entire United States of America.

That concludes my remarks. I hope I wasn't too fast. If you have any questions, we'll take them later. Thank you very much.

(Applause.)

MR. STEENHOEK: Well good afternoon. It's good to be with you today. One of the key points I really want to emphasize and underscore is that what happens down here impacts what happens up there. One of the goals of this conference, this meeting is to really make sure that this agency is providing services, important services to stakeholders who are impacted by this critical link in the U.S.'s supply chain.

To effectively do that, you have to have a good idea of who the stakeholders actually are. One of the things that I've really worked hard to try to dispel among my colleagues and counterparts in the Midwest, and I'm from Iowa; my office is in Iowa, is for this kind of notion that issues related to the Lower Mississippi River, well that's a New Orleans thing. That's a Louisiana thing.

And one of the things, you know, bottom line that if my work is successful is when these issues percolate, it's regarded as an Iowa thing, a Minnesota thing, an Ohio thing. I wanted just to share with you a few slides that just kind of underscore that point. I won't go through this in great detail but the ‑‑ what this slide conveys is the cost to a customer in China, back in the good old days when soybeans were exported to China.

(Laughter.)

MR. STEENHOEK: Of transporting a metric ton of soybeans from three origination points. One is Davenport, Iowa, which naturally is going to be, involve a short truck movement to the Mississippi River, and then it takes a journey via barge down to the Lower Mississippi River, loaded onto an ocean vessel, on to a customer in China. That is the bar chart to the left.

As you can see, in the green part of it is the actual cost of producing that metric ton of soybeans, $313.55. We'll skip the middle one because that's a rail movement from South Dakota to the Pacific Northwest. The one to the far right is Mato Grosso, Brazil. Brazil's the number two producing soybean country in the world. Mato Grosso state, which is kind of in the northwest part of the country, is the number one soybean‑producing state in Brazil.

The cost to produce a metric ton of soybeans in that part of the world is $293.43. So they have a lower cost of production than the United States. But as you can see, the total cost realized by the customer is lower for U.S.‑produced soybeans. So really the moral of the story is the reason why we're so competitive on the international marketplace is not due to a lower cost of production, but it's due to a lower cost of transportation.

We're able to overcome that lower cost of production due to the fact that we've got a more efficient transportation system, and the inland waterway system is integral to that. This really, some of us, we know this theoretically, intuitively. But this really underscores that the fact that we are able to rely on these modes of transportation like barge that's so well‑equipped, so well designed to transport high volume commodities long distances at an economical price point is really key to our success.

One 15 barge tow can carry between, you know, roughly 800 to 850 thousand bushels of soybeans. Compare that to one semi at 910 bushels of soybeans. Brazil has to still rely disproportionately on moving soybeans via truck long distances to get to their export facilities. So that's really why we're so successful. We also use rail quite effectively as well. But really the fact that we've got this inland waterway system that penetrates into the most productive farm ground on the planet is really so key to our current, our past, our current and our future viability.

Because the issue is so important, transportation to our industry, is the reason why we established the Soy Transportation Coalition. So we really are an organization comprised of 13 state soybean associations located throughout the country, and you would think that farmers located in the interior part of the country like Iowa, like Minnesota, why would they be international entrepreneurs, even though they're located 900, 1,000, 1,500 miles away from our coast?

Well the reason is because we've got this effective transportation system. This map highlights that we've got this effective system of the Ohio River, Mississippi, Illinois, Arkansas River, to a lesser extent the Missouri River, that provides this access to all these farmers located around the country. 60 percent of soybean exports leave from this critical area of the country; 59 percent of corn exports, by far the number one launching point for both commodities.

You know, to dovetail with Paul's comments about deepening the Lower Mississippi River, this is a priority that is something that we are working very diligently on. I'm often asked if you had one infrastructure enhancement to the soybean supply chain, what would you ‑‑ what would you elect?

I would say deepening the Lower Mississippi River, just because you've got all of these states that really filter soybeans down to this area of the country. This area of the country is also able to provide service to so many of our customers around the world. We're able to access our Asian customers, either via the Panama Canal or around the southern tip of Africa.

We have access to South America, Africa, Europe, all of these customers. Of all the things that are planted in the United States, soybeans are the number one agricultural export from this country, and so really has an important, you know, engine to our U.S. economy. But related to the Lower Mississippi River deepening, we did some research that highlighted to what extent would farmers in the interior part of the country benefit from this, and we did some research and then highlighted that.

If you deepen, if you make this barge to ocean vessel journey more economical, that would not just benefit the shippers of that commodity, but it actually would benefit the farmers located in the interior part of the country, in the form of them receiving a higher price for the soybeans that they grow.

For the state of Illinois, for example, farmers would receive annually $77 million of additional value every year, $461 million annually for U.S. soybean farmers. So obviously a very important project to our viability, something we're working very diligently on.

And as Sean mentioned, the United Soybean Board, which is a part of our organization, recently made the announcement to allocate $2 million to help underwrite the cost of that project. During this time of a lot of market uncertainty, a lot of turmoil with the ability to plant a crop, the ability to market the crop, our customer, number one customer China historically, which historically would take one out of every three or four bushels of soybeans produced in the United States, has all of the sudden come to a dramatic stop.

We first established an office in China in 1982. We've worked diligently on this, for this customer for over three decades, and now of a sudden it's come to a dramatic stop. So there's a lot of turmoil confronting the industry right now, and the temptation could be for farmers to pull back and to be timid.

They're actually leaning forward and investing in their industry, so I think they need to be commended for that.

Just kind of a final couple of thoughts about as you're kind of thinking about the services that National Oceanic and Atmospheric Administration provides. So much of the weather forecasting, you know, not only just with hurricane seasons but just more routinely, that's really critical and to those shippers down here but then also the interior part of the country, because what happens again down here can have an impact up there. It can certainly move markets.

I've worked a lot with federal, state and local government, and one of the things that I've observed over the years is that government does an exception job at accumulating information, not as good of a job at disseminating that information. So really one of the secrets is always trying to challenge yourself, to make sure that you're meeting the stakeholders, the customers where they're at.

I always have an exercise that I do with my board of directors every year, to determine whether or not I'm effectively communicating with them, my bosses. I ask three questions. What is the information you need from me? I ask the "what" question. I ask when do you need that information from me, the "when" question, and I ask the "how" question, how do you need that information from me?

It's not just effective for me to just simply do a big data drop on them, kind of an information bomb on them and say you are effectively informed. You also have to ask those other questions, the when question and the how question. So that's something I'd just encourage you to continue to challenge yourself on and reach in your outreach, is to make sure you're doing a good job with the what, the when and the how. Thank you.

(Applause.)

MR. WINGATE: All right, good afternoon. My name is Mark Wingate. I'm the deputy district engineer for the Corps of Engineers out of New Orleans. I believe my boss was here earlier, Colonel Murphy. So you all were treated to hear him. I will tell you Sean, I do have my supervisor shoes on today. I do not have my boots on, but I will never wear my supervisor's shoes again at Bonnet Carre.

And unfortunately I'll probably have to have them on next year anyway. So I was asked to come here today and be brief, and I guess speak a little bit to how we coordinate with NOAA and Hydrographic Services, and how we share information, so I will go ahead and jump into that.

All right, but before I do that, just a little bit about the New Orleans District. I took this job about four years ago. I took it because it's a small district. You can see it there in the red, and I knew it wouldn't be too challenging. Four years later, we've just entered a 292 day flood fight, had a hurricane during that particular time and maybe we'll be back in high water season here in just a couple of months.

But it is a very busy district. It is part of the Mississippi Valley Division. That's what we have on the slide here all in gray from St. Paul, Minnesota down to New Orleans, Louisiana. Just a couple of quick stats about the New Orleans District. You can see up at the top many miles of navigable waterway, 2,800 miles in fact, and we've already spoken in this panel here about some significant interest in deepening the Mississippi River to 50 feet.

So that is certainly a priority project for us, and we're going to continue to work with DOTD and the Soy Transportation Coalition and all our partners, hopefully to make that happen when monies are made available. You can also see the Mississippi River and tributaries levee system is a big component of our flood fight type program in the New Orleans District, and you can see some of the other stats.

But I will tell you one of my personal favorites up there is the bottom one, and that is all the regulatory actions that we deal with. That was a little facetious there; one of my personal favorites I will tell you it keeps us occupied. In fact, working closely with NOAA through NMFS is some of my favorite permit actions, and that's large‑scale diversions on the Lower Mississippi River.

So stay tuned for that, because my boss will most likely be a decision‑maker on one or both of those large‑scale diversions. But in terms of our mutual mission areas I believe between NOAA, National Weather Service, the River Forecast Center, as well as Hydrographic Services, is in the form of navigation and obviously flood risk management.

I guess ultimately the question, after preparing for this particular session here, was how should we, how can we, what should we do to continue our relationship in terms of serving the nation with respect to both navigation and flood risk management?

Okay. So what I've got here obviously, I want to dive into a little bit of detail in terms of the navigation and how we work jointly together. I will tell you when we submitted this slide, it was 16 August, and that was the picture at the particular time. All the stars on that particular graphic show where we had active dredges.

That is not where we sit here today at August the 27th. We have three dredges down at Southwest Pass and now we're really moving our assets up into The Crossings north of New Orleans, all the way to Baton Rouge. We have five dredges currently working. Today in The Crossings, we have a dredge that's headed to New Orleans harbor area by the end of this week, and then we have three dredges down in Southwest Pass.

And of course what this graphic shows is everywhere in yellow is where we have to focus our dredging on the Lower Mississippi River. But just as this slide shows, the conditions have changed in terms of the number of dredges. I am happy to report that we have no draft restrictions on the Mississippi River at this particular time and we don't expect to have any.

I will tell you my folks tell me in The Crossings, we probably will go to one way traffic at some point in the year, but we're not there at this particular point. But as the slide shows and as the talking points are evidenced, we do dredge and work in a very dynamic environment to maintain that navigation.

We certainly need to relay the condition of that channel to the users, and what's going on and where those shoals are occurring and not occurring, and we do that in partnership with NOAA, National Weather Service, Hydrographic Services as well, and some specifics.

On a daily basis at the district here, we use NOAA's Marine Forecast information, the weather predictions to plan our surveys and that survey schedule. We use river stage prediction tools from NOAA National Weather Service on a daily basis, to help us perform our channel maintenance requirements. NOAA National Weather Service participates in providing weather briefings to us before, during and after tropical events, so that we can prepare and restore to regain navigation.

In fact, immediately following Hurricane Barry, NOAA used some of their surveying assets on the ‑‑ on Bayou Lafourche in the Port Fourchon area, to help us understand the condition of that channel and get that information out. I have to admit I'm going to use some terms that I learned as I was preparing for this presentation.

But apparently we work together on something called S‑57 charts. So now I'm walking around the district talking about S‑57 charts. I don't know what an S‑57 chart is, other than seeing some pictures. But I'll admit to that. So we work closely together with NOAA and Hydrographic Surveys by providing information to augment or to compliment the S‑57 charts, and that in turn is used by navigation. It's my appreciation that we're providing that information weekly to those users.

NOAA also has tidal stations set up at several waterways that help us if in fact some of our staff gages have gone down, or to augment that information. The last piece that I would conclude with is every ten years apparently NOAA is performing detailed surveys along the Mississippi River and putting that into hydrographic survey books.

We're also doing that on a ten year cycle. So we need to make sure that we are collaborating, and that we basically get it every five years. I don't know if we have a formal agreement in place, but that is something I think that we should consider as we move forward.

Okay, in terms of flood risk management, the graphic that you see here is I guess in layman's term we call it the plumbing diagram. I guess more officially it's the General Jadwin plan on how we operate the river, really how the Mississippi River Commission operates the river.

The key point here are the three outlets. It's the floodways in addition to the Mississippi River. In the middle of the slide you see the first outlet at least in the New Orleans District. That's the Old River Control Complex, and then right south of that is the Morganza, and then south of that of course is the Bonnet Carre Spillway.

So this is critical to us passing Project Flood through the New Orleans area, through the Baton Rouge area, by not only using the river but also the outlets. So why is this important and where do we collaborate? Well, it's very important that we understand the forecast that's coming down the Mississippi River through the National Weather Service and through River Forecast Center, what's actually coming to the Old River Control Complex.

Based on that information daily, we then determine how many gates to open at Old River, and then we determine how much flow will actually go down the Atchafalaya, and how much flow goes south through the Mississippi River. We in turn provide that information back to National Weather Service, as well as River Forecast Center, so they then can make the forecast for the river south of Old River Control Complex, and that's done on a daily basis.

Of course in doing that, we work closely with those entities in sharing our models and our data and our lessons learned and what do we see collectively. Of course we work closely with the Hurricane, National Hurricane Center, again as well as National Weather Service and River Forecast Center, just like we did during Barry and during high river for the last 292 days in terms of modeling, surge predictions, river elevations, et cetera.

And again, sharing those models and helping us develop inundation models as well, and providing that information to users.

I think in terms of moving forward and some of those things that I think that we should continue, but it doesn't mean that those items can't be improved, one of the first ones is something that's referred to as an e‑Hydro database. This apparently is a database and you'll see I'm not very familiar with the database, but something that the Corps produces at ten of our districts, ten of our coastal Corps of Engineers Districts called e‑Hydro, where we're collecting soundings and channel conditions, et cetera, that describes the shoaling. That information is provided directly to NOAA, to help update the navigation charts.

The second item goes back to the S‑57 charts, where we are augmenting those charts with very similar information out of e‑Hydro. That other information is provided weekly to industry and as I understand, we just produced the 325th weekly overlay chart as well. The third one again is the item of the hydro books, a large effort that we need to make sure we're synching it and that's occurring every five years as well.

So as I've mentioned a couple of times as I was preparing for this presentation, I have to admit I wasn't familiar with some of this information. The first time I really started talking about some of these details in the weeds. I asked myself, so why am I not? Maybe I've been sleeping at the wheel.

I'm sure our staffs are working this daily. But the one comment I would leave here is I think there's some things that maybe that certainly we in New Orleans District could do better at the leadership level, working closely with NOAA leadership to make sure that we're really moving forward together efficiently, and making sure that we are in alignment with what right really looks like.

So I will leave it at that, and certainly turn it back over to you Sean.

MEMBER DUFFY: Thank you, Mark. Thank you.

(Applause.)

MEMBER DUFFY: So Mark, you are unaware, but you really touched on an item that although HSRP has talked about it a little bit, the communication and cooperation with the Corps and NOAA, I thought the Lieutenant Governor was going to steal my story to explain NOAA and he didn't, so I get to say it at the end of the day, or for me the end of the day.

But there's so many services under NOAA and a lot of times, so what I say is NOAA's kind of like a Swiss Army knife. Sometimes you've got to pull out a couple of different blades to find the tool you need, and that means are you talking NGS, National Ocean Service. There's so many areas under NOAA.

But that cooperation with the Corps and I'll reference into an article. Mr. Paul mentioned a very good book that I told him I had never seen it and next day I had it on my desk. I hate to tell him I still haven't had time to read it. But when the river comes really down, I will.

But Stratfor had an article called "The Inevitable Empire," and George Friedman wrote it and it basically said that Americans are great because of where they are, not because of who they are. What I saw with this panel and as we talk about it is we're in a very historic period of our time, and what we do to incorporate technology, bring in the services that navigators need, pilots need, operators need and making it available is crucial to our future.

And as I say that, I'll come back to Mike Steenhoek and I will say that we have to remember what other countries are doing, and I know China is looking to dredge Argentine rivers, to help with access to soybeans there. So as we talk about the future, that interaction of our government partners and stakeholders is really key.

Mike, I know you know more about that project than I do, but it's rather distressing as we look to try to promote the Mississippi River and move forward. Tim?

MR. OSBORN: I wanted to bring up one of the questions for Paul Aucoin in terms of his constituency. How much interactions or how much concern or awareness do you see internationally with the big ship lines in terms of issues like high river or restricted draft or timely arrivals and departures of their ships in terms of the ports?

MR. AUCOIN: It's very important. It's crucial. I mean we hear about it all the time, you know. I'll get a call from one of the grain elevators. My ship is loaded but it can't leave because of depth restrictions, and I've got a ship waiting to come in and it can't come in because a ship can't leave. So there's 12 hour delay.

For them a 12 hour delay is a lot of money. So it's an issue for everybody, and the rule of thumb is a million dollars a foot, and I think that's a fair value that they give to this problem that we have. What's shame on us if we don't dredge the mouth of the Mississippi River, I mean because the cost‑benefit, it pays for itself automatically. It's just, it's like a good investment that any one of us, you know, maybe everybody but Congress can figure it out.

But it's such a great cost‑benefit. If you do this, we maintain our competitiveness and our reliability. We don't lose our customers to other countries where they can grow grain, and it's just so important. And not just for grain, but for petrochemicals and for crude oil.

You know, the United States is going to be a major exporter of crude oil, if we're not already. I know that's, you know, that's what they're telling us. I mean we have more oil now than we know what to do with, more natural gas. All you hear about is liquefied natural gas.

But without the Mississippi River and without dredging the mouth of the river, what happens to all of that? Who knows? Thank you.

MR. OSBORN: And Mr. Chairman, turn it over to the Panel.

CHAIR SAADE: Thanks Sean, and thanks everyone on the panel. Any questions from our Panel?

RDML GALLAUDET: I just have ‑‑ first I want to thank you all for being here and your contributions today, and as a reminder, I'm Admiral Tim Gallaudet, the deputy NOAA Administrator, and I want to thank everyone who gave praise to the National Weather Service. Those people perform a great public service and they work long hours, on weekends and holidays.

I know Suzanne Van Cooten is here, representing the Lower Mississippi River Forecast Office, so thank you for your services.

Just a few things. Sean, you talked about this critical time for our country, and I believe we're taking the advantage and I know NOAA definitely is. We're doing it through some transformational technologies. Yesterday, I earlier this morning talked about AI artificial intelligence and unmanned systems.

Another interesting area we're advancing is our data dissemination using commercial cloud providers. This is part of the Administrator, Dr. Jacobs' overall data strategy. He has a background both as a professor in a university and in the private sector, and he is looking to use NOAA data strategically.

The idea is this: Heretofore we've shared all our data openly and everybody had access to it and life was good. But the reality is we can work and negotiate with the private sector, like Google and Amazon, and they make our data available and we leverage their capability in terms of software development to provide cloud services.

So Matt, you talked about I want one common view. I want my hydro, my weather, my water all on one screen and it's all there and easy to get. We're going in that direction and we're funded to do it, and we're working with the private sector to do it fast, not at government speed.

The other thing I want to talk to you, Mr. Aucoin, is about you talked about how we need to advance our competitiveness, and that is the theme of my chairmanship of the Coordinating Board for the Committee on the Maritime Transportation System. Our overarching theme is to advance U.S. maritime transportation systems' competitiveness, and I have a number of goals identified of the five, three relate to which you hope to achieve, and that is assessing the state of the Marine Transportation System, advancing the data and technology behind it, and then enhancing the MTS infrastructure, getting all our ports to 50 feet.

So again, this is not just a NOAA effort; it's an interagency effort and I have this really nice opportunity to lead the interagency this year. So I hear you loud and clear, and we're going to do everything we can to get there, and we'll work with the White House and the Hill to do it. Thank you.

MR. AUCOIN: It's a large task to take on, but a very important task.

RDML GALLAUDET: Yes sir, thank you.

CHAIR SAADE: Dave.

MEMBER MAUNE: Question for Mike Steenhoek. You seem to infer that the Missouri River wasn't as significant as some of the other rivers for the soybean industry, and I thought that was ‑‑ I thought the Missouri led to prime soybean country. Can you explain what you meant when you said that?

MR. STEENHOEK: Yeah. It's a river that's very under‑utilized. You do have some degree of maritime transportation on it, but it's ‑‑ there's a scarcity, and then it's not just agriculture; it's also all different commodities. It has had some challenges with low water events, sand. It's hard to imagine that there was a time when the Missouri River was at low water. So I get to western Iowa and I get to see how high it's been this year. But they've had some challenges with the reliability of it.

But my ‑‑ one of the things that I'm working on is to try to change that narrative, because one of the things that I do believe is that the reputation of the Missouri River is worse than its actual potential. When you actually look at the data, it has been ‑‑ had suitable navigation conditions pretty consistently for the last easily decade.

And we're starting to see a rebound in some shipments. I toured the Port of Kansas City, oh it was in 2015 and then also last year, and in 2015 they handled a grand total 9,000 tons of freight at the Port of Kansas City, roughly six barges in the year 2015. The year 2018, they handled 450,000 tons of freight, so about 300 barges.

So that narrative is starting to change. You know, but you know, there are some challenges, but there is very much this chicken versus the egg dynamic, where the ‑‑ in trying to get funding for it, you will petition Congress to invest in the Missouri River, and policymakers will say well why would we invest in the Missouri River until we see any substantial amount of traffic on the Missouri River.

The potential users of the Missouri River will say well, we're not going to use the Missouri River until we see investment in the Missouri River. So you kind of have this chicken versus the egg dynamic. One of the good ‑‑ I mean one of the bad things about the Missouri River is that there are no locks and dams. One of the good things about the Missouri River is there's no locks and dams.

So the good news is that you can ‑‑ you can make some modest enhancements and investments in the Missouri River and significantly impact its usefulness. So yeah, there has been very little, but I think there is some potential there. It's never going to rival the Mississippi.

You can't get the same kind of barge flotilla sizes, and again it's not as reliable, the fact that you don't have that lock and dam, systems of locks and dams, but I do think there's some potential. Look forward to seeing that traffic increase in the future.

RDML SMITH: I wanted to thank Mark for all the comments on the Hydrographic Services coordination. I did want to just comment for the record, and we can talk about it some more afterwards, that we do have a handshake agreement only with Colonel Clancy about doing similar scope of work every ‑‑ each of us each every ten years, five years out of phase.

So we timed this one that is just finishing now to be five years after your last comprehensive and did work with the Army Corps stakeholders to ensure that the scope of work was going to be suitable for the modeling and navigation and everything else, you know, the Channel Stabilization folks and everything.

So I hope that, you know, so if you think that we should memorialize it more than that, we can certainly ‑‑ we can certainly take that up. But I think we're basically on the right track. And happy to hear all the other things you've got going on.

I do want to make sure that before you take off that you, that you meet Captain Brennan and we can think about next steps in more detail as well. Thank you.

CHAIR SAADE: So I have a question for Sean and Mark and Captain Brennan and Admiral Smith. With the survey that's been going on on the NOAA charting over the last months, have we had any significant breakthroughs with turnaround time on the data coming off the vessel and being able to be used very quickly?

MEMBER DUFFY: So you may have heard me say before that I live in a minefield, and I feel like that's one of those questions where I heard a pin drop behind me. But what I will say is that to ‑‑ there has been a lot of good cooperation between NOAA and the contractors and the Corps, and I'll focus on one aspect.

So river datums, which everybody at the table you understand datums better than I do, and I try not to talk to them when I'm not at full capacity up here. So I'll be real limited, but we have a lot of datum challenges on the river. Some of the work identified that some of the incorporations of datums, which are kind of historical, were off.

And as I always promote that cooperation between the government agencies, what we've seen is NOAA and the Corps in meetings talking about where they were off, watching adjustments being made. One website I use a lot is Rivergages, and then somebody would ‑‑ I mean in real-time, you know, looking at Bonnet Carre Spillway was open and so I was putting out river. The river stage was 16.7 feet.

Well in another location, that same datum said it was 15.4 feet, and it was related to the source. So it's one of the reasons I promote the partnerships and the thing that I'll always ask for is that when our big brothers are solving those problems, that someone from Navigation be involved and engaged, so that we can talk about the practice and the importance of the datum.

I'll refer back to some of the points Matt made about bridges and clearances, you know. There's a lot of different information distributed on the heights of some of our bridges, you know. My vernacular for air gap sensor is it's an electronic tape measure, low steel to water level.

And you know, that's why we see people promoting that, so that you don't have to incorporate differences in datums. As we move forward, of course where we are is we're subsiding. We're seeing impacts‑ of coastal land loss and tying this all in together is important. But I think it's a tribute to all the agencies involved, that quickly improvements were made. When the Rivergages problems was first addressed, I think it was with ‑‑ it was offline for a few days in certain areas.

But it came back very quickly, where improvements were made and as a navigation guy, being able to take that information and properly incorporate that into decision‑making is a big deal, where I don't have to understand all the formulas and the Chinese language and symbols. I just want to know what that distance is, and I think most mariners feel the same way.

So as you work to cooperate, there's been a lot of information and I know that the Corps and NOAA are looking at survey adjustments. I know the Corps has done a couple of different things in the lower river to show what is available and we continue to look at the technology advances to drive the future, and we expect you to help us figure that out. I hope that answered your question.

MR. LAGARDE: Mr. Chairman, to add to Sean's comments on the river datum, the river stage in and of itself isn't enough, because 12 feet on a slow rise is not the same as 12 feet on a fast rise. It's not the same as 12 feet on a slow fall. It's just that gives us some bottom clearance status, lets me know what we've got to deal with there. But it's not telling me what the current's going to do or what I can expect.

CHAIR SAADE: Rick.

CAPT BRENNAN: Thanks, Ed. So I'm not ‑‑ I guess I'd like a little bit more clarification on your question.

CHAIR SAADE: My question is actually if we've had any breakthroughs relative to the turnaround time, going all the way back to when Sean was trying to figure out ways can we get the data to the captain sooner, not so much the accuracy.

CAPT BRENNAN: So I think to answer that question, I think this is ‑‑ as was pointed out, this is probably the first time in 50 years that we've surveyed the river. So, you know, if you haven't mowed your lawn in 50 years you've got a lot of work ahead of you. So that's what we're finding right now is going and slogging through that, the number of features that, you know, that we have found, you know. The feature count on the river has been huge, so going in and doing that, getting accurate heights on those features while we've had a high water flow has been incredibly challenging. So we did pick the highest flow rate as we've heard all day today to do that hydrographic survey. So that has been confounding the ability to deliver products, because we can't get back to areas to complete the amount of survey work that's needed for that.

The other thing I would say, just to add to the Corps' list of collaboration points would just be to make sure that we collaborate as we update river datum. So as a part of this, we've been shifting our chart datum to the low water reference plain on the Mississippi, because one of the things that we heard over and over and over again from our constituents on the river was that when they would come to a bridge or when they would look at a chart or anything, that there was ‑‑

You know, that they would see three different elevations and not know which one that they should use to calculate, you know, either water depth or bridge height or otherwise. So we've been harmonizing with the Corps of Engineers on that one datum, which I think should hopefully eliminate a lot of that uncertainty.

But what we ‑‑ the other point to that that's pretty interesting I think is that we share a boundary, a datum boundary at the head of the Mississippi. Right now, those datums don't correspond in a single line. So there's a step there where those datums come together. So I think right now we've kept that step in because it's good for both sides of the equation there.

There are shoreside infrastructure that is referenced to the low water reference point, and you can't just willy‑nilly go and change that. So as that gets redefined, I believe that the Corps is going to be embarking on an effort to redefine that datum here coming up. I guess what we have said, at least we've got again a tentative agreement to do this, but that the low ‑‑ the mean low or low water datum and the low water reference plain datum that those, you know, that one be the boundary condition for the other, so that where they meet, they coincide as a model. And so I think that's the other thing that we've been ‑‑ we've spent a significant amount of time ironing that wrinkle out as far as what do we deliver.

And so that has been a source of friction, I guess, for getting delivery of the surveys, and it certainly hasn't been that our contractor has not been working feverishly on that. They've been an excellent partner. I think Sean would attest to that and the other members.

But you know, at some point ironing that out between our two agencies, and coming up to an agreement as to what that is going to be is, you know, is not a ‑‑ is not a simple feed. So I think we've gotten there, and we expect to start seeing surveys roll in in the next two to three months at this point. So as far as survey status, that's where we sit with surveys.

MR. OSBORN: And to continue on with what Captain Brennan was briefing on, one of the ongoing efforts, however, has been call‑outs and notifications from the surveying and the HSD project managers of wrecks and hazards as we're finding them along the river. In fact, recently one of the big issues had been the presence and locations of exposed pipelines crossing the river.

And there's an entire listing of those exposed pipelines on the river bottom that have been provided by HSD to federal and state partners in terms of their locations, the description. Some of these are 20 feet in the water column above the water bottom. And this has been an acknowledgment and a recognition by HSD as to the importance of how important it is to actually not only report it, but also with Sean and his efforts with the state and other entities, in looking at channel deepening efforts.

You know, are these features, which of these features have depths and characteristics of exposure that needs to be targeted in terms of supporting moving on, in terms of going to a 50 foot draft. So the ongoing interim reporting of some of these really urgent matters has really been ongoing, and something that we're trying to make sure that everyone is getting as quickly as possible.

RDML SMITH: Before we go to the public comment, I just want to make one final comment on this issue, just to kind of clarify something that I think is still loose in the room, and that is making a distinction between the survey that NOAA commissioned all the way from Baton Rouge to the Head of Passes, and including all shoreside structures bank to bank, full coverage, is a pretty ‑‑ is a much broader scope of work than a multibeam survey of a section of a channel that you might do for a condition survey.

So there has been a lot of discussion, which we've not discussed here. But I know it's in the thick in the room, of about doing multibeam surveys in channels as an improvement to sparse single beam surveys, both to guide the dredging program and also for navigation directly.

And there has been quite a bit of progress in turning around those limited scope surveys within the required one day. This is certainly a stretch, but in a lot of ways the multibeam sensors and processing systems have had a major improvement in the last five years or so that really makes this not unreasonable to expect any more. We're looking at ways of doing demonstration projects and that sort of thing with the Corps and the pilots in order to sort of test whether we're technologically ready to make this step.

So I'm sorry to sneak in the last word, but I think we really are at the public comment time. So Mr. Chairman.

CHAIR SAADE: Okay. So it's Public Comment time, whether online or in the group that's here sitting with us. So if anyone has anything or if anyone has signed up, please step forward and let's get it started.

MEMBER DUFFY: Mr. Chairman, can we dismiss the panel first, or are we here for ‑‑

CHAIR SAADE: Hold on. It's up to you. You might get a few questions, or you can get dismissed. Your pleasure.

MEMBER DUFFY: We're here.

(Pause.)

CHAIR SAADE: Okay. We've got a big group out there, and you've been real talkative for every break, and now you're all silent.

Okay, go ahead.

MR. SCHOTT: Thank you. I'm Benjamin Schott. I'm the National Weather Service Office Meteorologist in Charge here at the New Orleans‑Baton Rouge. I've kind of had a chance to talk to a few folks, and Mr. Wingate mentioned this earlier. And I just want to kind of throw this out there.

As we were going into the back end of this flood season and we realized hurricane season is right around the corner, ourselves, the folks at the Corps, the Hurricane Surge Unit. So there were all these different partners, and especially the folks over at the River Forecast Center, which are in the same office that we're in, understand that we had a serious challenge should we have an early season, a tropical storm impact the area and the river at the level it was at.

So we started to make sure that we worked together, and months before Barry was even a thing, we were in a room a couple of times, a few times on the phone. We ended up having a final meeting where we all got together. We worked the issue, started to run some modeling so we'd have a full understanding of what the effects of a tropical storm at the river at a level which we had never seen at, with the possible impacts of surge and whatever else may be factored in there with rainfall and everything else.

So I just wanted to really highlight the collaboration that went on behind the scenes. Though it didn't end up being at the level that we had forecasted, and I'm sleeping a lot better because of it, it is something that, you know, sometimes it just doesn't get put out into the light of day that this is what goes on behind the scenes with a lot of the NOAA partners and with the Corps.

So I just want to kind of highlight that, and then also for those who are our local partners here at the meeting, if there's anything we can do on the weather side, my staff and myself are always available to you any time to help you, whether it be through walk‑through stuff that we issue, or to discuss constructive feedback for anything that you feel like may need to get some extra attention to.

So with that, I will end my comment and thank you.

CHAIR SAADE: Thank you. Anyone else? Anyone on the Web?

(No response.)

CHAIR SAADE: Please identify yourself, thanks.

CAPT BOPP: I'm Michael Bopp. I'm the President of Crescent Pilots, and I want to elaborate on what you said about the multibeam, because the Crescent Pilots decided in July that multibeam is a possibility going forward. And I said it in my speech, and I'm going to stand by it, because we took the onus of doing it for the month of July. We did multibeam with C&D Solutions, and the Corps of Engineers told us that the single beam, we're the only people in the world that could turn around a survey in 24 hours.

And so we proved it in the month of July, and we saw anomalies against the single beam of lumps that were building, that we were actually hitting with the ship but were not in the survey. So going forward, I would really like to see this technology to be available to the navigator. So that's really all I've got to say.

CHAIR SAADE: I have it right here in my notes that I said "he said multibeam." So we're in full agreement with you ‑‑ some of us are in full agreement with you.

(Pause.)

CHAIR SAADE: Please identify yourself.

MR. SCULLY: Ryan Scully, Crescent Pilots and mrtis.com. I just wanted to extend a little bit on what Michael said about the multibeam surveys. I think that we always think if we want to get to 50 feet, that we need the dredges in order to do so, and we do need the dredges in order to do so. But I think it's a two‑part problem because when it comes to setting depth, the pilots are going to come up with a recommended depth that the ships are going to have to adhere to, but the pilots are going to set that depth using a margin of error when you look at the surveys.

So if you have a single beam survey with 600 foot gaps in between survey readings, and the pilots are going to have to subtract maybe a meter or three feet before setting that actual depth. So if you do dredge to 50 feet or 47 feet, the survey isn't detailed enough to actually set the depth to 47 feet. So you have to subtract a few feet to account for the error in the single beam.

So if you can do a two‑part solution where you're dredging deeper and then you have more accurate surveys via multibeam, then you don't have that three foot margin of error, and you can gain three additional feet year‑round just by having better surveys in order to set that depth policy. That's all I've got.

CHAIR SAADE: Thank you.

(Pause.)

CHAIR SAADE: Go, Jon.

MR. DASLER: Jon Dasler, David Evans and Associates. So Portland District Corps has now switched from running single beam surveys on the Columbia River to multibeam surveys, right, and it's going into e‑Hydro. So it's not that it hasn't been done before, I mean the rapid turnaround. I mean we're now getting to systems where we can do more automated processing and try to turn things around. So by the time a tile is completed, products can be generated. But I think it's also important to note that all multibeam surveys are not equal, right, and object detection, the work that we're doing with NOAA now, is a lot more intensive in terms of object detection surveys and picking least depths on structures, where probably more of those surveys you're looking at sediment transport.

So the NOAA mission, as many of you know, is really that object detection and what's a hazard to navigation, where the Corps of Engineers it's what do we need to dredge, right. So you're not worried about that ship mast or the single pile sticking up. So vast coverage, quick processing of data and it's pretty hard on a CATZOC level, right, in the Mississippi River when you have so much sediment transport change, right? So even with object detection surveys, they quickly get out of date because of sediment transport.

So there's really two needs to meet the requirement, and especially in the Mississippi River, where there's pretty dynamic sediment waves. We've seen sediment waves moving a quarter meter an hour, and in some cases even more than that, and shoals moving and migrating pretty quickly. So I think it has to be that joint effort between NOAA and the Corps of Engineers for more repeat surveys to look at sediment transport, but also object detection. Thank you.

CHAIR SAADE: Thanks, John. And I'd add the Cook Inlet to that too as well, as things are moving real fast. I think that's ‑‑

MEMBER DUFFY: Chairman Saade?

CHAIR SAADE: Yes.

MEMBER DUFFY: Up front.

CHAIR SAADE: Sorry.

MEMBER DUFFY: Okay.

CHAIR SAADE: Voices from above.

MEMBER DUFFY: I'm sorry, and I'm going to come back to your original question, and so my first HSRP meeting in Miami, you will recall that right afterwards, I spoke to you and said hey, how quick do you think you can make multibeam surveys of Venice to the Gulf Southwest Pass available? And the original answer was one I've heard in different places, that we can do that quicker.

The Corps answer had been about five days. So as you looked at it and had people contact me, we found out that that estimate really wasn't all that far off. And since that time, there have been a lot of efforts and discussions behind the scenes to move that along, and I feel like the Corps cooperation with NOAA and what's going on, as Mr. Dasler hit on, what happened in Portland, Oregon, was very similar. It was a process that took a lot of smoothing out before we got to a final product, and I believe that's exactly where we are now that we're very much engaged in working to make that available. And we're all hopeful that we'll have multibeam surveys in that area available in the next couple of years on a regular basis, if not sooner.

CHAIR SAADE: Thanks, Sean. That's a good update. And I know it's been a long time running. Go ahead.

MEMBER CHOPRA: I thought it's important to bring out two factors which have come out, which may be very pertinent to navigation on the river. One is that the river is going down, and now we're looking at low water rather than at high water. So clearances are reducing, my apologies.

A second factor is that we found a lot of objects in the river which are uncharted, which really need to be put on a chart as a safety for navigation. Dredging is a little bit longer project. Safety of navigation in the channel is immediate.

So maybe we need to have at least those objects, and we offer aid to navigation or a navigation warning going out to the pilots and to the general maritime community, that those obstructions exist in the water, so that we can stop any further damage of those known hazards.

CHAIR SAADE: Thanks, Anuj. I guess time to break?

(Off mic comment.)

CHAIR SAADE: Okay. Without ‑‑ I think we're going to call a close to the public questions. We have a 15 minute break coming. We're a couple of minutes into it. So we'll see you all back here about 3:15. Thank you.

(Whereupon, the above‑entitled matter went off the record at 3:04 p.m. and resumed at 3:21 p.m.)

CHAIR SAADE: Okay. We're going to get back into the swing of things here. Welcome back. The Nav Services portfolio spans three offices at NOS, and we'll hear from all their updates right now. So if you all three will go ahead and introduce yourselves? Everybody knows who you are anyway, so thanks a lot.

CAPT KRETOVIC: Good afternoon. I'm Captain Liz Kretovic, and I'm currently the acting director of the Office of Coast Survey.

MR. EDWING: Good afternoon. I'm Richard Edwing. I'm the director for the Center for Operational Oceanographic Products and Services.

MS. BLACKWELL: Hi. I'm Juliana Blackwell. I'm the director of the National Geodetic Survey.

CAPT KRETOVIC: So I'm going to give a pretty broad overview of our five year strategic plan. I know that the Panel has had an opportunity to review it, but we're going to kind of go through it goal by goal. So as the volume, value and size of marine vessels in U.S. waters continues to grow, it's essential that Coast Survey resolves critical data gaps, and that we increase the accuracy and frequency of our surveys.

It's a pivotal time in ocean mapping, and while we continue our work to deliver real-time data and high resolution bathymetry for PORTS, and maintain nautical charts for the U.S. Marine Highway infrastructure, we are also working toward building a comprehensive and high resolution bathymetric data set of the unseen America.

The continued strength of Coast Survey's valued partners, its highly skilled and dedicated workforce, and its ability to fully leverage technology is key to achieving the substantial modernization effort. Coast Survey leads a coalition of U.S. federal offices that provide hydrographic and meteorological services, working in close coordination to achieve shared mapping objectives.

Goal 1. Our commitment to delivering world class digital navigation services is essential to safety and economic success of the maritime community, particularly as the volume, value and size of commercial ships continues to grow. Successfully delivering these precision navigation services will require a redesign of the current chart suite, the development of new products, and more easily accessible dissemination systems.

Coast Survey aims to establish a national bathymetric source database to feed the production of new high definition charts for priority ports and other multi‑use requirements. An integrated cloud‑based dissemination system will then enable users to access products and data in easily discoverable, interoperable and user friendly formats for use in navigation, research or commercial purposes.

We heard a lot this morning from our excellent panel on precision navigation, so I'm not going to dive into anything more than tell you that marinenavigation.noaa.gov is coming, and two weeks ago we hosted a workshop. You heard a little bit about this earlier today at UNH, where we had approximately 45 people.

Originally I thought we were going to have about 15, and when it came time for the actual workshop itself, I was turning people away, which is a good sign. We were made up mostly of, I would say it was a good mix, half federal government from NOAA and about half industry partners in the realm of portable pilot units, under keel clearance management systems and other software developers. Also as you can see from the photos behind me, this is the new Office of Coast Survey presentation position. Both Rick and I are doing the same thing in those photos if you can't see it in the back.

Goal 2. Map the unseen America. Mapping the unseen America, including the nation's sea floor, coasts, ports, harbors and approaches is essential to Coast Survey's ability to provide accurate and reliable charts and models to support safe and efficient marine navigation. This mapping is also critical to other missions across NOAA and the federal government. As a result, Coast Survey is deeply committed to working in close collaboration with its federal partners, to ensure that surveys are coordinated and conducted as efficiently as possible. This means sharing survey data, joint planning and the elimination of chart discrepancies or chart duplication, especially in under‑served areas like the Great Lakes, the Arctic, the Pacific Islands and its territories.

As an organization with a deep history and expertise in surveying, Coast Survey is in a unique position to lead these efforts and maximize the value for both marine navigation and partner data needs.

Autonomous systems. With nearly two million square nautical miles in need of mapping in addition to the U.S. ports, harbors and fairways that require continual maintenance, it's clear Coast Survey cannot accomplish the task of mapping the full extent of U.S. waters using the same methods as we have over the last 200 years.

There will be an excellent panel discussion tomorrow on unmanned systems, so I'm going to leave it at that and move on.

Goal 3. Sustain a high performance of people and systems for mission success. At the core of Coast Survey's ability to deliver world class digital navigation services and mapping the unseen America are the dedicated, passionate and highly skilled men and women who give their all to Coast Survey and its mission every day.

Coast Survey is committed to establishing a model federal workplace, a workplace that supports the training and development of its employees, a culture of diversity, inclusivity and flexibility and which attracts and retains world renowned talent. Other mission underpinnings include the development and sustainment of Coast Survey's IT and fleet infrastructure, as well as the integration of new technologies into operations such as unmanned systems and other emerging opportunities as they arise.

As technology requirements change over time, Coast Survey will continue to leverage new and existing technology capabilities to meet mission objectives.

In pulling on that same thread, capacity building and leadership, the summer was a busy one for Coast Survey. In July, we held our third annual Nautical Cartography Open House, welcoming over 250 attendees from the U.S. and abroad. Government agencies, industry and academic partners and members of the public attended. The Open House featured posters, presentations, tours and exhibits centered around four themes: bathymetric databases, custom charting, innovative cartography and precision navigation.

Just prior to the Open House, NOAA held its fifth Chart Adequacy Workshop. The workshop trains professional cartographers from international offices on techniques for assessing nautical chart adequacy using publicly available information, such as satellite images and maritime automatic identification system, AIS data.

This is an important technique for hydrographic offices around the world, particularly for developing countries who may be resource‑constrained. Also, the second class of NOAA's certification program in NOAA Cartography, Cat B, is in its final month of their program. This internationally‑approved training program certifies NOAA nautical cartographers academically, making NOAA an expert in the global cartographic community.

The announcement for next year's Cat B certification program will be announced in January 2020. And I know that you have already provided us a lot of comments on the strategic plan, which we greatly appreciate, and now I will turn it over to Rich Edwing from CO-OPS.

CHAIR SAADE: Just a second, Richard. Are there any questions? We'll go ahead and have questions for each one of these segments, if anybody has any. Go ahead.

VICE CHAIR THOMAS: Liz, you just said that the website, the marinenav or navigationmarine or whatever, marinenav.noaa ‑‑

CAPT KRETOVIC: Marinenavigation.noaa.

VICE CHAIR THOMAS: So you said it's coming. Is that like months, years? What do you think as far as a projection on that one?

CAPT KRETOVIC: I'm not exactly sure. We've had a little bit of trouble hiring a developer, and so once they come on board in December, I would imagine that we'll see things kind of come to fruition a lot quicker.

VICE CHAIR THOMAS: Okay.

CAPT KRETOVIC: And so maybe in the next year I would say we'll start populating it. It's just we're a little personnel constrained with our resources at the moment.

VICE CHAIR THOMAS: All right. That's great to have a timeframe, because you know a lot of mariners do ask about this integration website, and I know that it's been mentioned before. And so they were asking.

CAPT KRETOVIC: Yeah. We were able to secure the domain name, and at this point we haven't done any of the public facing architecture of it yet.

VICE CHAIR THOMAS: Great, thank you.

CAPT KRETOVIC: Thank you.

CHAIR SAADE: Any other questions?

(No response.)

CHAIR SAADE: Okay Rich, you're up.

MR. EDWING: All right. Good afternoon everyone. I thought it might be helpful for me to give an overview and status of the PORTS program. It was a robust topic of discussion at our last meeting in Washington. I knew it was likely to be a robust topic here again, and there's a number of new members on the Panel who I thought might benefit.

So apologies to those of you who are very familiar with this, but I'm going to go through this pretty quickly. Kind of there's a lot of slides. I put it together as kind of a package for you to have.

So just to start off, my program operates two base funded observing systems, and that's the National Water Level Observation Network, 210 stations around the country for tidal datums, predictions, sea level trends, those sorts of things. It also provides real-time data. Most of those stations have meteorological centers co‑located with them as well. And then we have a current observations program where we go around the country, a couple of locations each year to take short‑term current observations to update tidal current predictions. And then we have our public‑private partnership PORTS program, where we work with the local maritime community who wants to add more water level stations or permanent current meters or more meteorological sensors, or things like visibility sensors, air gap sensors.

We've partnered with the Corps and with Scripps and IOOS to where we can offer the wave buoys through their program. Over the years, we're able to offer all of the different observations parameters that that community has identified to us that they need for safe and efficient navigation. It all got started back in 1980 where there was a bad accident down in Tampa Bay. A ship struck one of the pilings or a pier. The Sunshine Skyway Bridge collapsed. I think about 38 lives were lost. But the findings were if there had been real-time kind of comprehensive oceanographic and meteorological data available, that may have been avoided. So NOAA got to work on developing a program to deliver that.

And at the time when PORTS got started, those offerings were unique. It was the only place to get kind of real-time oceanographic information and integrated information, you know. Today that's no longer true. But we offer this information through a variety of products. Certainly over the Internet and on mobile devices as well, and we also offer it over cellular phones through a voice tree menu.

And when PORTS first got started, that was the main way of getting the data, because WiFi wasn't around, or you had to have a hard‑wired PC to be able to get to that data, and people would download it and fax it out to their ships or call it out to their ships. But of course over time, people are using the Internet more and more as it's more accessible and reliance on the cellular phone portion is declining, although still needed in a lot of areas. The products themselves, you know, this is a picture, that top picture is an illustration of the amalgamation of collages of different data types that we put together, which you can also look at them individually. You can look at text displays, kind of however you want to view it, whatever's most comfortable for you.

We also have a capability called MyPORTS, which is a capability for you to go in and kind of just pick which sensors you want if you only use a subset, and kind of save your own web page and be able to go back to that web page and just see those sensors update every six minutes.

So the Coast Guard captain this morning talked about the objective ‑‑ safe and efficient navigation and protecting marine coastal resources. So here's just a simple safety example of how PORTS data can be used, and this is ‑‑ the illustration in the upper right hand corner is super cranes coming into Baltimore up the Chesapeake Bay from China.

When they first started getting ready to ship these cranes over, they looked at tide predictions to kind of pick a good time of the month to arrive in the Chesapeake Bay when the water, you know, the predicted tides are going to be low. And then when they got to the mouth of the Bay, they started looking at the real-time data and our forecast model data, and that illustration down on the left there was at the time they hit the mouth of the Chesapeake Bay, and that red line is the observed water levels, that blue line is the predicted water leave. The kind of dashed black line is an outcast. But you can see water levels were elevated a bit from predictions, so that potentially was presenting a problem. That arrow a little bit over to the right, I guess I do have that. Is that, yeah? Oh that's right. I'm not going to ‑‑ all right. You see the arrow.

(Laughter.)

MR. EDWING: That's where they were projected to get to the bridge, and of course as they got closer and closer to the bridge, they could look at the air gap measurement there in the lower right‑hand corner, and then they did indeed make it under their bridge. One thing you may not know is when they bring these ships up, they actually kind of partially sink them. They put more ballast in to kind of lower than freeboard as much as possible.

So efficiency, you heard people talk about this this morning, you know. If you have more water than you thought you were going to have, you might be able to add more cargo onto your ship if it's sitting at the dock and get out of port. And a number of years ago we did some calculations, because you know, numbers are good, but people tend to visualize things.

So we, you know, with an inch of draft, you might be able to get, you know, almost 100 new Chevy Volts. I don't know if they're even in production anymore, but on board your ship or John Deere tractors. We did coffee beans, we did all sorts of things. But it's just a way of kind of trying to communicate how much more cargo a vessel could carry if they had more water.

Actually, and you probably can't read this, but this just came up from Port Fourchon, and this is I think when Barry was approaching, and they were kind of ‑‑ I think they were very astute and they were kind of promoting their PORTS system and saying hey, besides supporting commerce this is also going to help protect us during a storm by giving us real-time storm surge. And I'm sure they're kind of helping to, you know, promote the support behind them for the funding that they need to provide to support the PORTS. That's kind of your protecting coastal marine resources example.

So how does the program work? I'm going to start over on the right‑hand side, is you know the partner has a need. They need more observations within their body of water or within their sea port. They kind of have the requirements, and then they also have to find the funding to procure the equipment, to install that equipment and to maintain that equipment moving forward.

You know, our responsibility really starts up if kind of a simplistic way of looking at it is on kind of the data management side. When we get appropriated a certain amount of funds every year to manage the PORTS program. There's a lot that goes on underneath that program management bullet there, but you know, it's also bringing in the data, quality controlling it, disseminating it, creating products and services, you know, standards and doing technology infusion into those sorts of things.

Probably the single most important thing we do is we quality control that data on a 24 by 7 basis. We have watch standards who are ‑‑ watch standards who are, you know, as you can see one right here, constantly watching all the data. We have a lot of automated software that kind of flags problems. They don't have to look at every little sensor that's sending data.

But the system flags the problems and looks at the problems to see if they're real problems or just kind of, you know, an unusual situation I'll say. But if they think there's a problem, they turn dissemination of that sensor off, because we want to prevent accidents and not cause them with erroneous data.

And then if it's a problem, they send it on to other folks to try to figure out what's going on and get it repaired.

Another I think really important thing that we do is we're always looking for ways to improve the observing system through a test and evaluation program. On the left‑hand side, there's an air gap sensor and that, you know, we developed that air gap sensor using existing technology. But back when air gap, you know, striking bridges was becoming more and more of an issue.

When we first developed that system, the sensor, the only sensor we found that could meet the requirements was a $35,000 sensor manufactured in Norway. Today, we can use a $3,500 sensor for the same thing because American technology kind of caught up. So it really dramatically dropped the price of that, you know, that air gap sensor.

That's the visibility sensor there in the middle that was talked about, and again people are always talking to us about visibility and they needed to know what's going on with fog all around the harbor. It is a point measurement, so it's got its limitations, but it does serve that purpose.

You can see those two kind of prongs, if you will, and it kind of measures right in between those two prongs, and we make projections of how clear it is for about five nautical miles around that visibility sensor.

Through the NOAA Small Business Innovation and Research Program, we actually have a grant out to a private company, a small business who's developing a new one of these, which is using a camera, and I think it takes a picture of an object off in the distance in clear weather, and then as fog and other things move in, then they use infrared and other types of things to kind of see through that and make forecasts, or not forecasts, but assumptions about how much visibility you may have. So that holds a lot of promise, so we're excited about it. It's also much less a power hog and other things, easier to install. These particular sensors can be challenging to install.

And on the right‑hand side is an iAtoN current meter. Again, you heard today this morning someone talk about well, well we really need to, you know, the current measurements out there right next to the channel. Well, many years ago we developed the capability to put current meters on ‑‑ yeah, current meters on Coast Guard buoys.

But at the time, they had to be collimatored back to a shore station via line of sight radio, all sorts of communication issues. We never got the data reliability out of them we liked. But now we've kind of reworked the system. It's all on the buoy. We use iridium satellite so we don't, you know, truly improved the reliability.

It's cheaper, we got rid of that shore station, and now we can put it further offshore because you don't have those line of sight, you know, requirements. That's what allowed us to do the Miami Port System. So it's important to always keep improving your systems.

Our PORTS partners. I'll steal, I'll use it for the third time. It's a team sport, you know. You could see it as a pretty diverse set of partners up here, and there's probably even somebody left off like bridge authorities. I don't see bridge authorities on there. In some cases, they're a PORTS partner. Sometimes in one area we have multiple partners for a single port. It's just depending on who's got the funding.

So where are we today? We've got 33 capital ports, and it's important to understand the Capital PORT system can service more than one seaports, like the Lower Mississippi River Capital PORTS services those five seaports to some degree, you know, along the river here. And those 76 seaports and there's lots of different ways of measuring what comes through a seaport. But by tonnage, we're actually servicing over 90 percent of the tonnage on an annual basis. We're servicing over 90 percent of the value of cargo that comes through, and there's you know --‑ but that doesn't capture everything like, you know, we have a number ‑‑ the Navy's our partner in a couple of places. Well they don't really get captured by those sorts of things, but ‑‑

And this is a graphic I think ‑‑ well some of you have seen before. You know, we tried to come up with a graphic that shows where we're trying to go, right. How many, what, how much progress are we making at meeting the need, and there's really not a good end point defined. But we came up with 175 of the roughly 300 seaports there are in the U.S.

We looked at what would get us to 99.9 percent of the tonnage. That was about, you know, 125, 150 seaports, and then we added in Naval seaports, fishing seaports, other things that didn't get captured, and that got us to 175. We grouped those into 50 Capital PORTS, and these circles kind of show where those would be. The size of the circle represents how many seaports get covered. That kind of green aquamarine color, we think it's substantially complete, although I know for a fact we've been adding a few more sensors onto those. The blue is there's no PORTS capability there, and the yellow is we know the partners are still looking to build their PORTS. Often PORTS get started with just a sensor or two. People build confidence and start adding on to it. You can see the large yellow circle there, the Lower Mississippi River, because we know people want more air gaps and current meters and those sorts of things.

So much said. The system has doubled in the last 10 years, and that's true particularly in terms of just the number of PORTS. I can't even read this, but I think we were around 15 about 10 years ago, and now we're up over 30. Another way to look at it is just number of sensors, because again not every PORTS is the same size or created equal. Maybe a better way to look is at the number of sensors. You can see we're up to 895 individual sensors being operated through this system.

What's been the drivers behind the growth? You know, here's some general statements I don't really need to read to you, and we probably need to add a couple more vessels onto the right of this graphic. It probably hasn't been updated in a while. But what we've really seen recently are the three major drivers in the last five to 10 years, and probably going back 10 years or so, you know, the expansion of the PANAMAX Canal and everybody going to 50 feet and trying to look at that and get prepared for that was a big driver.

More recently, LNG has been a big driver. Some of our most recent PORTS have been established because they're looking to either establish or expand their LNG capabilities. We know there is going to be a new PORTS in Coos Bay, Oregon, which if you look at it from a tonnage or value sort of statistic, it is way down that list of 175. But you're putting in a very large LNG facility there, and the Coast Guard hopefully said oh, if you want us to approve the permit, you need a PORTS system to go along with it to make sure it's safe.

And then the last thing is we've had the Navy as a partner in a few locations, and now all of the sudden there's a renewed interest in a number of other locations. Actually, our next new PORTS will be in Kings Bay, Georgia, so they can get the nuclear submarines and other vessels in and out of their facility there.

And then there's other facilities around the country, particularly out in the Puget Sound that are coming to us and talking to us, and we'll see if they move forward or not. But these are I'd say the big drivers over the last five to 10 years.

So I have a few slides in economic studies. I think we were one of the first organizations to do an economic benefit study for oceanographic kind of information and its benefits. We started off in 2005 with a study in Tampa Bay, and then we followed up with some others in other locations. I think the Columbia River was the last one done in 2010. It was kind of a sampling. You know, you can see that the cumulative number there was $50 million, but that's 2010 dollars, so certainly more today. But the other thing that came out of those studies which surprised us a little bit was the economist found he could document reductions in accidents, and of course an avoided accident helps contribute to the economic benefit.

So maybe shouldn't have been such a surprise, but we didn't expect to see that. And so we then took the next step, and we said: what if we have a fully built out system? What if we had 50 Capital PORTS and everything that went with that? It was a NOAA economist named Eric Wolfe, who worked with a guy named David MacFarlane, ex‑director of Coast Survey and then he came over with us for a while, was the PORTS program manager.

But he kind of brought the kind of the real world knowledge to that study of how PORTS is used and we did. So the graphic on the right there is the 500 page report they did, analysis. And they used the Corps of Engineers channel portfolio tool and the U.S. Coast Guard accident database. And on the left‑hand side was kind of a glossy publication we did that kind of at a high level communicated the results, because no one is going to read that 500 page report.

But here's just a couple of pages. So at that time, you know, if we had a national PORTS system, over $300 million of annual value, again 2010 dollars. Again it found significant reductions in types of accidents, oil spills, those sorts of things. And then Eric Wolfe decided to even do more work and did another whole set of analyses that really drilled down into some areas, and this is a paper he and ‑‑ he got published and peer reviewed, so it's got that kind of credibility.

I just pulled out a couple of graphics. So he looked at couple of locations, seven locations where new PORTS have been established. He knew what happened before the PORTS were there, and he had some good history of what happened after they were established. That's what economists like to do. It makes it easier for them to measure change when you introduce something new.

But you can see ‑‑ well, for those of you who don't know, an allision is a moving object striking a stationery object like a ship hitting a bridge. You know, a collision is two moving objects meeting together, and you know, groundings are groundings. So he kind of broke these things out and in these particular locations, you know, he showed these different weights, these reductions in these type of accidents.

Here's another graphic, and he had lots of these different types of graphics. But this was looking at what happened at these locations in terms of how many transits they can make per type of accident being reduced or increased. So you know, that solid line, he looked at actually all the PORTS ‑‑ all of the PORTS I think in the U.S.

That upper line is those PORTS that had ‑‑ those sea ports that had PORTS established, and you can see back in 2008 they were experiencing around 7,500 groundings ‑‑ I'm sorry, a grounding every 7,500 transits, and after the PORTS they were getting up to one grounding every 22,000. And those locations that didn't have PORTS were actually experiencing increased groundings. So this is pretty powerful information.

I wanted to wrap up by talking a little bit about the forecast models. They're not technically a part of the programs, but they're a great extension of the value of the real-time information, because it's really important to know what's happening today. But if you also know if that's either going to continue into tomorrow or the day after tomorrow or change in the next couple of days, that's really important, you know, particularly for transit planning.

So again, you know, our traditional product was the predictions, you know, just astronomically driven. Pretty accurate on a regular day, an average day, but if weather moves in not so much, and you've got your real-time data. It tells you what's going on now at particular locations, and then you've got your forecast models, which can now project out a lot of these same parameters into the future.

This is an example of Chesapeake Bay. And we can put these pins in areas where there are no observations. You know, we work with the local maritime community. Where do you want, you know, these forecast information? And I'm going to go to ‑‑ and this is ‑‑ you kind of saw this graph earlier. Here's what a typical, you know. If you click on one of those, if it has ‑‑ if it's at a place that does have a sensor, you can observe water level, which in case is laying on top of the nowCOAST information, which is a modeled observation pretty well.

If you see it's deviating from predictions a bit because there's probably some weather going on, and taking into account whether it's forecasting that above average water level or above prediction water levels could continue for the next few days. So that concludes the presentation. Are there any questions?

CHAIR SAADE: Any questions for Rich? Julie.

VICE CHAIR THOMAS: Rich, you mentioned the SBIR.

MR. EDWING: Yes.

VICE CHAIR THOMAS: And I'm just interested in that. I was involved a little bit in some of the submissions. But it seemed like there was this gap where ‑‑ and you mentioned, you know, they would be taking pictures and then they could make some assessment, and then that becomes operational. But the question that I always have is okay, so once you ingest it, it becomes operational. Do you have the resources then to continue with quality control and oversight of that data?

MR. EDWING: Right, right. Sure.

VICE CHAIR THOMAS: I mean what is that full path that you have on those?

MR. EDWING: Well, and that's ‑‑ well, I guess at the start of the process, we kind of get to write the requirements for what we want out of this, you know.

VICE CHAIR THOMAS: Yeah, but the one that I saw had no quality control at the end of the project.

MR. EDWING: Right. Well, we don't ‑‑ we don't take anything in, and that's part of our test and evaluation process. It just doesn't look at the technology, but it makes sure that data pipeline is in place, you know, kind of behind it. And part of that data pipeline is being able to quality control, you know, that ‑‑ understand and quality control that sensor.

VICE CHAIR THOMAS: So that's embedded in their ‑‑ in their package that they send to you?

MR. EDWING: Well, we at least specify to them there's certain information or it needs to work certain ways so that we know we can quality control it. There may be some things we have to develop after that to do that good quality control. But we make short kind of lines. You know, and that's why we just don't use any current meter or tide gage that's out there. We always test and evaluate those things to make sure we operate how they work, to make sure we understand the accuracy levels, to make sure that we can ‑‑ every sensor has its own idiosyncrasies, and we need to understand those so we can properly quality control it.

VICE CHAIR THOMAS: Okay. Thank you.

MEMBER DUFFY: Rich, I just want to say the photo behind you really demonstrates the importance of the PORTS program to us. There's a vessel built right above the Huey P. Long Bridge. High river stage came in. There was a lot of movements and concern about getting that vessel out without clipping radar or having any scratches put on the vessel.

I remember working with Tim and going back with the pilot associations a lot, and when they were able to get through. But unfortunately with the PORTS program, I'm reminded of one of my first bosses told me something very important. A customer always wants more, and he is willing to pay less for it.

MR. EDWING: Your boss was a wise man.

CHAIR SAADE: Okay. Let's move on to Juliana. Thanks a lot, Rich.

MS. BLACKWELL: Good afternoon. For those of you who are not familiar with the National Geodetic Survey, I'm going to start off with a brief definition of geodesy. Geodesy is the study of the size and the shape of the earth, including its gravity field, and how it changes over time. And so it's a very mathematical science. It has a long history and in the next 15 minutes, I'm going to give you some very brief highlights of what we do in the National Geodetic Survey, primarily focused on the National Spatial Reference System. This was mentioned earlier this morning by Nicole LeBoeuf.

So the National Geodetic Survey is an office within NOAA's National Ocean Service, and we are responsible for defining, maintaining and providing access to the National Spatial Reference System, which is the consistent coordinate system that defines latitude, longitude, height, scale, orientation, gravity and shoreline throughout the United States and our territories.

It's also our responsibility to make sure that what we do here nationally fits into the global geodetic reference frames and connects internationally with our other partners in other countries, so that we have one consistent frame that we're all working within.

The National Spatial Reference System also includes geodetic datums, which are used not only in the foundation for mapping, charting and geospatial data, but also have a role in the precision navigation products, which I'm going to highlight here very briefly.

So within the National Geodetic Survey, we have two primary programs that we're responsible for, and again on the geodetic side, which I'm going to talk about in a little bit, and the coastal mapping side, which was defining that national shoreline and having that shoreline available for the nautical charting product. But we've learned over time with the new technologies that defining the national shoreline and the byproducts of doing that are applicable for a number of ‑‑ a number of things, and the uses for that information just continue to multiply.

Within our Remote Sensing Division, where we provide the coastal mapping program and oversee that through Mike Aslaksen's leadership, one of the primary things we do is for the nautical chart application, and without that information you wouldn't have a shoreline, you wouldn't have the land features that are required for the precision navigation component of how things relate to land and how they relate to the geodetic datums.

So we do this for all of the safety and navigation products, in the form of the foundation data and for ‑‑ that refer to reliable, consistent, accurate reference frames, because you can collect all sorts of data, and if you can't relate it to each other in an accurate way, that information is not valuable, and it can get you in trouble.

One thing about relating data is the importance of having and knowing what datum you have collected your data in, and being able to transform that data between geodetic water level, river datums, local datums, et cetera, and knowing that you're doing that and doing it with confidence, and knowing what your accuracies are when you do make those relationships between the different types of datum.

One of the things you're going to hear about here in a few minutes is V‑Datum, which is one of the primary products that our three offices coordinate on in providing the tool that allows that information between the geodetic, the water level and the title datums, water level datums, and making those all work together in the geographic locations that we're responsible for.

One of the things that you'll see here is the fact that from the imagery and the delineation of the river banks and how that gets applied from NGS to Coast Survey, and the fact that through our collections and the transformation of the data to the proper datums, is being able to update that information that's being used in precision navigation products.

And you'll see here what we currently collect in NGS meets the scale and the accuracy of the current precision navigation products, but we also know that things are going to be evolving. And as requirements increase with the accuracy levels and the need for other shoreside infrastructure data, maybe that's one of those things that we can continue to build on and work towards providing for precision navigation products.

But as we know right now, I think the needs are being met but we are always looking at how we can improve the information that will feed into 3D or higher definition charts. I would say from the National Geodetic, from the geodetic perspective is also being able to look at improving 3D high definition of all transportation systems, which means taking those products that come in through the PORTS, and also how does that apply to railways and highway systems and airline systems, so that we can move those goods inland in any ‑‑ in all ways possible with the highest degree of accuracy and the use of autonomous vehicles in all transportation modes.

As Admiral Gallaudet mentioned earlier this morning, one of NOAA's priorities is the unmanned systems, and being able to utilize unmanned systems in a variety of ways. Within the National Geodetic Survey, and again under the purview of the Remote Sensing Division, one of the things that we are doing is through our Testing and Training Center outside of Fredericksburg, Virginia, is enabling the ground work for additional sensor testing, platform evaluation and improved proficiency in utilizing small unmanned aircraft systems for the use of mapping.

And one of the other things that we've done is again, this is ‑‑ it's a big lift. It seems like it should be an easy thing, but realizing all the complexities of not only learning how to utilize these systems, but make sure that we're doing them in a safe way, including having our IT risks identified. One of the things that NGS has been really engaged in in the last couple of years is making sure that we meet all of the IT risk acceptance requirements for NOAA, and being able to share our expertise and help train other offices for the applications of the small and unmanned aircraft systems.

Some of the examples here, and I know it's kind of small print, but working with Coast Survey, I think it was mentioned earlier today about utilization on the Thomas Jefferson of the unmanned system, and then being able to provide other opportunities for folks to learn how to utilize these systems for their mapping and surveying needs.

Very briefly, I want to touch on some of the other aspects on the coastal mapping program. In addition to our continual update of the shoreline, some of the areas that we are also focusing on with the use of the supplemental funds that are from FY '17, are covering the areas that were impacted by Hurricanes Harvey, Irma and Maria.

We've got a number of projects that are currently underway and are wrapping up here soon, and just in time for another supplemental that was provided in FY '19. The spend plan is still not approved, but we know that we've got some work to be done here to support the marine mapping from the effects of Hurricane Florence and Hurricane Michael. So we'll be giving you updates on that work at the next meeting.

Earlier this summer, as we mentioned a couple of times, with Hurricane Barry that came ashore here in coastal Louisiana, we were able and requested to fly some of the areas locally here, in particular the intracoastal waterways and some of the other major waterways and ports along the coast.

It wasn't a significant event compared to some of the others that I mentioned on the previous slide, but there were impacts and we're able to use our mapping capabilities to quickly collect that data and provide those aerial images for emergency managers to be able to look at, and for FEMA to be able to utilize to determine the impacts in areas where they needed to provide additional resources.

I want to shift gears very quickly here into the geodetic side of the updates for NGS, and talk about some of the modernization of the National Spatial Reference System, some of the activities that have occurred since we met last in Washington, D.C. this spring.

I know some of you are not as involved on the geodetic side of things, but I just want to make sure that you understand that we are going ‑‑ we've been very methodical about the activities that we're doing in our strategic plan to get to 2022, which is the date that we have established for when we're going to update the National Geodetic datums.

At the end of 2022, we're expecting to replace NAVD‑83 with four new terrestrial reference frames, one for each of the tectonic plates, and to update NAVD 88, which is our current vertical datum with a geopotential datum that will be based on our airborne gravity data that we've been collecting and modeling.

In doing that, we've got not only the operational aspect of collecting data and improving our sensors, our geodetic sensors that we have throughout the country at Continuously Operating Reference Stations, but we've also got a number of publications that we are providing, that define in very technical detailed geodetic terms what we're doing and how we are planning the changes, and how we will be working in a modernized NSRS in the future.

So we were successful in getting the blueprint for working in the modernized NSRS out, and that's available on our website. We have a geospatial summit in May in Silver Spring, Maryland, where we talked to hundreds of our stakeholders and gave them updates on what we were doing and heard from some of our partners on some of the case studies that they are interested in, understanding that the changes that will be coming for them in their areas of business.

We've done some updates with our policy and procedures related to State Plane Coordinate Systems, which are most impactful to the professional surveying community. In June, we were able to publish a status report on all the products and services that we've identified as part of the modernized NSRS.

So there's a number of things that are in great detail in that technical memorandum that was released, and we were able to update our research plan to better align with our research needs, not only to get us to 2022, because a lot of that is already underway, but looking at the research opportunities past 2022 and looking for partnerships on how we can accomplish a number of those activities.

On the operational side, as of last week, we've got about 77.5 percent of our airborne gravity collected for our portion of our Gravity Initiative. The picture that you see here, anything in green is data that's already been collected, complete and is available for others to utilize, mainly in a research aspect. The areas that you see in orange are those where collection is underway.

There are a few white blocks that we haven't started collection in as of yet, but we are planning on getting not only the landlocked areas but also the Pacific Island areas collected before our 2022 deadline, because that data will become the basis for our new vertical or geopotential datum that will be covering all of the tectonic plate areas that we're responsible for.

Also earlier this month, V‑Datum 4.0 was released. Again, it's a datum transformation tool. Stephen White is here, and he's going to be talking to us about that in a few minutes.

One of the things that we've been doing in the interim before we get to 2022 is working on an interim update to our GEOID model, which is helpful in providing the orthometric type heights above sea level that you will ‑‑ are able to obtain through GPS, but only through an updated model. This has been kind of a crowd sourcing initiative that's been ongoing for the past five years, and we're able to culminate that with an update, our last, our newest and our last hybrid GEOID model, GEOID 18, which will be released here very soon.

The data that we're collecting for that will also help us in a lot of our transformation tools that we'll be providing for the 2022 update. We are also in the process of doing the final vetting on the updated coordinates and velocities for our Continuously Operating Reference Station Network.

Again, aligning those with what we know now, with the technology that's available now, and aligning those with the International Terrestrial Reference Frame. Those coordinates are sort of available right now but not fully integrated into all of our products and services, but will be soon.

Very brief update on our CORS network, I've talked about this a few times, and I know at our last meeting in D.C. it was one of the priorities of the group in the letter that was written to Dr. Jacobs about the support for the CORS network. A brief update that. Since spring, we've been able to hire a CORS program manager. We had a goal of establishing eight foundation CORS this year, which were really CORS that we had, NGS owned, that we're able to upgrade.

So far, we've only been able to establish five of the eight that we had set for our goal, and it looks like that's probably going to be it for this year. We had some down time earlier this year, as you all know, which put us a little bit behind. We're still working on interagency agreements so that we can adopt some of the stations that are owned by other federal partners and establish them as foundation CORS. So we're still working that. And we are trying to fill a number of vacancies in our CORS group. Currently, right now we've got eight that we have prioritized. So it takes a while to get new people into positions, and it's been kind of a slow go at that, but we're making progress.

The one big takeaway that I will keep saying every time I have the opportunity is, in preparing for 2022, one of the most important things that people can do is to manage the data that they have now, understand what the metadata is associated with the geospatial data and your projects, what reference frame it's referenced to, what epoch, what models were used in getting to that final product that was delivered, knowing what you use for project control, knowing when it was surveyed, and retaining the original data so it can be reprocessed at a later date.

Those are the most important things that we are talking to our partners about. And, if you're able to and you have the tools to go out and collect additional data, help us by supporting the transformation tool by collecting additional data using our guidance on our GPS on Benchmarks campaign on our website, and looking at our beta products and giving us feedback on things that you like or don't like or don't understand or don't work for you in the area that you are collecting data.

Back in the spring meeting, there was also some questions about managing the datum updates and when things were going to be rolled out. This slide is really just to put it all in one place when things are expected. From the geodetic side, the NSRS modernization, the new geodetic reference rooms and datums are expected in late 2022. From the CO‑OPS side, the National Tidal Datum Epoch update is expected in late 2023. And from the combined effort with NGS and CO‑OPS in coordination with our Canadian colleagues, the International Great Lakes Datum is expected in late 2025.

Last, but not least, if you're interested in learning more about geodesy and things that we have going on, there are a number of things that you can reference on our website, and I just have a bunch of them posted here in case you're hungry for more. Thank you very much.

(Applause.)

CHAIR SAADE: Any questions for Juliana? Okay. Oh, go ahead.

RDML SMITH: Quick question. I know the Tidal Datum Epoch for Louisiana is accelerated. It might just be worth saying just a little bit more about that, because it actually did come up with our Army Corps colleagues this morning about keeping up with that epoch.

MR. EDWING: Yeah. So, I think there's about half a dozen locations in the NWLON where we do these five year updates of the datums, and it's mainly driven by land motion. I think there's four stations in Louisiana because of the subsidence, and two stations up in Alaska because of the uplift still going on because of the glacial retreat.

You know, the datum that's ‑‑ we can't wait 20 years to update the datum to those stations for them to be useful to people. So a number of years ago we went to this five year cycle.

RDML SMITH: Approximately how much of that is too much? What is the five‑year difference? Is it ‑‑

MR. EDWING: Yeah, I know what you're asking. So, I don't know that number. You know, I can ‑‑

MR. OSBORN: For here? I mean, what was the adjustment?

MR. EDWING: Well, yeah, I think what he's saying is a certain rate that these stations have to exceed that triggers our decision to do this five‑year update.

(Pause.)

RDML SMITH: I'll repeat that on the microphone for the audience. The answer was it was an adjustment of 3.3 inches in South Louisiana.

MS. BLACKWELL: Okay. Thank you very much. Now we are going to hear from Stephen White, who's an NGS employee. He is our VDatum program manager, so he coordinates the VDatum program and what's going to happen where. And this is a combined effort with Coast Survey, CO‑OPS, and NGS, and has been an ongoing program. It just keeps getting better and better. So, Stephen, why don't you give us an update?

MR. WHITE: Okay, thank you. I'm going to jump up, because I'm probably going to use the laser pointer a little bit here.

Okay, thank you. So, if you start thinking about you're, you know, creating a project or developing an application, you know, one of the things you're going to do is actually go out and start obtaining data. You might start obtaining lidar, it might be based on NAD 83. Some lidar might be based on ITRF. And we'd grab some GPS data that might be based on WGS 84.

You know we have holes in those data. So we grab some USGS data. It might be based on NAVD 88 based on GEOIOD96 if they're doing beach mapping projects. We have some FEMA lidar. It might be based on NAVD 88 based on GEOID12B. They we go to grab some Army Corps of Engineers data, NGVD‑29.

And then, you know, we're looking for bathymetry. We also can see that it might be mean lower level water, mean low water, mean high water. Once we start integrating all these data sets together, you can see, I mean, they could be 30 meters apart. We start having waterfalls in our data and people are like, oh, this data's bad. It might just be actually the datum that the data is actually on.

So, with that, NGS, OCS, and CO‑OPS have developed VDatum. And this is really for converting among many different vertical datums. And really we're trying to help, you know, map the land‑water interface.

So there's three tiers of the VDatum program. It kind of starts out with the foundational data observations. This is can be geodetic and tidal. That then feeds the modeling efforts. This can be hydrodynamic or TSS, and the TSS is the topography of the sea surface. And with those grids or models we actually put an uncertainty estimate associated with the transformations. And then that feeds into the software development, outreach, training, and coordination. And these three tiers make up VDatum.

So when you think about VDatum, we kind of support three categories of vertical datums. There's the 3D. Those are based on generally space‑based systems, such as GPS or GNSS. We have orthometric. That's really based on a form of global mean sea level. And then we kind of move into the water levels. So then we go into local mean sea level, mean high water, mean lower level water.

This here, some people think this is a very complicated slide, but this is actually a very simplistic slide for VDatum. And you can kind of see where we have the 3D datums, the orthometric datums, and the tidal datums. And really what is in this red circle here is really what VDatum is responsible for, and kind of everything on the left side is really NGS and the international community.

And so you can find a lot more information on the VDatum website, vdatum.noaa.gov. Currently, you can see here, the current coverage. We have coverage in continental U.S., the Great Lakes, Puerto Rico, U.S. Virgin Islands, and then just recently Southeast Alaska.

We do support four different interfaces right now. So we have the GUI, it's graphical user interface. This is what most people utilize. And this is really where you're going to be processing terabytes and terabytes of data. So when we process our lidar, we're putting it in blades, you know, we're spinning up multiple instances and really just trying to push the data through.

And so with that we also have a command line interface. And so you can programmatically cull VDatum without actually seeing the GUI. This is what we're doing with most of the lidar and multibeam. We have actually created a web or online application so you don't have to download the program. You can just go online. We have a map interface. And so we've created layers here to try to help educate the users on some of the inner workings of VDatum, so you can kind of see what's valid, what's not valid, what's non‑tidal, things such as that.

And then we've also actually created an API. And so people that are developing mobile applications, such as on your phone, you know, can ping our servers. And then it provides a response, and you really never know that VDatum was included.

And so Juliana kind had mentioned earlier version 4.0 that we released earlier this month, and with that was NADCON 5. And this starts to get into separating the various NAD 83 realizations out. And you'll see we've kind of had to configure the software a little bit different, because when you select Alaska it's going to give you different datums than when you select continental U.S.

We have also added in ERDAS Imagine support. So this kind of just helps out with kind of like the GIS users. So you kind of think of GeoTIFFs or Imagine formats. These are like the digital elevation models that most people use, and so you're not having to translate data. Then we have also ‑‑ it wasn't part of the former plan, but we've really tried to push including southeast Alaska, and I'll talk a little bit more about that.

And then also based on some of the Sandy supplemental, we were able to really enhance the New York/Long Island Sound model and really, you know, sort of expanding coverage into some of the estuaries back in New Jersey.

So, kind of just in summary about VDatum, what we're really trying to do is assure, you know, data is transformed correctly, really enabling multiple uses of data across applications, so that kind of integrated ocean and coastal mapping paradigm. Permitting merging of disparate data sets to that common reference set was really kind of that first slide I was kind of talking about. And then providing transformation uncertainty estimates. This really helps, you know, allows people to make intelligent decisions and analyses.

So, kind of what of our next steps? Strategic priorities: really creating consistency between regional models and bringing our uncertainties down to less than ten centimeters, increasing coverage, and really working on this next generation topography of the sea surface. And this is really getting into where NGS is going, you know, utilizing the gravimetric geoids.

One of the key things here in red is GPS or GNSS and tidal benchmarks, looking at spatially varying uncertainty, and then as always software development, communication, and outreach.

So, we're kind of going to give you a synoptic view of some of these issues.

So, VDatum model consistency. So, initially, we were doing regional models and we kind of did it in a piecemeal fashion. And, you know, over time we've tried to utilize a consistent methodology everywhere. You will notice the Chesapeake Bay, kind of Delaware Bay, Mid‑Atlantic, this is where we have some null issues, where you cannot transform along the shoreline for valid transformations. And so this is an area we need to resolve.

Looking at kind of our uncertainties, you can see we have uncertainties. There are pretty high uncertainties in the Pacific Northwest, Louisiana. It's kind of difficult to see on this, but there are some issues back in the Texas estuaries where we have pretty high uncertainties as well. Puerto Rico, the Gulf of Maine.

And so then we're really, you know, also going to spatially varying uncertainty. And I'll kind of talk a little bit more about that. But, operationally, once we release the New York Bight/Long Island Sound region, we have those spatially varying uncertainty grids. We will be updating the entire west coast here soon. We did do some exploratory analysis, because we were going to be moving into the Gulf of Mexico and this has really helped us out, especially with the Harvey supplementals, the Michael supplementals, and then you can also see where we're starting development in Puerto Rico.

And, actually, we will have a spatially varying uncertainty in the Chesapeake Bay/Delaware Bay as we deal with the null issues.

And so you can kind of see where we don't have coverage, good portions of Alaska and then the Pacific Islands.

So, how do we plan on tackling some of these? So, really, it's obtaining some of the foundational data that's needed. So, water level data. We, you know, did about a seven‑year campaign on the west coast. There were some permitting issues that kind of delayed it a little bit, but it took us about seven years to get the data we needed to update this model.

We didn't get everything we wanted, but, you know, we were able to fill major data gaps. We were able to use funding to assist with the Great Lakes datum update, and then also some of the Sandy supplemental efforts that I talked about earlier.

One of the things is, really, supplemental efforts have really been huge help for VDatum. You can kind of see here we have Hurricane Harvey, Irma, and Maria, kind of preliminary estimates or preliminary analysis. We think this has really helped expedite these observations by approximately five to ten years and, in some instances, even more, depending on the sequencing.

And then we also have other supplementals that are supposed to be coming soon. These can really help out, especially in the Pamlico Sound where we really are trying to understand some of the non‑tidal regions in there. And there's also quite a few data gaps as we kind of go from Morehead City into the South Carolina region, especially in the intracoastal space, based on that TSS. And then there's definitely a lot of data that will help in the Panhandle, as well as the Big Bend of Florida.

And then kind of going to the other foundational data is the geodetics. And as NGS goes to the new datums, one of the ways you access this datum is through GNSS or GPS. So we really need to be able to get these observables on tidal benchmark so we can really understand the relationship or, you know, tie the geodetics to the tides. This is really a critical link for developing that topography of the sea surface.

One of the things is, as long as we get that data into OPUS Share as well, then we can go back, mine the data, reprocess it, and understand ‑‑ or, you know, reprocess it to any ellipsoid and then tie it into the water levels. And, you know, with the development of this and going to the gravimetric geoids, we really can start producing more physically meaningful fields.

You can see there's other countries. Whether it's United Kingdom, Canada, Australia, you know, they're really starting to look at developing separation surfaces, going from ellipsoid to water levels. Sometimes they squish all these into one grid and we're trying to divide these out so you have more capability to do different transformations.

One of the things is you'll hear is like, oh, we've got lots of water level observations. But you know, that can kind of be a little misleading. So this is what we're really trying to show here in this slide. So every data point here can be used for the hydrodynamic modeling, but not every data point can be used for the topography of the sea surface.

That's really where we've got to have those links between the geodetics and the tides. So you can see here actually, especially in the middle Puget Sound up towards Canada and some of the entrances, we do not have those links. So if there are large variations, then we kind of miss that. So that is really important.

So really where we're going is really trying to do this next generation TSS. So we will have, you know, the GNSS observables to understand those links nearshore. But then we can also really start adding in satellite altimetry products. So we can get into the repeat passes, and then once they turn the missions into geodetics, you can start picking up points that are really closer to shore, that deal with some of the contamination associated with the altimetry.

This is really what allowed us to, you know, go to southeast Alaska, is the gravity program that NGS has been flying, you know, is really feeding into a lot of these experimental geoids. Once we have this experimental geoid, you know, we can utilize it to go back, reprocess observables, make those links and then we're actually adding in, you know, that altimetry data to get really a more physically meaningful field than what we have now, due to kind of how the hybrid geoid breaks down offshore.

Other efforts. Right now we kind of have one uncertainty estimate for a regional model. This is kind of complicated. We have the uncertainties associated with the transformations, we have uncertainties associated with the establishment of the datums. But for Chesapeake, we might say ‑‑ we have a 12 centimeter, 12 centimeter uncertainty. But we know that is not a 12 centimeter uncertainty everywhere.

So really what we're trying to do is get rid of the spatially varying uncertainty. This is kind of our Phase 2. So what we're trying to do is understand that very nature of uncertainties. This is really important, you know, when we're collecting multibeam or collecting lidar, so we understand the uncertainties as we move around the regions.

But kind of one of the other really key things about this is, you know, it helps us pinpoint where we do have high uncertainties. Once we know where that is, then we can really target, you know, foundational data observations to bring those uncertainties down.

Future enhancements for the software. I mean we're always dealing with bug fixes, change requests. We're looking at implementing these, that SVU or spatially varying uncertainty. If you're ever playing around VDatum, there's lots of datum selections. You can ‑‑ it can be very confusing. So we're really trying to give directed assistance for datum selection, with kind of enhanced logic elevation, to really assist the user.

We've implemented ADCON5. If you're assuming VERTCON3, we'll be implementing it as well. We'll be implementing the new datums, the new tidal epoch. Then we're also looking at integrating some of the river gradient datums. But one of the things we kind of ask is that these are published and documented, so that we can really implement these correctly.

I'm going to just going over some of the HSRP recommendations. I mean you have more funding and especially as we go into Alaska and the Pacific Islands. I mean things just become much more expensive, really extending coverage. And you know, processing is kind of near and dear to my heart, because if we don't have these coverage going inland, it really makes it tough for shoreline extraction.

Especially as shorelines move, we want to be able to, you know, be able to transform data. Again, incorporating river gradient datums. Again, just making sure it's published and documented well. And then we get into concerns over the National Tidal Datum Epoch and the release of the new geodetic datums. This is the thing. We just, you know, need to ‑‑ it will take us about two or three years really to produce these new models and get that data fed into the program.

And so then I've kind of talked about extending into Alaska. I'll cover this a little bit more, and then really dealing with the whole five‑year modified epoch. Right now, we have an uncertainty envelope, and once those datums kind of come out of that envelope, that's when we will look at updating those in VDatum.

Performing more robust GNSS at high tide gages. This is something we are definitely working on. We're definitely working with CO‑OPS in their statement of works, and really being able to provide, you know, two observations, two benchmarks when they install it and then once they de‑install it. This kind of really helps with stability issues and understanding that you have uncertainties associated with the observables.

And then, you know, there's the whole thing about referencing different epochs at different times. But with a lot of this, we did, especially in southeast Alaska, try to get those observables as close to the epoch as we could. But again, you know, a lot of time we're dealing with data start fields, so any data is good data for us sometimes.

And just to kind of give you a kind of an overview of the production and maintenance schedule of VDatum, so right now I mean the Great Lakes, once the Great Lakes datum is updated we can implement that. Kind of east coast of Florida we've been doing several iterations lately. So we feel pretty good about that as well.

You know, the timing of this slide. These should have been included. So we did just finish New York, Long Island Sound, as well as Southeast Alaska. Going forward, we're really, you know, we've already started production of the new entire west coast model. We will be implementing the kind of Harvey area. So this is Texas, western Louisiana. We will be updating Puerto Rico/U.S. Virgin Islands, and it will also be updating the Chesapeake Bay/Delaware Bay, as we address some of those null issues.

Then currently we are starting a model run of the entire state of Alaska. We know this is probably not going to suffice for what we need for VDatum, but it at least gives us a notion of where we can say we have problems, we need new bathymetry, we need new water level gages, we need new geodetic observations.

And then moving from there, based on the Michael and Florence supplementals, as well as base funding, we hopefully will finish out the Gulf Coast, move into North Carolina/South Carolina, finish that. Then move on to the Gulf of Maine, and from there try to tackle the Pacific Islands.

This is the current prioritization, but we know things change and we will have to change prioritization as needed. So I thank you.

(Applause.)

CHAIR SAADE: Okay. Any additional questions for anyone on the panel?

(No response.)

RDML SMITH: So it turns out we had technical difficulties and missed a question online that we discovered after the comment period closed. So we don't need to necessarily respond to it now, but did want to get it read onto the record. So this comment is from Guy Noll. The comment reads "MARAD leadership is very interested in increasing the support for bulk shipping ports, particularly on the river ports, and increasing overall resiliency of the shipping system.

"What is being done to deconflict port and river navigation information to create a single authoritative source, particularly for smaller ports as a way to improve overall reliability?"

So I don't think Guy's on the line anymore, so it's probably not worth engaging in a discussion on it, but did want to get it into the record and I think it's an additional, additional food for thought for the integration of authoritative information. So thank you, Guy.

CHAIR SAADE: Last call for questions from the audience?

Jon.

MR. DASLER: Jon Dasler, David Evans and Associates. Actually, I've got a couple of questions for the panel there. I guess Rich, you know recently you know, the Columbia River pilots have been pushing to integrate some USGS gages, and they're going to bring that in through their portable pilot units. But I know CO‑OPS has been reluctant to bring in Corps of Engineers and USGS gages into the system.

But I know here on the Mississippi River here as well, it's sort of a problem. The gages for the Corps of Engineers, even though New Orleans District runs it, Rock Island District puts it on their site. So it's listed as station datum and the pilots see it as station datum, and then they've got to adjust to NAVD 88 and then do another addition to get to low water reference plane.

But it would be really helpful in the PORTS system to incorporate those, even if there was a disclaimer. So I don't know if there's been further discussion in starting to incorporate some additional gage data with disclaimers to bring into the PORTS system to help the pilots to that end.

MR. EDWING: So yes, there's been discussions and we've actually been working more so with the USGS and with the Corps. But it just ‑‑ it proves to be very challenging, because what we find is each district does thing differently even in USGS kind of the water science centers that operate their gage networks. They all do things differently.

Some apply offsets at the gage level, some apply offsets back, you know, once the data gets into their system. You know, it's just not as simple as bringing that data in and displaying it. There's a whole host of other things that have to work as well.

We actually have been working USGS in the east coast, where they have supplemental funding from Sandy. We worked with them and they put stations into our hardware specifications. But then we ran into this issue where some of the Water Science Centers were doing things differently, and we can't afford to build a different ingest mechanism for, you know, so many different types of stations.

So you're talking about a dream of mine, where somehow we can get all of these gages to some common level standard, where we can exchange interoperable data. But it's still more of a dream than a reality at this point.

MR. DASLER: And I guess a follow‑up questions to Juliana and Stephen White. I know that a lot of the issues in Louisiana here are the geoid models and the datums, and having CORS stations on, co‑located with tide stations I think would definitely be beneficial. If there's some pursuit to that, especially in areas where there's a lot of subsidence, or in Alaska where there's a lot of glacial rebound.

Having a direct tie to the geoid where you can bypass the geoid model, where you'd go directly to ellipsoid heights would be pretty beneficial. Then also relating to the GPS and benchmarks, I mean it would be great to have a program of GPS on tidal benchmarks, right. I mean some of the issues we see in VDatum, which is a great program. It's been a great move forward, but orthometric heights, sometimes it's older data that's in there that's created some distortions in the models and some other issues there as well, and if there's ‑‑

I guess the question is, is their work I guess towards that end and then supplying the Corps' tidal stations and observations on tidal benchmarks?

CHAIR SAADE: Hey, I'm going to need to interrupt and cut it off there, because we're into the next session already. Sorry.

MS. BLACKWELL: Talk to you during break, Jon, because we have a lot of those things that are underway, and yeah. A lot of things are already being done. The last thing I will say is to increase the number of CORS and to have continuously operating GNSS stations associated with water level stations requires additional resources.

CHAIR SAADE: Okay, thanks to the panel. I appreciate it, guys.

(Applause.)

CHAIR SAADE: So we're going to shift over to Julie taking the lead on the HRSP Working Group discussions and issue papers. All set?

VICE CHAIR THOMAS: Thanks, Ed. So I think we touched base about this this morning. We have four issue papers that we're discussing, and I think we're going to do the three tomorrow. You raised your hands. You are ‑‑ we'll say been assigned to a group. So we just want to make sure that we have the latest issue paper mailed out to everyone by tonight, so that you can actually read it for tomorrow afternoon, or I think it's actually right after lunch to discuss.

But today, we're going to ‑‑ so those are the three. Dave has taken his own initiative, great, to write an issue paper on mapping in the Arctic, and he's going to talk a little bit about why he thinks this is important. This paper, we know we're not going to finalize.

Well first of all, we have to decide if we're going to do it, if we're going to address it and then second of all, if so we will talk about it more in Hawaii because he's still waiting for additional data, and he'll talk a little bit about that. So Dave.

MEMBER MAUNE: Thank you.

VICE CHAIR THOMAS: I think about 15 minutes, Dave.

MEMBER MAUNE: Yes, 15 minutes is fine. All HSRP members are encouraged to find a topic that they hear when we go to these local sessions, to say here's something I'm interested in pursuing, to the point where you might be able to start working on issue papers. We'd like to get them approved by HSRP that we're going to pursue this topic, and that's what I'm proposing to do this afternoon.

This particular topic started last August in Juneau, where we had a series of discussions in which I talked to some guys and they said when NOAA talks about the blue economy and maritime commerce, they seem to be talking about the big guys. What about us little guys, and you may remember that ‑‑ does this work?

You may remember seeing this slide here. It was given by Mark Smith from Vitus Energy, and he talked about the difficulties in bringing fuel ashore. He says he's part of the blue economy too, but this is a different type of maritime commerce than what NOAA normally deals with.

So he grabbed me aside and I've been talking to him ever since, and I also went to the last mapping and surveying conference and found that they are working on coastal strategies. It seems to me as though that we share a lot of common interests here. So first of all, there are hundreds of coastal villages that have no roads to the mainland, and a few of them have airstrips. Most of them don't.

Most do not have docks. Many of them have very large tidal ranges of maybe 25 feet between high and low tide. They don't have tide predictions. They don't know when their high and low tide is. They need continuous topo‑bathy data for over the shore logistics such as tug barges, as shown here bringing in fuel to this village.

So Vitus operates the sounding skiffs to supply villages with fuel. I asked what a sounding skiff is, and he sent me these pictures. The sounding skiff is a little boat on the side that uses consumer depth sounders and a sounding stick, literally a pole with markers on it when they get in shallow water, to see how deep is the water here.

Then they radio instructions to the Captain of the barge there on how he comes into dock. And Mr. Smith's telling me how these guys need continuous topo‑bathy data up from the ocean up onto the land in order to operate much more efficiently. So let's see if I can get this. Oh. He also needs this for selected villages on rivers, also supplied by barges.

My friends in Alaska sent me this slide. It shows the major gaps in the inland stations. They're in Alaska. There's one tiny one there in Texas, but the major gaps are up in Alaska. Nathan Wardware, who's ‑‑ Wardwell, who's here today, was telling me that the distance between NWLON stations in Texas is like 100 miles, but in Alaska it's 1,300 miles.

So there are very large gaps in which these people do not have access to good information on when the high tides are going to be there or low tide. So that's one of the issues there, these major gaps.

And then I talked to Jon Dasler, who's here also today. I was glad to see both he and Nathan arrived, and Jon Dasler was telling me about how you could establish short term measurements on tide gages, observe data for 90 days. You don't need the full expensive end line station to serve this need. But at 90 days of observations and then you're able to get the offsets to these villages from where you have end line stations, to see what their tidal situation is there.

Okay, and then in addition to getting the tide data, we need to have hydrographic surveys, but only out to four meter depths for these guys at low tide. Whether we use the unmanned surface vessels shown here, or a ‑‑ or this Saildrone, I wasn't sure of until last night I talked to Saildrone people and found out that this is not very suitable for nearshore bathymetry. It's better for the deeper waters.

So we're looking for hydrographic data collected during high tide, to get as much of the water as possible, and then we're going to need topo‑bathy lidar collected during low tide. Here shows ‑‑ this picture on the left shows topo‑bathy lidar being collected. If we collect that at low tide and collect the multibeam sonar at high tide, you'll have two data sets that are able to be merged to get a continuous topo‑bathy surface.

The picture on the top right shows where topo‑bathy data sometimes has voids when the water is too murky, and so it's nice to have topo‑bathy data collected when the tide is as low as possible, sonar collected when the tide is as high as possible, and then you merge it such as is done with that California coaster imager in the bottom right.

Finally, Alaska tidal datum priorities. The state of Alaska came up with priorities in which they have the highest priority, high priority, mid‑priority, medium, low, extra low for over 150 villages, where they say they need to prioritize the collection of tidal data.

When I put together a draft issue paper, I first passed it by Rich Edwing, and I'm bothered. This microphone seems to be cutting out. Is it cutting out for you too? It's not cutting out for you? Okay. Rich gave me some comments and I sent it to other people for comments, and one of them was Jaci Overbeck in Alaska. She's with DNR and she's putting together some of the Alaska coastal map strategy.

I asked her to review a draft issue paper, and she got back to me with it with the quotes here "This type may be too small for you to read." She said I'm glad you're always Alaska in your sights. I'm too busy this week to edit the paper. I do have some suggestions." She talked about the Alaska coastal strategy and how some things are changing.

There's a gal named Marta there who's responsible for the Alaska strategy. They've been working on prioritization and she tells me that some things are changing. She said some of the end line gaps in the map that she had provided me are out of date, and that since CO‑OPS decided to reinstall at Port Moller, some of their priorities have changed.

So she asked for a month or two to get back to me, and but she agrees with the idea of getting continuous topo‑bathy data for these villages. I would ultimately recommend that we chose a couple of these villages to try this process of putting in, of putting in these short term observations of 90 days, put in tidal benchmarks, collecting bathy data and bathymetric data from sonar and topo‑bathy data from lidar to see how well it works, what does it cost, and if it works well on a couple of pilots projects, see how we can develop funding partnerships.

We already have the Alaska Mapping Executive Committee, which has been very successful in coming up with funding partnerships. So we'd like to build upon the success of the Mapping Executive Committee, to see how we might come up with funding partners to fund this kind of solution through those other villages in Alaska, if we can get a couple of the pilot projects to show that it works cost effectively.

So really my goal here today is to brief you guys on what I have in mind. Oh, this was Jaci's first hyperlink in which she talked about the ‑‑ that's the link to the coastal strategy that they have, and this is a link to some of the water level observation programs that they have in Alaska.

So one of my objectives here today was to find out do you guys, the members of the HSRP, do you agree with me pursuing this topic as an issue paper? Would we be able to take a vote on that? Can those who are in favor of it raise your hand, think that we should pursue?

(Show of hands.)

MEMBER MAUNE: Those opposed, think it's a waste of time?

(Show of hands.)

MEMBER MAUNE: Okay.

MEMBER KELLY: I wouldn't be as strong as a waste of time, but I think the cost‑benefit analysis, it might just be something to throw up to NOAA if they want to take a look at it. It would just seem, with the priority list and everything that we have, I don't know if this is far enough up the food chain that this is something we should chase. So just my comment though.

MEMBER MAUNE: No, that's fine. Okay, and I wanted to close with a story about lessons Dave Maune learned about tides in Alaska, because I was ‑‑ last year when Ed took us on a whale watching cruise in Juneau, I was impressed by the fact that they had a wheelchair‑accessible restroom on the boat.

My wife is handicapped in a wheelchair, and we have not had a vacation in ten years. When I came back and showed her pictures of the whales, she said "I'd like to see those whales." I said but you said you would never fly again, and she said well, if I can see those whales, I will fly again. So I booked a cruise to Alaska for my entire family of 11, my children and grandchildren and wife based on us being able to see whales in Juneau.

And the boat that we hired, it was not part of the Norwegian Bliss that we were booked with. I had a separate cruise and they emailed me back yes, we're prepared for your wife. We'll send a bus to pick you up with a wheelchair ramp and all that sort of thing.

So everything was fine until one week before the cruise. They sent me an email saying they could not accommodate a person in a wheelchair. That was the whole purpose of our cruise in the first place. I was stewing for five days, trying to find an alternative. They gave me numbers of other people that might have cruises to accommodate us, but none of them had any vacancies.

I even talked to Ed Page and he had invited us to sit on the lawn of his house and see whales from his house. I was at the point of where I was about to take him up on that offer, and finally I went back to the original company. I said I need more information. How is it that you could tell me for nine months that you're ready for my wife, and the last minute you say you can't.

She said well the problem is that the ramp that leads down to the dock. If you look at this picture, you will see some concrete posts there that are about 25 feet high. They hold floating docks that go up and down that post, and there is a roof over that ramp going down to that dock. When we were scheduled to return, that ramp was more than 45 degrees deep. They said we cannot handle a wheelchair getting back up that ramp that's steeper than 45 degrees.

But she said, then she said but if you can take the later one, you can arrive at 6:00 p.m., you can go down a steep dock and when you get back, the water will be higher and it won't be so steep. So problem solved in just two minutes once she explained it to me.

This is upon our return. So right now, it's not as steep as it was when we got there. So it's less than 45 degrees now, but you can see it's still fairly steep there. But we had our cruise and my whole family got to go, and we got to see those whales. You can see some of the whales here on the right, and I want to thank Ed Page because he made my family very happy by setting us up with this. Thank you all. That's my briefing.

(Applause.)

MEMBER MAUNE: I delayed the issue paper, but I think I just got your permission to proceed, and I'll try to have something for you by the time we get to Hawaii. Thank you.

MEMBER PAGE: If I can add one thing here Mr. Chair.

CHAIR SAADE: That's okay.

MEMBER PAGE: All right. First of all, I arranged for those whales to be out there for you, so you're welcome on that one. I think Ed Kelly brought up a point though. I mean we do have the Wild West in Alaska, and certainly I would be ‑‑ if anyone's going to be a champion of doing things in Alaska, it would be myself.

I think that we've got to find out we're going to have to prioritize or vet whatever ideas, because there's so many little communities that get one shipment a year, about 20,000 gallons, that's it or maybe 40,000 gallons. Right now, some of those tanks are falling up the river and then eroding. They're moving villages.

It's a very dynamic situation. So there's a tremendous cost involved, but there's so many areas that we have a lot of tankers going along coastal, offshore and then they bring these barges into like Bethel and other places, which are our pretty regular customers and higher risk and higher cost and greater ability to amortize the costs of doing good things.

So I think the idea of kind of inventorying and see what technologies are available, a less costly technology, I think the idea of 90 days or three month sensors makes a lot more sense than trying to maintain them all year long.

Even the Coast Guard didn't put aids to navigation. They said it's too expensive. You guys figure it out on your own. We're not putting aids to navigation in the rivers so ‑‑

MEMBER MAUNE: And I think that's why Alaska wants to prioritize it. What are the areas that are the highest priority for them getting something like this? It's not just for supplying these villages. They are doing studies on coastal erosion for some of these villages, to see where they need to go.

I think it's also going to help Mike Aslaksen in his shoreline mapping effort, because he needs tidal data to do the official shoreline for Alaska. So ‑‑

MEMBER PAGE: And my point is that, you know, the Coast Guard didn't build the AIS system for Alaska. We ended up doing it ourselves, because it wasn't worth it. It's too expensive. The Coast Guard doesn't have a Rescue 21 system in Alaska, northern Alaska because it's too expensive, they didn't do it.

A whole bunch of things that ‑‑ they don't put aids to navigation up there. So the point is the cost is so high and the return so low, which is what Ed pointed out. That's one of the challenges we have of building like that. It's real easy. I understand the investment that goes into New Orleans. When you look at the importance that has to the nation or the world, it's no question they get millions and millions of dollars to keep this port complex going.

So we have a harder time with amortizing costs. So there's a need, there's no question and I think it's worth exploring. I still don't know how we're going to get on it because the cost and the return dynamics. It's the Wild West. Only crazy people live in Alaska. Case closed.

VICE CHAIR THOMAS: All right, thank you Ed or Dave and Ed.

MEMBER PAGE: And Ed.

MEMBER HALL: I do have just a quick question. When it comes to what we have on our list and we've kind of agonized over it as we've looked to prioritize, what does that actually mean? Are we going to accept what the prioritization is? I don't want to say ‑‑ the reason I raised my hand is not because I thought that it was a waste of time. I don't want that assumption at all.

The reason I raised my hand is I thought there were issues that were bigger, and for the group at this time, for prioritization because the problem we have, and I know that Dave writes a darn good issue paper and especially since he understands BLUF, although I won't be able to write them for him anymore.

But it's still a lot of work for the committee, and so I think that when you propose it, you have to think about it in terms of the other things that we have talked that we want to do something about. Whether it's an issue paper or learn more about, there's a lot of time for a lot of other things.

So I just, I want to caution running ramshod, because it requires everybody to look at it and comment on it, and I know that Dave gets frustrated when people don't comment. So if you guys really want to take it on, take it on. If not, then let's be honest with Dave and ourselves about what, where our priorities are, because again there's not an unlimited supply of time to do HSRP work for a lot of us have, you know, regular day jobs.

So I just wanted to put that out there. That was the reason the prioritization matrix is there. If we want to reprioritize so that everybody's on the same page, that's certainly a wonderful idea at this meeting. We haven't done that in a while and I know that we need to update what we've got.

I think before we vote that it's a yea or nay going forward, I think we have to understand what is the expectation of the whole group on where we're going.

VICE CHAIR THOMAS: Thanks, Kim. Yeah, good comments. As far as the prioritization, I think my feeling is is that every meeting we look at it in our discussion, and we haven't really brought it up and looked at it again and talked about it. As far as Dave's paper, you know as far as I understand, I have no problem with him going ahead, getting the data from Jaci, looking at these tidal stations or what needs to be done in Alaska.

I think it is pertinent. I think when we were in Alaska we heard, you know, we had a whole panel on that and we heard about it, and it was pretty critical for a lot of things. Whether or not there's a cost‑benefit there, maybe not. But Dave has done ‑‑ my feeling. Okay, my feeling is is he has already done so much on this and put so much time into it, that we can ‑‑

We're going to look at it again in Hawaii and see what, you know, see what we want to do with it then. I think that our vote was to have him go ahead and get Jaci's data, and to go ahead and put it in there, and then we're going to, like Ed says, kind of look at it and kind of assess and see if we really can come up with a couple of areas of Hawaii where there is a cost‑benefit for it as an example. Anne?

MEMBER McINTYRE: Yeah. I guess I just would like to say that it doesn't necessarily have to be like a cost‑benefit analysis that comes out on the good side of things in order to take a look at something.

VICE CHAIR THOMAS: To make ‑‑

MEMBER McINTYRE: And it may just be that the recommendation is that either these small communities are important and we need to keep them in our mind, and that might be the end of it ‑‑

VICE CHAIR THOMAS: And that was kind of more I thought it was just going to be this statement to look at this is, you know, we've seen that this, there are lives up there. They are getting their fuel through difficult methods, and we'd like to just keep it in people's consciousness.

MEMBER McINTYRE: Exactly, yeah.

VICE CHAIR THOMAS: Ed.

MEMBER PAGE: I guess my only question is at this session, we're only looking at three papers, right?

VICE CHAIR THOMAS: Right.

MEMBER PAGE: Okay, and we don't have any in the future in mind. So in reality we have nothing to look at as far as an issue. So we're not competing with anything at the moment, we're looking at it, exploring whether we want to pursue it. If there's situation prioritization, you need a couple of things to prioritize. Again, we don't have anything to prioritize against right now.

We're just going to vet, determine if this is worth pursuing. So I don't see anything drawing from any other workload, because we have no other workload, no other papers we're looking at after these three that we're doing today. If there are others, can you look at your prioritization.

We'll also determine whether this is even ‑‑ this dog will hunt, whether it has some, you know, we think it's going to get some mileage out and it's worth pursuing. So I'm not too worried about looking at it. No one's saying we're going to jump ahead. We're going to look at it and give it some consideration I think at this point.

MEMBER MAUNE: I would say that we have the priority, HSRP priorities matrix, and the last time we looked at these priorities, Priority No. 1 was dealing with autonomous vessel surveying. Priority 2 was identifying quantified benefits of NOAA's Hydrographic Services for which the 3D Nation Study is part of it. Priority No. 3 was relative sea level rise and subsidence, for which we have an issue paper.

VICE CHAIR THOMAS: There's a lot of overlap.

MEMBER MAUNE: Priority No. 4 was private‑public partnerships, and I don't know that we're doing anything to pursue that one. But number four was tied with enhanced navigational assistance, do we need to have a follow‑on to the PORTS. Then we had a bunch of other topics that got two or less votes from the members.

These were all ones that got four to eight votes, and the others were two or less. So they're sort of low on the priority list. Now we can add to these as people come up with new topics.

You may come up with new topics this week after what you see here in New Orleans, and if you see a topic, particularly if you would like to pursue it by writing an issue paper on it, I think we can add it to this priorities matrix. Now whether or not we want to revote on these priorities again ‑‑

VICE CHAIR THOMAS: I think that every meeting we bring them up, discuss them. Maybe the last day is the time to do that, take an hour. I mean what I see is that tomorrow let's try to go through these issue papers, get them in pretty good shape, and then the last discussion we'll have on Thursday to review the priority list and really kind of set our interests that we might talk about over in Hawaii and at ‑‑

MEMBER KELLY: I see these issue papers as kind of a precious and a limited commodity. I'm even concerned if maybe putting three of them might be to dilute the value of them. I think they have to be well crafted and done, we do have an outstanding list of priorities which we ought to review.

And maybe what Dave is saying, maybe we'll take a look and the group will say that's important. Maybe we'll say it belongs here. But I'm just afraid that anybody can come to the meeting, throw something on the wall and everybody goes ooh cool, let's do it and we run off in that direction.

So I think we have to be a little more concentrated. We don't have a lot of time that we can really sit and discuss these things, and I think we, you know, I'd rather see the effort and time being put into reevaluating the priorities list, to kind of decide what we do next. Because we have three of them pretty much almost ready to go two, at least two of which we'll probably be able to launch. But you know, I'm just concerned about how we pick up new topics.

VICE CHAIR THOMAS: Okay. Anybody else? Anne.

MEMBER McINTYRE: Just this is just a question, and I don't know if it's something that we would want to consider doing. But you know, we write the issue papers. We get the response back from the issue papers, but we don't really track kind of what the outcomes is like of our recommendations, and whether or not some type of system like that might make sense in order to judge our effectiveness.

VICE CHAIR THOMAS: So Anne, you missed the last meeting, and on the prioritization list there are ones that do say tracking. They are ones that there has been an issue or had been recommended in the Administrator's letter. So we tried to put them in place last time a little bit and we are going to talk about that on Thursday.

No, I think it's a really good point, like how do we track and kind of have some type of metrics going forward. Not really metrics but, you know, progress on an issue. So I think that it is worth looking at this prioritization list, because there are some on there that say "tracking" or "track," and that's exactly what that was supposed to address. I think we could flesh it out more. Any other comments? Ann.

MEMBER KINNER: More a question. We've got a draft of the strategic plan as well. Where does that fit in our discussions?

VICE CHAIR THOMAS: It will come up. We have some time to address that too. Lynn, Ed?

CHAIR SAADE: I don't have anything else right now.

VICE CHAIR THOMAS: Okay. I mean ‑‑

CHAIR SAADE: So we can continue on with the discussion about the papers, or we can move right into the recap of today. If you're ready for the recap, let's do that, okay? So I'll volunteer to start. So just I'll just throw out there. I thought it was a really good day. I thought the energy ‑‑ as I expressed before, I thought the energy in the room, particularly with the guests that we had both that were presenting and both that were observing, was really, really great.

Sean, thanks a lot. You worked hard today and it was obvious that you had a lot of preparation, and that it came through that it was all extremely well thought out. The panel members were really informative, educational. All of it was really good. Okay.

So and I'll just throw out a couple of the quotes real quick, that as I was mentioning, one of the captains was really singing the praises of multibeam echosounders, which I think is great. I think they're a fantastic tool.

The whole comment about we want to get the most draft possible I felt was a really powerful statement, and your story about everybody waiting around to watch the air gap get punctured and have a hit and being extremely disappointed that they didn't see any action. That's all incredibly meaningful.

One of the other captains was talking about the very dynamic way that the precision nav is changing for the better, and so rapidly. I thought that was really powerful and really meaningful to NOAA in particular, because that's the folks that are driving all of those changes.

There's some other things, but I'll leave it there and let everybody else jump in. Anne.

MEMBER McINTYRE: I thought it was great that you brought the National Weather Service in and that we're integrating that together, particularly the river level forecasting and all that stuff. It's really good to see that together. Then I just wanted to make a general comment, because Admiral Smith I know you're not going to be here for the rest of the meeting.

Now that I've had an opportunity to be on the Panel for a while, I've been very impressed with how in your leadership you're integrating the suggestions that are coming through this committee. I see the relationships developing with the Army Corps of Engineers. I see the focus on the PORTS systems and everything like that, and I just wanted to say thank you.

(Applause.)

RDML SMITH: As you all know, this is all Lynne.

CHAIR SAADE: Kim.

MEMBER HALL: So I learned a lot more about soybean transportation than I ever thought I would, and that's not ‑‑ I'm not mad about that. It's kind of interesting, and I actually looked at some of their press releases and information to kind of understand the problem.

I think the key and I think that this is where having the meeting down here is really important. It's not just about hurricanes. It's about everything else, and efficiency, efficiency, efficiency. So all the things that NOAA does, Weather Service and Ocean Service, lead to efficient, maximizing efficiencies down here.

I think that we got a smattering of that today, and I think it's clear that NOAA products and services are necessary, especially for such an important viaduct through our country, of getting goods and products out and in. So I just ‑‑ I know I've become accustomed to my Amazon Prime, although I am shocked by being here in the Port of Southern Louisiana, and I don't get one day shipping or next day.

I've got to wait two to three days. I don't like that, now that I'm down here. But I just, I think that yeah, it all comes from Georgia and Alabama. You've got to fight Mobile a little bit I think. But yes, certainly the infrastructure investment and then the products and services that come from NOAA, that was really key today. Thanks.

MEMBER KINNER: This comes out of the Houston meeting with the National Harbor Safety Committee summit, because I heard the same words today, resiliency and relationships, and I'm hearing about Army Corps and NOAA and how they're beginning to integrate or maybe getting more recognition for the integration that they're doing.

I asked Galen earlier about private companies who might also be integrated into this providing data, and the key things I pulled out of Houston, I wrote these down because they really struck me, because they're relevant certainly here in Louisiana, and this is part of what I heard today.

Resiliency and relationships, who do you call at three o'clock in the morning, what's his first name? Have you trained and exercised together and how does he take his coffee? Because that's the kind of integration of resources you have to have, so that when the thing happens, whatever it is, it's not a matter of oh my God, now what do I do? It's a matter of okay, start here, call this guy, get that done.

It's great to see that, and I'd love to hear more private enterprise integration into this whole thing. The government can do a lot of it but it can't do all of it, and frankly sometimes it shouldn't be doing it. There should be more private sector interaction. I'm thinking of that, particularly in terms of the Space Program and what we see going on right now.

So it would be neat to see more of that kind of outreach. I don't know how to do it, but to ‑‑ more outreach to private sources for information, for resources, for tools. I have a friend in San Diego that I just realized is working with Scripps, a company called Ocean Air, yeah.

They do basically autonomous, whatever you want to call them. They're surface and they're underwater. They just fold the wing and go down. Didn't know they were already integrated, and it's that kind of thing. There are other companies out there. You talked about Saildrone. Getting those companies to in some way input what they're learning about the resources would go a long way I think toward expanding what the government agencies can do. I've certainly seen it going up to space.

CHAIR SAADE: Thanks, Ann. Ed.

MEMBER KELLY: I learned a little bit more, quite a bit more about the uniquely challenging physicality that's here in this river system, you know, and the ‑‑ I was always aware of it, but that coupled with the big economic impact really means that we need to target some efforts to solve these types of problems. This is a good place as a test bed, any improvements that can be made here that can then be file/copy extended elsewhere is a benefit.

You know you can learn a lot from trying to do it in a tough environment, and to echo what Ann had said our partnerships. I think, you know, I know we've got several sessions still to come to talk about partnerships and integration with other units. But you know, better, faster, cheaper, you know.

There's a lot to be said for that and I think, you know, I'd like to see how we can make some more discussion on already‑established partners, people like through the IOOS networks and things like this, and how we can better maximize some of their efforts and give them direction.

MEMBER DUFFY: So Admiral Smith, I know you love my stories. I'm going to leave you with one, since you'll miss us tomorrow. But Hurricane Barry's coming and the river's just below 17 feet, and projections were for it to go 20 feet. I had a meeting of my children, and I told them if we're going to 20 feet, they're all evacuating.

They looked at me and said are you serious? I said oh yes, I'm dead serious. You will evacuate. So that's partly because I've seen sand boils up and down the levee system and I know where their stresses are, and that it was a huge concern. Now the next morning, I woke up very early, had a pot of coffee and looked at river forecasting and some other, Dr. Van Cooten's efforts and I pulled out my Swiss Army knife and went through all the information.

When they woke up for breakfast, they all ‑‑ are we evacuating? I said no, it's not going to 20 feet. They all went to the websites I showed them. They said it says it's going to 20 feet still. I said wait for the ten o'clock update. The ten o'clock update came out and it showed 19 feet. They all looked at me like wow.

A few hours later, the next update, it came down to 17 feet, and I think we ended up like 16.7. But you know, as we look at being in the area, you know, first day in New Orleans in a while, the stresses and the risks that we deal with are huge. Sometimes we get lucky, sometimes we're good, sometimes we take a lot of information.

But the system is being challenged in a lot of ways, and it really does ‑‑ I mean there are things that scare me. High river and hurricanes, never happened before. So a lot of the challenges and you'll hear from more people and people from Louisiana will talk passionately about what they do for a living and, you know, we're so tied to that river that it's very important.

But we did not evacuate. I was right, and it was good to be able to show the kids I knew what I was talking about.

CHAIR SAADE: Gary.

MEMBER THOMPSON: So yes. You brought up during your presentation about the importance of datums, and I think it was very evident today. So it makes it, and Juliana talked about the transition to 2022. Datums are ‑‑ we all need to be aware that they're very important, and especially when you have these localized datums, that we need to know that information to prevent an accident.

And then I liked Rich's idea of coming up with a, kind of a RINEX for tidal datum data, so that we would share data with you more efficiently.

MEMBER PAGE: I think one thing I got out of my HSRP experience, this is my third meeting now I guess, is this blue economy, which Admiral Gallaudet brought up. But I'm really more and more aware, especially in New Orleans, these phenomenal stories I'm hearing about the impact on such a large region.

And but also I mean you hear all the agencies involved and the private industry, I do think there's incredible public‑private partnerships already underway. I'm really impressed how NOAA fits into that, the National Weather Service and NOAA itself, and that agencies are really not stovepiping. I'm hearing the discussion you had with the Corps of Engineers with staggering with surveys.

I mean this is ‑‑ this is good government, you know, where we kind of let's divide and conquer or whatever, working together and complimenting, getting more out of our ‑‑ value out of our surveys and what have you. So I keep on being more and more impressed with NOAA's role in this.

At the end of the day, it's a lot of information brokering, and I oftentimes think of real-time and then I realize a lot of forecasting of river heights so far out is key, so I get a better appreciation of that.

So but I leave ‑‑ every time I go to a meeting, I get more impressed with NOAA and the service you provide and how integral you are to supporting and facilitating this blue economy that's so valuable to our nation.

So kudos to all of NOAA's staff and if I have any negative comments to say is that every time I come to a meeting, I feel like I'm a little dumber each time, because I realize I didn't know all this stuff beforehand so ‑‑ I should have, but I'm still learning. I'm a kid, just a kid.

CHAIR SAADE: Deanne.

MEMBER HARGRAVE: So I really liked your comment, and in fact that was very similar to what I was going to say. Just seeing the clear evidence of partnership between government agencies, as well as government and private partnerships. There's a lot of that going on, and I sit here representing private industry, working for Shell, where we have obviously a global footprint, a lot of needs.

And for the most part we fulfill those needs internally by mapping the sea floor where we need that information when we need it. I sit here thinking about well how can we give some of that back and use, because there's so much duplication in what we do and wouldn't it be great if we could share some of that.

But of course that comes with a lot of challenges. So it's something that I sit here and think about a lot as we're having these different conversations. But today I was blown away by learning more about the Mississippi River and the importance that it has to the U.S. economy, the world economy. It's quite massive and quite impressive.

CHAIR SAADE: Julie.

VICE CHAIR THOMAS: I noted just a few things thinking about the letter to the Administrator. These are just ideas that I kind of jotted down. One this idea ‑‑ so these are things that we might include in the letter. You can take, add, whatever. This idea of a team sport. Several people have talked about the partnerships and how they're only getting stronger, not only the federal partnerships but public‑private partnership.

And several people have mentioned VDatum, expanding these CORS stations, the robust GNSS and tidal datums. Gallaudet made the two comments. He's assessing the state of marine transportation and advancing technology, and continuing efforts for integration of products.

I think that those two ideas have really come out a lot today as we've listened to the panels. I thought that was an interesting statement, very obvious, about the multibeam surveys and I'm sure that there's a long history, and this came from Captain Bopp, the needs for surveying the sediment and then also the object detection.

Because in my mind, I kind of have these overlapping a lot, but I realize now that there are these distinctions, and I think the challenges of multibeam and not all multibeam are equivalent. But I'm not sure that's something that wouldn't be good to bring up. And then obviously in our last letter to the Administrator, we talked about fog sensors, the visibility sensors and that still seems an issue. So maybe we should mention this continuing issue of visibility. Okay, that's it.

CHAIR SAADE: Good. Anyone else? I'll just add, I know it's only the first day, but I think we continue to provide great evidence for the importance of moving this meeting around the country, and a tremendous amount of turnout from the local, from the locals wherever we are.

Folks really do take this opportunity seriously, to be able to give feedback to NOAA, to you all. It's obvious the seriousness with which they take it and the importance that they put upon it, and the really excellent information that we're getting back.

So keep moving us around. I was just thinking about I was in New York a couple of weeks ago and talking to some people that were sharing a shuttle bus with me, who are getting ready to board an airplane to fly direct from New York City to Hawaii, coach, and realizing it was an eight hour flight with no food, which was a stunner.

But then I mean how many countries in the world can you fly for eight hours and nine hours and still be in the same country. There can't be very many of them. So it's a big footprint. I think NOAA's to be congratulated that we can have a meeting in Juneau and then all the way down here to the Gulf Coast and everything in between, and really adapt to what the new, to the new concerns are and what the new focus is. So thanks.

MEMBER CHOPRA: Can I say something? Just one comment. I'm sorry I was missing for about an hour on a conference call. But there was one comment made that there were three ports which were planned for the multibeam surveys. It was New York, it was LA/LB and it was the Mississippi River. These are three where it's been going on and planned at this time by NOAA.

I was going to say maybe you want to look at three more ports especially in Texas, the Houston/Galveston waterway, Corpus Christi and Port Arthur. These ports are under massive expansion, and already last month's figures came out at 3.22 million barrels per day export going out from those ports, and that's expected to go up very significantly in that 20 percent plus range on an annual basis, because 21 target is 6.1 million barrels.

And then chemicals is an addition. So of course these three ports are important what have been identified. But maybe you want to look at more resources or better managed. These are the three ports which require attention, and they have exactly the same problems like we identified in the ship channel, where we are scraping the bottom and trying to load the ships more, and every foot has a huge impact on the economic aspect of it. Thank you.

RDML SMITH: Yeah. So well thank you all for participating, a great meeting. I think this met my expectations of getting some awareness of the river as a unique and the ports of Louisiana as a really unique complex. I think the one thing that I wanted to add that really struck me again today was that, and this really comes out of the soybean presentation, was that the issues of efficiency in our ports is a national competitiveness issue, that this is ‑‑ this is, you know, this is ‑‑ this is really important overall to our economy.

So the difference between American soybeans being, you know, competitive on the world market or not is not just a couple of inches on, you know, of draft. The impact is so much bigger than that, and Anuj's example of, you know, in the ports of Texas, where we can ‑‑ where we can produce and bring to the port more oil than we can get out of the port.

And that is, you know, that is essentially a limitation on the efficiency of the ports. So anything we can do. If we can do five percent efficiency gains somehow through our services in dredging and the sort of navigation services side of things, that's a huge impact to not only those particular shipments but to American competitiveness overall.

So anyway, thank you all. I'm sorry I'm not going to be here for the rest of the meeting. There's a whole bunch of great stuff planned, and in particular I'm sad to be missing the hospitality of our host, Mr. Duffy. But we'll have to catch that another time.

VICE CHAIR THOMAS: We'll eat double for you, okay.

RDML SMITH: Good, thank you.

CHAIR SAADE: Okay, Lynne. So we need to hand it over to the next event?

MS. MERSFELDER‑LEWIS: Yeah, hurry up.

CHAIR SAADE: Okay. So let me gavel this closed. Okay. We're all done for the day, but don't go anywhere.

(Whereupon, the above‑entitled matter went off the record at 5:30 p.m.)