

## Closed Captions NOAA HSRP virtual public meeting, Mar 3, 2021

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Hello, everyone. My name is Ed Saade. Welcome to our latest version of the virtual HSRP public meeting. Over the next two days, we will be having a lot of discussions on a lot of topics and introducing some new ideas and members. To get started for today, I would like to go ahead and introduce the members of the HSRP and let them introduce themselves and their organization and their geographic location. This will include member directors and know what, NOAA leadership and everyone on our list. And we will go in alphabetical order and we will start off with Qassim.

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Good afternoon and good morning, everyone. I am vice president and chief scientist and also a joint officer with Penn State and the University of Maryland Baltimore campus and I report to the office in Arlington Virginia but residing in just north of DC and Maryland and in Frederick County. Thank you.

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Next up is Captain Anuj Chopra.

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Just for everybody's benefit as many of you know there is various power issues and various cities across the nation so there may be a little bit of a hiccup every now and then when we try and introduce somebody and that is probably what is going on with him and next up we will come back to him and next up is Sean Duffy.

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It looks like he is not here at the moment. I am not sure if we lost him for a second.

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I don't have an excuse for him but we were figure one out and are next one up is Dr. Nicole Elko.

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Good afternoon from falling beach, North Carolina. I am the science director of the American shore and beach preservation Association and I hold some other hats at the local and state level where I help coastal communities manage coastal resilience.

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Thank you conical. Next up is Mr. Lindsay Gee.

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Good afternoon, everyone. I am the speaker from New Hampshire right now and it was cold and windy yesterday and I think it is now okay and I managed the science and mapping operations and exploration trust and we operate the exploration vessel Nautilus were we are in the middle of preparing and we will be exploring off the U.S. West Coast and out into Hawaii waters so certainly I can't get out of it HSRP meeting but I will get out there with work. Thank you.

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Thank you. Next is Deanne Hargrave with one E.

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Good afternoon and good evening everyone. I am the geoscience manager for Atlantic Shores offshore wind and it is an exciting project off of the coast of New Jersey. I currently reside in Houston so I have been in the deep freeze but I should be relocating to Boston here shortly. Thank you.

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Thank you. And in the first of many Ed is Ed Kelly.

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I can see Ed but he can't hear us.

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I think I am okay now.

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There you go.

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My name is Ed Kelly, the executive director of the Maritime Association of the Port of New York and New Jersey and obvious and located up in the port of New York and New Jersey.

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[Laughter] thank you, Ed. Next is Captain Ann Kinner, but I don't see her in the video. So maybe we will come back to her. So next up is Dr. David Maune. Go ahead.

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I am chief scientist for geospatial and technology services at Dewberry engineers headquartered in Fairfax, Virginia and I am the author of a leading textbook on elevation models from radar, lidar and sonar. Thank you.

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I will apologize ahead of time and every now and then the Marine air base near me decides to do a lot of maneuvers above my house so there will be some background noise and up next to Captain Anne McIntyre.

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I was a Maritime pilot on the Columbia River for 23 years. So happy to be here on the meeting today.

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Thank you. Really quickly I will get off Captain Ed page.

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I am taking a risk here and I am right in the path of an avalanche so if I run out suddenly is because I jumped into the water instead of 14 feet of snow on top of me but I will take my chances by being at this meeting today but we evacuated some homes today so anyway I am Maritime operations in Alaska for 32 years and often prior Coast Guard officer as well but I get the best place to live so sorry despite the avalanches I am in the best place. That is all I have to say.

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Thank you. Next up is Captain Salvatore Rassello.

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I think you are muted.

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Good afternoon from Miami. My name is Sal and I am with the carnival cruise lines as director of nautical operations and have been a cruise ship captain for the past 20 years and a beautiful day in Miami and I hope we will have a good meeting today. Thank you.

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Great to see you. Next up is the cochair of the event, Julie Thomas.

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Good morning, from San Diego. Wait just a second. Sorry. That was the echo. So I was program director and PI for a program at Scripps institution of oceanography and one of the regions in Southern California. Thank you.

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And then Gary Thompson please.

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Good afternoon. I am Gary Thompson from Raleigh, North Carolina and the deputy risk management chief and the chief of the North Carolina geodetic survey.

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Next up I would like to have the four nonvoting members of the HSRP and leadership.

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Would you like to go back?

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Sorry. I am juggling a paper chart order for Sally ride and I was trying to tie some loose ends together so they could understand what I could get for them. So I am owner of seabreeze books and charts in San Diego and have been selling navigation charts for 26 years now, long enough. And speaking on behalf of the smaller boat fleet primarily. I am Ann Kinner.

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Thank you. I don't see anybody else that we missed. Okay. Moving on I would like to have the four nonvoting members do introductions in alphabetical order and that will be Julianna Blackwell, Richard Brennan, and including Doctor Larry Mayer and kept the captain Andy Armstrong who service codirectors and Larry serves as the director for the center of coastal ocean mapping at the University of New Hampshire. Our rear Admiral Shepard Smith is the outgoing director and I would also like to acknowledge the two alternate DSOs including our new deputy high driver for and our programmer Lynne Lewis and can you each provide a name and job title and location we will start with Andy Armstrong. Thank you. Thank you and as the chairman said I am Andy Armstrong the codirector at the center and based on the campus of the University of New Hampshire in Durham, New Hampshire. Thank you.

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And Julianne Blackwell.

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I am the director of the national geodetic survey based out of Silver Spring, Maryland, and working from home. Thank you.

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Next up is Ben Friedman.

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You may be muted.

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I apologize. I was having some issues there. Good afternoon, everyone. I am Ben Friedman, typically the deputy undersecretary for operations for NOAA but currently the acting administrator.

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Thank you for joining us.

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Next up is Nicole.

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I name is Nicole LeBoeuf and acting assistant administrator and it is good to see everyone.

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Nice to see you.

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Next up will be rear Admiral select Richard Brennan.

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Good afternoon. Currently captain Richard Brennan and hopefully a promotion on that shortly to rear Admiral and I will be following Admiral Shepard Smith as the director of office coast survey and looking forward to be a designated federal official for the HSRP in the coming years.

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Congratulations. Next up is Richard Ed wing.

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Center for operational services and I am joining from Maryland.

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Next up is Doctor Larry Mayer.

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Thank you, Ed. As I mentioned, I am Larry Mayer, the director of the center for coastal and ocean mapping at the University of New Hampshire and a professor and also the codirector of the NOAA joint hydrographic center and I'm speaking to you from Lee, New Hampshire and only hazardous trees falling down and not avalanches.

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Thank you. And then finally rear Admiral Shepard Smith.

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He is not present today. And Admiral select Brennan is here.

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So Shep is not available right now?

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That is correct.

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Can you help me out, Lynne ? Should Rick read it all?

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Shep will be right with us.

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I will do a little song and dance while we wait. My name is Ed Saade. I'm President and group director for the Americas region and the current chairman of the HSRP and I say current because later on in assessing tomorrow we will be handing the gavel over to

Julie Thomas who will be the incoming chair and Sean will definitely be coming in as the cochair. So a lot of good things happening here and I do see that Shep is on the line so I don't have to keep talking. Are you ready to take it?

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Thank you. I was stuck on the other side of the control wall and I didn't have speaking privileges. Happy to be here and thank you and the, yes I am the outgoing director of the office of coast survey and the outgoing designated federal official for the HSRP. Thank you, Ed.

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I will hand it over to you if you do have your notes in front of you if you are ready to do that.

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Yes. So I am here, as I said the outgoing designated federal official and captain Richard Brennan has been selected to succeed me both in my role as the director of coast survey and as the HSRP designated official. I am very much looking forward to his leadership to succeed me in the coming years. He has been a really important ally of mine for my entire career and many of the things that we have accomplished over the course of the last few years have been either directly led by Rick or inspired by as a really key advisor. And so I am very pleased to be turning it over to him. I would also like to welcome you the chairman and the cochair, Julie Thomas and the acting NOAA administrator, Ben Friedman and the acting administrator, Nicole LeBoeuf and Julianna Blackwill and Richard Edwin and the codirector Larry Mayer and captain Andy Armstrong and Steve the HRS members and esteemed stakeholders, partners and colleagues, thank you for joining us for a condensed version of our HSRP, which we will have two half days of virtual public meetings. So I will be turning this over to Captain Brennan to chair the remainder of the meeting along with Ed Saade. Ed, it has been a pleasure to serve with you and thank you for your time serving as the chair. I would also like to welcome a very warm welcome to Julie Thomas will become the new HS RP chair at the end of this meeting and last congratulations to Sean Duffy who takes over as the cochair of HSRP at the end of the meeting. I would like to maybe if I can have just a moment to thank you all for what I think has been an extraordinary Ron of the HSRP in the last few years, run. The way you have all approached advising NOAA has been really impressive and has really inspired all of us who were involved in this to keep raising the bar and raising the state's on the HSRP and it has been very well attended and the depth of engagement of the panel members as well as the public have really been helpful and instrumental in helping to advise and to continue to modernize the hydrographic services of NOAA. It has really been a real treat as part of my assignment as the director of coast survey to have the honor to be the designated federal official. And so with that I would like to turn it over to Captain Brennan to lead the rest of the meeting. I will be here in the background, but Rick will be running the meeting. Thank you all, and I really look forward to a really great meeting. Over to you, Rick.

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Thank you, Admiral and I would like to thank you for your leadership over the past four years with us and congratulate you on your retirement. It has been a pleasure working with you these past 26 or 27 years now, so Thank you. Moving us forward on our agenda today and I intend to make this a convenient and productive thing as possible

and to fulfill the HSRP requirements for two public meetings a year. I know leadership and I both believe that in person meetings for the HSRP and they are the right course and provide the most useful and formal and informal dialogue and productivity and convey the most benefits to NOAA. That set our next meeting will necessarily still need to be virtual and I look forward to that meeting sometime in late August or early September and we are still ironing out that date right now. I am hopeful we can return to an in person format in February 2022 and hopefully that we will be able to finally have that in our long schedule Hawaii venue so please join us for those meetings coming up both virtually and in person. I would like to also recognize now our NOAA staff and colleagues and stakeholders and some of her HSRP members who are in Texas and elsewhere in the south with experience prolonged electrical blackouts and issues with potable water and piping issues. My thoughts are with you in this time of extreme cold particularly in Southland where I grew up. I do understand intimately how that can affect an area that is not routinely ready for those type of temperatures. Well some of us are here with almost a year of telework, our thoughts are worth the first responders and the incredible toll the world has endured during this time of COVID. My thanks especially to those who are keeping us safe in healthcare and teaching and the parents of children everywhere. So for any of you who have children at home and are trying to juggle both jobs and parenting at the same time, which speaks to a large part of our NOAA workforce as well as our contractors. These impacts are readily felt throughout the hydrographic and navigation services community where severe health and economic impacts for our Maritime partners and elsewhere in the rural economy have been significant. My thoughts are also with you if you have lost somebody during this time of COVID. And I am incredibly sorry for your loss and I hope you're able to find some solace and move forward. And more positive note, I would like to talk about our partnerships and in collaboration and a topic we frequently discuss here at the HSRP. First and would like to recognize our colleagues at the U.S. committee on the Marine transportation system and those partners across the government to support the system and congratulate the CMTS on celebrating their 15 year anniversary. I especially would like to recognize Helen who is the executive director of the CMTS and also a past HSRP member herself and Heather Gilbert who is from NOS and who sits within the CMTS and serves as the NOAA Senior advisor and Deputy Director. Their work serves as an exemplary interagency partnership and collaboration that helps keep the MTS moving forward. CMTS has been a huge proponent of the work of the HSRP. And so we welcome them here today. I look forward to another 15 years of collaboration with the CMTS and positive work from them on that. It is also important to note that we are witnessing the 30 year anniversary of the first physical oceanographic system known as port in Tampa and a special shout out to the University of South Florida and co-ops for such a long and successful joint partnership and for Richard Edwing who grew that program along with Chris and others in co-ops and now serves over 40 ports in the U.S. and you'll be hearing from Steve from USF and Richard Edwing from co-ops this afternoon on their project. So we are very excited about that. Just as a side note and for me personally I would like to recognize some of the side benefits and utility that may or may not be directly visible and in particular Sean Duffy and he is creating a series of meetings called making sense of sun source and that meeting will do a brilliant job of pulling together various federal, disparate federal agencies, pilots and various state

orders from the Mississippi River to bring additional value from our federal products and services to the local maritime community there. I think we have seen some really amazing progress and because of Sean's leadership on that. I would really like to think Sean particularly for seeing the needs as expressed here in multiple meetings at the HSRP particularly the meeting we had several meetings ago in New Orleans where these issues came to light and taking charge in working to do something about that. Thank you very much for that, Shawn. So talking about goals and outputs and outcomes for our meeting. The goal of the meeting is to discuss the unvarnished current state of the portfolio of our various navigation service products and you will hear updates on NOS and the data backbone especially as it applies to resilience and climate change at this meeting and HSRP members, NOAA and speakers will have a dialogue on these and other topics to talk about their short and longer-term interests and possible issue papers and their thoughts and recommendations for the NOAA administrator. At the last HSRP public meeting in September 2020, the members provided NOAA with many insightful comments in a letter to the NOAA administrator along with two hefty 20 to 30 page papers with a myriad of recommendations on the Alaska coastal mapping strategy and I particularly to that and would like to recognize Doctor David Mohny who wrote and vetted a lot of the HSRP strategy comments and he also attended and presented the key findings at the coastal mapping summit in December and I want to call out members Lindsay G and Ed and Julie Thomas and all of those who commented on the strategy and I think the 36 stakeholders who divided, provided comments to the HSRP on that document in the strategies to the 15 members and the 36 commoners on behalf of NOAA how we value your voice and efforts and your active engagement so thank you on that. Reminder about our two newest members, Doctor Nicole Elco and Qassim. This is their third meeting and they are up to speed and have been actively engaged and we will make sure to help you with all of the acronyms that we inadvertently seem to spew out of our mouths without thinking and try to fill that gap as necessary along with the concepts and topics that may not be familiar and I think both of you are a quick read on that and we will move forward there. I appreciate Nicole cochairing the session on data and resilience this afternoon and this links nicely with her ongoing interests and expertise regarding coastal resilience and I look forward to that session. And thanks to Qassim as well as the speakers and members who pushed us to lean in on the discussion on fog and limited visibility for navigation imports and enclosed waterways at our last meeting and I appreciate hearing from you and the HSRP technology working group working on this topic going forward. Is a brief reminder to the HSRP members when you serve on this during the two public meetings a year you serve as a NOAA employee interpersonal capacity as a subject matter expert and you don't represent any group or industry Association, your own employer or other entities and please remember to take off your regular work at and replace it with your NOAA hat as you provide questions, comments and guidance to NOAA and the administrators so thank you for your service to strengthening the hydrographic and navigation services portfolio. And I and NOAA appreciate your vision and help with this. a quick note about public comments and to stakeholders and staff and all participants joining the webinar today. I do encourage your public comment and if you have a public comment please type it into the questions panel in the go to webinar it will be read into the public record or scare cashiered on the screen of time allows and

that meeting comments will become part of the formal record and be included in the official meeting minutes. For any comments that are received in advance they will also be shared in advance and highlighted at the meeting with the slide read into the public record as well as become part of the official meeting minutes. Just a word in my continuing service announcements for this afternoon. This is about privacy policy and privacy act. We are complying with the provisions of the privacy act as well as the requirements for the federal advisory committee act. This webinar is being recorded and transcribed and retained and disseminated to the HSRP website and accessible to the public. This includes the public comments and the list of participants which are listed in the meeting record and become part of the minutes and the meeting speakers have provided advanced individual written permission to use their photo and video and voice images. Due to privacy form requirements, participants will not be able to provide live public comments and we can provide substantial of written public comments and these are definitely encouraged. Written comments will be captured and written in in the meaning public records and minutes with attribution to the public comment or. You can decline having your name used by abstaining from public comments. Participants names may be displayed during the webinar if you want to abstain from having your name displayed please call in by phone or refrain from providing public comments. And moving forward. Normally we do introductions to the NOAA staff at our meetings due to the condensed nature of our meetings today and the virtual content of those, we will include them in the summary report for the meetings and suffice it to say they have been instrumental in making this meeting a success and NOS and NOAA has a variety of staff who provide subject matter expertise and program and support and on this webinar there are approximately 20 no staff who follow the work of HSRP and can assist you throughout the year. This is a shout out to all of them and thank you to them for their support in getting this meeting brought together and executed. I particularly want to thank the staff for helping with the webinar and that would include Jill and Galen, Amanda Phelps, Jenny and Lynne. I would like to thank Tricia Huber who is moving to a new job and we will miss your help at the NOAA level on this so thank you and thank you as well to the many others who provide ongoing support for your assistance and teamwork and last I will miss my boss and colleague and friend as I said previously, Shepard Smith. We had many years of working together and sharing our vision and helping to move our agency forward. I will miss his counsel as we move forward. On the topic of membership of the HSRP, I would like to point out that NOAA is looking for a few new HSRP members for January 2022 and I encourage you or for a very well qualified colleague to apply and the call for nominations is out and the nominations are due by April 26. Please be in touch with Lynne if you want a briefing or to recommend the candidate so we do recall in this community for that and we are not eager to see any of those new applicants.

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I want to note that HSRP leadership changes and thank the out going chair, Ed Saade. This is a warm welcome to the new HSRP and cochair, Julie Thomas and Sean Duffy. I appreciate all of the members expertise and broad contributions to help push us to be better and a tuning us to the different ideas and help us to embrace new technology and paradigms. So thank you to all of you. I would also like to take a moment to remember Doctor Larry Atkinson. He was a very well regarded member and passed away recently.

We would all like to have had a little bit more time with him. He pushed us to look at resilience and sea level rise and hosted a number of sessions including a dynamite one in Miami. He will definitely be missed. My condolences go out to he and his family. And similarly heavy note I would also like to pass along my condolences to Dave and your family on your recent loss. My condolences to you. Ed Saade is chairing his last meeting which if you are Ed is probably a more positive note than the last two. And while he remains on HSRP. NOAA and HSRP members will miss his leadership and I would like to personally express my gratitude and thanks to you for a very productive three years as chair and at this point I will turn it over to Ed to carry us forward. Thank you.

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Thank you, Rick. I appreciate all of that and all of the information. I will continue with a few notable acknowledgments as Rick said. I am the current chair of the HSRP and we will get into some more introductions with Julie and Sean going forward. Nicole LeBoeuf, Ben Friedman and panel members and stakeholders in staff, Thank you for joining us. Congratulations are in order to the rear Admiral select Richard Brennan who was just speaking. As you may know, he is the incoming director select and there is a bit of a snafu with the way the federal government work and this will all be formalized very soon. And we will be able to work under his guidance and leadership for the next several years and we are all of forward to that. A fond farewell to rear Admiral Shepard Smith who is retiring this year and I would like to take a moment to say what a pleasure it has been working directly with him and for many years besides just on the HSRP and we talked about this a few weeks ago in terms of his leadership and also his ability to get it and be excited and be encouraging about technologies and encouraging all of us to push the envelope to talk about technologies and learn about technologies and to advocate for applying these technologies. So we really do thank you for all of that guidance and leadership, Shep. I want to recognize the following panel members as well. Julie Thomas, as you know serves as the cochair and my very sincere and warmest congratulations to her becoming the HSRP chair. She has been doing a lot of these duties as we are transitioning and we will make it more formal tomorrow and I'm looking forward to several years under her guidance and leadership. Along with Julie is another hard worker and innovative and influential member of the team, Sean Duffy who will be stepping up into the cochair role and congratulations to Sean in that position and the willingness to step up and want to help and provide that support in that position. Also attention to three working groups with the five chairs and that would be Dr. David Mauney and Julie Thomas is the chair and planning engagement working group and she chairs the Arctic working group and Deeann Hargrave and Lindsay G cochair of the tech working group and thank you for all of your work and leadership on these chairs and activities. And in regards to conserving time all of the HSRP members and the speaker and the biographies are all in the advanced materials and it is accessible to everyone. On our meeting website. And for the most part, we will dispense with meeting speaker bios and you may hear too many reminders to presenters to help keep the presentations and the meeting on time. There are many people and businesses operating with the COVID-19 impacts especially in allegation services and we want to acknowledge all of those folks and everybody who has successfully navigated the COVID-19 for almost a year right now and making plans to continue to do that. The

success with the NOAA and the various working group that have teams with the NOAA and their contractors and everybody did an incredible job and continuing to produce results and continuing to do the job over the last 12 months and they shall be congratulated.

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Ben Friedman and Nicole LeBoeuf, we all look forward to the next in-person meeting and in the meantime we will continue the positive work in the HSRP and we will be as productive as possible virtually to provide you with recommendations as far of the outcome of this meeting. As Rick pointed out I encourage her public comments and input and these meetings are really designed to have some interaction with the public. It is a sad note that we can't do that physically, but we have proven with the last few meetings that the interaction as a means through this type of virtual action has worked quite well. So please keep up the action on your part and keep pushing us and keep asking the good questions and keep continuing to provide your input. As Rick pointed out, there is a little bit of rules to all that, but it is all pretty straightforward. We will get back to those questions either as immediately or quickly as possible.

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I have a note here to moderate the video and NOAA leadership remarks. Is there anything I should do here? Lynne nor anyone else? I guess I will introduce.

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You can introduce.

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We are honored to have a video from representative Charlie Crist from Florida's 17th congressional district, and he covers from Clearwater to Saint Pete and he is committed to working in a nonpartisan manner to create jobs and increase wages and protect our beaches from climate change. With his role on the prestigious house of procreation committee he fights to combat climate change and protect clean air and water and provide for a strong national defense and strengthen programs designed for those struggling to make ends meet. And coverage and you, if you will please roll the video and I will stand by.

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I represent the 13th district of Florida and home of the Buccaneers by the way. I am sorry I could not be with you today and I want to thank you for the opportunity to address the committee [ Indiscernible ] and like the one I represent. As vice chairman of the appropriations committee of commerce and justice and science as well as a member of the committee on science, space and technology. I had the pleasure of witnessing firsthand the incredible role that NOAA plays and protect team our state and nation. We all know that investing in better technology is either disposable and saves our coastal communities from climate change. Technology like improved ocean mapping to better prepare our communities for sea level rise and catastrophic storm surge like you recently saw. And this hit my neighbors especially hard. [ Indiscernible ] our community is still on the road to recovery and we in the Tampa Bay area recognize this could've been much worse without the continued work of NOAA and partnership in our region. This includes mapping with University of South Florida and setting up a center for ocean mapping and innovative technologies to advanced research on methods and technologies for ocean mapping. This partnership will allow us to

incorporate high precision maps for storm surges and sea level rise. And save lives literally and reduce property damage and as I'm sure you can imagine, many of my fellow [ Indiscernible ] are supremely grateful for this effort that this committee's work and success directly supports and not only for the way of life in Florida but also our local economy. For that, we will always be deeply appreciative. Thank you for having me and God bless you all.

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Back to you, Ed. I think you are self muted.

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There we go. Thank you, and that was really great and we appreciate his time and the thoughts and these types of periods of commenting from the hill are really appreciated and they do mean a lot to the members of the HSRP and everybody tuning in. So thank you again. Ben Friedman, we are thrilled to have you at your first meeting to continue the dialogue and contribute strategic and useful ideas and make small improvements for your navigation services portfolio. Ben Friedman is the acting NOAA administrator and serves as the agencies chief operating officer. He is responsible for the day-to-day management of the national and international operations of NOAA for oceanic and atmospheric services and research and coastal and Marine stewardship. This is the third position with the NOAA having previously served as the deputy general counsel and as chief of the office of the General Counsel enforcement section. His complete bio is contained within the web materials. So without any more delay I will turn it over to you and thank you again for joining us.

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Good afternoon and thank you, Ed. I do appreciate that welcome. Let me take a moment at the start to think Admiral Smith and his service over the last several years as the director of coastal survey has been remarkable and we all owe you a debt of gratitude. I personally do and know it does in the nation does and thank you for everything you have done and a congratulations to the captain soon to be Admiral Brennan for stepping into Shepard Smith shoes and those are big shoes to fill but I know you will do a fantastic job.

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Let me start with the obvious and welcome to my home and I am working from my home as many of you are as many NOAA employees have the previous year and the last year has been extremely challenging for NOAA and because of the pandemic but we have stepped up to the plate. I have constantly been amazed at the creativity of NOAA employees and their ability to get things done despite all the challenges we have faced and it doesn't mean we have hit every mission Mark and I am sure as many people on this call recognize we have struggled in some areas but we are slowly moving forward getting our ships back out and getting data flowing and again and I want to thank everyone at NOAA and in particular on this committee for continuing all of the great work despite the challenges of the last year. Because this is my first time before this committee, I thought I would spend a brief moment on my background and you heard some of it. I am a lawyer by trade and I have an undergraduate degree in molecular biology so I do have some science background but I moved quickly into law and spent many years at the Department of justice and came over to NOAA a little over 10 years ago. I spent the last five years at the deputy and secretary of operations which is

basically the chief operating officer at NOAA. It is been a fascinating job getting to see all aspects of the agency, just that but working with an incredible team of folks. During that transition and during the last transition I was acting administrator for nine months and during this transition I am in this role again and it is a real honor to be in this role. One of the main jobs I do in this role is to deal with the transition into the new administration. I thought I would talk about that for a few minutes here today.

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So for those who have experienced transitions before and I know many of you have. When you have a political transition, it is transition in tone and people and priorities and how we do see all of that and on the people side obviously NOAA as part of the Department of Commerce and yesterday our new secretary was confirmed. And up until yesterday was the governor of Rhode Island. And we are pleased to have her here and Rhode Island is the ocean state so she has a deep interest in NOAA and our mission and even before she was nominated to be secretary of commerce we worked with her close and a number of issues and we have a lot of resources there and we have some ships stationed there and a lot of assets in Rhode Island. And Gina Raimondo met with the director of the weather service a year or so ago and even again well before she was nominated to be secretary of the commerce and we have a close relationship with her already and she has expressed a great interest in NOAA and we will be one of the first bureaus she meets with in the coming days, and we are excited by that partnership.

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Typically within NOAA we have up to 15 new political appointees that come in and three Senate confirmed positions including an administrator and two secretaries and those positions have not yet been filled. We current we have four political positions filled. We have a Chief of Staff and she comes to us and we have a general counselor, Walker Smith who has a long history in federal service including the Department of Justice and EPA. And then we have two senior advisors as well. And while it is a small team, they are definitely punching above their weight and they are doing a great job and they come in with a lot of enthusiasm to set the administration. The administration's priorities, and am sure you have seen a lot of them because they have been well publicized. I will focus on three today, climate, scientific integrity and racial equity and these are some of the biggest priorities for this administration. Starting with climate change, obviously this is huge for the nation and it is one of the biggest priorities for this administration and it is impacting everything we do at NOAA and everything we do in the nation. And I know it impacts a lot of work that this committee does. There have already been two executive orders issued on climate change, one requiring us to review past policies and regulations to make sure they are environmentally friendly and we are in the process of doing that. The second one creates a national task force to deal with climate change across all agencies and the Department of Commerce and the NOAA play a significant roll, roll in that task course. I will say for purposes of this committee, it is clear the work you do, do falls under this administration's priorities and the work of the survey and co-ops and they play a critical role in understanding coastal and ocean change. You're actually recognized or this area is recognized in the new executive order and requires the Federal geographic data committee to report directly to this new task force showing that geospatial data is critical to understanding climate change. Really, I would challenge this committee to think creatively about ways NOAA can do better in this area

or address climate change and I was really pleased to hear that it is already on the agenda and you are already working on these issues and whether it is new to elegies or other methodologies that we could be using to reduce not only our own carbon footprint but the footprint of Mariners in the shipping industry. We did really appreciate your work in this area and trying to figure out how our services can be more climate friendly. Moving to scientific integrity. It is another big issue for the administration. They have already issued a memorandum on scientific integrity calling for a review of all scientific integrity policies throughout government. I won't go through the last few years with the NOAA and I think many of you probably saw what happened after what was affectionately called sharpie gate and there have been two independent studies done about integrity with the NOAA and one by the NOAA scientific integrity policy that we farmed out to do a review and the second by the Inspector General of the Department of Commerce that did a review and both found there were both violations of scientific integrity policy out of sharpie gate and we have been working hard with them about any issues we have with NOAA and working hard to address those issues as well and we are pleased that the new administration is taking this issue seriously and we are talking to our partners and other agencies in the White House about these issues now. I do know that everything that this committee does is science-based and we welcome your partnership in this area as well.

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Finally with racial equity, this is again one of the principal priorities for this administration and it is impacting all missions across all government in a number of ways and basically there are two parts to this equation. One is the internal process to her agency and whether we are a diverse agency that likes inclusiveness and the second is our services and whether we externally we provide our services in a racially equitable way. There is an executive order on this that requires us to identify programs and policies for review within a racial equity lens. We have a working group currently working on that. We are partnering with the Department of Commerce on that as well. With regard to this committee, again, I think you can play a very important role here for us in both areas, internal and external, making sure externally we provide our services in an equitable way across the entire country including to those areas that are traditionally underrepresented, making sure we provide data and services and surveys equitably everywhere. This is in the country. Internally, we could definitely use your support in promoting diversity within NOAA. We struggle sometimes with diversity within NOAA and we are being aggressive in our approach to diversify. We appreciate any insight you have on attracting talent and recruiting new talent to NOAA. Before I close, I will move off of the administration change now and I wanted to say a few words about our fleet. First of all, obviously, we are operating a fleet over the prior year and it is been very challenging and has had an impact on our mission and I know you have recognize that. I do want to call out our partners who were contractors who provided data and hydrographic services and sometimes where we have been unable to. We are getting the ships back out, and we will see more of that in the few months. I want to thank those who have helped us fill in the gaps while we have not been able to. Obviously, I do think you all know we are in the middle of recapitalizing our fleet and we did about \$75 million a year from Congress which has provided us this income to start building ships and we have the first two ships under contract at this point in these are the class a ships which

are research vessels and we are excited about that in partnering with the Navy to build those and the class B ships which are hydrographic vessels are the next in line and we are hoping to have draft proposals out on the ships in the next few weeks and we are excited to start getting out on those as well. As to particular ships I will note that we had considered sending it to Hawaii this year to do live operations and logistically it did not make sense we decided to keep it in Alaska doing the hydrographic work. It will go to Hawaii next year. We are working on the Fairweather schedule to compensate for what will happen. I am sure Admiral Smith and Captain Brennan can provide more details on that if there is any specific questions. I think I will and there and I will conclude by saying there is a lot of challenges right now and challenges with COVID and challenges of climate change and racial equity. We are up for those challenges and they know you are too. I can't emphasize enough how important this committee is to the work we do and we deeply appreciate all of the support and advice you can provide us in the coming years in these areas. Thank you very much and I will turn it back over to you guys.

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Thank you. That was really a great discussion and definitely you have done a lot of thought-provoking comments and ideas for us and it helps put things in perspective for the HSRP members to hear about the incoming administration's interests from climate to economy and especially with the fleet and the updates which tie in well to the navigation services portfolio and your request and focus to discuss with the work of NOAA. We will definitely be considering these interests and discuss them and as you challenged us, there are many of us that we have talked about recently whether it is folks like myself from industry or people from the University with backgrounds and there has been a lot of activities and a lot how we can contribute about diversity and inclusion that are being implemented across our own networks and companies so we will get right on that topic. Next up is Nicole. And we are, as ever, grateful for your attendance and turning this over to you and her bio is in the web materials. And without any delay, I will go ahead. Nicole LeBoeuf.

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Thank you for that introduction, Ed, and I appreciate you not reading my bio and sounds weird every time I hear. Thank you to Ben Friedman for your remark and it is a pleasure to have you joining us today. Like others have noted I would like to welcome rear Admiral select Rick Brennan and his role as the designated federal official for the HSRP and congratulations to him. I look forward to you joining the executive team as Director for the office of Coast survey when the paperwork is finalized of course and find out something about that. I would also echo previous sentiments thanking you, Ed for your service as HSRP chair and welcoming both Sean Duffy as cochair and Julie Thomas's incoming chair and we look forward to working with both of you. Of course welcome to the members of the HSRP and the nearly 170 attendees who joined us today for the virtual spring 2021 Hydrographic Services Review Panel public meeting. It is a pleasure to get together and even virtually to receive your input for improvements in the way we deliver services to the nation. Many thanks to Lynne and the team as mentioned for organizing another virtual meeting and I have full confidence that this meeting will be as navigation services will be nothing but smooth sailing and because NOAA thanks to Ben Friedman among others is taken a study in science-based approach to resuming our in

person operations, when we meet again in person, I know it will be because it is safe to do so. As you may imagine the last few weeks have been a busy time here at an OS as we not only continue with the operational but a new administration. Fortunately the we across NOAA are poised to advance the new priorities. As Ben Friedman noted, only a few members of the policy team have arrived including the Chief of Staff who I believe is on the call with us today and yes, they are absolutely punching above their weight and they have proven to be committed advocates for NOAA and its people. And as of yesterday we have a new secretary of commerce from Rhode Island. I can't wait to help the former governor get to know the ocean service and as been touched on earlier the reputation and capabilities of NOAA is a science agency positions us to be a leading contributor to this administrations agenda on climate change, racial equity, economic recovery and scientific integrity. And co-ops in the national geodetic survey as well as the office of coast survey will be fundamental. All of us here today note that the economic impact of our nation's navigation infrastructure on U.S. jobs and Maritime commerce is enormous. Are navigation services support the 1.3 billion metric tons of cargo valued at \$1.8 trillion that moves in and out of U.S. ports every year. In 2008 in collaboration with the Bureau of economic announcement in the Department of Labor, NOAA found the coastal and Marine sectors as a whole provide 2.3 million high-paying jobs annually. In my conversations with the new policy team I make sure to convey that any infrastructure jobs or are initiatives coming from the administration should include the maritime sector. This sector is more important than ever then when we combat climate change and we begin the long process of economic recovery. Through the foundational support NOAA leads efforts to impact the effects of climate change and improve our nation's resilience along the coast. I am grateful for the commitment of the office directors for the navigation services portfolio and Juliana Blackwell and Richard Edwing and Admiral Smith. Admiral Smith, it is been an honor to work with you of the past few years. I wish you fair winds and great season your next adventure wherever it may be and I know we will be in steady hands with rear Admiral select Rick Brennan at the helm and thank you for your service, Shep.

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So to HSRP you have heard me say this before but it bears repeating. You are a critical partner for us and our work providing valuable recommendations and advice to NOAA on our core navigation and resilience missions. We absolutely value your expertise and even in the last few years the HSRP has provided NOAA with invaluable input on a range of important topics and as was mentioned you raise to our attention the need to address a fog and other low visibility conditions in our nation's ports and your recommendations on the need for better operations forecast and technology in heavy fog conditions helped prioritize the observational capabilities enhancing the collaborative work being done between co-ops in the National Weather Service to improve visibility forecasts. HSRP, you were the early supporters of the national geodetic surveys gravity projects in your early supporters of precision navigation and the LA Long Beach demonstration project and innovative use of lighter technology and many other advances in charting and mapping and coastal survey. Definitely over the years you have provided NOAA with strategic topics or advice on those ranging from sea level rise and the Arctic to the NOAA fleet. Each of these efforts advances the position as a national and international leader in science and technology and your

advice transcends political administrations. Your contributions to the national ocean mapping exploration and characterization counsel influenced the drafting of the councils implementation plan and we heard from you but we need a robust and sustained mechanism for nonfederal partner engagement and collaboration on this effort. We agree and your comments made their way into the implementation plan. And while it was started under previous administration by all indications it will go on. Just like NOAA has had a climate mission for decades, we have an ocean mapping mission and we will carry it out even better than before thanks to your efforts. Rick and I will keep you updated and how it progresses. With regard to the coastal mapping strategy we are likewise in a full steam ahead mode with the new administration and we had hoped to have the Alaska mapping implementation plan out for public comment by now but new faces asked us deposits release the they can become more acquainted with its contents which was a good thing. So stay tuned for more on that. During this time of ongoing challenges and struggles, it is important that we celebrate the bright spots when we can and there are absolutely bright spots for celebrating. Years of work for NLS to become the lead provider for ocean and coastal data paid off when we saw both the digital coast authorized and the integrated Ocean observing program reauthorized by Congress. Just last week Senator Wicker introduced a bipartisan bill on ocean mapping, exploration and hydrographic services that would codify them and reauthorize the ocean and coastal mapping integration act and make technical corrections to the hydrographic services improvement act. I look forward to working with Congress on these and other issues critical to our mission. On the budget front Congress provided \$628 million in funding for an OS for fiscal year 2021 and 2 million of which is an increase for ocean mapping and coastal charting relative to no and the strategy. Overall this represents a 3.6 increase for FY 20 budget and it may sound like a modest increase but recall we were proposed for a greater than 40% reduction including the proposal of the elimination of several essential programs. Given all the proposed eliminations that were restored I will call a 3.6 increase a win. In fact it is the largest appropriation in the history and has represented a very strong showing of congressional support. Speaking of congressional support as you heard from Representative Crist we are welcoming the University of South Florida into the no family through the launch of the center for ocean mapping and innovate of technologies and this new center in St. Petersburg will develop technologies and approaches to ocean and coastal mapping in line with the commitment of NOAA to build resilient ecosystems and communities and economies. This research will be critical to meeting the goals and objectives of our agency and I am looking forward to hearing from the director for this new center and my former boss for what feels like a lifetime ago. Welcome back to the NOAA family. The new center is welcome to join our work as we all stand on the shoulders of a years long successful collaboration with the joint center at the University of New Hampshire. I am also looking forward to hearing from another friend of NOAA Dr. Larry Mayer later today about the exciting advancements being made at the GHC. With regard to coastal resilience I am thrilled to say that through the FY 21 budget NOAA was given multiple instructions by Congress to expand and strengthen our work on coastal resilience and a sealevel rise. You will hear more about this and other NOAA contributions to resilience at the panel coastal data and information systems for resilience where the senior advisor for coastal innovation and resilience will be providing remarks. Because we share an appreciation

of the associated risks of coastal change, the HSRP has made coastal resilience a recurring theme in recent years and it is no surprise that co-ops and co-survey provide the underlying framework on which all of our resilience efforts were built. I can't overstate how important their contributions are as major decisions at all level of government and the private sector need to be informed by how water and land levels are changing now and into the future. The water level network in the National Spatial Reference System and surveys and shoreline maps are the authoritative sources of that essential information. The earths conditions are changing. The change is accelerating along our coasts and in our oceans posing risks to all communities and infrastructure that exists there. There is no other way to put it. The ports and industries and economies associated with them are too big to fail. We must continue to provide navigation services that they require to move the goods and services in and out of this nation that are so essential to our economy. As the new administration seeks to build a better, we will need to do this with our eye on building back more resilient coastal import communities. NOS has relied heavily on advice from this panel, and I know this reliance and our relationship will grow more robust and useful as we plan for the future together. Thank you for your time and for being here today. I am really looking forward to the discussion. Is

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Thank you, Nicole. Your remarks are always welcome and right on target. We really do appreciate your candor and direct approach and we are very interested in the budget and legislation and hearing about how the foundational data and operations can tie into the needs of the nation for resilience to climate change. All good stuff. Do you have any comments, rear Admiral Brennan?

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I would like to first thank you Nicole for her enthusiastic involvement and support for all things navigation services as well as her personal support and mentor ship for me so thank you, Nicole. It is great to see you here today and is always to have your involvement in that venue and also I guess I would like to say that Ben Friedman's remarks resonate with me and I published an article about diversity and across the hydrographic services industry and how we affect that, both nationwide across the community as well as here at NOAA. It is definitely something we are thinking about and wanting to see that grow and change not just within the hydrographic community of NOAA but nationwide community from the hydrographic society of America's perspective as well. Those were definitely appreciated. So we definitely have them taken to heart so thank you for that.

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We are going to go right into the directors presentation.

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I am turning it back over to you, Nicole. So you moderate the directors presentations.

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To introduce our program office directors to give up dates on the opportunities and challenges for the navigation services portfolio we will hear about how the navigation services offices are addressing the navigation services portfolio in support of seamless data including the coastal data and information systems to support planning for resilience to climate change. First up I would like to welcome rear Admiral select

Brennan who will touch on the intersection of the mapping plan and no and other topics including precision navigation and the FY 2021 hydrographic season. Back to you.

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Thank you. Glad to give you this briefing today and we can go to the next slide. So we compiled this matrix because we were getting many questions about how the surveys and the mapping plan merged and picked up the requirements as stated in no. You can see that our internal strategic plan addresses all of the objectives as laid out in the NOMECS strategy. We have more detailed notes on this but I know that in some of the past meetings this was a question I wanted to highlight and do this very briefly to show that we have all of those strategic objectives from the NOMECS strategy included with our ocean mapping strategy and that was not by chance but by design in the class collaboration, close collaboration we had working with the NOMECS Council on that.

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I think it is important to show that the NOMECS Council and what they are working to do addresses everything that we are seeing in red here on this map. And all of the red areas we show here are deemed to be unmapped by the very generous guideline of basically one measurement per square 100 m of seafloor. You can see there are vast quantities around Alaska that are technically unmapped or at least mapped to modern standards in large portions of the Pacific islands and as well as swaths of that region which is basically the shallow region on the shelf along the eastern seaboard in the Gulf of Mexico. Those are traditionally the hardest areas to survey because they are the shallowest. And so we are working on that and currently, we are at 53% of U.S. coastal and ocean Great Lakes waters being unmapped and that is down a percent from last year and I think we are at 54% last year and the key thing to note there is the burned down rate that we are doing on that is not nearly adequate enough that we want to get this done by 2030, which is the deadline to get everything, I believe 40 m and deeper done and then we are on the hook to get everything 40 m and shallow done by 2040. So we have a lot of work to do. And we are not nearly hitting our metrics like we would like to be. I think the other thing is that all of the areas in red, I see as real areas of opportunity for the nation to get those maps both from a preservation and conservation standpoint to characterize what is in there and living in those regions and what natural resources lie there as well as for how they are sustainably maintained. The first step in that, in all things, is to map them and assess them and understand what is there. If we go to the next slide please. I think this speaks to my statements of our progress. You can see what we have made just in the last year and all of these regions so the U.S. total as well as the Gulf of Mexico to the Great Lakes in the Caribbean and Alaska, etc. We definitely, if we are trying to drain all of these down to 0 x 20 30, we will need to start increasing the rate at which we acquire this data. That is critically important. Next slide.

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So this is that burned down map we are talking about. You can see how we are doing and where we would like to be. So really what we need to make is about a 3% rate of change every year in order to get that completed.

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So I would like to point out that we are saying farewell to paper nautical charts. I would like to say that producing paper nautical charts, I personally as an avid pleasure

boater and professional mariner absolutely value having a paper chart on board as somebody who is lost on one of our ships full power in a very tight navigational situation and had no power on the bridge and not having a paper chart in that instance would've been a real disaster. I think having paper charts is important but what we are trying to do is transition our production system to a new way of producing that services our primary product which is the electronic navigational chart but also allows easy production of paper products through our print on demand vendors. We are working with our vendors to support that now and looking for innovative ways to use her custom chart tool to make that happen. And so you can expect to see different meetings and workshops occurring over the next six months to build that out. Next slide please.

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This is our website and talking about that if anybody has any questions and this is where you can find additional information about our transition to away from producing paper chart products. Next slide please.

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The next thing that you have heard us discuss over the last several years is about our precision marine navigation products and services and how we are building that out. I am happy to point out we have a new data get, Gateway that you can see on the left and that shows the S-1 11 surface currents and also under laid by our national source data and this is where we are beginning to push out some of these preliminary product to the mariner and I would like to point out that it is our intent that this is the portal through which we would deliver machine to machine readable products and services directly to the bridge of the ship to our Mariners and that is what this project was intended to do which is different in providing it on a portal or on another website because ultimately that is where the mariner is able to compute their routes and come up with their sale plan and that is where they need the data so that is the theory that has been under all of our efforts under machine navigation to get that to the point of use that the mariner needs it in the form that the mariner needs it. So I would invite you to look at that data gateway as well as the data dashboard which shows where we are building that out and where we actually have services.

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This is a real quick overview of where we have projects underway in this field season both in-house and through our contract surveys and there are too many here to go through them individually and this is our area for Alaska and you can see we have a number of areas working north of the Aleutians which is technically Arctic and the Kodiak Island as well as well as Prince William sound and the glacier Bay.

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These are projects that we have underway for both on the left you can see in the Great Lakes as well as the image on the right work we have planned in the Gulf of Mexico in both Texas and Mississippi.

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These other projects we have for the East Coast and the Florida projects so you can see that we do have some in New Jersey and up in the Chesapeake Bay off of the Virginia and North Carolina coast and down over Lake plateau as well as off the coast of Florida.

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I think that is it. If you do have any questions, as I stated earlier, please put them in the questions window. I will pass the baton back to Nicole.

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Thank you. Looking for the mute button as we do. Thank you for that update. Really looking forward again to working with you in your new role. Let's get that paperwork signed. Next up I am happy to introduce the director Juliana Blackwell. She will provide an update on the progress of modernizing the National Spatial Reference System which is the foundational coordinate system for the United States. She will share highlights of our latest coastal mapping activities. Over to you.

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Thank you, call. As Nicole just mentioned, the national spatial reference system is the consistent coordinate system that defines latitude, longitude, height, scale and orientation throughout the United States and its territories. The modernization effort is underway and it is a major update to the 1980s definition of the NSRS and will support the need and demand for accurate and improved access to data, models and tools for positioning, surveying, mapping, charting and the integration of geospatial data and applications.

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The NSRS and coastal mapping that NGS provides under the mission mandate is the foundation upon which coastal resiliency is measured. It provides foundational authoritative data which enables accurate heights for flood risk determination and coastal and inland. It provides disparate vertical measurements to be accurately related to each other through this consistent reference frame and information on shoreline change based on decades of consistently collected shoreline data.

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Looking ahead, coordinates will provide time-dependent information about control and coastal communities and this will support time dependent flood maps more rigorously than the current standard practice of providing reference specific coordinates. Once complete -- let's go back to slide 2. Once complete, the modernized will help communities understand how the flood risks are changing over time. The NSRS geodetic framework connected to water level data and observations provides the necessary data to inform and support this resilience.

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Last year NGS announced a delay in the rollout of the modernized NSRS and it was previously planned for completion at the end of the year of 2022 but operational setbacks from COVID and other constraints would delay the effort by two or more years. We continue to make progress on many of the projects under this goal and I will provide a brief update on a few of the major components in just a moment. First I want to mention that we will be hosting a geospatial summit on May 4 and five of this year and the event this year is virtual and open to all and registration is free and there is information about how to sign up on our webpage.

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At the Summit we will highlight changes to the three new print documents which detail the technical aspects and decisions that guide the NSRS modernization effort. The three NSRS blueprint documents were revised in 2020 and will be released to the public in the coming month. The first two blueprint documents focus on details of geometric

and geo-potential coordinates. Part 3, working in the modernized NSRS provides important new definitions and explanations of how the new system will work. Number 3 also includes four use case examples to compare how business is done today with how it will be done in the future. The first use case, multiyear cord or projects addresses state D.O.T. planning for road and highway construction. The second case, infrastructure looks at airports and could also be used as an analogy for courts and the third, transitioning data to the modernized NSRS addresses how the modernized system and how to pull existing data into the new modernized system. In the fourth use case on flood mapping addresses how the modernized system and the new time dependency functionality can improve flood risk determination. You will be hearing more about the flood mapping example later today. In blueprint 3 we defined the new types of coordinates supported by the modernized NSRS which are referenced epic coordinates and that is a 5 to 10 year snapshot to allow people to continue to work in a way that is comfortable and familiar. And we will add survey epic coordinates which track changes through time and are particularly important for areas of subsidence and in coastal regions. Next slide.

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Just a brief update on GRAV-D the airborne gravity data collection project which is the basis for new Geo potential data part of the modernization effort. As you can imagine, the data collection has been impacted by COVID but we do now have protocols in place to ensure the safety of personnel and are currently collecting GRAV-D in limited areas but with reduced productivity. To date we have collected over 84.2% of our goal and we have had some recent progress in areas in the central and southeast and northwest parts of the country. I am happy to say this past week we are finally able to collect some data over Hawaii and we have approximately three or four flights to go before that survey area is complete and we are also hopeful that later this spring and early summer we will be able to start collections over the Aleutians in Alaska so fingers crossed that things work out for us there. But to summarize the importance of this data, this will be the basis for the new Geo potential data which will replace other island based datums which one datum providing a consistent and accurate means of comparing height across the contiguous and noncontiguous U.S. and territories.

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Another major component of the modernization effort is the upgrade of our gnomon -- NOAA comprehensive network at consists of 1900 stations of which NOAA owns and operates about 40 and it is a huge partner network and has continued to grow over time but we do know we have some work to do so one of the things that we have currently underway is a new revised comprehensive plan for this program. Also we are working to do repair and upgrades on stations that have been unable to get to because of COVID and other constraints. We are also working on expanding the reliance on our partnerships of federal entities and especially to establish a set of foundation which are federally operated high-quality highly reliable stations with longevity to guarantee access to the official national spatial reference system and to support international positioning consistency efforts. I am happy to say we are currently collecting data from 26 of the 36 stations identified as foundation CORS.

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One new area of expansion for NGS is the addition of the NOAA CORS data into the NOAA data program and through a partnership between NOAA and Amazon cloud, collect and select datasets are now available on Amazon Web services cloud platform. And you can see the links there if you're interested in checking it out later. This will benefit from having these datasets available on the cloud platform.

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Shifting gears to the coastal mapping and shoreline update and the importance of having geo-referenced imagery and this data to inform efforts and as Nicole mentioned earlier the implementation plan for the Alaska coastal mapping strategy is entrapped and it incorporates the recommendations made by the HSRP white paper through the white paper on the Alaskan strategy. And we are planning a public comment period on the draft to increase awareness and gather any final input from external partners. The draft's current the under review and the Office of Science and Technology Policy. The steps to release it for public comment will occur once we have the clearance. We are happy to wait is the administration's attention on the strategy and implementation plan can only benefit us in the future.

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So a brief update on our hurricane supplemental work and across the U.S. and its territories the hurricane supplemental's are being used to acquire lidar data and update shoreline and in impacted areas and starting from the left in 2018 we had supplemental work done in response to hurricanes Harvey, Irma and Maria. The status update with the lidar and imagery datasets for Harvey which was primarily in the Texas area and in Florida have been completed and are now publicly available. And in response to Hurricane Maria and the Virgin Island areas, datasets should be completed toward the end of this calendar year. In the center portion and to the right in 2019 we did have supplementals in support of hurricanes Florence, Michael, and this typhoon. Current Lee the acquisition has been complete and data is beginning to flow in and we are performing Q HC on the lidar and imagery data. Hopefully will have all the data in house and available by the end of this calendar year. And just another note about the data being collected in response to the typhoon. We have been routinely obtaining depths to us approximately 50 x 0 for the survival survey said it will assist with rain year when it gets out there and it will help with situational awareness and efficiencies in shallow areas.

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We want to focus our efforts on increasing safety and efficiency of the NOAA hydrographic operations by collect team information from the nearshore to the laser extinction and as you see here we have some ongoing projects in Hawaii and others planned for Alaska and Virginia and it will help and that we expect will be hundred 30 days of lighter acquisition and it would result in the potential of over 1000 days and this includes both ship and launch operations. Lastly, I want to mention that we have been in the process of upgrading our camera system. We have the RGB and the near cameras mounted now in single opposing alignment and rotating mount that provides 123 degrees field of view and supports on board real-time positioning.

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This will be the next and last slide. Just a few images from the acceptance testing we have been doing with the new camera system starting with RGB and mistress --

images. And this is the near infrared. We are getting some great pictures out of that camera system and we do look forward to showing you more in the future. Again, thank you for your time today and we hope the information provided was valuable.

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I am always impressed with their work. I want to thank you again.

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[ Captioners transitioning ]

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I WANT TO THANK OUR INTERPRETERS. THIS IS TECHNICAL STAFF. THANK YOU SO MUCH FOR THIS CONTRIBUTION. YOU ARE IMPRESSIVE. NEXT WE HAVE THE DIRECTOR OF THE CENTER OF OCEAN [INDISCERNIBLE]. HE IS GOING TO GIVE US AN OVERVIEW, CURRENT AND FUTURE VISIONS. I AM HERE [INDISCERNIBLE]. AS WE KNOW THIS DATA WILL HELP US ASSESS THE CURRENT AND FUTURE VULNERABILITY. ALSO MILITARY READINESS.

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Thank you Nicole. I want to thank you for the 30th anniversary of the port program, and the flagship program. I am here to talk about the other area that is important. Coastal resilience. We do support outcome that might be different from fishing, that we use the same data and the same system that will also support our mission. And that also is true for NGS. We have been doing this for over 100 years. And coastal resilience is a new term. We measure the dynamic change in the coastal environment. This is given a nation a lot of data to work with. We have the shoreline imagery sets. And someone. Go to the next slide? We talked about monitoring the sea level. We have done this from the beginning. It is taking on added importance in the most recent years. We are now aware of climate change. You can see at the bottom left, a sealevel trend outside of San Francisco. You can see where that earthquake happened. It did reset the elevation if you well. And landlord lower right-hand corner, we have extreme observations over time. It used to be we would update and publish every five years. People would use is for basic research. Climate change became a concern. With that advent of real time data, we have to talk about real time information with the coastal folks. And also we have to look at major storms like hurricane Sandy. And looking at records about what happened during those storms. Along with the data, this is the expertise that we have behind the data. We worked with a lot of people to build this document and the core. They obviously, seawalls and levees etc. to help their internal documents. On how to take into account sea level rises. At the end that [Indiscernible] scientists help this methodology for the Department of Defense. To assess the vulnerability of military facilities around the world. To help them plan for sea level rises over the year. Here we have Miami-Dade County. They have a very impressive strategy. Very comprehensive. We want to sit at the table with them and help them to develop out of this. And you can see some sealevel around the coast. I would like to mention we are in a network, we have 27 stations. We help to determine global sealevel changes. And that organization is to make sure that we have the same standards and so forth. So we can compare apples to apples. I know I have talked about the coastal inundation dashboard that we rolled out last year. One thing about this dashboard, I see this as a flagship program. This is about the forecast the data. It is a dynamic spatial project this is related to the new high water data. So we know about water and navigation community and what they

use. I know this is hard to see, each blue dot represents a station or a partner station. Here we have when the storm approaches. And when he gets to flooding levels. I will talk about how we came up with the threshold. This is also pulling in historical information sealevel strands, and displaying what is going on right now I live with future forecasts. I think this is going to be helpful for folks. If you are familiar with a specific station, if you see there is a specific storm you will be able to let them know what is going to happen in that area. We are still making improvements. We have storm products, that will help storm the [Indiscernible]. You can see we went up to Alaska. And this year we will do this up in the Great Lakes, looking at the flooding and looking at stations. I talked about the flooding threshold. We are putting out information on the website as the same time the weather is forecasting. There could be minor, major or moderate flooding. It does depend on the weather. So we will work closely with [Indiscernible]. And what these levels should be. In other areas we really have not done that, but now we want to help with the mother delegate -- methodology. And here we want to track our annual sea levels. We are standardizing this across the board. A lot has been accomplished. We have a five-year plan. We will continue to improve the organization dashboard. We want to look at real time water levels. We want to improve flood outlet information. Some people might think this is more important, education people have to be aware that these things do exist there and what is behind the pics and how to use them. And part of raising awareness, we want to look at flooding, and the outlook. And this is driven by an increase in these different terms. Here we have in land flooding. This is the flooding that people will see every day. You see this typically in a backyard or parking lots and that sort of thing. It did create a safe space to talk about climate. People do see that this is happening on a regular basis but they want to talk about it and they want to be prepared and we want to look at high flood forecasting every year. Last year, we had a call with the media so that questions could be answered. But again this is just another capability that we are bringing into the dashboard. And of course data visualization, how do you show people the data? There is a lot of information. So we are working with the visualization. I like the one on the left, there is a lot of variability. Not just a linear trend. This is the annual value. And you can see as we go through time, it is stacking up and rising over time. On the right-hand side, this is for the near term. Here we have this Nami. This is the one for Nami that had occurred. You can see that the waves are now in being detected. So they can validate their models and uses information to make a decision for the evacuation. And here we have forecast. We do like to help people when we can. Another area is to provide tools. Add a way for people to be able to help themselves. But we can only do so much. Here we have tools and another calculator. Here we have other methodologies. This is for other people to use. We also have virtual training courses. We also have visual models. That way it will help trade more people. Observing system will support this. Here we have infrastructure. We had a wake-up call after Hurricane Katrina. Real time data is a recent capability. We needed to keep the station operating throughout a store because that is the most important data. We want to use this along the southeast or the golf course -- Gulf Coast. We do have offshore structures. And we were funded to design a single pile instrumentation platform. We have six more around Texas coast. We did not do this, other people took this information and [Indiscernible] structures and now this will

provide information. We want to improve in order to better understand land and ocean. With the sensors themselves. We have a GPS tied, --tide.

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Only about 20 years, but there is a need for that data. We are taking the first step in doing the requirements study. On what is needed. There was a lot from the weather cast office. And next step, we will see what we can do with that. We might be able to do this with all lot of extra funding. But we also want to measure waves. That is the next steps. Where are we going? We are working with a lot of other people. One big thing, is getting more data. Looking at the available information. There are a lot of people who are putting in tied -- tide gauges. We are also working with the Association, because they can bring in data at different levels of standards but that is something we can bring in, data that may not meet our [Indiscernible] make can still be used for other purposes. We have been working with people, we have 10 other stations. We did the gap analysis that would show you a total 204. We have about 25 gaps felt. -- filled. So we have been able to fill in some of those gaps. This is my last slide. We are only one piece of the larger requirement. We are a very important part. But we will work with NOAA, leadership and Mark Ressler. Both near-term and long term. Congress is very interested in this. There is also a congressional report. We also have data information and coastal flooding information. We are trying to get away from observations. There are only so many tide gauges to look at. Coastal flood risk information. Re-analyzing some of the large data sets that we talked about earlier. So we can strapping late that data. For the areas that do not have a tide gauge . So that we can look at the sea level. I will stop. And I want to take this time to say thank you.

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Last up is you and H -- UNH.

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Larry, I know you are not an officer but you are definitely part of the team.

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Larry, you are still muted.

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Thank you. It really is not my file. [Laugh]

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Thank you, Nicole. I also want to talk about your relevant opening remarks on research. It was appreciated. I am going to talk about one aspect what is going on at the center. We have a very exciting effort, we have a new and crude -- uncrew vessel. We completed successfully a new cooperative agreement. We are very excited about that. We are part of the new ocean exploration efforts. That is part of the agreement. We are testing the applications for sailboats. That grant that we recently renewed, has many components. Federal funding opportunity had a number of research priorities that it described. They had themes and subthemes. We had over 40 task. Do not worry, I am not going to discuss all of those. We could touch on many. But as you can see this is a very diverse set of tests. What I want to focus on the large component of the uncrew system. I think we already introduce you. This is a fleet of our uncrew vehicles. You can see in the upper left corner. This is a boat, and a Z baot -- boat. This was designed for surveying. We talked in the past, and we introduce you to some of the efforts that we have done with the C worker and the deployment of Alaska. We are working very close

with the non-manned vessel. Here we have the sanctuary. Last year we deployed this at Aurora Island. It can go from that sure -- shore using the economist vessels or drones. I think this is a great demonstration going from the shore to the sea.

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Here is the Drix vessel. These vessels can travel at high speed. They do collect a lot of nice data. Here we have Admiral Smith who is on board. Who will step in as HHC, I think I heard that yesterday. I also mentioned an exciting direction that we are taking the this is the universal delivery system. We can launch a number of other platforms. Such as AUVs by just building the interface. And finally we introduce this concept of a large 72 foot unmanned vessel. It does have a wide range of capabilities. Here we have a series of acoustics system for deep water in shallow water. And here we have environmental sensors. And DE sample. And this can be deployed for nine months, operating 24 hours a day. Now this is a reality. We have been undergoing a lot of trials in San Francisco Bay. It was very successful. This is the sale -- sail system drowned. The driver can see what is going on. They can put the input into the surrounding situation, this is the situational awareness. This one I captured a couple of days ago. This is the first departure from San Francisco Bay. In the last few days it has been out by High Canyon. We are able to monitor using what is called the remote operating system. We can monitor in real time. Even though we are in New Hampshire. We can monitor the data that is coming and. We can change the settings. And we have been able to do remote system checks. Standard noise checks, role and pitch variations. And even going through a patch test, all done remotely. This is the high quality of the data. This is a beautiful platform for capturing data. When this test is finished, hopefully in the next week, we can start on the first real mission. Which will be a trip from Hawaii to San Francisco. We will give another presentation. We do have a new tool that we develop, it is called the [Indiscernible]. It has all of this data. And it will figure out what the path is and maximize their tribal over a non-mapped area. Depending on how long the trip is. It will calculate the swap and the depth. So you get the logistics. And this can be used to plan more traditional services. Overlap, real time data and the hours.

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[ No audio ]

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We do need an operator to monitor it. The research that we need has to be autonomous. Extracting information, from existing charts. Doing a lot of machine learning. Identifying objects. Recognizing them. And developing the ability to avoid objects. Are we doing well? Because this is such a rich field and there is so much that is going on. We have a team that entered what was called Virtual Ocean Robotics Channel. So they had teams from all over the world, they would to [Indiscernible] and they would navigate through a series of obstacles. They had to get to a certain location. They had to do that in the simulated environment. And our team had a really good group. And it gave us confidence that we are at the leading edge doing this. We were able to take what the team learned, and turn that towards our own system. We will do this for the Drix and drone too. That way we can understand the behavior of the vehicle. We have another exciting development, and that is the development of a new prototype system, it will have six cameras. That our motion and stabilized. It will give you a view of the surroundings. We have a machine learning algorithms, that will recognize the

targets. That will be sent to you the detection system and get them and avoidance danger signal. And this is how much information that we can send back over they satellite link or the wireless link. That is the direction that we are heading. We are quite excited. Finally, everything that we do eventually will tie into my next flight. -- slide. This is the [Indiscernible]. I want to show you a beautiful slide. I am excited about this, we are at the dawn of a new age. These are vessel operations and this is what we want to do.

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Larry, thank you. I think we need to get a new logo for the Sairdrones. It is work hard but play hard. I know this is so fun. We are a little late with our schedule. We are going to take a break. Do you want folks to come back at 3:05 or 3:10?

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How about 3:06?

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That will give us five minutes.

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[ Session is on a five minute recess. Captioner standing by. ]

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Weekend away had and get started.

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I am please to have Steve, from the University of South Florida. This is Center for Ocean Mapping and Innovative Technologies or noun as COMIT . He is the director and investigator for COMIT, which is a joint venture between NOAA and the University of Southern Florida . This is the development of habitat in fishery studies. And his bio in the material if you would like to look at that. Steve, thank you for being here today.

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Steve? I believe you are still on mute.

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How is that?

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Good.

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Thank you, for your introduction and this opportunity to present. And COMIT with us establish in conjunction with NOAA. We are very grateful that they grant us. We have a number of priorities. Certainly, they are trying to look at extending mapping capabilities and promoting collaboration. Admiral Smith was interested in imagery. Looking at mapping products, and the other line offices of NOAA . One of the themes that you will see in my presentation, we are trying to reestablish these partnerships and other entities along with NOAA. We are interested in helping NOAA to address their priorities and strategies. We are interested in developing the academic program as well. We have a vibrant how the -- hub we are very familiar with NOAA . Many of these elements [Indiscernible]. We have a long collaboration with USGS. Also Ocean [Indiscernible]. We have two educational institutions. There is something that is called the innovation district. They host what is called the ocean team. And we have all of these different entities and when you get back to face to face meetings we would like to host a meeting if possible. Even though we are new, we are not new to ocean mapping. You can read

some of the accomplishments that we have had in the past. We were, along with Dr. Martin, what we consider a peer me airport program -- port program. Donald Wright, what is responsible for the first maps. In terms of the mission, we are trying to benefit a diverse constituent base by evaluating and implementing technology. Such as cutting edge technology. This issue of maximizing efficiency and mapping is important. Much of the West Florida shelf is in a shallow area. So we have a problem mapping Shallowater. We are hoping to use these capabilities to close that gap. And this is heavy on her radar. We have six tasks. And we have uncrewed systems, we want to develop the [Indiscernible] to utilize them and test them. If we are going to try to close this gap, what is the right mix of traditional systems and the limited resources that we have? We do have the ability for observation. This notion that responding to coastal impact and change. We witnessed some serious problems here in the Tampa Bay area in the last fall. This is a very important issue for us. And the high resolution graphic modeling is where we have particular capability. Professional development. I was happy to hear that the administrator, Mr. Friedman, about diversity in the profession. This has been an issue not only in navigation, but ocean sites in general. But we do have some ideas for diversity. We want to look at the chain, where people hired from? In terms of the long term goals, we certainly want to look at development. We want to look at software systems for as this might evaluate Tampa Bay, and Westshore Florida. Two uses imagery which is so important to us. That picture that you see on the right-hand side, is a map that was put together by a number of people including Brian Wilson and NOAA and USGS and others. This is a very important map. It shows this high resolution image but look at the Westside. The peninsula. This is where you have the in lend water and this is where [Indiscernible] from the tropical storm that we had in November. We want to redo the West Florida shelf. To see if we can protect for this area. One of the projects that we have right now is an area that we call It Bend. And here we have a variety of colors. This was developed by Florida coastal mapping, they were trying to develop a mapping capability for all of coastal Florida. We have a goal, you can see this is a very shallow area. We do have an interest with the state of Florida along with other federal entities. Because of a number of things. That area that you see off shore, had been mapped by admission in the past. The polygons, that people are gone, is extending the oft sure mapping. What we need to do is create that core door for mapping. Florida is trying to identify opportunity areas. They have identified a number of areas around Big Band. They look [Indiscernible] for the establishment of this program. To help other entities and NOAA out, is an area of emphasis that we should create. This is just another view of the data that we just collected. With the offshore mapping. This will emphasize the notion that we are characterizing the phenomenon's. This is part of our capabilities. We also have capabilities in relatively large unmanned system as well. This is [Indiscernible] being deployed in the Antarctic. One of the members, Alex Graham, who just joined us. Who has a lot of capability with under ice mapping. We do not have any ice mapping in Florida but we can utilize these devices. One capability, the capability in observation. There is a region that has shallow water, it is off of Tampa Bay. It is about 65 meters off shore. And this represents a precise data for us to calibrate all of the vehicles at all of the mapping and readies that we are contemplating. We participated in a great project last fall. We are trying to formalize another partnership [Indiscernible] would like to work with us. And that is a springboard for this NOAA vessel

. One of our members, Bob Westberg, has a model system. This is hydrodynamics. We have a number of experience that we would like to do with his current imagery. To see how it is going to affect the storm surge. We did this in the Florida Keys, we did this before and after a hurricane. We are looking at the imagery product but it is also part of the real time modeling as well. Teaching and outreach is very important. We want to create a new concentration with a Master of arts, and Marine study. This is going to allow us to expand the program. For a variety of purposes and that would include degrees in hydrology or port security. We are trying to establish the CAD program. We are working on a product right now, regarding imagery but with collaboration with Frank Collier. This is going to begin this summer or early fall. Are activities that are underway. We have an outreach activity. We have a newsletter that we are starting. We do have a webinar series. We do have next week carry from -- Carrie from NOAA . Current tasks. The formation a steering committee. We welcome any partnerships with vehicle sensors or software vendors. And I did showed you about our mapping efforts. Upcoming events. We just did a large survey offshore. Anybody who is interested, and if there is anything that you would like to tell us, you are invited to participate. This is something that NSF is running. It is called the pioneer array innovation lab. And with that, thank you so much. Please do visit us online. Bee

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Thank you, Steve. I really appreciate that you are here today. I am very excited about our partnership. This is so exciting. Thank you. When -- did we miss anyone ?

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Sean Duffy? Do you want to unmute yourself, tell us your name, and where you are located? Do not hesitate to unmute yourself. Will you tell us where you are from, your organization and your title?

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Thank you. My name is Sean, I am based here in New Orleans. I really appreciate and appreciate stepping into the kosher role. -- co-chair role. It is great to have a lot of eager participants in this effort. And at some time, we will probably be able to give you a better update.

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Thank you, Sean.

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I am going to pass the microphone to Nicole. We have coastal data formation for resilience. No call? -- Nicole?

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It is my pleasure, my name is Nicole . I am honored to moderate this session. Audra, do you want to introduce yourself?

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Thank you. I am enjoying this panel. I am a program manager, I look forward to this panel. And all of the act entities that we may -- activities that we may discuss.

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We want to respond to the challenges on the coastline. Here we have all of the bios. I would like you introduce the senior adviser, Mark Osler. He is a senior adviser for coastal inundation and resilience. He is part of NOAA leadership, and he also represents NOAA. Mark?

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Thank you, Nicole. It is my pleasure to be here today. I went here in the spring of 2019 so it is really great that I was invited back. I am very pleased to be part of this panel discussion.

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Sealevel rise, dramatic shifts, and water levels. High tide flooding. This is impacting states, and the ecosystem. Millions of people and billions of dollars are at risk. And the future is going to be even more severe. The flooding frequency, has more than doubled since 2000 because of the sea level rising. We have now [Indiscernible]. This increase in floating and hazard represents a threat to our national security. And our response to this threat, require accurate data, mapping in order to quantify the drivers. To improve our understanding of the risk of the coast. To enable sound public policy. An informed decision making. The whole of government approach is required to understand this crisis. I want to think the U.S. geological surveys, to be a partner. Thank you Hillary Stockton. Hillary has been a tremendous leader and supporter. It is a pleasure to share the stage with Dr. Stockton. We were reminded earlier today that this is a new administration priority. First, policy decisions about improving coastal resilience must be informed. Especially those who are going to be impacted by the decisions. Equitable outcome rely on equitable access to environmental data. With regard to NOAA data, there is critical gaps in coverage that NOAA would like to invest . We want to look at our nations rural coastline, in particular Alaska and U.S. territories. How does this relate? It does requires an understanding where the land, water and is see -- sea is related. Here we have data, and reference system. It is therefore a foundational datasets for the nation when considering coastal resilience. These datasets are provided to the nation not because of the importance to coastal resilience because they are required by the navigation services . I want to invite the audience to observe this reality. This is a vital but secondary program that is part of the mission. When it comes to coastal resilience these foundational data are not nice to have, but it is a singular resource. For every state, local, federal, tribal, private or nonprofit. I believe there exists a narrative that will help folks understand that NOAA navigation services , Ray lie upon a common set of technology observations modeling data, and spatial reference system. One area, that we can make a very important contribution, we can contribute to developing and community serve. Congress has become a partner. A budget was passed by the end of December, it was \$2 million directed for NOAA for coastal resilience . And this includes to initiate and accelerate efforts to integrate coastal observation, model and service delivery. Congress also directed NOAA to report, both is the windshield. The first report will highlight the need to expand observation modeling and service delivery. The second report will cover a five year research development plan for service delivery. I am pleased to need these reports. Both will be written in a complementary level. To maintain and support foundational modeling. Both reports will give both a voice. And both with other federal agencies and other governmental entities, academia and the private sector. We have to act and provide a survey on coastal states. Congress returned [Indiscernible]. This is the work that will be provided by the program, will only increase [Indiscernible]. The financial is also the life blood of our nations coastal resilience goals . And to provide access to this information. It is vital that NOAA programs should not choose between success of their navigation versus coastal

resilience. We want to find durable ways in which we can Axtell Excel. To enable a more resilient nation. Nicole, I will pass us back over to you.

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Thank you, Mark. We can get the panel started. The first speaker, Katrina Wiley, who is a physical scientist. She is the operation team lead of the national [Indiscernible] source. Katrina?

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Thank you. Today I will present on [Indiscernible]. Here are policies that well highlight the importance. There is that presidential executive order that we heard about early today. This is about the infrastructure and it has to be publicly available. NOAA will map [Indiscernible] our job is imagery. Because of the mandate that is listed right here. This is important to the nation, and Mariners safety. Here we have data that was collected on a designated area. Here we have teachers, to update the chart product. This imagery, what has been a traditional [Indiscernible] of different sources. It is being reimagine and the next generation will support navigation. This is the Bathymetry . To determine the best available data. We call this the national imagery. The next generation products are currently being tested in Los Angeles and Long Beach, California. This screenshot on the right, is coming from a pilot. She can set her vessel draft, and she can pop up to where she can safely maneuver. This will include timeliness data. And this is tied to commerce and safety. To make data driven effective, we need to gather all of these imagery's to compile the and we need to have these quality metrics available. To determine the best. And for informed and effective use. That data that should be captured, how deep? Who collected it? How can we use it? To know how deep it is you need to know what that daddy is referencing. Here we have horizontal and lyrical vertical. We have to ensure that we are treating this data properly. And here we have products, and collapse. We can export [Indiscernible] data transformation models. How well do we know it? Quality. That is vertical and horizontal coverage. Look at the bottom right. Coverage can be a combination of sites. Feature detection and variation. Here we have standard quality metrics, and increase the input from automation. Here we have imagery, crowd source, magna data metadata. And here we have [Indiscernible] tables. This will let the user know how deep it is, and who collected it. Once the area is map may not mean it will stay that way. It is important to make sure that it is available to the downstream user. On the left, if you would collect you can see that resources. And you can see one is 10 years earlier. The image on the right, is the health model. And now you can see that decay, and the number of storms, and that debris. This allows for the newer or lower quality data. The team is building this national image for the region. This is maintained monthly. We are building out the Gulf of Mexico. This supports navigation. So we have to produce the best imagery, keep updating it. This imagery is important to more users. It is important to the public and industry. And this example is [Indiscernible] sanctuary. To determine where species live, breathe and live. This area, understanding this imagery is very important for city planning. On the right is a picture Rhode Island. And here we have a wind form farm. This example, is a long they coast. This is going to get [Indiscernible] like determining the outbreak in the levy. Accurate elevation models, well engineers make informed decisions. In partnership with Maine, New Hampshire and Massachusetts, are using this product in the Gulf of Maine. As the primary input. For example, bridges and valleys. Four the classification, look at the bottom right. If you

look closely you can see this pilot area indicating low [Indiscernible] because this area has not been mapped. So the quality metric is very low. Now you can see [Indiscernible]. I am talking about coastal resilience. We are also talking about flooding, storm surge and sea level rise. This is Coney Island. These are the contributing sources. The are there vertical and sent to D -- uncertainty. This is critical for models. This predicts [Indiscernible] and for example this is category two. This is my final example bit this will communicate maps, coverage and quality. And wet requires new data. And this directly supports this layer of this model. This will help the next generation. And it will support modeling, and we do have other recommendations. Downstream users need to be educated in Bathymetry. To provide access to data is important. And it is important for [Indiscernible] to identify their priorities. Thank you. And here is our email address in case you have any other further questions.

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Thank you, Katrina. We appreciate your recommendations. We are going to hold our questions until the end. The next speaker, Dr. Hillary Stockton. She is a research oceanographer. Hillary is the executive director for coastal marine hazard and [Indiscernible]. Today, she will talk about her research on storms and the community. Hillary?

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Thank you. I am excited to present my work. This is a collaboration between NOAA and USGS, to predict coastal change. I will focus today on the importance of understanding the unique expertise in order to address these questions. And the importance of having a strong collaboration. Before I get started, I have a story. How USGS had a moment of recognition. We are a research agency focusing on earth science. There are several processes in which we understand or create models or explain them. We did not focus on service delivery. But hurricane Sandy change that. So now we know the importance of earth and [Indiscernible]. On the left is an image that we produce. This is an early forecast regarding the impact from hurricanes. About a week after hurricane Sandy, I got a telephone call from a Captain from the fire department. He was standing on the beach, he took this picture which is to the right. He said, I showed your map. But I am looking at a beach, there used to be a Sandy right here. I knew what was going to happen. He did not have any updated data. I said you should go talk to NOAA . Because they probably have the best information. And at USGS we knew we wanted to be part of this process. So this is when we change our thinking. We wanted to move beyond the fundamental science. To produce science that people can use. Whether you are a federal agency, or if you are in science or if you serve the public. We were motivated by a clear need. How much will the coast change and when? We wanted to look at start science. We wanted to look at models. We wanted to say something about the coastline. And because of the complexity of coastal issues, and the scale of these problems, there was no way that one could do and allowed. We relied on a strong collaboration, with each organization. We wanted to address these challenging questions. This is what we have been thinking about. I would like to focus on the national operational forecasting of water levels. Also coastal change. There has to be motivation but with a clear need. Here we have a picture of a very cold winter storm. We got a request from some weather forecasting offices. They wanted to know what it meant if the offshore wave height change the level of the beach? So we were looking at

two meter waves. Sometimes it would mean the road was over washed. NOAA leadership had the same awareness. What is the wave? What is the part of the equation for total water levels? What about storm surge and that tide ? What is changing the landscape? What is causing the damage? There was a report that was published after hurricane Sandy, they found that the forecast lack guidance regarding waves. Little did they know there was another part of the federal government, USGS, developing system for forecasting coastal system, corrosion, over washing, flooding. Here we have a log scale protection and sea level rise. This is dependent on observation models. And heavily dependent on NOAA observation. Water levels and search. U.S. wanted to know what the land would look like. And we wanted to look at the interface between the coast and the land and describe the interaction between the two. Based on these models we now know how that land will respond when there is a storm. Here we have long-term. And we can provide this information that is needed to address Pro program questions. Some of our first attempt to do this, this was an observational tide wave. With the hurricane, we used the model to forecast the probability of coastal change. This is a product that we use during hurricane Sandy. Years later this is hurricane Dorian, this is 2019. We are providing actual data, and mapping products to the users so they can take the information and combine it with their own maps. Here we shall erosion. And here we have a high probability such as where a road might over washed. Or what will end up underwater. And this is USGS and NOAA providing lidar information. This is triggered by the national hurricane tracking. And so the product is updated. And again this is provided online. That forecast is triggered by a hurricane sitting offshore and threatening the shoreline. Not all coastal change hazards are national. This is the Outer Banks of North Carolina. A couple of weeks later this is what happened. This is a big wave event. It overwatch the sand dunes. And this is a single road going into the community. And it was underwater for several days. This is when USGS and NOAA came together. So we wanted to look at the total water levels at the shoreline. We wanted to detect if there were any changes. We have wave and weather conditions. So we can address local concerns. This product would include magnitude of the water level in relation to the land. It is also a time series, that will show the duration. We learn from NOAA , we want to provide data that is understandable for the public. There had been a purpose for this product. And this is where we came together to develop the operational model for total weather and water levels. At the time of this collaboration, NOAA was developing the prediction system. This was a wave model that was closer to the shoreline. And this is what Katrina just describe. So we wanted to look at the ways. waves. We wanted to take about how the water and land interact with the beach. And NOAA , would provide models, the wave type and search. surge. Another valuable report is the infrastructure they had for computing this information. And no one -- and NOAA does provide this information . This is the result. This is a six day forecast, this is a six-day hourly forecast. The figure in the middle, is a time series of the water level. This is the water level went high tide and the wind surge. You can see the elevation of the water marked. This is uncertainty, you can see this in the Blue Line. I have a movie. This is a profile view of the beach. What we are watching is the water level that wears over that do -- dune crest. This information is at scale, here we have the forecasters at the national weather Center provide guidance on high level waters along the coastline. Through the National Weather Service we are implementing this model. The director of

INSEP this is for all of the Gulf shoreline. We have about 4800 kilometers of coastline. West Coast is under development right now. We will implement it by 2022. We are also working to expand the complex environments, compost, coastlines, and also the Great Lakes. This is an example, and this is probably some of the favorite work that I have done here at USGS along with NOAA . This is Bob about how high the water is going to be. And because of this, and the complexity of this problem we did have to work together. We wanted to pull together a unique but complementary expertise. To provide a reliable and useful information to the stakeholders. Moving ahead, I have outlined some of the key pieces that NOAA and USGS will work on your we will continue to focus on the West Coast. And we want to use this information through the national weather Center. The models are displayed right here. We are really leaning on NOAA and their expertise . USGS will focus on developing models for the more complex coastal environment. And also model validation. We want to improve the model to provide accurate information up and down the beach. One key component of this, is the observational system. We want to verify the model. And to support the research, and to increase accuracy. Both groups need to maintain our connection. So that we are addressing needs and providing information that the user can use and also in a way that they can understand it. We have been working with the weather service center, we were working on the weather scale. We have been talking to NOS him about using a similar framework. Looking at different projection scales, over the decades. What we can expect regarding the water level. And again this is work that we could not do it alone but we had to work together. It was all about collaboration. Thank you.

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Hillary, thank you. That was a great example about collaborating between agencies. I know a lot of coastal communities rely on that fool. For their hurricane preparation.

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I do have one last fly, it is all of our collaborators from NOAA .

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Thank you. We are going to move to Dr. King's men. She manages [Indiscernible] program prior to joining NOAA in 2015. She has mapping activities. She is also on the faculty at the University of Alaska.

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Thank you. As we have been talking about today, we do need to map the coast. We need to look at sea level rising, erosion, and using spatial data. It is absolutely imperative if you want to create quantitative coastal resistant products. This includes everything from creating [Indiscernible] services that underline what we just heard about the with a total water level viewer. And doing things like documentation of the national disasters, sea level mapping. And coastal harbor engineering. And this is that framework. To house the data that we are collecting. This is the first step for spatial data delivery. The and SRS is what I am going to talk about today. This is common, this is the framework that is shared by all civilian and federal agencies. You probably heard about talking about the NRCS . When it comes to coastal resilience but in areas that have a lot of change, with as much fidelity as possible. The example on the slide, we look at the FEMA flood insurance map. It is important, not only are these areas are changing, but there is intersecting with a built in environment. Typically, we think about levies, harbors and our own homes in a fake sense. And we do not like to associate with

moving around all of the time so it does require a spatial system, for these dual needs. And to fulfill my primary mission, as we are doing so we want to recognize that [Indiscernible]. Two meet the expectations of the user. And how to improve consistency. But not to depart from that characteristics. We are modernizing, and this means replacement of [Indiscernible]. We have to have consistency. There are modernized systems that I would like to touch on today. This is GPS-based access, and time-dependent secret this is the ability for every single department at NFS to have latitude, longitude and data that is associated with it. Looking at that undergoing change. Looking at metadata. I do not have time to go all the modernization NSRS. We have foundational [Indiscernible] I think about it how it is like the port system. And together this is the benchmark and it allows us to track the change. And maintain relationships to the international frame. And this project is a model that have real-world significant. This is a bridge between you get out of your GPS and the height that you would like to work with in development. Even if you have a perfectly deaf I NSRS, we have to provide access to NSRS with all of these foundational [Indiscernible] in place. It should be available with geographic coverage when necessary to provide access nationwide. One example, the [Indiscernible] project is one of the reasons why we have to delay the modernization of the NSRS, because it is foundational that it has to be in place before we proceed . This is how we are defining the model at NSRS. We want to talk about coast. This is how the sea level is being considered without surrounding modernization but this figure is directly from one of our blueprints. And it will talk to about how the height, what is calculated to sea level. And then a standard sea level and mapping [Indiscernible]. And with a GL model. We know sea level is rising. So the definition of what zero is needs to change as well. This will probably happen in about 50 years. When the zero surface is no longer allied with the surface of the United States. Sea level itself is inherent to the definition. So coastal changes is part of NOAA definition .

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This is a picture of Alaska. This is Western Alaska. It is very difficult to find places like this. It is not linked to a national benchmark. So local marks are not stable because they can ship because of surface change. So we want to have a weather service forecast that will be linked to the height of the infrastructure like airports. And here we have an employee from the state of Alaska, who can reliably Mark [Indiscernible]. And this will allow it to be compared with other data, models or historic models. And the added value of the modernization and SRS in this tool is showcased. And when we are considering NSRS, we have to think about the importance about where things intersect and the structure. I will show you a quick example. So what are we talking about when we say time dependency? With the new modernized system? And this is what I am talking about. Time dependency is important because it can be a big game changer for NSRS. And here we have two ordinate that each has excelled purpose. The full benefit of the NSRS , is apparent in the land level changes in the coast. And this example, this is stable at project scales. This is the height, construction parameters, and levies. And they are easy is fixed and -- And RES is fixed. And here you can see the land is exciting. We have the ability to survey. And we observed this mark on an annual basis. Now we can see how it changes over a global fence but and this is gonna be helpful if we want to understand the change or if it is overtopping the levy or something like that. And better yet we can put [Indiscernible] in the area. Then we would have a coordinate

function or an active picture with all of the seasonal variability is. Within that area. And it will give us a better way to understand how that is going to change relative to the world around it. I want to talk about the use cases. This is part of their modernization. And I think this is important to coastal resilience. And this build upon password dad NGS did . It will allow us to think about how this is going to change and affect the workflow. First of all, there is going to be the initial shaft then there is going to be a drift up on how we work with time-dependent coordinates. On the transitioning piece, I want to reinforce the competence comments that were made. This is the transformation tools, both within NOAA and this is available products and software. One of the other things that we learned a lot, as we were going through this experiment. Especially with flooding but we were looking at what is specific to FEMA leading insurance program. It really does not need to change that much. GPS access makes things more convenient. As you can see with his picture on the left hand side. There is a nationwide consistency because everyone is using the same vertical data. There are more tools that are available to professionals to evaluate the coordinates that they are surveying for the project. But the real value that comes out of doing experiment is not how the workflow works today but how they can actually change and leverage the capability that the modern NSRS has come using this dependency and think about how we can create products and tools and make them more time-dependent themselves, it is exciting to think about the places that we can go. We need to ensure that that groundwork is in place to support this. And this is going to show the earth quests and the stormwater search during hurricane Harvey. I showed you this, we are building tools, that are user-friendly in the modernized system per we can start to imagine operational, things like that you see to the right. Using the data from this [Indiscernible] for mapping of the coast and translate that into decision support. This was already laid out by HSRP. These are the recommendations regarding coastal change but before I get into my closing recommendations. I want to share my own personal story. I came to work at NGS, I used to manage the Alaska hazard program. I have witnessed how there were barriers to the products to the community. When it operates in the background seamlessly, and we do not even think about it when we are making a decision, it is exciting for me to be part of the modernization and this modernization will ensure that the entire system is has insisted access. There is no reason why a small town in Alaska, should have any different access to the NSRS framework. To enable them to conduct surveys, or qualify for disaster relief or the assessment of the local trends. So this is exciting because it is designed for equal access. This is a framework that should be available to the entire nation. I have a few recommendations. First, the importance of advancing NSRS modernization projects . I showed you why that was important for equitable coverage. And we need to do this sooner rather than later. And taking years of data that is required to be able to make projections accurate as much as possible but we also need IT support in place to make sure that we get that data as much as possible. Education is important to provide [Indiscernible]. And lastly to have the right technical assistance, and the right partners, will help us implement this fully. And leverage that time dependency of the NSRS in the future data driven case studies. Hopefully we will be able to talk about these opportunities.

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Thank you, Nicole. It is so wonderful to see your enthusiasm. We are behind schedule. We will move on. I was just going to say just a few words. Gary has worked with [Indiscernible]. He has been instrumental in modernizing. And serving on the team that conducted the lighter [Indiscernible]. Gary, take it away.

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I would like to to show you a tool, called FIMAN here in North Carolina. And the goal is to provide real time mapping. So that we can have both occurred suggestions conditions. And so that we can realize what is going to be impacted bear we want to have the local government, the public. And we want to have data. This is a key component of the system. The most important is the genetic network. This is the foundation for all of that data that we collected with the state [Indiscernible] the imagery, engineering surveys and the mapping program. It has the same horizontal and vertical [Indiscernible] will uses data. For the risk-based decisions and projects. For resiliency. And climate. You will see as I go through the network, it is not just includes gauges. These are all of the components. And this is just an example. And here we have communication. Depending on where the gauges are located, we use different types of communication. We also use NOAA satellite. In New England we use [Indiscernible] . Because they are the best tools, and they will get that data into our system. I will show you an example? And here we have a library. And the engineers did develop these libraries. This is a lot of the data that we collect, allow the engineer surveys that we collected and other information. So the system does not have to keep this on [Indiscernible], that way they can quickly display that. And that way you can communicate with the user. When you go to this, you can see this is our screen. This is the network. As I mentioned this is a partnership federal, local and private sector can include gauges within our network. And it is color-coded, and green is good. If you click on it one time, a menu will pack up pop up.

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[ Captioner transitioning ]

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The contract is not fine when the rivers are on the other banks. We use this as a tool to know when they can fly in the area they are collecting. This is the dashboard, as you will see on the left, it is collecting all information. Not all sites have weathered sensors but they do. The stage and our gauges are referenced. This site has flow, by the flow information, the middle is a hydrograph. This is a forecast site. This shows you the current condition and also the forecast and then the information and the impacts. I will show you how we are utilizing our data to determine the impact to build this. You can see, if you will click one time, we bring up the dashboard. There is current scenarios and forecast. All gauges have a current tab, not all have scenario and forecast. If it is a national weather service side, it will have scenario and forecast information. This is used by the public and local governments so that if there is an assumption of how high the water will get, they can use this scenario to visualize what will be impacted and the impact that gauge site. So this is just a view of current inundation at this stage in Greenville, North Carolina. You can visualize, this is one of the libraries that is being visualized. You can see what is flooded, which roads are flooded, and which building areas. If you look at one of the dashboards you will see the building impacts from this current condition at FIMAN. Click on the hydrograph, you can see this is a forecast site.

It will show you the history of the water level at that site. Also the forecast level. This is a great tool for the citizens and the local government because they can see if the water will continue to rise or are we in a downward trend. If you click on the building impacts, you can see which buildings are impacted, the number and amount of water. To be able to do this because we have surveyed all of the buildings within the special area of North Carolina, referenced them, and incorporated that into a database so that we can intersect the interrelational library with the footprint. We can determine how much water is in the buildings and the numerical impact of damage to those buildings. If you click one more time it will expand that. As you can see, it is broken down by the amount of water that is in the buildings, if they are commercial or residential. This is a tool that we use post storms so that we can do a quick evaluation of how much damage has occurred around that gauge location. Next slide, please. This is how as I mentioned, we have surveyed all of those with the special flood hazard area. We used a combination of traditional surveying methods and traditional LiDAR to build the models. That was created into a database that is used in FIMAN to determine the impact to each building as the water rises. So then we also have built into it so that local governments and citizens can set up alerts. If you click one time, you can see the triangle button there. If you would like to set up for this gauge, you click on that button, just advance the slide and then one more time. One more time. There you go. You go through and you can custom create your alert to what level you want to be alerted and is it rising or falling. You can receive both emails or texts, one or the other four alerts in the area. So this is flood scenario mode, there is a toolbar. What you can do is if there is an assumption of how high the water will get, local managers and the public can visualize that to see which buildings will be impacted and which roads will be impacted. If you will click advance slides, it will visualize, you will see as the elevation changes, notice -- keep clicking. Just advance the slides and it will change. As you can see, as the water level rises, you can see the impact. And as the colors of the buildings change, that tells you how much water is in the area. This is a great tool for the public and emergency managers to determine what roads are going to be impacted, which buildings, which evacuation routes they can use, and do they need to evacuate as the floodwaters rise. Next slide, please. We also have our gauges on the coast that we have in both FIMAN and USGS. We can do the same thing along the coast. You will notice there in the dash board, it provides you information about the number of buildings that are impacted and the estimated damage that has occurred. So, after hurricane Fran and Florence we saw the need to expand FIMAN. Because FIMAN is basically for buildings. So, we are not partnered with our department of transportation with the North Carolina DOT to enhance FIMAN into FIMAN-T. FIMAN-T instead of focusing on the buildings it focuses on transportation corridors. Roads, highways, bridges, railroads. And you can see the dashboard is the same thing but instead of building impacts it will provide you wrote impacts, it is the same dashboard current scenario forecast. And this is just an example of showing the buildings but instead of water, it tells you and visualizes you of how much water is on the road and the depth of the water. Also critical infrastructure that the DOT uses. One of the things that we are doing, we just recently partnered with NOAA to upgrade six of our gauges sites to standards. Also we are working to incorporate or install those gauges. This gauge location, we have [ Indiscernible ] that is part of the network that is located there with the gauge. We are looking to our coastal gauge to see

if we can estimate us the water level elevation. One of the important goals to support FIMAN is to do quality control. Post-storm, we sent a survey crews out in partnership with USGS , the Army Corps of Engineers, Department of transportation to survey the high watermark get. We can survey the level but we can do quality control on all of our models that we have developed. This is a tool that we developed, a phone applications that citizens can use, local governments can use where they can mark high water marks, photograph it and it saves them in the database and then we can send survey crews out post storm and survey those and add that high watermark to our database. This is an image of our model and the lower right is the actual survey of where it was. In this case, the model and the real world matched and that is what we are looking for. So, FIMAN this is just to show you the importance of FIMAN. This is our emergency operations center on our main screen. FIMAN is usually displayed almost all of the time on that screen except for briefings. It is a way for everyone involved in pre-and post-storm to get an idea of where flooding has occurred and help plan for recovery activities and other activities during the event. This is during hurricane Florence and you can see all of the gauges that are purple with shows you major flooding occurring. So, we are currently in the process of installing 71 new gauges and you can see the ones in green are where we are installing the gauges that will be added to our network. We also partnered with the USGS as they had gauges and local towns and cities. Our network will continue to grow in FIMAN . Our goal is to have a gauge in every community that has 100 year floodplain. That is our buildout plan for our gauges. Next slide, please. In just conclusion, as I mentioned earlier, our control network is critical and we have been able to develop that over the years with our partnership with the national geodesic survey. That is makes all of this possible as we collect data and use it seamlessly together. Thanks, Nicole.

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K, Nicole. Mark has to sign off in about two minutes.

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Mark?

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I was not requesting to give final comments but I'm happy to celebrate the array of federal, state, and local activity that we saw here and the degree to which the federal contributions are unique and important in empowering the kind of local activity. All resilience is local. The federal government cannot manufacture resilience and delivered in a package to everybody. It takes that transition from the federal to the state, to the local. I really appreciate hearing how the partnerships that are described by the work that we heard from allows for that. It is great to be a part of that discussion and appreciate the trend for keeping those discussions on the agenda.

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I think that that was a great closing to this panel. I would like to thank all of the speakers in this session on coastal data and information systems for resilience.

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Thank you, Nicole. I would like to also thank Mark for his participation today and his clear compelling points about the foundational importance of the navigation services program Stata. Thank you, Mark. I appreciated your comments and I appreciate your participation, so thank you. I would also like to thank Nicole and Audra for moderating

today's session. I would certainly like to commend Katrina, Hillary, Nick, Gary for demonstrating how these roles fit together to provide the American public with truly valuable resilient services. I think the suite of these presentations today really put a nice bow on how all of these things fit together and painted a very nice clear picture for that. We have had a number of excellent discussions with the panel over the last three years and discontinues that dialogue and I'm sure it will continue to have this in the upcoming years so that these innovations and operations can fulfill the interests of NOS and the administration. I have to apologize, I will need to depart early due to an unforeseen conflict that I had emerge so I will need to depart so I will leave you in and's very capable hands to do with the public comments and with John and Lynn, who are my co- [ Indiscernible ] to help close out today's session.

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Good to see you and we will see you tomorrow. Thank you for everything, the moderating and the highlights and comments you have made. So, in the interest of time, the remaining topics we have is first of all public comments or questions and then we want to move right into the panels ability to ask some questions or make some comments as quickly as thoroughly as we can. We have a hard stop at 5:30. I apologize ahead of time that we will cram a lot into the next 45 minutes but that is the way it has to be. The last panelist did a great job and the topics were terrific. The information is terrific. With that, I will ask Lynn to help me out with questions and comments and in the meantime it is raining really hard here so I apologize for the noise in the background. It is not raining as hard as Julie's place, so you might have to moderate for a while.

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I don't hear your rain but that is fine, don't worry. Better than ice, right? We have a few public comments. We will ask the folks to respond. If there is additional comments, can you put them in the comments box. Dennis Haynes, he has a comment for Ben Friedman. With respect to equity, diversity, and inclusiveness, priority. It is understood that NOAA is supporting the IHL assembly adopted, apparent women in high drug or fee initiative. Are there some targeted actions that NOAA will deploy to engage into the specific initiatives over the next years and the U.N. decade of ocean science for sustainable development, more specifically in collaboration with the U.S. Canada hydrographic commission.

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Can you hear me? It is great to see you all today. I would like to thank Denny Haynes for the question. So the co-survey has submitted a letter of support to support gender diversity that is being considered in the context of the IHO capacity building steering committee. The Canadian government is contributing resources including expenses for women in high drug or fee. The support offered what is essentially no cost development opportunities for up to three individuals that of the board NOAA vessels. All of these commitments are contingent upon opportunity and safety. Obviously COVID was a consideration right now. And OCS has made an additional offer of support which would include transportation to NOAA vessels. We think that this is a great example of our partnership with Canada. In addition to the U.S. Canada hydrographic commission which is where we frequently interact with Canada. We expect this initiative to run from

2021 to 2025. It should serve as a complement to the decade of ocean science for sustainable development. We believe that the proposal promises to make an important contribution to the field of hydrography by empowering a significant segment of the future of the discipline. Thank you for the question and I hope that addresses it. Good to see you all.

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Thank you, John. The next comment is from Bob McConaughy. He said is there an anticipation and date for graph D in Alaska? All of mainland Alaska is now completed was the answer. We are waiting until we can get back to the western half of the Aleutian Islands sometimes in the next couple of years. I don't know if you want to add something to that. You can let us know but otherwise we can leave that. Alan commented on a presentation, he said it was nice to see the success of the sale drone from the national oceanographic funding. If you want to make any comment about that, you are free to do that. Ashley Chapel said regarding Steve's work, the oceanic graphing campaign project. Mark Luther commented to Steve for the record, Steve gives me too much credit. I've been involved with the Tampa Bay ports since 1990 but it's development wasn't all NOAA a compliment. I took over local management after the system was declared operational. I have continued without sense. If you want to make any comment about that you are welcome to. Dennis Haynes asks Juliana Blackwell, thanks for your very good NGS presentation and congrats for the trend at Trent eight. Will the new data include the integration of a continuous vertical data surface representing the lowest astronomical tides chart date as we here for hydrographic and electronic navigation charting. If you want to make the comment.

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I will check in response to the question regarding the data and get back to him. I don't feel comfortable with that pentacle question answering it at that time.

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John Kelly asks Dr. Hillary Stockton. After this, I don't have any other comments. If there are other comments, can you please put them into the question function. Is the national water partnership system forecast system for both extratropical and tropical cyclones. If yes, what storm surge model output is used for extra tropical cyclones? And if we could get Hillary, if she is still on to answer that question. And the trend for can have any conversation they would like.

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This is Hillary. Under normal conditions, the model uses the extratropical surge and tied operational forecast system. Under hurricane conditions it switches to P surge from the national hurricane center.

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Great.

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Can we go to the panel now?

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We still have public comments. I will read you two more. For Dr. Kinsman, this is from Chris Freeman. The NSRS is exciting for those in topo MAPI monitoring fields but there will be challenges for those groups collecting long data sets. We have a 22 year and running Shoreline monitoring program with at least one or two data sets per year. We

have had several adjustments over this time NVD 29 two NVD 28 with changes, datum that has cost our partner considerable dollars over time. We recognize there are nice tools to help with my question is as NGS works through the modernization, has there been recognition of the significant challenges and how NGS might aid in additional flow works or grant programs to help with the understanding that many of the long-term programs we work on -- it has gone into and I don't know how to address it.

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I will address that briefly. One of the nice things is that we are incorporating lessons learned from previous modernizations. As we continually improve the system, there is growing pains. One of the things we are taking the time to do and one of the reasons we have the latest that we want to bring sure that we are bringing as much experience as we can to make sure that the tools are in place to minimize that impact to the extent possible. I will add on that to invite Chris to contact us, we would like to go through some of the things specific to that area we are talking about and incorporate them into our incorporations with our thought experiences and some of our use cases. The challenges that you have faced with previous updates to the NSRS.

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Great, thank you so much. So, John says I would like to acknowledge the importance of sentinel stations with [ Indiscernible ] with co-located was instrumental to open the entrance to Lake Charles, Louisiana after hurricane Laura. This was the only operational station in the area after Laura. I would encourage NOAA's effort to open the entrance -- to continue locating the stations where practicable. Should we provide him an answer later or is there someone that would like to talk to that?

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He is not really asking a question, thanks, John for that input, letting us know how valuable that was and we certainly recognize co-locating the technology with our stations. We are working on that as resources allow.

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Thanks.

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Today has been very informative, discussion on coastal resiliency has been exceptional. During the session, the importance of the water levels and time dependency has been highlighted. Both land and sea level are moving, the data must become out of date and are no longer representative of the current sea level. This seems like a great opportunity to leverage long-term data levels to develop a title datum and the transformation tool. Doing so would reduce errors in datum, transformations, improve storm surge modeling and better align title datum's with the modernization effort. Would someone like to talk to that?

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This is Rich again. I think that Nathan is referring to, we do update these to reflect the current level. We are in the process of doing the next update. I think what Nathan is asking for is there a way to transform between the different titles, the past ones that have been in effect. Just as there are different metrics for their systems. That is what the tool is for us to do transformations. We would have to look and see what the demand is for that type of transformation. And if there is an demand there, we can

consider building that into the current tools. It does not have that capability. I guess I would ask Julie if she would like to comment on that as well.

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The only other comment is that we are trying to co-locate continuous [ Indiscernible ] and stations and tied those together better. Anyway that we can do that to get the feedback from our stakeholders who are interested in making seamless connections not only in current time but also between past datum's and from the water data. We are working on that in general. But the specifics to the different title datum, I think we will have to look into that and see how that can be incorporated. I don't have any other specific comments.

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That is going to conclude the public comments. If people have additional public comments, we would love them. We will have more time tomorrow. You can email or pop them into the question section. Please feel free to contact us if you have something, anything that we can get in advance. There are comments, on the presentations, that would be great.

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In the interest of time, everyone. I'm going to start with the HSRP panel because none of you had a chance to speak. I do think the panel members, all of the information was incredibly relevant. Let's not forget the comments from the public and the comments and the highlights that they brought up were really good. Please please do some more tomorrow. Let's start with Gary. Do you have anything more? Do you have anything you would like to add?

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Just a good session and to show you the importance of partnerships with different agencies at the federal, local, state, and the importance of modernization of our network and the importance of keeping data up to date.

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Julie, if it is okay I will put you towards the end. Captain Sal.

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I believe he is unavailable at the moment.

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I don't have further comment at the moment. Thank you, it was a good session. Thank you.

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Captain Ed page.

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I am just nervous about my presentation tomorrow. I cannot compete with all of the sophisticated knowledge and impacts. Very impressive with all of the things we have done. Very proactive, squeezing so much out of technology, it is very impressive. I am humbled by what I'm hearing from everyone. Good job, good stuff. That is all I can say.

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Captain and McIntyre.

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She had to leave.

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I have her comment. She said, thanks to all of the presenters. My take away is how technology has moved along and speeded and improved decision-making.

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Okay, Dave McIntyre .

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I have been impressed by Gary Thompson for 22 years now. With North Carolina and Gary in a leadership role has really shown the country how to do a lot of things in flood plane management. I'm continuing to be impressed by him. I am pleased to hear the coastal resilience which includes subsidence. It is not just sea level rise but subsidence. We do have satellite-based tools, satellite synthetic Aperture radar that can measure the annual rate of subsidence, we are talking millimeter level subsidence when compounded with sea level rise has an impact on coastal resiliency to predict what the land is going to do in the future so we might want to look into that in the future as well. That is all I have.

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I want to mention that Julie and I had chatted earlier and we would love for people to make a comment about today but any party they have for the recommendation letter, for issue papers, for something they would like to see at the next meeting, anything that trigger them for today.

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It is always a lot of technical stuff that is a little aside from my expertise a couple of things that stuck out. What I wrote down is that if there was a mention of the importance of paper charts and the transition to the digital based database which I understand now and I have been playing with the tool. It still needs some work but I think part of it is getting word out to people and I'm also reaching out to the vendors to understand how they expect to go forward. Another comment that was made, and I think it was Ostler who said that not to forget that navigation services is an important part of NOAA's purview. Resiliency is important. With all of the time we spent talking, most of the hazards are happening in less than 40 meters. The idea of waiting until 2040 two have all of that properly characterized strikes me as a little missing something of what is most critical. Inundation is happening in less than 40 meters.

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Good point. Okay, thanks. Ed Kelly. You might be muted.

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Here we go. Since we have these every six months or so, I am getting increasingly amazed with the calculus, the rate of change, that technology is leapfrogging what we have seen before both in the ability to collect data and effectively use it. Dr. Stockton mentioned something that is the need to create teams and that is essential for us to be taking a look at on how to move that forward for systemic synergies, capacity connectivity. Can we create the files/copy scenarios where NOAA can be the fulcrum to create benchmarking and the evaluation of best practice and best products to expand and facilitate what is being done. The rate of change is moving so rapidly, we actually are at risk I think of going in disparate directions and we need to pull more connectivity and concentration onto what we need to do as and goals and NOAA would be the best centralizing force to move some of that forward. So my summary for today is, yikes. We are collecting more data, we are using it much more efficiently. Everybody's heading

north in disparate directions and how can NOAA pull some of that together? We need to take a look at and recommend. Maybe it is a separate department, maybe it is a new functionality, I don't know. Anyway, that's where I am today.

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Thanks. My big take away from today was that nearly everything we have talked about, or that was talked about by the fantastic presenters relates to some aspect of offshore wind. The new development happening off of the east coast of the U.S. and very shortly off to the West Coast and Gulf of Mexico, every single topic was relevant to some component of that potential renewable expansion of our energy market offshore. So I think we will talk about it a little bit tomorrow and talk about how we can tie some of that together but it ticked nearly every box as far as I am concerned with things that we need to be prepared for as we look towards moving energy offshore.

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Sounds like a really good topic for a technical discussion in the future? Next up is Lindsay.

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That was a big day. I feel like there was a lot of really interesting things. One of the areas, I was really pleased to see, I was unaware of the details of the new southern Florida center, the mapping center. Steve talked about partnerships and those sort of things. I'm interested to know about transferring technology to industry and others and what the mechanisms are in place for that. How the danger of forming too many partnerships that might restrict what you can put out and I think that is kind of important. I would be interested to hear from the joint Center at UNH whether that was the focus of the new grant. We have commented about that let you transfer over the time. Maybe it is a discussion tomorrow but there was comment early on about the response we had and the content of that. I was kind of disappointed in the implementation strategies, I did not see any of those recommendations there and maybe that can be a discussion tomorrow. Maybe subtle differences but I don't honestly see them in that. The other aspect I think was, there is a lot of things going on here and it is related to one of the primary things we mentioned, that is industry and nonfederal participation in these activities. There are a lot of things that we are involved in and the danger of being pulled in many places is drifting off from what might be viewed as the priorities of each section. That is something that would be for further discussions to address some of those things that need to be done. Can I also ask as a comment, I don't think it is appropriate for employees to comment during public comment. There would be probably something better outside for them to comment.

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Nicole.

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Thank you everyone for allowing us to pull the panel together and focus on coastal resilience today. That was a real treat. I thought that you had thought a little bit about the recommendations that the HSRP panel might make based on the thoughts you are getting. Speakers, thank you very much. If you would like to provide to us your recommendations, many of you went into a few at the end of your talks. We would like to have those written down to help us with no keeping and perhaps will be preparing a memo or updating our sea level rise wide paper as a result of this. I guess my overall

comment about the presentations is that the federal government has come a long way over the last couple of decades. When my career started, we were not allowed to think about property scale impacts. All of the maps had to be a larger scales. NOAA, the core, FEMA, they are getting better at zooming in and getting better at data collected at that resolution. I think the foundation in high-resolution accurate data was highlighted today and it is critical to the ongoing success of this mission.

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Thank you, Nicole. Thank you again. Sean Duffy.

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Thank you. I would like to just discuss as coastal resiliency, I was downriver in Mississippi, down below Venice watching multiple drudges all doing beneficial use. In that partnership we hear from the land owners, wildlife management areas about the impacts to migratory birds and the benefits of land critters, knowing where these areas are put up. Over the last few years we have been able to build the material at even higher elevations. A lot of really interesting stuff today, look forward to trying to bring it back to the Mariners but I am reminded of a comet that a colleague made about a half an hour discussion on different datums. We need just one datum. We don't need all of these. That is unfortunate, the understanding of some of the people that use the datum on the navigation channel. I think we have a lot of detail and how we work to translate that down to apply ETA for those under the waterways. Well done today, everybody. I appreciated being part of it. Thank you.

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Thank you, Sean. Qassim, do you want to go next?

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He may not be on the line. I will double check that. I think he might have dropped off.

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Julie, do you want to go. I would love to take two minutes. Is Hilary Stockton still on the line?

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I am .

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I have a really quick question. As you move into the West Coast, are you talking with Patrick and what is your interaction going to be with that? He is USGS, he has been proactive with the program on the West Coast.

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Absolutely we are working with Patrick and the whole team out there in Santa Cruz. The USGS has recently launched a program on coastal change hazards to make sure we are connecting the work in our different science centers, to transfer that knowledge that developed regionally and produced nationally where applicable. So, Patrick's team is part of that effort. They are starting to bring some of their work to the East Coast as well.

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I think that Qassim is back.

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Okay, great.

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Thank you very much, everyone. I did enjoy the meeting, the mix of topics. It was great for the panel. This is a nice direction to the problem. And then we moved to what technology can do, Larry did. The capability is amazing, definitely. And then we move to Getty, the modeling, which is really great, actually. I hope this experiment, what Gary is doing, can expand between agencies, like FEMA, probably, and NOAA to put their heads together. I'm sorry if there is one similar but what he presented and even in the New England area, it is a beautiful thing to have as national. It will take some Corporation between public information and industry and to have it is a great thing. Considering the modernization program on the datum, vertical, horizontal, definitely will serve the resilience perfectly. But that will drive me to the need which I have been calling to a national USGS center for coastal and oceanic mapping. We need one to serve all agencies. Every map agency has their own project specification. I would like to see that we push hard, as a nation, as NOAA to develop a national center of USGS specialists . Other than that, I thought it was a great day. Thank you.

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Thanks, Qassim. Good stuff. Anything more, Julie?

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I have been making a few notes as far as our letter to the administrator. Please send us more comments. We want to try to get that turned around as soon as possible, and we will have time to discuss it. I have heard a few of our panel members discuss topics that they are interested in going forward so we are definitely making note of that. You have all said so much about the presentations today and they were all great. It was really good, Larry -- I'm sorry, Larry to see your presentation and how it drilled down to local use for resilience and this interaction between the federal and the state. And that is it for me. I look forward to tomorrow.

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I know that Rick has left. Is Shep still here?

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I am.

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Please take the floor.

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Thank you. Great sessions, really inspiring day. I was really struck by how the resilience conversation has shifted over the last few meetings from sort of a description of the problem towards some sort of a shape of a solution. What sort of data really is useful and how does that tie to our existing observation and modeling programs and where the weaknesses in our science and where the weaknesses and opportunities in the way that we are organized. I think that we have come a long way and I am really excited about that sort of solution. I really wanted to tip my hat to the panel on that.

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Thanks, Shep. Thanks for the leadership and building this great team of this panel that is so energized and so aware and so active. It is really nice to be part of. Nicole, are you still here.

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You have Larry mirror, Rich, Edwing.

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Larry Mayer.

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I was impressed by the coastal resilience panel. I think what most thrilled me was to see the real sense of partnership of government agencies, states, but I missed seeing the potential role of the private sector. As we start focusing our coastal resilience, I am sure that there is an important role that the private sector can play and that would be worth our discussing a bit more.

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Thanks, Larry. Rich.

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I cannot say that I had any major epiphanies today. We have been working with most of the folks on the resilience panel, Hilary, USGS. Certainly, Gary is doing a great job with his network and effort down there. I always learned some good things but I would say, no major epiphanies to share with the panel. I thought it was a great panel.

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Thanks a lot. Giuliana .

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I also thought that the coastal resilience panel was excellent and I would like to thank all the speakers for the information they provided. It gives everyone a different perspective on coastal resilience and the different aspects of it. I thought that that was very well done and appreciate Mark's opening remarks and all of the moderators and panelists. That is all I have. Thank you.

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Thanks.

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Andy.

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Thanks, Ed. I just wanted to echo what a lot of folks have said about the great resilience panel, particularly Dr. Stockton's presentation on the partnership. It struck me that there are probably a number of other areas where that particular partnership can't go on. I was thinking in terms of NOAA's Hydro health model and some of the wave option information. I hope that we can explore some of those things in the future. The answer to Lindsay's comment about private sector tech transfer, that certainly was an element in the joint hydrographic funding opportunity and was a key part of what we expect from our partnership. Thanks for that question.

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Thanks, Andy. I'm going to wrap up with a few comments for everyone. First of all, to Larry, what is the link so that we can follow along with the drone? It would be fun to follow them along in their initial crews and activity. I want to comment on the diversity, inclusiveness and equity aspect. I think that that is a topic we will have to discuss internally. I will just comment from what we are seeing in the industry side of things, the timing is pretty incredible to me because this is a hot topic every single day for companies like mine. I think it is going to be pretty easy topic in terms of us all collectively being able to talk about it and see what we can do as for the request that we got today to add to the ability to recommend to NOAA on how to proceed on those topics. Coastal resilience, that question came up about the private sector in that. I can

tell you with absolute certainty, the coastal resilience aspect of everything we do in the ocean and on the land side of the coastline is a huge focus on the private sector side. So yes, I think it would be good to have these discussions that involve the private sector as well including technology transfers back ways book and forth between the private sector and all this great work by NOAA and the other agencies. How fast technology is changing, I will ask you all to think about in 2016. Larry was talking about this crazy concept to put the barge out there with the system for deepwater mapping. You can see the presentation today and I can tell you that no less than three other companies including our own are doing other types of things for autonomous ways to go collect deepwater data, I will stick my neck out and say by 2022 there is going to be at least four companies providing these types of sensors and at least one dozen, maybe two dozen of them mapping the oceans in 2022 simultaneously. Larry, kudos to you for seeing the future. Kudos for you on how fast we got there. And I think that is about it except to say that once again, I think everyone should take a lot of pride in the fact that the diversity of the topics we are talking about, the quality of it is just tremendous and watching those conversations and the comments that everyone is making, you can see how everyone is building on each other's understanding on this. Let's keep the focus on resilience. Something that is important to everybody and affects everybody. That is nice to see that it is being attacked so well and so completely by the federal government.

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We have a couple of minutes. I just want to say that I know for Rick Brennan, the discussions on resilience really resonated with him. He mentioned how much he liked the comments. Also, he is really wrapped around inclusion, justice, diversity, equity kinds of things. He will be able to talk more to us and what he thinks what he would be useful. And from you guys. And so we can talk about that in a working group meeting and in other public meetings too.

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Good stuff. Thanks to you and your team for another successful, very cool day, doing it virtually. Congratulations to everybody. Thanks a lot.

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I look forward to seeing everybody.

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See you later. See you tomorrow.

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Bye-bye, everyone.

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This meeting is closed.