I'm going to go ahead and he did over to shop so he can fill a little void here before we have the official kickoff. Shep Smith, please take it from here.

I'm Shep Smith I'm based out of Silver Spring, Maryland. Since March, I have been working from home in Maryland nearby. Today, I am coming to you from an undisclosed location for this meeting. Cochair Julie Thomas, no administrator Neil Jacobs, an assistant administrator Nicole above, transferred to Julia Blackwell, administrators which at wing. Codirectors Dr. Larry Mayer, HSR team member stakeholder partners and colleagues, thank you all for joining for a condensed today, to a half-day virtual meeting for HSRP . The hydrographic services review panel is governed by the rules of the Federal advisory committee act. The federal advisory committee act defines advisory committee is any the board, commission, council, task force or other similar group that dispenses advice to the president of the United States. They are professional bodies and as advantage of being able to circumvent bureaucracy and collect a range of opinions. In drafting the federal advisory committee act, legislators wanted to enjoy that advice by the various advisory committees is objective and accessible to the public by formalizing the process for establishing operating overseeing and terminating the committees. In particular, the act restricts the formation of such committees to only those which are deemed essential, let's New Paris to provision of advisor to officers and agencies in the executive branch of the federal government, and limit the length of terms during which any such committee may operate. Further, the federal advisory committee asked was an attempt by Congress to curtail the rampant cloakroom discussions that had become prevalent and administrative discussions. These cloakroom discussions are masked under titles like task force subcommittee and working group meetings, which are less than four meetings and so they do not have to be open to the public. FACA declared all meetings were to be public knowledge. I had the pleasure of meeting with Dr. only 90 in developing the national ocean mapping and characterization strategy released by the White House in June. Along with Alan and Dr. Jon Hansen the USGS, we now charity number counsel charged with heading the NOMIC counsel. With input not only from federal agencies but also from the academic, philanthropic, and commercial sectors and end-user groups. There are two existing federal advisory committees that advise no on the hydrographic surfaces, the HSRP and ocean exploration, the ocean expiration advisory board. We will be using these committees as one structure for gathering public input as we develop the limitation plan. We have heard and that is one of the agenda items on the meeting today and tomorrow. We have heard from me in the public we need to gather public input earlier in the process of developing government policies rather than simply the pro forma public comment period on a completed policy document. We are doing exactly that today, which is why the comment. Is so loosely structured. Not keeping the implementation plan hidden. It doesn't get exist and will be informed by your comments during this meeting. There will be other opportunities to engage in the next few months and I am committed to ensure that the eventual governance structure for the broad NOMIC program will have ongoing forms are for discussion of strategy, operational coordination and maturing and use of new technologies. There has been a parallel effort to develop the elastic coastal mapping strategy implement vision plans under the leadership of Nicole LaBeouf, Julia Blackwell and Ashley Topol. Both of these plants are on the

agenda for discussion at this meeting. I look forward to hearing your ideas on how to achieve the bold vision for implementing NOMIC into the a CMS. There will be a public comment. Today and tomorrow as well as dedicated time to hear from the panel members. In addition, we will have a short update from the working group on their work on navigation services and limited visibility. I want to pass on my regrets that all of you could not join me in Hawaii has planned for this meeting. We have already decided to hold the spring meeting for Tony as well with the Hawaii meeting planned for the fall of 2021. We decided early on in the pandemic that since we are going to have to do a lot of virtual meetings we should take the time to get good at it. I am proud of the production team that is put this meeting together and I have every confidence this meeting will be smooth and engaging for all participants. Ed and I intend to make this as convenient and productive as possible. No one leadership has been generous with her time administrating in recent HSRP meetings including this one. If you administrative events. This session is being recorded and transcribed. Your individual permission is required for our use of audio as it will be retained and disseminated on the website and accessible as a public document. You can withhold this permission by expanding from speaking or dropping of the webinar. Ethics reminder to members, while serving the HSRP during the two public readings per year, I want to remind the HSRP members who serve as a NOAA employee as a subject matter expert and you do not present any other group, industry association or other entity. Please remember to take off your regular workout and replace it with your NOAA had supervisor questions, comments and guidance to NOAA and the ministry. Thank you for your service for strengthening NOAA's hydrographic and navigation services portfolio. We do so appreciate your vision and help. While we normally do introductions to the NOAA staff, due to the condensed nature of the school, we will include them in the summary report for the meeting. NOS is a variety of staff who can provide subject matter expertise added benefit of support. On this webinar, there are presently 20 additional NOAA staff who followed the work of the HSRP throughout the year. This meeting has been a real labor of love for many on the NOAA staff and I would like to come a moment to shout out to and help put toward those who have put this together. David Mike Lowe, Klebold of its, Steen Burns, Michelle Bert and Ashley Topol, Melanie pontoon, Chrissy Hayes, John Kelly, John Nyberg, Amanda Phelps, Julia Powell, Jill Stoddard, Darren Wright and the others who I may have missed or who are providing ongoing support to the HSRP. Thank you for your teamwork. The goal of this meeting is to discuss the current state of NOS navigation services portfolio project, provide key updates on ocean mapping such as NOAA's role in developing the two strategies aforementioned and to initiate a dialogue with the HSRP members on these and other topics. There is your position between the accommodations. 20 was discussed into position. On the strategies and we seek your comments at this most elite of stages. The HSRP provided us with insightful regulations on emergency response and social intelligence at the last meeting. In regard to a different time, all the HSRP member and speaker bios are on the advance materials on the web so we will dispense with reading speaker bios. He may hear from minute to minute and one minute for many supercenters to help keep the presentations and meetings on time and with that, I would like to turn this over to the HSRP chair. One more piece of logistics. To the stakeholder staff and others joining the webinar, I appreciate your public comment and input, especially on the coastal mapping

strategies, we been putting a lot of time for this, more than we usually do because we expect to have public comment. If you have a public comment or question, I should say, we have received over a dozen public comment and we have those already captured but if in addition you have not yet set in a public comment or question, please take it in to the question tab in your GoToMeeting interface and from there, we will curate up for recognition during the public comment period. We will also go into the public record for input into those strategies or otherwise as appropriate. During the public comment, we will recognize some of those who have provided comments in advance to make a brief summary of their remarks during the course of the meeting and we may have some additional time for additional speakers if you would like to have the floor. We are probably going to be limiting it to two or three minutes per speaker because we have a lot of people to squeeze into the allotted time. So with that very not a brief introduction, I would like to turn this back over to our chairman, very capable chairman, thanks.

, You are muted.

Sorry, okay. Thanks. I serve as the HSRP chair. Based in Houston but I am transmitting from San Diego, California today. I am very happy and excited to participate in the latest public meeting of the HSRP and the second time around. All virtually. I also want to thank all the technical and I.T. staff and all the software providers that makes us look so well it works so well. Of the last several months, we have a lot of experience. It has been repeated a number of times and in multiple venues, the ocean is having a moment. Whether it is hydroxy or coastal initiatives and focus, commerce, fishing, whatever it might be, the blue economy is getting the attention and focus and awareness it deserves. Over the next two days, I am sure we will all be very impressed and educated and informed. So, am looking forward to all of that. Nicole above and Dr. Jacobs, the HSRP panel members, staff , and panel members, thank you for joining us, we are all operating in this new normal in the Covid-19 impact and everybody is doing a good job and is very productive. I want to recognize the following panel members. Julie Thomas serves as the cochair. There are three working groups with chairs and they include Dave and Julie as the chair of the planning and engagement working group. Ed page, chair of the Arctic working group. Dan Hargrave and Lindsay G, chair of the technical working group. To hear more about the technical working group tomorrow and also all of the bottles are in the wet materials. Thank you for your leadership and your ability to get the job done. Dr. Jacobs and Nicole Lebeuf, I look forward to the next in-person meeting and the positive work we will do together. In the meantime, the HSRP will discuss and hope to provide you with recommendations as part of the outcome of the meeting. Dave and Julie Thomas, Lindsay G will lead us in a discussion of the draft issue papers on the ocean and coastal mapping strategies along with the ONF leaders. Following up on Admiral Smith's request for comment, encourage or comment input for the coastal mapping strategies. Has been really nice but his vision already with some of the premeeting comments so it's great to see people really engaged. Due to the condensed meeting format, we ask you to provide your comments in writing so we can capture all of them and of course share all of them. Okay. So, moving on to the next phase of the meeting, we are honored to have Nicole Lebeuf and Dr. Jacobs in

attendance. Michael, am turning this over to you for your remarks and condemn her bio is in the wet materials. Go ahead McCall.

Thank you chairman. Admiral Smith, Julie, and the rest of the HSRP and thank you to do Dr. chips. And repetitive John Young will be here joining us by video. Aloha and good afternoon everyone. Thank you for joining the virtual review panel meeting. Well done. Clearly Covid-19 is impacting our lives and our work better any circumstances is is good to be together to discuss matters of importance to all of us. As you might have imagined, I have spent a lot of time thinking about Covid-19 but also about coastal resilience and the essential role that the national ocean surface, including of course NGS co-ops and customer surveys play in ensuring the resilience of our coastal communities economies and ecosystems. As a leader, is also.all about the resilience both physical and mental of the entire NOS workforce and our close partners like many of you as we serve our nation during this pandemic . I've done what I can to stay in communication and engage with our team and with our leadership to stay tucked in, retracted, and to make sure that everyone knows that they are supported both personally and professionally. We are indeed facing challenging times and I am sure your organizations are also dealing with many of the same issues as we are at no one. I'm asking for our folks to be kind enforceable with her colleagues and to remain adaptable and innovative in their work. Through our words and deeds, we are striving to cultivate compassionate, forgiving, yet driven workforce across all that NOS does. That accommodation is especially important to me because the changes that are taking place on our coasts are not stopping for Covid-19. In fact, with the retention 20 where various supply chains, or contributions to the U.S. blue economy that all of you were present is top of mind for our nation in the last few months and despite the various challenges of Covid-19 and 20 20, everything is, no one and and OS are working harder together with folks like auntie HSRP to promote safety and navigation and to provide essential services to protect life and property meta-landscape. Before I say a few more words on that, I would like on behalf of an OS, I want to thank the panel in advance for your device and regulations in the public for your comments as well. Your input is critical to improve our services and ensures that our ongoing success is relevant in providing 21st century navigational and other related services. I know that one of the major topics you will discuss today, as Admiral Smith has only mentioned it tomorrow is Annette national strategy for ocean mapping, acceleration and characterization, as well as of the Alaska coastal mapping strategy. These in more detail. You will be hearing from Admiral Smith and Julianna Blackwell and referred from Ashley Chappell before. This work is very important to me and to NOS and we are fully supported and engaged in the use of it. I do hope you will provide us with feedback. Your expertise is invaluable. Switching from how awesome you are to how awesome we are, it's really a fun crowd, right would like to look at NOS's response to the most recent hurricane in this active hurricane season. The most recent hurricane, Laura and Sally merely remind me of the work of our emergency response work, that is from the office of Coast survey and the cops, the Center for oceanographic products and services. We were on the scene immediately following both Sally and Laura to select aerial images during our specific areas of divide by FEMA and other state and federal partners. For co-ops, the water levels during Hurricane Laura measured at our top issue but stations was 9.19 feet above mean high

or high water. That is not the absolute storm surge and that was higher still but this is the second highest water level record at the station. This is behind the record set by hurricane Ike in 2008, which was 10.01 feet above mean high or high water level. Similarly, Hurricane Sally picked as an observed water level at the co-op station in Pensacola, Florida at 5.6 feet above mean high or high water. This is exceeding water level records for Hurricane Katrina at the same station. As recently viewed this past weekend, so the impact and are still assessing the impact of tropical storm began as water levels in Corp. stations along the Texas Gulf Coast measured between half a foot and 2 feet above normal height height levels. As you know, following storm events, the optical survey is also on the scene to be sure that we can reopen our ports safely and efficiently. For example, the hydraphic services division conducted a proper survey of events leading into Port Charles. That rapid response was with 11 to ensuring the reopening of this for draft ships immediately following Laura. Additionally, the office of customer service no additional response teams in Mississippi and in front Edina Beach, Florida worked with U.S. Coast Guard to survey Pensacola. This survey work is also essential to reopening that port. The big ticket co-ops and to OCS and to NGS for their important work in these hard-hit regions of the country. And of course, all being done during a global pandemic. Thank you to everyone. In light of these hazardous conditions, and for mental and cultural change and flooding across NOS, we are working hard to improve the services and tools we provide to our mission to protect and support maritime commerce, which is one of the backbones of our U.S. economy. We are looking to sell that fact from the rooftops. Just this summer, NOS, NOAA and the Bureau of, analysis released the first of its kind. The statistics on number Marine economy to. This point. According to this data, our nation's Marine economy situated $373 billion request mystic product in 2018 and as a sector, grew faster than our nations economy as a whole. Everyone here probably knows that it is nearly impossible for most Americans to go a single day without eating, wearing, or using products that come from or through our ocean and coastal communities. NOS's net addition observing and positioning mapping programs provide underlying data essential to services that support our very way of life. We continue to adapt to the challenges of our time and we continue to talk about it, making sure that Congress and others know what we do. Just a few weeks ago, I personally briefed 245 people in the 60s and were congressional staff about the services that we provide at NOS for our nations coastal resilience. This was a record turnout for a no a Congressional briefing and we are particularly pleased to talk about this, as well as the wider new initiatives that improve our uptake of artificial intelligence, mental systems and cloud computing in publishing our goals. I want to thank the HSRP for the most recent issue paper on automation and artificial intelligence in post-disaster product and services. The spells were accommodation to improve collaboration with academia and public private partnerships identify areas for improved fast response times and consider stakeholder input are vital to improving our success so that you. We look forward to continuing to examine our product and services and work with other federal state and agency partners in doing so. In addition to the rapid onset of threats like hurricanes, we also deal with slow-moving chronic threats to maritime safety and navigation such as font and limited visibility in enclosed ports and waterways, but I understand this group will discuss tomorrow. And, this afternoon, you'll be hearing from the directors of the navigation services portfolio at

NOS, including to the other Blackwell from the national survey, will give you a status update on coastal mapping activities and the national spatial record system. What about the plans for's mention of the ports program and's Admiral Shep Smith from the office of Coast survey will cover the progress report on unmapped waters, the new OCS strategic plan, and the technology needed to omit the new ocean mapping strategy that I'm sure you have heard so much about. We will also get an exciting update from Captain Andy Armstrong on the number joint hydrographic center partnership. In terms of a budget update, you may recall that last year, Congress enacted NOS's fiscal year 20 appropriations at its highest level yet , $606 million. At fiscal year 2020 comes to an end, just a couple weeks to go, it is apparent that our fiscal year 21 appropriations will be delayed and disappear we may be on our way to getting a stopgap measure or a continuing resolution, at least until December. The house has, however, marked up our fiscal year 21 appropriations bill and the numbers remain good for NOAA and for 21, including funding the navigation observing and positioning programs pretty much at level with the last years appropriations and some overall modest increases for the rest of NOS. The Senate has yet to pick up fiscal year 21 funding. Not clear if they will or when they will do it but stay tuned for more. Our newest Marine transportation information systems infrastructure has plenty of areas that would benefit from job creating and economic investment and position navigation like activities like Hydra to fix surveys, swelling mapping, modernization and water level network enhancements. Hopefully we are getting the word out and Congress and stakeholders like you are aware and can advocate for those programs. With that, I want to thank you again everyone in attendance. I am looking forward to our discussions this afternoon and to a future meeting in person. Thank you.

Thank you McCall. I appreciate your remarks. Dr. Jacobs, we are thrilled to have you back for the second minute to continue the dialogue and contribute to strategic and useful ideas to make small improvements for the navigation services portfolio. His bio is available on the web materials. Over to you Dr. Jacobs.

Thank you, it is great to be here. Big shout out to NOS for the fantastic response with the landfall of storms Laura and Sally. Seems like we are in a wall now. I hope it stays that way but I'm afraid it probably won't. Thank you for the introduction. Looking forward to representative Young's remarks, as well as others. Wish we could be in Hawaii but unfortunately a virtual meeting is probably the best we can do right now. I think most of you probably have either met me or know me. But I'm not working at NOAA, my two favorite things to be doing are either surfing or fishing. Obviously maritime navigation services are important in both. The topline message is the work you do really matters to us to work of OCS, co-op, NGS, it is critical to the work of the agency and a lot of these programs not just benefit us but also really strengthen our public private partnerships that I think a lot of this is evidenced in the presidential memo on ocean mapping. Clearly a top priority from the White House all the way down. Really looking forward to joining in on the sessions throughout this afternoon. I think we will be taking into a lot of the supplementation in various associated strategies. Personally excited to talk a little bit about the nearshore imagery. I have just been in the process of updating all the maps. I sold a small boat that I had and got a pulling skiff in the process of updating all the

maps and have been looking at a lot of the new data. Most of the fish and it was nearshore but all the maps include a tremendous amount of data. Of course, it was exciting to me to think I am downloading data from my own agency's website. These types of applications are extreme the important and not just necessarily for maritime navigation but the data is also really useful for emergency management and conservation. I will give you a couple examples of that. Just in this last year I think that with the landfall storms, a lot of people it seems the storm surge forecast. To properly forecast the storm surge, it starts pretty far offshore it is a lot of when you get that amount of water pushed and worked sure, it can either spread out or pile up. A lot of this is a function of the atmospheric weather models producing the track of the storm and the wins but if we don't understand the height and help the storm surge is magnified, this is also true for the spell and the waves. A lot of the way free fraction amplification starts way offshore. We see this with wave watch three with our nearshore model. This is relevant for rip current forecasting whether we will be dealing with rip currents or just a straight longshore current. One of the challenges going forward is and I think that everyone probably saw this with Laura, we mailed the track but the rapid intensification, particularly when you get within a few hundred miles of coastline in the Gulf is always going to be a challenge because we really have to do a better job of understanding what is going on below the surface when it comes to upwelling and having a good handle on the input parameter to the models is critical. A lot of these models are two-way coupled ocean atmosphere models and that is incredibly important data that we have their. The higher resolution models we run, the higher resolution input data we are going to need. I know it is also important when we are talking about a lot of the Alaska coastal mapping as well. So there is a ton of coastline out there and we are in the process of trying to map as much of it as we can. I did want to take a quick second to talk a little bit about Covid-19 because that is of course why we are here for 20. Resuming fleet operations is a top priority and we took a pretty big hit as far as Boston days at sea. I think we see numbers estimated around 400 days at sea but we are getting things back the way. The release of the final what the protocols are, how should operate, what type of environment we can, I know that a lot of the crews have been quarantining themselves even before they get on the ship just to make sure we are not bringing anyone with an infection on board and when we do keep everyone as isolated as possible. Oh and 80 had access to rapid testing. Not just for our vessels but also for the aircraft, which, as you can imagine, they are doing a lot of fight in the storms and they are in a small, contained area. Fortunately, most of the vessels are starting to get back on their way. The Thomas Jefferson departed folk on July 19th. It is working on hydrographic project. Hoefler departed August 29th working in the Chesapeake. Renier got underway on August 4th conducting projects for cost surveying in Southeast Alaska and also the fair-weather departed Seattle on September 14th, also headed to Southeast Alaska. I can say and I think a lot of people know we are probably moving ahead with the procurement of two class B vessels. We will be releasing probably in the next couple of weeks the fiscal year 21 fleet recap plan and I know that at NOS and OMAO are working on this and may have a brief later today. I just wanted to again reiterate that the recommendations that everyone provides our incredibly important and we are definitely listening to what everyone is saying. Really appreciate all the thoughtful comments from the April meeting. As Nicole mentioned, we are really looking

at a lot of different aspect of public, private partnerships, particularly when it comes to advancing and I in various ways to manage data. I know I is I have been talking but I resolution data and the more senses we have deployed the more areas we are going to be mapping actually managing the state and sorting through it and optimizing it are going to require a lot of different techniques, AI being one of them. Of course, data management is one thing but to the storage is also something that is always going to be a challenge going forward you would like to mention the no big data program is something that a lot of folks in the atmospheric and meteorology community have been talking for a while. The data that everyone here is talking of providing is going to be a component of this. Essentially what the big data program is is a partnership between NOAA and commercial cloud service providers. If you've ever talk to anyone in I.T. computing, the first thing they will tell you was productive and of high performance computing that do not have enough storage and there was a lot of data that we have that the public would really love access to and the trick is how to avoid the storage and how to get the data into the hands of the public and the cloud service providers absolutely love this idea because while they are not allowed to charge for our data, they have to make that freely available they can charge for the processing of our data. By allowing them to host our data for little or no charge, we are driving business to them. So, it is a good business model for them, it is also our data storage problem and it allows us to get more data out into the public, which I think ultimately will benefit everyone from emergency managers to maritime community. I did want to mention a couple other things as we are doing a lot of this new AI and processing of data a lot of the cool things that I saw in their was a structured promotion. I saw it in use out in Hawaii was sort of mapping a lot of these beefs. It was kind of cool. They actually took the camera and I got a 3-D rendering of myself. I can't describe any way that I look like an action figure in a video game. It is a really cool technology and it is very similar to the technology that I actually have in my new system that allows me to review in three dimensions. Very cool capability. Also we are quick wanted to say I am excited about the recent port expansion in Kings Bay, Georgia and Portsmouth, New Hampshire. I really appreciate the board partnership with everyone here on that. In general, just really excited to see the continuation and evolution of what we are doing here. It is really, really important to the agency. Like I said before, just can't express how valuable the work everyone here is for the agency. I will stop there but I am going to be, it will be logged in and listening all day. Thank you.

Thanks Dr. Jacobs. With the great as always to have you join us. The insight from data management and sharing, as well as the AI and economist tools, all that is really good insight and hopes direct the thought process. Also, of course, the update on the Covid-19 impacts on vessel operations, that's of interest, it's good to see there is some positive news. We are going to take a 15 minute break right now. By Mike Clark, we should all be back at 10 minutes before the hour. All right? I have that right? Yes.

Do we still have the video from Congressman John?

I will have to defer to --

By don't we watch that before the break.

Yes, let's do that. Thanks.

Hi, I'm Congressman Don Young. Thank you for inviting me. I have been a longtime supporter of NOAA, as you know. I'm grateful for the work you have done to ensure that our oceans are healthy and safe. Healthy oceans are essential to Alaska's economy, as you know. A lot of things have happened in the Arctic along Alaska's coast. The difference in the water as far as shipping, is going to play a major role. We have tried to get things done and have been successful. We have integrated coastal observation assistant to pass the house. We have tried to get the final passage of the Senate bill in the house to get the integrated Ocean observation system to continue to be the eyes and ears in the ocean. There is important work is to be done. NOAA will continue to be a major role. I thank you for the invitation to say hello to you. We will continue to work with you. God bless.

Can you get a round of applause.

That was great.

Okay so I am glad we got that in and it was great to see the Congressman and he is definitely a big supporter of NOAA . Let's go ahead and take a 12 minute break. We can come back, 10 minutes before the hour. Okay.

Okay, welcome back everyone. We are going to go ahead and continue and up next, I am turning this over to Nicole Lebeuf for the section with the directors. So, in a call. Over to you. Thanks.

I was just rejoining, and the. I'm sorry, I was just rejoining, is there a question on the floor?

No, sorry, all set for the next section where you will be moderating the various presentations of Andy and Rich and Giuliana.

, Got you, all right

All set to go?

I think so.

My apologies. All right. All right, sorry, excuse me. And, welcome back. Thank you for the quick break. I apologize for being a couple minutes late. We are now ready to hear from our NOS office directions and opportunities and challenges for NOS's navigation services portfolio. Or speakers that you know quite well will discuss a variety of topics and I look forward to hearing their updates from each of the offices. I would like to start

with N Armstrong, the codirector of the hydraphic center. His full bio is attached in the materials. Andy, take it away.

Thank you medical. So, NOAA and the University of New Hampshire just have begun a new five-year cooperative agreement for the operation of the joint hydraphic center and I am going to share with you today the research plan for that new five-year agreement and since the center is run both by NOAA at the university, I'm speaking today on behalf of myself and Dr. Larry Mayer, the codirector from the University of New Hampshire. Next slide please. So, the University of New Hampshire joint hydraphic center has its primary facility in a beautiful dedicated building on the campus of the University of New Hampshire and we have a modern waterfront facility at nearby New Castle, New Hampshire and that waterfront facility is where the UNH maintains its research vessels and where indeed the NOAA ship Ferdinand Hassler , one of our hydraphic survey vessels is home ported. We are proud of that relationship with NOAA as well as a research relationship at the center. Could we have the next slide? So a little bit about the center, we actually have about 100 people at the center, which is including 14 research and teaching faculty, a number of affiliate faculty members from industry and other academic institutions, as well as from NOAA . Staff have research scientists and other supporting staff and we actually have 14 NOAA time scientists based at the center so we have actually outside of Silver Spring and Norfork and Seattle one of the biggest groups of NOAA , especially national Ocean service employees. We have a significant component of our center is graduate education and we have 31 graduate students at the center. In addition to that, we have a number of international fellows who come to the center for a fellowship in ocean mapping and then returned to their home countries and that is a great institution that is creating a new and effective network of ocean mappers around the world. Next slide please. A key part of the center is industry partnership and we at the center derived tremendous value from this partnership. We are able to leverage their contributions, stay in touch with the development in the private sector. We have a path for our research operations and great opportunities for our students and in return our industry partners derive significant value from their relationship with the university. They have both accessed goat and researchers, the right to license things and the ability to collaborate and use our facilities. Next slide please. So now to the cooperative agreement. Sometimes these terms are kind of arcing the cooperative agreement is really just a grant in which the federal government has substantial participation and you saw that our substantial participation includes those NOAA scientists on the site working with university researchers. The presence of the NOAA survey showed at our facility and a number of other interactions that we maintain so this new award was done through a competition. It was just awarded competitively so the funding opportunity was released in March of this year and was accomplishing. Is not competition for the University of New Hampshire was selected and the award was issued last month so the new five-year period is actually going to start in January and will run for five years following that. A little bit about the plan. Next slide please. So based on the opportunity notice from NOAA and the proposal submitted, there's going to be three major programmatic themes for the next five years, the first one will be advanced technology to map U.S. waters and that will include a subtheme for both data acquisition and extracting maximum value from the data, then to

advance technology for digital navigation services and that will include both ends of that process, the tools for the navigator and the tools for the development of electronic charting products and a 13, which is kind of hybrid and it includes the study of acoustic propagation and effect, particularly affects marine animals and this is where our education and outreach program resides. Will talk a little bit about each of those. Next slide please. So in the technology to map the U.S. waters on the acquisition and the center will be looking at systems sensor monitoring technology, real-time quality control of hydrographic surveying and mapping work and of course continuing to develop Thomas platforms and economist systems for processing and managing data, trying to not only gain benefits and efficiency but to improve the quality of the data has been collected. Next slide please. So, on the value and, we will continue to work, as the center has for many years, on efficient data processing. We will be looking at Thomas processing techniques, cloud AI and machine learning technology, looking at developing some new interactive tools and editing environment, and of course we will be doing this on the full range of bathymetric data, including acoustic and Lidar data. A little further down the line, we will be looking at the visualization and interpretation and the filament of products across the full spectrum of ocean mapping. The object detection, the water column and backscatter, and so on. Next slide please. On the navigation services, is that we will be looking at automated cartography tools, automated generalization ideal portrayal of data, we will be looking at virtual reality, formerly as a pathway to augmented reality, and I know the panel is very interested in continuing to operate into developing technology so that sips can continue to operate in the fog and we think augmented reality is a means that may allow that. Of course, we will be looking for improved ways to display whether current and hydrodynamic model outputs on those electronic charting systems in use by both recreational and professional maritime community. Next slide please. So in our third theme, we are going to be looking at Marine soundscape and Marine geospatial expertise and so we will continue to work on modeling and measuring the sound field from our graphic echo sounders and trying to understand the impact these sounders have on the ocean sounds good, particularly the effect on marine animal sound production and marine animal behavior. Next please. So, in that regard, this is from the last. But I think it is a significant item to note the vertical journal of the acoustical Society of America publication out and so we are adding to what is known as the sort of best available science in these activities with studying the effect on 12 kilohertz multibeam echo sound on beached whales off Southern California and demonstrating that there were no changes in their behavior detected in the case of the echo sound operation over there, they're feeding areas. Next slide please. Education of course is a significant part of what we do. Right now, we are in a blended mode where we are trying to mix some socially distant hands on practical training with mostly online classes and we of course want to maintain and support student research projects which are fundamental to both students education and to our research and ultimately our goal is to graduate capable, forward thinking hydrography professionals. We've done that for many years and hope to continue that. Okay, next slide. So, finally, you can see a little bit but we have done over the years on our website. The website addresses down at the bottom there and all of our progress reports since 2001 are posted there. Next slide. This is our latest one, as of the end of 2019 so I think you can take a look at that and get a much deeper dive into

what has been going on and hopefully at the next meeting, Larry will begin to be able to present some of the results of our new research efforts. So, thank you very much, Nicole.

Thank you Andy and congratulations for all of the hard work that is being done there. We are looking forward to another great five years of this partnership with the University of New Hampshire. Just for the amazing everything that has only been done there and that we are looking forward to. Let's pass to Mike. This is from the center for oceanographic partnerships for his update. Thank you.

Thank you Nicole. So, as Nicole mentioned earlier, we are almost to the end of the fiscal years felt like it would be a good time to look back at past a person's and talk a little bit but what is coming up next for future commitments. Before I start, I will mention that we do have a pandemic going on but was really impressed and proud the workforce for every thing that he did get on this here. We had a lot of good things to talk about. Next slide please. So as Dr. Jacobs mentioned, we were able to establish to report systems. Kings Bay, Georgia with a baby and the one is to allow nuclear submarines transitions if we are to put down there and up in New Hampshire at the naval base there to support naval operations transitioning in and out as they gather information on coastal hazards, storms, and long-term sea level rise. These are ports number 34 and 36, Surrey, 35 and number 36. Next slide please. So, you know, we found that once we establish a port, which were not necessarily done. People start using the information see the benefits, they start adding on more sensors. Across the network every year, you know, we are doing a lot of work to not just maintain sensors but add additional ones. So I want to read through the list here. You can see there is a variety of sensors being added on from where Louise. I should mention the waters, we don't actually do that work was ultimately partner with the Corps of Engineers. To avoid doing it all the coastal data information program is available that is already operating nearby when we established reports, we bring that data in and incorporated. Sometimes the partners will add a Radeon. The last thing I will mention on this slide is the last bullet. Complete phase one of the NOAA small business innovation research grant. There was a webinar given to the agents on that page so I won't talk too much about it. There was a less expensive center as well as greater capability than the technology we are using now so we are looking forward to completing the work on that. Next slide. This is a big year for us where we did our last hardcopy tide and tidal current tables. We fully transitioned over to digital. That's ¬150 of published tables. It's a little bit of a heart condition to leave behind. The digital tables obviously are more cost-effective to produce. They integrate with other technology nowadays. They really provide an improved product over the hardcopy tables. We did a couple of surveys in South Texas and York Harbor and we updated the title predictions there for efficient navigation and we developed and transitioned operations a new rapid response Billy but does current and meteorological parameters that can be, we are using it in our own surveys but it can also be done in cooperation with the office of response and restoration if they are responding to some sort of oil spill or other type of hazmat spill and need that kind of information to support their response. Next slide. We built our in-line station down in Rockport, Texas. That was destroyed by hurricane Harvey and we got supplement the funds to do that and

that work was completed. We developed an integrated model observation claim that I am excited about. It is really helping, it is giving us a path forward to better integrate our modeling and observation apps but it is also helping us better understand our models and how to really have those types of information infrastructure to work together better. We are continuing the transition of water level sensors our national water level observation at work. We transitioned eight stations fully over to the microwave water level. We do a year-long did a comparison between the microwave and acoustic and once we are done with the data comparison, then we can remove the acoustic so we did that at eight stations. But we have been doing a lot of engaging both with both baselines and supplemental funds. Some of that work did get delayed the next two weeks of Covid-19 but we still managed to get a fair amount done using hurricane supplemental funds in Texas, Louisiana, and Florida. Next slide please. We provided support, scientific support for an organization called they L.A. one collision. They are supporting the elevation of Louisiana Highway 1 that runs up into the interior of the state and that is the only transportation corridor between a major seaport for energy imports and it floods a lot and it is going to flood more and we did an analysis that showed the increasing rate of flooding that was going to occur if it wasn't elevated and the coalition was successful in locating $135 million worth of grant funding to get that highway elevated and it really gave us a lot of credit, a lot of credit to the scientific analysis that really showed you know, the impacts of sea level rise in the area. For a number of years we have been eating out a high tide flooding report Outlook reporting and what did you see in the past year for high tide of flooding and what does the next year look like. It always gets a lot of media attention. I think, you know, we had 40 different media outlets call in. It is a way to be able to talk about, you know, sea level rise, if you will in a way because people are seeing the high tide flooding in their backyards on a daily basis. And then a few years ago we rolled out our coastal dashboard, which popular historic, real-time, and forecast data into one place, particularly when storms are approaching the coast. We came up with the strategic plan on how to continue in not just enhancing that dashboard for those existing types of data but also to bring in all sorts of resilient tools like frequency of innovation and sea level trends so it becomes, you can come into one place and do all of the resilience planning from near-term to long-term sea level rise. Next slide. Okay so pivoting to 21. We will be establishing a new port in Valdez. That will be done very soon. It is not one where we are having to put in sensors. The port had already put in sensors using oil spill funding but wanted to work with us to get the data through our product generation to get the quality control we can provide and things of that nature. We will bring in our launch station and integrate the data in the ports there. I think we have another new report coming up in Washington as well that we just signed an agreement for. That should be another one in 21. Again, there will be a lot of existing ports enhancements. I just listed one because it is about to be done. We had to delay it a couple times because of hurricanes coming into the Gulf this summer. Adding visibility to mobile day. Port Mueller should be reestablished. Would've been real established in 20 but because of Covid-19, it was a remote location and people weren't allowed to travel there. That should be done early this fall. The international Great Lakes data update is going on and that is a seven-year effort. We were kind of in a middle of it, which is a big field campaign going on and that is a partnership between co-ops and and GLS. That is a lower level data-gathering measurements needed to bring

the water levels and the land elevations together. But we will be doing more down in the Gulf of Mexico but also during Puerto Rico and the Virgin Islands as well. Rodrigo and the Virgin Islands was delayed from last year. Next slide. We are going to be working on the coastal dashboard improvements. We will be upgrading our northern Gulf of Mexico operational forecast system model, which actually is merging three models that are kind of covering most of the Gulf Coast. It's going to be spending it to cover all of the Gulf Coast and is going to be going up the Mississippi River up to the head of tide, which is a major deliverable from our precision navigation project that you may recall. What is the big deal. Not on this slide but also we will be bringing in and operating a West Coast model, a large regional offshore model for the West Coast, which will be the first real-time data symbolization model so that is a big deal as well, bringing real-time data in helping improve the model. It is on the slide right there. Visibility. I have talked to you about the ability of the weather service to provide visibility probability forecasts but right now they can only do in Tampa Bay. It was done there as a demonstration project. We are working with them to get that expanded to other weather forecast offices but those forecasts will be coming out through our four models and upgrading to the Gulf of Mexico model. Once we demonstrate it, we will be going to mobile to do that. What we do it in mobile, we should be able to do it in many other places. Finally, you have been hearing about this one for a long time but there was been a lot of work going on behind the scenes. Now the Coast Guard is getting ready to test this at two locations in October, if that works out, they will be doing it for ports over all over the country later in 21 or early 22 at the latest. Next slide. I think that was the end. There we go. Thank you. I don't know if we are taking questions or not but back to you Nicole.

What a great update. Everything from the news reports that photographs in Louisiana. Is definitely providing information essential to decision-makers. Good stuff. Exciting to hear what you have been up to. Next let's move over to Julianna Blackwell from the national giogentic survey.

Good day everyone, I hope you're having as beautiful weather as I am having here. It feels like I am in Hawaii, and dressed for it at least. Hopefully the sun is shining where you are and you are all well and continue to be so. I am happy to be able to provide a few updates today. They can go on to the next slide please. I will run through what I plan on covering. The first two topics on the delay messaging and the foundation course infrastructure relate to the national spatial reference system modernization effort that has been underway for a while now at NGS. The next three topics, emergency response, hurricanes elemental and coastal mapping studies involving the national genetic survey coastal mapping program and then I will round out with an update on the NGS co-ops and NGS collaborating on that tool and then a brief update on a such an economic benefit study that NGS recently completed. Go to the next slide please. Okay. So as I reported at our last treaty meeting, NGS was getting prepared to officially release the delay of the modernization effort. The modernization effort has been underway for a number of years. We have a very, we had great success in doing the data collection and getting our products online. We hit some snags the last couple years with the number of difficulties, including some having issues that I think have been resolved and can you new to rupees that we have to pay attention to but also with the

number of shutdowns we experience, as well as the current pandemic, it is really the court to keep operations going with airborne gravity collection, which is really a huge foundational piece of what the update will do for the nation. We officially announced the delay in June and we did this through a number of ways. While we may understand this, it is very important to have our partners, our customers, our stakeholders understand why things are being delayed and give them our best updates on when we think things will all come together. So, some of the outreach efforts that we have been living including a page through our NGS news announcements. These are messages that go out to our subscribers. We've updated our webpage. We've had a number of articles and newsletters, some written by NGS employees, others just being picked up from our partners who are helping us communicate the message of the delay and then through our advisory network. We have a set of regional advisors who work very closely with those in our areas and provide them just and always amounts of updates and support throughout the year on a number of topics, including the latest on the modernization efforts. One of the activities I want to highlight is the webinar that we hosted in August, which had more than 400 people on it, which included almost every state, district of Columbia, and Puerto Rico and through that mechanism, as well as through feedback from our advisors and our information center, we have been collecting feedback from our stakeholders. I will see that well not everybody is happy that it is being delayed, that most people understand and expect it that this would occur. Many of our stake holders are relieved that they have more time to prepare for this because this is going to be a major update in the geospatial world putting, bringing information, geospatial information into the new reference frame and the new datum. They are glad that they had time to prepare because this current pandemic is affecting everybody and we are going to bring them along with us. One of the other sentiments that was shared with us is that when we proposed to our stakeholders through the webinar if they would want us to do a phased rollout and provide some of the products before all of that was where ready and the majority of the folks said they would like us to do this all at once, they do not want to have a phased approach, they really want to be able to transform their data and have all of the bells and whistles available before the new reference frames and datum are in place, we took that part. On the not so happy said, we had stakeholders expressed concerns that it is really important to have a modernized national spatial reference system to support autonomous ground transportation, to support twins, to support the technology that is becoming more and more available. That is needed sooner rather than later. We understand that and we want to provide it as soon as possible. We are a little hamstrung right now. Some of the other stakeholders that were not as happy are those who are currently underserved, I would say, by the infrastructure in their areas, in particular Alaska and then we will have a chance to talk about that a little bit later. Those who don't have as great of a set of geonetic control in their area are certainly waiting patiently for an update to the national datum through our modernization effort. Next slide please. The second activity is also related to the national spatial reference system modernization effort. This is the establishment of a set of foundation course in our new group. The goal is to have 36 stations and federally operated, high-quality, highly reliable stations that are designed for the Jevity. These would be the sites that we would work to maintain with our federal partners that would provide the very basic connection to the national spatial reference system and support the rest of the

partner network as the primary control points. These stations would also be the primary addition to the international global positioning effort that is occurring across the world. The highest level highest quality stations. Currently, we are working with our partners at NASA and the National Science Foundation to bring in some of the sites that they have. We were successful this year in getting an agreement with NASA to include 11 of their sites as part of the foundation course network. We also have a number of NGS sites, and in particular, that currently part of foundation course established. We are working with the national transportation to try to get an agreement with them to bring another eight stations and the foundation course network and lastly, we have plans to construct nine new stations and we are looking to partner with other federal entities have possible to achieve that final set of stations for the backbone of the course network in the backbone of the national spatial reference system. Next slide please. Switching gears a little bit to talk more about our remote sensing and cost mapping applications and mission. As has been mentioned, NGS has responded to a number of hurricanes thus far this season. The first being in support of hurricane Isaias. The photos on the left show a before and after him and the same areas so that the changes and transportation systems as well as infrastructure can be seen. We also in later August we collected imagery in support the impact of Hurricane Laura down along the northern Gulf of Mexico. Images on the right are showing the before and now and then the lower image showing, you can see the water hitting up against something, that is a sunken drydock scene from the Ritchie we collected. Obviously, really important to be able to use the cemetery to assess the play reports that are responsible for at NOS and also to determine impact to infrastructure, roads, other transportation systems, and obviously, you know, businesses and people's homes. This imagery continues to collect the support of not only FEMA but the coastal emergency responders and coastal management and a number of other federal agencies and also supports a lot of NOAA and the National Weather Service is efforts to determine information about flooding and impacts based on the storm surge. So, as Nicole mentioned, in additional to those two hurricanes, we also had response last week to Hurricane Sally. Those images are available on our website. Everything we do this, we have learned more about the challenges to doing this within the environment with the pandemic. We are getting better at it and making it accessible in different ways. Next slide please. Just a very brief update on our hurricanes mental efforts. Last couple years, we have received funding to acquire additional Lidar aerial imagery of shoreline affected by a number of different hurricanes. We are finalizing the Lidar imagery data sets from Harvey, Irma, and Maria and the acquisition is complete for hurricanes Florence, Michael, and NOAA expects to continue to perform the quality assurance quality control on these data sets and hopefully we will have all of the final data from the 2010 supplemental in-house 2021. Next slide please. Briefly on our coastal mapping efforts, or program that you delivered 6.8% of the national shoreline. The updated shoreline 57 Nick of the nation's prior reports. He met our metrics and exceeded them in some cases. A lot of that had to do with the fact that we had a lot of the cemetery already in-house. We are going to be a little bit challenged if we are not able to get out and collect soon to meet some of the metrics for next year. We will just have to wait and see what happens with travel restrictions and how that has impacted us. One of the things I want to highlight this year, we have moved forward with program and upgraded Lidar system and an upgraded

camera system. These will enable us to stay up with technology, as well as improve the processes and specifications for how data collection will be done in the future. Next slide please. Very briefly, this is a collaborative effort between customer survey, co-ops, and NGS. We work together on this navigation service product that allows users to transform geospatial data between datum including title, or the metric and vertical datum. This year, we released two different releases, 4.1 and 4.11 and incorporated things such as enhancements to support 2014, some of the models that were produced recently by NGS and the first-ever incorporation of spatially varying uncertainty with the New York Long Island regional models. I think I mentioned this in the past but we were also working with exploratory models for Alaska and we expect that we will be able to get a West Coast regional model updated in fiscal year 22. Lastly, with supplemental work, we are also collecting traditional geonetic model data for the next time they are up for renewal. Next and last slide, just briefly want to mention a recent socioeconomic benefit study that was completed. The NGS aeronautical survey program, we support land, water, and air positioning. We do a lot of the quality control airport surveys that were conducted by third-party surveyors in support of the FAA. We did a benefit study on this to determine what the value is that to the nation. The study resulted in an estimated between 3 billion and $14 billion over the next decade in support of the work that we do in support of keeping the national airspace system safe and in support of the federal aviation administration. We have done a number of other socioeconomic studies in the past. I listened those in case you want to take a look at them. With that, that is my last update. Thank you very much.

Thank you. That is also a lot. Got a lot going on. Appreciate everything you have been able to do throughout the season and throughout Covid-19. Last but not least, of course, let's pass the mic to Admiral Shep Smith as the office of Coast's surveys director. Admiral Smith.

Thank you Nicole. I'm happy to that cleanup on this great set of presentations. I am struck, as a bridge put it out earlier, at how much we've gotten done despite Covid-19 and I think the same is true at Coast survey. There are things we didn't do and maybe that is why we had the attention span to get all the things that we did on going to take a similar approach as the other directors but I'm going to be the kind of focus a lens on how we are aligning Coast survey given the conversation we are about to have with NOMIC, how we are aligning coast survey activities with the NOMIC survey and a few activities relevant to that. First, we have any long-awaited what we were calling for a while the ocean mapping plan. We delayed its release in order to have it be released in the context of the NOMIC strategy . We were pleased with the amount of natural alignment we only had. This document is out and available. Republished it in July but we really, it describes a new take on how we are driving our ocean mapping program, our hydrography program. How we are prioritizing things, how we are balancing the needs for various different types of surveys and most importantly, sort of how we are partnering with larger ocean mapping community to ensure that all of our work has the maximum public and back. It's divided into two goals. First is very narrowly on navigation needs. So that optimizes the safety and efficiency of donations infrastructure. As all of our shipping routes. Everything from inside the ports all the way through to the

major global transit so that encompasses our work for improved services and precision navigation for high-resolution imagery. We are partnering really well with the U.S. Army Corps of Engineers to do that to a very high standard in our ports. The second is the mapping the ocean more generally. Just be sure has navigation impact but it is not narrowly targeted in the way that we would for a port or brute say but it is generally charting the coastal waters of the United States and all the way out to the U.S. easy. This aligns with the strategy as released by the White House in July and under that goal, we have several activities that really help us align and partner with others for that framework and we will be hearing more about that. Next slide please. Part of this effort both for NOMIC and our own strategy is to make our data useful, usable and accessible. Our effort is to not just build an archive where all of the data collected over the years can be found for users to compile it in their own way but really an operational database where you can just point your users out bathymetric service and have access to the latest data. To be sure, this is certainly the most ambitious we have ever done and it really differs from the way that other bathymetric relations have been on in the past in two important ways. One is that it is not at a fixed resolution. Where we have high-resolution data without a half meter in some areas, that is preserved and available in the database. Second, it is continuously updated. So, the Army Corps of Engineers that's surveys import areas, sometimes quite frequently and they distribute their data through U.S. Army Corps of Engineers Hydro database. The script that database daily and update the master database. Similarly, we are pulling the NOAA Lidar from the digital closed archives, we are pulling data from NCI and as we discover new external data sources, helping to bring this into the public domain and helping and pulling it all together. Lastly, there is a global effort, I think we may hear from Vicki in the public comment, the global multiresolution train model compilation of the deep part of the ocean and we are making in a seamless partnership with Vicki at Lamont Doherty. So anyway, this is very exciting. You can see the Army Corps data there is in bed. It is a significant contributor for navigation safety and as a percentage of the whole ocean. It is not very big but we are very pleased that it is a well-integrated part of our system. Right now, we are doing this is phases. This is the first phase for just the northeast New York to the Canadian border. And the next region that we are taking on is the Gulf of Mexico. We anticipate being able to community, marched through the U.S. coast, around the West Coast in the next few years and get this fully compiled and put it into full maintenance. This is critical internally for our charting program. We are updating all of our charts from scratch. We simply cannot afford to go chart by chart and go back and pull up historic data. So this is enabling not only for us but also as a service more broadly has big implications for our ability to more rapidly and rigorously update all of our modeling efforts can be seen on the run up models to the coastal Hydro Namic models and navigation and storm surge models for coaster resilience and so this is an exciting piece of geospatial infrastructure. Next slide please. Just some examples, this is a left there is all the different sources are put together. It is very, it is rules-based but they are complex rules. It would be really much easier if the best data was always the most recent but it isn't always the case. We have very flexible algorithms to allow us to be able to understand and choose the most appropriate and most probable in order to knit together a seamless model like you see on the right. Next slide please. We are continuing to build out our interagency partnerships. These are other federal agencies

and this doesn't even include all of the partnerships we have within NOAA. We are doing seabed mapping but we do have agreements in place with these three agencies we renewed in the last year where we can be an execution arm for them, bringing our capabilities, our capacity, not only our in-house capability and capacity but what we can bring through our contracts and our other partnerships to bear on behalf of the entire federal government. We've had a couple of really good examples in recent months. Barry arm up in Alaska is an area that was recently exposed by receding glaciers and the assessment by USGS was that it was it was a very dangerous as a Geo hazard, it was a high probability of a landslide cutting a cinnamon in the Prince William sound, which had a long history of settings and armies and so we were able to get that done via contract and similarly in the last few years, we just finished up a multimedia project with the Channel Islands in the Channel Islands with both NOAA programs and interagency. Next slide please. So outside the federal government, we have academic partnerships with the University of New Hampshire, we've only heard about that. The University of Southern Mississippi and the University of South Florida. He will be hearing more about those interiors to come. This movie brings us a level of capability and reach into the academic community that for deeper research and trying out some bleeding edge technology and that sort of thing that complements what we can do in-house to our contractors. Our contracts, our big hydraphic contracts were renewed this past year and we are very pleased. I think this is the strongest group of contractors that we've ever had and you know, all these companies bring something a little bit different, you know, not only with geographic spread but differences in capabilities and expertise and equipment. It really helps us to be able to solve pretty much any problem you would imagine in the ocean mapping realm and to do it at scale. One of the things I like to say is through these contracts record year-over-year double our funds available and I think it's pretty unusual for that level of nimbleness for a federal program. We often do not quite double but have significant bumps as a result of supplementals after hurricane threats. Next slide please. We are not really going to be talking about unmanned systems very much but I know the panel is very interested in it. These are all the activities from last year in unmanned systems. Associated in some way with co-survey. A lot of these are our contractors. Through our contracts and working with our contractors, we have been able to find projects and apply the cutting-edge technology to some of the varied American mapping problems on the coast. Unmanned systems in Alaska, Florida, Great Lakes Commissioner, the Chesapeake Bay and elsewhere. This is really one of the main ways that we are engaging industry in the technology sector on this and I am really proud of how far the hydraphic community has come in the last few years and maturing this technology and, you know, we are still at the point where me to say I think we are at the pivot point right now where there are some of these technologies are mature enough that we could take them to scale. A big flood of money invested in some of these technologies right now would be a big investment. Wouldn't have said that a few years ago because some of them were still pretty immature but there is some really good stuff out there. We are investing, obviously, we have pictures of little, I just the same little yellow boats but clearly they are orange and red and gray and all the colors of the rainbow now but the tricky part is not making about that can drive around in the water, the tricky part is making it do hydrography. We are really investing heavily through our university partnerships and our own work and working with

the commercial sector on trying to really improve that too so that they are not just remote-control but they are truly on top of it. Next slide please. That is all I've got. I will turn the devil back to you. Actually, can I make one more point? That is in the unmanned systems and in general, if you go back to the NOMIC strategy, the milestones we put out and the NOMIC strategy are simply not possible using state technology. This is just a question of throwing money at the problem until we are done, we simply cannot do particularly in the shallow half or the shallow two thirds of the problem, which is 40 meters and shallower, we simply cannot do it. With today's technology. It will only be through continued investment in those types of systems from the slide, as well as artificial intelligence and new communications systems and other types of advanced sensor technology we will be able to get to the point where we could have a plan where we could actually achieve that full ocean mapping goal. So we are going to continue to invest in that but I hope any investment that the federal government makes Bradley will contain a significant portion for technology investment in the early years as well. That is my last point. Back to you.

Thank you. I feel like I want to almost retitle the session because of making the most of and in spite of Covid-19, you all have done an amazing amount of innovative work really in ways that we could not have done so congratulations to everyone. It is very impressive. Thank you all for your attention and for the officers that were here today and to all of their invaluable work. We continue to produce top-quality work despite the challenge, like I said, because of and in spite of, yeah, amazing. With that, let's pass it back to the chairman and give us the rest of our day.

Okay, thanks. As Nicole said the great stuff, it is really nice to see a big reach forward on the technology. I will defer to Lynn report, should we do some Q and a or should we take a break?

I think Q&A.

Just to clarify, this part of the Q&A is for the panel members only. Will get public comment in a little while.

With that, do we have any questions from any members of the 21 this past several presentations?

My unmute it? Yes I am. Can you clarify a little bit more the less than 40 meters? I know that is a difficult heart of the nearshore. Are there agency groups, academia, technologies that are actually currently being addressed to measure that part of the shoreline or have people written it off and that oh my gosh, not now?

That is most where my program mostly spends it time in that space because that is the navigation relevant part of the coast and so shallow water multibeam works but it is a laborious in that depth of water. Bathymetric Lidar works well when the water was like it is right behind me here in my video but that is not often in the estuaries. So I think that the messaging on the 40 meters has been a little bit awkward. We wanted to have a

significant milestone by 2030 but we recognized that we couldn't, that milestone could not complete everything. We didn't want to define the scope of the entire problem to be only to the easy part and the part that only meets some societal needs. Navigation a lot of our Center 80s, Marine protective areas, coastal modeling, there's a lot of habitat, a lot of really valuable reasons to have the mapping in the shallower water that fades away as the water gets deeper. So recognizing all of those really valuable societal benefits, we wanted to keep the overall goals of if it is water, map it. The whole thing. But, to give ourselves a little bit more time not only because it was going to take longer because we region would benefit from a technology search disproportionately benefit from a technology search in future years. We can imagine that with a not reasonable amount of money but unimaginable amount of money we could do the 40 meters by 2030. We couldn't make the same argument for the 40 and shallower.

Right, okay, thanks.

Anyone else have a question

I will go one more if no one else has anything.

Sure.

I think it was Rich, you mentioned ports over AIS. This is actually fantastic, I think a lot of people have been working a lot of time on that and I wouldn't, so since you are bringing in the waves please and talking about the integrated port system, are the waves also going to be over IAS or would they not be included , you might not know the answer to this.

This is great, I believe they will be but let me just double check and get back to you on that but I believe the answer is yes.

You know what would be really helpful, rich, is you can just email this, if I could have the contact person who was working on that, so it would be great because we also are doing parallel work to try to get our wave buoys over IAS and there are some places we have wave buoys where there are not NOAA port systems so it would be really great to try to collaborate with what you are doing there and integrate that with the wave data also, thank you.

I will be glad to provide your contact information. At this point, all the work is being done on the Coast Guard side. We completed what we needed to do years ago but they needed to make changes to their I.T. system and do some other things. I will get you contact information so you can ask whatever questions you would like.

Okay, great, thanks.

Okay, we are going to take another short break. Nicole, do you have a question?

We have time, I have a quick one.

Sure, go ahead.

I am new to the HSRP. I haven't seen all of you in person yet and am looking forward to working with you. I don't really have a great feel for the dynamics of the group because this is how we are, you know, how I know you so far. So, I did really appreciate the comments from Chapa about the collaborations that are going on and relative to Julie's question about, you know, the coastal zone, which is the zone I live in and work in the there are so many agencies in there, all these interagency groups popping up right now to work on coastal topics and if in future briefings it would be really helpful for us, I think, to understand a little bit more about how you are collaborating with other agencies and how you are building on those capabilities to a fortification of efforts and Justin Kree séance that the new capabilities that are developed will indoor.

That's a really good point and we are going to have a considerable amount of time later on today for various topics and we can all give you some background on that as well as get your opinions on that. I think I can speak for everybody on that cooperation and making sure we are tracking that. Thanks, we will break right now and be back at the top of the hour. Take about five minutes and we will see you soon.

[Captioners Transitioning]

WE HAVE A COUPLE MORE QUESTIONS THAT WE ARE GOING TO TAKE CARE OF FROM THE LAST SESSION.

I was just trying to find out technically how to raise a question.

It worked. It was not the correct way to do it.

I have a comment but it can wait for later on the summary. I just was going to get technical, if there was a question to ask how do we get recognized?

I think Sal had one also.

Will have a formal statement on that in a little bit. I will go to Excel for right now for a question on the last session.

Hello. Okay. I have a question for Smith. Regarding the 40 meters depth and regarding the precise navigation, what is the scope of the 40 meters, 30 meters [Indiscernible] I'm just trying to understand the number. 30 meters would probably be more appropriate for the navigation.

That is a good point. I want to clarify that the intent is that we are not going to stop doing navigation surveys in less than 30 or 40 meter water. Notably expect the up-tempo to increase in shallow water as well. We will not finish before 2030. This was a number,

around number taken from a wide variety of contexts. We did a level of effort study wear that was one third of the effort is deeper than 40 meters and that's why we chose that.

I agree, navigation depth are all shadow shallow.

Okay?

Okay. Do not go anywhere Shep, I'm turning it over to you for ocean and coastal mapping strategies.

This is introducing a repeat of a webinar that we did with the panel members and is really a summary of the strategy that was developed and published back in June. The hope that this and the part that Julianna will describe for the Alaskan postal mapping Genji and the standard ocean mapping protocol will all provide food for thought and inspire some comets from the members and public. We did ask HSRP to consider making recommendations to NOAA on the implementation plans that will follow. The NOMEC and the Alaskan coastal mapping strategy. We are also using the public nature of this meeting to be one of a number of touch points that the NOMEC counsel will be making together public input in the early stages of development. Next slide Pete's. Back to last November, the president issued a policy memorandum saying it's the policy of the United States to act boldly to safeguard our future prosperity, health, and national security through ocean mapping, exploration and characterization. This is an exciting development. I do not remember the president ever talking about ocean mapping as directly as this. Certainly flagging the links to national and economic prosperity and national security and health etc. At the same time the complete mapping for Alaska and the Arctic, these are both flagged as part of the presidential memorandum back in November. We November and June we developed and vetted through an agency process and national strategy which is still pretty high-level and that was published in June. The next phase is coming up with an implementation plan. How will we do this? There has been a lot of discussion that they would like to have visibility and a voice in this process and this public session is one piece of providing that voice. We will let you know some other ones coming up. NOMEC is the national strategy for mapping, exploring, and characterizing U.S.. Just to be clear this includes the Great Lakes and state waters and it's a shorthand description that geographers would quibble about on the terminology. The intent is to be inclusive. We have an plantation plan, the first draft of which is due December 8 to the ocean science and technology committee with all kinds of different agencies represented. From the very beginning we have been committed to being very inclusive within the constraints of the law. We are developing the strategy with input from the public and philanthropic and academic and commercial partners. I hope we will hear from you all today. Next slide please. . There are five goals in the NOMEC strategy. The first is about governance . How will we coordinate not only across interagency but also the other sectors. The be part of that is establishing the NOMEC counsel. [Indiscernible] and I cochair that cancel and that has just now been stood up. Our first order of business is to develop the limitation plan. Go to is the heart of it if you're into mapping. It is simply to map U.S. easy. The first step is to find the standard set of protocols for what we would do together. If we did something and USGS

did something and someone wanted to make an allowance in a commercial tender that we would all be talking about a similar set of ocean mapping activities so that it will fit together into a seamless set of services. Second is to coordinate and execute campaigns to map the United States EEZ picked we envision this to be done regionally . Original mapping efforts, there is a lot of different geographies on the U.S. coast and the stakeholders and those with capabilities in each of those regions are pretty disparate as well. While that has not happened yet we do envision a regional flavor to that. The third is to make the data usable and available. I showed you one example of that with the national [Indiscernible] source a few minutes ago. That really only covers bathymetry, does not Katter water column or backscatter or physical oceanography, said bottom, etc., etc. that would be part of a standard issue mapping protocol. Those are still open questions as to what extent we can and cannot make the data more readily available. Next slide please. . Goal three is explanation and characterization. A quick definition check here, the characterization, the expiration is about activities where it's less known. Characterization is observations in excess of what might need to be done for basic mapping for particular applications. I could give all kinds of examples but I don't want to get hung up on it. We are giving the focus for that to the OEA be for their consideration. We are deemphasizing it for the conversation here. It is part and parcel of the whole effort. Goal number four is about the technology and we chose these verbs very carefully to develop an mature. These are active roles we need to take. We cannot just use the latest technology because we are this sector. It will not be developed if it's not for us. We need to take an active role in developing and maturing those new technologies. You can imagine that we need to identify the needs and support the development of the technology to meet those needs and support partnerships with organizations that are working on that. There are a lot of different ways that can be implement it. I look forward to your thoughts on that. Last is partnerships, building partnerships beyond the federal agencies to maximize opportunities for nonfederal per dissipation and to inspire and involve the public. This is not just in a NASA wow way, this is also to ensure we are meeting the needs of the public and that the applications that might derive from these activities, the needs are being met by the larger program. Next slide please. here I am turning it over to Paul Turner from the interagency working group on ocean and coastal mapping. He will describe the process for where we are with the standard mapping ocean protocol. Go ahead.

Thank you Admiral. Good afternoon, everyone. I am Paul Turner and I work with the integration mapping program with the NOAA office survey. I will give you an update on the standard mapping protocol. Currently in draft with interagency working groups ocean and coastal mapping, getting such subject matter experts. We are working towards drafting [Indiscernible] this is in support of will to for the NOMEC strategy. Basically states develop a standard ocean mapping protocol and within this the intent is to establish the baseline of national data standards to guide participants from federal states and nongovernment and ocean mapping data acquisitions and the protocol will remind provide recognition standards and specifications and best practices the intent to improve communication, reduce cost and present unnecessary and redundant work. The protocol is also intended to serve as a guide for all partners in the ocean mapping world which also includes expiration and characterization to ensure the widest use of

data available. The protocol will at a minimum include seven primary features which are data management and stewardship. Symmetry data from the the Lidar systems, backscatter, water column data , sub bottom profiling and solar sonar imaging. We will follow national data standards within the protocol that align with geospatial data act of 2018. The one big goal that we can include in this is to ensure the widest aspect in use of all of these different data sources that are required. To maximize data stewardship and minimize duplication. Next slide please. . To promote our protocol that we are drafting, we are still in the initial phases, we've been working this over the last several months in the summer, the interagency working group will be holding a virtual symposium on October 6 and seventh. I have some of the details outlined on the slide. With the purpose of the symposium to enable nonfederal stakeholders to learn about our protocol and provide an opportunity for comment on it. There is a link on the slide for the symposium registration which provides a brief summary for each of the seven primary components. We will be facilitating lightning talks which are based on topics of interest from the registration process and will also be holding a roundtable discussion for each of the seven primary chapters and features to gain feedback, input and comments from the audience. We know the academic world and the private sector have a lot to share and we welcome their input and look forward to including their feedback on protocols going forward. Effectively the purpose of holding this event is to enable the nonfederal stakeholder to learn about the standard ocean mapping protocol and provide an opportunity for inclusion for their input. That brings me to the end of my slide. Thank you for your time. I look forward to any questions or follow-up.

I think we are turning it over to Giuliana for the rest of this.

Questions now?

I was going to turn it over to Giuliana but should we take questions? I would say wait to the end. We will get back to you.

I have four slides so I will get to this pretty quickly. I basically want to go through with the goals and objectives are within the Alaska coastal mapping strategy. Let me start out by saying we were charged with completing the strategy for mapping the Arctic and subarctic shoreline but the and shoreline and new shoreline and the charges to make sure we are coordinating with the state of Alaska and the Alaska mapping executive committee. I've been involved in the committee since its inception and I am pleased to say we are now a cochair of that group and have been working very closely with the federal partners and the state partners to do a lot of the ongoing work in Alaska on the coastal mapping side and other geospatial data sets that we have focused on. Before goals of the Alaska coastal mapping strategy are before you. First and foremost, build on existing mapping partnerships. There are a number of them and we want to make sure if there are not folks involved we want to make sure we get them involved. We want to use what we arty have an existence, we are under a tight deadline to get the strategy in place and the implementation plan in place. Making use of what we have available. The second goal, expand the data collection to deliver the priority products that sticklers require. What are those things that people want most and will benefit from

the most? The third goal is leveraging innovation and mapping technology development. It was mentioned we need to continue to push this. We need to have new technology that we can capitalize on these efforts. The fourth goal, the importance of communication, strategic communication to promote engagement, to include stakeholders and to promote the engagement of the stake holders. Next slide please. . The strategy itself is rather short. What it does, it goes through and identifies specific objectives under each of the goals. Under the first goal, you can see the four objectives, the first one is to establish a team and that has been completed as you can see at the bottom of the screen. They will propose the creation of a coastal mapping technical subcommittee and that was approved and stood up and now they are working hard on the coronation and development of this Alaska coastal mapping and limitation plan. We have that one going. The second objective is to define the mapping priorities of the stakeholders. The third is very important. Resource it. We can have a plant but we need to be able to resource the implementation of that plan. Fourth, integrate with other complement three priority mapping themes. It is all part of a bigger system so we want to make sure where those touch points are and we are integrating the needs and connections with other data sets. Next slide please. . Under the second goal, the objectives include having an agile plan and campaign. We know, just like with 2020, things happen. We have to be able to be versatile and have plans B, C, D in our back pocket. When things go a different way than we planned we can make progress on things. We want to be able to execute an agile plan. The second objective is to make sure we have the foundation necessary by upgrading the national spatial reference system components to support the mapping data acquisition. As I mentioned in my presentation earlier, foundation cores and the NOAA course network, that we have the proper models and updated technology in Alaska so the information is being layered on top of something that is the most accurate and relevant in today's world and using today's technology. Third, to produce and disseminate key datasets and products from this mapping plan. Collecting the data is one thing but what are we disseminating out of that and how is it being used? Next slide please. . For goal three, the subject is under that are to upgrade the Alaska climatology tool for smart application of satellite/airborne Lidar. Determining what the water clarity is so we can utilize that for surveying purposes and improve that tool. Secondly, monitor and test the new technologies for acquisition efficiencies. We need to do that throughout our operational needs. Nothing new here on the coastal side, same as the Oceanside, how do we develop and monitor and test these new technologies. The last goal is to focus on the communications and promoting stakeholder engagement. The strengthening the communications and growing the participation we could only have a better product. We will get people's input and look for ways we can work together to implement the strategy and to use online tools as we are doing now and technologies to mitigate plans and performance so it's not just about sharing information but monitoring how we are doing with things and being able to share that with a broad range of stakeholders. That was my last slide but I have a couple other comments. As far as stakeholder engagement I know there is a tentative date for an Alaska coastal mapping summit. I think November 5 is the current date being looked at. We want to have something we can invite others to from the public, from the state and other federal entities and make sure we are casting a wide net and getting input through this coastal mapping summit. We are working on that. Our plan is similar to the NOMEC

plan, we want to have a draft available by December 8. We have a lot of work to do in a short amount of time. I will also say there is a great team in place. There was already wonderful participation by a number of federal and state entities on AMEC and the coastal subcommittee that has been created is a huge partnership and there is huge participation by federal and state entities. They have been meeting regularly and I can say at this point, they are rolling up their sleeves and getting started. They are writing the component of the imitation plan. Under the HSRP, several of the panel members have been very involved in developing recommendations in the form of a white paper to present and discuss later today and tomorrow about the strategies and I applaud you for all of the effort you put into this work thus far. I am looking for to the discussions about your recommendations and you've done a terrific job in getting those pulled together. I hope, with this it can lead to an opportunity to utilize your work within the implementation plan. The writing team is just getting started. Your input is very timely and whatever is written and whatever we indicated in the next couple of days, we would love to be able to pull that in and hope that you will share with us your approval to bring that information into the implementation plan. I think with that, that is all I wanted to say for now. I know we have a lot of conversations ahead of us. I will end my update. Thank you very much.

Thanks a lot. We have a couple questions lined up. If you want to go first Catherine?

Thank you. I have a couple. The, says the comment about the postponement of the 2022. I would not feel bad about it. I think you guys did a great job in the last seven or eight years of preparing and we waited all this time. We can wait another year or two. It's totally understandable. I don't see anybody that would be hurting from this delay. Keep up the good work. Inc. you very much.

Thank you Quassim.

For Paul, I appreciate the work of Shep and everybody on this project. You can see we are focusing on the importance of everybody speaking the same language. I am glad you brought up the protocol and the importance of delivering that protocol and we all want to make it enter agency but one thing I want to emphasize, the last few weeks, I've been trying to get a hold of a national standard for coastal mapping. For ocean mapping I cannot find anything in the form of a standard. The protocol is great and everything important but it's a good opportunity for us to think about it being within that protocol, we will refer to the U.S. national standard for coastal mapping and hydrographic survey for something, I got hold of hydrographic surveys specifications and deliverables which is great, that's on a standard. The standard had different definitions and it will be nice so everybody will use it will or if it's an engineer, the core or NOAA. We can all sign off on it and every but he can use it in the future. With technology now, our vision for the technology now, collect it once and use it many. Having a standard where all agency collect data and in one way, that's where we will make the most impact of the strategy. We don't waste resources and we don't have to agencies going to the same cosigning and scanning it twice. It is important to have a center and everybody go according to that and we do not duplicate efforts. NOAA will collect Alaska,,

Good stuff. Larry, you are up.

A question for Admiral Smith in the NOAA goal number two. You mentioned the potential of taking a regional approach. Wondering, what mechanism is envisioned that could take advantage of all of the possible assets, and a since it's a twist on the other direction of the customs question. We have such a huge task in there are many assets out there. Federal, state, academic, private-sector, philanthropic, have you thought about what mechanism could potentially coordinate amongst all of those different assets to truly get a corrdinator program going?

I think that is the question and it underlies the whole thing. I am hoping to hear your ideas first. On what that looks like. We have really cast a ballot for what another example of how this is done in another sector. We really have not found one. One that really does that really well. I think we are going to have to invent it. I think part of the reason that we do want to think regionally, at least for priorities and designing campaigns is we will never get the Arctic people to get interested in the Great Lakes. For the Gulf of Mexico and vice versa. We would waste a lot of time talking, if we had everybody in the room we would never get to the level of detail to do anything meaningful. Regionally. To really think these things through.

We might haven't Arctic vessel that could do a lot.

There are organizations like mine that have national scope and they need to be involved everywhere. There is a lot of the stuff comes down to money in the end. We are really trying to build as much flexibility into how we can use resources to get this done. One of the things I've always regretted is it is very difficult to add a little bit on to an existing research group that is already doing all of the logistics, the maturity works and the people are there we just want three more days and that is the way we are structured for environmental compliance and federal acquisition regulations and everything else. There are a lot of barriers in place. We are looking at how to erode some of those barriers. That way we can take advantage of opportunistic deficiencies. I think this needs to sit on a foundation of stable capability and capacity in both the government, commercial and academic and philanthropic fleets. There is plenty of work to do. Right now there is not enough money to go around but I'm hoping that as this conversation goes on we will be able to get the scope right.

Thank you.

Sean is up next. You might be muted.

Hello.

There we are.

Really great panel today, a couple times things came up that I wanted to comment on but I figured I would save them for the end, first of all being in the Gulf Coast region, I have to think what I call the NOAA Swiss Army knife , if they have multiple benefits and calls with the National Weather Service as each system has approached and had to take efforts to shut down the Mississippi River for navigation, luckily, I hate to even say it, the storms went different ways but we've had a very active season and a lot of impact. Shep someways touched on what I wanted to get to. I remember from the presidential direction and directive that there was a question about appropriations and being consistent as we heard some of the discussion about increasing port sensors, unfortunately local impact means we have challenges funding the sensors we have. I know that's on the Mississippi River. I know throughout the program that has happened in other areas. I just want to look back at the statement I say a lot. Full funding floats all boats. I am wondering if, I know some of this is managed and programs that have already been run and a lot of great work has been done and there is a lot a partnership but in the end, I think the funding, the consistent level of funding and increased level of funding, without a budget increase, doing more at some point just becomes impossible, even with the public, private partnership. I wonder if some of the increases will fund this and come back to those questions related to having the authority. That can be great but without the appropriations you cannot get there.

That's basically a statement or a question?

If there's an update on where funding will come and I heard we have the potential for ACR and stopgap measures but what can be done with the directive and OSHA mapping without increased funding.

In a public forum, I need to tread this ground carefully. The way it has been described to me and it makes sense, we have this vision from last November of a strategy in July and we haven't limitation plan in December and it's only when we have an implementation plan where we know who needs to do what. Can we think about funding anything? Otherwise we are throwing money at a problem rather than investing in a considered implementation plan. I hear you. And that is the way I see this playing out. The limitation plan is the roadmap for investment. We want to put this building block in their upon which we can scale the program to the size we envision to meet these goals.

I appreciate the complexity of that answer. Thank you.

We have time for one more question from Lindsay and then Shep will moderate public commentary. Go ahead Lindsay.

I'm up now, sorry about that. I am technology challenged. A comment and then a question. As Ed said, the ocean is having a moment and we fully support that. I think the way I see Shep embrace this is great and I am waiting for the official Coast survey be turned into the ocean Coast survey, I just have some concern on how he will balance, he talked about the under 40 meters and over 40 meters and the technology will support that acceleration of the under 40 meters. You will be in parallel but you will

see it accelerating the under 40 meter areas in the future after we've gotten the deep stuff done but still doing it in parallel. It seems from the coast survey perspective you are planning to be involved in the deep water and I wonder how you balance that and not keep the real momentum you've had in the shallow water going under 40 meters?

Quick question. In the public comments we've already received and things I've heard from our stakeholders on the side is there is a real concern, particularly navigation interests but others as well, if we all march to deep water then the shallow water applications will be neglected. I do want to verify that it is not the intent of the strategy and it is certainly not my intent to redirect the resources that we have already been using for Shallowater work and in partnership to deep water. We have a scalable capability and capacity where we can add additional activities on top of our foundation activities that would allow us to do more and we could do some of that and deeper water over the course of the coming decade. I don't think there was a judgment on anyone part that the deeper water was more important. In fact, most judgment is the optimum opposite. It is easier and we can build momentum for the program and we can take advantage proportionately in Shallowater from technology advancements in the coming years. Does that sort of answer your question?

Probably. We just want to leave the hard bit for you guys. If you can get more resources and top off your foundational funding anyway, why would you put that into the deep water and not put more money into the Shallowater would be the question?

It depends on what the note was that is attached to the many. Often times there is a note that comes with the money that says what the intent is. It's pretty broad and I expect a good balance between shallow and deep in the context of regional campaigns with the goal of getting it all done. I think that is the bottom line. The plans have to envision the completion. We are trying to get away from the little postage stamps because that will never add up to done.

Okay.

Is this public comment or do we go to general HSRP comment?

I jumped the gun by about an hour so you guys get to go more.

I had one more, and question regarding the focuses on the mapping, it's an unfortunate word because it is a product and people understand mapping but they also misunderstand it. It has been mentioned, the different parameters that will be observed and we are talking about the acquisition and the use of the data. I think one of the areas that is difficult to manage is we have the gap analysis that has been held up to say here is where our gaps are. That is kind of concerning. It is great if there is a gap as it is easy. One of the problems is is just the holdings that is just more data and quality assessment. In the areas of data, it can be a problem. I give an example of that the trust working off the West Coast this year. We are actually exploring areas with the sanctuary and we are off the West Coast in deep water but in accordance to the Betty gap

analysis it's done but it's not done in preparation for the exploration we are talking about. There is an interagency group that we work with to define what is really required through exploration and I think that is a key aspect. We say the foundation is the map but in a way, we have not really defined in implementation, I think it's important to clearly define what we mean by that and that is the data and how we will distribute it. It seems like it almost needs to wait for the OER to say this is what we will characterize and this is what we will need to characterize. That was something we fully support. What do we mean by that and how are we going to get it done and how will be presented. You mentioned the bathymetric source and I think combined it's great but for backscatter and sub bottom, how do we really say we are done even by 2030? Maybe that's a question for Shep or Paul Turner.

I don't want to reply to every comment because it will take up half the time but I think that's a really important point and the definition of done in that gap analysis is very crude. Is tied to the seabed 2030 model which is do we have any and it does not mean it is sufficient for any particular purpose. A lot of it is insufficient for navigation for instance. We have something. I think it is important point going forward that we need to document, we might need to update that definition of what done means for NOMEC but here is one cautionary note. If we define it and we set that Bart too high and we do a gap analysis based on the criteria we will have gap analysis for 0% done. I don't think that is a really sellable place to start this program. I think we need to give enough credence to the data we already have. There is a balance in there somewhere.

Like he talked about regional campaigns, it's almost regional definitions of what is required in each area I suppose, shallow versus deep, Pacific versus Gulf of Mexico.maybe that is one of the areas it helps to define what parameters you need. As a minimum under this federal program, what is the minimum set of parameters. It might not be across the whole EEZ and I think that's the experience we've had depending on where you are exploring, those that are leading the expiration need a different parameter. I think that is an area of limitation we need to think about. Thank you.

I will interrupt, you're going to be back on in a couple minutes Lindsay. In another role. Nicole had a couple comments.

Thank you. Real quickly. To reinforce a lot of ships replies, to Sean's question and Lindsay to your comments, these are exactly why we need the HSRP to provide us with input on these plans whether has to do with different definitions of done or the definition of the berm of mapping characterization, order of operation, all of these comments you raised are part of our internal discussions on the development of these plans and the role out of the plans. The good news of course at the beginning is we have a presidential memorandum on the work we do and it's drawn a lot of attention towards it. It has encouraged and forced conversations that need to happen. We need your input on the refinement of these areas of work and helping us prior ties these taste on our initial work at it. We recognize the difference as Shep pointed out between the Shallowater and deepwater work. There are different objectives and different costs, etc. Having these plans will allow us to have more sophisticated conversations with

stakeholders and owners about how to prioritize these items. We welcome that but it is a lot of work. We do welcome that and we are pleased to hear your comments and your questions. We do not have new money pouring in at this moment. We are having conversations and we can point to this memo and these documents and hopefully your input and say this is what people care about.

Lindsay, stay on, Dave and Julie, if you can join, we have a mini panel. This is to continue discussions regarding Alaska and NOMEC. Lindsay you can ask your questions of yourself.

Good. I guess I did have one comment. We keep hearing it and I acknowledge that there is obvious outreach for involvement of the community for industry academia and others to be involved but I'm still interested to know for the SOMP, it's developing a community standard and not allocating funding and I wonder why there cannot be other nongovernment people involved in the development of that and having some ownership, I don't personally want to be involved in that but I think it seems like there is a lot of expertise outside of the government in developing protocols and authority in place in different areas. Is there no way it can be the group that was not an advisory board that's formally appointed like us but can sit alongside that group in the development. I'm not sure that question is for.

I think you were asking me initially but maybe the admiral can weigh in. There is no additional funding for the protocol, there has been some discussion as to how to best involve the nonfederal side. We have not even began to write the drafting protocol. We have a simple Museum coming up in two weeks, there is still time to potentially include another review cycle from the nonfederal side.

Thank you.

I would jump in. I have a comment first. I feel a little bit hesitant about how saying this because I've been out of touch with mapping for a few years but it was really frustrating when we were doing Lidar in California and doing that on the company coast as far as even the quality control checks were so different between he was performing the mapping and this is where I'm going, we actually did port to for the physical parameters and biochemical parameters in 2001. It was feds and academia, private partnerships and we formed this group for the quality control of real-time data and we actually did not specify resolutions because that does depend on the region and instrument that we at least established what quality control measures would be looked at. Therefore the data as it goes through and getting out to the National Weather Service, at least it allows non-Fed partners to contribute and you know the quality control is all at the same level. That has been our effort since 2001, 19 years and we are still working on some of the parameters but it was a way of bringing together Fed and non-Fed partners and we got the manufacturers at the table for each parameter, waves, currents, wind, etc., we got the manufacturers there and we got them in the same room and said what are the minimum criteria for the quality control you need. Maybe this has been done at the mapping level but it seems like it is still all over the place and I think the standardization

is so important. Otherwise you have no interoperability, no way to really tell what has been collected. That is my input. Who else wants to talk? Anybody else have questions or comments on this?

I can add a little bit to that. I think the concern that Admiral Shep brought is a valid concern. How are we going to do it? I think the strategy is very clear actually with the five goals. Go five says build public and private partnership to map, explore and characters eyes the U.S. EEZ. And goal number two, execute the mapping of EEZ including getting agencies. I think it will take a village. I don't want NOAA to feel like it is on their shoulder only. I think there is a private, public agency, they need to sit on the table with equally weighted and exchange and brainstorm and divide and conquer. You focus on the below 40, I focus on and we pull the money and resources and everybody has chunks here. Without that dialogue and openness and honesty about it, I think it would be very difficult for anybody to execute the strategy. The only way to do it is bring the right people around the table, whoever they are. Whether it's other agencies or companies, private and things like that. I am just emphasizing what the strategies say, it's pushing us to build that public, private academia agency and aggregate the resources. Do not do it alone. Thank you.

Okay.

You mentioned quality control procedures. In the topographic arena with had very well-established procedures for relative accuracy between overlapping fight lines and procedures for testing the absolute vertical accuracy for planes from topographic Lidar. It is difficult to have good control points in the middle of the ocean. You can to a certain Shallowater or of the ends of docs we can measure the depth of the water and put in control points from the bottom of the ocean floor that it only works in Shallowater. I Meisel continue and talk about the Alaska coastal American strategy. That is one of the two topics raised by the presidential memorandum. Members may root call we talked about developing a HSRP issue paper on the Alaska coastal mapping strategy. At that time we did not know a present a memorandum was coming out. I knew on the Alaska coastal mapping strategy, it was in progress and being developed by people working with AMEC. The got to work when they got the memorandum coming up with a strategy that was addressed this summer and now the HSRP, rather than having a two page paper , we saw the issues were much more complicated than what we could put onto pages so I put together a twentysomething page, very comprehensive paper on addressing the various goals and objectives of the Alaska coastal mapping strategy. We got a lot of input from HSRP members. I think my members but input on the paper we are discussing tomorrow. They can be influential in influencing the imitation plan that will be developed by December of this year.

Thank you. That is a good introduction to what we are going to be discussing tomorrow. We could do a couple things here. I know that Quassim has a couple comments that he wants to make. I think we have some time. Is that okay add? Did you want to talk a little bit about the overall view? Quassim?

Absolutely. I just want to highlight the situation of COVID-19 and how the federal agencies are performing. They have been pushing forward with all of these coastal mappings, there is so much going on, and Alaska, the Pacific and in the last eight or nine months there is a tremendous amount of work being done in that partnership. That is a partnership we are trying to build between private and public because none of them can do what they are doing without the others and I think it's proven during this difficult time of COVID, it is serving everybody. I want to give a shout out to the federal agency, we should work with them and to the private industry with working through this difficult time and mobilizing people to the field. They are collecting data and processing data. Kudos to both of them. That's all they needed to say. Thank you.

Thank you. We are going to take time to go through each HSRP member right now. Let's talk about the Alaska mapping since Dave has already introduced that one. We have received several comments back on the Alaska mapping. I know Quassim has given us some, Nicole, there are different ones. I was just wondering, I would just go alphabetical down the list. This is focused on the Alaska one. I think you all have in your package and I think you've had a chance to read it. Any further comments on that Ed?

No.

Quassim anything further ?

No, I am fine Julie.

We need to unmute the panel for this one.

He is an muted.

Are you there? We will come back. Sean?

I would just say that this is a course outside of my area being in New Orleans but I was able to help with the paper, I've seen a lot of improvements and this is where together every one is on a team acronym and I'm happy to have contributed with language. Beyond that, it's very well done and I appreciate everything Dave did to get us to this point.

Great.

My apologies, I had electronic challenges. I think for me it was a learning experience. It is amazing to see so much being done in this COVID environment by the NOAA team. Congratulations to them. It is a challenge and we understand our challenges. Specific to the NOMEC policy and the Alaska coastal mapping strategy , I think as much as we can participate as a group and support them, I think that is the way to go. That would be my focus. Thank you.

Thank you. Thanks Anuj. Nicole did you have any further comments?

I just want to say that was really helpful to hear from Juliana, the overview, when you read them it's one thing that getting it from the source like that was extremely helpful. Thank you for that. From my perspective as a representative of eight national NGO that focuses on chores and beaches, I think a lot about on engaging stakeholders, our specific stakeholders are the coastal communities of the U.S. and I loved the fact that the Alaska study did not wait until the last bullet to say engage stakeholders which is what often happens with these. Building on partnerships was the very first thing. Kudos on that. I did have a question if there is time regarding the subcommittee that was formed and mentioned that state and federal agencies are working together on that to begin drafting and I wondered if there is repartee's adhesion representation beyond that or is it allowed, stakeholders, community members involved?

Do you know about that Dave?

I would recommend that she contact Ashley Chappell. She is working with the people in Alaska on that. I know they are seeking input from a lot of people so if you need her email address I can send that to you.

Ashley cannot make this meeting.

Ashley is the cochair, one of the cochairs for the coastal subcommittee under AMEC and the group is working with the counterpart with in the state of Alaska also as well as having representation on a subcommittee from Alaska they are also working it from there geospatial council perspective and trying to engage other locals, tribal, native Alaskans and I can't speak to the private sector component but I think that's one of the reasons why they want to make sure there is at least an opportunity to coastal mapping summit and there might be other venues where the net is cast wider. I think as Dave mentioned, Ashley is the focal point for coordinating this effort from the NOAA perspective. We can certainly follow up with you with some more details shortly.

Great.

Juliana mentioned the Alaska coastal mapping summit she said it's scheduled for November 5. I have been to the last two summits and it really is a wonderful opportunity for people from every place to throw in their ideas and to interact and collaborate on how to solve this problem together. I strongly encourage everybody to sign up to participate in that summit when it comes up.

We will definitely let you know.

Thank you.

I'm going to continue to go around and then we will come back to you Dave to give the high-level overview of your paper. Lindsay.

I have no further comment on the Alaska strategy, it's a great job.

Thank you. And Kelly?

I think the Alaska is working well and I am impressed to see the public and private involvement in this. I think that is something HSRP has been promoting for years . Nicole mentioned she is brand-new to this but this is my eighth year and I realized this is probably my last meeting and , I never did get to Hawaii, you promised me that and that's why I got onto this thing in the first place. I'm kinda disappointed with the whole thing. I've really been impressed, everybody is beating it to death but COVID has moved the goalpost this year and I am very impressed to hear all of the progress that has been made despite COVID both internally and with the vast expansion here into the public and private. That is bringing us back. I think I am glad we keyed off with blue economy. I think that's what we are all about. Cleaner, safer and extensive societal benefits. We mentioned a lot of money. I think the economic impact from what we have seen from the commercial activity in the port, I would not doubt it's bigger than that. Coastal resiliency is really coming out of the spotlight so I'm really glad to see how we are approaching this. I think a lot of this progress and the perspective of how we are approaching some of these is coming on target with the latest two pieces. Perhaps Alaska will be the beneficiary of increased technology cup better public, private interface, data sharing, we are moving these projects faster and better. I am very happy with it. I think this is the evolution of what we have been working on for these past few years. I am very pleased with it.

Thank you for your comments. And

I had to go to a headphone and I hope you can hear me. The Alaska thing to me is a pitiless curler of particular interest to me, I saw an AIS image showing the amount of traffic that is operating in and around the Alaska coast, particularly the north side. To be able to really provide good charting for navigation safety up there is really important. As far as the blue economy, I know from the people I deal with who are buying charts and want to be able to navigate safely up there that it's critical we give them the best possible information so they can continue to do what they are doing, whether it's fishing or exploration or just general shipping. I like the way the paper has gone and we can talk about it more tomorrow. I am glad to see the focus on Alaska.

Thank you. Dave I will skip over you. Anne ?

I am just going to say what and Kelly said,, what struck me about everything this morning was how fast technology is moving and it's so impressive how everybody is embracing it.

Thank you.

You are muted.

I'm good. I am feeling the love from everyone talking about Alaska, it's pretty neat. I appreciate that. Evidently the president met our policy memo last year we talked about more charting in Alaska. I'm glad he read that memo which has been implement it on at a great scale. Is still the last maritime frontier and there is increased shipping activity so clearly looking at this area and trying to get it on par with the rest of the United states I believe makes some sense from a for selfless perspective. I think the paper is very conference of and very good. It is a good game plan to tackle challenges. Providing local input is a very challenging season maritime wise. We had a tank running around a year ago that ran aground because the last charting was 1900. Things like that. We have earthquakes and other things that change the topography so it's good to see it happening. I am pleased with what we've got developing here. Glad everybody else loves Alaska also.

Gary.

I think most of the topics have been covered. I like the public partnership discussion and I especially like the comment about collect the data once and use it for multiple applications.

Dave, I know you have received some outside comments also and maybe you want to just give a brief overview of this paper for the public comment portion of it.

Also, we want to ask Sal if he had any questions. Sorry.

Sorry Sal, I apologize.

I think the Alaska project is a great one. I think it's achievable due to the fact there is a lot of interest from public and private sectors. Also because there is not much COVID over there. I think it's a good point with that project and 40% is already mapped so we already have a base to work on. Just to do a better job of that.

Thank you. Great. Should be go back? Juliana?

Cannot follow up on the earlier comments. I am getting feedback from Mike who wants me to point out information regarding your comment about Lidar. I believe it was from the efforts in the California area from a few years ago. He is mentioning that a lot of the issues have been resolved to this national coastal mapping strategy. In particular, looking at things about total propagated uncertainty for Lidar. Basically, identifying all of the different air sources and the accuracies and the estimates when you consider the platform and the sensor being used and the GBS errors in all of the different pieces. Bringing altogether and studying that and making sure there is a better understanding with the total propagated areas of uncertainty are and also aligning the requirements with terrestrial standards and things being done on land such as the three depth effort. I know is pretty technical and is probably something we can discuss off-line or have a follow-up discussion on to get more into the weeds on the technical aspects so maybe that is something that comes out of the discussion that we are having today and

following onto tomorrow. Deftly want to make sure we can bring the right people together that have these technical updates on what is happening in the world of collecting data with Lidar along the coast.

Julie, this is Andy. I don't have anything to say at this point but I wonder if Larry might?

I was going to get you also. I turned the page and saw your name there. Larry?

I'm coming on. I think the Alaska strategy has really come together nicely. I am pleased with that. I don't know if we are commenting about the NOMEC also or just Alaska?

Just Alaska right now.

I think it has been covered well and I am very pleased with what has evolved.

Before returning to Dave for outside comments there is Giuliana, Rich and Shep, if you have any comments. You are more than welcome to. Nicole, Dr. Jacobs if there is anything you want to comment on this? I do not hear any comments.

Nothing else from me. It takes a moment.

I'm not sure how to do this efficiently. Rich do you have anything?

Nothing.

Great. Do you have anything Shep?

On the Alaska coastal mapping strategy, I think I think we are focused on what we can get remotely sensed for the first pass and to get it locked down with title and geodetic data control. I think it's worth keeping an eye on the extent to which the navigation needs nearshore being met in many places where Lidar will not provide meaningful coverage offshore. I think we need to keep an eye on that.

Thank you. Juliana did you have anything further about the Alaska one?

Nope, I am all good. Thank you.

Dr. Jacobs?

I am here. I have nothing from me. All of this feedback is really good to hear and very helpful.

Great, thank you. Dave, I'm going to turn it over to you. Do you want to give a review of the paper and also maybe mention public comments that you've gotten for it.

How much time do I have? Is it one minute or two minutes?

Five minutes.

You guys have about 10 minutes, if you want to go a little bit less if you want to have questions.

That is fine. We started on this a year ago with the HSRP issue paper on the Alaska coastal mapping strategy and I mentioned a little bit ago that a lot changed since the presidential memorandum and now the two-page issue paper has got to be 20 something pages. It got to be six pages longer because I discovered that our own Dr. Larry did a national research Council study on this in 2004 and I had to include his recommendations because he was dead on 16 years ago. I'm sorry Larry that it's taken us 16 years to get this far. I appreciate seeing your comments.

I was only 12 at the time also.

I am pleased that 11 of the HSRP members contributed something that I was able to incorporate any study and then we received outside comments particularly, I wanted to mention the Alaska ocean observing system. I was given recommendations from them and another one from the Alaska water level watch, we have incorporated all of those recommendations. We are focusing a lot on the need to establish vertical data and Alaska where they are missing. The transformation tool only works in Southeast Alaska. We need gravity finished up there. a lot of this is necessary because right now, we do not know when high tide is and when low tide is for a lot of Alaska. To obtain this data efficiently we need to acquire bathymetric lidar at low tide when most of the water is out of the way so we can actually map the exposed surface and then we need to collect nearshore dip symmetry from the surface specials with sonar when at that high tide. A lot of this needs information on when is high tide and when is low tide in various portions of Alaska. That is a main part of the focus on priorities. We have several dozen recommendations here on here. There are 11 objectives in this strategy that came from NOAA. We made comments on many of those . I don't think I want to go through all of these individually. They have been out there for members to review for the last few weeks. We have had several HSRP working group meetings in which we've gone over this . This is been fine-tuned up to today. We've actually had three different versions of the latest paper, three changes today with but we got just today. We are ready to talk about this tomorrow and to have further discussions if you want to go into greater details. I really wanted to think everybody that contributed to this particularly SOMP , Gary, it was good for us to work together because we have experience. I know that we are proud of this strategy and offered nothing but favorable feedback from everybody else. I want to thank everybody who contributed to this paper. It was a group effort. I think we will have some good recommendations going forward.

I agree.

It's really nice to see everybody come together on it. You've done a great job incorporating all of the comments and getting a diverse group coming together. We want start the NOMEC right now. Juliana has one.

You have comments for six more minutes.

Let's do Juliana.

I will take one minute. I wanted to make sure everybody is aware that the Alaska coastal mapping strategy is an interagency strategy. While NOAA is prevalent and it , it is something that was put together with our partners, not something that is just truly a NOAA strategy. I think Dave reference to that. I appreciate you Dave referring it to NOAA's work on it but it's something I want to make sure that we incorporate the fact that it is interagency.

You're right. Thank you.

I'm trying to think if there was anything else. Maybe as a follow-up to that, I know there is a lot of great detail in the white paper and it's a lot longer than the strategy itself and we are hoping that the information that is in the white paper that the HSRP , when you're ready and are able to use that information in total and the limitation plan and share that with the other entities that are part of this coastal subcommittee so they're able to reference it and work together with us coming up with the implementation plan. I don't know if that is clear or not but we want to be able to take this that we are talking about and bring it back to the subcommittee for further discussion and consideration for the implementation plan. I am pretty sure it will be well received. I wanted to let you all know that it is a multiple step process for us.

Certainly. That is our intent.

Thank you.

Any other questions? Quassim?

Just a quick comment about the HSRP response. I definitely want to think Dave, he has a lot of passion for Alaska. He started it before the strategy came but we just worked with him on modifying it to serve both to respond to the strategy implementation. Dave, your leadership on that brought us to that, Inc. you very much.

I think we agree with that. Anybody else have a question or comment? Okay. Ed I am going to turn back over to you. I think tomorrow is the panel we will probably approve this whatever we need to do for the Alaska paper going forward. When.

This is Lynn, I wanted to make I wanted to make a clarification. I wanted to make sure the paper was accurate and that he did an amazing job. Any member can reach out to

anybody to make sure your work is accurate and correct and we appreciate that you did that, they've.

I think we all appreciate Dave's input here. It is a tremendous job and it will be a nice paper to submit with our letter of recommendation to Dr. Jacobs. Looking forward to that.

Lynn, can we start the public period yet or do we need to wait till 4:45?

I think you can start it but I wanted to double or triple check to make sure nobody else had any comments to make. We have two minutes. We were going to start at 435. We have at least eight or nine comments and if we do not get to all of them today we will get to them tomorrow. If we have additional comments we can also do them tomorrow. Christine Burns is showing you the additional comments that came in this afternoon as you are speaking. The initial comments that we asked for an advance and some from this morning are up on the web. We will update the list on the web as well with these. Anybody can see them.

We can go ahead and start, I recommend we start.

Please do.

Okay, Shep, go ahead and moderate the public comment period.

Thank you to the whole panel. A lot of really great discussion and observations in that last session. There will be a lot of great notes for us to unpack and use to guide as going forward. I am very pleased with the level of participation we have had from the public so far for this and the comments keep pouring in. I thought the way we could do this, we only have half an hour and I'd love to be able to give the floor to everyone but what I would like to do is quickly summarize some of the comments we have gotten to date just to catch everybody up. Then we've talked to five or so, and number of the commenters have asked to make a short summary version of their longer comment to us here. We will shift to that afterwards. Let me just very quickly, I'm not going to, it's not copperheads of if I don't talk about your comment, don't feel left out, this will all be part of the public record. Some of the themes and their comments on SOMP and the value of ground true thing to questions about the role of HSRP with respect to these strategies and I will make a quick comment on that one. It advises the NOAA administrator on a wide variety of topics and these programs have a role in these strategies and therefore that is the role HSRP plays . Nothing greater than that. There is a whole lot of other organizations and structure. There is another comment on how to get the data and this really points to the usable and accessible part of the strategy. The list of viewers and how you can get at it without being a PhD. A couple people commented on the fact that this will not go much of anywhere if it does not come with money eventually. Another comment that during COVID we have this opportunity because a lot of vessels are idled or underutilized and mapping is something that can be done with fewer people. Therefore it would be inappropriate activity to be done during COVID. A couple offers of

relevant technology with satellite derived bathymetry . A cautionary note on making sure that we have the requisite accuracy and resolution to make this chilly valuable. Another comment about the need to better include private industry, academia and nongovernment organizations in the planning process and all the way through both now and in the future. An offer from the U.S. powers quadrant to use their network to help with shallow water bathymetry . A suggestion we think about creating different contract vehicles to do smaller contracts closer to shore where logistics are easier. We had another cautionary note that we need to be sure somebody is responsible for this thing because if it's just a big, if it's everyone's business, it's no one's business send somebody needs to own it if we want to get it done. I had a comment particularly about Noah's navigation services and how they are so critical to the blue economy and the national special infrastructure and while this is all great, we need to be sure we are not distracting ourselves from the long-term responsibilities of these programs have. We have a comment about the importance of topography and bathymetry for modeling . And update on some new technology being used in Alaska for water modeling and water measurements. Etc., etc. It keeps going on. That is a little bit of the flavor of it. I think I would like to shift to recognizing some of the commenters for brief comments. I think we have up to 10, nine are lined up. We have about less then 30 minutes because I used some of it. Maybe think in terms of something like three minutes. First up is Dr. Joseph Zhang

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Can you all hear me okay? Good. I am a professor from Virginia Marine science. I have been doing postal modeling for 20+ years. I want to give my support to the important work you all are doing. Think the general consists in the modeling community, how important the typo information is. After 20 years we are still facing critical knowledge gaps in the bathymetry. I gave examples with if you marsh starts. We used the highest resolution information available from NOAA and USGS . They did a fantastic job compiling that info. We are doing this study in the Chesapeake Bay and we found that for the tributaries, some of the information is really old, 50+ years. What we did eventually was refunded lots of channels and creeks and we had to send our crew to resurvey the data. And five years ago we talked about this information to surveyors, they would tell you, models cannot take this kind of high-resolution or high accuracy data. Even if we gave it to you you cannot make full use of it. I think that has passed and the modeling technology has really caught up and I can tell you you quizzically now, we cannot actually make full use of the high-resolution high-end accuracy. This is from the watershed to the ocean. What we really need is the [Indiscernible] information is consistent reference to the vertical data. Think in terms of accuracy, I think it's very important and we have published a number of papers that demonstrate how sensitive the results are with respect to accuracy. We came up with estimates. If you cannot do this for the entire 0 to 40 meters I would say 0 to 10 meters, give us this kind of accuracy, that will be hugely appreciated. Thank you.

Thank you very much. I appreciate it. I'm glad to hear that about the modeling community being ready for the next level of resolution. Thank you. Our next commentor, our dear friend and colleague Dino, guy.

I'm trying to represent sectors I don't usually get into all that much and in particular I really appreciate the work they've put in on the Alaska mapping program outline and I think it's well on its way to being a very successful program. There were a couple comments I wanted to make about it. Specifically the work that has already been done with USGS as part of this for the ecological coastal units. That began a few years ago, a couple years ago and it has a global reach with global partners outside of the U.S. as well. That is based on Landsat imagery. The resolution is only 30 meters. That would be a good start, a baseline if you will. We recently begun work on a sentinel vector extraction program using machine learning and I submitted an image that is here. This is from the Northeast United States. It is not perfect and obviously it's picked up some things that should not be picked up and probably left off a couple things. This is from August and we are continuing to refine the process and I think we will get a very good baseline. My point in showing this is actually that although the common problem in the past has been how do you establish a full map of Alaska, it is such a large coastal area with challenges and weather and tides etc., that we have the machine learning computational perspective, I think we should be thinking about how do you see the trends over time, not just the baseline effort but it changes over time. Highlight the changes so that people can do something about them, whether it's local stakeholders using mobile devices or unmanned aerial systems to update certain aspects or perhaps having ports provide their own information and own it. Maybe CMTS, they can provide those updates that become part of a national database. Thank you.

Thank you. That is very exciting. The machine learning is another great example of how machine learning needs to be a critical part of how we designed this program from the beginning. As you pointed out, one of the things we are looking for is change. If we can do things in an automated way, it will be much more accurate and smooth with wide scope. Thank you. It's good to see you and thank you for joining us. Next up is Helen from the committee on the Marine transportation system, I will also note that Helen is a HSRP veteran herself . Go ahead.

Thank you so much. Thank you members of the HSRP, I appreciate the opportunity to submit a written statement and just provide a very short overview at this time. I negative director of the U.S. committee on the Marine transportation system or CMTS. I would like to give a shout out for even mentioning the CMTS. I appreciate that. I want to make note of the fact that the CMTS is monitoring the efforts that are going on with NOMEC and the Arctic coastal mapping strategy. We are certainly very supportive. Any of our member agencies have been very engaged in the development of those. We have been monitoring and we appreciate the effort to consider all of our mapping and charting needs within the United States. I would like to emphasize two points. Well the work of the Arctic group and NOMEC is very couple imagery to the work of the national vision service trading and mapping, the co-ops work, geodetic, it is not yet clear how those initiatives will be implemented fully. To that end, we hope you will consider remembering or emphasizing the foundational programs at the Marine transportation system relies upon. That is from the office survey. This programs are hugely important to the Marine transportation system to navigate safely and securely. I also want to emphasize that the work going on with those programs is interagency. Other agencies including the Coast

Guard, Army Corps of Engineers, the NGA are engaged in providing real-time navigation services to the industry. In doing so they are working very collaboratively. There trying to bring the United States to their essay the 21st century plus in providing the best information and most discoverable information and real-time information for navigation services took to the extent that you consider these new initiatives which are important, we also appreciate that you not throw the baby out with the bathwater so to speak. Remember those foundational programs are also extremely important. That is it for me. Thank you so much, I'm happy to answer any questions.

Thank you. I appreciate your comment and thank you for your service to the HSRP . Next we have a nether HSRP veteran. I don't know how you organizational affiliation so I will let you introduce yourself.

I am Joyce Miller, I am a retired high driver for and deepwater mapper. Two things, my last meeting, thank goodness we got AIS for information. Is a real a compliment for the HSRP. A comment to Paul, look at the I standards as a starting place at least, don't reinvent any wheels. Those are sideways comments. I have been involved in integrated coastal mapping since 2002. I intended my first meeting. In that time ships have gotten multi-beams and many of them have sat idle even after the integrated coastal mapping act was post in 2009. The comments that Larry and Shawn made about funding are the point of my paper or the comments I made. Ships have really set idle because there was no funding for deepwater mapping. We have the multi-beams, we have the equipment, we've got a whole new band of surveyors and in this COVID crisis, many of the academic ships are underutilized or idle and there is mapping that could be done. If you look at the bathymetry coverage in-depth analysis, there is mapping that could be done within the range of medical facilities that we can at least get a start on filling the gaps that are near enough to be reachable during this COVID time. Again, we've had an integrated ocean and coastal mapping group, they talked about standards, we talked about a national plan, we can plan for another two decades and if we don't have funding for mapping and I'm totally in support of greater than 40 meters because it is doable then we are not going to get anything done. That's my comment. It's good to see everybody also. I am in Hawaii.

Thank you. I appreciate that. Thank you for your comments. Next up we have Dr. Vicki from the Earth Observatory who also serves, I don't know what the right title is, she heads one of the assembly centers for the 2030 global ocean mapping effort. Go ahead.

Thank you. I'm going to submit a written, but echoing a lot of what was stated earlier I really sit in the NSF funded space and echoing what Joyce said, recognizing the huge investment that's been made in the fleet and its capabilities for mapping as well as data management and data synthesis efforts and also best practices for data acquisition. Most of what we are doing besides the basic data management but the cure ration and best practices are geared towards deepwater. I am encouraged the opportunity to work or closing across the silos that exist so we can share knowledge and approaches. In a space of the will be multiresolution topography synthesis, we have been evolving because we recognize more data is being acquired then we can keep up with. We are

presently more than 50% of the data that has gone to the NOAA archive has been integrated and processed, most of it goes in raw. We are trying to make our tools to biddable so people can use them, whether it be academics collecting data or other mapping groups that might be processing data routinely. What we have found in our years of trying to build this global synthesis is it is really helpful, particularly when you're working with transit data which is important for filling some gaps to look at the data in the context of other existing, already processed data. That is how we are evolving our tools so we can distribute it on ships, to other researchers and to potentially engage students to engage in this process which is a citizen science to help us build these data compilations and make them more accessible to the public. I think that's all I have to say. To have thank you for the opportunity.

Thank you Vicki. I really appreciate it and thank you for all you do for ocean mapping. I appreciate you joining us today. Next up we have Molly.

Yes. I have my WebCam on but it's not showing up for some reason. Can you hear me okay?

I can.

Great. First of all I just wanted to think the committee and Dave for his work on the Alaska mapping strategy. This was an opportunistic effort because when the executive order came out a year ago the state, NOAA, USGS and the Alaska observing system had been working on developing a strategy for priorities. It was really opportune that the executive order came out. We really appreciate Dave's work on it. We appreciate his reaching out to us for an input. Also for being very patient for us to get our input in the last minute. I did want to note, the whole issue of coastal hazards, we first got involved was in 2012 limited a workshop with USGS and the Fish and Wildlife Service and the state and the landscape cooperatives that they were doing.. Trying to see what the whole play was. There are lots of different components with coastal hazards. There is the bathymetry and charting, water levels, permafrost, coastal mapping, vertical data, all of these pieces and how do we play them altogether? What are the various dishes in there. That's where we picked off the water level pieces. With support from the National Weather Service office we have devoted to bit of funding and time in piloting the reflect, tree stations and we have one active one in Saint Michael now. We have ongoing that was delayed due to COVID restrictions and travel restrictions and now we have another one that will go in summer on the West Coast of Alaska as well. We will have three sites. They are AOOS supportive. The reason the weather service came to us was because we were able to pull money from multiple sources over multiple fiscal years. I just want to emphasize that the regional associations can be looked at for a test bed for these kind of opportunities in the future. I want to thank the committee and Dave for his work on the mapping strategy.

All right. Thank you. I appreciate your comment. Next up we have Rob from Alaska fisheries science Center.

Good afternoon, everyone a. I am a fishing biologist and my particular specialty is habitat science. Some of the earlier discussed the regional prioritization challenges. I guess with my question, I would like to try to take the conversation into thinking one level higher. Recently I had the good fortune to lead the team for Alaska where we are identifying and prioritizing areas for mapping under NOMEC. To do this we surveyed all of our scientists and managers at the science center and in the regional office and compile the information and as you can imagine we wound up with a complicated result, a mix of complications, this is just for Alaska fisheries. My question is, presidential memorandum identifies multiple societal needs, things like security, minerals, navigation and everybody's favorite fisheries. All of this from a national perspective. I'm wondering how these different needs, not switch regions and sites, higher-level needs, how they will be or can be prioritized and translated into an operational sequence? How do we consider the relative importance of security, minerals, navigation, fish and others. Thank you.

All right. Thank you very much. I appreciate your comment. Thank you for joining us. Next up is Dennis. The former head of the Canadian hydrographic service and now on his own. I appreciate you joining us today. I appreciate your comments on the side and your willingness to make a public comment. Go ahead.

It will be pretty short. You can read my comment here. I just want to thank NOAA for this very transparent process and allowing for input. My comments are more related at framing all that you mentioned in the presentation. There are two oceans and the Great Lakes were included but as a northern American from Canada I think the Great Lakes should be spelled out and three oceans rather than to to include the Arctic Ocean which is a challenging one as you all know. Second element of what I wanted to provide as a overarching concept in scoping is the multinational impacts of NOMEC. Clearly most of the work will be done in the U.S. and that is great but I think it is essential to name the collaboration that will take place because I am assuming it will take place with neighboring countries such as Canada, Mexico, Russia, the Caribbean countries and others. I think it is important that is framed into your documentation either under the governance piece that you mentioned undergo 1.1 or possibly under the goal five that you mentioned in terms of going beyond the partnership. That is all I wanted to mention this afternoon. Thank you.

Thank you. I appreciate your comments and I'm glad you were able to join us. We will certainly take your words of wisdom to heart. Last on the list is Eric Fisher from geoscience solution. Are you on?

Can you hear me?

Yes. We've got you.

Okay. I submitted a couple questions, I wasn't sure which one we are looking at.

You can make whatever comment you would like and we really do not have a lot of time to respond to them right now but whatever you would like to use your time for.

Okay, thanks. Just looking at the broader picture, there is a lot of permitted activity going on in the East Coast and in the Gulf of Mexico. I'm not sure if you guys are looking at integrating with that data to make the requirement to submit it to the mapping plan. I think it would have a lot of value. The requirements there are pretty high. [Indiscernible-static] working with operators to install different co-ops or core stations on the structures to provide a network for positioning of sure reference, there used to be several of these in the Gulf of Mexico and they used him years ago. They are nice as far as a lot of different impacts they have. My last question was around natural Marine fisheries permitting areas, is there any discussion around permitting requirements and how that might affect opportunistic surveys. Thank you.

We can talk for hours on those questions. It was really great. I appreciate you raising the subject of the bone data and the environmental compliance requirements. Those are two big issues that we have been talking about in interagency discussions. I am glad they are on the record here. I appreciate you raising those. Thank you for joining us. That is all the speakers we have lined up for the public comment period today. Will have another public comment period tomorrow. I appreciate everybody's really great and concise comments and I look forward to doing some more of this tomorrow. Keep sending in the written comments and we will work with you from of their if you think it would be helpful to make a public comment as well. With that, I will turn the chair back to the chairman, Ed. Take it away.

There we go. Okay. All right. That was a great session. Fantastic that there were so many participants both with the panel and the guests. That's what it's all about. We are going to get into the wrap up mode. I will step through the panel and request some wrap up ideas and comments, we have the better part of a half an hour, it will be everybody that's having a chance to speak today formally and anything you want to do is wrap up and we will have more time tomorrow if we do not cover everything. Gary Thompson, let's start with you.

All right. I'm always waiting, I'm always at the end with the last name of Thompson. Great session today. A lot of great information. I want to think Dave for his leadership on the paper. He has done a great job and I was glad I could participate. I think we just need to keep looking to use existing technology but also new technology. It can help us map in these environments that are critical to the infrastructure, critical to Alaska and any part of the country. I am always looking forward and I always like to use new technology when I can. When it is proven technology.

Thank you. Julie Thomas?

Maybe I can just say ditto on what Gary said? I totally agree and I am continually amazed during the directors reports about how much people have been able to do during COVID and the challenging times. Maybe I will just make one more comment to

the panel because tomorrow we are going to be talking about the letter to the administrator, Dr. Jacobs and Sean will be leading the discussion but just a reminder that if you have any suggestions, we want suggestions as far as what to include cover tickly topics that have struck a chord with you or something of interest. If you could just jot down things that you want to make sure we include in that letter, that would be great. That's it for me.

Thank you Julie.

Can you hear me?

I think this was great work today. It's very late over here. I'm going to say for these two projects, prioritization is of paramount importance to the environment we are in. That will dictate the steps forward. I am very optimistic on strategies we are taking. I'm looking forward to working with you guys.

I was particularly encouraged by the use of AIS to disseminate the information. That was an issue that was a logjam for sometime. At the meeting two years ago, that is when the head of the headquarters hammered out and agreed they need to move forward on finding the Coast Guard tools to support NOAA's dissemination. I think that is encouraging. It starts with the ports. Any information or precision navigation information that can be better sent via AIS versus voice has more clarity and better access. Other weather information has been a great way of applying the transmission of data. I see that when I go to Canada. I see a lot of sites transmitting information to vessels. I see it overseas. We are slow on the uptake on that one. I am glad we are moving on. The Coast Guard owns the infrastructure that NOAA needed that tuple applications from other parts of the report that is a good step forward. I am pleased to see that. I don't want to monopolies everything. I will be quite. Thank you.

You are a Congressman. Okay, Anne?

I think I am on muted.

You are good.

I wanted to touch on something that Admiral Smith said earlier today when he had the slide up with all of the vessels out there. He said three years ago I would not have felt comfortable moving forward with the technology but today I do. It was just in general, a comment about how exponentially at exponentially technology is impacting everything under the purview of what we advise on. It really struck me and in the time of COVID when we are all making these big technological shifts just to do our job, it's amazing to me. Things are changing quickly and how much opportunity that has been put forth on the same line.

Thank you. Dave.

I have two topics. Several people mentioned things about environmental factors, fisheries and that sort of thing. We are in the middle of the 3-D elevation requirements and benefits study that Ashley Chappell is heading up. It will be interesting to see what the results that have to do and what how that benefits 1000 different midocean critical activities. The second point I want to raise is Admiral Smith talked about the emerging technologies and I'll be anxious to hear everything I can about the lessons being learned from the ongoing drone a project in the Arctic Alaska. I know you are working there and I'll be anxious to see how well that works out. That drone goes out for weeks at a time by itself. It's just upgraded from mission control. I am pleased to learn more. That's only have. Think you.

A couple quick comments. I think it was something that Juliana said, the comment about doing things right as opposed to doing things quickly. It struck a chord with me because I said for years, you cannot have a deadline on a boat. The minute you do, you have a problem. It needs to be done right and if it takes longer to do that, so be it. I'll be looking forward tomorrow to talking about NOMEC , particularly about interactions with other agencies. There was a certain amount of that in the Alaska paper as well but I know there are a lot of people out there looking at the bottom of the ocean and it will be interesting to find out how many of them are talking to each other and how we can share that information and maybe get through the Deepwater part with less expense so we have money to expand on the shallow water part. That's it.

Ed Kelly.

I continue to be amazed over the eight-year period even at an accelerating rate of calculus here how quickly the technology has been more available and more people are working out there. I go back to the measure it once and use it 1000 times. This public comment we had more opportunities to hear private enterprise coming up with what appeared to be quality data acquisition and use systems that we have to find ways to have NOAA and other governmental agencies work to assimilate and accumulate and integrate and use that data so the pace of our exploration from mapping, safety, etc. can keep pace with the rate of technology that is emerging. The only thing I am disappointed with is by now I thought Rich would have had a much better COVID beard. I am disappointed in that. Other than that, this is a good meeting.

Thanks a lot. [Indiscernible-static]

I said before that I think we are seeing an ocean moment and it's exciting to see that. I echo again the number of benefits of public private partnerships and I think Ed just described Heather so much happening in the private areas and nongovernment areas with technology and particularly that we need to be able to make sure that is fully utilized and it's efficiently utilized in any partnerships when we move forward. From a technology point of view it is great. I like to see it applied and hopefully we will talk more about that tomorrow. I think we are seeing a trigger in some of these things also. We hope to come forward for the initial thought, there is some use of the technology but maybe the COVID situation is going to be a bit of a trigger for this. I think we are seeing

that little bit. From a personal experience we have talked about telepresence, we did not have the ability to do in the 80s. Right now we are being forced to do it and they are using that fully. Heavily that trigger of COVID has some benefit in allows other technologies to be used more when people have just been thinking they might use them but now they can truly embrace them and move forward. Thank you.

Thank you.

Dr. Nicole.

Thank you to all of the organizers today. This is been a great session. I think everyone is really engaged and I really appreciated the conversations. I am looking forward to the conversations tomorrow about NOMEC for a number of reasons that have already been brought up. Specifically interagency coordination and this concept of integrating the rapidly emerging new technologies into the mapping strategy. We said that a number of times but how do we do it? This is not something NOAA has necessarily embraced fully in the past and it seems to be that we are going about it the right way. Developing the protocols and standards first is key because it sets the bar, wherever we are going, we can go. I think that is the million-dollar question. Is developing the protocols and striking that balance in your data standards and that new technology, since her cost advantages to be more consistent. I hope we can find a way to recommend some of those in the plans because if we do not by the time it comes out, you might be addressing yesterday's needs today. I'd like for us to avoid that. Thank you.

Thank you.

Sean?

Thank you Mr. Chairman. As Julie referenced I will be working to capture ideas for the response letter and I will use that as a segue into something that I mentioned before on some of the subcommittees. What I would call making sense of sensors where we have some different readings and I'm sure it happens and other places. It was really good to hear the Dr., she had a great point about having a presidential directive. Something we say a lot is never waste a good emergency. While we have the attention at that level pushing the efforts to deliver not only just papers and continuing all of the NOMEC and different white papers but that we have a lot going within this group and hopefully I can take comments tomorrow and start a draft for the response letter and with that I will sign off. Thank you.

First, I know I mentioned earlier, I'm really amazed at the amount that has been achieved by the NOAA leadership during these COVID times. I am excited about the public private partnership and the way it is moving as proposed. I appreciate the leveraging of technology as already mentioned by everybody else. I think this is the age of a I and we should use it to our best advantage. I am looking forward to tomorrow. I am excited for tomorrow and I'm looking forward to getting to good conclusions thank you for this opportunity.

Dr. Quassim ?

Thank you very much. I echo what he said about the progress at NOAA and what the federal agencies have achieved during this difficult time. Keep it up guys. Great. I would like to emphasize on NOAA that the interagency working group is a great idea. I just want to see more tangible cooperation because from my experience, clicking coastline data different specification, that when they sat around the table on this interagency, it should be hashed down so they agree on what to collect. Just an observation. I could be wrong about it. It is a great opportunity for the federal agency to come to some thing. As for the private academia please have a seat for them on the table. Given their five minutes for a lightning talk for public comment is historically, public comment does not change cooked policies. Very little if it does anything to change anything because already on the paper people are excited about what they put, to have somebody come and change that is very difficult. If you really want to participate, we have a lot of intelligence and the academia and private, no other federal agency, give them a seat on the table.. I want to emphasize after this meeting we take a serious step on what I propose for Paul and Ashley on the national standards. I'm not talking about protocol or project specifications. I'm talking about national Center for coastal mapping and hydrographic surveying. I would love to entertain the idea and give ideas or participate in the development. Dave was with me and we developed the national standard for STRS. Is used worldwide now. We can do the same thing. We can let our experience to NOAA and the interagency of the coastal mapping. Thank you very much.

We're going to shift to the directors and leadership. Let's start off with Larry.

Thank you. I will start by piling on with the comments on how much has been accomplished by the offices. It is amazing at this time. I will focus my comment on the NOMEC. I paid a lot of attention to it, it is near and dear to my heart. I will use the word great a lot. It represents a really great challenge. It also offers great opportunities. I think NOAA has made a great start . Addressing it and start the has been filled with great intentions just to keep using the word great. It is a huge task and it will take all hands on deck to get it done. I know technology will come to our aid, hopefully we are in the midst of that at the University and pushing those technologies but my biggest fear is unless we find a mechanism, it's really an issue of finding a mechanism that will truly allow the engagement, collaboration and cooperation of all of the sectors we talked about, private, industry, academia, philanthropy, state and local people, it would take everybody to get the job done unless we find that mechanism we can let a great opportunity slip through our hands. I'm hoping tomorrow we can come back and maybe have some time to start brainstorming about are there mechanisms out there that can coordinate across all of those different sectors? That is it.

Rich. You are on mute.

I have to push two buttons. It's been a very good meeting. I appreciate the recognition we've gone from the panel members for their great work, not just my office but the

serving we've been able to get done this year despite the pandemic. My office is not essentially involved in the NOMEC and Alaska strategies . We do have some role in Alaska as Shep mentioned. There are places that do not have titles. We have been very involved with the Alaskan water level watch and other groups that are looking to get more work done up there was water levels. Stay tuned I guess. For Ed, I actually trimmed my beard back this morning because I do work for the government and I did not want to look to shaggy. I wasn't going for a general James look. Thank you.

Great.

Juliana ?

I would like to think the panel members for their continued engagement's on these topics between the meetings. I think you all owe yourselves a pat on the back from us here at NOAA for all of the work you do in between. All of the working groups that have been meeting and discussing topics and coming up with recommendations, it is because of the work you put into it and we really appreciate you taking this seriously and providing your professional input to the work we are doing and the challenges we face together. I think you should also be proud of yourselves for putting together the white paper on the Alaska coastal mapping strategy and getting in front of the development of the imitation planned. I realize that might not be all of the industry and put that you would like to see but I believe you are representing your sectors well and your areas of expertise in providing the input to the white paper. I thank you for your engagement.

Captain Andy.

I managed to get both buttons pushed. I think most everything has been said. I would like to add a comment recognizing the good public input we had. There were some really helpful statements from the public commenters this time and I hope we will have a chance to follow up on some of those. Also, I want to think Ed and Julie for doing such a great job for helping us to the meeting today.

Nicole. Thank you everyone. I have said this before. I will say it again. I have worked with a lot of federal advisory committees over my 25 year career. The HSRP is the gold standard. You all are engaged and experts in what you do and willing to share your feedback with us. Thank you for that. I would be remiss by not mentioning this performance evaluation for Shep, Rich and Juliana. They appreciate all the complements. I would pile on further but because I'm at the head of an OS I feel like I am gloating. I am so proud and impressed with the team. We have been in touch all year and I know how hard it is been for all of them. Not just to get through COVID and do their mission but transform their mission and some anyways to be as productive as they have been. It has been an awful glass of lemonade that we will take it and thank you for your praise on that. I compile on, on the technology stuff. It is the incorporation of technology but also being nimble in our data simulation and processing and providing access to others to do the same so we can keep pace with the coastal change that is

accelerating. Really look forward to going into this era with all of you and I appreciate your engagement immensely. Hopefully we'll get a few takers for the wrap up.

Dr. Jacobs?

I wanted to say I appreciate the chance to speak. Lots of good discussion on new technology. I really want to emphasize the discussion on the quality control and on the metadata. I think as we go forward and have more service systems that this will be more critical. As well as data management. Great points on the interagency coordination. I think that that process and getting it streamlined to reduce redundancy while we are doing it is going to be really helpful. Of course that ties back to coastal resilience and fisheries and any other aspects that we can utilize a lot of the stuff across the agency. I think there is a lot of additional value there that we have not even dug into. A lot of good questions from the community. Great to see the feedback and support for data acquisition for nearshore modeling. In general just really appreciating everybody's understanding of all of the challenges we've had this year with COVID. I cannot say enough how proud I am of the agency for everything they have been able to pull off this year and how everyone has been able to adapt to the new way of doing things. Kudos to my own team. I am proud of you.

Great stuff. Thank you. In the interest of time I'm going to hold my comments until tomorrow. There are some good points to make. Admiral Smith, would you like to wrap up for us?

Very briefly. Ditto to all of the thank you's that have been made so far. Two more, I think the inspiration is contagious here. The dedication of the panel has inspired the programs to engage more and to raise the level of this review into something really important. NOAA leadership has seized the inspiration and it provides their own inspiration. It helps us keep going. I think the public today, we saw a level of public engagement with this panel that we've not seen as much in the past either. All four of those parties are inspiring each other and I cannot wait to take that same level of inspiration and apply it to some of the really big challenges that we have coming up. This includes the NOMEC and limitation and the Alaska coastal mapping strategy, etc. Another thing, each shout out to the folks behind the scenes. I don't know whether any of you have been involved in theater before but the show runners, they have a separate radio system, it's a whole another drama that is happening, not on the strange. I've had one year on the chat that is keeping the run of show going smoothly and all of the folks I mentioned earlier have been executing in a brilliant way for us today. It makes it look very Smith. Thank you to all of them.

I second that. It's great to be able to have all of that support in the background, keeping it running Smith. Great job.

Could you mentioned tomorrow's start time and that we would love more comments.

The start time tomorrow is right at 1:00. We will not have that 50 minute ramp up. Correct? We will get started at 1:00 and I will wrap up as most of you know, I'm always a big advocate of the fact that great things get invented with NOAA. I can tell you that Thomas vehicles, both acoustic mapping devices and airborne hydrographic Lidar's. All that technology is getting transferred to the private sector, particularly on the East Coast and it's all of these types of things that grow and nurture and challenged by the likes of the people on this panel and NOAA itself and the University of New Hampshire. It's incredible to me to watch that transfer of technology that moves to the private sector and into the industry. If there was ever an example of private public partnerships, it's the ability to move these ideas from the public sector and the things we do and being embraced and going out and really making a huge impact on the world. The other aspect of it all, we're talking about NOMEC and Alaska. Mapping in the ocean and working in Alaska. I could not be happier. With that, I will wrap it up. I will call it a day. Thank you everybody. Today's meeting is officially over. Have a good evening. Stay safe and healthy. [Event concluded] This message is intended only for the use of the Addressee and may contain information that is PRIVILEGED and CONFIDENTIAL. If you are not the intended recipient, you are hereby notified that any dissemination of this communication is strictly prohibited. If you have received this communication in error, please erase all copies of the message and its attachments and notify us immediately.