

## Closed Captions NOAA HSRP public virtual meeting, Mar 4, 2021

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Hello, everyone, we had our muting challenge, this is day two of the Hsrp virtual meeting here in the month of march, 2021 we're going to do another round the room update with Hsrp members in alphabetical order, I'm going to add a little bit of extra commentary at the end, explain a little bit of the change of the order of things that are going to happen today. So without any delay let's get right into it with the panel, Qassim, if you would go first, please?

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thank you, Ed, hello, everyone, my name is Qassim abdullah, I am a chief scientist for woolpert, also adjunct professor of Penn state and university of Maryland, Baltimore campus, a member of Hsrp. We will be looking forward for today's session, thank you.

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Hi, good afternoon, my name is anuj chopra based out of sugar land, Texas. Thank you.

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Thanks, good to see you today, anuj, glad you can join. Sean, go ahead, if anybody wants to make comments you can too, go ahead, Sean.

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Sure, I appreciate everyone being here, Sean Duffy, big river coalition, based upon New Orleans on the banks of the mighty Mississippi river.

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Thanks. Dr. Nicole Elko?

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hello, good afternoon from falling beach, south carolina, where I am based, it is just outside of Charleston here in the south carolina low country. I am the science director of the American shore and beach preservation association, which is an Ngo of coastal communities, I work in similar capacities at the state and local level and was happy to be able to share some of our perspectives on coastal resilience for communities yesterday and look forward to today's discussion.

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Thank you, Nicole. Lindsey Gee.

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Hi, everyone, my name is Lindsey gee, I manage the mapping and science operations for the ocean exploration trust, based right now, we're planning this year's activities in portsmouth, New Hampshire, I'll be joining the exploration vessel in the Pacific on the west coast initially, and we move out in to Hawaii and Pacific later on in the year. Thank you.

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Thanks, Lindsey. Just a reminder, to date, it is perfectly okay to comment on anything you want to talk about yesterday as opposed to another introduction please go ahead and do your commentary as you feel necessary.

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You guys would really like to hear impressions from yesterday, comments, suggestions, things that came up, session proposals, issue paper proposals, et cetera.

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If there is anyone already gone and would like to ad, turn your camera on and I can unmute you.

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Dee alreadyDeanne Hargrave, I really enjoyed yesterday, to me it all came together, it is really clear on the 40 meters in west, filling the gap of information I think we acknowledge there is some challenges to doing that, we look forward to talking about ways to address those challenges moving forward today and also in the coming meeting, that's very exciting for me, it is where I have really spent most of my career, I think it is a very interesting, topical, especially as we're talking about the blue economy, how that's changing, and how climate change, renewables, all factor in to that, looking forward to another great session today.

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Kelly.

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I'm the executive director from the merit time association for the port of New York and New Jersey, I'm obviously located in the port of New York and New Jersey, we act as a marine exchange and trade association addressing merit time concerns in our area as well as our regional and national basis, with the calculus of change, there is so much invasion that's about to happen, I'm trying to take a sip from a fire hose, there is just so much that's being developed and running and I really do think there is so many multiple fronts that this static end can and should be used for, we're facing climate change, we need to look how to adapt to the blue economy, and to make that work and I think we're really at a point where there is a certain amount of management and direction as needed, as we listen today I think we can think as far as structure for what do we do with all these wonderful things that are happening how does NOAA play a role with how to get this data, basically corralled how we can get it under control, in a structure and format to bring it forward to make the most progress in our goals for resilience climate change I see we'll be talking about modeling a bit today, forecasting, I think that's all very important, basically known as herding the cats, I look forward to an engaging time today.

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Captain ann Kinner, seabreeze books and charts, I've been providing particularly charts and navigation materials to the spectrum of the management community for decades now, I'm interested in the comments about the transition that NOAA is going through in producing charts that can be used by the mariners, whether they are paper or digital, I understand, to unify the data base and make it similar to update and make it more accurate, but I have been looking at it myself, and trying to understand how the pieces are going to fit together, because a lot of the community that I deal with do not understand what the changes are, I think one of the things I would like to see is more

emphatic push to get the information out to all levels of the merit time community, even experienced mariners are not aware that some of these changes are coming, and I have been trying to talk to some of the Pod venders because how are we going to get people printed charts if we don't have some sort of an avenue to physically get them printed? One of the things that I've done in the last couple of months is to look up the Regs, merit time coastal agency which is the British equivalent of our coast guard hydrographic regulations, I saw some reference yesterday, I think we're going to talk about it later, the requirement to provide some sort of charts in Mca and chS terms, those are paper charts as the background, one of the things that I have been watching closely for several years now is the interference, packing of Gps, now the Ligato issue with interference ais information that don't prommerly transmit information, there is user ineptitude, people don't know how to use these tools, we really do need to get more out there in front of the users, number one how it is changing, number two, they begin to now how to use it, number three, they understand its vulnerabilities because there is many. Packing has been a big issue for a couple of years, I've certainly been touched by it, my San Diego community was touched by it, our port was hacked and shut down for quite awhile by a ransom wear attack a couple of years ago, I don't think they still fully recovered from all of that. These are all issues that are intertwined and my ultimate objective is keep the mariners safe so that they don't have problems within that 40-meter or less coastal area.

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Great, even reaches out as we try to go to autonomous solutions and operations of assets and hacking of the Gps or just the hacking from the serious issue.

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It is critical, yep.

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Thanks a lot.

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Dave Maune.

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I'm the chief scientist for technology services at dewberry engineers in fairfax, Virginia, I was impressed by the panel we had yesterday on coastal resilience, it is obvious to me, most Hsrp members that we need to do everything we can to address that near shore imagery shallower than 40 meters, we'll be able to do that with radar with satellite imagery, both of those need water clarity tools so that we know when the waters are clearer so that these two technologies work, so those three topics are going to be of great interest to me, thank you.

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Thanks a lot, Dave.

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Captain ann Mcintyre?

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hi, good morning, everybody, greetings from San Francisco, yeah, my comments are that, you know, the resiliency, the technology issues, they are fascinating to me, they are so far outside my Wheelhouse, I don't think I have a lot to add on them, but I just, I continue to be marveled at how exponentially the resources and the quality of the

technology grows, I just, I see so much potential in it, you know, but I also have to agree with some of captain kinNer's comments, particularly from the mariner's sides as things move and develop so quickly, it is going to be really important not to get out of step with the human element, how the human element interacts with everything, particularly in understanding the limitations of the technology and the limitations of the data, just understanding what the data means, my other comments would be, you know, again, precision navigation, courts, the safe and efficient movement of the courts thank you so much.

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Captain Ed page?

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I'm the executive executor for the great state of Alaska, a non-profit organization up in Juno, Alaska, we developed an AIS, weather system of about 150 location from the north from the islands southeast as we build sites, travel to our boat, via aircraft, throughout the state, but also provide information, my profession dates back 50 years, my first exposure was 50 years ago, doing the BP drops, coast guard north Atlantic goes here for some 30 years, spent the east coast, west coast, most of my time up in Alaska 32 years up in Alaska, 32,000-miles of coastline it is a fascinating state, beautiful state, also very challenging, NOAA as much as we are very critical for us, when I look back. 50 years now as far as embracing the new technology, new technology and data, safe, sufficient, environmentally responsible in merit time, impact our communities along the coast, I'm so impressed with how that data, tools are being used with different regions and challenges there that, to me, I'm impressed by NOAA, they open new ideas, and I think when we talk about the economy, the impact the economy on our whole country, in the forefront trying to facilitate that, precision navigation, new tools, new charts what have you, it is an evolving situation, perhaps we can get technology, even though, in the coast guard when the aircraft they took away navigating everybody, gave everybody iPads, technology for whoever is moving, you have to realize, you don't see airline pilots walking with a briefcase full of charts now, they now have iPads, NOAA is recognizing the technology is being applied and going fourth I'm impressed with where we're going, I think I understand what's going on, thank you.

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Thanks a lot, Ed.

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Captain Salvatore Rassello.

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If you are there, you are self muted.

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Can you hear me now?

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Okay, electronic navigation expert working for 7 years as a director, just retired a few months ago, I'm very interested in the climate changes, I think what I've seen in the past year, being on the ships that we cannot rely anymore on the season, I think that the data we collect for weather is very, very important for the save in the water, also in efficiency in fuel and saving the environment. Another item I'm interested, is this navigation being close to the water, I do believe that the Gps would be subside, by

official intelligence in the closed water sensory system to safely navigate and you have a sensory around you, you can see Gps for the positioning system. So, yesterday was very good session, did really enjoy the new technology, new data, that's the way it was going forward and I'm looking forward for today.

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I'm going to put you at the end if that's okay, Gary Thompson.

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My name is Gary Thompson the deputy management chief of chief North Carolina, a good session yesterday afternoon, the topic I'd like to see, fema this morning of research division a main aircraft vehicles, very beneficial to have a future event, stress the courts of typographical is for our application, we showed yesterday, but for all the modeling we do for our floodplain map, resilience and for mitigation.

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Thanks, Gary.

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The directors and leadership.

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Good afternoon, everyone, I'm Andy Armstrong from New Hampshire, Durham, New Hampshire, and that's where I'm speaking from today, so, I greatly appreciate it, yesterday's panels, and I'm looking forward to today's discussions as well. Thank you very much, Ed.

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Thanks a lot, Andy.

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Juliana blackwell.

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Good afternoon, everyone I'm Juliana BLACKWELL director of the national geographic survey, to comment on coastal resiliency panel members did an excellent job, I appreciate the highlights of the importance of the foundational data set that support not only the navigation services but also the framework for measuring, the question I have for the panel members maybe not right now, the director would be appreciated and hone our meeting if you have specifics you would like to hear more about, thank you.

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Thanks. Next up is rich Edwing.

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Okay, can you hear me?

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Good afternoon, afternoon, good morning where you are the director for the center of the services, come at you from Georgetown, Maryland, but what else, I really enjoyed the coastal resilience panel, yesterday, something I already, also I learned more about, also with all of these panels. And so, I'm looking forward very much to today's panels, also looking forward to the recommendations that come to Noah out of the Hspf, so, thank you.

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Thanks a lot, rich.

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Next up is Larry mayer.

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I'm Larry mayer, the professor for coastal ocean mapping at the university of New Hampshire, with the co-director of the NOAA and the graphic center and for New Hampshire, I was very impressed with the coastal resilience, it is important to learn more about it, the partnerships between local governments, federal agencies different agencies, I did mention, I was kind of disappointed, a private sector can play in that, provides a wonderful transition for a topic that's been brought by deeann, that's this very critical issue how you have less than 40-meter zone, I think there is lots of technology and expertise to bring to bare, I think it should be an area we take a close look at in incoming session, I'll leave it there.

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Thanks, Larry.

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Thanks Ed, I don't have a lot to add to what I said last night, at some point I did want to lose track of comments about how the Hsrp's input was incorporate into the Nomac implementation plan, and if yours and admiral Vernon's discretion, I'd be happy to comment on that at some point during the meeting.

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Sounds good.

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Thanks, Julie Thomas?

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thank you, Ed.

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Well, welcome, everyone, in San Diego, I retired from the oceanography, I was past executive director for one of the region schools in southern California for southern California and also one of the Pi and program director for coastal information program which is a network in to the NOAA national data buoy center. Well, gosh, yesterday was I felt a very craft meeting, started out with Friedman's presentation which, I thought was really good because I enjoy seeing the priorities where NOAA lives climate change was mentioned, this is going to be important going forward, and, Juliana thanks for the comments about feedback to the directors, I actually love the directors, it is a chance for the Hsrp for what you are focusing on during the last six months, think about how you can contribute, I really feel like it is a two-way conversation, I look forward over the next six months to talking with the directors and the panel see how we can come together on some productive, overlapping either topics we do for panels or issue papers, whatever is productive for an advisory committee, once again everyone said the coastal resilience session was really interesting well put together, I love you can take marine navigation and put it towards the north shore environment and the same tools can be applied for coastal resilience, there is such an overlap as I've seen throughout many years its been mentioned about these partnerships, I enjoy Gary Thompson's presentation, showing the partnerships and also the sophistication of what they have done, but also as an Hsrp member, I think it is really informational, and I love it that the Hsrp member is actually participate on the panels because it gives us a little slice of, your slice of life, too. So I will hold my comments any further, we'll have a chance this afternoon to really

talk about issue papers and priorities going forward, and I encourage that as a discussion with the director's also. Thank you very much.

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That is great stuff, I'll go ahead and do my summary real quick here, hand it off to Rick. So, in addition to my comments from yesterday, I meant to also bring up NOAA's need to start to track or document the sustainability matrix, especially associated with moving towards a little bit more every month or every year, with autonomous platforms and autonomous vessels, I think along with diversity and inclusivity, it is logical that NOAA will need to document its sustainability goals, sustainability achievements to which there is many.

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Next item I wanted to just bring up quickly here, because I won't be around this afternoon, all things offshore wind farm technology, Dan is probably going to touch on this later on, but from my perspective the offshore wind farm industry that's going on in a huge way on the east coast, there is some 50 vessels working in 2020, 50 vessels doing all types of hydrographic surveying work as well as Geotechnical, it will be the same for years to come. With overlap with NOS, co-ops and NGS is tides, coastal erosion, resilience issues along the coast, beach erosion, sand bars, hydrography, ISO standards, change detection, and the best of all, is the desire of the developers to do data sharing, because it is a serious desire the developers to want to get together with NOAA and U.S. government and the state governments and start to share all of this data that they've got. Let's not forget, it is all less than 40-meters of water, every bit of element. In addition to that, there is going to be a push to go to as deep as 1200 meters of water on the west coast, the first survey for a floating system off of Maine starts in about 1 week from today, so it is everything that it is a footprint of what we've been discussing. Then the other thing is, to add to all of that, is of course because it is coming to shore with coastal resilience coastal erosion, transit safety fog, it is everything again, as we've been talking about -- of course, why is all this happening, the whole push for offshore wind farms is directly related to climate change, and climate change mitigation. And so my perspective, offshore wind farm is huge in the overlap with what we talked about is huge. And then finally, one last mention of the handing over of the duties of the chairperson role to Julie Thomas about midday today, also Shawn Duffy taking over as the co-chair I'll say it right now so we can do it quickly this afternoon and keep on schedule. With that, I'll hand it over to Rick Brennan, thanks, Rick. Before we go any further, I'd like to ask our alternate DFO John Niburg if he had any comments he'd like to make?

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Sure, thanks very much, Admiral Select, I appreciate it. Thanks for the panel, I'm John Niburg, I am coming to you from Key West, Florida today I'm the deputy hydrographer for the survey, I want to say I'm a real big fan of technology in the field, real excited about how the panel highlights how our foundational data impacts so many disciplines, I'm recognizing we're in a transformative era with regards to navigation, I took note of Ed Page's comments yesterday, when he mentioned pulling it all together is a big challenge, I think that we're moving in the right direction when it comes to our navigation services and excited on the panel of coastal modeling, I think we'll highlight some of our progress maybe some of our big new initiatives, thank you for the brief word, I

appreciate it from yesterday's first session, I think it is valuable to hear from about the direction of this new administration from Ben Friedman, then also from the Nos assistant administrator to discuss the importance of the work of our three offices, particularly Ngs, co-ops, co-survey for a recognition that our nation's ports are too big to fail, that's for her, particularly good at capturing the value of the navigation services programs and the value that they deliver and support of coastal resilience sy how they are not separate but complementary to that, to marine navigation and support of coastal communities from the native communities in Alaska, in the arctic, right down to the beaches of Florida, just as a side bar, I know that there were two images that were shown both in Hillarys and Nicole kinsman's presentations, I think we typically think of flooding events, you know, as being associated with hurricanes but when you see these winter events where coastal communities in Alaska, or even in New England that occurred in the winter time so you have people's homes being flooded at the same time that there is freezing cold temperatures out. As somebody who has lived through a hurricane and seeing homes flood, have to deal with the aftermath of that, to lay on top of that freezing temperatures is just a particular Hell I'm not sure how those communities endure, I think to the extent that we can provide value there, and information to them, I think that was particularly effective. So, I'd also like to call out captain ann Kinner's comments this morning and the need for better communicating the changes to charting and our chart products, I certainly look forward to working with you and the Hsrp on how we can do a that better, at communications certainly one of those areas where you never reach the goal, there is always better ways to communicate and I would certainly be all ears on how we can do that, I think all in all, yesterday provided, and discussions for us to have, meetings and years, the discussion, for proposals for the September meeting, for today, and understand that there are interest in wind energy, mapping, less than 40 meters of water, as far as imagery and new technology, where light Rar, the intersection of Lidar and satellite imagery, water clarity, how to put this all together. I would just like I'm going to leave it there right now to move forward.

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Anything I missed on this?

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Rick, is it okay if I go back to some of the people that commented to begin with?

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I'm sorry, Rick, could you go first over the privacy policy and the public comments, you have some notes to make on those.

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Right, yep, thank you, linn. Ed, let me do that and go back, is that good?

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yep, that's good.

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First let me go through the privacy policy and privacy act statement, just to be clear and restate it again today, for everybody, for those who perhaps were not on our call yesterday we are complying with the provisions of the federal committee act, this webinar is being recorded transcribed and retained and disseminated on the website and available to the public, this includes the public comment which are included in the meeting, record and become part of the minutes. The meeting speakers have provided

advance individual ring permission to use their photo, video, voice likenesses, due to privacy former requirements, participants will not be able to provide live public comments, you can provide substantial written comments, written comments will be captured in a written meeting, public record, minutes with attribution to the commenter you can decline from having your name used by sustaining providing public comments, the participant's name may be displayed during the webinar, if you want to Obstain, please call in by phone and refrain from providing public comments.

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Also a note about public comments to the stakeholders stand and participant, join the webinar, encourage your public comments, especially those that help the Hsr learn about and make recommendations to our navigation services programs and operations, if you have a public comment, type it into the question's panel, it will be read into the record and shared on the screen if time allows. The topical meeting comments will become part of the formal public record, will be included in the official meeting minutes, they will also be shared in advance highlighted at the meeting with a spot read into the public record as well as become a part of the official meeting minutes. So, Ed, if you'd like to go back and recognize some folks we did not get in our round robin there?

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did you have anything else you want to add?

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you are muted, captain.

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Thank you. I just want to add my comment to what people have brought up, folks, I really want to start off with Noaa's rule, leaders of the resilience, you know, exemplified yesterday by the session, we supported for the, it is very important definitely, we have the challenge of sea levels the storm surge, all these threats, the more we prepare for it or the more data, the better the community is, I also like to applaud Noaa, aps, for leading us in the modernization program for the national special forces, it is a great move, definitely, marching the right way to it. And with such new excellent data and the level of accuracy getting from the technology of mapping the shore off chart, we need to think seriously about the progressive national jurisdiction for coastal and oceanic mapping, it is important, not too many people can go back and fourth, but what we, very accurate things we need standard to to match the level of efficiency of the new data, and another topic close to my heart I want to bring, we produce it as really the issue of precise navigation with visibility and fog Noaa and Srp with the solution, we are in a good position technology wise to add that share to move this port safely, we don't need to close the ports over time, there is a situation where we have to where we close it in the winter and fog, and we come up with a solution. I would like to see, admiral Vernon mentioned, we discussed it yesterday, I brought it up, we stand to revisit the industry with the technology of offshore mapping, especially under 40 meters, we visited a long time ago, now we need to bring all the players and that technology to tell us what the greatest technology is, especially manufacturing what we can do now for bio metric mapping, multibeam, whatever technology, for example, that's all I have to do, to say, thank you very much.

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Thanks a lot, qassim.

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Did you want to add anything at all, anuj, if you had my comments.

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Thank you so much, Ed, thanks, I missed yesterday, but I agree with most of the comments made before we today by the speakers, by our panel with a background, climate change is here to stay, I'm in Texas I can tell you, Texas freeze was amazing. Somebody left the refrigerator freezer door open, precise navigation completely agree with Qassim, has a huge effect on our ports, especially in the gulf we have the technology to facilitate and improve that, these are the areas that we'd like to see, thanks for the opportunity, cheers.

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And Sean, did you want to add anything now?

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Also Nicole Elko, might as well. Dr. Nicole Elko, did you want to add anything today?

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I can go first I hate to bump Nicole, I was impressed by how things navigate challenges on the Mississippi river, many specific, climate change, inundation, flooding, as mentioned we had some cold weather challenges here surprisingly not too long ago, so as we look at all these things captain brennon admiral mentioned yesterday a group effort with bringing in government agencies together to take some sensors, air gap sensors, and to try to put them into a uniform metric where they mean something to the mariners, some of the things we explain in that group are a mean server, velocity sensor that's measured in feet per second isn't very helpful to a mariner so as we look to try to incorporate all these things, my question, what I'll push for with all the brilliant scientists we have here is to translate to the mariners, so the end user doesn't have to provide a formula, I've said multiple times in these meetings, if I look at something and see a formula, I'm probably not going to do it, but I know a pilot or somebody on a tow boat is definitely not going to do it. Putting those sensors, making them realtime, making them metric to convert over to easy-to-understand things as the science kind of explodes in all different new directions that's one of the things where we make it where we don't need a translator, where we understand where that metric is, a U.S. metric doesn't differ from NOAA or core of engineers, I think that's important.

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Okay Nicole, you're up.

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Okay, thank you very much. First of all, I'm juggling being out in the field today, helping to install this which is super exciting a mini argis station, so it is remote sensing a video camera looking out at the beach taking pictures that are convert into symmetry, one of these technologies that are available to us working on folly beach to get that installed, that's why I have sunscreen all over my face. My province is regarding how exciting and interesting it is to hear everyone's perspective on resilience, we talked about, Sean mentioned the beneficial use of material to elevate other areas to mitigate coastal flooding, talked about wind, all these interesting perspective, the coastal communities likewise think of resilience in many ways, they think about critical infrastructure, they think about septic tanks, barrier island communities as a panel, grapple with maybe how to put recommendations forward about resilience, which I hope we can do in a letter to

the administrator, I would encourage a conversation, has us look at focusing on one element of it we kind of did steer yesterday's panel to focus on coastal flooding in the previous white paper that the Hsrp wrote prior to my tenure, did start out with the title in fact addressing the threat of increasing flooding in forming responses to sea level rise and subsiding with NOAA's service, I would encourage, perhaps pulling in resilience but keeping the focus on coastal flooding just a suggestion, I know I want to talk about papers. My second comment -- second comment is collecting recommendations from our panel yesterday, everyone kind of ended with some nice recommendations, we can package those either forward the letter to the administrator for an updated white paper or even just for general information. Thank you.

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Thank you, Lindsey, we'll go back to Shef and get back on track with Rick.

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Thanks, Ed, sorry, I'll listen to him when he commented, I won't detail that all now, I'm impressed with the customer resilience session yesterday and modeling today, I think for those coming outside the U.S., really benefits the structure you have here with the offices of Ngs allows us to come together and not be isolated in different departments that are all separate one of the things I will discuss as Larry mentioned, the involvement of outside the federal government, particularly private industry maybe it is stating the obvious, there is flexibility and agility they have to really support NOAA and in this case, NOAA, but federal government in particular, I think from those in the merit time community many representatives here where they are already across many of the areas that NOAA works in, whether it be ports of exploration all of those things from the land that could be a service provider or assistance they have this knowledge and experience that can benefit and encourage every opportunity that NOAA takes that, an example of that would be I guess we talk about the charting and transition from paper chart to, we need to be more proactive in educating outreach, a business that does that only is going to fail. If you have the product and you keep pushing it and keep don't like it there is a reason, it has to be honest assessment in business when there is something effective, what do we need to change that makes it be accepted more, if you look at technology and the way it is accepted, the technology that gets accepted the quickest is not something that's legislated or people are told to use, it is things like Nicole just waved, the phone, that we never even thought of embracing that and move forward. That's where the industry provides knowledge and experience that can help in transferring that technology in to use that's my general comment with future sessions moving forward.

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Thanks, Lindsey, back to you, Shef.

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Thanks for bringing this up, Lindsey I want to make sure I offer, again to the Hsrp with thorough making comments they all made in the fall during the time that we were preparing for the NOAA Mac implementation plan, maybe describe a little bit, you know, what happened after you sent in your comments, I don't think we have time and it is probably not appropriate to sort of go through them all in detail here, I do know the one that we spent time on in the NOAA council and you spent all time on, was the formalization of some structure that included private structure, into the government program of NOAA, the caution that I had provided back in September about how the,

any such panel needed to be aware of the limitations of the federal advisory act. The recommendation that you all put forward, just to be clear, everybody involved in this thinks it is absolutely critical that this be an open and ongoing conversation with all of those sectors I just described. There is no feeling this needs to be a government only thing within the confines of the law, the recommendation made some sort of formalized structure, for that involvement, we I took the language that you proposed passed the legal council, that any such committee has envision by your recommendation would in fact be subject to the federal advisory committee act. And would need to be then either need to form a new federal advisory committee to fulfill the functions that you described or use the ones that we have, the Hsrp and the Oap. So what, with a deadline breathing down our necks, we decided that we didn't want to push forward with a new federal advisory committee, did want to, and while leaving the door open at some point for some additional formalized structure, to go forward for now, with a structure that involved formal engagement a closed-name body which would require the federal advisory committee act. So, for example, we did have some listening sessions, some of you all were involved, that were really more like workshops about how this should work and what the focus should be and there were some really great input that came out of that, those that happened in I think in October and early November, then in normal times, we would be planning to have workshops and sessions at the normal conferences we see each other, in order to have, take advantage of existing forums whether that's some technology, society, or, you know, the oceans conferences that sort of thing, where we pull a lot of people together to focus on this. And then in addition, we envision some regional planning activities which would necessarily which would involve regional operations to sort of plan out regional priorities and operations. So, I regret, Lindsey, you feel like we didn't incorporate that, there may be other things that we can talk about as well, we try to find a way, yes on this issue, and simply couldn't with the restrictions we have on how we advise the federal government. So thank you for bringing it up, that said, I am really enthusiastic about this, I think it would be really great if the Hsrps continued interest in this were made known in order to get it on to the new administration's agenda, because there is a risk of course that seems like the last administration's idea, even though there is nothing political about Nomec at all, thank you for your continued interest, Ed, I hope that answered the question a little bit, sorry for taking up so much of the time.

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Thanks a lot, Shef, thanks, everyone, I think it is great when the panel really gets engaged and gets really excited and the feedback is so meaningful and gets this kind of discussion going. We can get back on track, I know it is going to be a hard act to follow now, over to you.

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I think we have a point of time where we had a great discussion or around the table of comments that we are actually we are behind schedule to start our session on coastal and ocean modeling, is that correct, linn, are we ready to move into that?

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yes, please, Shahak, Julie, turn it over to you and very happy to have you.

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All right thanks very much, thanks, Rick.

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All right so as you can see this is our next session on coastal ocean modeling a form of navigation and blue economy, I am going to be co-moderating this with Dr. Shahak, the current division coast survey development lab at NOAA I'm excited about this session, it was one I really wanted to hear, I believe it is going to build upon we heard from the session yesterday, we will learn more about the foundational role in how NOAA plays in these efforts for coastal resilience, also.

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For this session, show welcome notes we missed a book at the centers for operational products and services if we can go to the slide, please.

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While this is getting loaded, coastal ocean models in Hsrp. Since 1989, the disaster, a mission is and was still is the development of operational realtime base, now forecast models can predict water levels along the coast, this is in addition to all the other missions that the office has, survey, Ngs, co-Ops this information is valuable it gets entete greated into the system and provides information to the mariners to provide guidance and prediction, we had a session for the need for fog, other products that are available, already water levels and currents, in addition to that support to the shipping industry it is used by fishermen, coast guard, in addition by other agencies that provide support for HAZMAT and oil spills even for ecological purposes. One of the models our office produced was east coast forecast system that provided information for water levels along the east coast, joint effort between weather service and Princeton university next slide?

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this information is important when we're looking for products that are coming out of that. For the mariner that doesn't mean to build the models but needs to know, do they have enough clearance and air gaps meaning passage below bridges and overhead pipes and cables do we have enough water levels to do that same goes for other products currents for control surface waves, sea ice coverage, available in different models that are operated by the office this session will discuss these limits and provide with presenators from the three offices and columbia fish commission, before that I'll pass to Mr. Pat burk here from co-Ops for modeling experts.

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There you are, next slide, please. I'm the division chief at co-Ops I'm going to make some brief remarks before we turn it over to our expert panel this is our current view of ocean modeling and Nos, traditionally, we design our models for navigation, our outputs, water level currents and border temperature, but as we heard yesterday with Brazilians from the panel today, we're getting a lot more requirements in building these capabilities out while we have an eye on navigation, we're addressing questions of flooding, coastal resilience, ecology, waterquality, can we drink the water, there are critters out there, and the response working with the coast guard. It requires our systems be built and run in different ways, that becomes a resolution requirement or a different time scale, right now we run our models on a day to week time scale, when you think about resilience, you are looking at decatal type of runs, that's forcing to make decisions on how best to redesign our systems to address all of these need and to make sure we're multi-purpose in what we're doing. Some of the active development,

we're also doing in coincidence with this, data select picking look at our vast operational networks in reducing the bias by introducing these models as we run them, ice corps casting isbig in the great lakes, we're building capability as well as waves, really looking at a very active research where they neat salt water, that's where people live and have questions, this is difficult running these things through silos, forcing us how to run these things, these models and communicate with othermodels for my other services to answer these questions, next slide as you can tell it is a collaborative effort, we have traditionally Ngs, co-Ops, working with our ice partners, they are really our arm to the community, both public and private sector, in doing that, four different offices running out finding out what's needed we have someone coordinated efforts we hired a portfolio manager who is trying to get us better aligned to talk about this, that collaboration does not expand for offices, but other parts of the agencies, especially the mother service and satellite operation, so really, it is really all-hands-on-deck approach, we're really trying to take an informed way of doing business better so we can work throughout that. Next slide.

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Here is where we're headed today to start in that way, so, what we're trying to achieve is an operational system, right, modeling is a component, we have, we're aware, we're very thankful that we have a very carefully-maintained operational network at law network as well as using information from the Usgs, Ngs as well, we have these monitoring systems to make sure what's really unique about network, we have a forecasting mission that's unique across the agency, so we take that very seriously in doing that, making sure things are running all the time. They are available to the folks when they need them. The component we really want to work with with the community on, especially the panels today, are we meeting the mark? You know, we're building these things the models are another tool in the toolbox to get information out to the user and folks like yourself, so we want to continue to work with you to develop a feedback system where, one, as we're building these components of an operational system, either aware of getting more comfortable with using these, more importantly, after we deliver the systems, how are they doing? That's going to inform future builds in to the future how we use that. This is an important component, that's why having a port portfolio is important for these efforts, this is my last slide, this is just going to give everybody an understanding of where we're headed to the next few years, at the end of the pipe, operational responsibility to make sure we have delivery systems that are maintained over the course of this next, actually this month, we are delivering two new systems, one, an upgraded system for a northern gulf Mexico, you know, where we've expanded into the Mississippi river up to Baton Rouge, as well extending our domain down to the Texas/Mexico border, something that we're really happy to see come evolve, that was based upon requirements to gain from that navigation community in the Gulf of Mexico. So that's coming on line march 23 as well as a new system for the west coast, it is different from what we've done in the past, it is not really a system like we have in these other parts of the country, it is really more of a shelf-type system for kilometer resolution, talking about the multi-purpose, multi-use approach to what we're doing, it is really where for the mariner it is going to help with those approaches, figuring out, you know what we could be doing with the actual communities, search and rescue communities that's going to scratch that itch as well as we're going to be delivering a

new, the doctor going to talk about a new capability for stops in the next couple of months, we have a moratorium, we at NOAA we work off of a very complex super-computing system, not only for NOS but across the agency, we need a refresher for that system. It really gives us that pause to be working with the community to inform future builds and really hone in on those requirements that we want to make sure as we build these systems that we're doing the right way. It is an expensive endeavor, we want to make sure as we're doing this that we're on target. From that you can see kind see we're looking at the Great Lakes, building a nice forecasting capability, moving onto places like New York, sailor city, we take a look at developments within the ocean services the regional association, other parts of the agency, Great Lakes laboratories to ensure, you know, we're keeping abreast of where we are in terms of the development and working with folks like yourself to work on those time lines to ensure that you guys are ready, prepared for these capabilities as we build, you know, this, again, there are some links here to some of the products mariner-based products in terms of scaling models, as you'll hear in the course of this panel some of the other things we are also designing with models as a component, I'll stop there and turn it back to Shok.

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Thank you very much, Pat. Now we'll start our session with the first speaker, Dr. Danielle Roman, the chief geologist of the survey improvements planned for the Pacific.

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Daniel.

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I pointed to the previous discussion, the different sensors that are available now, with all that proliferation, having a consistent reference for data, is critical to integrate that data for safe navigation and other services that can be provided. Next slide, please.

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First I'll discuss height relationships to make sure we have a fundamental understanding of what we deal with in the national survey, broadly throughout the national ocean service and U.S. government, I will focus on height, since it is more pertinent to this discussion, we deal with the geometrics, also the horizontal coordinates and physical heights and water surfaces and such. I'll touch on the GGRF, not a national reference systems but touches on aspects the ITRS and WGS84 are systems I'll go in the western systems in 2022 how we'll impact that future, specifically focus in on western Pacific and discuss some of the aspects of what would be available for the research in that region. Next slide, please.

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So, height relationships the critical separation, I've shown in blue are the surfaces that are Datums or reference services, if you measure a height it is from one of these surfaces, the others in green that I show are height transformations if you will, a Geoid height, what's of interest here, is most people understand or have some conception of what they believe GNSS provides, you get geometric coordinates, tie in, very accurately, are very efficient in terms of determining your positions inside of the framework. The reason you get those is both satellites are traveling in orbit in a framework, therefore you derive your position from them, you can do that very efficiently yet on land or at sea. The difficulty, though, is the Geoid, the Ellipsoid, upwards it is upwards of 30 meters, it is not to use for physical heights, talking about water. That's why it is necessary to have

these types of transformations in there. And particularly focus on transforming the heights into that I made at mean sea level those become your heights, the difficulty is mean sea level is not in fact level, local means sea level can vary by a few meters from the global mean value that is provided. So that is where the topography of the service, that is the transformation where we have the sea surface, that provides a transformation based upon pressure, temperature, variations, these are getting further afield from why Ngs is involved, we have an interest in this matter because we do our comparisons at the tide gauges to try to establish some confidence, the Geoid model as well as Tss models to make sure we're having an accurate transformation to the local tide service, from the surfaces then you have co-ops and other agencies that are responsible around the world that provide the various tide variations, that manner, then you can ascertain the depth underneath the keel of the ship, you know where the Gps receiver is, tell you the position of the craft, know the depth from the Gps receiver from the keel to the ocean bottom, can be ascertained from some of the charts. From these transformations that are available. So the key to this is, doing the modeling ahead of time, checking the model, allowing for time variation, that is a component, the land is changing the water is changing, so you have to address that component of things, then you can provide that in a broadcast system or on board as a simplified grid that can then be utilized to actually enable the mariners from that location. Next slide, please.

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Of those components I mentioned before, the different services and transformations between them are actually provided in a data product. Some will slide to the right in another stylized diagram to the left, it shows all the different vertical services potentially possible from the ocean graphic side also from how it will all integrate. That is what we provide with the data product. Part of the difficulty is, of course, we use our old Vda, make these transformations the sea surface tends to be a model mismatch between what's detected at the sea gauges, local mean sea level, trying to fit that together is more of an art than science, what we're going to look in the future is something a little more rigorous than that, next slide, please.

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So, I'll take a brief detour to emphasize some of the motivations from the updates that are coming in the 2022.

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We had the end date for the U.N. that everybody should be adopting, a common reference frame and that is what the goal of a Gdgm reference frame is concerning, it is not adopt the Itrf's, not adopt some type of specific realization, it is put the infrastructure in place in the standards and conventions that's where you have things identified such as the Hisd or international system, then you have our networks that build up via the NOaa corps network, absolute gravity sites or the stations could be considered components of this, when you have all that infrastructure in place, the next thing is you have to implement it and you have to require people to use it, that's where special data attribute reports. In the Gdgm it required us to have data, not just data available from surveys, or such on land, but indicates all of the special data, ocean graphic, really the navigator meets the infrastructure, the built infrastructure when you pull peer side, when you land the aircraft that's where you need to be accurate in your position, you can get by with a lot of precision, precision navigation in you will, when it comes to actually

trying to touch something or interact with infrastructure or any number of things then you have to have a much more accurate precision, you have to be tied consistently and do the same thing or end up with a miss match, we want to avoid that. Next slide, please. Hopefully you can see on the left-hand side they do not map transformations between the Wgs84 versions, they make an approximation of the most current version except for the initial one, on the right-hand side you can see them what they are nominally aligned to. There is no advertised, rigorous transformations that will be publicly available so when you use the broadcast you really obtain from the Wgs84 is not necessarily tying in to the ltf models on the right-hand side nor necessarily at all of the North American data of 1983 would indicate, there are transformations between the lts models there is if you wanted to move between realizations of information collected in various versions of Wgs84, first have to make the approximation across the model and then make the transformations then make another approximation back to the current version of Wgs84. In that context the Wgf and the U.N. behind it says let's focus on models for international references we will be aligned the national system and replacing Nat83 and some of the others, next slide, please.

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Modernizing the Nsrs, leave these up here, I'm not going to go into too much detail, we'll focus on aligning the coordinate, how we would be aligning and defining our potential data. Our Geo potential data will no longer be tied to some tie gauges that we level on, tied to a Geoid height model tied into the frame. That's why it is critical for us to test against things such as the tie gauges to make sure we get a good fit to make sure our model is realistic as well in terms of accuracy as well as in terms of precision provides the best product possible. The third on the right side is practical applications I would urge you to look for them on our website, certainly provide a lot more information, our way forward in modernizing our systems, next slide, please.

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So, in terms of the, moving forward. In terms of these planes, particular interest, I'll draw your attention to Terrestrial reference frames, next slide also have Geo model, the largest by far will cover about a quarter of the globe, also have ones for American Samoa, the project area in the micro region.

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We do have available data sets that we can pull in, there is a geometric reference, ltrf2014, there will be an ltrf2020, a map will be available at some point, we also have access, you can have a frame, but how do you access it? That's where our NOAA corps network also have available sites that you can access the Geoid height model, our global models available, global earthmodels lcg website, the late models are omitting certain signals that make it difficult to provide the best resolution for this type of work for a region. When you typically enhance our models with all the additional data sets such as Terrestrial data, we certainly check with Mga to see if there are data sets available. Finally, tide gauges in that region there is very limited data available, one of the groups we're talking about is Pgsc, Gns access this is showing the distribution, we have very poor coverage in our NOAA network, has more stations available particularly in the region.

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Geoid, 5 minute models are usually not going to be sufficient, you usually start and build on them, this is not necessarily available, something to look into, if we can obtain them for available data, certainly keep satellite, we'll need information building a model better than 5 to 10 accuracy.

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Pgsc is focused on, it is a hydro graphic survey of authorities in the region, these are our counterparts, they are the ones who probably have the available data that we can use as well. Next slide and last slide. Summary of pretty much everything I covered image to the right is only showing the available densefied, the green is showing the only model available is for Hawaii, there is nothing in the region, that's all, thank you very much.

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I guess so much, there will be time at the end for comments that will address some of the comments, especially regarding the relationship. Our next presentation will be by Mr. Peter stone technical director for ocean graphic and Noaa title S1 04 water level and s-11 currents, Nos coastal modeling.

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Thank you.

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You can hear me, right?

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good so thank you for inviting me to come talk to you today, I also want to, before I again thank my colleagues and cosurvey to help supply some of the slides you'll see.

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The purple of this talk with operational modeling program, as it supports marine navigation, I could talk much, much longer than the allotted time that we have on modeling I'm going to touch on different things, hopefully our interest to the panel, if I don't touch on something you'd like to hear more about pleads ask.

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The program works with frameworks for the guidelines, it is very important to work with these frameworks, it makes the products authoritative, and reliable, also works to make them most efficient in developing them so we get the maximum out of our resources, the framework, the Noaa framework is something called Nao, basically the policy and research and development transitions. It was originally developed in NASA, then a few years ago, Noaa adopted it and as a process to research operations, it is a process no one really uses about 8 steps the first step is being basic research then it flows through from basic research to applied research which is really kind of Noaa's starting point then laboratory demonstration, working in a relevant environment, basically prototyping to see if it works, evaluation of the test results, slight very nice kind of developed the last few months I do want to point out I use as a very important part with the lower levels especially the coastal ocean modeling test bed you request see how the coast survey lab, process they work with the demonstrate prototyping the co-ops modeling team works up in setting up the transition, actually goes into W costs. Okay. Really one of the things that we focus on is that operations do not have until the model information is in the user's hands not just installing it on a super computer and running it, it is getting the output out, getting formatted, getting the stakeholder engagement, make sure the users

getting it into their, in front of their eyes. The other partners that we have that are very important to us is the weather service the center for environmental predictions which runs the W cost super computer the national center for environmental information, Nci, who are the archive, we use unified modeling, so we are all using the same models and using community models this gets in some of the panels observations of bringing in the private community, these models are standardized in the private community and we take the latest version, set it up for a certain domain, and then install that and again, the biggest thing is, stakeholder engagement, making sure that the output of the model meets user's needs.

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Next slide.

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This is a different version of pat burk's slide of the operational forecast systems where we have them now is in red, you can see the model in blue that's coming on this month, and then the upgraded the integrated modeling, I will say most of the model updates are really pointing, also pointing to standardization implementing the community models we want to have for the long term success of the program, next slide, please this is tomorrow surge forecast models that csdl, runs, operates on the W cost super computer, on a global scale right now, there is also the hurricane surge, Osf that is, already implemented the system to make updates of that.

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How we work with NOAA to build the models switching over to the international framework, the hydro graphic organization100 network, kind of the next wave of the future the spatial standards that supports all the different data types we have and the data types are everything, the water level, coastal hazards, marine weather, coast pilot information, ice and waves, they all have different product specifications developed that says how they are going to be formatted, what Meta-dating has to be, has to be attached to it, and then how it gets sent out to the organization so that they can be picked up reformat or displayed on the Exis system. This whole system is set up so that we'll be set up so that ships going from Asia to Africa to Europe to the Americas, all right, are all working on common data set, and seamlessly processing the data as they move from one country to another country. If you want to move on to the next slide, please. So the time line, I know I'm moving very quickly, the involvement of the co-ops survey are mainly involved in the surface current, product specification, the water level specification, 104, S1 11, currently as we speak S104 is at version 0.08 and S1 11 is at version 1.01 and basically what we're trying to do is when you get to version one is when you see the yellow squares in this frame, we're hoping to get to, should be getting to version one at S104 this year, at that point, that means that the product specifications are pretty near final form and they are, they can be distributed to the end users and stakeholders and to get their evaluation so it is kind of a bait and release of the product specifications people can start testing them, working with them, telling them what works, what doesn't work, then after that evaluation is done, all right, we get feedback on the lho and changes are made to the product specifications and they'll go to version 2.0, all right which are the green blocks, we're hoping to get the surface S1 11 surface guidance version 2.0 by next year, that was originally published in I think 2019 as a version one, hopefully moving to version 2 by 2022, that really becomes the first kind of

operational version people can use in an operational context. We're hoping to get to water level version one this year, version two by 2024, next slide, please.

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Our model very quickly on this, there is a number of different path ways we disseminate our Nos model information with the co-ops tied to the upper left side, that's mainly a preS-100 navigation then below that on the left side is a precision portal stood up a few months ago by co-survey, that's the S100 level of data dissemination incorporating these product specifications. We also disseminate the data because of its multi-use data, through the use of Eds model viewer which again brings in a lot of the other regional data sets among other things make the data multi-functional and brings in the weather products and merges with this. Next slide, please. This is the last slide. I couldn't find good graphics in these two. The, another way of disseminating the information is through the NOAA big data project, and that builds on some of the comment it is panel has expressed, it opens, it allows a single location in the cloud everything from satellite data, weather models, our models all on one side, it helps group obstacles for the public to the public, I should say, really hoping the private enterprise will come in, use, discover that data really kind of build neat, interesting tools things that we haven't even thought about. The other thing, the path way is through the Ncce model archive, all of the Ofs models, currently I have about four years of model out put archive there, it is on a thread server, allows for going back and doing retro perspectives of the storms, this, again, would be very helpful for resilience so that you can look at long time period, especially in places where you do not have observation systems installed so it is just water level gauges or current readers. Right. And I think next slide, I think that's, I believe that's it I'll take, I guess we'll just move on to the next, we'll take questions later.

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Thank you so much, Peter. Next speaker is Dr. Greg Seroka scientist and lead for operations at the coastal marine modeling branch part of csdl under survey, Nos models for navigation services.

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So, yes, I'm a scientist in the Nos Ops survey, I'm one big deem within NOAA including Nos survey, also the weather service and academic partners including the travel commission, speaking to you guys after me. Next slide, please.

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So I just wanted to kind of like, start off with explaining why coastal modeling might be important, just so we're all on the same page, so, you know, the models can provide information between observation locations and space but also in time it can provide information about the future forecast guidance, traditional tide tables predict tides but not changes in water levels and currents due to wind pressure, you might have seen this figure showing the water level in red and now cast water level in black and then green is the forecast model, so you see a big difference between that and the blue predicted tide only water level, we can include, there is also these other elements for our system. And then finally, operational coastal and ocean models provide local, official, reliable water levels surface current guidance as well as water temperature for rain navigation, coastal resistance, ecology, fishery, science and management, next slide, please.

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Just want to provide some examples of end users, ocean forecast guidance, those are, here is the mariners, as well as storm surge forecasters. So, examples for example for a mariner is a pilot, ships navigating efficiently based upon the tide and the forecast you see on the top right the system, a lot of the information from our models can be fed into this system to guide the ship away from hazards then the other side is this storm surge forecasters so for example the NOAA national weather service weather forecast offices generating flood forecast during winter storm, snapshot from last December, coastal flood statement that the weather service issued for Nantucket showing one footer less aboveground level expected in low-lying areas. So, next slide, please.

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Just to get detail, we hit some of these already, the two main areas to develop and also operate within NOAA are for the ocean forecasting modeling systems are the operational forecast systems, global surge and tide operational forecast system, global XOps as we call it for the OFs these are NOAA operational models in the great lakes, they provide short term now casts as well as two to five-day forecast guidance of water currents, water levels, water temperature, on the left, we have 17 OFs in operations right now, in the coastal waters of the U.S., great lakes we have as pat mentioned I think with less than a month they'll be implemented in operations in the west coast, Mexico, surface currents from the now coast, on the bottom, I'll get more details on the global system, this is an operational modeling system from the world now, providing now casts again, seven and a half day forecast with water levels including the tides the storm surge and the combination of this, too, the right is an image of imagery underlying the modeling system, next slide, please.

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Provided some good background, to show some images of the two new models coming online, next month is a west coast, to Mexico OFs, the west coast on the left, it is again the first day of OFs assimilating the temperature, HS radar satellite imagery, it is a shelf-wide model larger scale, so it is a little different, traditional OFs supporting route planning voyage planning coming into the coast to approach, we can go against the ship can go against the currents and use more fuel but if we go with the currents you can reduce speed and then we can have like a 10 to 15% fuel savings from just one knot of speed reduction, this model provides search and rescue and hazard response, images of the surface currents and sea surface temperatures, some images for the Ngos2, 45 meters with 10-kilometers offshore, the lower Mississippi port, resolving the red, those are the model grid points on the shipping channels, Corpus Christi, another example, showing very high resolution providing that guidance to mariners. Next slide, please.

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Wanted to give the first example for navigation support these are S-111 surface currents as Peter mentioned this is part of the precision marine processing system, so, these OFs as Peter mentioned, are being encoded into S100, universal hydro graphic framework, Iho, so the surface currents Sm-11 surface currents is one example the mariners can use these currents to plan optimal routes avoid hazards, I'm showing the models the sample display of the surface currents, approach to a port middle, then the right, kind of showing in red a potential route into Hawaii going with the currents reducing speed, next slide, please.

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Onto global Estofs, this is an Nos model providing global surge forecast guidance today, it is the coastal resolutions that we have up to 80 meters global, we're providing, we're working on providing even higher resolution 25 meters to resolve those shipping channels and key ports, we're also working to improve model imagery and shoreline. This is estofs again, I won't go into this detail, here is some examples on right of guam, Hawaii, and U.S. east coast showing really high resolution as you move into the ports next slide, please.

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Previously since 2012 and 2014 we had three regional base and domains from Estofs, we of course had gaps in coverage globally western Alaska, for example, Samoa, Pacifics, also unifying the models reducing the boundaries from those models also we want to include sea ice and correction for the bias so next slide, please.

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So the coverage right now since November of 2020 is global so here is an image on the top showing maximum forecast water levels in meters above means sea level from a global forecast cycle, for Estofs this is an idea for risk assessment for coastal communities over the 7-day forecast period of the forecast. You know globally, we have this bias correction, we corrected the bias observation globally at tide stations so here is an example from hurricane Katrina and Alabama, black is observed water level, red is uncorrected blue is corrected the correction brings it closer, the model closer to reality, the observations, the next slide, please.

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Having access to Estofs will show the Ofs also mainly apply to global Estofs, this partnership with Lsu, they are providing Estofs guidance for storm surge in southwest Pacific, here is an image but also globally, you can zoom in and also click on the map and get the tide, here is a snapshot from now coast showing a zoomable map, also click and see the water level height at a certain time and place. I want to state that we will be providing training workshops, this is a new model, so for the end user communities to learn how to use the model forecast as guidance, next slide, please.

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Two minutes, Greg.

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Also the note, the data program that Peter provided the Ofs link we have global Estofs on the cloud, a couple more slides, navigation support S104 water levels, one of our biggest challenges, that our models reference sea level, for charting navigation, you use chart data, for example mean level of water Lat, lowest tide to get it on to the chart, into the users' hands, integrated, so global Estofs is being encoded, S100, relative to the chart data, here is some examples the bottom left is prototype from Estofs, on the titles and then just an example of the dynamic under the system columbia river where the S104 data can be provided to these systems, next slide, please. Finally, this is a transition Charles talk specific enhancement project, the Pacific Ocean will be enhanced, as being enhanced to global Estofs, an area of higher national priority, looking to increase resolution, really the idea is to enhance the ocean model to not only provide water level guidance, surface currents the end goal is to support the clarence

and specific ports, showing examples looking to operate and main increase that domain, next slide, please, I think that's the last slide.

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Thank you so much. I will move to our next presenter, Columbia Intertribal Fish Commission, he will be presenting about the environment.

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Thank you. As he said I'm going to talk about surface currents from depth resolving computer models both talking about the work we have done previously on the Columbia River estuary, the work that Greg mentioned in the Pacific. Next slide, please. So the coastal margin observation program, CMAP has been working in the Columbia River estuary for over 20 years doing both observation and modeling, we're a component of the Puget Sound region NEMO, forecast and long term simulations, we use depth-resolving models the intrusion of fresh water plumes and throughout the water quality, additionally we use a model that Greg shows early we are, uses a mesh that uses a resolution of complex features.

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We've done a wide variety of projects previously, we've worked a lot on habitat opportunity in the Congaree River estuary, particle tracking for search and rescue and equipment recovery, we worked on the evaluating the effects of channel deepening in the navigation channel in the Columbia River on intrusion and risk to fresh water habitat, we work on storm surge evaluations in working with FEMA. Next slide, please.

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So, we're part of a larger modeling community, we're part of the Schism modeling community, Schism is the semi-implicit cross-scale hydroscience integrated systematic model, the modeling community is a combination of academic and nongovernmental organizations and state and tribal government researchers and developers, and provide a test bed for model and application development, Schism is used internationally as well by national participants as well as U.S.-based participants.

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The community serves as a feed-in to NOAA operational models we've been used in a variety of projects, Schism has been used in the program and storm surge modeling for the U.S. east coast, currently participate in supporting the development of VDatum from the Pacific. Next slide, please.

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Looking back at referring to the Columbia River specifically, looking at what sorts of things our models are capable of, these are all images from a recent forecast day looking at a movement during a strong tide starting from the left figure, it shows the fresh water plume and the regional context to the Oregon and Washington coast, moving to get a close up of the plume showing the strong currents that develop, strong and complicated currents that develop with the Columbia River mouth during the tide, at the center of the figure, we have Salinity intrusion I have a vertical structure along the estuary and on the bottom most figures we have the currents along the vertical structure of currents. So this gives you an idea of the complexity of what we're able to model tide currents, water levels and density over vertical structure with surface currents and under clear clearance. Next slide, please. Moving to the much larger scale, the image here shows a proof of concept model run, conducted by one of our colleagues and the

developer of schism, Dr. Jong Vims and here we see that we can produce surface currents for the entire region while maintaining high resolution for areas of interest, our models of depth revolving so we can get surface currents at a very large scale also at high resolution, as Greg mentioned the existing operational products of NOAA global Estofs produces water level guidance, does not produce surface currents because it is not depth-resolving, the depth-resolving model in NOAA is either regional, uses structured grids with a resolution that's too coarse to resolve features like the Columbia river estuary or Portsmouth in specific areas of interest, next slide, please.

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This model is difficult to show what the grid resolution is like, we're on the order of 10-kilometers, our grid resolution, we see Guam, Afa Harbor on the west coast of Guam, we can see that as Greg showed, the grid is able to resolve fine features even entering into the port and getting down to the scale of 30 to 50 meters than has the capacity to do modeling down to the scale of one meter, next slide, please.

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Just showing you some examples of what our models are able to produce, in case there is a very preliminary proof of concepts, in fact, in this particular model run, Guam is not very highly resolved Afa Harbor is not resolved, since I produced these slides a week ago, we've actually done model runs that are produced good results for highly-resolved harbor or Guam, here you see a particular day in August 19, 2018, tropical storm passing to the north of Guam, generating strong surface currents, in Hawaii, with more typical weather still a complicated current structure, next slide, please. So 24 hours later that tropical storm spun up into typhoon Simmeron with very strong surface currents underneath the hurricane and complicated structures around it and we can see a little bit of strong currents developing specifically around Guam. And then in Hawaii, still relatively normal weather, but the currents have changed dramatically over in this 24 hour period none the less. Next slide, please. So, in conclusion, the support for the modeling community feeds back into NOAA operational modeling, specially responsive modeling allows scale and high resolution features to be handled in the single continuous model and depth resolving model in surface currents water levels and density structures these provide realtime navigation support and these models will also support understand base and scale of ecological process, thank you.

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We have about 10 minutes for comments and questions. [ captioners transitioning ]

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Doctor Allman had a comment first.

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For Danny Haynes, I think the question was raised yesterday with regard to how the ship is tied to lowest astronomical tide, as I was trying to get to, the data transformation was critical here to understanding how the ship is positioning itself, how that prayer relates to the others, including the astronomical site, the lowest level. If you have those transformations, you have the ability to make those transformations and position the ship in that framework. It is just a question to transform your positions into a consistent frame. A lot of the nations are also adopting the same type of reference systems on land, so Canada and the U.S. is moving towards a common space system, so will

Africa, so will Europe. Everybody is consistently moving the same framework. It should work globally, not just in the U.S. Hopefully that addresses your question.

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Thank you. Any other questions from the group? Especially as Mister Burke mentioned, all the requirements, are we meeting the mark?

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This would be from the HRS panel group right now if you have any questions.

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Cassie has a question.

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Thank you. I have a question. For Doctor Greg, I enjoyed the presentation. Thank you very much. I am very adverse with the signs. I enjoyed that, definitely. My question to Doctor Soroka is I am impressed with the dynamic clearance. Just wondering, because we tried to push the navigation during the reflective visibility. Now seeing this one we can you our approach, like how accurate is that model? Is it safe to navigate to using the dock? And is anybody using it? To navigate, I am not sure the barometric model. Thanks.

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Sure. So the dynamic under the clearance systems are developed and operated the private sector, mainly, so I can't speak to the specifics. Some others can probably speak to it better than I can, some involvement in the Long Beach California area as well as the Columbia River project, but one thing I did want to note is so as part of the S100 standard, we do have both clearance management standards, so S1 29 as well as for the weather, so as 41X, so we do have visibility. I think visibility will be part of that system so that we can integrate it into the clearance systems and help manage the ships, but I don't know if any other panelists wanted to speak more to the specifics of the clearance systems.

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You are correct. S1 29 is managed by industry and Powell listening can also talked about. Regarding to the models to incorporate, regarding the fog model, the visa models with the weather system, specifically the Ocean prediction Center deals with S4 1X layers, but we are looking at that, but I can't say we are confident in the compilation. May be Pat or Pete knows.

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So to that, we talked about this collaboration across the agency, so we are looking at how to integrate our forecast that have oceanographic variables like the forecast by the weather forecast office. We have a capability. Right now it is in Tampa, but we are looking to expand that to Mobile Bay and others, so that is something we are actively looking at with our port manager as well as working with folks at the weather service. So we would be happy to share some of those experiences as we get closer to getting these online.

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Thank you. Regarding the estimates of the skill assessment and for uncertainty models that we develop, they are still in development.

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I think Sal has a question.

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Yes. So I am very impressed by your presentation. I think I used to say congratulations on that. I have a question. I probably misunderstood all these high-resolution extending to 80 meters imagery? Is that correct?

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Are you talking about the methods we used?? Other precise data you produce, I have up to 80 meters off the coast. Is that correct?

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Can I jump in? So the methods we use were taken from the grid provided in high resolution. We have a resolution symmetry and low resolution sampled accordingly. So keyboards or key Marine areas has a high resolution of nodes based on four meters, but we sample it 45 meters depending on what model product you are looking at.

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I understand. 30 meters going down, it doesn't read above 30 meters. Another question, I mean, I think this is more to the private sector, how do you explain all this data because data on the key clearance and so forth, I will see the occurrence and the valuable data to plan accordingly to save fuel. But how do you display all the data because my problem when I was using the navigation was when he went to the water and you set things according to your drop squad, then it is a distraction for the office navigating. So I am very interested to understand how these are going to be displayed on the access.

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I will for this to Greg.

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First of all, the model in the current specifications for S100, S1 11, excuse me, the currents are downscaled to 500 meter resolution, and then there is different scaling versus how much you zoomed into your chart. That is one reason why we really need to have people go to the navigation data website, which has the S100 version 1 view of that, and to try and get feedback from the Marine navigators, from the equipment manufacturers, all those at different stakeholders to get that feedback on that because these specifications were developed within the international organization, NOAA counterparts throughout the world and not necessarily by mariners themselves, so we have done our best, we had some feedback from representatives, but we really need, at this point starting with version 1 to get the feedback from the mariners to make sure it is done right. If it is wrong, now is the time to change it.

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Yeah. I think I gave feedback. In the planning stage, I need to plan peer to peer, and I need to work all this information if I am in the middle of the ocean on the arrival port. If I click and I get the information, that is fine. I click back and put it somewhere, not on the chart because it would be too much data to read and too much to listen to. That is the main challenge. I think really you guys, I know I need to talk with the makers and make this more fluid and feasible for the Mariners because how do I use them?

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Powell is here, I think she can talk more. As part of S100 working with IHL and all these other different offices worldwide, we are working on interoperability, harmonization of the portrayal so we don't confuse the mariner and overload, but as part of the precision

navigation program within NOAA, they are doing workshops and also we have feedback from the user community so we can do this the best way, so we appreciate the feedback.

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At the moment we are only dealing with one usage band. I wish we had full usage bands. S100 is working on S 98 interoperability specification to handle the data. That is how we give it to the mariner to using the system.

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Right. I thought S1 11 and S104 also do portrayal of water level occurrence. Right?

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Yes. So water levels may not have the trail, but surface current, so all these different product specifications need to work together and harmonize.

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Thanks.

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This is Lynn. If you want to call Julie Powell, please feel free. Sheet is on the call.

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I know we have two more questions, so why don't we take those and we will see how much time we have. Kelly? Are you on the line?

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There we go. Okay. I have been an muted. You get to see me as well. Wonderful. I have been fascinated by being awarded a peek behind the curtain. The granularity of the science is really quite amazing, but I kind of second but the captain was saying, the challenge here is to make those so that it is digestible by mariners who are on the spot making instantaneous decisions, not by people who have the opportunity to study long-term shots and data and look things up on websites, and challenge is to get this onto an excess that is instantaneous to someone who has to make life-and-death decisions. One of the things we have commended very highly is the ports system, and we like to find better ways to utilize that as well, including perhaps AIS transmission so it is instantaneously available to get us right onto chart for immediate display, and to make this an official is such RP meeting, I will now mention back to Pat Burke who was talking about the port system and how it has become so usable and user-friendly and accessible but it is now being used extensively by recreational boaters, coastal managers, resilient folks, U.S. Coast Guard, U.S. weather, academics, etc., and I just have to remind everyone that the ports is predominantly still overwhelmingly funded by a very narrow strip of deep-sea marine assets, and I think the funding formula has got to be revisited and or nationalized because when something is everybody's business, it is nobody's business and that is where the government needs to step in. You have heard me once again, ports is extremely valuable, but ports should be federally funded, and as we move forward with this, we need to make this information available to the public in that the public has to have that benefit and various parts of the public have to either share it or obtain it through a governmental entity such as NOAA.

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Thanks.

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Larry is next. Thanks.

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Brian: thanks. I do have a question, but let me comment on Sal and Ed about this question of how it is displayed and make the comment that of the long list of things I had in our task yesterday for the center, we have a very competent visualization lab who is looking at the question of how to best make these things really understandable to the user and they do that with the real theory of human perception and lots of case studies, so it is something that we know we want to get the Mariners involved because that is where the decisions have to be made in terms of what we are doing. We can spend all day thinking this is good, but we have to put it in the hands of mariners and we are starting to work with some of the maritime academies on that, so keep doing that one, I think we will have some helpful suggestions for that. The question I had, this is really impressive. I am thrilled to see this modeling effort, I am curious to know whether there is any interaction with the Navy or with the academic modeling effort, and how that interaction works if there is.

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Patrick?

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Great question. Yes. It is difficult. So one of the big challenges we had was first this coordination effort, so bringing on board Tracy was a huge step in the conversation. So collaboration first across the agency, that is something we have been working pretty hard on, and then working with associations such as the one that truly would be a part of. They are key in this. As we move forward, and this is also working through, these are bigger efforts that we are beginning conversations with folks like the Navy to do that, but sometimes working with them, they have places where we can't get information, but they have expertise and I think in having these meetings and one thing we have not been able to do because we are all virtual is have those conversations where we can talk about these things. Things we are looking forward to in the future is having those opportunities to go out there and talk to NRL and have those conversations, so I think we have this long-range vision for the decade and how we are going to collaborate to build that operational enterprise for the nation, and I think all these agencies and units you talk about are part of that.

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Thanks.

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One other thing I would also add real quick is that maybe in the national agency also has membership in the IHL working groups, so they bring their requirements, their point of view at least in the international framework through the IHL, so they have the presentation.

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I think we have Lindsay and McIntyre.

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Thanks. I guess I will contradict myself, but it was a good session and great to have you guys present and show us what is happening. We appreciate it. My first comment is we need interoperability, and the standard specifications, but I wonder how much that constrains and what can be possible, and you talked about the general levels. That is one area, and in my view, I think that whole infrastructure, I think that is what we see

NOAA having to build, but we want it extendable by a port that wants to then be able to add into this structure as well. I think we have had discussions about that. And maybe that is where the unit manufactures, which I am sure you are speaking to and be able to make it usable and almost, sorry, maybe I should let him speak to this. It seems like that is an area where you have the flexibility to do other things and then that can be taken if there is any other comment on that. Thanks.

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This is Greg experiment one thing I would say is we are designing S100 for the actors, but is for the PDUs to be included in the conversation. Also, I do want to mention we have gotten feedback from the international community that we may not do surface in the future that would be integrated into the clearance systems, also the voyage planning systems, so if that is the case because they don't be overwhelmed, that is what we will do. Yeah.

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Julie is online.

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Thanks. I would like to hear and I.

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Thanks. So I agree with everything that Sal and Lindsay have set. The other thing I wanted to point out is that I think the forecasting, the near-term forecasting is super important because you know, that is what we are used. We are looking to see where we move the ship tomorrow, not where we are in a specific moment in time, and again, the other thing, being accurate, when I was a pilot, we operated with the clearance with a very dynamic bottom with a lot of different strategies and different data and all that kind of stuff, and you really got to get it down to the inch of the centimeter because there is an impact in making sure that you have enough water, but there is also an economic impact in that all the money for the shipping companies is in that last few feet of draft. Adding another six inches means a lot, but we need to get six inches safely. There are so many things going into it, it is impressive what you are doing and I say the 23 years I was there, it changed a lot, the data that is available, and then getting everything where it matches and getting into the PB you. For a pilot having it, it doesn't help.

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We appreciate the honesty.

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Thanks.

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So I think hopefully I can help gelid altogether, so with our position navigation programs, it is a cross office initiative. It is about trying to get all of our data into these international formats that can be used across that spectrum of navigation systems, you know, and we are right now, our outreach is focused on PP use because we recognize they can innovate in terms of adjusting the data, implementing the data, doing some tricks and trades because excess is a highly regulated thing. So I will say you know, part of that is that that clearance, we have the water level in the water level forecast to do the adjustment, but the other key piece, which is the foundational layer we are working on is high resolution symmetry. Have a good tour it. You can get good precise measurements through systems. The other thing I would like to point out is this is not a this year thing,

more of a three-year Outlook, and I just had a meeting this morning with the working group was to talk about how to integrate real-time data feed in a structured way across the spectrum that can be taken advantage by different types of maritime applications and so that means we can eventually have the real-time observations coming off of port to sort of Institute collectors off of the data. We are not quite real-time, but with an 18 minute correction. The other thing for Sal, you know, with the equipment manufacturers at the IHL level am a part of my other hat that I have is the F 100 working group chair is we have continued and high engagement with the big [ Indiscernible ] I have made sure they had a seat at the table and a lot of times the conversation goes into these technical implementations, I stress to the members that this is not our business to tell them how to do their business. Our business is to say we want to depict things safely, let them figure out the technical solution in a way that makes it easy so they understand their users. They are the ones that have the key input with a pilot and the navigators, so that is kind of where we are at with the manufacturers, and then we have equipment manufacturers that represent a large part of the actual market. But then also to some extent, plugging the service project we have done within the Marine navigation problem, we use the global model and we can actually provide service data in a standardized format for navigation systems, for root monitoring and root optimization up there I believe the North Atlantic basin and part of the North Pacific basin, so you can get a good depiction of the Gulfstream eventually integrated into your route system, and that is a specific. Thanks for letting me crash your party.

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Thanks.

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Yes. Thanks. Did you have a question? No, okay. We are ready. I think I thank you to all the speakers, was a really interesting session. I think it is hard sometimes to grasp what is going on behind the scenes on a lot of these modeling efforts, so I appreciate the overview, and I am really happy to hear that what was this called, the portfolio manager. Thanks so much, that is great because as I have seen the integration between academia, fed state and industry models, and has been quite a challenge, so I am glad someone officially is taking that on. I appreciate it all and I am sure we will have follow-up questions, but I think we need to have on now in the meeting. The next, thank you all very much again. The next part of it is let's see, actually Rick Brennan, do you have any comments on this session that you would like to say before we move on?

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I have lots of comments because there was just so much there. When we talk clearance with Allie Long Beach, the is just, it was hard for me not to jump into the fray of the conversation, but I was glad to hear everybody's comments. I guess I would say there is a unique interplay between the S100 products or position navigation dissemination efforts that we are working on right now, and the models, so I think Peter certainly discussed that, and I think it was good to hear, but I think that act is that we have these models for any years now and what we lacked is the standardized format to get them from a scientific format that they sit in the, which is the CD of format and get them onto the bridge of the ship so that is where I feel like we are finally reaching this synergy and this nexus where we have the format, we have the ability and all those things are really going to come. Also I think as it was brought up, Lindsay brought this up, we are

absolutely working with the private sector on this. We have been working with CI Q, the herbal pilot unit producer to look at how to visualize as one or two data and they are doing that, so we are doing that and I believe the unregulated pilot unit arena is where a lot of these things can get tested and tried and we can figure out what works best, so we are clearly working towards that end and ensuring they are a part of the conversation. Given that time is short, I will restrain myself and allow us to move forward. I think there were some public service comments that Lynn had asked me to make on this, and that is just first, I guess I would like to thank everybody that worked behind the scenes to get all these presentations together. Their presentations are already up on the website, so please share and use as you see fit. Closed captions for both days of the meeting will be posted by next week. They are great for a quick review of notes, but right now, I am probably missing main attributions. Let's see. A transcript with names will be available in about two weeks for anybody that really wants the full transcript. It is going to take that much time to get that finalized. The detailed meeting report will be available in about four weeks for anybody looking for that, and we comply with federal advisory committee laws and all meeting documents are posted to the website. So I think that is it for my public service announcements. Julie, I will turn it back to you.

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Thanks. So now we are going to switch into the public comment period and we welcome all public comments. That will help us to improve our understanding and recognition of services. Lynn, do you want to share any public comments?

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Yes. We have a bunch, at least eight. So I am just going to go in the order that we received them. Bob says another constituent, this was from earlier today, sorry, so not about this session, but a mother constituent that would benefit from nearshore accurate map ring are the bidders whose numbers balloon from 50 million in 2019 to 57 million in 2020. Accurate bathymetry means they would find their favorite fishing holes easier and faster driving less, consuming less gas and reducing dilution as well as it enjoying themselves and bringing others on board to live in the outdoors. Getting families to leave their screens at home and spend time together is good for the health and well-being of Americans, especially with voting being a safe activity in the era of COVID and possibly future diseases. He has a second comment and he says one important constituent now ought to consider as it surveys and develops nearshore data are the approximately hundred thousand votes that were purchased by new boaters in 2020. These new boaters are not experienced and do not venture too far out from marinas in the shorelines, hence accuracy and accurate charts in the 40 meter depth range is of paramount importance not just for safety of navigation, but to make sure new boaters are happy partaking in their favorite pastime and come back. Tony, a former speaker has two modes. In regards to many users not understanding much of the improvements happening, possibly the best way to address this is by educational outreach through the speakers and educators who addressed these folks, resistance to improvement inertia will be or is a very significant hurdle for all. His second comment was end-user clients should be identified separately between wholesale versus retail users. Learning that a product can be very different. Rob says yesterday, Giuliana Blackwell commented on NOAA plan for air point mapping in Southeast Alaska and Virginia. Presumably the work

in Southeast Alaska will be in support of the Alaska coastal mapping strategy. Can she confirm that these activities are particularly those in Alaska will include contractors as articulated in the a CMS and as is the established practice with the vessel base charting work for NOAA's National Service office of co-surveys. If you are around and you can answer that question, or Ashley?

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I am here. Do you want me to answer it,

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Sure.

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Briefly, when I talked about airborne gravity collection, that is part of the gravity project underway. At this point in time, we are looking at a number of different aircraft that could complete that work in Alaska. We do have NOAA aircraft hopefully available, but there are contract aircraft that have been used in the project and will be used to fill that mission. As far as the elastic coastal mapping implementation plan, the national data survey does plan on utilizing contractors to do work in Alaska for the coastal mapping aspects, as well as doing some of that in house. There are a number of other federal and entities who are also collaborating on that, so there are opportunities for support from the private sector in a number of ways. As far as the ship had your contracting, I cannot speak to that. Thanks.

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Brennan, do you want to comment?

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Absolutely. I did that in my opening presentation for our office report, so we absolutely have contractors working in Alaska this summer, and as we do every summer continually, so we have in house contract work in Alaska this summer and they are responding to a CMS priorities, absolutely.

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Okay, great, thanks. The next comment is from John who says great presentation by Dan. The most valuable tool for the engineering community. There are many issues with the models that should be addressed when updating to the new current models don't always align with stations that were not used in the model. I also extend ports overlap for conversion of the vessel or air point [ Indiscernible ] have inaccuracies and adjusted from superseded data, etc. NOAA should consider use of other agency water level stations in the development validation of data. This question is our updated models going to be rolled out with a modernized and SRS? This ordination will be critical for the private sector for coastal engineering and coastal study efforts. If Giuliana or somebody else would like to talk about that, that would be great. He says loved Greg's presentation. Comment slide showing water levels dynamic undercoat clearance and Columbia is nice. This does get to the issue that U.S. Army Corps of Engineers surveys don't align. So if anybody would like him to make a comment to that.

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I can answer for it unless the Giuliana wishes to.

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Go for it.

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Go ahead.

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There and up. Quickly, the data ties to the difficulty in the Pacific Northwest by being out over a medium. There was an attempt to try and fit a surface across the country, but there was accumulation. When we developed 2022, the replacement to the potential data, we are tying it to flight stations, there is about 200 scattered around the Gulf Coast, East coast, West coast into Canada to try and unifying the potential data. That is where I was addressing my presentation about the topography of the seas service, the local difference to which you see locally and trying to tie that together and that is very much what we are interest in doing with the update. First we have to roll out the modernized SRS, but I had started talking to Stephen White and the modeling advisory board. I am making them aware that making these ties are going to be critical because we have to make sure that our modernized SRS is the component that we get consistency in the results. It is about precision, but it is also about accuracy. Once we get that and validate it around the shoreline, I believe we will have the best fit between our terrestrial models in the ocean models to make sure they integrate properly so as to facilitate a lot of the work we are discussing today. Hopefully that addresses your question.

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I can answer John's question about the Columbia River. I mean may be that is a softball from John on that, but we have been dealing with this on the Mississippi River, as I know John is aware, and so as we are building out the national metric source, the thing we spent the most time on, particularly with Army Corps of Engineers is just making sure we get the data correct, and so that when we bring their data in, that it aligns with ours, aligns with the title data and all of that is correct, so that is the biggest thing. We are doing that at least on a charting area by charting area basis, which is our production branch within the Marine division, how we are building out NDS right now. We are currently doing that in the Gulf, so those are significant issues, particularly if you are talking about under kill clearance to McIntyre. But that is how we are addressing it on the date of issue is ensuring we are working with the Corps of Engineers to ensure how they attribute the data in the metadata is clear and correct and aligns with our definitions on that. So that is a significant amount of the behind-the-scenes work that Katrina did not talk about yesterday that just is a real heavy interagency lived, so that has had us working very closely with the Corps of Engineers on that basically on a district by district basis.

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Thank you.

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Thank you. I'm sorry, John added an additional comments that got cut off. This does get to the issue that the Army Corps surveys don't always align with the NOAA data models with the low water over the Columbia River. Is there an effort to resolve these discrepancies to involve chart data between the U.S. Army Corps of engineer and NOAA for the Southwest past ? I am going to, because of time constraints, I will go on to the next question, which is guy says I would like to know how the water resource development act of 2020 releases restraints on uses of hardware maintenance trust services. Addressing appropriate usage of these funds and supporting the information

management of such programs as precision marine navigation boards and operational forecast models. Hopefully somebody knows the answer to that question.

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Harbor maintenance trust funds are used exclusively for dredging projects. Take legislative changes for those to be opened up to navigation uses like charts or things of that nature.

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Thanks. Okay. The last question is from Schneider, it is important to not focus solely on PP use and pilots, the vessel Masters was plan their voyage in advance. This requires longer-range planning, the voyage planning is done primarily with practice. The vessel is loaded three weeks in advance. Okay. Thank you so much for the public comments. If somebody does want to address I'm sorry John question about the Mississippi River Southwest past data and discrepancies between Army Corps and NOAA, that would be great .

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Okay, thank you. So I think now we can, and we will look at the comments and if we need to follow up with any of them, we will certainly do that. I think we are at time for a break. Say that again,

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If I jump in real quick before the break. I am going to have to take off during the break, so I wanted to say goodbye and say it has been a real pleasure and real honor being the cochair and the chair of the panel for these last several years, and I am really happy that you are taking the lead now and good luck with it all. I want to thank everyone on the call and I am looking forward to the next meeting in the fall, wherever it may be, and in the spirit of the fact this was supposed to be in Hawaii, Hawaii is under a tsunami watch from a large earthquake off of New Zealand, so we are all thinking about you all in Hawaii. With that, I use this ceremonial gavel to hand it off to you. Good luck and we will catch you.

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I love it. Thank you so much. We are all going to miss your leadership as chair and you will be a hard act to follow. I know you have well served is that. Let's move on to the break, and do we come back at 4 o'clock in 15 minutes or 10 minutes, do you think?

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Probably 10 minutes since we are running late.

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Let's do 10 minutes and page, you will be the first one up when we come back. Thanks.

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Come back at 3:55.

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Okay.

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[ Event is on a 10 minute break. Captioner on 10 minute break. Captioner on standby ]

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I got my second vaccine last week.

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Thank you for looking out for me. I am feeling the love. You must love me.  
Congratulations. I am thrilled to see you moving up to the slot. Good call. Good stuff.

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I am excited to come see you sometime.

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Always open. I get my COVID shot, the next one is and who have weeks. I feel like we are turning a corner here. It is great. Finally we are getting to where we want to be. I agree with that.

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Good. Good stuff. I am a wimp.

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I am flying a sailboat. [ Indiscernible ]

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That was the delightful upside of COVID.

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We are back and everybody is on.

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Welcome back everyone after the break. We are going to go into the session between HS RP members and discuss some of our priorities and working groups. Ashley, we are going to switch over, so it is going to go first. Ashley, if you have any comment afterward, that would be great.

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I will give you an update on the document from a couple years ago [ Indiscernible ] I think if we could put that document up, we can refer to it. Someone can hoist that up. There we go. We just had an avalanche triggered a few months ago. I don't have a real-time video, but it came crashing down across the highway. Everyone is talking about big problems and we want to compete with Houston and the East Coast, so this is an effort to compete with disasters, if you will, so we have our issue with avalanches and we did have a power outage that lasted two hours, which is Gary when you have salmon and crab and caribou meat in the freezer, but nothing competes with Houston. We don't have that up here in Alaska, but we have avalanches. That is a climate change issue. Next slide [ Indiscernible ] and update on NOAA's services to support the blue economy. What is happening in the Arctic? There are changes, more activity. If you look on the left-hand side, the traffic density, 10 years ago from today, you could say 100% when Michelle was doing efforts, they are not doing that anymore, not producing oil. There is some talking about [ Indiscernible ] that is subjective. Expanding NOAA . And has been studied for several years now. What I looked at is what is the point for departing the Arctic? The Bering Strait is 42 miles wide and that is our benchmark is who is departing the Arctic and I hate to say that in front of people in LA or Houston, that is a small number, but they have 7000 buses going by my house in Juneau within a mile of my house, so 500 feet the will make me nervous. I am in the middle of the traffic. This diagram on the right shows you on the Russian side is expansion and the Russian side, the black are tankers, they are dealing with tankers and large cargo vessels moving out of Russia to the parties, and that is where most activity and growth is right now. The maritime activity of the Bering Strait, now most activities on the other west side of the Bering Strait is on the Russian side. You can see on the east side is orange tugboats.

Most of our trade is towing vessel, barges supplying small communities. Vessels deliver it to small communities up and down the Arctic. A lot of effort has been done to improve charting and that is why the [ Indiscernible ] safest routes [ Indiscernible ] make sure that writing measures is have to go by and that led to adoption of routing measures. The New York Times with more ships in the Arctic, fears of disaster arise. A lot of people are preventing things from going wrong and NOAA is in the lead as well is the Coast Guard. My comments are in the article. They mentioned changes in my organization. We should stop worrying about things. We will deal with it when things go wrong, but we should prevent things from going wrong. That is NOAA's focus. Let's keep things from going wrong. Give the Mariners better information. They can know the weather so they can avoid it. I think [ Indiscernible ] next slide. Ice is an issue in the Arctic. There is less ice, how do you operate in iced waters? Information [ Indiscernible ] if you step back 30 years [ Indiscernible ] the captain was a boarding eyes from a glacier nearby letting go of the iceberg so the stakes happened, but he was avoiding ice and he hit a recent study. The vessel on the right is another tanker. That is what it looks like if you hit a piece of ice. It can be nasty and you don't hear much about the overseas Ohio, but it hit ice. You want to know where it is so you don't crash into ice. This is the nature of the trade. This is a broker going through the largest mine in the world, which is in Alaska and these come from the [ Indiscernible ] we only have 30 of those vessels come to Alaska right now. The concern is over time more and more traffic will cross the top of the Arctic and go to the Far East from Europe as a major thorough Ford [ Indiscernible ] right now it is still tenuous because of the things we are looking at. That is the future. [ Indiscernible ] we are on the right track. This is a document we came up with the most three years ago. The question is every year it is relevant. I will show you quickly where it is relevant. I have pretty pictures. Next slide if you will. Here is our recommendations. Evaluate new technologies for the acquisition of data. There are new technologies being developed. Another issue is [ Indiscernible ] that is another thing that is being applied, so it is relevant. [ Indiscernible ] a lot of discussion in that, that is being worked on. We recently [ Indiscernible ] to transmit information back and forth to the polar star to ensure [ Indiscernible ] safety information, whether information, protected areas, weather etc. can be provided. When we talk about how do we get this information of vessels, that is one means of providing information. We have a lot of data, how do we get the ships? We make sure we have the capability. We only have 33 transmitters right now. We will have 50 by the end of the year. [ Indiscernible ] this is sending information back [ Indiscernible ] safety information. They are delivering information to mariners in real-time. This is coordinated with the operations center, which is 24 hours. We work with the Coast Guard and the maritime industry for public private partnership in the same direction. Next slide. Developed dynamic Coast pilot. That is my house right now. [ Indiscernible ] let me give you an example. Pick up your telephone and call the local community and they will let you know there is whales in the area. Ships aren't going to call local communities. Get information. It can be done through better technology. Call somebody and ask and it will show up on their screen. It will show up on the screen and alert the vessel. Two presence avails [ Indiscernible ] we are working on that. That is another bullet. [ Indiscernible ] that is well underway right now and using the information [ Indiscernible ] that is how NOAA has been doing the surveying looking at where vessels go [ Indiscernible ] when I look at all those bullet items, the paper is relevant.

The good news is it is being acted upon. Next slide. That is it. That is my story and I am sticking to it. Very quick. I need a COVID shut.

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Thank you. I know you have to leave soon. It is good to hear your comments about the navigation in the issue paper here, but it is still relevant because we are going to be discussing that in a little bit. So can I say that for right now, you feel there is no changes that need to be updated?

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No change. That is it.

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Okay, thanks so much. Nice update. Ashley, did you have anything you would like to add with Arctic mapping?

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Ashley had to head out. She phones her apology and she is very happy with the update.

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Okay, great. Thank you.

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Thank you.

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We will go to Gary Thompson next because we are going to, we have been asked to update any comments on the charter that we have and Gary is going to update us on a proposed change and then afterwards, I will go ahead and call the vote.

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Okay. Thank you. As you know, we have to review our charter. This was sent out to all the HSRP members and we received one recommendation for modification of that. We might give rationale. Would you like to provide a rationale of why you want to make this change?

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Thank you so much. The rational behind requesting this change was that as much as we are interested in trying to get the weather data and all those factors, we should always have the overarching principle behind that. We need to facilitate commerce from U.S. ports, and all these activities should lead to in some way or another value in the nation.

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Thank you. You can see this was looked through back at NOAA and unless we have initial comments, Julie, I think we can put this up for a vote.

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Okay, great. Are there any additional comments for discussion before we take a vote?

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This is Lynn. I will mention the three offices most involved with HSRP have legislation, overarching legislation [ Indiscernible ] that language comes directly from the. So that is great, just to point but to that second legislation.

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Great okay, good to know. Lynn, just because it is kind of awkward to take a shorthand, I think I will just go around and ask everybody individually if it is yes or no on this, if you don't mind, so Gary Thompson?

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Yes.

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Do we actually -- does someone need to put forth --

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Do we need to do a motion?

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I think we need to do a motion. Sorry.

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I move we accept the amended charter presented today.

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Second.

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Thank you. Okay. So all those in favor, as I call you, you can tell me yes or no. Gary?

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Yes.

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Captain Sal?

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Yes.

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Page is gone, but he does make

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Yes.

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You are still here, good. Yes?

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Yes.

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Sorry, I interrupted you. Captain McIntyre?

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She might have had to step out. Okay. Let's go on. Were you muted?

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I am having problems. Yes.

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Yes. Okay. Moving on. Dave?

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Yes.

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Captain Kenner?

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Absolutely.

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Kelly two

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Yes.

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Hargrave?

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Yes.

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Lindsay?

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Yes.

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Nicole?

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Yes.

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Duffy two

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Yes.

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Shaver.

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Yes.

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Abdul.

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Yes.

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So I think we are unanimous.

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Thanks so much for doing that bit of duty.

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We do approve that. Thank you very much for leading the change. All right. Let's go on now. We will move on to Lizzie. Any updates on the working group?

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Thank you. Maybe there is with a couple points. We don't have a sweet presentation like Ed, but there was a number of points we covered some the last meeting. The first one was we mentioned it earlier, there was the response we put in. We finished compiling that response, and we had discussion with Sheppard this morning and I think there is back and forth about this, there is broad support. There is broad support amongst the members for this strategy, and I think it aligns, if we think back to the administrators comments about climate change, this provides the foundation for the scientific mapping and exploration. It is definitely scientific integrity. We are concentrating on the mapping with multidisciplinary scientific approach with the exploration of the U.S. CV and I think we have a real opportunity to also [ Indiscernible ] that is partly with remote technology, we embrace more people on that, more people generally enveloped. Also I think a lot of that, as we saw in the Pacific is major areas for exploration, and mapping out there, and I think that is an opportunity to address some of the historical colonial exploration and address some of that in our approach to Pacific

exploration. I would hope that we can make a note that we certainly continue to endorse this for this current administration. Sorry. Christina is going to be speaking about the activity we had regarding limited disability. Let me handle it over. We will move on to the future activities after that.? Thanks. So for some of you who were at the last meeting, we introduced the topic of rescission Marine navigation [ Indiscernible ] we are trying to review a technology solution. What we did prior to that meeting between Lindsay [ Indiscernible ] we talked a couple meetings on it, and we introduce it first to the members just to make them aware of the issue. We have members, we invited Captain AI and company to introduce technology of navigation. That was very impressive what they are doing and going to the last September meeting when we brought Doctor Maria Burns from the University of Texas, she highlighted the economic impact of the problem. You know when you have some of the major ports closed for a day, you talk about [ Indiscernible ] we continue that push with trying to find a balance between we, what can we contribute to the solution? A lot of it is technology, but I mean hopefully it will evolve. There is something like you driving your car with GPS navigation for example, like Google maps or something. We try to see if there is enough technology to build that with NOAA's support [ Indiscernible ] I am sure we can do something, so it is probably going to be towards the next meeting in September to expand that presentation to bring more technology into it. By then we will make sure we will show what services we can hire to offer for the technology. That is what we are working on. Lindsay, if you want to add anything, feel free.

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That was a good summary.

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Thank you so much. I think we covered all the points. Thanks.

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Okay, thank you. I think I am not sure we have another couple we have got to decide on and discuss the for the future. One of the other ones was DM is proposing, DN was going to speak briefly about wind energy proposals.

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Thank you. There is so much activity with offshore wind and it has come up very quickly. Five years ago I would never have guessed we would have had 50 vessels doing survey and geotechnical work of the coast at the same time, so it is a really big change that is happening very quickly, so I think there are a number of areas where what is happening in offshore wind overlaps with the blue economy and with NOAA's objectives, so there are a number of topics being considered, and I think it is being considered if we will talk about that during a technology working group meeting or if it will be done during a panel. I am not sure if that has been decided yet, but there will be lots more to come in that space. There is a lot of interesting things happening with interagency coordination. A lot of the working wind is being led by the coordinating agency, but there is a lot of coordination that happens with NOAA through that . As far as the permitting process and the environmental impact statements that are all part of furthering the development of this renewable energy off the East Coast, that is just the start of its. If leases are coming to the West Coast, Julie and Anna are coming to your neighborhood as well, and also Mexico. It is a burgeoning industry, and there will be a

lot to talk about in the near future and in the more distant future as well. So that is about it on the board today

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You might have mentioned it before, even the current NOAA services [ Indiscernible ] is that something that you are using now in your activities, and is something lacking or you would like to see improved? Other areas?

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Absolutely. Certainly the symmetry is being used, of course. Currents and ocean information. For the level of detail that the wind industry needs, it is very high resolution, so industry has gone and installed a number of ocean statements, including one that Atlantic Shores has installed that is actually broadcasting typically through [ Indiscernible ] there is a lot of opportunity for this kind of both using information but also sharing information that is gathered back and really working together to defer understanding of that shallow water 40 meter part of the coastline.

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Rick is back up. Do you have any comments?

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I think the fog discussion that we had was brilliant and loved that and I think it is good and I think we need to continue to touch base on that going forward in the future. I certainly support that. I think for wind energy, I have had a couple conversations personally with various weaned energy companies as we have worked to establish some MO is to get the data and really the data is being elected to channel Ashley here of the soft right, so it is all that data and more and so I think it is great that we are doing this. I would love to talk about how we could do it more systematically and working with Bo on how we change some of the policies in the legislation that is there because I think they are viewing the data very similarly to how the oil and gas use that sort of data, and I think there are very distinct differences between how oil and gas viewed that survey data that they acquired and how wind energy uses it, so I think there is a real opportunity, and it is beautiful data, and we are very excited to get our hands on it and we are making, we are trying to make every connection we can to gather that up and get it to the chart and have it contribute to 2030 and etc. so really thrilled about that.

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I think maybe we should think about how we schedule this, but I think we have a number of meetings that we can have beforehand to gather some of the presentations, to gather more information from the panel. I listened all the activity and that is your area.

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The third area that has been raised was on crude systems. I think we put that off from one of the previous meeting, and particularly with the article we keep hearing about, I think we should probably expand that back to Oak. That integrated across from land to the 40 meters in the shallow area. So that is probably another area I think we can panel and that is a matter. I think the three topics really are there for us to work on in the future going forward with visibility and navigation with energy, activity and [ Indiscernible ] that is more than enough for the technology group for that period. All of them are related unless anybody else has got any other comments?

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Any other follow-up comments?

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I think we definitely need to do something with wind. There are lots of moving parts with this whole thing. The data collection, the safety, the setbacks, the impacts to marine mammals, [ Indiscernible ] to mandate certain stations and data capabilities and feedback and there is an awful lot of things I think we are on the brink of an amazing industry that is going to be out there, that will impact, I would also say with all due respect, these are organizations with very deep pockets that are willing to spend a lot of money so that they are culturally acceptable, and so they get accepted into these various states and the amount of money that would be required to put in recruiting and data systems is not even a rounding error on some of these budgets, so I think the opportunity to step forward and make a long-term concept with how the offshore wind industry will work for the benefit of the blue economy as well as the environmental and climate change impacts. We are at the formative stage of these things, and I think it is an opportunity that should not be missed.

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I think that is a fantastic comment, and you know. Being at the front seat of this, I would say there is a lot of that activity already happening. At you will be presently supplies and it is also interesting to see what some of the roadblocks are for example installing a mid ocean buoy, the permit required to install that actually took about three years, and millions of dollars in fact to install the buoy, so there are ways we can certainly look to streamline some of these things so we get to the benefit more quickly.

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Absolutely. I am waist deep in wind, with the laying of cables and the encourage into areas and the fact that for maybe a couple thousand years, the deep draft shifts are the only things out there and we have to deal with causeways and setbacks from shipping lanes and dealing with all sorts of interference with search and rescue capabilities, radar interferences, so there is an awful lot and we want to make sure offshore wind is essential for the future of the U.S. and the planet and we owe it to ourselves to make sure we get it right early on, there will be a lot less money that has to be spent to fix it later on and so far I found that most of the major [ Indiscernible ] all sorts of people, and they are very receptive to doing things the right way and they are looking for some guidance and I think the trade back can be accelerated permitting and a lot of other things that could be of mutual benefit and HSRP could give a lot of valuable feedback to guide NOAA to flex their muscles because what is happening here could be a tremendous benefit to NOAA to feed data and solutions into their systems and to share data. I think there is some tremendous opportunity and the sooner we get started on the them of the better we will be able to identify, and we need to invite people like your organization and others into the tent as quickly as possible so we can get some stuff going with this.

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Can I also comment, I think we are on the brink right now, but I think other countries have been on this for a a while, and it would be great to get some of the lessons learned if you have access to that so we don't make a mistake. We can't accelerate and have those roadblocks. It would be great to get input. Thanks.

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If I just add from an observation standpoint, the amazing thing about the various wind energy installations is they are incredibly well designed, well installed observation platforms, so I know from NOAA's perspective, you know, you know, if you want to put a weight sensor on them, put a tight sensor on them, how do we tap into that, so I think you know, the things go both ways and certainly that is an issue that Rich and I talked about frequently is how do we get water level observations offshore to improve our models and to improve observation, I do you get currents and all that stuff, so to have a very rugged and robust offshore place that you can attach a sensor to and potentially get information to and from from the work that we do is incredibly valuable, so those partnerships are not just about getting the data. There are a long-term partnership implications as well, I think.

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I like what you just said because the transfer take it [ Indiscernible ] people are using it now for snow coverage during the snow, so [ Indiscernible ] that is always there. It is always there and fixed and there is a lot of data. I think you are right. We can do that from the windmill, definitely.

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There is tremendous nearshore application, all these transmission cables had to come through shallow water, the headset to make connections either through estuaries or where they feed into landlocked words, so there is a lot of back application as well. So as far as the bottoms, as far as stagings, the tremendous amount of in water applications that require accurate scouring patterns, all sorts of stuff that is out there and I think we have to find the best ways to make relationships with the people developing these systems so we can mutually make the best advantage of the data that is being procured as well as how it is distributed. There will be issues or private data etc. in the sooner we get started on this for the better we are. I am very much in favor of bringing some of the major offshore wind developers into talk either separately with HS RP to start developing some recommendations, but definitely to have them as part of an offshore wind panel for the next meeting. It is an emerging technology and it is very definitively impacting the way business is being done, the blue economy, energy, climate change, data, it ticks off almost every major item that HSRP is charged to deal with, so the sooner we deal with these people and get started with this the better off we will be.

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Thank you. I think we are getting clear direction.

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We even have some friends on that side. Now it is working with the Marine coordination. She is working with one of the major wind people, so there is even cross-pollination with people at this point, so we could get people that speak our language here pretty quickly.

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Okay. I think that was a summary of what we have done in the three areas. He wanted to make sure [ Indiscernible ] I think we should probably cut the discussion down.

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Thank you so much. Renin, we appreciate all of the comments on this, and I think Lindsay is right. Between the discussions of yesterday and today, I think we have some really good ideas for working groups, four panels for the next meeting. Of course we

went to make sure our three directors are on board with anything we actually present at the meeting. I think we have got lots of good ideas and so I look forward to developing those further. Sean --

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Could somebody talk to the GPS reflect symmetry session being proposed to the tech working group, either Gary or Rick or we could have Galen?

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Okay. Do any of you want to take that?

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I will take it. Yes. We are interested in a presentation on GPS. As you saw yesterday, especially along the coast, we feel like this technology could be used to help us function water levels. I think it is a technology we could utilize more in a presentation on that would be very beneficial.

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Julie. That is definitely technology working group with wind energy being a partial working group without planning engagements. Sometimes we have more general meetings about that, so that is a bit of a crossover. I think for a panel [ Indiscernible ] we should tell Gary about how we schedule that for a working group, Fisher. Thank you.

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Sounds good. Okay. Sean, I was going to ask you, thank you for offering to take the first draft here of our letter to the administrator. As the pillows, we sent a letter to the administrator. I think we have lots of good material, I think it will be hard to decide what we don't include because there was a lot of good ideas, but do you want to go ahead and talk a little bit about the process and what your ideas are?

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I would be happy to. I have taken a bunch of notes. I will say you can hear a lot by listening. I did a lot of listening and made a lot of notes. I think I will put a drafting. Lynn always helps with notes. This will be a collaborative effort. There was a lot of things mentioned in the aspect that may not have been mentioned, the Jones act component, lots of manufacturing for jobs, U.S. jobs, and also the energy workers manufacturing Louisiana. I was on a webinar this morning with the board association and there is a lot of focus on the Jones act. So I will start by accepting any comments, you know that have been made, but as the draft goes forward, I will take what you have. I know you have got some good notes, and Lynn's feedback and try to put things together because there was a great deal of information. Some similar points and different views to try to incorporate, but we have a lot before us.

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Right. Okay. Thanks. So much for offering to do that. That really helped. I think we can go into our round-robin. We are in the closing session here, and we have not really taken time to discuss the priorities matrix or issue papers. If you have a comment, like Nicole, I know you had some thoughts about the issue paper, why don't we go ahead and do that? And obviously, I think we need to update just thinking about some of the discussion right now where we talk about our working groups and panel, I think we need to update the priorities matrix of it with a couple items, but as we go through the round-robin, if you could think about the priorities, think about updates to issue papers you might want to do, or any other general comments on the last two days, or future

meetings, that would be great. Let's just try to do it all in one session. Is that okay with you? Do you have anything else before we do the Roundtable,

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That is excellent.

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Okay. So Gary Thompson, let's just start out with you.

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All right. I heard multiple times today a discussion about [ Indiscernible ] so we are dealing with different data sets, so I think that is an issue we can continue to keep our eye on and work with. It also sorts out the importance of [ Indiscernible ] the other areas, we have a subcommittee that is working on public-private partnerships, and I know that is a topic we have discussed here. I think if the rules allow, I think it would be good for the advisory committees to collaborate on that. Between the two we could have some beneficial outcomes as far as public private partnerships.

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Thank you for mentioning that. Lynn, do you want to just take a minute? Gary brought up the collaboration between two of these packets, which I think is a great idea, and I don't think there is anything permitting us from doing that, right?

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We have had other members speak to us as well. It has been excellent and we have had a joint session with the advisory board, which was excellent and we could possibly have a joint session I with them this fall. We have also suggested in this meeting people suggested we might have a joint session with the ocean exploration and research advisory Council.

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Right. So that is actually three different packets there. So we will follow up with you on that suggestion and figure out a time. Lynn, I think the request came from I used to have a joint session on modeling. Is that correct?

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To talk about -- yeah. I think --

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I think they would be interested in some of the same things you guys want to talk about in terms of meters, maybe also in how to approach [ Indiscernible ] things like that.

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That is another one we will have to think about how to address, and I really like these collaborations and particularly we don't want to be exclusive or redundant either, so I think it is nice to join forces on some of this. Captain Sal.

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Hello. Low visibility, I think we can include here, I think we can discuss how to use equity services, a tradition of culture. I think this fits very well into the discussion of low visibility because I think we need to include entities into this discussion. Regarding tools to improve low visibility.

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Okay.

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Is there anything else?

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I think it is very important that this argument is expanded to other entities. We really need to have everybody in agreement as a way to go forward and overcome this decision.

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Okay. Great idea, well noted. Thanks. I think page has gone already. Is that true? Are you here? I think he has left, so we will move on to Captain McIntyre.

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Nothing really to add at this point. I will pass it to Dave.

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Okay.

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I think it is incumbent upon us to do everything we can to provide recommendations to the administrator on things that should change, and we have not, we don't, we have been talking about a lot of issue papers, but we did not vote on any this week, so I am hoping that by the next meeting, we can have some issue papers developed that we can vote on. I know one of the things we talked a lot about yesterday was the shallow water 40 meters and shallower, and I see four technologies needing to be developed in order for us to be able to pull that off. Number one, we need to have water clarity climatology tools and NOAA has such a tool they are working on. That tells you where and when is the best time for the waters to be clearest for some of these technologies to work. So the water clarity climatology tool is one of those technologies. Second one is satellite drive bathymetry. We want to know when is a bladder clearest so that the satellite can penetrate through the water where it is the least murky, and that is the least expensive way of acquiring data. Then where satellite drive does not work, where will have a metric let our work, it is a function of how clear the waters are, but we do satellite drive bathymetry it lidar before we proceed with sonar work so we are we are not able to penetrate the water but lidar satellite drive, that is where we need the autonomous surface vessels that Larry was talking about yesterday, and some of them can come fairly close to shore, but some of them are maybe 10 meters off from shore, that sort of thing, so that technology is the fourth technology we need to work on. I am not sure what we have in the way of recommendations to the administrator, but I am hoping we can develop some issue papers on these and other topics so that can have some recommendations to go forward to with the new administrator. That is all I have

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That really have surfaced as an important topic, less than 40 meters, so I think we should give it some thought as a panel and see we don't have any issues in mind, so thanks for raising the topic and we will think about it and see if we can't maybe get something together.

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I am always looking for suggestions on anybody that has an issue paper, they are planning an engagement working group to promote those things and I welcome your suggestions.

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Great. Okay. Kennard,

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I don't know if it is an issue paper or special session in the next meeting or sometime in between, but by the time we meet next, we will be almost 2 years into this transition, and we will have seen how some of these charts have disappeared how are people trying to make the switch from one to the other, and I think it is important again to get the word out that this is going to be changing, it is changing, it is happening now, and people are not aware of it, they don't know how to use the tools, they don't know what the tools are, so one way or another, getting the word out about this transition so that particularly the newer mariners, and we have seen a lot of them in this last year, we have seen it here in San Diego. My friends tell me they can't find notes to sell because nobody wants to let go because they are all using them and the new boat dealers are very very busy. Those are new people who don't know what is available who are not familiar with the older system. A lot of them are going to jump directly into digital systems without any understanding of the underlying chart, how they are put together or what is being shown to them. Two groups, one is the maritime community understands what is in a piece of paper and then there is the new group that does not have a clue and they are used to looking at their maps and iPhones and they really need to understand what it is that they are going to be looking at, particularly with the levels of data layers that are proposed in this custom chart tool, and how are the POD vendors, if there are going to be any, how are they going to be able to meet the needs for something on paper? I think it is something we need to look at and we also need to look at the requirements, whoever for paper charts as a backup to systems of whatever scope, however many you have on your bridge because I'm sorry, but those systems can fail and they are being hacked and there needs to be some I don't know, an analog system where you look out the window and pick up your binoculars and you do some basic dead reckoning, but you put it on a piece of paper so that when the system does not talk to you nicely, you have a fallback position. I don't know whether this is an issue paper or whether this is a special session, but I think of something needs to be communicated to the mariners, all of them from the little guy who bought a 24 foot center console to the other new buyer who just bought a 65 foot motor yacht with long-range capability, he is going to go and drive it around the world using onboard plotters and you know, maybe he will learn how to read a chart we hope, but since everything else in the world is going digital, maybe he doesn't know paper charts exist. Along with that, I know a lot of these private companies, whether it is like Matt media, Garmin, all of those people are doing a lot of their own cartography. There are paper charts being done by a lot of private companies. We deal in those because in a lot of cases, the official charts are thin on good data or good information, I should say for small craft cruising and those sources of information should be integrated somehow into this new digital system, particularly in areas where we are not paying attention because it is not in our purview. There are lots of small craft cruising around in the Antilles and there are lots of large muscles cruising through and there have been some interesting incidents in those areas because it is dead water. I don't know how you pull all this together, but I think it is important to look at the integration of all this information, the explanation of how it is being used and by whom and then the education of existing users going forward and we will be two years into this program the next time to meet and I guarantee there will be people who will be coming to me and saying there are no more paper charts.

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Thanks. We will think about how to keep the HSRP informed on updates.

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Could I offer a comment real quick? Just to put a line out to the captain on this as a commercial mariner and pleasure boat enthusiast, I absolutely share your concerns on that, and I would volunteer my services to either we have some working groups that we can establish on that, or them sidebar work that we can do on that and then develop an agenda or on the coming special session or otherwise, so how about you and I agreed to get together at some point after this because I share your concern, and also we have done our best to communicate this, but it is clearly falling short, so how we close that gap, I am absolutely dedicated and interested in closing that. So let's talk off-line.

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We will definitely do that and I have notes from other sessions and off-line working groups as well, so definitely we will be talking.

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Thank you for those comments. Okay. Kelly?

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Yeah. I continue to be amazed by the flood of new data and products and the rate at which these things are being developed, I think it is important for us to find a way to make recommendations to NOAA that they need to become a lead agency as far as the coordination of some of this data production to create good standards and exchange capabilities. I think they also conserve as the convener for the coordinator to promote public-private partnerships, increase usage and exchange of data between federal agencies including DOD. I was kind of taken aback when I heard about all these things we are doing with all these charts, and when we ask are you meeting with the needy and the answer is no, you know, that should not be happening, and I think partnerships are important. We need to be more aggressive with that, and internally, I believe we also have to recommend that NOAA become more aggressive in seeking out and involving the various regional associations. They are a subset of NOAA, and I think I am the cochair of the mid-Atlantic Association, and I think there is tremendous opportunity to further embrace the working of the regional Association as far as these partnerships go. People are talking about bringing in public organizations and private money. That is what the regional associations do. They bring in academia, they bring in private enterprise and I think NOAA needs to be more aggressive in creating a wider network of partnerships of public-private as well as intergovernmental. I think that is important, and offshore wind, offshore wind. We need to get NOAA deeply involved, we need to harness the opportunities of offshore wind and the offshore wind brings in new jobs to help the economy. It brings in clean energy, it impacts our oceans, our coastal areas, it offers opportunities to produce and share data. This is a home run for what we should be doing and I think we have to get moved up with what needs to be done internally find out what the options are and then start getting a paper put together for recommendations, and the last thing I would say, we are coming up with a lot of good ideas, but we have to remember our role. The role is to give guidance to NOAA, not for us to get involved and start tilting too many problem-solving issues.

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Great. Okay. Yes. As far as partnerships, we did take about joining and that might be one place we can bring up that discussion to you. It is 5 o'clock is that a hard close or can we go another until we are done?

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We have a contract with the transcription.

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Thanks for clarifying. Sorry to cut you short, but we only have a few minutes left. These say anything you would like.

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I will keep it quick. Thank you.

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Okay, great, got it. Lindsay?

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Can I say briefly, I was impressed and I mentioned earlier about NOAA having a broader reach, and I think it is a benefit, but I have some concern, there was a real concentration on north of 40 again, that was important, but we know that is most difficult area, so then we have no Mac, which is separate and I worry where we spread thin and the funding gets spread in and I think we need to look at how we can support NOAA. There was discussion about the trust fund, but that gets rebuffed quickly. The other one was I think what Anna said, I agree totally the transition of technology is really difficult, but as I said earlier, I think we be careful about telling the mariners how they should be using it all the time and we need to realize the specification was written back in the 80s, and we need to make sure that we are always cognizant of why people are struggling with it and why they are having trouble transitioning, and including those discussions you plan a special session to be thinking about is there a way that they can change things within the configuration and feeding that back to update the specification. Thank you.

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Thank you. We want to get to the directors. So we are not doing well on time. Nicole, you are next.

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Okay. Just a couple quick comments and addition to the things I said this morning about resilience and comments in the directors memo. I like the idea of a teacher meeting topic on modeling. However, I think it is important for this group to recognize that within that short area, it is not just the summity that we lack and that we need higher resolution, we need the measurements that are missing with water levels. I work with communities here to do the same thing with water level sensors to bolster the measurements that exist at the federal level, so a joint meeting would be great. Of the regional associations are really coming on board to try to help with some of those measurements necessary to help with coaster resilience. Quickly the second item is Katrina Wiley talked about the source project, which I think I don't know enough about yet, but I think it will be great for us to learn more about and have future recommendations of applying that to other physical oceanographic measurements, like water levels where you are analyzing the quality of the data, how much it has aged and the symmetry is 10 years old and you have so many other options for data that can be brought in. Thank you.

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Great, thanks. Great comment. Okay. Sean?

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I will just say I really wanted to thank Ed for his services as chairman. I look forward to working with Julie and as I followed that up, I am going to say I will personally miss Shep Smith. I look forward to working with Admiral Brennan. Chef has been great to work with, and both have done a great job for us here at HSRP and NOAA across the board. Thank you.

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Great, thanks. I think a lot of us echo the comments. Qassam?

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Sorry.

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Thank you so much. A quick one, what Captain cell said about precision on navigation, I think the last meeting we had in September, one of the questions raised was that we are still worried about the borders and the chance is of incidents happening in a space. I believe there has been increased capability in U.S. UAVs as eight team actually running ahead of a ship and being eyes and ears and warnings of going ahead and that may be something worth exploring and looking at. There is more capability in that space, but that was one risk that was identified. I think a more detailed workshop could be great. Completely agree with offshore wind. It is coming it will be humongous. Climate change is here to stay. Completely agree on the public-private partnerships and the navigation charts and the reason I'm here is because we had a meeting in California. I am privileged to work with you and I hope this continues. Warm welcome to add more Brennan thank you.

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Thanks. Last one here.

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I know we said at the beginning that [ Indiscernible ] we talk about the data from the bottom of the ocean or the water. We need a national sender work so I am not sure we are ready, but I think we continue between now and September the, hopefully [ Indiscernible ] it just makes me proud to see the government working for you. It is great, definitely. I think when I look at the model, not only do we sign, but given the tools to the public, they have [ Indiscernible ] this modeling activity, maybe we are giving it to the public and Mike as Kelly mentioned, science and modeling, let's give them tools. Is simple could help. The basic tool given to the user needs to be there. One thing I want to add, it might be a crazy idea, but I think we need to sell HSRP to the public, and we are really selling Qassam. Am a big lever and publishing NPR and we need to think about NOAA staff on highlighting the issue paper or important topics. I would love to work with somebody on that. I am very active on publishing, but --

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I'm sorry sorry, but we are going way over. I am going to ask everyone to only do one minute. We are way over our time on our contract.

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I am done, thanks.

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We will follow up on those comments, definitely. Chef?

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Thank you. Thank you for everyone's kind words over the course of the last few days. I wanted to come back to something Ed said about sustainability. I think there are two ways we need to be looking at that within our area of responsibility here. One is how can we do what we do in a more sustainable way, and this is where unmanned systems came up, but how can our services be tuned to help the world, to help others do things in a more sustainable way, and this is where our service current models be able to optimize navigation efficiency, for instance are important. There is a lot more to this subject, but I think it is something that would be good to keep an eye on for the next few years and really to bundle some of our thinking under the banner of sustainability. With that, I will sign off and thank you all. It has been great working with you.

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Thank you so much. We will keep that sustainability in our minds here. Great. Okay, let's go on to Larry Mayer.

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It is nice going near the end because I agree with most everything everybody has said. We have seen this amazing transition to a digital world and thank you a lot to Admiral Smith and I am sure Brennan will carry on the tradition and push us even further, so that is wonderful, and I think one of the things we are facing that, subtly is how do we present this to the mariner in an easily understandable manner. Tremendous challenges. It is in peril we have an opposite problem as we answer a world of autonomy, had we present that information to autonomous people? I think we have the dichotomy of a challenge and I will stop there.

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Those are great ideas. Rich?

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Okay. Great meeting. It looks like there is lots of great stuff for the panel to work on coming up for future meetings. Low visibility, wind, technology, Larry Mayer talked about data visualization and artificial intelligence is in the mix of topics of how we may want to consider going forward. I will ask something else that we have not talked about, that is the priorities of the new administration for racial equality, underserved communities, diversity and inclusion, and we are working out a lot of those things internally. Particularly in that underserved communities piece, I am not sure we have a good handle on it and that is something [ Indiscernible ] a working group, I feel like we have a little bit of a blind but. At least I am talking for myself. We just have not been focused on that piece of the social fabric. I was just throwing that out there as an idea. Thanks.

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Thanks. I think we are going to be discussing that at one of our meetings and we will figure out what we can do.

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Thanks. I think it might be a good idea if we highlight some of the things we are doing within our program office related to diversity and inclusion and our hiring efforts, so maybe that is something we can talk about at a planning meeting for the next meeting. The other thing I wanted to give a shout out to all the modelers who presented this afternoon. I am glad you all are on the team. A lot of work was done. Thank you all for

working together and collaborating on the different efforts happening. Thank you very much. That is all.

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Thanks. I think yeah. We will think about planning an engagement meeting where we can address the pros and cons of what is going on.

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[ Indiscernible ]

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UR last. You get to say the closing comments here along with me.

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Great. In the interest of time, I think everybody has said everything I was thinking, so I am not going to consume any time since we are already at a deficit. I just have a couple more so. The next meeting will be September 1 and second, that will be virtual and it will be two afternoons a similar to this meeting and so we will be following a similar format. I personally hope we will be on in 2022 back to our in-person meeting because I miss seeing all of you in person. I would like to thank Julie Thomas for her leadership in stepping up, so thank you. It will be great to continue working with you at the leadership level here thank you to Julie today for sharing the session and giving us insight on the modeling resilience and climate change, so thank you, I thought that was an excellent session. The member, resonated with me today, and too many to address here since we are in a deficit of time, so I will turn it back to you. Thanks.

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If anybody wants to add additional comments, please email me and I will include them in the meeting record.

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Great. Thanks. I think we will take this time to thank Lynn and Virginia and jail and all of the multitude of NOAA people .

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Amanda especially.

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There are so many people that put this all together, and the interpreters. We really appreciate you, Michael, and your team and so thank you to those in the public that have made comments, and for your patience during this webinar meeting, and I hope to see you all at the next webinar, which we will have virtually also September 1 through the second. Those are not finalized dates, but we are working on them. So thank you and thank you to our directors who really get behind this meeting and put a lot of effort into it. So thank you very much and we will talk to you later. Goodbye.

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