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TRANSCRIPT:

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>> Sny

>> We'll be starting the meeting in about 3 minutes if you could take your seats, please.

Okay, can you hear me? Okay. Welcome to the hydrographic services review panel, Puerto Rico 2023. I'm Julie Thomas I'm the senior adviser. The information program and the southern California coastal observing system. , one of our trusted NOAA assistants has an announcement to make.

[off microphone]

>> Thank you Amber. It is a public meeting so it will be recorded. I would like to take a moment and introduce a few of the people in the room before we do the formal panel introduction. I would like to introduce admiral Nancy Hann. She is the director of the marine and operations and then we have Nicole LeBoeuf, if you want to raise your hand, who is the assistant administrator for the services. We have the U.S. Coast Guard captain Diaz. We have the army corp, Sharon Rodriguez Hernandez.

It is good to see Ben Evans and the designated federal officer. We will also be joined by director Juliana Blackwell. She will be remotely dialing in.

We also have Mary Anne Wesley. There you are, thank you for raising your hand. She is with the center for operational hydrographic products and services. We have also UNH co-directors captain Andy Armstrong and Larry Myer.

We have many of our HSR team members, staff, colleagues and other, state, local and federal agencies. So there are approximately 60 participants on the webinar and we have about 50 in the room here. I would like to give you all a warm welcome control. for those non-HSRP members please consider making a public comment. These will be used in our discussions and in our recommendations to the NOAA administrator. We look forward to hearing those public comments over the next 3 days.

I'd also like to give a warm welcome to a couple our new members, one is Mary Paige Abbott. Do you want to raise your hand? And Eric blierches who will be dialing in remotely. I want to congratulate Deanne and Nicole as they're terms are renewed. A big thank to capital exCrz who is a member of our HSRP from Puerto Rico.

I think Anne Macintrye will be dialing in remotely. This is a video from the U.S. Virgin Islands. Do we have the video, please?

>> Good day I'm Congresswoman Stacey Plaskett. I'm sorry I can't be with you in person the NOAA hydrographic advisory committee member. My interest in this topic is two fold. Our island communities are particularly vulnerable to the impacts of climate change as we encounter more severe weather patterns and the long term prospect of rising sea levels in ecosystem changes. NOAA's work to produce standard mapping protocol and ensure seamless data will be important to tracking sea level rise and water levels. I also look forward to the national ocean services update on sea bed 2023 as a dough fin tiff map of the ocean's floor. This will provide vital information for navigation, reducing pollution as well as climate change impact.

In addition, the maritime industry plays a key role in the Virgin Islands's economy and brings thousands of visitors and cruise ships, permits inter island transformation. It is around partnerships and collaboration. Private-private partnerships are effective as they incentivize economic growth and consider community impacts. In the 117 Congress I was pleased to see President Biden's inflation reduction act for grants to provide financial or technical assistance to coastal states and territories for the conservation, restoration and protection of coastal and marine habitats and fisheries.

This will enable preparation for extreme storms and other climate impacts. This one funding stream alone would allow us to achieve great process in building resilience, protecting our island communities, revitalizing our coastal economies and fighting climate change. For this to be realized in the U.S. territories there must be notice and equitable consideration for this immense new resource of funding.

In the 118 Congress we can make foundational investments in the maritime industry. Small ports a need technical and financial support. They are vulnerable to rising seas they are all vulnerable to the same threats impacting every coastline community in America. I look forward to a productive meeting. I encourage all Virgin Islands participants to contact my office to weigh in with your priorities. My staff and I would love to continue hearing from you about any issues and ideas you have. Thank you all and have a wonderful day.

>> Thank you very much for that. For the representative for that wonderful video that we just had. The HSRP is ingrained in coastal resilience and discusses the data backbone for navigation positioning that NOAA brings to its constituents during the next couple of days we look forward to hearing from NOS and admiral Evans, I am going turn it over to you now. Can you come up?

>> **Admiral Evans:** Thanks, Julie. I think you are the only one that is allowed to use this. Thank you, Julie. I'm glad to be here for my third HSRP meeting as the designated federal official for this panel and to be with you all in person again. Okay? For those in the room we are pausing to ir o on some recording and translation services. Stand by. Very good.

Again, thank you for being here. It's great to be back with the panel and our stakeholders. This certainly promises to be a very productive week. I got off to a great start yesterday with visits from local partners including the San Juan pilots and the shipping association just as we do in Hawaii last fall we heard directly from the stakeholders about the unique challenge edges and

vulnerabilities in the Caribbean and the value of NOAA navigation services. These groups and others will bring that perspective to the panel all week. I echo Julie's thanks to the delegate from her remarks to the panel. NOAA's navigation, observation and positioning services provide an essential foundational data and operational products and services which enable not only the marine transportation system but more broadly support development of traditional and emerging sectors of the blue economy concentration in marine resources and many other missions.

Nowhere is this more important than here in Puerto Rico and the islands of the U.S. Caribbean. I want to express my appreciation for members of senior leadership. Admiral Hann. You will hear more from them today.

A week in Puerto Rico may not sound bad but your time is valuable. Your recommendations have real impact which you will see as we get into the updates and panel discussions later today.

Julie mentioned some of the changes in membership on the panel since we last met. I want to personally acknowledge captain Kenner and Dave who rotated off the panel since the last meeting. Many panel members stay active in providing advice to know along after their formal service on the HSRP. I hope Dave and Anne will follow in that tradition.

I thank our returning members. Thank you for agreeing to serve for a second term. A special welcome to our new members Mary page Abbott and Eric Peace will join virtually.

We have an exciting agenda with 3 major technical sessions planned. First today we will be discussing partnerships and priorities and clannation for the U.S. Caribbean. Tomorrow the focus is stakeholder perspectives on maritime transportation and navigation. And then on Thursday we'll be focusing on coastal resilience planning in the U.S. car Caribbean using NOAA's data products and services.

We will engage in other discussions one of the favorite topics the standard ocean mapping protocol and perhaps also really starting to dive into discussion of sustainability and decarbonizatio tbl clouding our in-house and contract operations this is an area of growing interest and concern for the panel and for the government.

With that overview complete I will turn to more mundane house coping items. The HSRP is required by law to meet twice a year. While we can conduct business in a virtual environment, in person is more productive and collaborative.

The chair, co-chair and I intend to honor your time and promote this collaboration by running the meeting as efficiently as possible. The goal of the HSRP meetings is to discuss the NOAA operation and services including achievements and challenges. You will hear updates as it applies to the NOAA navigation products and services and coastal resilience. The HSRP, NOAA and the guest speakers will have dialogs on navigation, position, sea level rise and high tide flooding mapping protocol and more.

I look forward for the member's advice for the NOAA administrator. I consider all lins to go make public comments to enhance this dialogue.

Now the required reminder on ethics for HSRP members. When participating in HSRP public meetings, you serve as a NOAA special government employee as subject matter experts. Please remember you do not represent any group, industry, association or other entity clouding businesses you may ordinarily be affiliated with.

Please remember to take off your regular work hat and replace it with your NOAA hat as you provide guidance to know a and the administrator. Thank you again for your service for

strengthening the hydrographic positioning portfolio. NOAA and I appreciate your vision and assistance.

Some notes on public comments. Thank you to the participants who have provided public comments in advance to the stakeholders, staff and others joining the webinar. I encourage your comments and input. If you have a comment please type it under the question tab it will be put on the screen if time permits. All comments from the meeting that are on topic will be included in the official meeting minutes. When comments are received in advance it will be shared and highlighted at the meeting as well as become part of the the public record. I welcome and encourage comments from any groups or individuals during the public comment periods.

Lastly, regarding privacy as has been noted this session is being recorded, transcribed and posted to the NOAA website. They have provided their written permissions to do so your individual permission is required for your photo, video and voice on audio. The meeting webinar will be accessible to the public. You can abstain by refraining from speaking or dropping off the webinar. With that I will turn it back to Julie.

>> **Julie:** I think I'll just speak from here from the time being we are now going to go around and do our member introductions both for the HSRP members and the NOAA leadership. You will find that there are member and speaker bios in your advance materials and as we go through the members, please just announce your name, organization, job title and geographic location. We will do these in alphabetical order. Mary Paige we will start with you. Brand new member.
>> I'm Mary Paige Abbott the immediate past commender of the United States power card ans American's boating clufnlt my geographical region because we are a volunteer-based organization is my home base which is southwest Florida.

Julie: Thank you, Mary.

>> Good morning I'm believe scientist. I also team at Penn State and university of the Netherland I'm from orange county. I am located in the Netherlands around the DC area.

>> **Julie:** Thank you.

>> **Anush:** I'm the CEO. I'm also an adjunct professor at the university of Houston and based in Houston, Texas.

>> Deann, are you with us remotely.

>> **Deanne:** Yes, good morning. There she is. Can you hear us, Dean.

>> **Deanne:** Can you hear me?

>> **Julie:** We can hear you.

>> **Deanne:** Good morning I'm Deanne from the off shore men. I am based in New Hampshire. Nice to see you all.

>> **Julie:** Thanks for participating, Deanne. Tuba.

>> **Tuba:** My name is is Tuba. I am the interim dean of the college of earth, ocean and sciences at Oregon state university. I am in Oregon

>> **Julie:** Thanks much, Alex?

>> **Alex:** My name is captain Alex cruz I'm a harbor pilot for Puerto Ric ocxfing this is my location.

>> **Julie:** A big, billing thanks to Alex for arranging this meeting in the next 3 days. Shawn who is co-chair of the meeting at the opposite end of the table.

>> **Shawn:** Good morning, everybody. Shawn Duffy, big river co-lesson, Mississippi river navigation glierched. Vice qulaish, happy to be here. Thank you, captain, Cru disrks everybody. Good to see you. Good morning.

>> **Julie:** Thanks, Shawn. Dr. Nicole Alco o.

>> **Nicole:** Good morning everybody. I am the science direct of the American shore and breach association. I'm the executive director of the South Carolina beach add vo kits I am the president of Elco coastal consulting. I am based just outside of Charleston South Carolina on a little place called Foley beach. I am thrilled to be here. Thank you for everything to make this meeting happen.

>> **Julie:** Thanks, Nicole. Lindsay.

>> **Lindsay:** That slide is wrong. I'm actually a consultant. That is a polite way of saying semi retired. I'm based at this time of leer in Hawaii. In other times up in port Smith New Hampshire.

>> **Julie:** Great. Eric Peace is remote. Let's see if we have him.

>> **Eric:** I apologize I couldn't be here in person I had another obligation. I am vice chair of the lake car years that represents the U.S. fleet on the great lakes. Whriench secretary for the maritime task force which represents labor, ship yards, everything great lakes navigation system. So happy to be here and Cleveland, Ohio is my base.

>> **Julie:** Thank you, Eric. We look forward to having you in person at the next meeting. Ed.

>> **Ed:** I'm E dvment I'm based in San Diego, California. I'm mostly retired with a little bit of consulting work here and there. I'm happy to be here, thanks.

>> **Julie:** I think you are doing a lot of consulting work every time I see your name pop up. Okay, Gary.

>> **Gary:** Good morning, Gary Thompson I work for North Carolina emergency management I'm the deputy hazards mitigation chief and chief of the survey. I work in the Durham area.

>> **Julie:** Nathan.

>> **Nathan:** Based in Alaska. Enjoying the nice warm weather here.

>> **Julie:** I have to say neighboring an that's volunteered to help me co-chair the planning and engagement working group. So I really appreciate that. It would be great to have some help. All right. I would like to invite the non-voting members of the HSRP and NOAA leadership to do a brief. Is Anne on today? She is. I'm sorry. I thought Anne had a committed to. Okay, Anne it is all you.

>> **Anne:** Good morning everybody it is early here I'm off camera. Anne macintyre. Former maritime pilot on the river. Sorry I wasn't able to be here in person. I am juggling work commitments with the logistics of travel I was unable to attend. Glad I am able to attend virtually.

>> **Julie:** Thanks, Anne, we miss you. We can go to captain Andy Armstrong.

>> **Andy:** Good morning everybody I'm Andy Armstrong the NOAA co-director much the NOAA university of New Hampshire hydrographic center. I'm an employee of the NOAA survey. I am based in Durham, New Hampshire.

>> **Julie:** Thanks, Andy. Julianna.

>> **Juliana:** I'm the director of the NOAA's survey based out of Silver Spring, Maryland.

>> **Julie:** Thanks. NOAA staff. Chrisy.

>> **Chrisy:** I'm the analyst [off microphone.

>> **Julie:** Nicole.

>> **Nicole:** Good morning I'm assistant administrator of NOAA service also based in the DC.

>> **Julie:** Nicole has been at 3 of the meetings since I was chair. We always having Nicole here. We are so glad that you at least -- today will be your only day with us?

>> **Nicole:** That's correct.

>> **Julie:** If you have questions for Nicole, you have to get them in quickly. Larry.

>> **Larry:** Hi I'm Larry I'm the UNS director and coastal and mapping. This is my first time in Puerto Rico. I'm absolutely delighted. Thank you so much. Julie: Mariane.

>> I'm the acting center for oceanic certainty I have been following your work with great interest. Thank you.

>> **Julie:** Rich Edwing retired. We are so happy to have Marianne with us. We look forward to discussions with you. Thank thanks for coming. I'm going to turn it back over to you.

>> **Ben:** I do want to introduce some of the NOAA staff who is here at the meeting from NOS and NOAA we have a variety of staff that provide subject matter expertise and planning support for the HSRP and these meetings. About 20 of NOAA staff follow the work of the HSRP and can assist you with their expertise throughout the year. In the room today we have Lynn our alternate fed official.

Virginia, Amanda, Gayland, Nathan, Chrisy and Melanie. I would like to give a special recognition Our navigation manager for Florida and the Caribbean. Nick for standing and identifying yourself. Nick hates the spotlight I told him I was going put him on the spot this morning. Nick plays a critical role in the region as our stakeholder engagement specialist.

He has done a lost the work with Alex to put this meeting together. So I encourage you all to engage with Nick.

I want to thank captain Cruz my notes say assisting I should say leading the planning and partnership in this meeting. You will hear from Alex and Nick on Wednesday morning and Caracuz on Thursday morning.

In addition to those I have named we have additional experts you can call on from coast survey my deputy director leer I think participating in her first HSRP in her role as deputy director. The commander the chief of our hydrographic survey division. Ashley chapel is also in the room manager from IOCM and Lucy Hick. We are pleased to have from ocean exploration Rachel Medley. There is Rachel.

So thank you all for your engagement and support of our mission. I look forward to learning more with you with great meeting planned, I am looking forward to discussions. With that I will turn it to my boss, Nicole LeBoeuf from ocean services and coastal zone management. Certainly needs very little if any introduction to this group. You can find her full bio in the background materials.

She served as the system administrator since 2021 prior to that acting system administrator. She brings a broad background to this role a strong grasp of service.

>> **Nicole:** It is weird to be called anyone's boss. Thank you to Julie for opening the service. It's good to see everyone in person. Welcome to all of the HSRP members and thank you for your participation and engagement in the next 3 days.

A special welcome from me as well to all of the new and renewed members. I won't repeat everyone's names. Your participation in this panel is so important to us. So I appreciate all of your ongoing participation and work.

I am sorry that I missed everyone in Hawaii. Puerto Rico is not a bad location to have a meeting. I am really glad I am here. I am glad Paul Schultz was able to join you in Hawaii. He came back

energized after the discussions. I did say to Paul you have to get out more. He loved getting to know you all and your work.

Unfortunately as Julie alluded to, I have to be somewhere else again. This will be my only day with you. I leave tomorrow for Panama to be part of our ocean conference. The ocean is a busy place. I'm happy to be its advocate that means sometimes you have to split your time. I apologize for that. Puerto Rico is a wonderful place. It is wonderful to meet with partners and see how powerful the impacts of this work is to the local communities.

I want to thank our colleagues our partner and in particular a local organization for showing me around the extensive mangrove canal system just south of San Juan. I had no idea this natural resource was there. It is almost hidden. I had a chance to visit just right here near the hotel where a local community group is really remarkable. Those are local citizens who have gotten together. They are now so organized and enter gayed. They are it conducting beach projects to help coastal developments right there. They have established a no take zone off shore to protect the reef. All of this is working in relatively short order, there are communities around Puerto Rico that want to learn from their approaches and how they did it.

Right in this no take zone, lobsters are thriving the coral are healing. These folks are placing medicine on coral reef that has been affected by coral tissue loss disease. It is hand to the coral. It is remarkable. This is abdomen opportunity for me to see lieu these tangible successes are really standing up in the face of sea level rise and this really devastating sea coral rise.

Just a stone throw's away from this thriving urban area. In the coast everything is connected. I just wanted to call out their work. It was very special. I was really honored to be a part of that and to meet with agency leaders. We had Puerto leak owe's under secretarial Bert owe Mercado: Christina is with us here. Thank you so much for all of your work and for showing me some of what Puerto Rico has to offer. In terms of lessons and knowledge that we can take elsewhere it's labor intensive, but they are helping to really spread the word about how success can breed more success.

Being in Puerto Rico absolutely reminds me how specialized the needs are in islands and not all islands are the same of course. When we say we are going to delivery robust products and services we have to delivery what those people need whoever it is we are delivering them to. That includes tailoring what we have to make it usable and accessible.

I just learned that NOAA staff or NOS staff are working with the Puerto Rico to translate into Spanish the application guide for our inner agency technical report on sea level rice that was released last year. That kind thing is absolutely important. We were out on the water asking local fisherman what they knew about sea level rise. I wish they knew more. Getting that translated into Spanish will be another good success.

I also really value getting to go talk with partners at San Juan pay pilots. Your partnerships will keep us centered and focused on delivering what Puerto Rico needs. We start developing if we get off track you have to get tell us to get back on track. That's really what we delivery our mission is to do.

Across NOAA's mission we recognize also that put Puerto Rico has had a rough few years with hurricanes. We to assure you for the future. Help emergency managers make accurate and timely predictions.

We are thrilled I believe we have with us or will have with us this afternoon meteorologist in charge Ernesto Rodriguez. Shout out to the weather service today and for speaking this afternoon.

Within NOS I'm looking back on the hurricane years we have had, we have worked through many of our programs. I want to call out just a few that we are particularly proud of. The NOAA debris program has helped in response to Irma and Maria in 2017 with \$7.9 million in supplemental appropriations to remove 45 vessels and over 2 million pounds of marine debris from Puerto Rico and the U.S. Caribbean. I want to highlight the work they did post Irma and Puerto Rico. They traveled in from 500 miles south. This work was carried out as you all that live here now without support for infrastructure to help their operations given the devastating impacts. It was absolutely essential that we be here and do those over flights. Some of the same teams are conducting work as we speak in Puerto Rico to make sure we have prevent imagery for the island. That is also very important as you know going into hurricane season.

As many of you also know, the NOAA ship Thomas Jefferson spent 3 weeks in Puerto Rico surveying ports and surveying 13 areas, 18 sport facilities on the fly conducting emergency repairs to tide stations and weather stations and anything that needed to be done in the wake of those storms.

So this week among your other duties I would invite the panel to think about events like these as they affect Puerto Rico and the islands and share what might be unique requirements in those places as a part of our work we are also witness that those lessons can be learned and applied elsewhere or there may be lessons we have that can be applied here but they are different in their nature.

There's no time to reinvent the whole. We want to make sure that Puerto Rico's needs are being met.

I had a new update I didn't know I was going to talk about. I want to. It has to do with the national economic ocean watch. In the spring of 2024 we will be incorporating Puerto Rico information into ENOW. That consists of 6 ocean and coastal industry sectors. Recreation and tourism, living resources, marine transportation, marine construction, oil solve oil and gas and ship building to understand a community's reliance. It can be layered with coastal hazard data to identify areas that are at risk for development planning, for advocacy purposes so having Puerto Rico's specific incorporated will allow local stakeholders and agencies to see what is coming and tell their stories in dollars and cents about the benefits of their ocean and coastal -- of the ocean and coastal areas to their local economies. So that's where you have real rationale where people listen to understand what is at risk from change along the coast.

So we heard a lot of thanks of the HSRP staff and Alex and others who have helped make this meeting so successful and I want to make sure that I also recognize Amber butler for all of her work. I think she got skipped or maybe said twice. It doesn't matter. I will say it again. Thank you, Amber, for everything you have done to help us get going this week. Appreciate that it so much.

I want to thank the rear admiral Nancy Hann and the staff who helped get here or helped admiral Hann get here and came for this meeting. Having them here is a way to highlight that what you all do and the advice beneficial. I appreciate you are here and will give us an update on fleet recalculation. That will be exciting.

Also I want to thank the state, federal and local officials for joining us today. The federal family this wherewithal if not today will include the Coast Guard, army corp of engineers, FEMA, Department of Transportation and the U.S. geological survey. I appreciate everybody coming out and hearing from our panel members.

Finally to some NOS updates. You heard from Paul in Hawaii about the strategic plan. Everyone loves a good strategic plan. We are working on it. It's going to be out this spring. It will outline our goals, objectives and priorities that we want to accomplish across NOS not just within individual programs and offices. As an entire unit. That is very powerful. The objectives in that plan speak to that. We will carry out our foundational activities, of course. We want to really adapt ourselves and inowe great our work playing to strengths to meet the moment of this really dynamic time but also help the administration care out their priorities with climate, equity and economic development.

You will see opportunities for yourself in at least some if not all of the priorities. If you have any questions or provide input once you have a chance to see it. It's cross discipline air and cross boundaries in our organization. I'm convinced that's how we are going to have to address a lot of the dynamic and cross sectoral challenges.

I also wanted to touch on the historic investments available to us in the boy partisan law and reduction innation act. Everybody likes to hear updates about money. At NOAA we are also using the bipartisan infrastructure law or BIL funds to ensure our coast and climate are ready and our resources are resilient and that our climate data and products are meeting the needs of decision makers and getting no communities equitably. The BIL provides \$3 billion for NOAA to take action in the next 5 years of habitat and infrastructure among other thismghts thanks to the BIL NOAA will competitively award \$35 million per year over the next 5 years for coastal management programs supporting habitat restoration, conservation and activities like land acquisition. There's a lot of moving parts.

The inflation reduction act IRA also aims to help coastal community, conserve, restore and protect valuable coastal systems.

If all goes well and all goes as planned we will soon be announcing our intentions for IRA funding including a focus on coastal resilience and coastal communities. When I say soon, very soon, hopefully in a matter of days hopefully if my iPad doesn't freak out which it likes to do. I need new tech, y'all.

Fingers crossed that we will have approval to get that information out to people soon. So get the Google on repeat for that. For IRA we anticipate roughly \$2.6 billion going out the door for coastal resilience and \$100 million for climate data and services. That's a lot. With IRA we also are going to make historic investment and focuses on under served communities, tribal communities and folks whose voices have been left out of the conversation for to long. Many of them are on the front lines of climb aren't change. We are going to take a special emphasis on hearing from them.

Now, for me, I want to make sure every penny is well spent. A lot will be coming to NOS and partners and we have an impact in the short term. Also this is where I get a little provocative to you. Those dollars are not temporary. The paper that is signed now by Congress, thank you very much, says they are temporary and that they will sunset. I don't believe that that is in line with our reality and what we know about what we will be facing on the day that those dollars are time today sunset. I warrant to share with you 4 policy goals, 4 goals that I have in mind for myself and for NOS and really for anyone that will listen over the next few years when we talk about these large increases of funding.

The first one is somewhere in the 2 quleesh time frame blaiive I want members of Congress that fought for these dollars that thought about fighting for those dollars or maybe even didn't fight for those dollars to feel affirmed that coastal and community resilience and changes along

the coast is the right subject for those dollars. That they were correct, that Congress was correct to include this language and funding associated with coastal resilience in the BIL and IRA. That is the first goal.

The second -- well, how do we do this? This is an example. We do this through thanking Congress over and over again. Briefing them on the state of coastal change and the challenges in their district and we keep up that national narrative with them in a very positive way moving through with a diversity of voices, community groups, Governors, anyone who finds this important needs to say gosh, Congress thank you for putting yourselves out there. This is good. This topic is important.

Second, I want Congress to feel affirmed it was right to give these dollars to know a and to NOS and our partners. There's specific language to our topic and through our partnerships, they are areas where NOS put decades of work into building trust and those relationships with folks like you all. It is not an accident that these dollars came to us. I want Congress to go coastal resilience was right and NOAA was right. NOS was right.

Third, I want them to be aware of a more enlightened by an accurate demand signal. We have been masking this work for a very long time. If NOAA has a grant program that puts out \$40 million we have 2 times the need. I can tell you under BIL we are putting way larger funds for grant programs and the application need is through the believe. So that is data. Those are complete applications. That is data. I want Congress to know that. It is not that it is \$40 million for a \$20 million. It was so, 15 times these large dollar amounts.

So 4 I think I want Congress to be completely convinced within I don't know the 2 to 3 time frame I'm being very ambitious that there is no going back. The problems we will face and the challenges we willtblairches do not allow for sunseting of those levels of funding not for NOS. Not for our programs, not for our partners.

So it is not once in a generation for me. Maybe the opportunity in the next couple of years to achieve these policy goals is, but the dollars just can't be. I cannot convince myself that they are going to go away. So in the end, we want to qulirch in the next few years. We need Congress to be convinced we are just getting started. I view these dollars as historic not just BIA and NOL. They had historic appropriations as well. I don't want -- I don't have time to go into all of those things. What I do want to note for this group and my colleagues knows this all too well, our programs, our foundational programs were not funded evenly. This rising tide has not floated all boats. It has not floated some of the most important boats either. So that is a reial text it is a budget reality. There are winners and losers. That's fine. As we turn our attention towards the holistic needs we have to at NOS face the fact that we have foundational programs like many of those

represented here today that did not get dollars in the last few years. We can't just move money around. We can't just give and take as we want control. so we have to, NOS does and we already are, really examing the big gains, the big disparities. What we will node from you all are the stories to tell from your programs and programs and projects where these dollars not only benefited but where there are gaps. We would welcome your input on how we spoke to that as one voice and speak to Congress in a way that is thank very, very much. Because there are some really programs that did not get in the door with some of those big gains.

I do believe, again, it wasn't an accident that these dollars came to know a and NOS. The strength of our partnerships and decades of experience on the ground has really confirmed Congress's faith and belief in us. I believe Congress sees NOS as a trusted partner. And this

trust of itself is currency. It's not that I want to spend all of that right now. But I do think it's time to cash in a little bit of that and say, yes and to Congress in the next couple of quleerches. With that I want to really thank you in advance for your forward leading advice how our foundational data and tools can relate to those national challenges. Before I introduction our next speaker I want to give you an update on NOS of a second deputy navigator. We have received approval to hire a second Paul Schultz but not exactly. We're taking a leap of face and bifurcating the NOS mission into the conservation coastal resilience and science side and the Nav positioning side. Both will report to me and they will have to work together. That's the primary remit. I know you've been hearing about this for a couple years. These positions sometimes take a really long time to on board. I am hopeful crossing all of the fingers and toes in the next 2 or 3 months we will have some good news. We are moving forward. I'm feeling very good about that.

So with that, thank you for your time and your attention. I want to introduce our next speaker. I'm very, very pleased to be seated next to admiral Nancy Hann. She will share an update on float and aircraft recap itallization. As you heard before she is the direct of OMAO.

I'm really glad Julie is up here. You would think I didn't wear white for some r you would be looking at colorful I am. Julie we are in good shape. With that admiral Hann. Please the mic is yours.

>> > Admiral Hann: Is this on? I'm going to walk and talk to mix up how you are receiving information. I'm Nancy Hann. Nicole did a really good job introducing what we do. We provide the ship, on craft and officer services for NOAA and for the nation. I'm going to talk about those things. First I want to thank you for the opportunity to be here and talk with you today. I've had the opportunity to talk with the HSRP a couple of times in the previous few years as my tenure - - this is the first time as director. Thank you, I appreciate it. It is great to see familiar faces and so many of our partners from the Coast Guard and army corps and the local pilots industry that we work with.

In thinking about what I wanted to share with you today, I really want to emphasize the importance of the public-private partnership and how we are doing our part to serve that mission. In when the HSRP was established I'm not telling you anything you don't know, over 2 decades ago it was on the foundation what does the partnership look like to meet the nation's survey? What does it look like to meet the operations, workforce and technology and instrumentation meeting the nation's priorities. What started the HSRP that partnership is more important today than ever.

As Nicole alluded to the demands for our data and importance of that data has never been more heightened in my tenure of 30 years than I have seen today.

I will talk about how in our office we're providing the ship resources, the aircraft resources, it is an exciting place we are growing and the officer resources to meet the nation's survey needs. First we will talk with fleet recap itallization. This is a really exciting time to talk about what NOAA is doing to provide the ship and aircraft resources. In 2016 most of you are probably familiar we had a fleet recap it thallization plan that is our public-facing document that tells you what NOAA is going to do to meet our part of the nation's work towards survey and all of the requirements which survey is a big part of it.

On the fleet of the fleet ocean plan that is put together by inner agency group on facilities and infrastructure. NOAA wrote our plan to to know a requirements.

What is really, really exciting is the first time NOAA has ever designed and built a fleet specific to know a's needs. Of our current 15 ships, half of them were hand me downs. We were grateful at the time we had nothing else. The navy and Coast Guard used them for the design life 25 or 30 years. Would you like them? Thank you we have nothing else. They weren't designed for NOAA's needs.

What this new plan and funding line means is we are very specifically designed and building a fleet for the nation. I will speak about what that looks like so far.

so our start in 2016. We have established a contract team of 23 people. We have established a platform division all of the naval architects and engineers and everybody that designs and builds ship. We awarded our first contract for our oceanographic vessels. The first one is on schedule to be delivered in July of 2024. The second one is in January of 2025. Those are primarily monitoring vessels. They will have mapping, charting capabilities. So that is really exciting to see those new ships. They are coming together. You can actually see the parts of the haul. That is a really exciting step for NOAA.

On the heels of that we are working on the charting and surveying of vessels. All of you know the prices with inflation have taken a spite. Across the board we have seen a 25% increase in everything vessel. Vessel maintenance, vessel building all of it. Fortunately this year we were able to get the funding we need today make sure we were on track to award 2 of those charting and mapping vessels this year. That is closed. The technical evaluation is done. We are completing our wherewithal contract actions to complete those vessels. Our ships are 29 years old. 6 of those ships need to come off line by 2030. That is well past their design survey life of 25 years. These 2 ships I'm talking about the charting and surveying vessels will take over the missions which were built in the '60s. They are doing a great job they are obviously not the best asset we could put on the job

The new ships are giving us the opportunity to incorporate the best technology which we have developed in partnership with many of you. They will lean heavily on uncrewed systems. The ships are designed to accommodate new technology sensors on the haul whatever they are over the lifetime of the ships they will lean on technology now and into the future. I will talk about what we are doing to be ready for some of that technology.

They are designed to be better workplaces for our crew who spend a lot of their life at sea. Single state rooms, better habitability spaces, leading into better places for them to maintain their physical health. That is another opportunity we have.

We cannot go to birth people below the water line which we have to do. We will have bigger tanks so we won't have to come off mission to meet environmental regulations which are very important. We will be able to stay on station, collect the data, collect as much data as we can for the nation when we are out there doing those days at sea. I don't think next class of shipping that we are moving into are a new smaller fisheries vessel which will have mapping capabilities. What you will see in the next 10, 20 years is a whole new face to the NOAA fleet which is exciting to us. It is not something I was so sure I would see in my tenure. It is exciting for NOAA to do this towards our responsibility in the public-private partnership.

Nicole mentioned the Thomas Jefferson. We do a lot of work with these ships to do routine hydrographic data to provide the nation updated products for safe navigation as we see the maritime. More ships, bigger, faster ships. That is our job to stand forefront to do our part to support the nation and the world in that.

We also do emergency response. Nicole mentioned the Thomas Jefferson. 3 leaks we are stationed here doing emergency response. In partnership with the Coast Guard the captain of the ports will call on us. We will pre-position our vessels before storms come in right after so we can get those ports cleared, provide them important data so they can get the maritime commerce started and the backbone of our nation running as quickly and safely as possible. Moving on to aircraft, aircraft is very closely linked to the work we all do. Nicole mentioned doing the survey afterwards and now doing the routine survey. Last year we delivered a new aircraft that was the first new aircraft NOAA delivered in ten years. We are delivering a second one this summer. So we will have 3 king air aircraft online. They are highly capable a I remember craft dual instrumentation ports. They have long legs. we will get in there and collect that data. That data is processed near realtime. As soon as they hit the ground they process it and post it. we are also looking at ways to incorporate new communication technology, possibly the star link system so we can download that data from the aircraft to get it into people's hands, emergency managers businesses what you rely on more quickly. I don't think third thing will increase our ability to collect that routine data to inform all of the products beforehand, keeping up with the coastal changes, the growth at the coast all of the services we are putting out to provide that data ahead of time as well as emergency response.

So aircraft in general a lot of growth there too. The king air was the first new aircraft in ten years. We are also working on new high altitude aircraft. We support the grab D mission. You are all familiar with that. Our current high altitude jet we have one. It's about 70% reliability on its way down to 55% that's just a function of age. There is nothing you can do about it even with money.

We have a G550 jet in modification. That should be delivered before hurricane season 2025. Then that will also do missions off of hurricane. In the IRA there is money for another hurricane hunter aircraft. We are going to award a second G550 which will provide us the capability to get that data into the nation's hands. It's really excite being to move into those new aircraft you have new capabilities. You can put in wing hard points the new G550 will have 13. We went around the world I mean the world and look at the best capabilities that exist in this aircraft and we put them in ours. We worked with Germany and NASA. We took the best and said this is the aircraft we want. So we are bringing the most capable platforms to the nation to make sure we can support the best product service needs.

Our P3 hurricane hunters. We need to have replacements on line by FY30. We received \$327 million. That will start the C130 recap itallization. We need 4 of those aircraft to meet the nation's needs. We have 2 we need 4. A big part of that is making sure we can meet tasking when there is inception of stars far, far east. We flew the farthest storm east we have ever flown. That data improves the forecast as it comes to shore. Flooding is the biggest killer when it comes to storms. Having the assets to get ahead of it and provide that data and continually improve the track and intensity forecast by providing the data to the forecast is important. On the ship and aircraft front we have never been in a better position. It is due to our partnership with industry, the recognition of that data, our partnership with our other federal partners like the Coast Guard and the army corps of engineers.

Those on the west coast know it well. We have been flying it since 2019 working very closely with academia scrips. The data provided improves the forecast by 20%. Where is the water going to hit for emergency management decisions. When is the water going to hit when and how much for emergency management. In partnership with the army corps of engineers they

are able to shave 30,000 household's water for one year by managing one less vair this much water is coming at this time they can carefully manage those water reservoirs that is one example of what our collected partnerships in this room means for the tblairchtion. Uncrewed system. The NOAA unplaced system was placed in 2020 is when it started. This year alone that appropriation doubled it went up to \$21 million. Not a lot of money when you look at some other budgets it is a lot for NOAA. It is moving us in the right direction. What does that look like? The partnership with Andy has been invaluable. This year we tested the Thomas Jefferson. That was a highly successful test. We plan to operationallize that by calendar 2023. We are looking to see if we can combine another system and make that a permanent asset on the Thomas Jefferson. Improve our mapping capability up to 40% at sea. We are at sea. It costs a lot of money and it takes a lot of work to get to sea. How can we maximize every single hour we are at sea. Uncrewed system showed the capability of those systems to do that. We just did a test on one of our fishery vessels the dyson. That was a successful test they plan to do a test looking at fishery applications. We are looking at how we can by systems on line and apply them to a variety of data. As admiral Evans said collect data once apply multiple times. As we look at uncrewed system and aircraft how can we meet multiple needs with one set of data and leverage the resources we have.

The NOAA commission corps. We were capped at 321 officers for many, many, many years most of my tenure in the organization. A couple of years ago we received authorization from Congress to increase to 500. Not the appropriation but the authorization. That is the first time. We unfortunately had a bump in appropriations this year. We are on track to get a bump next year. So we are growing the officers we hope to be at 342 this year working our way up to 500. Those are really important to staff these new aircraft and staff the new ships and make sure we can fly and sail every single day. The demands for our data increased 100% in 3 years. We need the people civilian and the commissioned staff to make sure we can execute those important missions.

We do have challenges already the challenges you are familiar with. Staffing. The professional maritime industry right now has about 25% less people than we all need to do the job. Fortunately we have been able to work with Congress to get increased authorization and appropriations. So authorization we just had approval in the national defense authorization act to increase our shore leave which is amount of loaf that they earn when they are sailing. Rule making and funding after that. And delta pay which means they earn loaf at whatever rate they are work at not the whrairchght -- they will fleet up to a chief engineer. They are important for competitiveness with the industry.

We are able to put in place retention bonuses, recruitment bonuses, referral bonuses. So we are trying everything wreck to improve quality of life, to be more competitive with industry, to recruit and retain the very best people. I encourage any of you to refer people to us, talk to our recruiters. We will be happy to tell them about the opportunities we have. It's really important for us executing the resources that we have to have the best people.

We have also taken a really tough turn on conduct. So the conduct in our whrorchtion really started on our ships is pretty much a zero tolerance policy. Tolerance and respect is the base line for safety and productivity and retention in recruitment. We really don't take any nonsense when it comes to that. We have seen really positive changes in our workforce. A lot of people have said it is the best place in the maritime industry they have ever worked. We will never

relax on that but we will always be on the gas. We take that seriously and appreciate your partnership in doing that.

We have also seen staffing challenges on the aircraft side. There is a lot of commercial job that pay really well. You get a lot of time off. People love our might go and like what we do. We are trying to become more competitive with industry to make sure we can keep the best people the most experienced people. That is our pilots, our maintenance providers, our technicians, our engineers. Pretty much we have a one stop shop where you can bring an instrument in that a scientist build on their bench. We can do the engineering and flight testing and the sheet metal and we can fly it in a hurricane. We are proud of that one-stop shop cape bill.

I fortunately won't be here today. I have to go to other obligations. I will be here for questions. I don't know if it is permissible to allow questions.

>> Julie. E we are a little bit short on time. We should open it up to the panel questions for you or Nicole to it take a few minutes.

>> **Admiral Hann:** What we are doing with the ships and aircraft around reduced emissions and carb o on neutral float. In our ships we have hybrid systems. They are some of the best technology out there. That's really exciting to see. We are glock service life extension plans on our vocels. The first one will be going in this spring. Then IRA funding we have funding for our first 5 fishery survey vessels. We are leaning into the best technology. So probably tier 4 engineers to replace those propulsion systems.

How can we pull back half a knot and have fuel savings and give the chief engineers the authority to manage those operations. We are doing everything from operations how we run surveys to how we update our current systems and how we build the new shims.

On that note, too, we have also increased the bandwidth we have had about 200% so that we learned during COVID if we can move data to shore collect once apply multiple times. Instead of doing the same survey 2 or 3 times collect once, move the data off to multiple parties so they can apply it to different products and services which results in Leslie missions for the same type of data. With that I will defer for questions for either Nicole or I.

>> **Julie:** Qulaifn. We actually do have time. I know there are some questions from the panel. I want to say we are really sorry. I don't think you are going to be here admiral Hann when we discuss sustainability. Are you Nicole. You will be. We do have a session this afternoon. This whole question of carbon neutral and sustain ability. We have discussed it with admiral Evans. I would suggest we take a minute and catch admiral Hann with any questions we have and you too, Nicole.

I think you had your hand.

>> Thank you so much. Great presentation. Congratulations on that. I wanted to by up a few points and get your views on that. One, there was a national blue print released by the White House on the 10th of January which laid out waste specific requirements in reduction. They had a policy but they had a plan as well. How is NOAA planning to obtain that plan. The dates are 2013 rather than 2015. That's one.

Second, congratulations on the SASH side of it and implementation. I think that's amazing. We would like to have more transparently on the initiatives which are there s that it is transparent to the public.

The third one I thought would be measure to manage. Meaning greenhouse grass emissions world wide are getting reported. The EU started reporting in 2019. 2020 on wards. I believe

maybe for NOAA's transparency side of it to show where you stand today with the measurements the way they are today then that measurement map can go forward. If in those 3 areas you can comment I would be very grateful. Thank you so much for your update.

>> **Admiral Hann:** They are all good plans. I know what you are referring to. It is one the top quolls to be carbon neutral by 2050. We are looking at it holeisically. It can't just be the ships or aircraft it is how we can use those vehicles and the government vehicles. In the ships and the aircraft we are definitely looking as we build these new systems and operate them how we can reduce the emissions both towards the goal of 2030 an then looking at that longer term goal of 2050. By starting some of the individual ship plans now we get a better idea what we are doing, how we can improve it, what that possibility of improvement looks like over time.

The big challenge is funding. As we saw the 25% increase in ship funding and knew what we had wasn't enough to build ships. It's trying to factor in that additional tech follow glee. How much does it cost for us? Is it reliable? Is it serviceable working with SCRIPS that is the hydrogen. Ours are largely world wide. Many of our ships won't see their home port for a year. We are working across partners to figure out what is the supportability and how can we adapt to t to make sure we have the funds to support it and maintain it. The new ships what does that look like for the crew complement? A new complement is different than a crew complement for a 60 year old ship. We are definitely looking at all of that. I don't have a plan. Those are definitely factors. It is one the great opportunities of building the new ships and aircraft we can adapt the most modern technology which is harder sometimes impossible to do in those older assets.

We are really passionate. I said to you for recommendations how we are more transparent. I am happy to share anything we have. A great program within NOAA definitely liard, recently hired a new director of the program. We have a program manager within OMAO. We have diversity, equity an inclusion councils at the levels. We have them in our marine center and operations center to make sure we have a touch point for all of the employees we are so geographically diversified.

They went to training. So we sent them to training to make sure if they are going to be our leaders we need to make sure they understand the material and using the same language there is no discrepancy in terms or language. I'm going to send all of our managers to a USF program this year. So out of 1100 people, 260 are going to training this year as managers.

Again, it's really important. They have a response by.

We have people that want to be change agents. As a manager this is your job. I need to make sure they are all educated and tbcious. We built it into all of their performance plans. We are doing a lot around it. I am happy to share any of it in a way that you think is most productive. On the ships we have been asked to consult pretty widely. It is national science foundation, Coast Guard. We have done various panels where we have talked about our a approach. I am happy to share that with anybody. We ar really happy with our team the way they have embraced that.

>> Thank you so much. The reason I bring that up the SASH story broke in 2015 we put different band aids on regulations none of them were really effective. We have had challenges the last couple of years as well. I know your program has been very successful out of these. Maybe an annual whether or not on DI or SASH would say what are the good operations where successes have been achieved because they have been implemented. Because some of the

others haven't had that success. We know US FRAG is having that challenge in different receiving nervous the market.

>> **Admiral Hann:** I like to share what didn't work.

>> Learning to go forward.

>> **Admiral Hann:** I am passionate about this I will keep it short because I could go on and on. Our foundation is a respectful workplace. As a pilot controlled flight to train. If you only listen to the black box you don't know what happened. There is a chain of events that led you there. We took that approach in looking at respectful workplace. What scwhroafntion/tion did people let go. What treatment of new employees were let go. What isolation of people, what bullying. We took it all of the way back to that pre-flight minute rate how did things start. That has been really successful in gauging our team having adult conversations and having uncomfortable conversations and things that happened in our organization. Our team has bought no it. It is not from.

we still have work to do. It is better in some places than others. That has been successful for us. It is not a one-size-fits-all. I will figure out how we can share it.

The reporting too I will take that one black about reporting and how we can share that.

>> I would like to amplify that. Admiral Hann's program has been successful. I think you can feel her determination to hit this issue head on. When she speaks about the builds of the new ship with more comfortable living conditions and single state rooms, this isn't a luxury quleurches. This is to get at early indications of where people get bull Id particularly women at sea. So there's a lot of thought and really determination going into the future of the tbleeivet.

Admiral Hann has been absolutely intolerant of bad behavior. I just wanted to amplify that. We often stand shoulder to shoulder on these issues at know A even the language the way we are building our new ships is for mental health of the entire crew. It is also to really support folks who at sea have had a harder time. We do need to diversify that workforce.

I will also say that admiral Hann and her deputy admiral Carey have come to the committee on marine transportation systems are working there on the SASH issue there. It is a mental health issue. It is a workforce diversity is:it is not just a SASH issue. I just want to tie those things together. I am just so hardened by the hard whrorveg. There will be setbacks. It is not going to be Lynnal progress. We are happy to be as transparent as possible.

I'll pile on as well. I don't want to -- I have a little more to say about in this afternoon. One thing we are very focused on in coast survey when it comes to diversity, equity, inclusion and how that supports what I will call good behavior at sea and elsewhere, it really starts with our workforce develop American and recruiting, developing the potential workforce and selecting, on boarding and sustaining that.

With we have what I think are exciting initiatives that I will talk about a little bit more this afternoon to increase that. It is front and center in our new strategic plan which I will talk about this afternoon. I will have more to say on that. I just wanted to continue that because it really does cross -- there is an area where the fleet, NOS and coast survey are mutely supporting each other and have to be in lock step or the enterprise falls apart.

>> **Julie:** All right, those efforts are really good to hear about. I think there are a lot of people here that are interested in that. So thanks for those updates. We're going to move our break to about 10 more minutes or 15 more minutes so we have twhriench to take advantage for questions. I think, Ed, you had one.

>> **Ed:** Thanks a lot, Julie: Great stuff. Really great to hear the updates on this and where you guys are taking it, fully support it. One thing I wanted to add on the industry side about your upgrade of the communications capabilities for off loading the data and all of that, it became a health and safety violation if you lost internet connection so people can't communicate with their families and all of that. That was a big surprise just a few years ago. It is great to see you guys going in the same direction.

I wanted to comment on combining some of what you talked about with what Nicole was talking about. I think where you are going and what you are talking about feeds into what Nicole's effort is to get the word back to Congress that things are improving. In example I will whreurches American airlines improvements they made. I didn't look at it in detail. I never got those before.

I want to emphasize to you all how fast things are changing, how fast this whole communication feeding carbon improvements are the norm in everything we seem to be doing whether it is flying in airplanes or somebody weigh an EV or working in the industry. It is the one way to get blank to the taxpayer about the great things and the impact on the people they voted for and where Nicole wants to prove that these things are really helping.

>> **Admiral Hann:** Thank you for that. In COVID there are a couple good things that happen. NOAA became so critically important to one get the data back to shore. Not often sometimes the scientists couldn't sail with us and not at same complement. For morale, for our workforce, when they came to port we kept them on ships and bubbles to keep everybody sax that was really important to have that connectivity. It was a good forcing function to find a way to improve the bandwidth. We have continued to build on. Thank you for that.

You are right. It is a health and safety.

We use that for medical advice. We don't have medical officers on our ships. That's how we communicate back to medical advice it's critical.

>> > **Julie:** We have one comment from Eric who is online.

>> **Eric:** Great presentation, admiral, appreciate it. One comment first of all. I think using SASH I have heard this from our companies and crew members it is sexual assault and sexual harassment. Using the SASH minimizes it. The biggest issue you are going to face you have commented on this as well is your workforce. We're all struggling. So I don't know what your recruitment efforts are, I will tell you we have gone down to the level of maritime high schools. I'm a Coast Guard glierches. NOAA is even worse as far as what people know about you. So I'm just curious what your recruitment efforts are. Thank you.

>> **Admiral Hann:** Thank you for that. A couple of years ago we received delegated hiring authority from the department of commerce which means we can own the end to end life cycle. That was important. We can give job offers on the spot. We did that. In Mississippi in coordination with southern Mississippi hired 18 people on the spot. That Dell gleyings is really important for us. With that delegation we increased the HR from one person to now we are fully staffed at 11 people. Instead of centralized -- we started by centralizing that group in Silver Spring. The head of that division who has done it for decades that is not where the mariners. We hired people in the northeast, San Diego, on the gulf coast. We are positioned all over the U.S. focusing on the place where the maritime workforce is. They are going around and doing very targeted hiring events in each of those locations working with all of the local March a twhriench industries around schools. So thank

you for that. We definitely need to do more. We have increased our social media presence. That's where people large whirch are now. We have set up a contract and increase that had presence. We have updated our recruiting materials. We used to apply by E-mail you just sent an E-mail if you got a reply or not is another story. MSC had a great online portal. Everyone said it was user friendly. We have set up a hiring portal where you can go in and see the jobs and apply. We have tried to approach it on all fronts where where we recruit, how we recruit, staffing of the group making it easier for people to apply. We have updated our PD. There used to be one paragraph. Now they have all of the knowledge, skill and abilities. To really clearly describe the job to people. We've improved our twhraifng. So 2018 we had \$500,000 for 450mariners that included the travel to the training.

We had to 1, identify all of the training people need Ford their license and give them professional development training so this is a place they want today stay. This year it is \$3 million. We will chip away and giving people the skills they need for the job we are expecting them to do and give them developmental opportunities. That is paid dividends too.

We have tried to take as many actions as we can think of. We welcome feedback on actions we are missing. We need to start at the lower level. We are starting to engage.

One other thing we did we set up a shipping program. The now the students at the March a teen institutions to ksail with us. When the policy was approved we were off scheduling so we only had 7 people they had a really good experience. We are looking to really ramp this up for the following summer when they do their sea year requirements. We are trying to get at it from all fronts. I welcome any feedback that you or Eric or anyone has about what we can do.

We had a lot of work to do. We are headed in the right direction. We're not there. But we are headed in the right direction.

>> **Eric:** Thank you.

>> **Julie:** Thank you very much admiral. You and Lindsay. We have 5 or 6 more minutes in this session.

>>> Thank you Julie thank you both Nicole and admiral Hann for a great report definitely. I just want to suggest something that would help both of you managing the fleet or for Nicole I apologize if I got -- E-mail? I want to say just the concept of digital, this is a perfect thing. You can use it for Congress. Admiral Hann can use it for managing all of the fleet. The idea is when you have a holistic data management not produced 6 months ago in realtime people in command and control you can see on the screen the entire fleet and what is going on, what environment, who is what, what maintenance, for the E NOW that is perfect for connecting the coastal and realtime update. We are working on making the pan panel [inaudible] in September we will provide more detail about it. Perfect things convincing, efficient and definitely a look forward. Thank you development that's all I have.

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>> Thank you we will have a session on this.

>> **Lindsay:** I think we are very pleased to see the fair weather replacements move forward. I am pleased about that. I had a question about the talk of the uncrewed and how that's transitioning and improved the improved propulsion. Is there a strategy hows like in 10 years time or 15 years a transition from where we are now to a combination of uncrewed and whatever? One of the reasons I asked is I think we see in business in the common twhrifn in the ocean mapping and charting community a transition of even the way that's done from having a platform owned by a company to now data service and those sorts of things.

Related to that I'm not quite sure because I don't know how that is done at NOAA, how does the operations of the as well as as an example does admiral Evans control the operations to make them official or is that still OMAO? We have had the discussion you can have a 30-kilogram that maps. You are nearly near 124. That is an OMAO to get the right sonar. How it gets used by NOAA and others that can have a significant affect in sustain ability and cost. So we looked at that in the Pacific. It's like 3 times the cost and 3 times the twhriench you are out there which is the carbon footprint. That is one qulerch lieu that assessment of what you need and how you get a sustainable blaiption and who inputs into that.

The other question is regarding uncrewed, it's related to that strategy question. I see the trials and those sorts of things. I also don't see in 5 to 10 years time any of those uncrewed systems they are probably not around. I wonder whroirchg -- the technology but the goal of uncrewed should be get them off the ship. You don't want them supplementing you want them out in the uncrewed and out there and how do you plan that is the question. I have lots of other questions but that is a short summary.

>> > **Admiral Hann:** Those are good ones around the strategy of how we apply all of those tools, uncrewed systems are another tool to meet the requirements and collect the data. For the ships we have the tablet plan from 2016. One of the biggest drivers is the innovation of uncrewed systems. That dynamic evolution of you have ships, you have uncrewed systems that is a dynamic movement. That is one the big updates to it.

Also the federal plan and I am the co-chair of that. We are updating that. That is all of the federal partners that have fleet assets. We recognize the biggest driver to updating that plan is uncrewed systems. In the federal agencies we are all getting those questions. We need to make sure we are working together and sharing west practices. Both of those plan updates will address it.

Also we do the requirements collection for all of the new ships that is across NOAA. We go to partners too and learn about what is out there, what do you need, what does that look like. Adapting the platform so they can continue to take on the new technology is just probably more important than putting whooping is there now. What is there now will certainly not be there for the lifetime of the ship or 5 or 10 years.

The aircraft plan that was originally in 2019 that was updated. We updated it in 2022 with the same idea. What do the requirements look like and how are we going moste efficiently meet them? In both of those the experts said we will need ships and aircraft. Do we need to build new ships and aircraft? You absolutely do. The systems and technology will play a much different role than they do now.

To your point, uncrewed systems can operate independently. They don't need to be associated with the ship or aircraft. In other place it is the best play to launch them from while the ship does its work to maximize that day you are out there. That is part of the new crew complements will be people that manage those and main team them the increased bandwidth will allow us to manage as much from shore as we can so we are letting the ship do work that only the ship can do or aircraft to do work only the aircraft can do.

We will also be working I am sure in the future there will be an uncrewed systems plan as well. Part of that is built in. I'm sure there will be an independent plan for exactly the reasons you mentioned. Whrn -- to your point of technology changes so far. Our goal is not to buy everything. We want to leverage what industry and academia has and only buy the things we need to buy. We do a lot of work in our appropriation out of the \$21 million. \$7.5 million was

for services. Most of that will be data as a service. Buying data back or leasing platforms or working with academia or other government agency that's own those assets and paying to use those. I want to buy as little as possible. I only want to buy the things that makes complete fiscal sense for the time it will be usable. Then there is the maintenance and updating technology fee. So we're not looking to buy a lot of stuff. Most of the time we buy is small, small platform on the aircraft and marine side. At

the resources we have, they are much better applied to leveraging other technologies.

To your point about the instrumenttation, back in 2018 we had 16 ships. We had a deferred maintenance balance of \$35 million. That was the only maintenance that was in packages and had fallen off. We were able to increase the maintenance budget in '18 that has continued ever since. We reduce that had to \$2 million. We have completely transitioned the way we do maintenance. I can talk to you about that off line. The reason I bring it up we formulated a tenor maintenance plan we know by ship every year what those maintenance packages need to cliewvmentd dynamic as things break we will update those packages. What we have included is mission systems. First mechanical, corrosion sail the system without it breaking or the deck falling past with funding we have been able to move into mission systems. The part miles an hour is like we need this new sensor we can't calibrate it or update it. we have a sensor what do you need. Can we buy it as a fleet? Can we buy

it as a tbleebt we put the contract mechanism in place with try. The goal now is to keep them updated and replace the systems actively. And making sure we are on too much the best technology. With the new ships can we buy new technology we will use object new ship and use them on the current ship.

One is a dwhrierch compression system. We bought one from them. It will go on the new ship. I tell people I don't wait until the new ship. With new sensors and systems. We can get it on the existing ship and move it to a new ship. Let's do that. Our funding has allowed us to move into mission systems and do it a new practical way. there is an annual meeting where all of the programs and engineers and maintainers come together and say what is package? What does it need? So there's a lot more proactive work. Our partners like admiral Evans tells us what they need. We do the maintenance whreive don't tell them what sensors we need. That's what we could in terms of funding. There's a lot of positive change on that front. It is not perfect. Instead of working about broken parts that won't let us sail we are in mission systems. That's positive, that's what we should be doing. That's a lot. Does that at least at a high level answer your questions.

>> It does at the high level. My question was, w procurement it seems like the technology rush nodes to you take other approaches. Your pro cute meant strategy allows you to do that. You don't need changes in that.

I think that's important.

>> **Admiral Hann:** Another positive thing in 2018 I keep going to thattor that was a pivotal change we built in. We had one person in our large contract team in character OMAO. We have 23 people. They were all hand picked from ship and aircraft and uncrewed system backgrounds. So it has changed the whole change of our system and operations. That was a really important declaring to best a belying the resources we have and that's allowed us to move from this completely on our heels reactive stance to really leaning into it and getting ahead and working with all of you. What do you have? What works what is coming down the line? What can we afford? What makes sense to buy? What makes sense to lease? What makes

sense to share. We're not perfect brought we really tried to change our approach of how we look at it to make sure we meet our partner requirements.

>> Lindsay, admiral you will be during lunch.

>> **Admiral Hann:** I will be during breakfast.

>> **Julie:** We are glue for a break. One minute to comment.

admiral: I just wanted to amp belie admiral Hann's comments. One other example is multi year mission planning for the float which is a budget from the budget prospective. We never know what the appropriation is going to be. It allows us to make some investment in the voc he will so they are ready for a mission going forward. One good example of that was this year we again have Reneer head out to the Pacific. Having recognized that requirement for mapping work in American Samoa several years ago the pandemic helped us here it pushed back and allowed us to get more in front of that planning. We were able to upgrade the sonar from EM710 to EM304, not 12-kilohertz which is what you probably want. It was the best we could do. But because we had this multi year plan and several OMAO's new resources and new approach to understanding the mission requirements we were able to get that sonar installed, calibrated she is on her way now.

>> **Julie:** Thank you very much everybody. Let's give a big round of applause. Thank you Nicole, thank you admiral Hann. I just want to say if there is anything you can detail the HSRP please let us know to both of you. We like feedback too.

Thank you so much. Let's take a 10 minute break. The speakers for the partnership panels can come on up here and get installed.

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[break]

>> Please take your seats. We're going to be starting in about 2 minutes.

All right, let's get started. So we're really excited about this next session. We have those 3 wonderful people here. And Nicole and I are Nicole LeBoeuf and I are going to be chairing this it session. Nicole is outside right now she will be back in. Our very first speaker is -- this is on the partnerships priorities and collaborations within the US Caribbean. Our very first speaker will be cap Jose Diaz.

>> Jose. I'm Coast Guard we live by slides and presentations just like DOD does. This is my area of responsibility. Coast Guard is divided into districts and sectors what makes unique the district of San Juan. It is 1.3 million scwhrairch miles. Why so big of an area? It is mostly for the one mission of the 11 missions belief the one that I really take to heart is search and rescue. Safety of life at sea it blierch main priority.

Different from other sectors San Juan There are -- in the Coast Guard we have 2 centers San Juan and Guam. Unfortunately we don't have ICE in the eastern Caribbean.

Talking about partnerships for this mission we use the Amber system for senior search and rescue. We have the ships to help us. We work close with the Puerto Rico police department we have a maritime force n and assets across the island. With different agencies in the U.S. Virgin Islands to help us with the search-and-rescue mission. Anybody gram the interagency task tbrors? That is DOD. Their main mission is detection and monitoring of illegal traffic going to the United States. They deimliencted assets to target different illegal traffic coming from south America especially Columbia, Venezuela, southern American up to the main land as well.

When we have a search and rescue case I can able to take control of those assets and help us out, navy an international to help us with search and mission. The majority of search and

rescue happens within 25 miles of land. So when we have those cases that are off shore we have those partnerships with those agencies to work on that.

Being in a high drug trafficking area, which is a problem here that is very particular to this area. We also work with the federal agencies as well to help us out with that mission as well. Coast Guard, for the sectors we are preventers. We prevent things from happening. Then we respond when things happen. So which -- one of my hats is being the captain of the port for all of the ports in Puerto Rico and U.S. Virgin Islands. That includes safety and security of all of the facilities, the waterways and we work together with the pilot association. They are our eyes and ears they are always working in the harbor to tell us when the ACE navigation is not in place so we can respond and rectify those issues there.

We also have a migrant flow in Puerto Rico mostly from the eastern Caribbean and Dominican Republic. I am sure you have heard mass migration from Cuba and Haiti as well mostly to the Florida Straits. We have the influx of Haitian American migrants from the Dominican Republic to Puerto Rico. Our resources get sucked into drug and illegal activities. Sometimes we were not able to put attention to other missions like law enforcement and all of that.

In Puerto Rico compared with the mid Atlantic the eastern United States we don't have a large fishing fleet. Here it is more smaller scale commercial fishing. You know that working? I apologize I'm not technology savvy.

So this is my chain of command. I work directly for a 2 star admiral in Miami. So that helps me out with the regulation function as captain of a port to regulate industry without influence on the local government.

For surface resources, I heard admiral Hann challenge us on the float and aviation. I relate to that. Having an aging fleet fortunately we were able to replace our class cutters that were 110 long with the fast response 154-foot long, larger crew. The main thing about this cutter is the ability to command and control. Let's say I have an incident 200 miles off shore north of San Juan for example if a commercial airline goes down I would be able to send those cutters up there. They would be able to stay 7 to 10 days without having to refuel and return to port. Having those communications on scene it enhances the ability to respond off shore and assess in case of an international request.

We have one station. Both stations if you compare -- to give you a little sample, Florida Straits from the Key West to Miami you have 4 stations. Over here we have one station to respond to 30,000 square miles of AOR for that station. As part of the station we have DOD both attached at St. Thomas. We have 14 personnel. They man 2 of the vessels which is a 33 you see on the lower right corner. In Saint Croix is red is part of the reduction. We all have budgets. The Coast Guard decided to discontinue station Saint Croix. We are working to St. Thomas. We will have personnel in the W4R5*E6B on the top left corner in a 26-footer which is the mission is mainly to maintain our ACE navigation systems in San Juan around all of the ports in the islands.

366. That doesn't count the air station. Different command, different command. The only difference is they fly different missions. They have to go to the district to get air resources. I have the tactical control of the assets. They recently placed the orange helicopter you see on Bay Watch. The 60 that's the dual capacity the 65. Basically double the endurance. Also the amount of people it can hoist on board. One example you can see the left corner on the west side. If I have a case on the Virgin Islands before with the 65 the helicopter had to go there, do

the mission or refuel or refuel and refueling on the way back depending how far off shore. With the 60 you have to refuel once. So it gives less fatigue for the crew and able to respond further off shore as well.

The 144 that is the fixed wing aircraft that is very newer capacity that we have in the coast capacity. That is newer. With the cutters and even talking directly to the small part of the far seas when they are executing a mission. The FRC cutters are 144 cutters they carry a mark 4 small boat that goes out. It is capable of 40 plus knots and a crew on board that is able to execute use of force from the aircraft in case we have a non-compliance vehicle. They are able to talk directly with the aircraft when we have a target.

So partners twhreebs are some of the partners we have in the AR. We have the federal. That is the top the one we block for a drugs.

I want to be respectful of time and see if there are any questions.

>> > **Julie:** We will go to Sharon Rodriguez. You are out of Jacksonville?

>> **Sharon:** I recently moved to Puerto Rico 2 months ago.

>> Julie. Welcome then.

>> **Sharon:** Good morning I'm whriench representing the general. We are delighted to have the opportunity to be present to hear about the dynamics of the panel and share the products we whrierch work to support each other.

The United States army corps of edge tbleerches values the partnership with NOAA. It is of vital importance to the economy. Forums like this one to discuss marine navigation observations and positioning services in the Caribbean region are a reflection of our commitment and continue collaboration as we work on innovating products and services to better serve the public and the nation.

The U.S. army corpse of engineers Jack sobville district in particular is responsible for the State of Florida, Puerto Rico and the U.S. Virgin Islands. We maintain the federal water ways in these locations and these areas are critical for the United States economy and the economy of the Caribbean.

We have the United States corpse of engineers is responsible for the maintenance of 19 dope harbors in Florida. 4 in Puerto Rico and one in the U.S. Virgin Islands. The one in particular here in San Juan harbor it is of so much important here in Puerto Rico there is movement of over so million tons and goodsorly. That definitely when you compare to the various harbors in Florida it is significant.

The San Juan harbor is one of the too much 5 harbors for the south Atlantic division. I take pride when I stand here today to mention these numbers but I'm a native of Puerto Rico. Being able to see the importance of what we do, the corps of engineers is pride.

4 federal harbors in Puerto Rico. These are in San Juan, there is additional ten known federal harbors. Under the coastal waste management system we protect our coastal from erosion, we currently have 2 projects in Puerto Rico. We have the Puerto whrierchg owe coastal. It is under study. We have the San Juan on the planning engineering and design. As you may have heard the job was recently included on the water resources development act 2022 for a study depending on the outcome of that study, it can potentially become a harbor maintained under the federal government.

They are working other projects in the U.S. Virgin Islands. In addition we have a yearly budget in Jacksonville district just in Jacksonville district that covers Puerto Rico and the U.S. \$6 million just for survey. We do hydro and land area vehicles. We do over 400 surveys a year we provide

military support to the navy, Coast Guard and the marine corps. We have 3 major areas on which we focus our whrorchg. We do hydrographic surveys, maintenance drudging and new construction drudging.

On the area of the hydrographic surveys the United States corps of engineers maintains the federal channels. We have 9 hydrographic vessels with one of those located in Puerto Rico. We build a new shed. The team is very proud that. It keeps the life expectancy of our vessel robust for a longer term. We have the capability of bringing mobile units as needed. The data is compiled and placed in a central electronic location called the E hydro which is available to the public for their use.

Additionally the U.S. army corps of engineers per forms surveys on the harbors those are performed at a frequency of at least once a year. On the shallow channels these surveys are performed at various intervals depending on the federal channel. The result of this survey is used to determine the maintenance require men and frequency of these. On the area of maintenance drudging they have the authority to maintain the channels funding project surveys dictate the federal channels that will be maintained on a given year. Before drudging surveys are performed prior to a maintenance event. After dredge surveys it is loaded in hydro. On the area of new construction dredge first degree where interstater action occurs. This interaction takes place when new federal channels are improved and ducted and they update their channels framework.

The data provides to know a on this newlyconstructed channel clouds new project limits, new channel alignments and new depths information.

NOAA products are critical for the mission. We use these products for navigation. We use the electronic charts, data, and weather situation and boilers I don't know if I pronounced that correctly. Our survey vessels use digital chart for general and a half quags from electronic navigation charts.

Our surveyors use the tide prediction from the tidal station for planning purposes, for routine surveys. We use the vertical conversion for NAVL setting water level calibrations.

The title bench guards to preserve the record of historic tide readings are used to calibrate the tidal data which aids in realtime water determination and field data collection via the GPS. The weather stations and wind speeds with high temperature and other realtime meteorological situation.

The national weather services during hurricane events is included on our daily command up brief. This is the most current information presented to the United States corps of engineers leadership. We use to Blake critical decisions and provide emergency response.

The over flight information is also a very good information. The national hurricane center provides storm predictions and forecasts for scheduling pre-and post storm survey which support federal highway. In closing, we are very pleased with the products and information that NOAA produces. NOAA nautical charts uses the hydrographic survey data to update their charts. We need NOAA a to continue their work in updating and continue innovating their web-based products and functionality. We rely NOAA during. During current and emergency technologies and recurring water reial advertise.

The key to success is the true and continuous partnership and collaboration that exists NOAA and the United States corps of engineers as we build resilient coastal products, protect natural resources and support economy with efficiencies on our hashors. Thank you.

>> **Julie:** Thank you, Sharon. Very nice. Let's move on to Alberto Mercado.

>>> Christina. I'm Christine the acting director. Basically the under secretary could not be here today so I'll be helping him.

>> **Julie:** Got it.

>> > **Christine:** Good morning, everyone. I would like to thank you for being here and selecting Puerto Rico, San Juan as the site of this meeting. On behalf of the secretary and under secretary, we are very happy to have our partnership with NOAA and also with Cruz who are present as well. So my remarks. The mission of the Puerto management program is to guide public and private development which extends 10E .35 miles of shore as well as submerged lands and the March twelfth.

The following inputs are the result of our discussion with public and private sectors, scientists, port and marine operators regulators and the community of practitioners. Our input are based on the following. Puerto Rico and most low lying coastal areas are facing the affecting and consequences of sea level rises. Coastal floods and erosion. To that affect the Puerto Rico management program as well as planners, managers, regulators and the coastal ocean community of practitioners would greatly benefit from increased data and information about processes, littoral land long shore currents.

40% of over 1200 of Puerto Rico beaches experience beach erosion. In many cases it exposes coastal communities to major flood risks which may occur with concurrently with downpours, tropical storms and hurricanes.

The cumulative impact of storm surges with hurricanes has been -- the cause of major disasters in Puerto Rico. Such was the case with hurricanes Irma and Maria where over 3000 people died and services and infrastructure collapsed. In fact Puerto Rico is still recovering from such impacts. During the next 2 days Puerto Rico and scientists and practitioners will provide additional details about the excellent work being conducted in our region to address these needs. In summary, two major asks to the review panel are, 1, increase data collection and inform communities about coastal long term currents. 2, the type stations to provide improved knowledge about water levels in Puerto Rico. Thank you.

>> **Julie:** Thank you very much. Those are great asks by the way. We have Marianne who might chime in. Nicole, do you want to follow up with the comments?

>> **Nicole:** Thank you, Julie. I am really impressed about my early comment about the early changes and knees of islands in Puerto Rico have born out in our inner agency conversation I can see how doing work here in the islands is very challenging and it has the geography on its head. The land to water geography so much here relies on trans sitting the water.

Then something I wanted to float is to Christina you are not alone in needing localized information for planning. I was just at the marine exchange of southern California talking to the ports of LA and Long Beach. I said if there is one thing -- not really one thing but if there is one thing you need from us. They said more highly localized projections of sea level rise of heavy precipitation land that kind of thing. They have the best data they can find. They are not sure it is good enough to model years out for their planning purposes that's a thread that I wanted to pull there. Thank you all for being here.

>> **Julie:** Thank you, Nicole. Mary Anne, I will put you on the spot. Do you want to comment on the tide gauges and plans? Mary Anne is with Coops who runs the tides and currents program for NOAA.

>> **Mary Anne:** We have 6 gauges in Puerto Rico. Those are part of the national water level observation network. Those gauges are built and designed to give us the long term sea level

records they are built to last 30 years. We had 3 of those destroyed in hurricane Irma and Maria.

We worked with local engineers they were hardened and made more resilient to future hurricanes in the future. We are very proud of that mission.

We serve both marine transportation and coastal resilience an area we have been swleng is putting out projections of high tide flooding and predictions of high tide flooding at a higher spacious resolution and Temporal resolution. We are operationallizing a forecasting package which we can give you which days you can anticipate high twhriend flooding. The other thing we have been working on we think we build nice expertise that is not our expertise. When we put out a web-based product we are making the information available so that someone with coding skills can pull the data and build something for their own purposes. Those are cases. We are very interested -- to understand what is happening between your measurements. Those are the places we are moving forward. We collaborate closely with the Puerto Rican seismic network. There are network that are designed to warn people of tsunami. Concerned about the list that can Puerto Rico faces. We have a lot of expertise in tsunami warning we do that in collaboration and people at the university of Puerto Rico. Very happy to be here.

>> **Julie:** Thank you. All right. I think I will open it up to the floor. HSRP members. Do you have any specific comments? We have nick quloabl near shore processes people, the 2 of you have something you would like to say.

>> Nick coast. You read my mind. I didn't have to lift my hand. As Julie mentioned I am a new shore oceanographer and engineer I appreciate hearing what you all think as the unique features. Their unique waves, beachy whroks, beaches are important to your economy. We talked about flooding. I have worked in many parts of the world and U.S. not the Caribbean. Elsewhere in the U.S. I have found that communities sometimes are frustrated bring various maps that they can find on line relating to flooding tell me FEMA will put out maps. The U.S. army corps of engineers and sometimes they don't agree. They don't a glee from a scientific perspective. FEMA does not take sea level whrierches into account. It is all about the blank and time lines associated with the missions of those agencies.

But that's difficult to explain to the person who is trying to figure out or the community that's trying to figure out where to put their next water treatment facility. Is that a concern that comes up in Puerto Rico? Is your interaction such that you feel like you have those differences accounted for pretty well?

>> I would like to talk to the point you make about the maps for coastal flooding for FEMA. We did a study where oceanographel who I think he used X speech. I'm not sure if you are familiar with that software. He applied that software to Puerto Rico. He had some findings that we feel the planning board should incorporate in the use of the maps for zoning. We've sent a letter to the planning board and they are considering it. We have met also with the GIS director of the planning board here in Puerto Rico. We hope that we can reach an agreement. They reached out to FEMA. So I think there will be a conversation going on with FEMA for swlrchg maps that relate to the particular circumstances of Puerto Rico.

In terms of communities, you were vague that you were worried that they are not -- if you could talk to that again basically because I'm not sure if I understood the question relating to communities.

>> Elsewhere sometimes when communities reach out to try to figure out what are the flooding maps? We want to take that n into account. When they see 4 different maps they say we can't

use any of this. I don't know which one is right. Decision making. It's because we lack the framework that can help people understand what the differences are and for what situation which map would be more appropriate.

>> I would say we are very fortunate in Puerto Rico. Maybe we don't have that much oceanographers. The ones we have are very committed. They really give the extra mile to help communities. You will have the doctor also presenting. He is great helping with the communities and really looking at the science and making sure that everything is the best possible data available. So I think that communities have that mentorship here that's been really important to navigate because it's really hard if you are an oceanographer. I use their expertise.

>> He will be coming on Thursday to talk. Nicole has something and then maybe Sharon.

>> **Nicole:** I just wanted to resonate with your comment about how if you're in the science community or if you are deeply engaged in these data set you know why FEMA's maps look a certain way and they all look great but they all look different.

There is an interagency effort going on led in part by our coastal resiliency senior adviser Mark Olser who is friends with this work he is working with other agencies U.S. army corps and NASA that bring very strong capabilities to understanding and being able to project innovation. They are all very different capabilities. Belief played a very strong commitment to one another to develop a single place, a single location. I don't know if it is a dash board or platform. It is challenging even if they all get it in one place where they think it looks good, that still doesn't mean that it is truly accessible information. So the folks, many of the agencies involved with the inner agency report on sea level rise are committed to doing this. It is the early days I know they are already work harder and in more ambitious ways than I could even imagine because they recognize it is not okay even if we all know why the differences are there, it is not okay for the general public and for practitioners.

>> I'm thrilled to hear that. If there is anything I can do to fuel that effort, it would really be a big step.

>> **Julie:** Let me just go to Sharon. Did you have any comment to put in there and follow up? No? Okay. I know you have a imlefnt.

>> **Audience Member:** [off microphone] so it's for awareness. For communities NOAA coastal map where Puerto Rico is included and it has high tide as she mentioned, storm surge even including the FEMA fresh water maps. I know FEMA is working on updating their new flood maps in Puerto Rico. We participated in the workshop last whrierchg about this. It's called coastal flood exposure mapper. If you could Google it.

>> **Julie:** If you introduce yourself.

>> From the NOAA national weather service. Sphwhroofn Julie: Nice meeting you.

>> Enesta, all of the maps and everything he was able to a sinus from the Coast Guard. Every brief we did, every brief with forecast what the storm was going to do and where the hurricane was going hit. Thank you.

>> **Julie:** That's part of what we see in the island communities is a lot of partnerships and working together. Does the panel have tblifn other -- nick coast

>> **Nicole:** Good morning. Nicole Elcow. I'm with the American beach and shore presentation. Thank you all very much for being here and for that high level perspective on the agency's collaboration whriench. I just want to reiterate something Nicole said in her excellent opening remarks. Thank you so much for those, Nicole. The need to just keep reiterating this message

over and over again. The first time I came to Puerto Rico was in 2015 when Enesto invited me to a meeting on climate change. There weren't a lot -- this message wasn't very clear then. It's only reason been in my observations in the last 5 to so years that Puerto Rico has come onto the map of the federal agencies. At meeting the communities really petitioned the army corps of those projects those coastal storm damage projects that you mentioned here. I'm twhrabled we are here and we have this opportunity to go black, go to Congress, reiterate the message, keep this in the forefront. Let's add your needs to our list of items for our memo that we produce here at the outcome of this meeting.

I guess my question or comment would be at AS blrks PA we are he embracing a theme of coastal settlement. The importance of settlement in coastal resill ambulance we don't get abdomen opportunity to talk sediment. The currents that move it. That partnership with the corps is critical.

Tblierchgly, another really fantastic thing that is going on through those collaborations is the corps's new mission to use dredge material 70% from 2030. A new directive came down on that.

That is another area we can begin to explore with this panel as we think about coastal resilience into the future is utilizing that resource tborch everything that's needed to do to improve the resilience of the community. Thank you so much.

>> I would like to comment to that, we unveiled a 309 assessment and strategy to have a coastal resilience program here in Puerto Rico. We whriench to be able to whrierchg a landscape architect. We feel that skill set is missing in our whrafntion to help us fiscallize those coastal resilience blonches. I'm looking forward to that.

>> **Julie:** Great. Nicole, do you have any final comments for this panel?

>> **Nicole:** Given what the panel has heard from our partners, thinking about what we might do to make sure that these voices are carried for whrarched in our deliberations, there's a lot of ways that we can mess whrainch to Congress and others. But I think really making sure that we are not in some ways the only ones that came to Puerto Rico, but the things we hear to be important and the common elements we hear between our partners can get out and leave the intlais and transcend the space and go to larger arenas. I am thinking along the lines to do the same.

>> **Julie:** Yes, we have some good people helping twaik floats whrarched I know they are doing a good job with other people. Amber? Oh, yeah. I wasn't sure what I was being twrold here. We give a big hand to our panel.

[applause]

>> Right now we will take a little bit of a transition as they go back to their seats and Murray will come up to the stwhraij please. Thank you very much. I am going to take a minute to interest Druce Rory making his way up to the stage. Rory is from the U.S. Virgin Islands. I believe he was one the founding fathers. When ughs a direct it was such a pleasure working whether Roy and Julio and some of the people that you will hear more from on Thursday. We have asked Ror, he has a long history in this area. We have background of the evolution with observance systems and models and weather and the whole sha dale bang. Sphwhroofn good morning everyone else. Panel members for those of you that have not been to the U.S. Caribbean before, welcome. We hope you will enjoy your stay. My good friend and former whreender in national federation for ocean observing, welcome back.

I'm Rory, I wanted to -- Julie gave me instructions that were difficult to follow. It sounded like not be too technical. But also I think she wanted me to give more of a historical, like what will flavor and so I Emma tempting to do so. I will return near the end to specific questions and trying to address those.

So the image is of the north coast of saint Croix. You will see a believe buoy, a wave rider that thread it installed in saint Croix. In this I am I take it if you look in the lower right hand that is saint Croix. It has a lot of historical significance in that this is the tblircht landing point of Columbus in anything that would become part of the routes. This is in 1493. He landed here in 1493. He had everyone counters with the local people, indigenous people, there was loss of life then he went away. It has a lot of significance. What I want to attempt to do tblierchg, these are tsunami evacuation maps that have been produced by the emergency management agency with the assistance with the Puerto Rico seismic network and university of Puerto Rico. They show the 3 major islands.

I will start with saint Croix. 84 square miles larger than saint Tom s and saint John put together. It was original quliencht the center of much of the commerce and politics of what were then the Danish west end des. Upper right-hand corner is St. Thomas which is now the capital of the U.S. Virgin Islands. The left corner saint John. The population is around \$104,000. It did some odd dips and qulairchtion/tion after the Her caissons 6 years ago. Then with co-slid whreefng for the first twhriene for a short trial below 100,000. This were fewer bream they were able to get things done. It had impact in the development trying to protect our marine resources and produce some of the services that CARICOOS is trying to produce.

The gross domestic product is \$4.2 billion approximately. Whrerchg our share of tourists 1.4 million tourists per year. St. Thomas is one the biggest tourist ports.

The point of the U.S. Virgin Islands is lots of things have happened. I will start with the upper left hand corner. In 1867 there was a lure cane called the hurricane affected saint John and St. Thomas. It wrecked the hash tore of St. Thomas. At that time interesting things had been blank for the American industry and Puerto Rico history. General santa Ann qulierchg was in St. Thomas harbor.

In the revolution that was being planned against Spanish occupation of Puerto Rico that resulted in a gray tragic attempt qulawnchd the twhreeshs of whrierches was being planned and this vessel was in port. Unfortunately the danish masters at the time betrayed our Puerto whreek an friends. The revolution was put at a great disadvantage from the beginning. After the hurricane of 1867 biggest documented tsunami occurred. That was moment you see off the coast of the St. Thomas being taken. In the lower right-hand corner you see a U.S. flavory vessel that was cast upon the shore. Many, many things resulted from that. At that time the United States was negotiating for the purchase of the 2 islands.

The hurricanes and tsunami were bad timed and it was the last nail in the coffin. Abe Lincoln was killed. Johnson was president. Reconstruction was going badly. United States purchased Alaska in that same year. That purchase was not as attractive to many politicians in those days as it is now.

The secretary of state William Stuart was negotiating this dwhriench. That was more important than the 2 tragedies they were nails in the co coffin.

I had to compare the lower right corner with the Mono gl ohela. The middle picture you see the massive buoy. They led to a disturbance of twhroarches of those multiple times.

The islands are very important for tourism of course and for cruise ships. Wharfs for smaller trafficking of goods and cargo. Many of you may know the U.S. territories or some of the U.S. territories are exempt from the Jones act. It has certain advantages and disadvantages like the like what will maritimes. This has played over and over again. At any rate in 1979, the sister ship to that other vessel that had been hijacked in 1978, it caught fire at dock in St. Thomas. Our local fire men didn't understand proper protocol putting out a fire on a vessel that was at berth. They put too much water into it. The result it sank and interfered with commerce for many months before being towed out.

Last but not least the actress was married to captain Blare a pilot. He ran a swiftness service between the islands called Anthony's air boat. He was a hot shot and lost his life in a crash. There was a lot of manifestations people thought that maybe sea planes were not a good idea. At that time there was a sea plane service in Miami harbor. So for a while we didn't have air boats operating we now do again.

The development of the DWI, Danish west islands and U.S. Virgin Islands development has always been linked to the development of harbors. One of the things that made them popular was the existence of facilities for vessels where the railway where you could pull a vessel out of the water. That smokestack is a big steam engine that would pull a small trolley with a ship attached to it out of the water. They could deal with it.

The importance of our island is very important for defense of the continent and for shipping in the Caribbean. It installed a naval air station which was looking for German sub Marines which some you may know did enter the Caribbean and did damage. We had our own subbase. Those were submarines that were anti-sub.

The prospects for a successful -- definitely diminish by yellow fever. It was a great harbor. A great deep water port. The danish were good hosts. They didn't have a lot of military power. The british powers didn't fuss with them. The Spanish would come and french would come and the Dutch would come. It was where the Paris of the Caribbean.

St. Thomas the affection affects its name was beer tap. Yellow fever ended that. It made it so difficult. One author one captain writes you don't go there without losing at least one person to yellow fever.

We have a lot of history. In the lower town we were swift a point to collect coal, for oil and in the early period took over it was the coal women it was resolve. It was very successful. They acted against that. The lower right-hand corner shows the airport. So this the harbor that is called the company port. The more historic one the older one that had much of the history that I related to.

So first the port of Christiansted. We are not talking about San Juan or any of the major ports in size, in terms of usefulness and being well located the ports of the U.S. Virgin Islands have played a part in the U.S. and European history. Saint Croix it is protected by a reef. It doesn't get much visitation of large cruise ships. Smaller cruise ships go there. That area is excellent for sea plane and sea plane landings and other small vessels. Lots of history for St Croix and Christiansted vessels. And ferries leave from there.

The U.S. Coast Guard I want to thank the U.S. Coast Guard for what it does for the U.S. islands. They have a marine safety detachment stationed in St. Thomas that reports to the captain on board who lives in San Juan, captain Diaz we just met.

The water and power authority has its main power plant there. It also conducts, reverse osmosis is the process we use the most.

A deep water port that is unsheltered from the west. There are incredible as wells and vessels caught. In 1867 and in 1899 we had those 2 events. The port is not used nearly as much. It is gloinch as well.

The blorcht of note for the U.S. Virgin Islands. It actually made the Danish west Indies competitive. The port twhroirchght to develop cruise ship docking that were very, very significant to the extent the largest vessels in the fleet dock there. It is well served by co-ops. A co-ops stations are there. A lost historical data has come out. Since the hurricanes of 2017 I was really pleased for example to hear the weather man on the weather channel talking about our situations in St. Thomas calling them by name. At one point given credit to CARICOOS and the saint John Buoy. The facilities that derived from NOAA's generosity have been noticed in helping division but the quluns national Her tans and storms. The only other thing I would say is crown Bay. This is where the biggest vessels come. There you see the largest as well as as of last year the wonder of the seas turning around.

To see those vessels turning around in there is interesting because it pushes. It has pushed very hard to blefnt off of that pier the stations so they can assist with the berthing and trafficking of vessels through that channel. It's a very important port. This is where the original submarine base was.

The question that Julie has asked me to consider. In the whrierchtion what more products, data services are valued by us and how beneficial are they? The first thing is inqulienchts the single thing we benefit from so much. We thank the coast glearchgd. We are being administered by the department of interior and army corps are engineers are wonderful to us. Government entities are very important and useful to the Virgin Islands. From where I sit, NOAA is everything. We have derived so many services that I swleerch that affect the life and commerce of the U.S. Virgin Islands. The appreciation of the natural resources and over coming of practices that were not Ben tblicial like to hunt turtle things like that. It was part of our culture routine.

The act of 1978 and its extension to the U.S. Virgin Islands and support of the program has been so singlely significant to the U.S. Virgin Islands. It has affected us in so many ways. Even twhrierch [inaudible] nobody would say we want to be without CCM. We need to find our way. how do you manage those islands as the population is doubling and quadrupling but tripling at least in a very short time, how do you manage the resources when tourism has become everything and everybody wants to convert natural resources into tourism resources.

Whroirchg can you develop win-win scenarios.

NOAA has helped us greatly. Also no sea grant which is administered in the Virgin Islands. It is a very useful program for educating and advising. Many thanks to know a on so many different levels. Just that inclusion alone. Beyond that the other areas the office of coastal service is very, very important. The peculiarities are used by everyone recreationally, educationally. In navigation and shipping. Those charts have to keep on being improved and produced and quliencht always be steadfast customers. Then co-ops. There's been a twhriench when there were a number of water level stations that were climate oriented. The sampling period and whatnot we are looking at sea whrainch, you know, in longer perspectives. Then the concern about tsunamis and other concerns because the enhancement of co-op stations in our region. For the region and maybe for the United States in general at least 33 additional stations whrairchg put in. Whrufn of the ones in the U.S. Virgin Islands is important. What you have done is improved them from tide gauges focused on climate level time scwhraibl to lead to

more bleak ebet rationale. They go to the web and they check their station. They know how to find it very easily.

The other major NOAA service of course is the national ocean service integrating system which from CARICOOS developed. This helped us so much. The U.S. Virgin Islands is part of it co-founders. It means so very much. People as I said before refer to the assets of CARICOOS in a very familiar whrierchg.

Then just as an example of data, whrierch from 2017 hurricanes Irma and Maria. You can scwhriencht not only the wind gusts look at the sustained winds that hit some of those regions. Many of those affected co-ops and assets. For example Buck island St. Thomas after receiving 105 miles per hour the instrument was toppled with gusts after gusts of 140 blink had been reported. Similarly in Culebrita, harbor we put rocks. Those numbers played into the U.S. weather service and the ability to interpret what was happening. They more than prove their value.

What do we do in return? We advance the use of CARICOOS as much as week in the corner is a younger jose for the first discussion to talk about trying to develop council to become part of an ocean system control. we have been assisting as a platform for Her quliencht intensification studies using lighters and the sea gliders. We use NOAA assets to help promote STEM education because we have a very serious manpower problem.

We service instruments such as buoys and weather stations. That is our part. Right now tblanch we are finalizing the scwhrefntion the high frequency Ray dwhrarch measuring system so it farther to the southeast beyond the eastern tip of saint Croix.

The other question, what new or enhanced products, data or services would you like NOAA to offer and how would you like to benefit from that?

Before I answer that, I don't have time to answer it. I just started from a SWAT street strengths, weakness, opportunities and threats analysis only one of each. One strength, one whreerchgness, one opportunity and threat. Strength is our progressive relationship with NOAA. Many of the Ben tblifnts our natural resources are derived from our sailors and quleurches industry everybody greatly benefited.. Weakness we produce a lot of Phds they do not stay. We train for the United States. I have trained many students. Not a single one is there. I'm now an old man I am trying to retire. I can't because having a good numbering of oceanographer is in Puerto Rico. We are dependent on Puerto Rico for oceanographya sighs answer.

We are big on coral reef sea grasses and corals. And fish raise. In fact, we are very, very whreerchg in oceanography.

Opportunities? More opportunity for meaningful blacks in NOAA programs. I see that as an open door. Then the threat. Over turning. Over turning is not only affecting us, your over turning affect us. Things change in the national office. We try to align and participate in some of the programs. We try to align with your priorities. Then they change. the language qulairchtion/tion. It's amazing those in Washington. I used to be in Washington. I don't want to a fend you. You come up with terminology all of the time. It blows us out of the water 6789 the blast whrun was hot wash. I know that is current. You have ask what is a hot wash they don't know what you are talking about.

Before that was walk the walk and talk the talk. It was succession. You have to chill up on that a little bit. Troy to have a little carry over some of the terminology and acronyms because it whrierches is out. I'm joking of course.

But turn over is a big problem. Us always trying to realign with opportunities in the federal programs is difficult. So anything you can do to help us communicate better. Products and so forth what we would like to do to help, one very small thing we would like to maximize the extent we can help the captain of the port open ports in the Virgin Islands a hurricane we don't know what the floor looks like. Sonar. There is an opportunity we can help to speed it up. We are very dependent on those ships sitting off shore wanting to come to port. It has been a really big factor in past hurricanes.

It gets a lot of benefits from NOAA's national tsunami program. Right now we need more maritime guidance for what people should do in the face of a tsunami threat. Some of the current modeling that was done before by some of our colleagues at the University of California need to be continued. This lower right hand corner picture shows the depth of the currents. The red means stronger currents the strongest is 8 knots. In our data there was a current problem. Currents were more destructive. It caused ships to run into each other. That with the current harbor with the large vessels that is dangerous as well.

I know I was long winded. I am struggling with my throat. Thank you for allowing us to say something.

>> Thank you, recognize, I know he has the most fantastic historical perspective of this local area. He does love to get into vessels. Being a professor at the university he can't help it. Nicole, do you have any blame comments before we break for lunch? We are into lunch time? Roy will be around. Let's meet back here at 1:30. Roy will be around if you have questions we can corner him.

Thank you all very much.

[lunch break]

February 28, 2023

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TRANSCRIPT:

CAPTIONER (Jayne): Testing live captions, testing live captions, testing live captions clear.

Welcome we will be starting shortly, please stand by.

>> We will get started in about two minutes. Are you here for a while? At the break, a bit we can talk. Am I blocking people? I am, aren't I, sorry.

>> MODERATOR: Okay we would like to get started, everybody stated. This is reconvening the HSRP meeting after our lunch. And we have a great panel up here. Moderators will be commander Brianna Hillstrom and I know you are there but I can barely see you. And Nicole. I will turn it over to you.

>> Thank you Julie I am excited to welcome our guests here today for the partnerships, collaborations and the U.S. Caribbean, local Commonwealth and local perspectives and this is part two of the continuation from the conversation this one

before lunch. With us today we have our Ernesto Rodriguez who is the acting meteorologist in charge at NOAA and Chris Moore and who is hurricane program manager from operation planning branch of FEMA Region 2. Jeremy McMaster and emergency support function number one representative, Regional Emergency Transportation Representative, U.S. Department of Transportation Federal Aviation Administration and you when the reward for longest title. So you can read the bios online and Chris you want to kick us off?

>> CHRIS MOORE: Covering FEMA Region two, New York, New Jersey, the USN Virgin Islands.

>> ERNESTO RODRIGUEZ: Hello I am Ernesto Rodriguez acting in charge for the National Weather Service.

>> JEREMY McMASTER: Good afternoon my name is Jeremy McMaster I am the emergency function one response will for Department of Transportation and within DOT I work for the Federal Aviation Administration.

>> BRIANNA HILLSTROM: I thank you each have a minutes for remarks would you like to just go ahead?

>> CHRIS MOORE: So I think I have presentation slides. I will speak first well you are first?

>> BRIANNA HILLSTROM: Who's ever slides are up first, I'm not sure we sat in the right order. I can see where the AV folks are over there so if you see your slides you should go [Laughter]

>> Yes.

>> ERNESTO RODRIGUEZ: Thank you for the invitation first, we are here near the airport server close to you. You can visit us anytime, at 24/7 so you are welcome at the office. We are the NOAA National Weather Service here in San Juan we call it Puerto Rico and the Virgin Islands. And I will give you the brief overview of what we do here in our region.

Okay first pretty much your region is similar, the first responders. So we need to protect the life and property also we need to enhance the national economy because we are under the department of commerce so what we do is provide whether, water and climate forecast and we need to also impact based decision support service we can make decisions during the storms are preparing for any whether climate hazards.

So the vision for our offices to create a more whether savvy society so they have more prepared for any hurricane or any flooding or storm search that is happening in the islands Puerto Rico and the Virgin Islands. So I need to talk about Maria. So that is the most impactful event that happened in our region in the last decade. Here hurricane Murray, affected St. Croix importer Rico so both islands on September 17th near sunrise.

But two weeks prior here in Maria was hurricane Irma the impact of the northern Virgin Islands, St. Thomas and St. John specifically the southern area of-- it was more powerful than hurricane Maria. This is an image of our radar. Destroyed by the hurricane force winds. And that is category for just two mph shy of being Category 5.

This is a couple of images I will go through very quickly but to remind you that was the destructive and with the communication and the infrastructure to power. This is damage related to storm surge. Specifically this is Mucal area southeast part of Puerto Rico. And I will tell you a little bit about our vulnerabilities. Not only hurricanes and tropical cyclones are part of our culture here, we've other weather hazards that impact our region. So if you look at the map the numbers are very small but is a representation of how vulnerable our different areas in the states and its territories for weather and climate hazards. So we are in the top three here. We are not proud to be in the top 3.

But certainly we have a lot of risk in terms of weather and climate prior, during and after the event. So it has been very busy since 2017 for us. We have Irma, Maria in 2017 but after that we have eight more tropical cyclones impacting our region. So a little perspective of how busy we are. Numbers are very small but we are issuing in terms of tropical cyclone products 4500 compared to Louisiana and that is the closest one with 220.

One is also active with like 300 but certainly Puerto Rico is in the highway of hurricanes and tropical cyclones and we are very active for this type of event. Also for coastal roads, high surface ocean and rip currents we are super active like 7000 being issue related to us. The closest one is again Juan and the Florida Panhandle with 2000. And so two years ago we said people need to understand our forecast and now need to be with them. We need to be with the Coast Guard and with our partners in the state to explain to them the risk with the weather or climate events. So this is our-- that was in the room briefly, Puerto Rico on the left side, Fiona and also doing some briefings. We were able to brief FEMA administrator Chris Wall last year and we had rain and then we had a cover event that dropped about 15 or 20 inches more in light October and early November. So the FEMA teams were on the field doing recovery activations and we were continually giving them information about the weather and hazards related to the other two events. It is easy for us to go to the primary base of U.S. Coast Guard here and sector San Juan. To do reform mediation briefings and to assist with the other areas that we provide. And also bring them to the office, which is the photo in the bottom part of the side.

They rotate every 3 to 5 years so we need to do this every three years or so. So we train their staff to understand the pros and also the uncertainty we have. We respond to different hazmat events and specifically this was in Mona island. The

surf. This was like ten years ago. This was-- ocean in the west side of the metro area.

And we also do collaborations with other universities and NOAA and through the NOAA SECART we are able to meet and work with the other partners in the Northeast, United States and Caribbean. So our representative in the office is -- Morales, we switch every three years so I will be three years. So we will be able to assist them, and also know what you are doing to be some satellite of information for communities and other NOAA efforts in the Caribbean.

The categories in the last couple of years will be like guessing forecast. So I need to thank IOOS and NOAA think for all they have been doing in our region and all of the assets. But most important the excess of real-time expertise.

I think we use here in San Juan the expertise that we have in the professors and professionals that Caricoos pretty much to 4/7 and with Roy in the Virgin Islands. So we know our network and we use that accordingly. And they are not putting current sensors, also helping the NOAA enterprise or the entire NOAA to improve the letters and collaboration with AML in Miami. So I would say the last, almost two-month ago we had a big meeting. IOOS. We were able to share the collaboration to show other regional, how do you call it? Regional? Associations. That we have a good collaboration and the local offices and NOAA and need to be the proposal face so we as NOAA need to ask for specific assets to be like us. To improve our forecast and use the NOAA funding much better if we are coordinating first together.

Obviously we work with the University -- Morales back there and also -- working and analyzing how the coastal communities and the coastal and the problems of the storms we have frequently during these months after the hurricane season. So I keep it there it is to you.

>> BRIANNA HILLSTROM: Thank you very much and we will find out who is next based on okay Chris is next. Okay Chris you are the lucky next speaker.

>> CHRIS MOORE: Hello so good afternoon.

>> BRIANNA HILLSTROM: Just kidding, just kidding [Laughter] there we go. We are just livening things up this afternoon after lunch.

>> CHRIS MOORE: Not quite as handsome as Jeremy here. I will talk first about my steady-state role and how those hydrographic services provide those foundational data sets for our nations process to support jurisdictions in their protective action and decision-making. Then after that talk a little bit about operationally, you know some considerations that might be important for this audience. And so for those who are not aware the national hurricane program is an interagency partnership between FEMA and the Army Corps of Engineers and the national weather hurricane center, this is the preparedness and response phase where FEMA

provides a lot of the technical assistance, national hurricane center provides planning resources for storm surge. Army Corps of Engineers oversees hurricane evacuation projects and oversees this project of transportation modelers and that process. So between the three agencies we collaborate to help state, local, tribal jurisdictions, with their evacuation decision-making and given those baseline planning factors that they can use for follow-on response.

So this kind of sums up kind of what I was talking about here. On the far left you know the forecast products, the operational storm surge products that the hurricane center does. Modeling hurricane evacuation studies are all pertinent to the hydrographic services that are provided by NOAA and they really provide the baseline data. All of this goes into an online resource called hurrevac it takes the real-time information and compares that with the evacuation preparedness times. And that provides local emergency managers with a deadline with when they have to begin their evacuation used on the current forecast. So overall just helping coastal areas make better decisions when those decisions are difficult and potentially costly.

So the high-resolution topographic and data sets are on mental to the storm surge modeling and they form the basis to develop the storm surge risk maps. So the hurricane center uses a model called the sea like and hurricane search. And also use wave models because we action and wave action set up play a much bigger role in the actual inundation you see. As opposed to you know continental U.S.. And just the physics of the water, going around the islands as opposed to you know crashing into a shoreline, the only place it has to go is inland and out. So the waves actually do play a bigger role in are modeled for risk purposes. I think the hurricane center is looking toward being able to model that operationally. But as of yet I have not heard that capability is online. So I mean Ernesto can probably speak to the better than I can.

But just to know that the data sets, U.S. coastal relief model, among others you know provides that comprehensive path to metric information, various sources, IONS hypo graphic surveys and-- I don't fully understand what all that means. Just to be candid.

So the output that you get look something like this and I'll just take you through a process that we use to assist local jurisdictions. So the outputs, of the modeling include these composite maps. That provide like a reasonable worst-case innovation vulnerability profile for every location on Matt. This analysis is performed frequently enough that the hurricane center is confident that the update cycle accounts for changes in water levels due to the sea level rise. So you should get a new analysis every several years.

And we have been told numerous times and that we are constantly asked, what about sealevel rise? The update cycle for hurricane evacuation studies is frequent enough

And so you might be asking what do I do with my house on this map? It is used for the Asus as a follow on planning. So this is a really straightforward approach where you have a storm surge risk map like I showed and we work with jurisdictions providing technical assistance to them draw the hurricane evacuation zones. So this one is a really simple and straightforward way. It is easy to communicate to the public which is a huge benefit. And areas with low population density this is, you know this could be the better approach so using the worst-case storm surge for every category.

There are other ways doing it with higher population density can use the direction or approach of a storm as a factor. And you know it is kind of an might be a little bit difficult to make sense of this matrix here. But basically what it shows is that based on the direction the storm is traveling, let's say that It is a CAT3 and heading northeast here around New York City. And let's say we are traveling north or northwest you would have to evacuee all the way up to zones five. If you look at the population figures that is an extra 1.6 million people you might evacuate just based solely on the direction of approach of a storm.

And so it is something that you know we have to look at and in each hurricane evacuation study to make sure if it is feasible to take this approach and its different. Down here in the Caribbean probable not so much but something on the table to consider. So we have this process here impaired Rico, this information is available on hurrevac, and the local municipalities we work with to come up with those evacuation zones were a lot of these areas as socially on the north side of the island would mean a specific storm track. Really we encourage users to going to hurrevac and look at the approach and the storm surge probability maps.

So once we have drawn the zones we can work with you know the local jurisdictions, Commonwealth, states, to help them identify which critical infrastructure and key resources and might be in storm surge will rule areas in which relations might need assistance. So police stations, hospitals, fire stations, nursing homes, anything that might need additional actions in order to evacuate. Prior to what is factored into the clearance times. We take the outputs of all the rest of the study and put it into a transportation model. That is performed by transportation engineers. It is mostly based upon model nets and the roadway network, the biggest bottlenecks will cost the longest delays which will also may become what the clearance time is. It takes a certain number of hours to get through a trouble section, then maybe they can do something out traffic patrol at that intersection to shorten the clearance times. But there is a wide range of

scenarios that can be used. Depending on the jurisdiction they might be Lane reversal or counter flow. But really that public self evacuation is the primary planning factor because you build around that. You build off of what that timeframe is. So this just illustrates that it is an example of you know how you have to backwards plan. From the arrival of hazardous conditions. You know so you want to make sure that no one is on the road when the tropical storm force winds arrived. Other things that have to take place like evacuation of medical care facilities. Individuals with disabilities or access functional needs. All that has to be done on top of that public self evacuation. So this process is really just a starting point for each jurisdiction to really do the planning that they have to do that is unique to their circumstances. Okay so that is pretty much a quick overview of what we do steady-state to help jurisdictions prepare and really how hydrographic services provide that baseline data that allows us to perform the entire study, the entire analysis.

So very important and it is a capability that we are glad that we have so that we can help communities better prepare.

Now to talk a little bit about what we do operationally and how this audience might you know, it could be informed by what our disaster plans are in the response phase. So just for context, you know we phase operations paste upon notice and no notice incidents. So this is just for context. We have two sensor types of plans. It is something like a hurricane that gives us a set amount of lead time. Then you know we will have a different resource phasing plan. We will have a different execution list, because we want the resources here before the hazard, to make sure those resources are safeguarded and the people are safe and have a safe place to be. We will queue up things that we have a little bit of lead time.

If it is an incident like a earthquake or something without notice, then we will jump immediately into the response phase, into stabilizing the incident. So you know hurricanes are a little bit different. We can of have two sets of checklists and resource plans based upon whether we have a few days notice or it happens with no notice.

So this is somewhat of a new concept and again is been around for a few years now. Prompted by the 2017 hurricane season. Community lifelines, something you may hear FEMA talk about. So these lifelines are the basic services on which the societal structures are based. If you look at problems sets in terms of community lifelines it really helps to rapidly share situational awareness across different levels of government and it helps to identify the root causes and the lines of effort that are going to help stabilize and score these committee lifelines. The are seven of them. Transportation pertain to them being one of them. Hazardous materials also applies here. But basically we go through this process, but to stabilize and you can

keep asking why down to the point that you can find something you can do something about. Stabilize one of the lifelines it will unravel the problems that some of the other ones. Sometimes it adds order to chaos how he fixed the disaster and communicate how we are fixing the disaster.

So in addition to communications obviously the transportation lifeline is critical for our Caribbean jurisdictions. And likely to be one of the first problem sets that we need to tackle. Access by air is likely to reopen relatively quickly. But obviously there are significant limitations on the type and quantity of resources that can be flown in. This is why vessel assessment, for the reestablishment of critical services and the establishment of critical capabilities. We all want to see the restoration of capabilities to accept tankers and container ships as soon as possible. I think everyone is on the same page. We need to bring in a bunch of resources and we had to do it by sea.

Also a note here you know kind of some of the dependence the USVI has on Puerto Rico especially Port of San Juan and all the resources that come into as well. It is a good time to mention that FEMA does not circumvent or the action scene by the captains of the boards. So we can enhance their efforts by incorporating additional international Fedor see support oftentimes they were kinder their own authorities but under emergency disaster declarations, FEMA mission assignments do come with reimbursements to those agencies. So it provides incentive for them to want to take additional assignments to do some of the things that need to get done. So this is about all of time here but take this from a Coast Guard flyer, the Marine transportation recovery unit, can augment those operations and providing funding, additional federal interagency procurement agency support. But we do that at the direction of the captain of the port, because really everyone is working for them in terms of reestablishing operations. Is pretty much it for what I have, thank you for the opportunity to come speak to you today.

>> BRIANNA HILLSTROM: Thank you Chris, that was great. And I know is Jeremy. I'm going to put all of my money and Jeremy this time. Thank you Jeremy
[Laughter]

>> JEREMY McMASTER: Again my name is Jeremy and what the Department of Transportation and I will talk a little bit about emergency support functions. So Chris already alluded to this and I think most people in the room are pretty comfortable emergency support options are combined to solve the impacts of hazard during a disaster. It semi-to the lifeline concept but there is a lead federal agency for each of the ECF and I'll go into that in the next slide. On the right-hand side you can see each of the emergency support functions and how they are aligned. I think most individuals in this room with NOAA in the Coast Guard are familiar or intimate with working with ESF ten and also ESF 9 the hazard response

and search and rescue. NOAA and the U.S. Coast Guard are also response agencies under ESF one under the Department of Transportation. The way that ESF are activated would be through the mission assignment process. Chris talked already about no notice versus notice events. FEMA would mission assigned emergency support function number one to solve a problem and then emergency support function one would figure out how we had to go about figure out the issue and how to resolve the issue.

So we have five basic missions essential functions under ESF1. They are listed here at the bottom line, we are responsible for the restoration in response to transportation systems. So you think transportation you think okay DOT move stuff, we really don't. Under extreme circumstances. The MA could be asked to perhaps move a piece of equipment from point A to point B but that is not their mission and that is typically not what ESF1 does. We are more response will for the system as a whole to get things back to normal and then the logistics from getting to point A to point B.

Within the U.S. department of transportation with this is the lead for ESF one. We have nine what we call operating in administrations and operating meditations are primarily response will for regulatory issues. Within each of the modes transportation. Whether by air, land or sea. And these in the blue area you can see each of the nine operating in ministrations.

As a whole the way that the program is broken down I work for the region to which is New York, New Jersey, Puerto Rico and the Virgin Islands. We are aligned the same way that FEMA is.

And as far as our personnel go I am the only full-time ESF one representative. I work directly for the regional emergency transportation coordinators who is senior executive service member and is the FAA Eastern Region Regional Administrator then I have a cadre of about 40 personnel I can activate to respond and they are more the subject matter expertise individuals and I rely on them for what they know because I'm not an expert much of anything. So they are the subject matter experts that I rely on and is a collateral duty for them.

Okay so now I was just talking about about how NOAA ESF one can integrate in the one. So these are some of the support functions that NOAA provides to ESF one. It's pretty much what they do day to day supports but would help the supports with the information they need to have with the best information available. The key that comes up with is the imagery before disaster versus post-disaster. There you see the orbital imagery provided to the Department of Commerce or NOAA desk at the NOAA response center. So you ask USDOT how do we bring things back to normal? There are 1 of 3 ways to do that. One is technical assistance and that will be the subject matter expertise that I alluded to. Also regulatory relief we can put into

effect hours of service waivers or commercial truck drivers. And we can waive hazmat endorsements that might be required typically move things from point A to point B. We also bring two of the operating in ministrations bring some assets to the fight as well. So the Maritime Administration operates 45 vessels, they just get rid of one. Training ship empire state has been retired. And also the Federal Aviation Administration also has physical assets they would bring to a disaster in order to help recover so this is just an example of some of th technical assistance we can provide and that hotline we can stand up for federal responders and tell them what roads are up and running and which ones aren't and how they can get from point A to point B. We can also activate the activation liaison team but that would not help a lot here. We have something called the safe store. We would break down maritime vessels and store first responder vehicles on those vessels. And this is just operating relief that the administrations can provide during a disaster and I will not go through each of these and put everybody really asleep after lunch. So the capabilities and deployable assets is the item to know on the bottom right-hand side. That is the national security multi-mission vessel that will be positioned at SUNY maritime in 2023 June. We will do a tour next month to see what the specific keep abilities are but it is basically all in one ship. Provide aviation support, roll-on and rolloff capable and also first responder lodging capable. So the MA has maritime fleet similar to what was mentioned earlier from NOAA. Those 45 vessels, most of them are 45 plus years old. Right now there are only 31 ready if a disaster was to occur today. Right here on the right hand side you can see the medication support team that is all in encompassing commit occasions vehicle that they can use to route your traffic and it is all in 1, 1-stop shop and has everything that they need to do their job.

We have contingency responsibilities, your traffic deployer's in a box. We could deploy the equipment given there is an airport open to accept it, if there is not one we could lie on great tales and the FAA does have a fleet of aircraft they can fly in. And if you can kind of me, on the right-hand side, so he had some predisaster, that this is up -- and where the weather service is located and the previous whether it was in bad shape after hurricane Maria it was in bad shape. And this is one of the success stories to show that this is an interactive and collaborative between multi-agencies. So the radar was actually blown off the pedestal I believe and the road needed to be repaired and that requires a lot of coordination amongst many federal agencies and the local agencies as well. You can see the after picture there, I don't know if you can make out the dog as well. But it looks like a brand-new world and this was taken post-Fiona, we went up after Fiona and they were able to implement multiple measures to help the area so that it is less flood prone. So that is one of the success stories we have their.

So just one of the issues that we do continue to run into is the refueling of the generators are critical for the routing of air traffic and also for national security because they are located upon Eljuncay and if they do up to them we have to figure out how to get fuel up a mountain which is not an easy task for

This is an example of how the activations that require ESF one support within the last year. Some of these are also special event coordination. Specifically hurricane Fiona which the recovery is ongoing for that. At the joint recovery office. And we were activated for over 30 days for that we brought down multiple subject matter experts to do assessments and work together with the Federal Highway administration and also DTA. This is the most important slide and it would be best to be discussed instead of just me just talking to everybody but how do we interviewed the future? I heard multiple engines of geospatial and how there is not an integrated agency that puts this in one spot. I would agree to that so I think a common operating picture going forward would be an excellent kind of starting point of where we can all integrate in the future and kind of have a one-stop area where if the data is open to the public where it could all be accessible. That is an issue that comes up often and also that would be able to, have missions within your operations under FEMA and then mercy support function one as well. And sometimes those missions, we are not aware of what other agencies are doing under their own statutory authority. So it was mentioned earlier that there are surveillance missions that NOAA is carrying out. And I need to do a better job of coordinating with NOAA so I know what those missions are so we are not both trying to save the problem. So if they are doing their overflights and we are asking the civil air patrol to conduct similar missions that we need to be talking a little bit more and closer so that it is very hard, it is chaos during a disaster and is bound to happen you have duplication of effort. But we would like to minimize that in the future going forward I think having this great working group is an excellent starting point for getting us all talking together and one of the most important responses, items of response during a disaster is the relationships that you have. And if I don't have at least a name to go with. And I'm not doing my job. So I might not have the most in-depth working relationship with everybody in this room now at least I know who to call if I have any questions and you know who to call as well [Laughter] so thank you for the opportunity to come down and meet everybody. I really appreciate it. And here is all my contact information and that is the last tour that we had of the training ship Empire State in SUNY. That is all I have thank you.

>> BRIANNA HILLSTROM: Thank you Jeremy and now we have your contact info and we can phone a friend. I think we have just two more minutes left in the session. I want to ask Nicole if you had any comets and also see if Mike A. Is on the line he is with the national-- survey who flies and I think he might have comments as well.

>> NICOLE LeBOEUF: You think Mike has comments?

>> BRIANNA HILLSTROM: I do think he does have comments.

>> [Echo]

>> I am here.

>> BRIANNA HILLSTROM: Okay hello Mike. Go ahead.

>> NICOLE LeBOEUF: I want to thank the panel is for sharing this information with this, I know some of us know some of it but having it all set in one place and this group is very, very beneficial and I appreciate that so much. I also, was just impressed by several bits of each of your presentations. But I don't want to take up Mike A's time because I will get in trouble for that. I'm kidding. Mike did you want to weigh in?

>> MIKE A: No ma'am, not much other than there is a geospatial in the regions and remote-sensing coordinator that we work with Glenn Russell at ROTC headquarters and great contact for the end of things as well as pretty large group that is associated with that. I will email the palace and give them not contact information and as well as contact for myself.

>> NICOLE LeBOEUF: Okay thank you very much. I just want to note an observation that so much of what we at NOAA do is seeking to preserve and predict the Earth's behavior, the planet's behavior, and having this kind of partnership is so important because you are adding to the equation. Not just the prediction of human behavior. Right? But hopefully the prediction of different kind of human behavior and that is that of the responders. And are so many of us around the room that contribute to that. I often think about when we have major events like hurricanes for example where NOS staff have people living in the area that we are mobilizing staff in and out at the same time and is a bit of a new experience for me and I appreciate being you will to put these dots together with the human and Earth's behavior. So thank you.

>> BRIANNA HILLSTROM: I think we have time for one question? Okay there we go.

>> Q: Thank you, you all talked about events that are of course can be disastrous in the hurricanes and the storms and things like that. Ernesto I think I heard you talk about rip current hazards, things that I call a slow bleed, they kill people 1 or 2 at a time over the course of the year. Do you have everything the region about that predicting and may be figuring out how to influence human behavior?

>> ERNESTO RODRIGUEZ: Okay thank you first I start with science, -- the most in the Virgin Islands. After that we got the signs and then we meet with-- on Thursday and he developed breaking question for island environment. We took some research from Hawaii and do some survey here and he did the breaking wave question. So after that we were able to integrate the research they did into the operations. So I would say sense 5 or 7 years ago we go to the island, through the island and meet

with the ULTA associations here we don't have-- we have to rely on tourist people that rent air B&Bs or hotels to clean how dangerous are the rip currents. Let me give you a little bit of statistics. In Puerto Rico, five years ago 30 people died due to rip currents. That is a lot if we compare it to the U.S. one state. So we need to do a lot of work in terms of telling the people, "hey although you may not recognize a rip current there are mainly because our custom-- is very irregular." It is not like the states. Here everyone gets the rip currents. So one thing that we need still to work on is to try to tell the people that coming to Puerto Rico. That I don't know, the tourist company to Puerto Rico to post our forecast there. We are fighting to do that but it is hard to that because they also want the business right? But at least we are giving the information to the newspapers and each news outlet in terms of team meteorologist cover the rip current forecast. There are still things to do but in the last 4-5 years we have improved a lot. And in terms of just we have been around 20. That is not a lot but improving. And we continue to go out and talk to the community and the different research we have been doing with the University of Puerto Rico specifically the medical campus, the Puerto Ricans are not ready for the warm that has been occurring globally. We have been seeing mortality increasing this year with the hot spells. Sorry for the long answer.

>> BRIANNA HILLSTROM: Okay I think we will wrap it up there, and give the panel one round of applause.

>> [Applause]

>> Oh Ben wanted to come forward. And so Larry or Andy and not sure which one of you, or both, you want to just sit there come forward? Doesn't matter. So we will go ahead and start with Juliana, do we have her online?

>> JULIANA BLACKWELL: Can you see and hear me?

>> We can hear you. Ah we can see you too. There you are, great. Okay Juliana it's all yours.

>> JULIANA BLACKWELL: Okay are my slides up and available? Can't see the room so I'm not quite sure if they are working on

>> They are just working on, hold on just a minute. Think they are getting ready.

>> JULIANA BLACKWELL: Should I go ahead and get started?

>> I think they are doing something with the AV right now. If you can give me one more minute. Just sit tight for a minute. I know we need to [Laughter]

>> JULIANA BLACKWELL: There we go.

>> Okay it is all you Juliana.

>> JULIANA BLACKWELL: Good afternoon everyone, thank you for the opportunity to provide a brief update on the national geodetic survey directors update and upcoming activities. Go-ahead to the next slide please.

All right. I will start off with a very brief highlight of a few things related to the modernization of the national spatial system. As you know it is the coordinate system that provides the foundational framework used for transportation, land Mac records, systems, mapping and charting and another number of scientific and engineering applications. First I want to mention with respect to the state plane coordinate system, as planned NGS completed the view of more than 100 zones by 28 states. And I want to mention in collaboration with the National Institute of Standards and Technology we announced the retirement of the U.S. Survey Foot also planned as the end of last year in 2022. If you're not in the geodetic survey service I might point out those that are not aware, they were previously two official feet slightly different links that were used in surveying. And while the difference between the U.S. survey for an international foot is tiny, when it comes to measuring the distance between coordinates over hundreds or thousands of miles. The difference can add up to several feet and can lead to costly errors. And delays for a variety of projects. So these two efforts were Stateline coordinate system and the retirement of the U.S. survey footwork complete last year. However they will not take effect until the new modernized NSRS is rolled out sometime in the 2025 timeframe. Also in the slide I want to point out particular for Puerto Rican and Caribbean partners, on the right the Caribbean plate estimates. In the modernized NSRS which will roll out in a couple of years, a separate reference frame for the Caribbean plate. This is a change from the current horizontal data used in 89 83 the groups together with the Caribbean and North American plates under the assumption that their tectonic movement is similar. We know now through GPS and a lot of other technology that for a dynamic time dependent reference frames it is important to account for the motion of each of these tectonic plates separately. Next slide please.

Although delayed by a few years the modernization of the and SRS is happening in addition to the replacing of the current horizontal and vertical data we are improving our models, tools, debates,

And right now the users can access the multi- GNSS and an pages with OPUS-S. And GDx to replace DBX. And the first office of coordinates on 100,000 marks. Also coming soon we will have a replacement for GVx. It will be called GDX. And we will have an initial set of cornets on over / 00,000 passive survey marks, so you can see the changes are when we update the reference frames and data. And also the state plane cornets system release even though it won't be effective for a couple years from now. Later on this year we will have the ITRF 2020 Cornet functions on all the NOAA CORS and the network stations and first alpha release of GEOID2022 which will serve as the North American Pacific data, the 0 the starting point for measuring to see levels.

Looking further ahead to '24 and 2025. We expect to have a one-year role of additional products. It is basically going to be Domino style where we release one product and then we will release a second one and third one etc.. That will be building up towards the modernization efforts. So users can have an opportunity to see these releases before they are live and active. So they will get a chance to test things out and to see what the final product is going to look like. Then in the 2025 timeframe. We expect it to issue the official announcement that the modernized NSRS is complete and one new potential data. Next slide please. I know that was a lot.

I will shift and talk about some funding opportunities. About money for a few minutes here. I just want to highlight the fact that NGS was successful in securing the IL funding to help build out our foundation course and support GRAV -D D in the initial forecasting. And also collecting process to the Topobathy Lidar data, pointing toward the U.S., Texas and Maine on the East Coast. And one more on the topic of funding and please to announce that we release to competitive federal funding opportunity this past week. The objectives of this funding, the grant funding are to enhance the modernization of the NSRS and addressing the Agiotisy committee to help address nationwide efficiency of Gioticysts.

And I will cover a couple coastal-- in addition to the coastal mapping and shoreline products, NGS-- is important response and so this is a valve on the website with a link there and I invite you to check out the coastal image reviewer and again that data is available for Caribbean as well as the states. Next slide. Since the last HSRP meeting we have release a new version of Vdatum. SVU for short. Provides better information to users and where the models can meet their accuracy requirements center applications. Coming soon I will point out here, version 4.6 which includes updated Puerto Rico cut U.S. Virgin Islands regional model with SVU included. Those of you not familiar with SVU data it is a transformation tool that is supported by the data tool and co-ops and NGS.

More information about the foundational data and including the observations and benchmarks and the new water level observations that have been acquired. In the Caribbean to help feed the updated title data components in the NexGen topography of the sea surface and SVU and field shown here all in regards to the VDatum.

Next slide. The other one is the projects five which will move into production next month. This new version supports both campaign style, GPS survey control projects as well as real-time kinematic surveying. The new standardized file format. Survey network adjustments. And the ability for users to submit their data to NGS for review and publication and to export the results into a common geospatial file formats.

We are working on a user guide and online training videos that will be available soon. Next slide. The next set of slides want to briefly engine important topic that affects NGS as well as other agencies and the entire geospatial industry. That is the geodesy crisis. Some of you are aware of the situation and has been raised in the working meetings and geospatial professional groups and publications and by other federal advisory committees. The short version about a year ago, a white paper was circulated highlighting America's loss of capacity and the competitiveness in the field of geodesy.

And implications this has to the economy and national security. There is a link provided here on the American Association for geodetic website along with the resolution from the geodesy from the geospatial advisory committee which also makes reference to the NSRS and that is on the material to the right. Next slide. So as this image here on the right on the GPS world article shows geodesy is the critical tip of geology spatial information and it supports \$8 trillion geospatial economy. I don't have a lot of time to go into detail of the shortage of geodesy this in the U.S. but I would like to talk about the next we are taking to mitigate the issue as best we can. We are providing training and professional development and advanced education in the geodesy related sciences to a small number of employees at NGS. Trying to raise awareness and communicate the risk and impacts to having a shortage of geodesist and engaging nonfederal sticklers for a grant opportunity focus on geodetic needs and building workforce and again that was a grant opportunity that mentioned. Next slide.

I also want to highlight the fact that geodesy is a global science supporting international collaborative geospatial framework and as such the United Nations can be experts on Global Geospatial Information Management and also supports UN subcommittee on geodesy. SIRGAS and the Geodetic Reference System For the Americas the small states meeting was held last week at the UN and this was a preevent meeting for an upcoming FIG event that is going to have a focus on Caribbean Small Island Developing States, next slide.

Before I wrap up I want to highlight some basic foundational data in its use in planning for resilience. NSRS will provide the new consistent surface across the Northwest hemisphere that will line accurate heights, water levels, imagery and myriad of geospatial data sets. Emergency response imagery provides actionable data to help first responders identify critical impacts and planned response actions. And our NOAA CORS network enjoyed model provide access to the NSRS, even when existing and protector has been damaged or wiped out. We are trained to make it more accessible and as well have access to that even in extreme circumstances. Next slide.

And to close out my update. I want to mention a full day of content is at the upcoming FIG working week in Orlando Florida. This is the International Federation of surveyors, it will be held May 28th through June 1st. All the Americas is socially the small island nation states and the Caribbean are invited. Several of these small island states in the Pacific will be there as well to speak and talk about their efforts and successes in the Pacific region. Next and last slide. For more information on this event and NGS's update on the national spatial system modernization you can check out any of the available links are here. Thank you very much.

>> Thank you. And I think we will hold off questions until the very end here. So Admiral Evans your next.

>> REAR ADMIRAL BENJAMIN EVANS: Thank you Julie, can I have my slides please? Okay. What I will start while the slides are coming up just in the interest of time. Thank you for the opportunity to speak to you all today. Again it is really outstanding to be here in Puerto Rico. Gaining a better understanding of how NOAA's services can address specific requirements in the Caribbean. I will provide an update an activity since we last spoke in September and the strategic plan going forward. I have been in this job for just over one year. I guess it is more than just over at this point. But still feels, it has gone really fast. And with that time I have come to appreciate both the challenges and opportunities of the close survey and the nautical community in general. That is definitely plenty of technical challenges, I want labor most of them here, I know most of us are aware of those. Whether that is managing increased demand for the data products and services. Sustaining the workforce, new technology innovation, all of these things, retooling our workflow for the products and services, all of this with a lot of our plate. And is definitely a lot to work on but also gives us I think a real opportunity to define what NOAA I drug or fee and coast survey will look like a going into the future.

And with that in mind we are in the process of the strategic plan in the next five years. We have been working on this since a strategic retreat we had for the planning meeting. I understand it is not submitted yet. I have shared the high points with her so I will do the same, hopefully I won't get dirty looks from my boss. But I don't think any of this will sound [Muffled sound].

Want to emphasize that you know our core mission of supporting safe navigation is not changing. We are adapting our strategic when to reflect those coast surveys ongoing transformation into an organization that is more woke us on our data and accelerate our efforts to provide authoritative fit for purpose products anymore timely fashion. We also need to ensure that our strategy and goals are clearly connected with the NOAA strategic plan which was released last summer and we heard about that over lunch. And nearing completion. Into the point I believe Nathan made over lunch. We see ourselves strongly reflected in both the NOAA and

NOS strategic priorities. Because the success of those priorities depends on the geospatial infrastructure and the database to products and services that we provide. And I thank you make a good point about the messaging that goes around that but we see ourselves strongly reflected an integral to that full range to the strategies that NOS is implying. What are we looking at? I apologize if this is a little bit small to read. For school, deliver high value U.S. ocean and coastal geospatial data, products, services to advance safe navigation, emergency response, and data-driven decision-making to support a sustainable blue economy. It up that is our fundamental goal. Not just for the safety of navigation but the broad and growing range of ocean and coastal management of science requirements.

Secondly, enhancing and sustaining a highly skilled, diverse and thriving workforce prepared to adapt to changing mission needs. Or than ever our workforce is essential to our present and our future. I think we are all seeing that. The conversation this morning strongly reflected that. It is not just in close survey, it is the partners in the fleet, partners in the private sector and academia as well. And is really leaning into this and by moving this up traditionally through traditional things through the bottom of strategic plans. This is moving the bottom up higher in the list for us.

And thoroughly accelerating the evolution of the OCS organization systems and processes to improve the efficiency of data in product evolvment and delivery. This is a little bit technical. But it is so essential that we really felt it needed its place as its own strategy. Because this reengineering work is essential to delivering on the promises we are making. So that is a high-level overview of our strategic thinking. The overall plan will be more detailed obviously. We will have objectives within those goals. Assuming those goals survive the review process.

And we also will be following up with more tactical documents including an update of our novel charting plan was last released and believe in 2017 and internal guidance and annual guidance documents that we are in the process of evolving. So we expect that the plan will be out later this spring or early summer. That is our goal, later this spring is our goal.

And we will certainly be sharing that with you want tickets a little bit further through the review process. And achieving this vision is not going to be easy by any means. We have certainly a lot of work to do. But I think we are fortunate to have strong recognition of the value of our products and services and some really exciting new support for our program. Chrissy talked a little bit about this at lunch so I won't go in the interest of time I will probably loss to this. The FY23 on of us appropriation did include the-- Great Lakes mapping. A number of questions around this new center, I'm happy to talk about it. Probably in the interest of time I will not dive deeply into this. But we are developing plans for this that are consistent with the

language that is in the appropriation you can find it in the omnibus language but you can have the concepts and systems in the operations and provide technical support for mapping and surveying operations. Leveraging public and private partnerships to advance the efforts and most significantly and this is the point I was using with the news earlier. Evolving and diversifying the mapping workforce you notice that it is the mapping Center, are working quickly with ocean exploration and ONAO and with the fleet operation system center to make sure that this meets the needs of all of NOAA it will strongly complementing but not replace the were capping at the point hydrographic center and at the moment the University of South Florida. And it will help us do the things right that we have been trying to do for a long time but lacking resources, it is exciting and we will continue to have updates as the plans continue to develop and improve. As we say we hope to use this as an opportunity and continue to address the commendations thus far. And asked been discussed at length this morning. The omnibus reauthorization including funding for the class B vessels. It is tremendously exciting to us. Because we do depend on this blended model of in-house and contracted I should say perhaps is not a virus, contracted [Laughter] Hydrography so having support for the NOAA is essential for us. We recognize this did not happen by accident. The support of the HSRP and other stakeholder's recommendations you made and have made over the years with recommending support for the NOAA fleet have ventricle to achieving this outcome. Also the National Defense authorization act included a number of provisions relevant to coast survey. Christie touch on a few of these over lunch but I do want to know that the and E including two honors for my predecessor Admiral Brennan the first association of the Brennan reef, that now appears on our charting products. And second the Brennan matching fund has been formally designated as part of the reauthorization of the ocean and coastal mapping and to ration act. Revise a cost-sharing and inclined support with mapping partners. I believe we currently have one proposal moving through the phase and one in negotiation. So that is really exciting because that again gives us an opportunity to move down the path of the partnerships that we all know are essential to achieving our outcome.

The NDA also included the formal establishment of NOMAC so that is important because now both the executive branch and the legislative branch are aligned on how we coordinate within the federal government on ocean mapping. And as was mentioned the hydrographic services improvement act was reauthorized. So the program is on solid ground for I believe 2023.

So shifting gears, I want to share some updates on our accomplishments since we last met. I realize we are short on time here so I will try to make this brief. We are expanding our sources of data and approving its distribution that is really key to

our first strategic goal. As we discussed last year, OCS has developed guidance for data licensing which we are in the process of rolling out. We are also working on the hydrographic survey specifications and workable document. Which will have a significant impact, this is significant to guiding the field hydrographic. We expect public comment on that by early summer but we would be happy to brief HSRP prior to that if there is interest. You can see on the slide there is-- source, we had part of the Northeast and part of Gulf of Mexico will topic we now have the Gulf of Mexico fully built out with the exception of the Mississippi River. Also the Caribbean. Right here in Puerto Rico. The national bathymetric resources available. And wants that is a bubble that will support the portal and the mapping. I do also want to mention the data, not only just NOAA a hydrographic data but we have sources from a variety of resources. High imagery collected and cemented to the EST team by the Texas Water Development Board near Laguna Madre, Texas.

And we deal still face the-- at the front of the workflow and data acquisition which leaves the backend, product creation and dissemination under resourced. Which makes you know our goal is to deliver that data in a fit for purpose format gives us significant challenges. But the product updates are contending in this is an example that the paper chart cancellation process is on track. We are canceling about 30 charts per month at this point we are on track to complete that by 225.

On a more positive note the re-scheming progresses, it is a sweet based on the footprint of the original paper charts to a regular grid and fixed set of scales. And then applying bathymetry from the source. And then we have-- cells once it is delete. That is up from a total of 1600 currently.

Regrading this process of regularising the target is really so fundamental to many of the other initiatives including the Bathymetric source and the-- tool which I will mention here in a moment and the customization of the charts. We are approximately 20% complete with a regrading effort. It is accelerating as we continue but it is definitely taking too long. At the current pace we will probably complete this effort sometime in the 2030s. And that is not acceptable. We are in the process of aligning our internal resource to get it played by 2036. That is a significant realignment an excellent reason and it will not come for free. It will result probably in the ways an application some source data to the charts while we search the hydrographic resources to the grading effort. And will have more details on exec we how that plan will work. In our upcoming update to the nautical charting plan which we expect a release the summer. Thank you. I mentioned the NOAA custom chart tool, we released in upgrade to this just last week. The good dunes there is we incorporated a lot of stakeholder feedback. And the most significant update is that users can now save their own chart catalogs. To re-create later. We expect that support update service in the future. We also expect that will increase

the commercial application for chart printers. Who may be interested in working with the NCC tool. And Nick has slipped out, there he is, I will volunteer Nick to provide a demo of that for anyone who is interested anytime soon.

A quick update on what we are planning for the field season. As you can see we have got another busy season planned. We have 41 projects, it includes roughly \$20 million for insurer, high-resolution surveys funded by DIL to support the national water model. We have ships going all over the world once again. The contract projects are also diverse and those are still, many of those are still in negotiation. So I can't speak to the details of those. But it is another exciting year. Our work would not be possible without the outstanding academic support from our partners, at the hydrographic support Center, and I want to mention that we did have the first review for the center of ocean innovative technologies shortly after our meeting in Hawaii last fall, I really excellent visit. And that we are very excited about the direction that COMIT is headed.

International, regional and international partnerships in the interest of time I will gloss through this. But we had significant updates to our surge and tied operational forecast systems right here in the Caribbean. Two of our models, both the 2D and 3D models have been upgraded for the Puerto Rico and Caribbean area. And we both also have significant international partnerships underway through the empowering women and hydrography the program. We have-- and is of significant interest to find my inbox was blowing up with applications this year as I was looking threat last night. And this is for the regional international hydrographic Association, it is the assembly, we will be participating in that in the first week of May. We have a number of papers and proposals submitted for that. I will also note that Doctor John Nyberg who many of you know who is not here this week because he is in the process of working on his campaign for running for one of the director positions. At the IHOP so that would be a very exciting development for us.

I just wrap up again, a lot of challenges, huge opportunities but as I told the participants in the field procedures workshop last month, very proud of what we have accomplished in the last year. I'm really excited about the direction we are going. But I'm not satisfied. And I hope you are not either. There's a lot of potential here but there is much to do and we look forward to doing it. So thank you for your attention and I will take questions when the time is right.

>> JULIE: Thank you Admiral. Yes we will hold questions to the very end.

>> MARIAN WESTLEY: Okay thank you very much I am Marian Westley on the acting Deputy Director center For Operational Oceanographic Products and Services. And the biggest update is that Richard retired, we threw him a great party last week. And there was some nice speeches, and I will say that what we as an office gave to Rich as we dedicated the-- case to him. You may know that he built this gauge.

Maybe 30 or 40 years ago. And there was a betting pool in the office about when the hurricane would take out. Structurally very strong but under the water it was completely to do up by Marine waters. But stood and stood and stood so instead we get funding to replace it. So those are the two structures. The type gauge was an place so once we built that structure we picked up and moved over and it did not lose any operation. So that is dolphin Island, if you are in the bank please way to the-- gauge.

We do have some exciting news on the bipartisan law funding. We got funding under three buckets. Under the provision 11 we will be doing some NWLON station recap and that is critical and we have well-established recap plan so we will go through that recap plan an excellent rating the transition to-- level. And the other side that is critical is the IT side of the data in the data management so we are investing in upgrade to the IT modernization so think we have about 10 million over five years for NWLON upgrades. Under provision three we have money to support modeling and accelerate some modeling developments. So we are very interested in completing our suite of 3D hydrographic models-- hydrodynamic models in the water and coast. And also the OCS and IOOS collaboration. We will make an investment of about four and half million and 3 years of modeling. Then also under the some seasonal collaboration this is another big parts of collaboration of NOAA and OAR, here we work with coastal predictions we started some of this work doing investments in hind casting and building out three-dimensional grids of tides over the last 40 years to get a better understanding of how tides are distributed around the coast. And we will be building new products and services face on this kind of work. So this is about I think roughly 11 million or 5 years to be invested in the timescale and collaboration with a lot of great work being done in other parts of IOOS, NWLON and the weather service.

So you might be aware that NOS is leaning into you vibrations of the last years, there is an annual self-assessment evaluation and we have been invited to do business review so we did that. And it was part of what helped us stand up the business operations division and restructured the oceanographic divisions to be more noble. We also decided we will be first navigating external evaluation and we were excited to get good feedback. It is a critical time for us strategically where we are at the end of our last strategic plan plan and certainly looking forward to the future.

So we put together a panel, we know that you guys are very busy our first plan was to address all of you. Did our HSRP, we had a great group of folks, we had Nick can some and grant Poco from USGS, Captain Carolyn Kurtz from-- Joyce Miller from the University of Hawaii we all know, and Josie Quinn tell from the NIHS Association and we asked them to judge us on the relevant capabilities. And they gave us very

broad findings and that actually apply to everything that we do and so one of their, these were there five overarching recommendations to engage with sticklers as partners. And to integrate across organizations of products. To enhance and embrace open strategic planning. To increase our intentional branding and outreach. And to prioritize website and findability enhancements. I could talk about this all day so I will be happy to talk to you guys over the break about things that resonate with you and things that you can see but it was really a terrific opportunity to get some expert advice.

Update on ports. We have just, 38 Porth has just gone operational that is the Freeport ports. FY23 we did some enhancements, Valdes, Alaska and Kings Bay, Georgia and then Corpus Christi, Texas and then Pearl Harbor in FY23 or FY two for partnership with an U.S. Navy. And then Seattle, Washington FY 24. We are about 20% but that curve is about 90% of tonnage. So that's where we are with ports. And then because we are kind of at a critical point with ports we have come a long way. There is more to come. So we decided it was really worthwhile investment to ask for some expert advice. And so we put out a call for a company to give us, help us with the ports assessment. And that has been awarded and it is gone to Eastern research group and have about ten months to give us a report and we have asked them to give us the requirements for a fully built out system. So they will be engaging with all of the stakeholders to really find out, what do people really need, what is the minimum number, types and locations of sensors. And also look at the governance options supports. Will always done it one way because that's how we were set up and there are other approaches we could take two ports. And quickly this came up in the external review as well. Evaluate equity considerations. We have successfully put ports in place with groups that have the means and the capability to support that. So that is not necessarily everyone, everywhere who has critical needs. So those are the topics we are asking this company to help with us and we are looking forward to that report in about ten months.

We have some title current survey updates, so Delaware Bay, I think we are about done with that. Columbia River we spent a lot of time there last year and we are going back this year as well. So the predictions in Columbia Bay and Columbia River as well. It is critically important because it is-- between 2005 and 2010 to allow order container ships and ships we need to update the current predictions. And Savannah River we have had request from the pilots for an update to the current information for over ten years. So we are working on that one is here. And then the Charleston harbor is also we have field reconnaissance plan for the summer. So those are the current updates.

We been working really hard on the high tide flooding products and services. We have been releasing a report or paper based it is digital now, product and then the

annual Outlook and seasonal updates. So what we are doing now is automating that on a statistical basis so that we can produce those constantly enrolled time. And then they will be available on our tides and currents website. We are looking at both tidal predictions and then specifically combining that with what we know about sealevel rise. And then the non-tidal residual, so if we are detecting something we can specifically predict when you have-- not just typical positions but these other factors as well. That is mockups of what that will click and on the website we will release this the summer.

And so these are the other enhancements. The idea here is that you can look for your city and see which days in the year, we are predicting or forecasting high tide flooding. And then the other thing that is really critical for this product and many of our products are under development now, is all of these will be available through our drive products API so that a city or county or help district or whatever it is, can develop their own visuals and their own predictions based on the API and then update those in real time as we go over our updates.

And then finally the coastal foundation dashboard is one of the major products and services and we have updated that recently. So now we have all of the great big stations. Consolidation dashboards, all of you who are weather geeks who are completely glued to this product, over Christmas when that big storm was hitting Buffalo we were all looking at Lake Erie and see what that storm was doing to the water levels on the lakes. Also started integrating impact graphics to make it easier for people to visualize what flooding could look like we predict flooding or the dashboard is showing flooding. You know what does that look like where you are? And also integrating into those foundation dashboard the high tide funding Outlook and sea level predictions so that you can see for your region not just what is happening in real time right now based on the type agents but what are the possibilities going forward? So those are some of the new products and services. And that is my update. Does anyone have any questions?

>> Perfect timing I was just going to say, no, you were great radon. Okay Larry and Andy I'm not sure which one of you will go first? Okay.

>> And I will try to stay sitting but I'm not sure if it will be possible. Yes [Laughter] prepared with a microphone because I think I might have to get up. Yes, just in case. It is very difficult for me to sit and talk at the same time. [Laughter] well I will try just to be polite. Over the years Andy and I have presented a number of the aspects of the research at the lab.

>> DR. LARRY MAYER: Will that change if I push it, okay maybe I will just and. The last few months we focused our efforts with the hydrographic systems. We have more exciting results to talk about those that we will differ that to some other meeting. We will focus on 2 topics today. One is some work we are doing in support

of the precision marine navigation and the other in honor of Nicole and our presence here in the tropics we will talk about some of the work we are doing in support of coastal resilience of habitat mapping of coral reefs. I can do it now. Okay. So what I want to do though is start with a video that was made, almost 20 years ago. And this was and we envision this would involve high-resolution 3D of a project in our lab what we call the tour of the future. And involve full situational awareness and 20 years ago we were not aware of the capabilities of the topographic lidar so we were thinking of panoramas of videos. And again this concept that we thought the Mariners again from videos 20 years ago would want to see current information in real time. And would want to see the available to of the tort to be tied aware. Basically can see go and no go caution. On something that would really enroll time give you that presence. And I'm not going to say it was easy 20 years ago to make those kinds of videos. So these are all based on real data and not just computer graphics but it was all real data. We recognize it is not so easy to get the data protocols and data flow, the data throughput that we need to create those kind of products. That's why we are so thrilled to be seen the precision of the marine navigation because it is evolving to that capability. We are really getting to this point where we are going to have this true real situational awareness for a Marine navigators. We have some jumping forward even further in the lab. And looking at the potential of augmented reality and virtual reality and I think for those of you who visited that you have seen our lab and these kind of displays. Come back to this display, this is the lower end of the Mississippi River. Again all real data. But again I will talk about how this has been built up. This data set and you will see it is coming now from real NOAA data streams which is really exciting. The first place I will start is with our being given from NOAA just a standard download process of some lidar work that was done by David Evans associates in the lower Mississippi and it was about hundred 30 miles of lidar data of the vessels, it is not an airborne lidar. That represent about 100 million points per mile. Or 23 billion points. For that data set. And so this presents a tremendous challenge in terms of how you manage that data. Because inherently lidar data this is what the raw data set looks like. And so our visualization team worked on was ways to efficiently clean this but any navigational he appropriately. What you want to do is you want to remove not just the noise but you also may charting perspective want to remove those features that are-- shouldn't be on the chart. And again I really question this when I did this. So it turns out has worked out very nicely. What they did is really focus on using virtual reality and using an immersive point cloud editor and something they had played around with multi pin data but the lidar data, the complexity and the noisy nose, it turned out to be more effective and they go through all kinds of tests that show expert mentally that shows much much faster

than traditional techniques. And the handheld controls and tools within the virtual environment that would let them very, very quickly clean the data and be able to annotate the data of what to say what to not. The annotated with different object types. But at the same time because of this question of the femoral questions, the features and that chart. And that satellite imagery to come appear and get what is real and whatnot. And see how easy it is in 3D, the satellite so just flash and say yes oh no that is a barge that was there that day. I will take that out. And things should stay on the chart. And at the end of the day, I should say there's a little cut, if you want to keep up in real time. How are you going to do it and say this poor guy, he was very, very brave. We call it our nasiogenic study, and set in the wave tank until he got sick basically. And in terms of very easy to get sick in waves, it's very easy to get sick they compensated the waves. But from a motion sensors. I should say at the end of the day that 230 billion points or edited in about eight hours. Which is just I think for those of you have tried to edit lidar data quite a remarkable time. And the end product being something nice and clean, being 3200 nautical miles. And I was talking to Sean about this last night. Is this still yet the tools that as we create this now in a full 3D virtual environment. With augmented reality quite connotative in terms of the gaps, distances bathymetry and so on. And if we are ready to use these tools yet? I don't know if the answer is yes yet. We will continue to keep pushing. In the meantime I will turn over to Andy. We are deriving from this approach. Think tools that are easy steps for Mariners to use. And will push the next slide and Andy can take over.

>> CAPT. ANDY ARMSTRONG: So looking for something to use this capability we picked on Marianne and her ports system. And what you see here is an image of NOAA ports website for the bridges on the Mississippi. And this website delivers airgap information in real time. And you see the values on the left there. On the right you see there is image of the bridge showing the sensor location. And the airgap. In this presentation you can see that the airgap measurement is provided not at the sensor location but at the lowest point which may be in this case is over and near one of the bridge support.

So that is you know potentially limiting for folks who may be very close to the tolerance to come through. So we thought we might take advantage of some of this clean lidar data. We took the bridge right our data and used a commercially viable tool and trim down the parts that are pertinent to the display and created a series of contour lines for the bottom of the bridge and the sides of the pylons there. And then we can transfer those into the image. So now we are seeing that the image of the bridge with the lidar generated contour line. User can then take a mouse on the website. Now this is not on the website. It is hypothetical. You take a mouse on the website and scroll along and find the actual gap at that location

anywhere along the line. Now then if you wanted to type in your actual ridge height in the space there. You will then generate based on your bridge height the areas where you could successfully pass under the bridge in the areas where you couldn't. So the green would be an area you could pass and then the red not. So we will be working with co-ops to see what it might take and in fact whether it is a good idea to integrate this thing in this capability and to the system. And we will certainly, you know appreciate any feedback from you all on that regard. And so just to wrap up this part of the presentation. These are the websites where you can find this Point Cloud Cleaner so if you have a headset and some VR wands you can actually get this and clean some data if you want. And you don't have to write a boat.

Now shifting gears a little bit I want to talk about some coral reef mapping that we are doing. And this is work of Jenn dijkstra from UNH and Chris Parrish OSU and the weekend old town was full of Ohio State people. I was only person in town that was not wearing a red shirt. Anyway so Oregon state and then also Erich at the Marine lab. We know that coral reefs are together the valuable ecosystem. They provide a lot of ecosystem services as well as being wonderful for fish and create substance for fisheries and bring tremendous amount of tourism. We also know there is significant die offs and significant percentage of coral reefs have died in the last 30 years. So there are ongoing efforts to restore these coral reefs. And we need to develop some tools that help us make these restoration efforts most effective. And so we began with some work that also involved our NOS colleagues in COS in the Keys with St. Thomas and you see here with the lidar system. And some of you remember from presentation we had from a couple years ago and the panel the airborne lidar workspace and impulse to the surface and part of that pulse is reflected back to the sensor and part of it penetrates the water and strike the bottom and is refracted.

In that process and you see on the left there, you get return waveforms of different shapes and sizes. And we felt a number of people you might be able to determine something about the seafloor based on the shape and character of that waveform. And in that study referenced here, we were able to correlate percent cover of coral with functional groups of coral, you see the functional groups there, the branch hard corals and so on, and cover with one form of aspect with the waveform metrics. And we were able to correlate the Rigidity of the coral surface with the reflectance from the lidar. And then in this case we used some structure from motion photography as ground truth.

So with that done the team moved on to a somewhat different project in the Florida Keys sanctuary to compare the efficiency of different types of seafloor mapping systems in assessing coral habitat. And you can see here that they used satellite

imagery from satellites like ICESAT and they used ICESAT 2 and the multi-mounted multibeam airborne systems and actual diver stereo imagery. And what they wanted to do was to investigate how we might put the systems together or identify which kinds of the system would be most useful in the coral habitat, and the coral management. And so as it turns out we are using systems with a wide range of uncertainty and spatial resolution ranging from satellite imagery through multibeam and lidar to diver collected structure from motion. All of these have a different uncertainty and different level of lower resolution. Now what is it that is important in this coral habitat mapping. So two minutes. Okay. And so the idea is we want to restore a coral reef, we need to have, we need to do it in the right place. So some places that will be successful in the restoration and other places not so successful. And if we just have one kind of system cut like a satellite view or we put divers in the water in one place. We have a very limited perspective of that. This we use all of these systems together we think, we can determine where the coral will have the most likelihood of success. And suitability and combine that with what we know about the coral species and with the environmental variables in the area. Hopefully to lead to a much more successful approach for restoring coral. And I think that is all I have. Thank you.

>> Great, okay well thank you very much and you know it is our break time. I don't think we will take questions now. But you are here. Is that all right? [Laughter] and yes? Pardon? Public comments in five minutes? Over the announcements. Public comment is at 5:00 PM in your agenda. So I think we will take our break and then let's save our questions and catch you around. Okay thank you very much and if you have questions for Juliana you can submit them and Gaylene can take them or pass them on and if he knows them himself he can answer them himself. Thank you very much Juliana. Okay.

[Break]

>> JULIE THOMAS: We will just go ahead and get started in two minutes. Okay can we take our seats please? We are going to go ahead and start.

>> ED SAADE: Okay I'm going to start because we have a whole bunch of eager people that will be talking. I am Ed Saade, we started talking about sustainability stuff in the last weeks and months. But is deftly getting more active. So for the purposes of this meeting I will read from his notes to get everyone thinking and really to stimulate a conversation with some ideas that have been thrown out in the past couple of weeks. And then also I will hand over to Ben and--

>> Are you leaving today or are you here for the session? Okay call on Nicole after you.

>> ED SAADE: I will hand over to Nicole and Ben and then everyone else can jump in, right? Okay. You guys will need to school is for me. We have been seeing

conversations on sustainability goals. The metrics are carbon output and footprint, economic inequality, carbon change and offsetting, there is a lot more. We want to focus on those metrics most impactful or relevant within the three organizations that represented that the panel deals with. So OCS, NGS and co-ops. For this discussion at least initially but you guys can take it wherever you want. It is really to focus on carbon footprint and output and urban offsetting how we measure that and what is going on and how some of the ideas are. Scroll down please. A quick summary of part of the discussion, what to measure? Obviously vessels, aircraft and automobiles and the ones that NOAA controls or owns and operates. Also the contractors and supporting companies and groups that feed into NOAA and that also thing about the transits, how much carbon is being spent or generated and should say relative to air travel or vehicles? And other third-party deliveries and things like that. It adds up mindlessly if you work on it. Operational efficiency, this is one of the topics that Lindsay brought up. It is trying to be, thinking ahead of the time for local assets, personnel, suppliers, the types of equipment or sensors you put out there which you know is, can you demonstrate that there is a big saving in terms of the carbon offset when you invest in the newer generation that might have a wider swath and more dense data, data density during the analysis.

Alternative methods. That is vessel versus aircraft, uses satellite versus archive data versus whatever other people come in. And then show they are getting data from the third parties that might be available in that particular area. Next slide.

Some more recent examples of the analysis and the discussion and we came up with the right multibeam system for the right water depth especially in deep water for efficient, minimal vessel transits and large swaths. Again aircraft versus vessels. Small efficient sensors and aircraft for longer department legs, in other words a lighter, nor system and a smaller or may be autonomous aircraft allows the airplane to be in the field collecting data for what would have been to lives could have been one live. And all the data on that. And satellite derived data versus boots on the ground and share data sets versus redundant measurements.

That is the feed into everybody that is a real quick summary. And Nicole or Ben who wants to go first? To comment? If you don't go quickly then Lindsay or-- will jump in [Laughter]

>> Can I ask you to do go to the previous slide perhaps? I'm trying to figure out how we are framing the conversation. Yes. Gosh. Not sure what direction you want to take this in. And I think the reason I'm pausing here is because the issue of sustainability of maritime system and reaching in all these things is multi, multifaceted. And really depends on what goals you are trying to achieve.

>> ED SAADE: For the purposes of this discussion it is to start the question, what are the low hanging fruit that we can start to measure, what are the low hanging fruit

that we as a panel can recommend to you all within NOAA to start the target and maybe have some actions?

>> NICOLE: So a couple of the comments I heard this morning that took no of in the I found helpful to me because I had been sitting in on a right of conversations whether it is related to decarbonization, shipping industry or of ports an environment of justice or reduction of noise underwater like all of the things that I'm hearing. What I took no of this morning had to do and this was sort of a combination of a-- and Lindsay's comment. I do think it would be useful in that doesn't mean easy. And so I don't want to jump into the difficult to quickly. I do think it would be useful for NOAA to try to determine his current whether that is greenhouse gas emissions or whether that is noise production, whether that is right, ask yourself some of these questions of what we are putting out there in the world. Right? We believe that we would like to do better on down the road. And that doing better down the road takes time, begin to estimate what our current impacts are. I think that is really important because later someone will ask how well did you do and if we don't know then shame on us right? So I don't know how easy or hard that would be but I do think there is something that we need to do their. And I am a little embarrassed to say that in terms of our own operations it really had not occurred to me that who you would be looking up to operational efficiencies as a potential way to reduce some of the impacts that we are having on the environment. So I thought that those were really useful comments. That we could that it could also be measurable. And trackable. And I had not thought of that. The conversations that are coming to me mostly and then I will turn it to Admiral Evans. Have to do with multiple simultaneous benefits. Right? Multiple things that can happen through you know, maybe it is half a dozen good things that can happen through two simultaneous activities.

I'm hearing that the true decarbonization technology that will be required for that for the large ocean going vessels, I mean Godspeed but we have to move now in different ways. Right, that has to happen that will take so long that what are we doing today? And what are the co-benefits, for example of slowing vessels, of making shipping routes more operational. I'm sorry more efficient. And measuring the real to co-benefits. If you slow a ship and just said that is a good thing to do for your operational reasons. Did you save fuel cost? You save manpower time and salary? Did you lower noise in the water did you lower particular matter, did you lower... right? So you could as an industry or company say yes that action that is good for my bottom line I also did the following things. Which I believe is really the first step to having a conversation about having maybe a double, triple, quadruple or more bottom line. Right? If I slow a little bit more or me that route a little bit different I could then gain these other things. Right? And that's where I am hearing

a lot of conversation about the simultaneous co-benefits. And efficiencies that can be found. And the estimation of tracking those. I hope that helps. This for me personally, this conversation goes in thousand different directions very quickly. And so I am always kind of nervous to dive into such a deep pool. But thank you. And Admiral Evans you want to add or subtract anything?

>> REAR ADMIRAL BENJAMIN EVANS: I will simply go and decide whether I at anything. I simply appreciate this conversation as against two things I have thought about over the course of my career. And if Admiral Smith were here he would actually take this opportunity to tell us about the work he did at the CEO of Thomas Jefferson to dramatically reduce their fuel consumption through some just clever, very Admiral Smithy, clever and tracking changes to their operations.

I think for me as we think about how can we narrow the focus here two things that are within our capability to address and change? There is kind of three main thrusts for me. That I think about. And that maybe to limited I don't know. It is just what I have a thing about on this.

First is, how do we baseline, how do we track the carbon footprint of our current operations? And I know there has been a lot of discussion about that and I wish everyone were here for this conversation because fuel consumption at sea is a big part of that. And as you noted it is not the whole piece at all. But it is part. You have to start by at least figure out how much fuel you are using and where it is going. And right now I think we struggle even with that. And having ships that are 50 years old and we are not will to anyway with fuel economy or checking any a of the fuel consumed or any granular level in mind. So how do we do that? How do we build models that not only track them forecast that into predictions of carbon footprint. For proposed operations that allow you to twiddle the knobs and optimize. And is not just about the ship operations, this is about moving the people around. And is this choice of sensors is Lindsay pointed out and the choice of sub platform, do we do this by ship, a crude system, you know, and we are seeing some very great promising instances there in the fuel versus crude platforms. So we will figure out how to track this and we can figure out how to incentivize ourselves and others to do the right thing. And this is a challenge cup more of a challenge than you would expect. You would think that you know is a government agency we are not, we don't want to burn more fuel or have more than we need to. We have budgets and ultimately this comes down to cost in many cases. It has proven to be difficult, partly because we don't have a good model to incentivize this for our internal operations.

And then I think it is also important to the about how we incentivize this for our sector partners. And you shared the UK Joe criteria for carbon footprint which I poured over that, I shared it with Grady and we were both like ah! Here it is,

understanding that the DE you and Europe been far out in front of this, I really wish we had AG oh here, our acquisition And Grants Office we invited them but they were not able to attend. And I don't want to put words in Bri's in mouth when we approach them this last fall and this conversation kicked off at the last meeting think basically they were like that is nice we just don't know how to write a contract that way. It is just not in the, in my mischaracterizing that Bri?

>> [Speaker away from microphone]

>> REAR ADMIRAL BENJAMIN EVANS: One more thing I was going to mention but it looks like Nicole you have a comment.

>> NICOLE LeBOEUF: After you.

>> REAR ADMIRAL BENJAMIN EVANS: Thoroughly and I sure this by email with many view. So how do we track, how do we base our own operations and how do we incentivize improved efficiency in our operations? Then pivoting it, how do we use our data products and services to enable reduced carbon footprint for the industry at large? And certainly you know Larry showed it the old video of the tide aware chart and the streamlines for occurrence. This is been in our minds for years. Utilizing the water space in a perfect world we can reduce support congestion which reduces later times, if the ships in an out of port faster. And when they are at sea utilizing surface currents for more route optimization.

We have a lot of ideas around this, we think there is a market there. But we are not sure. And we are these are big questions and I think that is an area where I will say for myself. I think really need help figuring that out. I talked to Nicole about the possibility of will is this a Marine board study topic or something like that to really dig in on this. And figure out if there is a there there or something that is just kind of nice in our heads? So those are the three things that I think about on this topic.

>> Brady did you want to say anything?

>> [Speaker away from microphone]

>> No, no, I thought you were done sorry.

>> Is it on?

>> Yes.

>> BRIANNA: Yes so we are in the process of setting up the next services contracts we approached ADO and how we include those in the next round. There was no-- without risk move down that road. And not speaking for the entire federal government but for our group within NOAA. That's all I wanted to say.

>> ED SAADE: So I will open it up, go back to Nicole sorry.

>> NICOLE LeBOEUF: Sorry and I know I don't have much time so I wanted to just say a couple of things. This is a topic right now for which the U.S. has taken a leadership role. The White House is very keen to move forward on the green shipping initiative. Major Spinner has asked me importantly what I'm going to do

about that. So we are having some conversations and thinking about what that might mean for us. But I do think we are an opportunity to push ahead and even how we will ask questions and model and that kind of thing. And so we are having some pretty good internal conversations about this.

I will say that there are precedents that we can draw from. And the office of national centuries is not here today they do model the greenhouse gas emissions and articulate matter in missions and noise emissions from muscles on the West Coast where the state of California has decided that thou shalt right? Reduce these bad things. And that has been very helpful. That has been a model for incentivizing these new behaviors. Because now the ports of LA and Long Beach can reduce their fees if ships slow down 40, 20 nautical miles or whatever that is offshore. And they are getting good compliance rates because they are required to reduce particulate matter and greenhouse gases and a can of thing and under California law. I will say near and dear to my heart for every nautical mile of speed you can reduce on a vessel you reduce the ability of lethality of a whale strike. We are rapidly losing Atlantic whales but why would we want to hit a humpback, or thin there are things we can do that make sense and we can-- and trade and that and that as corporations in this industry. I'm sorry after Miss the rest of this conversation because I could go on about it. But thank you for taking the time on it.

>> ED SAADE: Thank you Nicole. Before I hand off I will just remind everybody from all of us old guys we used to through our trash over the side, we use to pump our-- over the side, we used to do a lot of nasty things that are unheard of nowadays.

>> CAPT. CHOPRA: I was going to say to Nicole let's not try to reinvent the wheel. USAID has put something in practice and working on this. What I'm trying to say is other agencies are working on it. We talk specifics for the fleet. Because the relations do not apply to fleet. So the negligence do not apply directly to NOAA fleet but there is some good stuff sitting there which can be adopted which will help us. Then we are talking about breaking it down, it is already there, scope one, scope two an scope three. The world is already sort of accepted scope one in scope to. Scope three is where they are stuck. It is typically 2060 depending on the industry, scope three which you can't control. And then of course you line up with you said they are slowing down. That's called EPL, right? And you don't want to do too much EPL because there is a limitation on the renewable safety of the vessel. So is a double edge sword. We typically design where the vessel is concerned, three headings. One we say is operational which is much easier. 2 design which is more at the shipbuilding stage and third is when we talk about technology-based. So when you're talking about engine optimization. Which optimize it to reduce the emission. So you have all three levels which you can apply and work forward. And there is enough precedents just to give you EPA has a center of excellence on this. I

don't want us to tie ourselves down on decarbonization and reducing carbon because carbon is one of the elements but look at hear what they have done and look at what they signed up for. Talking greenhouse gases now. Not talking only about carbon. Because it has a larger picture. You know, just trying to be selective which may not be worthwhile. So let's stick with greenhouse gases. Let's stick with methodologies. There are a lot of groups associated in this world which have been formed by Western interest who have created questionable standards. Which were favorable to those interest groups. Do not go there, go for standards which are international. Which are already signed off as treaties by United Nations, by EU, U.S. rather than cherry picking because they have cherry picks. And there is lots of legal battles happening even today. On these cases. So that is a huge amount of stuff which can be done. But you know you said people, you said systems, I mean I have made tons of notes on this. And I teach a class on the so sorry. [Laughter] I love this stuff. But I teach at a couple of places how to implement. And all I can say is set some time aside, start with educating leadership. Deciding what you want, have a facilitated discussion and decide how you want to proceed and then have that education for your operation staff and then for your stakeholders. And there is precedents in the market, there is a timeline, there is a cost, all of that can be laid out. But we should not get, a one critical thing. I believe we made this mistake very often. The difference between sustainability and decarbonization. Sustainability emissions or sustainability and ESG. They are not the same. They are not admissible they are completely different things. Sustainability includes profitability, includes various elements while ESG and emissions management is really inward looking from a company inward how they are operating. To make themselves more-- while sustainability is more on investment element and how invested that company is. That's how the term was created. So we need to appreciate and that space so thank you.

>> Okay thank you.

>> ED SAADE: Do you want to go--?

>> DR. QASSIM ABDULLAH: Yes just a quick comment. And I appreciate the Frank and openness by Nicole and Admiral, definitely. It is nice to know we recognize as a problem and we are looking for help and I just want to maybe reiterate what-- said. It might be worthwhile to bring external consultant, globally there is mobile respected agencies and societies they can give us some direction within. That's all I want to say thank you.

>> ED SAADE: Larry.

>> DR. LARRY MAYER: A were markable amount of time in the green acidification, for meeting certain admissions requirements and from a sound scape for selective, actually monitor the sound of the vessels so think as others say there is a lot we can

learn from others. The other part as I listen to the conversation is and I think people have said this but not directly. It really needs a change in mindset everybody needs to be thing about it. There is a lot of things that are positive and we are just not keeping track of and not thinking about it. As Brianna said about the requisition and contracting end of things and not game out yet. That is from a top-down everyone has to start thinking about an internal you figure out how to incentivize rewards for demonstration. And I suspect there are things going on that we are just not seeing.

>> Vancouver's policy ten years ago we had to a moment it and measure it and get that going. That was 2012 we started and there are actually quite a few ports in North and South America and of course-- has this as well.

>> ED SAADE: I think that is important point Larry that the other thing we did not discuss and maybe this would be of interest to NOAA, every company or organization I'm million with there is a tremendous grassroots effort on the staff. Particularly the younger staff but they really care about the stuff and they really want to make it happen.

>> DR. LARRY MAYER: This becomes a recruiting and equity issue also. This is what people want now.

>> This is a really fascinating conversation and I count myself among those younger people, not that young but I feel passionate about this. I want to offer a different way of thinking about it. So NOAA is getting a bunch of new ships and they will be great for the next 25 years. What percentage of ship time is used for surveying? Bathymetry.

>> That is a good question it depends on the ship.

>> Is a little or a lot? /

>> REAR ADMIRAL BENJAMIN EVANS: So the new ships are supposed to sail for up to 250 days a year. And the current ships sail somewhere one her 50 to 180. So depending on which question you are asking.

>> What I am hearing is a significant portion of time.

>> REAR ADMIRAL BENJAMIN EVANS: For those ships.

>> This is something I have thought about for a long time around now and doing research on. What technologies can we invent so we don't need ships to do surveys anymore? That would be a wonderful way to reduce the carbon footprint right? And I might just do a little bit, put my self, what is the word I'm looking for? But the hat on where I am sort of telling you a little bit about the work I have done in the past. My research group has really focused on using remote sensing technologies to differ and infiltrate. And in some cases we can do it quite well of course it is not as good as a natural Sony as far as the remote technology you see a lot of surface features and there is a lot of features on the surface of the ocean that are directly

linked to the telepathy. The rate of the wins move are very will see related unless you are in deeper water. There is a certain region of you know of the close that we can map without ever needing a ship anymore but we have to invest in these technologies are very different and you have to be open to the idea that something other than natural sounding can get us what we are looking for.

So I am wondering this is a different way of approaching this question. I'm wondering if there is investment that can be made now. To develop those technology so that in 25 years from now you ships are ready to retire you won't need as many ships going forward for instance.

>> Sorry Nicole is gone but couple comments. Two things related to the operation sustainability and the other ones piling on but also another aspect is I think from NOAA or NOS is what data and what services do you need to provide the support the shipping, the future shipping which is going to be automated shipping, regroup planning in all those. So do you have enough services from co-ops and OCS to support what is coming in the future? And I don't know whether, I know you have thought about it but I know it is like who do you need to engage with in the shipping industry to know who that is? So that is one aspect. That is just separate think that you need to address. I'm sorry, I think we need to discuss further. And maybe we have contacts. I think one of the ones was actually Captain Sal from Carnival Cruise line was a great, they were really that was critical to what they did. And a good contact still I think for that. The other thing I think they talked about with the operational efficiency. And it is little bit different from the government perspective. And it should be not spending money I guess is what you are trying to do. But need to think about, and I think that goes now and in hand with the sustainability of however you define it. And I use that simple, I will beat the drum again. It's like you can now say it is a broken record. We could stay there for a few years but that is a cliché I guess people have broken records now. I just went out and we looked at Johnson at all that happened to be out there. And looked at what was map there. And it is about 300,000 km² miles. You take it a 30 kHz about their and is about 12 days or if you do it with a 12 kHz ship is 50 days. So it is one third of the time. Most offer him efficiency is like one third of the price and \$50,000 that is significant. And everything you don't have a ship to come in. Yes we think it rid of the ship but we are still meeting the requirements of what is required of that to cover that I think. So that is yes and that's why I wanted to talk more to Ohan, I'm not sure we talked about the relationship of who decides on that efficient operation not in the operation the way I think she was thinking. Yes it is all of the improved assets. There is the better engines, the better diesels and all that. But is like how do you run a survey efficiently to gather that data in the shortest amount of time and you know what the less fuel and what the ship did with the TJ and all those for

things? So think that is something that can be addressed and having the strategy for the longer-term I think is something what I was thinking. Not getting rid of ships, I think-- did it, I like ships. But going from now to what is 20 years going to look like and what do we need in those crude systems? What do we need in the crude systems because the ships to have another role of being that meeting there is a big U.S. like sitting out in the middle of the U.S. ocean, and that is the role to define I guess a part of the assessment of that. If there is nothing out there, how does that affect the national security? So I think that is important. To balance up. But there needs to be that strategy and I think well yes it is other, there is sailing-- now. There is electric solar powered ones. So is the full strategy for in 20 or 25 years time that we can address that know what I think taking a leadership in this is a real opportunity if the government is sitting those roles. The other port like Vancouver and places you can sit regulations and other people can apply but you better be the one measuring.

>> ED SAADE: Thank you Rachel you are out.

>> RACHEL MEDLEY: Hello did you see my handwaving? [Laughter] hello Rachel-- exploration division NOAA and topic. So much to unpack. From what has been said I would like to say the ocean explanation we are in a different part of NOAA more of the R&D space. So a lot of the things that different line of OCS is looking at different tools and technologies to accomplish multimission sort of activities. And I think that is the key there. Is that when Ohan spoke earlier this morning she was talking about the plan and these new ships being multimission. And so it is really not just about had your graffiti anymore. It is high draw graffiti and. So there are efficiency-- happening in all these platforms multimission and just what that means is it to be determined but in the ocean exploration we have an ocean exploration variables document that basically allows for 14 core ocean data sets that are important to a variety of disciplines and sectors and we try to acquire in conjunction with partners and our vessel. And in a standardized way. One of the things that our office has pioneered in the last decade since-- vessa is tella operations. When you think about reducing your carbon footprint it is not just about are you sailing a ship or aren't you-- and so we think about the tella operations. If that is new to this group, what I mean by it is the -- Explorer has a basically a dedicated science network where we have two way live communication from ship to shore. When I say two way it is not passive, it is active. Meeting we have scientists contributing, continuously. And hydrographers standing watch constantly. And this was huge, we did not have to delay our operations despite people having illnesses. We could still go out and sail and there was no impact to our ship schedule. Because of tella operations. So if we are really thinking about what can we do now to reduce carbon footprint, to me it is a pretty obvious answer. Invest NOAA wide and fleetwide in the tella operations

and make sure that there is a broader immunity that knows how to maintain and operate those systems simpler to what we have now. And the multi-advisory committee will go out and they are just got off of the-- to be able to calibrate the systems and make sure that they are ready. And we should have the same thing for tella operations and we can really expand impact across the science community. That's all I wanted to say.

>> ED SAADE: Thanks. I will throw a little curveball here quick. Mary, is there any talk of E vehicles for pleasure boats?

>> MARY: I must have had a will board on my head, yes the Miami International boat show completed about 1.5 weeks ago and that is putting much the future of what is going on. The issue from a recreational boaters point of view is similar to electric vehicles. It is the cost to the consumer. And getting them up and running so your MMA partnership would be awesome. It is something that we are, ourselves within the organization that I have grown up with which is United States power squadrons has its educating voters. One of the things that every organizer knows if they are not involved they will go elsewhere, it withers nine profit entity, whatever. We used to have a cooperative program with the United States Coast Guard. Cooperative charting and we used to do the soundings.

Sitting at the time about \$700,000 a year in taxpayer dollars. By utilizing recreational boaters to do those types of an ICW soundings and such. Things run into, the things that happen in programs just the end. But you have an opportunity, NOAA has an opportunity to engage or create a program and bringing those recreational boaters who are on the local lakes, ICW, don't hear and the squadrons across the nation, you have 25,000 people, past and present boaters, active boaters. Use them.

>> ED SAADE: Thanks.

>> You have ten minutes.

>> ED SAADE: Okay we have a few minutes if there is any other comments to make? Go ahead.

>> I will respond to my friend-- comments which are common start excellent as they always are. There is alternative methods and looking at this as there always are, lighter methods and satellite symmetry, the things you are talking about which a number of people have looked at, Rob open type of indications looking at the surface indications are great for indicators as right now I think satellite drive bathymetry I'm not sure from a hydrographic perspective yet that they can achieve both the resolution accurately and vertically that would be needed for a chart.

>> I agree, we have 25 years together.

>> DR. LARRY MAYER: Physics runs in the way as well.

>> But not everywhere.

>> I wanted to ask a I had and asked from NOAA knowing that we have so much technology and so much satellite capably. Know that media mapping was done and it shows how much fugitive emissions we have especially in the production stage coming to the road. What about using the and scope three of the maritime site? Do you think NOAA think has the capability of expanding that to all greenhouse gas emissions? Then is very similar way to get some sort of data

And today this satellite measurement has started and is only there on the back foot. The other one I thought was you know we are focusing on air and what is happening in the industries, we are watching and putting in the water. So what about, is there a way to measure ocean acidification? Accurately measure that, work at forward. Because that will dictate future methodologies which are coming in. What we have done is we have taken very poor fuel which is really band and now using it and increase the carbon footprint by 2.93% and washing into the seawater. But because it is economically profitable you are doing it other than environmentally friendly. So if we have those objective measurements, it would help. And last but not least it might be worth even looking at thermal trails. So we have so much of satellite data again if we could get shipping thermal trails knowing how the green cord ours are which is U.S. national policy monitor those and will tell us what we are looking at at this time we are missing objective baseline data. So the more objective baseline data we can put out on this, people who are, it will be informative for noncompliance and compliance and making policies going forward. And that would be my asked from NOAA use the megaphone to get this going and see how to limit tree and a I can manage this.

>> ED SAADE: Okay thanks. I'm going to go ahead and wrap up. Okay. So there is a lot that has been thrown around here. Obviously we are not going to satellite here. I would summarize it from my perspective is as we talked a little bit briefly in Hawaii to figure out a way to start to measure it, everyone agrees we need to measure or NOAA used to start to measure these big various contributors to find out with this baseline is for we start to mitigate anything. So that would be one summary from this.

And then to take advantage I think it has been said a couple times but to take advantage about what has been already done. There is plenty of success stories on various large vessel owners at least that I know of in the U.S. and obviously in Europe as well. As well as other agencies both in the USA and Europe they are already having success on this. Take full advantage of that as well. And I will, in closing I will add, I visited the UK-- in September 2019 and as I wrapped up the meeting I said are you guys doing anything for sustainability? And they said oh we are being asked to look at it. And then here is by the end of 2022 they came out with this incredibly rigorous, full-scale methodology. And a pandemic in the middle.

That is a pretty quick turnaround. And I think the one thing to be cautious of, that I would say to know is things are happening and they are changing fast. And I think somehow, somehow this needs to get addressed. Quickly. Because before you know it, it will be much bigger and faster and even more compressed time. So with that, thank you everyone for the contributions and it is nice to see everybody so engaged. And I will wrap it up and Ashley you are next.

>> Thank you so much Ed and to the panel and for Admiral for coming in their. And this can be a continuing discussion. It is not going to stop here. So within our panel we will have more time to bring this up and discuss it at different times. But now we are waiting for the long last LAAAST presentation here from Ashley. Ashley you do know that at 5:00 PM we have to break for public comments? That is fine we have more stuff to wrap up as well.

>> ASHLEY CHAPPELL: Okay. Okay finally. Get to our favorite subject as Admiral said. Standard OSHA mapping protocol.

>> As everyone know Ashley?

>> ASHLEY CHAPPELL: Just for the record I am Ashley Chapel, I am NOAA's, some integrated mapping program director. And so a lot of the subjects that you touch on, a new members and old, and the HSRP deliberations relate to integrated postal mapping. A be not this will focus but there is usually an element and everything that you are talking about that relates to IOC M which is what we call it. So I am a long time fan and participant.

So today it seems to me that in Hawaii I was not there and I apologize for that but I think that Paul was standing in the way between you all and dismissal and here I am ending the way between you and your sangria [Laughter] or something Nicola, [Laughter] if I can get through this quickly and we can go to the next slide please. Oh this thing. Okay I was about to use my phone. [Laughter] okay we will quickly recap the standard ocean mapping protocol. A note all talked about last time but not all of you were there I don't think. And I will just update you on where things stand and what I need from you all. In relation to this. Today we have been referring to NOMECA a lot, I'm not sure if everyone in the audience or around the table knows that NOMECA is the national ocean metric and characterization strategy. Has been for a few years, and both as the Admiral mentioned today, has been with the 2023 your tries Asian priority areas act. And eyes of the Council so it has some real have to now. More than it did before but it was pretty happy for us but even now more. So just so that you know for integrated and coastal mapping the goals that we tend to focus on in the strategy primarily are number two, you can see it here on the screen. Map the U.S. zone and number four develop and mature new and emerging science and technologies to Matt. But under goal two, we have

important objective to develop A Standard OSHA Mapping Protocol and that's what I will be talking about.

The SOMP is a standardized technical protocol for Ocean and Coastal Mapping data. So we can be on the same page about how we approach mapping of different types and you can see the list of this particular protocol covers. I will leave the last one, the first one until last but it covers the likely suspects. So very familiar, acoustic and lighter bathymetry and the seabed and lakebed backscatter and water column data, side scan sonar, sub bottom and some are a little less familiar but participate to other agencies in the integrated coastal mapping is the ring to magnetometer data. Right there at the management which cuts across all of those and we try to cut across and try to put a big Asterix on this protocol. Why we have a SOMP as we call it? We were told to do it and actually we were asked if we could do it and we said let's include this in the NOMECS strategy to work on a SOMP so we did that and so that to reiterate that the goal of the SOMP is to minimize the invocation of effort and help us be consistent as we approach mapping and consistent with each other and help the data be integratable with other data sets.

And you know preserving that and stewarding that data so that it gets to the people, really any people, who can use it. Whether it is mapped many times and use a lot or mapped once and use many times. We hear different slogans as we go this year. But yes again it is that need to maximize the existing, maximize collections that we have efficiently. To make this use the best use of the taxpayer dollar.

Okay how is it developed? We put together quite a large team in our agency team. Part of my inter-agency working group on the working group and coastal mapping the I cochair with Army Corps and the U.S. geological survey. We really looked at a lot of different standards, different best practices. We had actually to kick this whole thing off we had a very robust symposium back in October 2020 where we had the public come in and talk to us about what they wanted to see in the standard ocean mapping protocol and then we establish the writing team. And as you see on the slide the subject matter experts and contributors for all seven components. And the idea is that the standard mapping protocol is a living document really. It will be updated in the next few slides are really just what the chapters are about. This is a very technical document. It is not a policy document. It is and we really tried for the most part to be platform agnostic but the sensors that we were looking at are specific here to sonar, acoustic and lidar. And of course the important features about quality control and all the things that you need to do to get good bathymetry out of your efforts and similarly with the backscatter, water column sonar. The backscatter chapter I think really caused a lot of headache for our team until they settled on the fact that the Geo had backscatter working group

had really done the best job out there and it just for of adopted that until for the backscatter measurement by the mapping sonar. Those guidelines and recommendations. As you get into this you will see that chapter advocates for using that. And basically following what already exists.

Side scan sonar, profiling and similarly hitting on the key features and factors for each of these. And Magnetometer and data and can't emphasize data management enough for accessibility and utility and the broadest spectrum of users. Access making sure that they have access to the data.

So is happening with the Standard Ocean Mapping Protocol this is where-- had to leave off in Hawaii because we were still eating on clearance to release the document but we got that and really pushed it to get ahead of this meeting we did not have to talk about smaller session but we can talk about it here. It is out for public comment, 90 days, the federal district notice has hit the streets and I have a link in here. So in talking to you today it is opening up to you all to choose to review if you will, that is our request that you take a look at it and provide us your insights and comments and you may share it out as broadly as you like. And then after we get those comments back from you and other members of the public we will sort of coalesce and respond to comments and incorporate them as needed.

>> JULIE THOMAS: Can you share that link, email it out to the panel? Thank you.

>> ASHLEY CHAPPELL: And then we will recirculate after all the comments have been incorporated and call it final for the final version. I guess we will call it version one [Laughter] before we come back to it in a few years. And again as a living document we can updated as we go. And I think that that is all I have. I can take questions. I do just in case you wanted more information on this I have backup slides if anyone wants to look at this later. If you are not that strong on what NOMEK is they follow this presentation. That's really where I wanted to and is asking you to review the protocol.

>> JULIE THOMAS: Great thank you so much Ashley I'm excited to read it. It's been a little while. We have talked about it at a few of our meetings haven't we? So it will be great to look at it and I'm sure there will be feedback from people here. So I think that we should move forward just because it is the end of the day.

>> ASHLEY CHAPPELL: Okay that is it will thank you. Over the next couple of days if you have a chance to look at it, we do have time on the agenda on Thursday to discuss anything.

>> JULIE THOMAS: Exactly, exactly thank you so much. Does anyone have a quick question or should we just move on? Yes go ahead.

>> I have a quick comment, thank you Ashley, this is in the right direction definitely. I read through it quickly. My only comment and also the public comment, maybe we need to add, because if we are going into executing the NOMEK strategy and

talking about-- because that is my background. You talk about it in the document. We might just need to quantify that. You know for this coastal cut what accuracy range we are talking about for different classes and I mean accuracy mentioned, it was mentioned in general. And you endorse ASBRS which thank you because this is my baby there. But it will be nice maybe for the user and NOAA and and if we are going to use this bathymetry we need this kind of courtesy, I thought this was missing a lot that will be a specification section later.

>> ASHLEY CHAPPELL: I think that is in there in the table format. But I can get back to you. Okay. Okay thank you.

>> NICOLE LeBOEUF: Okay thank you so much Ashley. Go ahead Lindsay. Two know it wasn't for Ashley go on.

>> JULIE THOMAS: You had a question for Ashley? No. Okay so we have public comments at 5:00 PM. I think we are going to start to do a little above a round robin wrap up. And actually went to start with Gary. Because I know that Gary has a couple of comments that he wants to get in. So I think we will give you some time now.

>> GARY: Thank you Julie in our session in Hawaii we had the public-private partnership and it was good to see today and quite a few of the slides engine the public and private partnerships. I think we are seeing some action from our presentation. The other is during Juliana's presentation she talks about jobs in crisis and the-- act we did the resolution there. And would like for us to do a similar resolution here at HSRP. I think the more federal agencies, the more advisory groups bring attention to this then the more action that can be taken. And already doing something funding wise and trying to help out. So hopefully before we leave here on Thursday we can do a similar resolution. To support this. We heard it today. The local partners about can't get people to work. You know there is no, we have the same problem in the state government. So it is something that we can't, we need to do something quickly. We need to take action now. The other comment is, this is one we didn't get to ask questions Juliana. Just wanted to say how much we appreciate what NGS does at the state level. They are doing a outstanding job. In the next couple years going through this modernization it will impact everybody and they are doing a great job getting the word out. But I still think, I spoke to a group last week at the state level. And I think the lightbulb finally came on that they have got to get prepared for this. And I think as a group here we need to have that word out because there are federal agencies I think that are not, don't realize the impact and they need to get prepared. They can't wait until it happens. It will be too late then. So that is my comments.

>> JULIE THOMAS: So Gary when you talk about doing a resolution, do you want to go into that little bit more is this something that is a written resolution from our panel?

>> GARY: Can you go back to Juliana's presentation? Yes it was a written resolution so we could either--

>> JULIE THOMAS: You know what why don't we not bring it up right now because that might be difficult. Ridging is cringing over there. But we can have it for Thursday's discussion. We can bring a purse slide on the resolution Gaylen. Might have it as well. But then this is we would follow some guidelines that Juliana had their and have the panel input.

>> GARY: And we could depending on what the group wants in the resolution we could show the / other federal committees I have done this in reference that.

>> JULIE THOMAS: Okay so maybe for Thursday we could have that slide from Juliana and then we could discuss it. Okay great. Thank you Gary. Nathan, that's go to you, this is the comments, and of the day, any questions or comments?

Remember we are submitting an administrator letter as always. It has been helping me keep track of some of the things we might include in there. But really if any of you have any input specific that let's get them down got let's get them questions down in the recommendations down as we go along. Thank you. Nathan?

>> NATHAN: I think the main thing is this. That stuck out to me as I was listening as I was mentioning at lunch but the funding for the core programs mentioned in the last meeting. I think additionally was staffing. Staffing came up a lot. Not necessarily the Odeseey crisis but the whole supporting the Hydro services. The resolution I would be supportive of if we were to do something along those lines. I'm always fairly one mind, one track mind being from Alaska and I heard you know, I hear a bunch about a lot of tools, GIS tools and the value of these decision-makers, postal decision-makers and see level-- is a perfect example and a lot of these tools are not available to Alaska they don't have coverage in the state because we don't have the foundational to develop them. And to get the opportunity to use these tools. I'm also excited about the expansion of the use of multiple consolations and opus processing. I hope that will improve the accuracy with the-- position.

>> JULIE THOMAS: Thank you Nathan that's why we need you on the panel to keep beating on those remote locations. Yes I guess it is through all of Alaska. Okay. And Amber did you want to say something right now or do you want to wait a little bit to the very end? Okay Ed, do you want to put out some comments here?

>> ED SAADE: I am okay. Everything about sustainability we covered in great detail, thank you.

>> JULIE THOMAS: Great, let's go to Tupa.

>> Thank you this is a great day already and great to be a part of this.

>> JULIE THOMAS: So much more to go. [Laughter]

>> It has been a great day and all the notes here, thank you to the great organizers for the meeting, the chair and the speakers and I appreciate that everyone is really busy. And it is great to come together. And in terms of what I heard today, a few things, I was really struck by the community approach to the work here in Puerto Rico. I think that really comes across loud and clear in the way that NOAA weather service, Army Corps of Engineers and academia and everyone working together and there seems to be a strong sense of codeveloping solutions with the community. So that is all wonderful and I had a couple, aside conversation about this and maybe some of the isolatedness of the island, and thing about how that can be scaled up to other communities.

So that was one. In the other I was interested in the office directors summaries. It feels like there is some great positive energy. Really lots of important work happening at a really fast pace. So that is really wonderful to see. And then this discussion with the carbon footprint and I'm sorry that I missed the beginning of it because I had to take a call. But I continue to think that there is innovative ways of approaching this question and in addition to sort of the tried-and-true ways that some folks have already put into place. Is there some sort of like I don't know, RPO or some competition we can put the young minds to work? Because clearly it will have to be a portfolio of approaches in order to make progress. So that was the third thing, very enjoyable and thoughtful conversation. Thank you.

>> JULIE THOMAS: Great thank you so much Tupba. Do we have the remote people? Who is on still? Is Eric still on? No. Okay. And Deanne Hargrave? Deanne Hargrave? Eric is on? Why don't we give him an opportunity here. He just disappeared. Okay how about Deanne Hargrave? How about Anne McIntyre? Okay all right. Lindsay let's go to you next. Okay if air comes back on you can let me know. Go ahead Lindsay.

>> Yes thank you and I would also like to thank everyone for the organization it has been great. It is interesting to see the remote specific to Puerto Rico and also specific problems and other problems. The community just having to scaled up to the bigger land and other places I think was really impressive. And also like to think that not hear but Admiral-- and-- I think that was great to see them and hear their updates very candidly. And I would like to have more discussion with them but just to see so I can better understand I think how that process works. Something we don't get exposed to a lot of that. Resilience obviously importer Rico with the hurricanes and everything is really important. And I think that something that we see in many places here particularly it is important and obviously acknowledging that. And also the support and that benefits the NOAA infrastructure and data was particularly things important. And thing about something, well maybe when what I

know the navigation response team come down and is there a way that they can help down here when that happens and a general thing that was discussed before about navigational response, instead of just having the NOAA team down, how to use the locals there on the ground in that area? So I think that something interesting. And maybe you were addressing the already. But that just, we can discuss it. But again I think the directors, did have more question time but really I think the positive things that are happening is really impressive. And our comments, my comments may seem critical but it's not I'm trying to add to that little bit. Now it seems like we are adding to the little, small places here which is great. From the overall direction of everything that has happened. And again I relate and look forward to the discussion about-- and crisis and I won't say anymore about that but I think that is really important. And I'm excited I don't think it is and just geology think is the confusion of survey number that has gone. And I think I see that here across the whole. Even I have a survey mapping area that we are still struggling a little bit there to get the right people. Technology is kind of kick this in the knees a little bit. And yes I thought it was great to see Larry and Andy present present about what is happening at the front and apart from nice toys. Yes and no, related to that Admiral Evans, that is cool and is important we are hearing about that and part of the ecosystems of the data at the backend and getting the products generated and it is boring and I think that is important to talk about, the infrastructure, the idea of the infrastructure that these provide. It is really critical and not as sexy sometimes right? So I guess assure the admirals concern as you know, is it enough funded, that is something in future meetings we should address, how, what is missing and how can that be addressed? That is my brief comment. Thank you.

>> JULIE THOMAS: Great, thank you so much Lindsay. Okay Nicole.

>> NICOLE LeBOEUF: Thank you Julie. Thank you to everyone, great session today. And the talks about the local " you are here " talks I call them was really enlightening and fantastic. It is clear that there is excellent collaboration amongst the federal family from the presentations we have heard today. They are all using NOAA's products and services which is wonderful. And it is clear that everyone is really interested in partnerships and collaborations with outside the federal family. With academia analyst and stakeholders. We heard DNR mentioned the Hydro-- and long-term planning. And Marianne mentioned engaging the stakeholders and partners to collect data as part of the plan. So I just wanted to touch on that piece just for a moment and that is like your soap passion about sustainability and I love that, I'm very passionate about coproducing knowledge with the stakeholders. And I teach about the sometimes as well so bear with me for a moment. So you know we engage with stakeholders we talk about this a little bit over lunch. And we said what

you need to coproduce it. And someone said we did that and that is not the right answer. The answers we are doing that and you don't ever stop. It is really hard to do that and keep engaging it. But you think about the sort of, the process of research or any type of process where you come up with your problem and then you collect data and then you analyze it and you write it up and put out. And is every step of the way that stakeholders really need to be engaged otherwise eventually you lose that input and that important feedback. So just wanted to kind of remind us of how important it is to constantly and relentlessly engage our stakeholders and assess the products that we are producing will be meeting our needs.

And then finally the geodesy crisis sounds very familiar to me. It is something that has been near and dear to my heart for the last decade or so because we, Tubpa and I and others recognize the science and postal science into thousand 12 and we have gone through this process so would love to talk to you about, I feel like we have been successful. We have a program that puts out \$5 million a year to the universities which is not much what is sort of other efforts that have spooled off of it. I would love to chat more about that. I firmly support a resolution and the one piece of advice I would share is lead and more to your academic and NGO partners on that one because the federal-- it is just so hard for you all to collaborate right? We have to go through all this redtape just for us to be together and talk. In public right? The NGOs and academics can do that so we can invite you to our meetings and it is much easier. So you can facilitate some great collaborations by leaning into those partners. Thank you.

>> JULIE THOMAS: Thank you very much Nicole. Which we do public comments?

Okay five more minutes. If we give this one to Sean you might go longer than five.

>> SEAN: I will not go longer today. So always good to hear about interagency coordination and had a panel with Coast Guard, NOAA, CORP, Department of Natural Resources and a lot about coordination and it continues to be and I know is on the matrix. It continues to be very critical. I will say that you may recall in Hawaii there was some calls from Mississippi River pilots and lots of different challenges. And that an agreement in Hawaii to have NOAA come down and of course deal with some of the challenges we see. Some of it was related to Larry's presentation, some of the data of the Evans hydrographic service of the surveys done. The air gap. One of the things that was brought out was there was and I will probably get it wrong but lidar data can now be accepted for bridge clearances by NOAA. And yet we have had the courts page 4 I will say 15 years. In the pilots are still talking about where they want the measurement. And you know kind of trying to agree on it. Some of the things about coastal-- disappears. Because the ships will never be up against that. And if it is you are not worried about the airgap, you are worried about other

things. But some of those challenges to just change in how we look at that data and incorporate it. Will be very important but I have some more comments, we have a working group that went through. But Dan Wright was there-- precision navigation and a lot of discussions. Some of the things we are working on today of course there is always great to hear. Nicole Leboeuf and you know Congregational awareness. That is a tricky animal. From a navigational rep a lot of people think navigation will just work out. Navigation is so important everything will be always working out and be so easy. I was like you must work in a different field, right? So how we incorporate some of this and move forward it is just amazing at the level of detail and things as you would think as simple as a bridge airgap clearance. And then transmitting that data coming back. So hopefully that was under five minutes.

>> JULIE THOMAS: That was good Sean. You got it. Okay thank you so much on those are always important issues. I will turn it over to Admiral Evans.

>> REAR ADMIRAL BENJAMIN EVANS: Is it close enough to 5:00 PM we can call for public comment or do we need to wait? It is. So thank you, thank you to the panel and reflection of the day. Looking back, looking forward to continuing that here momentarily. But we are at the official public comment portion of today's session. So this is a request for public comments and you are encouraged to provide input for the virtual attendees. Encouraged to provide input in the questions box. Please target your comments to the HSRP members. NOAA and to focus on what NOAA can improve for the positioning in the products, data and services. This is not request to follow-up, not an opportunity for follow-up questions to people who presented today. So I will ask Lynn to read and summarize the comments that we received. And we will show those on the screen where appropriate. And then those will be collated into a document and shared with the members NOAA and posted on the HSRP website and included in public record.

>> Are the first, other people that would like to make public comments, we can do that? If there is people in the audience. Okay. Okay. I know we had some, at some point we had some advanced potential comments from yes-men, Detriz- Garcia, [listing of names] I'm sorry for your names and my pronunciation of your name. And Debbie Haynes. If you need you guys have a comment or someone else does? I know it some point Bri has a comment.

>> BRIANNA: I'm showing the hydrographic surveys working group has an open question in right now on the annual on high drug if he. So as it is being talked about, look there is even a slide. That is a place to take this questionnaire and to help inform the manual on hydrographthat is under the IHO that is my public comment, thank you.

>> Thank you we have public comments that are on the screen, they are not on the screen, all the public comments will go into the document for the meeting and the

official minutes as well. So Denny Haynes said I'm sure these articles are well noted and considered in the content of diversity by NOAA and included in the links is the and if the 3 NOAA mapping centers are funded, and the mapping levels in what work will be assigned to each center? You guys people can comment if they want that if we have time.

>> REAR ADMIRAL BENJAMIN EVANS: I will answer that probably not to Captain Noah's satisfaction but a little bit about that. Comes down to what is the distinction between the new center of excellence and the joint center of excellence-- and we see those as complement report impact the leg which requires these centric to become a mentor each one another. The leg which enough omnibus. The fundamental language and is we are pursuing the development of the new center of excellence where is the joint hydrographic center and COMIT and research institutions that have a five-year grant. They also have a higher education mission Masters PhD level as it implies it is very specific focused to supporting NOAA and the nations ocean coastal and Great Lakes mapping mission. And it will be, we envision I mentioned the training and workforce development piece of that. We envision that the center of excellence focus on the training and workforce development at the journeyman level. So those two pieces willing together as a lid details of that I realize there is probably still, differently still a lot of details to work out their. There is not a lot of meat on that phone yet. And we are working hard on that. But I hope that clarifies at least maybe the first order, how we see the distinctions. Between those, between JHC and Tacoma research-based grant whereas, the center of excellence being NOAA operated entity. Certainly with NOAA operated entities specifically focus on the operational component. So again, there will be more detail on that. Captain Noah I would be happy to chat with you about that off-line further but at least hopefully that addresses the questions.

>> I want to mention that-- has two more questions. It is good to have engaged people. Observation regarding electric boats. They are already in use on Sweden's Gota canal and there is lungs to that which we can maybe put up at some point. The next is there is a link to the Esri and Climate Forum 2022 on magnetometer tool. And he gives a link to that. And I don't know if you want to, on either of those?

>> REAR ADMIRAL BENJAMIN EVANS: I think I am content with where those come and stand. And

>> You guys and if there is overcome as we welcome them online or in the room. Going once.

>> Okay so Admiral Evans response was quite adequate and I think everyone appreciates the depth of his response. Fabulous. Thank you that was a very short comment.. I think if the HSRP wants to make additional comets we would welcome

those. We would welcome letters, text, whatever we will put it all in the public comments.

>> REAR ADMIRAL BENJAMIN EVANS: Any other public comments from the floor?

>> I think going once? Going twice?

>> I wanted to thank Ashley Chappell for going over the NOMECEC stuff and please that you guys are excited about the SOMP and we are certainly excited about the invocations as well. I'm actually Ashley's counterpart on the intra-agency group work and expiration and characterization so she is on the mapping side I'm on the characterization side on the NOMECEC. And we released just a few months ago the national priorities report. That I would encourage everybody to look at as well. Which really highlights the Maddock areas and crosschecking areas of where there is a lot of, I'm sorry. It is 5:00 PM and I'm just not ready. [Laughter] so the report is a culmination of 15 different federal agencies who deal with ocean and aquatics these. 92 subject matter experts. Across five main disciplinary areas. Those five main disciplinary areas are water column, geo-hazards, marine resources, underwater cultural heritage and benthic ecology. So quite a wide array of interest in what we did is asked them to prioritize both schematically and geographically their highest areas of interest for exploration and characterization. And I should say that one of the fundamental pieces of exploration and characterization is high-resolution imagery and backscatter. So is all interlinked. And the results are really, really exciting. And I encourage everybody to look at it and schematically everybody sort of pointed towards crude systems as being something that everybody across close disciplinary's is interested in. Increased sampling attributions as well backscatter. Consistent standards for backscatter. So again pointing to the SOMP and the utility has meaning a demand signal we are seeing across multiple agencies. Thank you everybody. That's all I have.

>> Thank you Rachel.

>> Just a question or comment for Admiral here about the NOAA center for excellence. That is exciting definitely. Is there any consideration to have on its board if there is a board, to include academia, industry and manufacturer? I don't mean a permanent members of that group because that will be difficult. But if you have a board well they meet regularly and give you some advice definitely and this kind of group environment. Thank you.

>> REAR ADMIRAL BENJAMIN EVANS: Thank you for that suggestion we are still working out the governance and I think we would at a minimum look to this body as many of those constituencies you mention for input whether we would consult with a separate kind of adjacent body and that is not something that we specifically considered but I do think that given the direction that is in the appropriations

language gathering input from a range of sources on how best to prosecute this would be helpful.

>> [Speaker away from microphone]

>> REAR ADMIRAL BENJAMIN EVANS: Yes, sure, thank you for making that comments. As I said we are figuring this out as we go and so all of this input is very helpful.

>> Okay actually we are going to consider that part of the HSRP discussion and not part of the public comments and I will officially close public comments right now. If people do have public comments and we somehow is them I will be happy to incorporate them until tomorrow. And tomorrow we will incorporate your next all the comments. Okay.

>> NICOLE LeBOEUF: Okay thank you Lynn and Admiral. Shui continue with round Robin or anything else Admiral want to adhere? Okay great.

So let's go ahead with our round-robin and Alex you are actually up next.

>> ALEX: It has been a great and exciting day today. A lot of learning. A couple of things. I want to go back to Lindsay's comments about news and independent assets we don't have the federal assets available. And yet we did during hurricane Maria we were able to use-- to do soundings to open ports. Because different assets were not billable for a couple of weeks. Going back to-- presentation it has been great to see the future of this fleet has this comment as Lindsay said I like ships. So I will be a big supporter to keep them [Laughter] I am man [Laughter] And please we continue with two words it is good to see how the federal agencies look as with respect to their plans but if you look at all we have a hurricane let's look at this chart, evacuations, number x, this is an island, we cannot go anywhere. So we had to deal with a situation and that provides how fragile and vulnerable we are in these national disasters. And so on. Thank you all and we will see you tomorrow. Okay.

>JULIE THOMAS: Okay Anaj.

>> I was when to say thank you to the NOAA staff, I thought it went very smooth. Of course thank you to Alex and I thought we had excellent discussion today and presentations. In the future strategy and if I reflect the last four years that's what my take away would be for today. Really like the PPP focus today on the presentations and the community approach and that holistic approach that is segmented. Excellent plan by Admiral Evans on the acquisition strategy. Thank you sir. Best way to go. Of course I am passionate about the sustainability omissions and greenhouse gas focus that is a national focus to that national strategy and it would be great if we don't reinvent the wheel. But collectively collaborative. On the outreach and education side, I will give you a statement by Congressman Elijah Cummings. You know, God bless his soul. He used to say if you can't see it you can

dream about it. We are to get these youngsters and those in school to dream about it. NOAA has to do the outreach on a continuing basis for the future NOAA employee whether he or she is on a ship or any technical or-- that has to continue. But great take away I learned a lot, and great to see all of you. Thank you.

>> JULIE THOMAS: Thank you Anaj.

>> Okay thank you Julie. I would like to thank the team. A great job. I would like to thank NOAA because what we feel from outside NOAA, NOAA really leading the path for the national hydrographic and charting program. And that is we all feel and it and this way definitely if you excuse me I'm wearing the other hat just to give this comment and I will quit after that so NOAA working with a lot of federal partners you know. To find all the resources and funds for these a greater project we are all involved. They are using their trusted partner and consulted partner, so keep up the good work you are definitely doing the right things. So thank you. A lot of the discussion today really when you look about the environment model. The ocean data and the green technology the oceanography, I don't want to sound like a broken record but digitally that's where you are going to find the real way of creating digital for ocean, coastline and let's do it importer Rico. Puerto Rico and be our sandbox for digital between. It is a great environment. And we have the customs and manageable. We have a lot of data to put it all in the digital twin and that will be convincing for anybody if we represented. And would love to work with you on that definitely. I love the director's report and thank you. And I reiterate what-- said. I love the positive energy by Nicole and Admiral and the director. By recognizing our shortcoming in looking for the future and hoping to reach that future, this is very exciting, definitely. The local community and how the interagency Coast Guard, NOAA, U.S.-- and this is definitely exciting here. I know that NOAA has a great team of AI what to use that message and market report. Because the future, we don't have a problem with recollection. Leave me. It dumps a lot of data. The problem is mining this data. I mean you don't want manual work to edit mapper lidar. You will need AI. AI as a tool now. And is the future. So try to supplement it and build it and have it focused for five years to build the greatest AI. Because otherwise I said, center technology we are we advanced to collect. We just need more analytical and AI to select. Inc. You that is all I have.

>> JULIE: Thank you Qassim. Mary?

>> MARY: It is great to be part of this group and I hope that I can be of service to the organization. I would like first to start with a correction. The fact that I had mentioned it was U.S. Coast Guard earlier. It was not them. So you know they are okay people, and especially tomorrow, do not, DO NOT tell them [Laughter] I will have to tell them myself. Regardless of that, when I was speaking about utilizing recreational orders as a resource for knowledge you are using that. And is through

a crowdsourcing style. The issue with crowdsourcing is all of us may be aware this year, the quality of the work that you are getting. And segmenting out that which is valid data is invalid data. So that is where I wish to make a little bit more clear that sometimes you can contain the group with whom you are working with perhaps you can control that a little better. So what I heard today was that there is a continued need for education, collaboration and communication. And I also want to personally say how much I appreciated the discussion on hurricanes. Having just gone through Ian, and the FEMA discussion was phenomenal. I would like to do a personal announcement at the lighthouse House on Sanibel which was built and erected in 1884 lost one of its four legs during the hurricane. And it was recovered and repaired and today at 6:00 PM it will be relit. So thank you so much. A

>> JULIE: Thank you so much Mary sure will be continuing to be contributing. Marianne let's go to you.

>> MARYANNE: I'm having a great time being on the learning curve and listening, so really appreciating the sidetrips we did to hear from people on the ground and the direct stakeholders. And it is unfortunate how unusual it is for us to really immerse ourselves and people's problems. That was a real gift and then to be in your company and hearing all of you so intelligently reflecting on the experience it has been a great learning for me, thank you so much.

>> JULIE: Thank you so much it was a great presentation and I concur with a lot of the panelist, the director updates are always the most valuable for the panel. Because we are supporting your efforts and we want to know where you are going and what you are doing and what your thoughts are. So it is always great to have that. Larry do you want to chime in here?

>> DR. LARRY MAYER: Everything is almost beside, I will reiterate a few things. Thank you to the host of Puerto Rico has been a wonderful couple days already. I'm sure it will be a great 3 or 4 days. Things that struck me are what Tupba said, you are quite right in it is also in contrast of what we have seen in other places so ethic we need to try to figure out how we make other places islands and forced folks to work together. The sustainability discussion I think was a very, very critical one and I think we will come back to that I'm hoping to our NOAA colleagues that you see on the HSRP there is lots of experience here and I think that can be really of some help to you in terms of sharing their industry experiences and your other experiences in that world. The new ship news was great. And it is a tremendous opportunity but also a real opportunity to screw up.

And I think we have to be very careful about that. Because I'm sure you are well aware of that. But we will be offering advice all the time. And finally Qassim's comment about AI, Ben told me last night his speech was written by AI. So they are using a don't worry. [Laughter]

>> JULIE: Ben, I will save you until last we will go to Andy.

>> CAPT. ANDY ARMSTRONG: Thank you Julia want to raise one thing that I don't think came up or at least not directly. In one of our presentations this morning the speaker remarked on the importance of small port and so we often get wrapped up in services to the big ports in the big tonnage. But if we think about the collective contribution to our economy of these small ports there are distributed all along the coast that is quite huge. And I think we need to be sure that we don't lose sight of providing services to those small ports. As we strive to serve the big ones. Thank you.

>> JULIE: I think that is a really interesting comment because I found out from Captain Cruz, you don't do San Juan by how many outside? Nine ports around Puerto Rico. And that is a lot of the ports.

>> There is a lot of important we get a lot of support from Sarah Cruz-- weather and so on for the operation.

>> JULIE: Once again is a cooperative effort, intercourse nation, inter-agency and all about this island mentality. We have Julianne on the line I believe.

>> Yes you do, it was a great discussion today I want to congratulations the panelist and contributors and I appreciated hearing from the local setting and the challengers, I want to shout out to the team there in the room that coordinated the audio and video because it came through really well today and I really appreciate you being able to bring me into the meeting. Thank you.

>> JULIE: Thank you Juliana, glad you could join us. Ben, should we turn over to you?

>> REAR ADMIRAL BENJAMIN EVANS: Thank you everyone wants to echo Juliana's comments think that was a great sense of the place, talking with them after lunch and they felt like it was not technical enough and I cannot disagree more. I think it was perfect. To get a sense of the spirit of the place that we are visiting. I am very much looking forward to tomorrow's meeting with a local maritime stakeholders and I really wish they had been here today because I think a lot of the conversations. So I met with some of them yesterday. One on one. Marianne and I and some of our staff. But they are very focused on emergency response operations and coordination amongst the federal family on that. I think we heard a lot of that today and so I really wish they would have been here to fuse that together. And then to Andy's point, about small ports, that is another thing that they are very focused on. Is relief ports for San Juan. That only to increase capacity but to provide a diversion port in the event that San Juan is taken out of action by you know, and he took the your time accident whether that is a hurricane, grounding, spill, anything of that nature because correct me if I'm wrong and I also believe we heard 90% of the goods that are on the shelves in the stores or in the gas, at the gas stations are coming into Puerto Rico through the Port of San Juan

currently, a single point of failure. Think we will hear about that tomorrow so I'm looking forward to that. I also really appreciated the conversation about the importance of the symmetry for a range of applications beyond navigation because that is specifically for the slosh model and the use of that model for corrective inundation and the response planning. I would be remiss if I did not note that is funded by the partisan infrastructure law, we are actually developing our team in the development lab we are developing that replacement for the slosh model. We replaced the model or at the national hurricane Center to work on that. And so that is exciting to see that come circle. And I think that highlights one of the unsung capabilities of the survey which is our modeling capability.

I was very excited about the sustainability conversation. As you might have noticed. It really ties together all of my personal thoughts and I think our thoughts is an organization on both our operations, how we pursue our mission but also our vision for the future of navigation how our products and services can support that. How do we, how do we align, but we think we are capable of producing with what the industry and what the market, what the community needs. We talk about the S100 suite, we talk about precision marine navigation. A lot of our as I mentioned, we see that being directly applicable to the sustainability conversation. I just hope we don't end up talking ourselves out of in person meetings. Because that would be sad. I did want to, really appreciate the comments about the geodesy crisis. I wonder for the purposes of this conversation and I appreciate there is a body of work and that those words have meaning and recognition. But I see this is really a geospatial crisis. Because it goes beyond geodesy and certainly geodesy is at the foundation of everything we do. And I don't want to distract from that or dilute that message in any way. By do think it is worth noting that you go up a couple layers and the foundation and we have got workforce challenges there as well. This was a really central theme of our procedures workshop just earlier, well I guess earlier this month. At the very beginning of February. So would certainly be supportive of that message coming from the HSRP meeting.

>> And our interpreters are stopping a hard stop at 5:30 PM. So you have to be quick.

>> REAR ADMIRAL BENJAMIN EVANS: I will wrap it up quick and just say I want to acknowledge again that I appreciate the recognition of the excitement and energy in the programs and just again point out that that doesn't happen by accident. That is, due to the input that we receive from this panel and other stakeholders to help tune and guide our approach and the support that we receive from this panel and others to make it possible we deeply appreciate that.

>> JULIE: Great, think of her much and I just want to wrap it up again, a big thank you to Alex, you will get so many thanks while we are here over the next three days.

We until we've had a couple mojitos today. The team and everyone have been great, Amber has a couple words to go. I love today's sessions. I thought it was so many presentations and discussions, and really looking forward to the next couple of days. Amber it is all of yours and we will see you at dinner tonight. I'm sure Amber will give us our marching orders. Thank you.

>> AMBER: I can if you would like for the fun stuff. So we actually okay.

>>JULIE: Officially adjourn the meeting right now. Thank you all.

>> [Applause]

>> Just a quick reminder for tomorrow, please remember to continue to use the microphones so the audience numbers can hear everyone and their comments. Thank you most of you have been very great with that and we appreciate that. I would personally like to thank our AV guides over here they have done a pen Hasek job juggling many of our notes and our last-minute changes.

[Applause]

>> And a note for that as well if you do have any updates we do ask that you send it to us for the session before hand because there are a lot of details going on back here and a lot of things have to be preloaded. So we would appreciate that. So for tomorrow morning we would like anything by tonight and we will be unable to take anything tomorrow for tomorrow and that's in the same for day three. We would prefer to have it for tomorrow. If it is in the morning session, and we can have it by breakfast, and see if we can get it in the afternoon session. So if you can give us that time, thank you. We would really appreciate that soaking any edits or changes so we are not stressing them out because they are doing a fantastic job. [Laughter] so thank you for that and also for the event tonight. We are headed to intravenous so if you had out of the lobby straight down the road here, that goes straight across, it is on the right. And is one block down. And you will see it, it is \$45, you can pay that to Lynn and there is information in your packet if you would like to dress and did not RSVP yet.

>> [Event Concluded]