

U.S. DEPARTMENT OF COMMERCE

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NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION (NOAA)

HYDROGRAPHIC SERVICES REVIEW PANEL

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PUBLIC MEETING

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WEDNESDAY
MARCH 6, 2019

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The Hydrographic Services Review Panel
met at 9:00 a.m., Ed Saade, Chair, presiding.

HSRP MEMBERS PRESENT

EDWARD J. SAADE, HSRP Chair
JULIE THOMAS, HSRP Vice Chair
CAPTAIN ANUJ CHOPRA
SEAN M. DUFFY, SR.
LINDSAY GEE*
KIM HALL
DEANNE HARGRAVE
EDWARD J. KELLY
ANN KINNER
CAROL LOCKHART
DR. DAVID MAUNE
CAPTAIN ANNE MCINTYRE*
CAPTAIN (ret. USCG) ED PAGE
CAPTAIN SAL RASSELLO
GARY THOMPSON

*present by telephone/webinar

NON-VOTING HSRP MEMBERS

CAPTAIN ANDY ARMSTRONG (ret. NOAA Corps),
Co-Director, NOAA/University of New
Hampshire Joint Hydrographic Center

JULIANA BLACKWELL, Director, National
Geodetic Survey, NOS

RICH EDWING, Director, Center for
Operational Oceanographic Products and
Services, NOS

DR. LARRY MAYER, Co-Director, NOAA/University
of New Hampshire Joint Hydrographic Center

STAFF PRESENT

REAR ADMIRAL SHEP SMITH, HSRP Designated
Federal Official; Director, Office of
Coast Survey

VIRGINIA DENTLER, Center for Operational
Oceanographic Products and Services

LYNNE MERSFELDER-LEWIS, HSRP Coordinator

ALSO PRESENT

ALLISON ALLEN, Chief, Marine, Tropical, and
Tsunami Services Branch, NOAA National
Weather Service

TYLER CHRISTENSEN, NOS Data
Manager/Oceanographer, Information
Management Office, NOS

TONY LAVOI, NOAA Geospatial Information
Officer; Chief, Integrated Information
Services Division, Office for Coastal
Management, NOS

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(9:03 a.m.)

CHAIR SAADE: We're going to start off with summary. Good morning and welcome back to the HSRP meeting, day two. We definitely had a great day yesterday with the speakers and the discussions.

Looking forward to the speakers today. We'll do a quick recap of yesterday for the Members.

As we -- again, as before we won't have time to do the audience introductions. During the breaks, at each break as a reminder we would like everybody in the audience to introduce yourselves to each other and introduce yourselves to us as well.

And when you do speak from the audience don't forget we need to give you a microphone.

Admiral Smith, could you go ahead and start us off?

RDML SMITH: So welcome back to day

1 two of the HSRP. Today we're discussing the
2 details of the matrix to help inform the HSRP
3 Members on what NOAA does and where HSRP can be
4 most strategic with recommendations.

5 I do know that this topic of
6 conversation last night, at least at my dinner
7 table and I thought there was quite a bit of
8 interest in discussion that I hope we will
9 continue this morning.

10 A few housekeeping details. If you've
11 not already signed up to make a comment for
12 members of the public or signed into the meeting,
13 the sign in sheets for both are coming around.

14 Emergency exit is the way we came in.
15 Bathrooms around the corner.

16 CHAIR SAADE: Back to me. Okay, we're
17 going to go around the table with anything that
18 got your juices flowing and your mind going last
19 night between yesterday's recap and now.

20 But I can tell from the discussion
21 this morning everybody has got a lot of really
22 good ideas anyway. So, Julie, do you want to go

1 first or would you like to go last?

2 VICE CHAIR THOMAS: You know, I think
3 I really said it yesterday afternoon. And since
4 I've been working on doing the matrix thing all
5 night, no, not all night, for an hour, I haven't
6 given it too much more thought.

7 But it's just all about these
8 partnerships and collaboration. I just was
9 really happy to see so much discussion that came
10 out at every level.

11 And that's all I'm going to say right
12 now. Thank you.

13 MS. BLACKWELL: Good morning. I'm
14 Juliana Blackwell, the director of the National
15 Geodetic Survey.

16 From yesterday again just the excellent
17 panel discussions and the, I think the issue that
18 was brought up towards the end of the navigation
19 services about, you know, bringing ships in in fog
20 and what the challenges are and what we can do.

21 Obviously there's a number of partners
22 and a number of challenges in doing that. But,

1 you know, what should NOAA be doing? What should
2 our hydrographic services be doing to enable that
3 in the future?

4 So, look forward to more conversation
5 on that. Thank you.

6 MEMBER DUFFY: So Sean Duffy, Big River
7 Coalition, Mississippi River Navigation Focus
8 Group. And I think we had a lot of really good
9 presentations and discussions yesterday.

10 I see fog issues have been very
11 relevant for us this year because we have high
12 river and fog. So I'll just say that I'm often
13 battling to get dredges and funding to try to
14 restore the river.

15 Having high water and fog at the same
16 time means some of the dredges that we work to get
17 are not dredging. And we've had a couple of
18 incidents in fog and, you know, looking at that as
19 a, something to add some more technology to help
20 eliminate some of the invisibility, if you will,
21 remains to be a good topic of discussion.

22 MEMBER CHOPRA: Good morning, Anuj

1 Chopra from RightShip. Great discussion
2 yesterday. Yes, I want to change that fog story
3 like we've said.

4 I think it should be, I believe it
5 should be risk-based rather than a fixed set of
6 rules. And risk assessment as to the actual
7 scenario, lots of good discussion on that. So,
8 looking forward to another day of great
9 discussion. Thank you.

10 MEMBER KELLY: Good morning, Ed Kelly,
11 Maritime Association, Port of New York and New
12 Jersey. I hate to beat a dead horse, but the fog
13 issue and I'm thinking beyond fog, I'm thinking
14 any type of obscured or restricted vision
15 capabilities there's a lot to be done here.

16 But, you know, I'm in New York City and
17 see unmanned taxi cabs roaming the streets. And
18 if they can do that in New York City we should be
19 able to do it with ships where people complain
20 that it's only an 800 foot wide channel.

21 So I think what the role of NOAA and
22 this group could be is to prove that it can be

1 done. Once it is proven that it can be done with
2 the sensors and the capabilities that NOAA can
3 produce I think then it moves into a separate
4 field.

5 Then you have to involve the Coast
6 Guard, the risk management people, all the other
7 people that would have to be involved to authorize
8 the usage of what, quite frankly, is already
9 happening on our highways and streets and is
10 already happening at our airports with instrument
11 landings.

12 We tend to be an older, more
13 conservative industry perhaps. But from what we
14 are hearing in our discussions, we're hearing that
15 if we put the suite of NOAA products together the
16 right way we will be able to demonstrate a
17 capability for vessels to operate into fog or snow
18 or whatever restricted visibility issues.

19 And I think then that can kick it into
20 a larger forum of how to regulate that, how to,
21 you know, manage risk management for it. So I'm
22 very excited with this whole thing and I think we

1 can actually break through a whole new level of
2 ship management.

3 I'm an old ship driver myself. But I
4 can't wait to be replaced by a 16 year old kid in
5 a basement in Kansas who is able to manage these
6 ships because of the capabilities, the sensors and
7 everything else that's out there. I can't wait to
8 be replaced.

9 MEMBER MAUNE: Dave Maune from
10 Dewberry. I really appreciated Dr. Qassim
11 Abdullah. He's back this morning.

12 Thank you. A lot of us talked
13 yesterday about how much we appreciated your
14 presentation. So, thank you, Qassim.

15 Fog sounds like it might be a new topic
16 for our priorities list here. And I look forward
17 to seeing what progress we can make on that
18 priorities matrix, which has sort of befuddled us
19 for the past year.

20 MEMBER PAGE: Ed Page from the Marine
21 Exchange of Alaska. Still taken aback yesterday
22 about how positive the comments were about the

1 added value that PORTS has brought as far as
2 position navigating, Physical Oceanographic Real-
3 Time System and other tools the NOS has provided
4 that aid the safe transportation of vessels in and
5 out ports and larger vessels in more confined
6 waters.

7 But I won't hesitate to beat a dead
8 horse as my colleague the other Ed said. But I
9 will beat the dead horse. Fog is the one thing
10 that we haven't nailed yet.

11 And I'm from Juneau, Alaska. And I fly
12 regularly on jets through snow and fog navigating,
13 twisting and turning through mountains, if you
14 will, and then landing at a couple hundred knots
15 with zero visibility type situation.

16 So I know this can be tackled through
17 technology. This is precision navigation,
18 obviously. And it's an area that we just kind of
19 accepted in the past as far as well it's foggy
20 we're not coming but making all kinds of other
21 efforts to facilitate trade in the blue economy.

22 So this is one thing that's

1 interrupting the blue economy objective. And so
2 I'm glad to see others to kind of circling the
3 wagons on this particular issue.

4 So to me that's the takeaway from this
5 meeting. We have suddenly identified, we've
6 tackled so many other things under keel clearance
7 or what have you very successfully to bring in
8 larger ships in more confined waters. But this is
9 one we haven't tackled yet. So anyway, that's my
10 takeaway. Your turn.

11 MEMBER HALL: Thank you. Hi, Kim Hall
12 with Brizo Maritime Consulting. I missed dinner.
13 I apologize. Baby had other ideas.

14 But I think what's really been
15 interesting, especially for my three some-odd,
16 three and a half years of being the Panel is that
17 I think we're really doing a great job when it
18 comes to who we're hearing from.

19 We're learning more. We're moving the
20 ball forward. We're not kind of starting over
21 every time on a subject. And I think one of the
22 key ones there was the AIS and sending out more

1 data on that.

2 It's something that I know has been a
3 big problem for years. It also, you can clutter
4 things. And I think we got a little bit more
5 information on that one.

6 I'll give myself a little credit of
7 asking the question because there are some legal
8 boundaries and some other concerns there. But
9 it's nice. I think that we need to keep doing
10 that.

11 With the priorities matrix I think
12 we're going to get it under control. I think
13 we're going to, it has certainly morphed and
14 changed over the last few years and hopefully we
15 can get some of our new blood excited about it.

16 And number one, we should figure out
17 what it actually is. And number two, helping us
18 kind of refine it as well. I know as a new Member
19 I jumped right in. Didn't always know what I was
20 doing. And so welcome aboard the three, four of
21 you, three and please feel free to jump in.

22 MEMBER RASSELLO: Hi, good morning.

1 This is Captain Sal Rassello, Carnival Cruise Line
2 Nautical Director. Yesterday was a very good
3 session and we had all the right people sitting at
4 the table.

5 We had NOAA. We had the Coast Guard,
6 the Corps. I think that the role of NOAA is just
7 to help this coordination of the technologies.

8 We have the technology in place. The
9 coordination practically is to make the people
10 that are on the ship more comfortable, more
11 confident to drive in the condition of low
12 visibility and restricted area. So precise
13 navigation comes into discussion. That's all I
14 have. Thank you.

15 MR. EDWING: Rich Edwing, Director of
16 the Center for Operational Oceanographic Products
17 and Services. You know, I'll second the
18 discussion on fog.

19 I'll just mention I have been seeing
20 this now for a number of years with our PORTS
21 partners. Visibility sensors along with air gap
22 sensors are the most commonly added sensors to

1 port systems.

2 We're going to have the Weather Service
3 here this morning. A few years ago the Weather
4 Service developed a fog forecasting capability
5 that we were able to incorporate into our Tampa
6 Bay hydrodynamic model that, from what I
7 understand, is very well received down there.

8 But it's a demonstration and they don't
9 really have plans to make that capability
10 available to other areas. But maybe that's
11 something we could, you know, there should be a
12 discussion about.

13 So I'm just kind of really reinforcing
14 other people's comments about fog. What I wanted
15 to just note was I was pleased to see recognition
16 of kind of the reference systems, you know, the
17 tidal and the geodetic reference systems that
18 Juliana and I, you know, maintain.

19 I think we'll both be talking more
20 about those later, but it's not often we see those
21 raised in some of the presentations because that's
22 one of those foundational capabilities that's

1 invisible or kind of unknown by most people but
2 absolutely essential. So I was really pleased to
3 see those be recognized yesterday.

4 MEMBER HARGRAVE: Good morning. Deanne
5 Hargrave with Shell International Exploration and
6 Production. Learned a lot yesterday.

7 Fantastic panel, obviously. One thing
8 that I keep hearing and is common in my industry
9 as well is data management and how do we get the
10 data to the people that need to use it.

11 And I think part of that is identifying
12 the different groups that use the data. And so we
13 talked about yesterday you have the small boaters.
14 You have the AIS capable large ships and
15 everything in between.

16 And so I think spending a little bit
17 more time defining those groups would help us
18 solve some of the issues of then how do we solve
19 that problem. So that was a key takeaway for me
20 yesterday. I look forward to another great day
21 today.

22 MEMBER THOMPSON: Good morning, Gary

1 Thompson, North Carolina Geodetic Survey. I echo
2 about the fog. I think that's an issue that we
3 need to add to our list to take a look at.

4 All day yesterday we saw a lot of
5 presentations and most of them were dependent on
6 GPS. And at the end of the day we heard
7 discussion about GPS interference and a back-up.

8 So I think we need to get more
9 information about what we are doing here in the
10 U.S. as far as a back-up for GPS. And Rich
11 mentioned the tidal datums.

12 I think, I know in our state we have,
13 do a lot of education outreach on the NAVD 88
14 change. But we haven't done a lot on that there
15 will be a new tidal datum.

16 So I think that's an area we need to
17 focus to and make sure we get the word out on
18 that.

19 MEMBER KINNER: Good morning, Ann
20 Kinner. I'm going to wear my hat this morning
21 briefly as the Harbor Safety Committee Chair in
22 San Diego and talk about fog and little boats

1 because I have been in the fog on a 24 foot boat
2 towing a 30 foot boat and encountered outbound
3 whatever.

4 And I can tell you that the fog is a
5 major issue for the little guys. And it's nice to
6 know that you can run a pilot's operation from a
7 desk in some place.

8 But the guy sitting at the desk in
9 Nebraska can't see the small craft or the small
10 vessel towing another vessel who isn't putting out
11 the kind of signal that would show up on his
12 electronics.

13 And I know in San Diego Bay getting in
14 and out in the fog, and they do it the fishermen
15 want to go regardless. So fog is a significant
16 issue.

17 And a big part of the issue that I see
18 is getting the communication between the big guy,
19 whether he's going in or out, whether he's Navy
20 and not talking to you or commercial and willing
21 to talk if you know how, but getting the
22 communication between the big guy and the little

1 guy because as you go through the entry into San
2 Diego Bay, and there are probably other harbors
3 like this, the channel is pinched between Ballast
4 Point and North Island.

5 There ain't no room. And if you have
6 fog and little guys running out there that the big
7 guys cannot physically sense whether they see them
8 or hear them then you have the potential for some
9 really ugly situations.

10 So little guys in restricted visibility
11 wherever and however you want to define that. And
12 I am very leery of dependence on GPS in
13 particular.

14 The book is Pinpoint, P-I-N-P-O-I-N-T.
15 It is worth reading. It's got that New Jersey
16 case in it as well as a number of others. And I
17 am concerned particularly with younger mariners
18 about this overdependence on electronics and
19 willingness to believe that if it's on screen you
20 must be safe.

21 So I'm hoping that's a topic that can
22 sort of ooze out, particularly into this idea of

1 getting information out to people and letting them
2 understand just because it's on the screen and on
3 your phone doesn't mean you really know what's
4 going on out there.

5 So speaking as a little guy and
6 speaking as a harbor safety person I'm not sure
7 how those dovetail. But I think it all folds into
8 this issue of fog and dependence on electronic
9 communications.

10 CAPT ARMSTRONG: I'm Andy Armstrong.
11 I'm the NOAA co-director of the NOAA University of
12 New Hampshire Joint Hydrographic Center.

13 I think I'll just limit my comments to
14 my appreciation for the panels yesterday and just
15 say how impressed I was with their preparation and
16 presentation. Thank you all who were involved in
17 that.

18 DR. MAYER: Larry Mayer, the UNH co-
19 director of the Joint Hydrographic Center. It's
20 funny because I left one thing for this morning
21 yesterday and that was how impressive that long
22 list of things on the matrix was.

1 And I was going to throw out a
2 challenge to us and say well maybe we should think
3 about and NOAA leadership think about do any of
4 these really rise to the top? Is there something
5 that's just overwhelmingly pressing that we really
6 should devote some energy to?

7 But it's kind of interesting to see as
8 we've gone around the table something has
9 certainly risen to the top. And I think this
10 concept of fog is really just a buzz word.

11 It's a buzz word for a lot of things
12 that are actually on the matrix already. And it's
13 a buzz word for precision navigation. It's a buzz
14 word for all the autonomous vehicle stuff we're
15 doing because that has to do a lot with sensing
16 what's going on around you.

17 It's a buzz word for the Chart of the
18 Future in terms of how do you display it and the
19 communications issues we talked about. So I think
20 this, it's so nice that one thing has kind of
21 captured, I think, a lot of the areas that we had
22 as multiple tasks.

1 But I think it puts it into a really
2 concrete focus. So I think that's, that's just
3 really cool. And particularly today as I'm always
4 in a fog I think it's very appropriate.

5 RDML SMITH: We had a very interesting
6 conversation at our table last night at dinner
7 about international hydrography. And I noticed on
8 the list, I was sort of going through in my head
9 the things that I worry about that are nowhere on
10 your list.

11 And that was certainly, that's
12 certainly one of them is standardization, service
13 provision, capacity building, soft power for the
14 United States, et cetera, et cetera. That whole
15 basket of issues has not, was not anywhere on your
16 list.

17 Nor were sort of national policy issues
18 about how do we improve American competitiveness
19 for maritime with technology or shipping? How do
20 we improve the efficiency of our ports?

21 You know, those sort of national policy
22 issues that are not necessarily narrowly

1 hydrographic, but which if we are advising the
2 NOAA administrator who himself is a principal on
3 an interagency panel for setting national policy
4 for the Marine Transportation system, he invited
5 us, he invited you to advise him yesterday on the
6 priorities for CMTS.

7 That's, you know, and that group is
8 bigger than this when you add all the agencies who
9 have some bit of maritime play and we meet
10 quarterly to coordinate these things. And there
11 are working groups and that sort of thing.

12 It represents an opportunity that is
13 not really well tapped and some strong leadership
14 from Admiral Gallaudet was staffed, you know, with
15 the rest of us behind him thinking about what
16 these policies should be is a really powerful
17 opportunity in the year ahead.

18 So I guess I would invite you all to,
19 you know, to broaden your thinking above the sort
20 of, you know, tactical and technological to
21 national policy. You know, why should a ship
22 start a new route, why should a cruise ship come

1 to the United States, have another port call in
2 the United States?

3 Maybe it's because we have LNG
4 bunkering, right. NOAA doesn't do LNG bunkering.
5 But as a national set of infrastructure this is an
6 issue that the Marine Transportation System of the
7 United States should be tracking and we could be
8 focused on.

9 I echo everything else. The challenge
10 case of fog I think is a good motivating one for
11 precision navigation, really tight integration of
12 navigation systems and communication systems and
13 redundancy and everything else to be able to
14 manage risk and risky situations like that.

15 And that same risk management will pay
16 dividends the rest of the time when it's not foggy
17 too. So thank you. I am going to, I'm going to
18 sneak a little bit of international brief into my
19 remarks today as well.

20 CHAIR SAADE: Thank you, Admiral.

21 That's a great segue for me. So, excuse me.

22 Before we get into the day's events I just had a

1 couple of quotes from yesterday, a couple of
2 ideas.

3 So I wrote these down because they
4 clicked for me. Planning for life in the future
5 on a changing planet from Nicole. And both
6 Admiral Smith and Admiral Gallaudet challenging
7 us.

8 I thought that was great that they came
9 up with these things specifically what Shep just
10 said and the long list of items from Admiral
11 Gallaudet including his emphasis on the Pacific is
12 expanding our work and our work in the Pacific
13 "it's there and the work for us is out there for
14 us to go capture."

15 A couple of other good quotes. Full
16 federal funding floats our boats. I think that
17 was great. And people only care about what they
18 know about and they don't know enough about the
19 ocean.

20 And I think that's a hell of a
21 statement because that's kind of where we're
22 always going is trying to, that whole long list of

1 23 items that's got our interest leads right into
2 that type of thing because we are trying to expand
3 our own knowledge and everybody else's knowledge.

4 The obvious statement but it's worth
5 repeating that America is a maritime nation. That
6 kind of drives everything as well. And somebody
7 commented yesterday about how nice it is that this
8 particular meeting is building and leading towards
9 the meeting in New Orleans.

10 And I think that's a really good tie in
11 that we're starting to naturally do that type of
12 thing. And I'm trying to come up with acronyms
13 for F-O-G from what Larry just said because fog as
14 a buzz word is a really good idea.

15 Okay. So with that I think we're all
16 caught up, right, and we're ready to go to the
17 next phase which means that Larry and Andy and I
18 need to change seats and go up front. So the next
19 segment is the best segment.

20 DR. MAYER: For those who were here
21 Monday Andy and I presented kind of an overview of
22 the center, the structure and its history and how

1 it worked.

2 And we touched upon a number of past
3 accomplishments we thought that really represented
4 research operation, tools that we created that
5 we've put into the field with NOAA with our
6 industrial partners and so on.

7 And what we wanted to do today is focus
8 on the current research activities, not all of
9 them. I explained and Andy explained the process
10 by which we collect our thoughts and create our
11 research program.

12 It's in response to a federal funding
13 opportunity that has four major themes and then 14
14 research directions or research requirements. And
15 in response to that we come back with a proposal
16 that's about this thick that had, in this case,
17 almost 60 research tasks.

18 I'm not going to go through 60 research
19 tasks. These are what we're actively working on
20 now over this five year period of the current
21 grant.

22 But we're going to touch on just a few

1 of them which we think represent our primary focus
2 and some of our, I think, most relevant activities
3 with respect to the HSRP.

4 We mentioned on Monday the fact that we
5 have a fleet really of autonomous surface vessels
6 and we have reported out here to the HSRP on some
7 of our ASV activities I think in, I'm trying to
8 remember, Miami I think we did was the last time.

9 And I suspect come to New Orleans we'll
10 be reporting more in detail. So I'm not going to
11 go into much detail about it except for one aspect
12 which is very relevant, I think, to our fog
13 discussion.

14 As I said, we have fleet of vessels, a
15 co-development with C&C Technologies for a C-
16 Worker 4. We really were doing a lot of the first
17 application of that to hydrographic tests of
18 smaller vehicles that we test out algorithms on
19 and particularly this brand new large vehicle
20 which is another co-development with NOAA, in
21 particular the DriX which is a purpose-built
22 vessel.

1 Delays here. There we go. We reported
2 about our application of the C-Worker 4 in terms
3 of what we call close quarter surveying, the fact
4 that you can get a vehicle like this right up
5 against a cliff wall in places where you would be
6 very hesitant to put a manned launch in areas.

7 This summer we'll be trying that in the
8 western Pacific in some of the U.S. Pacific
9 Islands where we're going to fill that gap that
10 the larger surface vessels can't get up to the
11 coast.

12 We also, and I think one of the very
13 exciting things had an operation and we reported
14 on that already with the NOAA vessel Fairweather
15 demonstrating that we can operate these vehicles
16 from a NOAA vessel and actually demonstrating that
17 the ASV can be very, very efficient in terms of
18 its operation.

19 It had no impact on the processing and
20 we were able to operate through the night. And I
21 think with a fleet of those we really can
22 demonstrate some gained efficiencies.

1 The DriX is the one we're focusing on
2 now. We've already taken delivery of it. We've
3 had two weeks of sea trials with it.

4 It has, there's been a development
5 where adapters have been built for the NOAA
6 vessels, for the NOAA davits so that the DriX can
7 be launched and recovered from a NOAA vessel. And
8 we have sea trials on the TJ schedule for August
9 and September.

10 And this vessel, as I said, is purpose-
11 built. It can go up to speeds of about 14 knots
12 and has a much, much larger duration than our C-
13 Worker in this case ten days duration.

14 And they're even building a larger one
15 that Andy I think has heard about than I have.

16 CAPT ARMSTRONG: Yes. And the other
17 thing about the DriX in addition to the speed and
18 the endurance is its sea keeping ability.

19 It's ability to effectively operate in
20 the same kind of seas that a ship could, one of
21 our ships could collect hydrographic data. And so
22 it's, in that sense it's a game changer and it

1 will allow us to operate jointly with a NOAA
2 hydrographic ship or another hydrographic ship and
3 really increase the amount of data we can collect
4 in the same time period.

5 DR. MAYER: And what was remarkable
6 because it was designed really with hydrography in
7 mind is we went put it through a bunch of tests
8 and collected just, almost impeccable data at
9 speeds up to 12 knots.

10 There was no degradation in the quality
11 of the data as we kept pushing the speed up and
12 up. And this is the very first data coming from
13 it was just absolutely beautiful.

14 But the area that we're really focusing
15 on in terms of autonomous vehicles comes back to
16 this issue with the fog. And that's pushing
17 towards real autonomy.

18 How do we teach these vehicles to be
19 more than just a remotely operated vehicle but a
20 truly autonomous vehicle? And so we're developing
21 a bunch of software tools, an Autonomous Mission
22 Planner.

1 We're developing tools that start with
2 the information that's on the chart and make the
3 autonomous vehicle aware of the chart so it knows
4 the bathymetry that's already been measured and
5 can plan its mission around that.

6 But most importantly, and this is where
7 the big effort is and ties into a lot of the
8 things we said with respect to artificial
9 intelligence or machine learning is we're looking
10 towards those techniques to try to fuse a number
11 of the sensors that are on the autonomous vehicle.

12 There's a FLIR so it can see in the
13 fog. There's cameras. There's LIDAR. Infusing
14 all those sensors so we get true situational
15 awareness, true awareness of our environment,
16 identify objects, identify targets and then apply
17 to that a reactive behavior.

18 Basically it recognizes something is
19 there, even a small boat potentially and knows
20 what it should do in terms of avoiding it. And so
21 that's really the challenge and that's going to be
22 a research effort for a number of years now.

1 But that's the real focus of what we're
2 doing in the lab.

3 CAPT ARMSTRONG: And we're also working
4 on autonomy in the sense of adaptive survey
5 planning so that as the ASV survey progresses it
6 knows what the depth is and adjusts the survey
7 pattern and line spacing.

8 For that we're building on some of the
9 work that was begun by one of our NOAA Corps
10 graduate students, Damian Manda who finished up
11 just a couple years ago.

12 DR. MAYER: Okay. So another focus
13 area is what we call real time data performance
14 monitoring. And this again goes hand in hand with
15 this idea of autonomy but it's also useful even
16 for people.

17 And that's the idea that the total cost
18 of ownership of data which is the cost, that cost
19 really increases the further we are away from the
20 data collection. So the more we can do right up
21 front to assure that we're collecting high quality
22 data the less pain we have down at the end of the

1 line.

2 And this is another really
3 collaborative project with NOAA, what we call the
4 HydrOffice tool kit. And this is a whole series
5 of quality control tools, some of them very, very
6 specific for NOAA purpose but also some of them
7 very general.

8 I'll just highlight one or two of them.
9 Probably the most popular one, the most widely
10 used one is something we called the Sound Speed
11 Manager.

12 This is a tool that easily integrates
13 the collection of sound speed profiles which are
14 needed to correct for travel time to depth
15 conversions. And this is something that has
16 always been a real pain to do.

17 It's now very, very simple, easy
18 interface. You can edit, correct, clean the data,
19 transmit it directly to the sonar. And this is
20 something that was again, developed hand in hand
21 with NOAA.

22 It's in the fleet now being used quite

1 widely. But through another organization called
2 the Multibeam Advisory Committee, the MAC which is
3 run out of lab too which is NSF-sponsored. There
4 are about 7,000 users worldwide.

5 I can't believe that many people take
6 hydrocasts. But there are 7,000 users of this
7 piece of software around the world.

8 With that, that's a tool to, something
9 you do on board. But we also want to have tools
10 that give us some hint about how to better plan
11 the survey.

12 And I'm going to just run over to my
13 machine here and hit a button because there is
14 something called the Smart Map which is something
15 that just comes right into what Juliana was
16 talking.

17 It takes a lot of the operational
18 forecast information and now turns that into a
19 real time map and a predictive map of what the
20 degradation in the bathymetry collection would be.

21 You can see here up in the Gulf Stream
22 we see areas that you want to avoid because there

1 you would get very, very poor data, high
2 uncertainty data when you can plan your survey, a
3 whole bunch of tools associated with that.

4 And this is going to be continued on.
5 It's going to, this is a global forecast model.
6 But to have the high resolution forecast models
7 which are so useful.

8 Excuse me, Rich, it was Rich. All
9 these parts of NOAA. I just get so confused.
10 Rich's side of NOAA. But we're taking that in.

11 And also to the point where it will be
12 telling you when it's time to take a hydrocast
13 because things are not looking so well. Also
14 tools that will track the uncertainty of the data
15 as we're going along from other monitoring the
16 health of the system.

17 So again, tools that tell us in real
18 time. We also are developing what we call
19 Deterministic Error Analysis Tools so that if we
20 do have problems we can start identifying what
21 they are.

22 We call them the wobbles for things

1 like that. Here we have a case where when the
2 vessel happens to turn on yaw stabilization it
3 actually creates an art odd effect and we've been
4 able to identify that. Then we have to figure out
5 how to fix it.

6 But the first step is always
7 identifying that there is a problem, right. We
8 all know that.

9 And probably one of the most
10 interesting and ubiquitous and hidden problems for
11 a long time because we had so many other larger
12 problems is problems induced by the oceanography
13 itself that we have thermoclines that move up and
14 down.

15 And here's an example on the TJ with
16 the amazing channel appeared. But it wasn't real.
17 It was basically just moving up and down through
18 an oceanographic layer.

19 And so we're trying to identify those
20 and have some success in identifying. The key now
21 is figuring out ways to remove them.

22 And for that we have a PhD student

1 working on a simulator so that we can put in all
2 these different parameters, recreate the problems
3 and then look at a way to automatically extract
4 them.

5 Andy, okay. Okay, we heard on Monday
6 about CUBE, which is one of the pieces of software
7 that's kind of spread widely amongst all of our
8 industrial partners in terms of the standard for
9 data processing now.

10 We also are extending that to something
11 called CHRT, CUBE with Hierarchical Resolution
12 Techniques. This allows multi-resolution data
13 sets which is going to be the way of the future
14 for digital terrain models.

15 It allows that for resolution. It
16 allows it to be run on parallel processing
17 machines. And we're working with our
18 Visualization Group to find nice ways to look at
19 those data sets in 3-D and you'll see a picture of
20 that in a minute.

21 But probably the most exciting aspect
22 of that Brian Calder has recognized and was it,

1 who is the fellow who spoke, Younkin spoke to us
2 on Monday about AI. Younkin, yes.

3 And I think he and Brian are working
4 closely on this kind of stuff that the ideas of
5 CUBE are very, very applicable to bathy-topo LIDAR
6 data. And it's been a very powerful way of
7 identifying good and bad data which has been a
8 very time consuming and manual process.

9 So we're hoping to see some good
10 progress on that. We are also taking advantage of
11 the new generation of multibeam sonars which have
12 much broader band width, operate over wider
13 frequencies to give us a picture of the sea floor
14 at different frequencies.

15 So we have the bathymetry and then the
16 same piece of sea floor 100 kilohertz, 200
17 kilohertz, 300 kilohertz. The backscatter looks
18 very, very different at each one of those
19 frequencies and it's telling us something about
20 the nature of the sediment.

21 So we're working on ways to use that
22 multispectral information to give us a new

1 dimension in terms of sea floor characterization
2 to add to our standard angular dependence we now
3 have frequency dependence. And so we have great
4 hope that we'll actually make some progress in
5 characterization and water column mapping.

6 We talked Monday about how that has
7 really taken off. Where's Ed? You're up here.
8 Particularly in the industry.

9 And so we started with just the tools
10 that allow us again from Deepwater Horizon to
11 identify and locate seeps and leaks, oil and gas
12 seeps and leaks, mostly gas.

13 What we're now doing is trying to push
14 that much, much further in terms of quantification
15 actually measuring fluxes from the acoustic so we
16 can see how much it's coming out and here at the
17 case of the Taylor Energy leak being able to
18 separate oil from gas.

19 And actually I have to say that our PhD
20 student who worked on the Taylor Energy project
21 came up with an estimate of how much is actually
22 leaking there. And there's a huge controversy in

1 case some of you don't know.

2 Orders of magnitude different from what
3 Taylor says and what the government says. And
4 that's it. It was interesting.

5 Okay, I'm just saying it's working on
6 it. It's relevant, relevant, relevant this idea
7 of oceanography to, we said it affects our sonar
8 and our mapping.

9 We are now developing tools from the
10 sonars itself that let us look at the
11 oceanography. Here in the case of shallow water
12 we're seeing Kelvin Helmholtz wave breaking.

13 It's really quite spectacular that we
14 can see that which can then be put into our models
15 to help understand what's degrading the sonar.
16 But in its own right at lower resolution in deep
17 water here we're seeing really, really fine scale
18 oceanographic structure.

19 Here we're seeing something called
20 thermohaline steps on the left. These are 30, 40
21 centimeter steps in temperature and salinity that
22 are the result of mixing of water masses.

1 And each individual one we can measure
2 with the sonar and trace them over very far
3 distances. On the right side there what you're
4 seeing is the mix layer, the depth of the
5 thermocline.

6 Just a single step here traced over
7 hundreds of kilometers. And so we now have a way
8 rather than just at CTD stations to see what's
9 going on to actually trace the depth of the mix
10 layer which affects our sonars tremendously over
11 long distances.

12 Finally or maybe it's not finally but
13 almost finally, we are focusing on cartographic
14 issues trying to develop tools to automate
15 cartography. I'm going to turn that over to Andy
16 because I get the willies when the cartographic
17 stuff comes out.

18 CAPT ARMSTRONG: So this is a fairly
19 new area for us and we're entering this with a new
20 faculty member and we're, I think we're starting
21 off with some fairly modest attempts here to
22 develop tools that will aid our cartographers in

1 their quality assurance and their chart
2 compilation process.

3 The two that we see here are a couple
4 tests that are sort of standard international
5 tests essentially mandated by the international
6 standards that the admiral was talking about to
7 ensure that no sounding that appears on the chart
8 is shoaler than what the mariner might otherwise
9 expect to see.

10 And so that's tested in the middle of
11 a triangle and on the edges of a triangle. And so
12 we're trying to develop some tools that will make
13 these tests and this quality assurance go much
14 faster.

15 And we hope to use that to begin to
16 provide more kind of tools that will help automate
17 the process completely.

18 DR. MAYER: And finally, our
19 visualization efforts which are kind of ubiquitous
20 in terms of everything we do. We had a
21 presentation, I suspect it was in Seattle I think
22 on our charter of the future efforts.

1 I think given the discussions of the
2 Panel yesterday and the discussions we have today
3 I hope we'll come back to it again and give you an
4 update on where we're going there. That vessel is
5 navigating beautifully in thick fog I want you to
6 know right now.

7 Complete 360 degree video of the
8 channel and position and everything. But we'll
9 leave that for another time.

10 Our focus now though has really been on
11 incorporating virtual reality and augmented
12 reality into the, well I don't want to, we'll just
13 call it into the chart of the future effort and
14 basically exploring is there a role for that.

15 Is there a role for aided navigation
16 that's a 360 degree view of our bridge from our
17 little research vessel fully recreated? That's
18 not a picture. That's a digital recreation but
19 with an augmented reality view of all the
20 navigation beacons and buoys.

21 And in this case actually a risk
22 algorithm that's showing green it's safe, yellow

1 caution, red danger. And so that's the direction
2 we're trying to go there.

3 And hopefully we'll report more on that
4 in the future. And then also 3-D approaches of
5 editing huge data sets, LIDAR clouds and
6 bathymetric data clouds in a virtual reality
7 environment.

8 Marine mammals, we have always been
9 concerned and others even more so about the impact
10 of all sonars on marine mammals. In our world
11 particularly multibeam sonar there's been a lot of
12 anecdotal issues in terms of potential impact.

13 We from a theoretical perspective
14 really didn't believe that the multibeam sonar
15 should have an impact so we finally decided
16 through a lot of effort actually to try to put it
17 to a test.

18 We brought deepwater multibeam sonar,
19 the kind of worst case scenario, 12 kilohertz
20 multibeam sonar to a Navy range first off
21 California SCORE range and then earlier this year
22 to the AUTECH range in the Bahamas.

1 And we basically ran the sonar over all
2 the hydrophone arrays on the sea floor, the Navy's
3 hydrophone arrays to try to actually measure what
4 the, an actual measurement of the radiation
5 pattern. That had never been done before.

6 So we're working on that. We have a
7 student finishing up a thesis on that. We're
8 seeing some surprises in the radiation pattern,
9 but nothing that undermines our thought that there
10 is potentially, not potentially that there should
11 be no impact on marine mammals.

12 And we had another experiment, excuse
13 me, going on at the same time because at both
14 arrays at both SCORE and at AUTEC there's a
15 resident population of beaked whales, the most
16 sensitive whales.

17 And these are the places where the Navy
18 demonstrated the impact of their sonars when they
19 would go into these ranges with their sonar. They
20 could trace the behavior of the whales.

21 So when they forage they vocalize. So
22 every three, four minutes they can actually trace

1 the behavior of the whales.

2 And the Navy saw a major impact on
3 their sonars on the Navy mid-range, mid-frequency
4 sonars on the behavior of the whales. The Navy
5 studies are up at the top in the gray.

6 And what you see is the behavior in
7 terms of feeding behavior group, what they call
8 group vocalizations before the Navy sonars.
9 During the Navy sonars they went way down.

10 The marine mammals actually left the
11 range. And then after they came back. And two
12 different experiments same behavior. And this is
13 what led the Navy to publish papers that actually
14 acknowledged that there was an impact.

15 Our experiments before, during and
16 after showed no statistical, analyzed exactly the
17 same way no statistical impact just as we had
18 hoped. And this will be published very shortly
19 with, and I'm sure it will be carefully, carefully
20 scrutinized.

21 But we think it will be a real
22 demonstration that the multibeam sonars do not

1 have, at least on the foraging behavior of these
2 sensitive marine mammals, an impact.

3 And the last thing I wanted to mention
4 was our efforts with Seabed 2030. Admiral Smith
5 has mentioned this a number of times.

6 Seabed 2030 is a project that has been
7 funded by the Nippon Foundation to facilitate the
8 collection of complete map of the sea floor by
9 2030, an impossible goal almost. But we'll
10 certainly hope to get much further along the way.

11 The way this is being facilitated is
12 through a series of what they call regional data
13 centers, one in Alfred-Wegener-Institut in
14 Germany. One in NIWA in New Zealand, one at
15 Lamont for the Atlantic Ocean regionally divided
16 and CCOM, our lab and Stockholm University sharing
17 the North Pacific and Arctic.

18 A lot of effort has gone on recently in
19 terms of this. But one of the areas that we are
20 particularly playing a role in is the new
21 technology approaches.

22 And this is an effort we have with

1 Saildrone who has been working very closely with
2 NOAA with the small vehicles. But Saildrone is
3 now producing a 72 foot long autonomous sailing
4 vessel that will have an EM-302 deepwater
5 multibeam on it.

6 And we're working with them to see how
7 far we push a vessel that should have six to
8 twelve months autonomy on it as a sailing boat
9 collecting deep water data and a satellite link
10 back. And so we'll hopefully be able to report on
11 that.

12 That will be delivered in mid this
13 year, I think June or July it will be out for its
14 first sea trials. And the last thing I just
15 wanted to show is a tool that was developed by our
16 Visualization Group that lets us really kind of
17 keep track of what those gaps are.

18 We're always saying how much of the sea
19 floor is mapped and how much isn't. And this is
20 I think a very nice graphical way to be able to
21 explore what is and isn't being mapped.

22 What you see is a collection of the

1 entire GEBCO and satellite bathymetry data set.
2 But if we zoom into any given place we see at
3 scale how much is covered and how much isn't
4 covered.

5 So wherever you see a thin white line
6 this is the scale it's about an 1,800 kilometer by
7 1,800 kilometer box here. That's a single beam
8 line with its kind of one kilometer footprint or
9 two kilometer footprint and whatever the depth is.

10 Multibeam data and now all the GMRT
11 high resolution multibeam data. And so we can see
12 why they numbers are like in terms of multibeam
13 coverage just about six, 6.2 percent when viewed
14 at appropriate resolution has ever had a real
15 sounding measured on it.

16 So anywhere you go you can see what's
17 really there and what's really not there. That's
18 all I had. I want to keep that.

19 CHAIR SAADE: Thanks, Larry. So this
20 is a great lead in to my presentation because
21 everything you just saw you've got to remember
22 because I'm going to walk you through how all of

1 that is impacting what industry has been doing and
2 how all of that material that Larry just presented
3 appear in the Caribbean out here, right here.

4 So a whole bunch of these yellow tracks
5 are data that Fugro's been donating along the way
6 as we transit vessels up and down the East Coast
7 of the Americas to try to help fill these gaps.

8 So this is a heck of a tool. We need
9 to get this tool too. Anyway, I guess I need the
10 clicker. We're ready for my presentation.

11 So this is a presentation by myself and
12 Lindsay. I got a note that Lindsay is online and
13 hopefully the communications will work.

14 As we're getting this set up just as a
15 note on the seriousness and focus on the marine
16 mammals with all the ships that are working on
17 the offshore wind farm activity on the East Coast,
18 virtually every one of those ships has to have six
19 marine mammal or protected species observers and
20 the like on board.

21 So there's probably going to be 20
22 ships working out there times six, times changing

1 the crew. You can see that there's a huge number
2 of, there's a huge amount of focus on making sure
3 that there's no negative interference between the
4 activity of the surveys and the geotech work.

5 Thanks. Okay. So, Lindsay, you can
6 jump in at any time. But there will be a slide
7 that you have to jump in later on. But don't
8 unmute yet.

9 Okay. I'm going to go through this
10 quickly. There's a lot of slides but a lot of it
11 has already been presented. I'm just going to try
12 and tie it into the return on investment of
13 technology transfer from NOAA, NOS and CCOM and
14 UNH.

15 So we're going to go a little bit of a
16 summary on that. We're going to tell you what's
17 active right now.

18 There's other technologies that get
19 transferred from other agencies tends to be the
20 DoD DARPA and how this has made a profound impact
21 on the way that the industry is approaching all
22 types of applications.

1 Lots of words here. But the background
2 is it demonstrates a measurable ROI for the
3 taxpayer monies. The point is everything that we
4 do, everything that we talk about here relative to
5 the NOAA agencies is taxpayer money.

6 There's a great story to be told that
7 says that all this money spent not only saves the,
8 all the economies that you saw earlier in the week
9 relative to shipping and the amount of freight
10 that you can move, but it also has a profound
11 impact on industries to go out there and earn
12 money with it.

13 And I've always maintained that NOAA
14 does a lousy job of beating its chest and telling
15 everybody, especially the taxpayer, that there's
16 some really good things that come out of all this
17 activity and it really stimulates American economy
18 here in the Americas, in the U.S. I should say,
19 but it also stimulates going out in the rest of
20 the world and applying these technologies and
21 earning money.

22 We've stated in the past that the NOAA

1 Charting Backloft program along with its industry
2 partners and various R&D innovation initiatives
3 from UNH have combined to be the leading
4 technologies creator and that have ultimately been
5 adopted and applied and which we have extensively
6 benefitted from in the industry applications.

7 And then I just, Admiral Gallaudet has,
8 you've heard his speeches and his talks. But he
9 also had a really good write up in the MTS
10 Journal.

11 I've paraphrased a bunch of the points
12 that are relevant to this. But I really liked his
13 last quote that NOAA's support for a healthy and
14 productive marine environment is fundamental to
15 the growth of the blue economy.

16 And I think that sums it up really
17 well. So remember all the things that Larry said.
18 Remember the term True Heave. Remember CUBE, MBES
19 Backscatter, water column, the water column
20 compression and these crowd sourcing and public
21 access to all NOAA data.

22 I'm going to tie these together for you

1 real quick. So this is just a graph of what True
2 Heave does. We used to collect multibeam real
3 noisy and all of a sudden it got really quiet.

4 CUBE you saw. Backscatter we've seen
5 plenty of these images. Satellite derived
6 bathymetry we've talked about. I'm going through
7 this quickly so I can get to this one.

8 So there's this huge amount of data
9 that's available to the public domain. This is
10 actual data that was online that our staff did
11 what's called a desktop study to find out what are
12 the conditions along the entrances to New York
13 Harbor and New Jersey Harbor.

14 So you can see here this goes back to
15 2007, various layers of activity that we were able
16 to stitch together just in one evening to, for a
17 presentation.

18 And the point of this was to find
19 routings for the power cables that come in from
20 the wind farms, to find routings for, cable route
21 surveys for telecommunications and in particular
22 to find a routing for an oil pipeline, heating oil

1 pipeline that needs to go between New Jersey and
2 Long Island, if I remember right.

3 The resolution is not perfect here.
4 But this little wiggly line right here is actually
5 an existing pipeline.

6 So this wonderful dredging program goes
7 on through here and they pick up the dredge so
8 they don't damage this pipe which really means
9 that's the least draft that a vessel could come in
10 through here even though the rest of this whole
11 entryway has been dredged deeper.

12 Again, it's all publicly available.
13 There's, the resolution is not so great here. But
14 if you look back here at the 2007 data it's real
15 noisy.

16 The difference between the 2007 data
17 and some of these more modern data sets is things
18 like CUBE and things like True Heave. If you
19 look, get a chance to look at this in high
20 resolution you'll see it's a profound change in
21 the quality of the data because of these automated
22 tools that fix all that.

1 And then this is just an example.
2 These are not the planned routes. But this is
3 just an example of what you can do on a desktop
4 without even having to get off shore with the
5 boats with all this data that's available from the
6 various NOAA studies.

7 So these are pipelines, cables, you
8 name it. You can keep draping them in there.
9 Okay. Other technology transfers which tend to be
10 from the DoD.

11 AUVs we've already seen that obviously
12 from Larry. ASVs, this is an ASV cartoon. But
13 the same type of thing now that was being done
14 with AUVs where contractors will put boltable AUVs
15 in the water and let them fly simultaneously and
16 collect a lot of data.

17 So we've talked a lot yesterday about
18 big data. We talked a lot, all days about
19 artificial intelligence. Artificial intelligence
20 and big data go hand in hand.

21 You can't have artificial intelligence
22 without having lots and lots of data. So as the

1 resolution of these devices start to improve
2 that's the basis that helps artificial
3 intelligence start to take multiple trains of data
4 and stitch them all together accurately because it
5 just takes forever to do it with the staff.

6 Autonomous airborne. ROCIS was a, was
7 developed by DARPA with a company called Arete.
8 It allows you to get currents from the air.

9 Remotely-sensed bathymetry from wave
10 dynamics. This is a new generation airborne
11 hydrographic LIDAR. It started off in life as
12 hills that was looking for mines in the water
13 column for the Navy with Arete.

14 We joined with Arete and we've morphed
15 it into a new generation of hydrographic LIDAR.
16 This is data from Turks and Caicos Islands. It's
17 working really well.

18 It's phenomenal differentiation in
19 terms of the data point density, the speed with
20 which you can collect it. But most importantly I
21 mentioned this yesterday, we went down from 11
22 staff members down to two staff members in the

1 field to be able to collect the data because of
2 these changes in the way that the system works.

3 So we've been using it all over North
4 America. We've been using it particularly in the
5 Caribbean and in Canada.

6 The irony is this is a U.S. instrument
7 developed by American companies. The only place
8 we can't use it yet is the USA because it hasn't
9 been sanctioned yet.

10 Okay. So this ties back to what Larry
11 was talking about. And I was just quickly trying
12 to put dollar amounts on what, this is the impacts
13 to the industry.

14 This is the ability to take these
15 technologies and go out and apply it globally to
16 all the types of things that go on in the ocean.
17 So when you talk about autonomous vehicles the
18 stuff that Larry was showing and particularly now
19 trying to do giant surface vehicles to be able to
20 collect data it's literally going to be billions
21 of dollars of impact to be able to move from
22 manned vessels to lots and lots of AUVs.

1 I mentioned the artificial intelligence
2 processing, reactive behavior, obstacle avoidance,
3 smart technology, target location. There is, for
4 instance taking, putting an underwater mass
5 spectrometer is another application for finding
6 these seep items that we've talked about a lot.

7 The theory is you can put an underwater
8 mass spectrometer onto an AUV and when it finds
9 some type of a hydrocarbon seep or other type of
10 seep it has the intelligence onboard, the platform
11 to turn around and come back remap that without
12 having to bring the data back up to the top.

13 CUBE applications for hydrographic
14 LIDAR. I didn't even know that existed until
15 seeing Larry's presentation which is great because
16 I'm sure that's going to have a huge impact on the
17 hydrographic LIDAR business.

18 His sea floor characterization and
19 mapping tools, all these types of things when you
20 start plugging them into the industry activity are
21 going to result in millions of dollars of revenue
22 for the contractors and the other people that use

1 it.

2 Full disclosure we're working on this
3 Taylor Energy leak too, probably not for the same
4 client that Larry is. But that's all I'll say
5 about that.

6 Impact on sonar on marine mammals. I
7 mentioned that. It's going to have a huge, trying
8 to sort that out and make it more automated will
9 be a huge impact on just the ability, this is all
10 infrastructure don't forget.

11 To be able to have the infrastructure
12 offshore to do things like wind farms or pipelines
13 or piers and harbors and all that you have to be
14 worried about the impact on the mammals. So
15 getting that sorted out has a direct line to us
16 being efficiently able to expand the
17 infrastructure to the requirements of the blue
18 economy.

19 And then Seabed 2030. I don't know
20 what other number to put on that immeasurable
21 because it is going to be phenomenal when we get
22 that sorted out and everybody is going to benefit

1 from it.

2 My only other comment on Seabed 2030 in
3 order to get the public more interested in it one
4 of these days on one of these surveys we need to
5 find a space ship or something like that because
6 that will get everybody's attention. Okay,
7 Lindsay, can you speak?

8 MS. MERSFELDER-LEWIS: Yes. Lindsay,
9 you should be on.

10 MEMBER GEE: Okay. I'm unmuted now.
11 Hopefully you can hear me out there.

12 CHAIR SAADE: Lindsay, go. This is
13 your slide.

14 MEMBER GEE: Yes, hey, thank you.
15 Lindsay Gee from the Ocean Exploration Trust. And
16 I just want to have a couple of comments, I guess,
17 just to talk about what Larry, Andy and then what
18 Ed are saying.

19 And related to what Admiral Smith said
20 we are in the weeds of the technology and that's
21 what we kind of love. But we have been involved
22 in implementing that I think and tie that back to

1 what Ed is saying about the amount of money and
2 the benefits that can have to industry.

3 And as an example I think of being in
4 the weeds of positioning and GPS back in the very,
5 very early days it was the surveying and sort of
6 positioning industry that did that. And that had
7 direct benefits to all of us that were involved in
8 that.

9 But I think we all have to acknowledge
10 that had much, much broader benefits now when we
11 all walk around with the GPS in our phones and
12 those sort of things and geolocation is just a
13 normal thing. So I think our view on what Ed had
14 there was a direct impact into our industry.

15 But I think it has much broader context
16 here. And so related to that with autonomy, one
17 of the things that was discussed I think all of
18 the technology about the situational awareness and
19 all of that is something that's evolving.

20 And we see it in general industry and
21 cargo ship. But how that relates to
22 internationally I guess from a technology point of

1 view we would hope that NOAA is working with Coast
2 Guard to ensure that the operation of that type of
3 autonomous vessel is going to be possible and
4 within the regulations.

5 And then hopefully that research and
6 development that's done at CCOM and other places
7 can assist in getting that done as well. What I
8 wanted to talk about really in this section was
9 the, trying to evolve the technology transfer.

10 We're seeing the successes that have
11 come out of CCOM and the Joint Hydrographic
12 Center. And that's been predominantly through
13 well their research of course, but the industrial
14 partnership that was established that CCOM that
15 allowed that to be transferred out.

16 And I think it's worth noting in the
17 industry what the types of companies, there's the,
18 you know, hardware, software and then the services
19 companies that Ed now, that Ed works for. And
20 you've heard about what Fugro is doing.

21 But all of them have different
22 requirements. And to get the technology out

1 they're both big and small companies. But across
2 the technology and the different companies and
3 that they all need the technology at different
4 stages of research and development.

5 You know, and that can be from as much
6 as a researcher talking to one of the people from
7 our industrial partners in a hallway, that's a
8 technology transfer, right through to the packaged
9 software that Larry was talking about of the
10 different CUBE and the Sound Speed Manager and
11 those sorts of things.

12 So there's no doubt that the CCOM Joint
13 Hydrographic Center has been a success. It's been
14 a great benefit to the industry. However, I think
15 it's also worthwhile that we make sure that we
16 continue to evolve that and improve it because
17 some of it doesn't get out.

18 And I think to the companies to enable
19 and to empower them I just wanted to use an
20 example. The HydrOffice Sound Speed Manager that
21 Larry talked about if we can go to the next slide
22 please.

1 Yes, so that was interesting. And it
2 was, as Larry mentioned, it was a collaborative
3 development through CCOM, UNH and Coast Survey
4 Development Lab. And it's kind of surprising that
5 it didn't get out and to industry.

6 It's out now through an open source and
7 it's being used as Larry said by many people. I
8 actually use it. It's a great tool.

9 But why wasn't that picked up with
10 industry? And one of the things is I think it's
11 because it's sort of suitable for both sensor
12 manufacturers, survey providers, acquisitions
13 software people and also the services companies.

14 And it's being used right at the end
15 from the services companies. So is there a
16 structure there, and it's come out into the open
17 source market.

18 But again, open source although we
19 think it is not free and so both at the government
20 end the research end and also at the industry side
21 of it. And I'm not sure the general model that
22 CCOM and JHC have for transfer of technology is

1 really well supported in the funding of a model
2 like that.

3 It's a very successful tool used by
4 lots of people. But why wasn't it, you know,
5 taken out into industry for the hardware and
6 software manufacturers?

7 Next slide, please. So I think the
8 goals and just, this is really just to try and say
9 that we see the success that's ongoing. And one
10 of the issues of even of those they look like
11 static transfers of technology that went out like
12 CUBE or the seabed characterization or the Sound
13 Speed Manager.

14 But they aren't static. And we saw
15 that Larry mentioned CUBE is involving into CHRT.

16 But most times, often times when
17 technology is transferred in the industry it's a
18 once off transfer and then the management of that
19 and moving forward and how the research ongoing
20 gets transferred and even if some of the industry
21 wanted to provide their technology back to assist
22 in the transfer and ongoing research it's not well

1 set up for that.

2 And I think there always should be a
3 goal to maximize that for industry to get it out
4 into industry to benefit the blue economy and to
5 benefit all of us that are involved in that. It
6 also shouldn't be something, I think in any grant
7 or any development that gets done whether it's the
8 Coast Survey Development Lab or its CCOM Joint.

9 It shouldn't be just, we've done this
10 technology now, it's not passively available. It
11 needs to be actively managed. And there's a
12 number of projects and discussions that we've had
13 about that, that, the problem is to actively
14 manage something it does need funding I think.

15 And so that's an area where I think we
16 would support to be improved that evolving
17 technology transfer. It really needs to be
18 actively managed and the processes need support.

19 And the benefit is it does get out and
20 it does assist and the industry works much more
21 closely with the researchers and then there's a
22 general societal benefit and industry benefit by

1 doing that.

2 So that was just, I think that the
3 technology we've had, Ed has produced that White
4 Paper or issue paper a couple years ago that we
5 did. And I think the same still applies.

6 But we just need to work on making sure
7 that we maximize what gets out into the industry.
8 Thanks, Ed.

9 CHAIR SAADE: Thanks, Lindsay. And
10 then the last slide is just, as many of you know
11 we try to have topics that we pick up either for
12 the next meeting in New Orleans or along the way
13 when we have the various conference calls and
14 webinars.

15 AUV update is being taken care of.
16 Seabed 2030 we still owe everybody an update
17 because that one fell off during the shutdown.
18 But Larry touched on it very briefly. But we want
19 to do a more formal one.

20 How to, you know. It's probably not a
21 bad idea somewhere along the way for NOAA to do a
22 ping the chart review of how that process works

1 now. How do we get the data onto the charts or
2 any of the other types of data that NOAA collects?

3 And then any other ideas and maybe the
4 other ideas come from what we talked about
5 yesterday relative to our big list of 22 items or
6 thereabouts. So that's that.

7 So, Lynne, do we have some time for
8 questions? Okay. So that's over to you all,
9 Julie.

10 VICE CHAIR THOMAS: Larry, is that CUBE
11 -- what stage is the CUBE software development at?
12 I mean is it actually in the public domain?

13 DR. MAYER: Yes. I don't know if you
14 were there Monday.

15 VICE CHAIR THOMAS: I did.

16 DR. MAYER: There were probably 14 or
17 15 of our software manufacturers who provide it.
18 The way we tend to work is we'll develop software
19 to the prototype stage and then we have these 45
20 industrial partners who all have free access to
21 our software, non-exclusive rights to it.

22 And so subsets of those industrial

1 partners will take that and implement it and then
2 make it part of their product. And that's been
3 the way we've worked.

4 VICE CHAIR THOMAS: Right. So I saw
5 that. It's just not clear then do I, if I was
6 interested in seeing it do I go to one of the
7 partners then to ask about it?

8 DR. MAYER: Yes. I mean, you know, if
9 you were --

10 VICE CHAIR THOMAS: And how do I find
11 out the names?

12 DR. MAYER: These are basically the
13 standard sonar processing software manufacturers.

14 VICE CHAIR THOMAS: Okay, all right.

15 DR. MAYER: If you as an academic
16 institution came to us and say we're interested in
17 CUBE we can probably provide you the research code
18 base, but with a restriction because we don't want
19 you to infringe on the rights of our industrial
20 partners.

21 And this was basically the approach
22 that was outlined by NOAA when we first started

1 that they didn't want and we didn't want to be the
2 ones supporting commercial software.

3 VICE CHAIR THOMAS: Right.

4 DR. MAYER: So the idea was that NOAA
5 would buy commercial products off the shelf from
6 manufacturers who then would take on the
7 responsibility for the long-term support and we
8 could go on developing the next research tool.

9 VICE CHAIR THOMAS: Okay, now I got it.
10 The whole end to end. I can talk to you
11 afterwards about it. Thank you.

12 CHAIR SAADE: Ed K.

13 MEMBER KELLY: Ed Kelly. Following up
14 on what the Admiral said before about
15 externalization and looking outside into
16 international and reverting back to my new
17 favorite topic, fog.

18 How much work does NOAA do
19 collaboratively with organizations like Google or
20 even overseas? Like I know Sweden is very far
21 advanced with unmanned automated vessels, large
22 scale vessels.

1 How much exchange of data information
2 research is going on there?

3 RDML SMITH: Yes, I'll take that. It
4 happens in a variety of ways. Through
5 professional conferences like the BlueTech
6 economy, BlueTech Week that's hosted out in San
7 Diego.

8 The Norwegians were there and gave a
9 really good brief on their sort of BlueTech
10 strategy. We meet our hydrographic colleagues,
11 from Norway in particular and I think Norway is
12 the most advanced in unmanned shipping, and then
13 a lot of technologies, Kongsberg is a Norwegian
14 company.

15 We see them several times a year in the
16 Arctic context and in other international
17 hydrographic organization bodies. They are also
18 a, what's called a, they have what's called a
19 RENC, a regional ENC.

20 So they, distribution point. So they
21 are one of two main organizations worldwide who
22 coordinate the dissemination of ENCs. And we're

1 working with them on next gen dissemination of
2 other types of services.

3 And in that context we've been, we just
4 provided them earlier this week with an early
5 version of the lower Mississippi River surveys
6 that are, were done under contract to NOAA. And
7 with the idea of starting to prototype and explain
8 the power of using gridded bathymetry directly for
9 navigation.

10 They're the, Kongsberg is the only one
11 that has a navigation system that can take a
12 gridded bathymetry input. Despite the promise of
13 it, it's, we've not been able to interest other
14 navigation companies.

15 So there's a lot of context like that.
16 Could we be doing more? Sure, in other contexts.
17 But I did want to outline a few.

18 DR. MAYER: And then from the academic
19 side that kind of adds another avenue for that
20 kind of international collaboration. And often
21 what we do academically which includes a lot of
22 international collaboration, will feed right back

1 into our NOAA sponsors.

2 MEMBER GEE: And could I, sorry,
3 Lindsay Gee. Can I comment from an industry point
4 of view, this is another benefit I think that is
5 kind of hidden sometimes that the industry itself
6 is very international.

7 You have to be to survive. And there
8 is a natural collaboration from industry because
9 the research and development that's done and
10 spreads out from the companies is used
11 internationally.

12 It sort of percolates through the
13 world. So I think that's just, you can see the
14 government discussions at various levels, the
15 academic collaboration.

16 And then industry, as always is not
17 something I think you can separate out. And so
18 there's a great benefit from U.S. industry and the
19 U.S. generally by having this sort of tripartite
20 together in, so I definitely think we have, it
21 adds to the international influence and again to
22 the economy of the U.S. by having this transfer

1 out.

2 MEMBER KELLY: Just a quick follow up.
3 And I mentioned Google and that's what their, you
4 know, unmanned automobiles and whatnot.

5 And are we coming outside of the
6 maritime industrial framework to look for what,
7 say Google is doing because frankly if they can
8 avoid running over the insane pedestrians in New
9 York City they should have absolutely no problem
10 avoiding small boats in San Diego?

11 DR. MAYER: I can assure you that in
12 the research we're doing with artificial
13 intelligence that the students are very aware of
14 that community and what they're up to and using a
15 lot of algorithms and techniques that have been
16 developed there.

17 But then there are unique aspects of
18 the maritime domain that they're focusing on
19 taking those algorithms and seeing how applicable
20 they are with those unique aspects.

21 RDML SMITH: One more example and that
22 is, and we'll brief more on our unmanned systems

1 work later in the year, but we're in the process
2 right now of converting some of our existing
3 manned launches to optionally manned.

4 That is using the same hull and the
5 same davits and the same junior engineers and the
6 same sonars and everything else putting a brain in
7 it. So it's still an ugly gray boat, not a pretty
8 yellow boat.

9 But it has a brain in it. And we can
10 then work forward in that higher levels of
11 automation in a supervised environment.

12 But the company that is doing that has,
13 this is their first marine operation. They cut
14 their teeth on unmanned robotics in clearing
15 roadside bombs.

16 And so there's a whole different set of
17 technological heritage that we're bringing to bear
18 in that context.

19 MEMBER GEE: Lindsay Gee again. Could
20 I ask Admiral Smith a question just regarding the
21 Coast Guard and the rules and regulations for
22 using autonomous?

1 Is there a collaboration with NOAA
2 working on that with Coast Guard to look at use of
3 the unmanned survey type of platforms?

4 RDML SMITH: So for our own operations,
5 you know, we treat them as vessels that are under
6 the supervision of our people within, you know,
7 typically within line of sight.

8 The Coast Guard does not yet have a
9 robust set of rules on that. We have a variety of
10 contexts including CMTS where we have discussed
11 this with them.

12 Any additional input from this panel to
13 inspire any more progress would probably be
14 helpful.

15 DR. MAYER: Yes. And I should say that
16 again, the way we've all gotten around this is to
17 have it as a piloted vehicle.

18 But our kind of point guy for
19 autonomous vehicles, Val Schmidt has been very
20 actively working with, the Coast Guard has a very
21 broad outline now of pretty nondescript
22 regulations, actually basically says just paint it

1 yellow, kind of.

2 But in the UK they are actually having
3 a very serious look at autonomous surface vessel
4 guidelines. And Val has been tied into that loop
5 too.

6 So we're at least witnessing what's
7 going on there.

8 MEMBER GEE: I no doubt would think
9 that the technology soon is going to allow, if
10 you're talking with the largest Saildrone kind of
11 out in the Pacific or something, it seems like the
12 technologies, you wouldn't want to get to the
13 stage where the regulations are going to block the
14 use of the technology would be my comment.

15 So I think we would support, Admiral
16 Smith, what you're talking about --- ensuring that
17 you can engage and it doesn't restrict what you
18 can do. If you want to go over the horizon
19 outside just, there's your limit.

20 CHAIR SAADE: Go quick.

21 MEMBER CHOPRA: Thank you. Anuj Copra,
22 RightShip. I just wanted to follow up with that

1 on Larry especially on the autonomous vessels.

2 So we do have a problem today that
3 every time there's a hurricane which comes into
4 the Gulf or other waterways it blocks the recovery
5 effort. It's slowed down because of the survey of
6 those rivers.

7 Have you looked at doing let's say a
8 mother ship and four autonomous vessels trying to
9 do a single pass up the river or up the channel so
10 that a recovery effort to rebound and the economy
11 resilience is much stronger? Has that been worked
12 on?

13 CHAIR SAADE: I'll answer, yes. So
14 from an international point of view on the
15 question of AUVs and ASVs, Fugro's perspective is
16 the only people really working on it are in the
17 UK, and everybody else that we deal with globally
18 isn't doing much. Okay, sorry. This is Ed Saade.

19 But on your direct question we are
20 experimenting, at least on paper, with a mother
21 ship and multiple drones or mother ship that's
22 staffed with people and multiple drones in deep

1 water to go out and collect more.

2 Larry is, I'm sure everybody is kind of
3 looking at this, including the manufacturers of
4 the drones. They're trying to find a way to get
5 that. Ann.

6 MEMBER KINNER: I have to, I'm Ann
7 Kinner and I have to preface this by saying that
8 I live in California. If you know anything about
9 California you know marine mammals are an issue.

10 And I'm just curious. I've been
11 looking at the charts back and forth between the
12 East Coast and West Coast. And the tracks that
13 were run West Coast backside of what we refer to
14 as the back side of San Clemente Island were in
15 very deep water.

16 The Bahamas are not so deep in a lot of
17 areas, deeper in some areas. Has anything been
18 done to consider whether the differences, because
19 they were significant in the results east to west,
20 might have had anything to do with the depths at
21 which the soundings were tested?

22 CHAIR SAADE: This is Ed Saade. No,

1 the differences, as an example we have, there's
2 probably 20 ships working off the East Coast for
3 various types of projects right now that have
4 these types of sonars on them for offshore wind
5 farm.

6 And there's probably none on the West
7 Coast because there's no activity going on. So
8 it's strictly where are the vessels located, where
9 is the activity.

10 But the vessels that, all the deep
11 water sensors that everybody uses are somewhat
12 universal. So there's 30 kilohertz and 12
13 kilohertz tends to dominate that.

14 The 12 kilohertz allows you to go full
15 ocean depth. The 30 kilohertz allows you to get
16 to maybe 3,500 meters. That's, and there's really
17 only one manufacturer that everybody uses.

18 MEMBER KINNER: Okay. I guess the
19 issue relates more to how do the mammals respond
20 if they're in shallow water versus if they're in
21 3,000 feet?

22 RDML SMITH: So just to be clear,

1 sorry, this is Shep Smith clarifying the depth of
2 the water in AUTECH. But Larry can speak to the
3 comparison between the two areas.

4 DR. MAYER: Yes, both are very deep
5 sites. So the SCORE off San Clemente is about
6 1,800 meters deep and AUTECH is about 3,000 meters
7 deep.

8 MEMBER KINNER: But those were
9 significant differences.

10 DR. MAYER: Right the differences that,
11 well the 1,800 and 3,000 meters we operate the
12 same sort of --

13 MEMBER KINNER: I'm not talking about
14 the depths. I'm talking about the response of the
15 mammals.

16 What struck me was it looked like there
17 was a significant response of the mammals on the
18 East Coast versus on the West Coast. On the West
19 Coast they just kept eating. On the East Coast
20 they all went away.

21 DR. MAYER: No, no. I think the
22 response of the mammals to the Navy sonar has been

1 consistent everywhere. So wherever the Navy sonar
2 goes the mammals, which it's a much, much more
3 powerful sonar.

4 It puts out a tone for seconds as
5 opposed to milliseconds. And so that's the
6 response you're seeing in terms of the mammals to
7 that very, very long pulse.

8 And I don't think it matters if it's on
9 the East Coast or the West Coast, yes.

10 CHAIR SAADE: Okay. I think we're
11 going to have to cut it off and move to the next
12 section which I don't have my notes in front of me
13 so if somebody could help me out.

14 Break, perfect, okay. Let's get back
15 at 10:45, Lynne. Okay, thanks, everyone. Hey,
16 let's have an applause for the speakers.

17 (Applause.)

18 (Whereupon, the above-entitled matter
19 went off the record at 10:27 a.m. and resumed at
20 10:42 a.m.)

21 CHAIR SAADE: Okay. We're going to go
22 a little bit out of order because one of our guest

1 speakers has to catch a plane.

2 We're delighted to have Tony LaVoi and
3 Allison Allen to address the follow up from past
4 HSRP meetings on topics of NOAA interest and Tyler
5 Christensen, thank you, New Hampshire, Miami,
6 Juneau.

7 On marine weather and NOAA's geospatial
8 activities and the impacts from the Geospatial
9 Data Act. Tony LaVoi and Tyler Christensen are
10 going to tag team on the presentation.

11 So please refer to the speaker bios in
12 your materials. And with that we're ready to go
13 and whoever wants to go first, thanks.

14 MR. LAVOI: I will go first. Thank
15 you, Ed, and thank you all for letting us go out
16 of order. I'm based in Charleston, South
17 Carolina.

18 And I've always had HSRP as one of the
19 groups I've wanted to come and participate in the
20 meeting and I was really excited and planned to
21 spend all week with you. But unfortunately that
22 didn't happen.

1 So I flew up on a flight that landed
2 about 8:30 this morning and I'll be back on one at
3 about 12:30, assuming that National Airport and
4 American Airlines do what they need to do.

5 And I'd like to introduce Tyler. So
6 I'm the NOAA Geospatial Information Officer. So
7 I work out of the office of the CIO. Tyler is the
8 NOS data manager and she works within the NOS
9 ACIO's office, just to kind of tell you where we
10 stand.

11 So I understand there was a little bit
12 of discussion yesterday about the Geospatial Data
13 Act. And in looking at some of your materials,
14 the HSRP materials in terms of the charter and the
15 things that you guys are interested in and even
16 hearing the discussion walking around the table,
17 I can clearly see where there's potential
18 connections between what HSRP cares about and what
19 could potentially be within the purview of the
20 GDA, okay.

21 Maybe a little bit of editorializing
22 before we get into the content though. For those

1 of us that have been in the kind of federal
2 geospatial community for a while, I've been in it
3 for about 20 years, it unfortunately is a
4 relatively insular community.

5 It's feds oftentimes talking to feds.
6 And I really do think that the GDA can provide a
7 mechanism for other voices. And I see HSRP and
8 especially the contingencies that you guys work
9 with as being really important here.

10 So is this the clicker, great. So I
11 asked a couple of folks and my understanding is
12 that you might not all be that familiar with, you
13 know, kind of federal geospatial coordination.

14 So wanted to spend just a little bit of
15 time on that and then we'll get into the GDA
16 background timeline so you know what to expect and
17 then a little bit on potential opportunities for
18 NOAA and HSRP.

19 We've only got about 10 minutes so this
20 is really going to be at a high-level overview
21 though. All right, hopefully everybody can see
22 that.

1 So we couldn't jump into the GDA if you
2 didn't have some familiarity with some of these
3 terms, okay. So first of all the Federal
4 Geographic Data Committee, so back in 1990 the
5 federal government basically said hey there's this
6 thing called GIS and geospatial data and we need
7 to do a better job of coordinating it.

8 So through an OMB circular revision a
9 group called the Federal Geographic Data Committee
10 was created, 32 Agencies chaired by the Department
11 of Interior and OMB. In 1994 there was an
12 executive order that created the National Spatial
13 Data Infrastructure.

14 So the concept of what an FGDC might
15 focus on and many of you guys are obviously
16 familiar with the term NSDI especially
17 internationally. Even marine spatial data
18 infrastructures, right, more and more happening in
19 the MSDI environment.

20 The National Geospatial Advisory
21 Committee was created, I think, within the date of
22 2006, 2008, sounds about right. I look at this

1 as, so it's a FACA, not unlike you guys.

2 And I believe that the reason that NGAC
3 was created was you basically had almost two
4 decades of activity within the FGDC and maybe not
5 as much success. And again, that kind of insular,
6 federal only approach.

7 So NGAC was created with the
8 expectation that we would be bringing in a lot of
9 other voices. And then a couple of other terms.

10 National Geospatial Data Assets. So
11 these are basically the foundational components,
12 the foundational data for the development of a
13 National Spatial Data Infrastructure.

14 Again, editorializing I think we missed
15 an opportunity here. We have 175 National
16 Geospatial Data Assets. Instead of focusing on
17 really, I think the most critical data we kind of
18 muddied the water.

19 And not everything is really at the
20 same level of importance, I believe. And then
21 NGDA themes. So these are the accumulation of
22 like NGDA's.

1 So those are some concepts that it's
2 really important for you to understand before we
3 go into the actual Geospatial Data Act. NOAA and
4 Department of Commerce are absolutely leaders
5 within the federal geographic data community.

6 And why that's important is it gives us
7 a voice. And I think maybe even by proxy it gives
8 the HSRP a voice working in tandem with NOAA as
9 well as independently to talk about the things
10 that are important to us.

11 So in terms of just an example of
12 NOAA's footprint subcommittee. So Juliana chairs
13 the Geodetic Controls Subcommittee. Ashley is the
14 co-lead of the Elevation which is bathymetry.

15 NGDA themes, you can see there are four
16 of the 17. So we're basically responsible for a
17 quarter of the themes. Then we're responsible for
18 about 15, 20 percent of the NGDA's.

19 And when you look at your charter and
20 you look at the eight or ten, you know, shoreline
21 mapping, hydrographic mapping and you look at the
22 NGDA's there's a really close alignment.

1 So you guys might not realize it. But
2 HSRP is present in the FGDC even if you didn't
3 know it. All right.

4 So in terms of the actual GDA. What
5 makes this different? Why are those of us that
6 have been, you know, kind of messing around in
7 this federal space for a while excited about it?

8 Well not everybody is excited. I'm
9 excited about it. First, it was signed into law
10 in 2018. It was originally introduced in 2015.
11 It kicked around in last Congress.

12 But it was passed as part of the
13 Federal Aviation Administration Authorization.
14 And the most important thing here to note is that
15 we now have a law which can comply, compliance or,
16 you know, force compliance whereas in the past
17 most of the activity has been voluntary in nature.

18 You can come to a meeting if you want.
19 You do your report if you want. Now we, hopefully
20 we're going to see, you know, things change.

21 The other part of this and I think
22 looking at it there's, I was talking to Admiral

1 Smith you could probably take the federal
2 community and you could divide us into glass half
3 full side of the house in terms of the GDA and the
4 half empty.

5 The half empty people are really
6 focused on the reporting and there's a lot of it.
7 Annual reports for the themes, annual reports for
8 the agencies, strategic plans, Inspector General
9 audits, biannual reports to Congress, I mean there
10 is a whole bunch of reporting.

11 If that's all you focus on, yes, you
12 walk away from it thinking it's negative. On the
13 flip side looking at it from the perspective of
14 the geospatial community is not well understood,
15 right.

16 Ed just had up on his slide the
17 billions and millions. We do a really poor job of
18 explaining the importance of geospatial data, the
19 return on investment, the impact to the economy,
20 all of those things.

21 I think that if you look at the GDA not
22 just from the perspective that there's a lot of

1 reporting that's required but really looking at it
2 from the perspective of hey, we've now got
3 Congressional attention, right.

4 And we've been telling ourselves for
5 years, decades, that we've got a story to tell.
6 All right, let's tell that story. So I think
7 that's really an opportunity.

8 The other thing I wanted to mention on
9 this slide is the role of the National Geospatial
10 Advisory Committee. So this NGAC is the HSRP for
11 the FGDC.

12 And both Gary and Dave used to be
13 members of the NGAC. In the past the NGAC, again
14 my opinion, in the past the NGAC has done some
15 really good work that often times was dead on
16 arrival.

17 Recommendations for change, feedback to
18 the agencies, whatever it might be. NGAC is now
19 written into the law and has a much more active
20 role.

21 Agency strategic plans and agency
22 annual reports will be reviewed by NGAC. NGAC

1 will have the opportunity to provide comment.

2 Those comments have to be responded to.

3 So again, from a trying to break down
4 just these walls of federal, you know, federal
5 geospatial coordination and bring in other sectors
6 I think there's a real opportunity. The rest of
7 the stuff is probably relatively self-explanatory.

8 So in terms of the timeline, I should
9 mention here we've got the Geospatial Data Act.
10 We also though right now within the current
11 administration have a number of other things that
12 are supportive of if not even superseding the
13 Geospatial Data Act.

14 So we have an executive order on open
15 data. So all data must, you know, if the public
16 can get its hands on it you need to be making it
17 available.

18 There's the Federal Data Strategy which
19 some of you guys might be aware of. But the
20 development of the Federal Data Strategy. There's
21 this new thing called Foundations of Evidence-
22 Based Policymaking Act.

1 This is really focused on making, again
2 it's open data. It's making sure that if the
3 government has data and is not restricted from
4 making it available they need to make it
5 available.

6 There's also a new executive order on
7 artificial intelligence. And if you read that you
8 see all kind of things about open data and portals
9 and platforms to spur economic development, to
10 spur research and development.

11 And the GDA fits in there somehow.
12 We're not exactly sure. But it's a common message
13 that's coming from the administration, coming from
14 OMB which is open data.

15 And talking to Admiral Smith I mean
16 that's a core tenant and, Juliana, it's a core
17 tenant of NOAA. We are trying as much as we can
18 to make as much of our data open.

19 So in terms of looking at the timeline
20 a lot of activity between now and the end of
21 October when we anticipate that there will be
22 guidance to the agencies, I have highlighted

1 though three opportunities if Members of the HSRP
2 are interested.

3 So NGAC has a public meeting scheduled
4 in three weeks, two weeks at the end of March,
5 public meeting. So if anybody is interested you
6 can dial in.

7 There's an NSDI leader's forum, so
8 National Spatial Data Infrastructure. I don't
9 know exactly what the plans are. We've held these
10 in the past.

11 They're typically day long or half day
12 long events where people can come typically in the
13 D.C. area and provide feedback. So there might be
14 an opportunity there. And there will be another
15 NGAC public meeting.

16 SO closing with, you know, what are
17 some potential impacts and opportunities. So I
18 think and I've hit on this a couple of times, I
19 really think that this is an opportunity.

20 HSRP represents a particular subset of
21 the geospatial community, right, the coastal and
22 marine primarily. And if you go back to the kind

1 of initial days of NSDI there were, I mean
2 basically the concepts in the NSDI stopped at the
3 shoreline.

4 Everything that was out, you know,
5 between the shoreline and 200 miles EZ was just
6 something else. So there's a lot of geospatial
7 activity that happens in our, in this, in your
8 community that I don't think is really being
9 highlighted.

10 And I think there's a real opportunity
11 to connect NOAA's mission and NOAA's programs and
12 the impact that NOAA is having to HSRP through
13 things like these NGDA themes, these agencies
14 geospatial plans.

15 There's mention of ROI, return on
16 investment. So I think that's one. The second
17 thing is additional reporting for federal
18 agencies.

19 Again, some people might be looking at
20 this as a negative. And, yes, I mean it's going
21 to be more work. But again, if this is an
22 opportunity for us to highlight the impact that

1 our geospatial data and systems are having I think
2 it's something that we really need to take
3 advantage of.

4 One that has definitely caught the eyes
5 of, I know, people within the Office of Coast
6 Survey is there is a statement, and that's not
7 verbatim. But after five years you can't spend
8 federal funds for data that don't meet applicable
9 standards.

10 I mean, there's a lot to say there in
11 the sense that we don't exactly know what
12 standards they are talking about, who is going to
13 be the standards body, what actually constitutes
14 compliance with. But you guys are a standards
15 community.

16 So again, being able to provide the
17 kind of guidance on the front end so we don't end
18 up in a situation where we're wanting to do data
19 collections, for example, with some of the stuff
20 that Larry and Andy were talking about earlier
21 with some of these new technologies but we don't
22 have the standards in place and Congress is going

1 to start pushing back on us.

2 And then lastly, the connections to the
3 other government data initiatives. I think there
4 is some real opportunity. I don't know enough
5 about your community as I saw some heads nodding.

6 So you might be somewhat conversant in
7 the federal data strategy or, you know, artificial
8 intelligence. But again, if you think kind of at
9 the core of geospatial data, open data that's
10 ultimately what we care about.

11 And trying to find as many mechanisms
12 and avenues to promote especially the impact I
13 think is really important. So with that there's
14 a couple of links here if you're interested in
15 learning a little bit more.

16 Our contact information and I did all
17 the talking. So Tyler was on backup in case my
18 flight didn't make it in. So I think she was
19 really happy when I walked through the door.

20 MS. CHRISTENSEN: But I also just
21 wanted to say that so Tony has to run to catch a
22 flight. But I'll be here in the afternoon and

1 both Ashley and Juliana have been deeply involved
2 with the FGDC work for longer than I have even.

3 So if you have additional follow up
4 questions there are -- there will be people in the
5 room that you can draw on.

6 CHAIR SAADE: Does anyone have any
7 questions? Ann.

8 MEMBER KINNER: How does this relate to
9 what I, and I'm Ann Kinner. I don't know what hat
10 I've got on right now other than the fact that I
11 deal with charts all day long.

12 And the NGA was a source of
13 international charts up until a couple years ago.
14 But it's described as the National Geospatial
15 Intelligence Agency. How do you relate?

16 MR. LAVOI: I'm actually going to look
17 at Shep who has got a lot more familiarity with
18 NGA, NOAA relationships than I probably do.

19 RDML SMITH: So narrowly within
20 charting. So the NGA does have charting
21 responsibilities primarily for the military. And
22 your experience of NGA charts availability over

1 the last few years has been their reaction to
2 honoring their use, data use agreements with other
3 nations.

4 And I can tell you more about that
5 offline if you would like. But so the scope of
6 what is publicly available from NGA has shrunk
7 from thousands.

8 And some of those are not maintained at
9 a high degree of currency. So I would be
10 interested in sort of your thoughts on national
11 policy for how we should be coordinating charting
12 responsibilities across the federal government.

13 And it is a subject, an active subject
14 of my thinking. So I would be interested in your
15 thoughts.

16 MR. LAVOI: I can offer one thing more
17 broadly than just at the charting level. When the
18 Federal Geographic Data Committee was originally
19 created most of DoD and almost all of intel was
20 not part of it which seemed problematic, right
21 because there's a heck of a lot, probably a lot
22 more activity goes on in those communities in

1 terms of R&D and data development.

2 Over the course of the past I would say
3 five years or so there has been much more active
4 engagement especially with NGA and the director of
5 national intelligence have been present.

6 They come. They might not say as much
7 in an open meeting. But the idea is that they are
8 looking to share as much of their data and their
9 technology that they're able to within, you know,
10 kind of the open public community.

11 CHAIR SAADE: Any other questions?

12 (Off microphone comment.)

13 MR. LAVOI: Yes. That meeting, so my
14 guess is, I got the wrong one. That is a webinar
15 meeting. So if you would go to the FGDC.gov
16 website and just search for NGAC there should be
17 a public meeting notice.

18 I mean just like you guys it gets
19 published in the Federal Register. So information
20 on the connection should be there. Well thank you
21 all. And again, sorry --

22 RDML SMITH: Can I ask one more

1 question, Tony?

2 MR. LAVOI: Sure.

3 RDML SMITH: And that is that I'm quite
4 proud of this whole community for the way that we
5 have traditionally approached some of the sort of
6 underlying drive that came, that developed this
7 with open data and coordinated and standards based
8 work and that sort of thing.

9 And I have no doubt that we will
10 eventually earn the blue ribbon associated with
11 this program. But I'm interested in your sort of
12 thoughts on how we get on the blue ribbon track
13 early for, you know, we don't end up on the
14 compliance end of complaining about not having an
15 Appendix D in some report but instead have an
16 opportunity to show leadership.

17 And I know Ashley has this top of her
18 mind as well. But I would like to hear your
19 perspective.

20 MR. LAVOI: Sure. My perspective is
21 that the vast majority of what's called the
22 terrestrial members of the FGDC community really

1 have very little appreciation for this community,
2 the sophistication, the maturation from a
3 technology standpoint, from a standards
4 standpoint, from an engagement of public/private
5 sector.

6 So my guess is that there's a heck of
7 a good story to tell. Right now we're so new in
8 the implementation planning phase for how the GDA
9 is actually going to play out I don't know
10 exactly.

11 But I know that there will be
12 opportunities and I encourage this community to
13 promote itself because I do think that there's a
14 really good story to tell. All right, thank you
15 all.

16 CHAIR SAADE: Thank you.

17 (Applause.)

18 RDML SMITH: Going to leave Allie up
19 there all by herself.

20 CHAIR SAADE: Thanks, Tony and Tyler.
21 The next speaker following for, you've been
22 following for a couple of years. I wanted to ask

1 Gary Thompson and Dave Maune and Juliana Blackwell
2 to weigh in as well as Members of the interest.

3 That's the wrong thing to read. This
4 is a warm welcome to Allison Allen who is in, and
5 with the Weather Service. And previously worked
6 with CO-OPS. Please refer to the full speaker bio
7 in your matters.

8 I guess we don't have a moderator for
9 this so I'll be your moderator.

10 MS. ALLEN: Sounds good.

11 CHAIR SAADE: Please proceed. Go for
12 it.

13 MS. ALLEN: Yes, I'll self-moderate.
14 Thank you all, Panel for having me here today. I
15 understand that weather comes up a lot during
16 these Panel discussions so I'm very glad to be
17 here.

18 In the back of the room I have two
19 colleagues with me as well, Joe Sienkiewicz and
20 Alison Agather back there from the Ocean
21 Prediction Center. So I'll invite you to join me
22 in answering questions too.

1 So I know Mary Erickson spoke with you
2 during the orientation and gave you a broad brush
3 of some of the things that are coming up with
4 navigation or Marine Services and National Weather
5 Service. I want to go a little bit deeper and
6 then touch on a number of other topics as well.

7 From reading your bios I know that
8 there's a wide range of expertise and interests
9 here. So my goal today is to cover a number of
10 topics.

11 But I'm certainly happy to follow up
12 with you and answer any questions afterwards. All
13 right. So you guys saw this slide on Monday.

14 I just want to raise again that there
15 are a number of challenges not only for mariners
16 out at sea but also for marine forecasters. And
17 to highlight what some of those are, you know,
18 just the great amount of shipping that's
19 happening.

20 The fact that there's two billion
21 passengers on ships each year. Severe weather
22 continues to be a problem.

1 Well so for the first, top left and
2 middle pictures you're seeing, you know, just a
3 snapshot of the ships out there at any given time
4 and then the, you know, the global shipping
5 averages over the year.

6 What you see in the top right is some
7 of the extreme weather. So not including tropical
8 cyclones we're seeing, you know, on average 80
9 hurricane force storm issues a year.

10 And as you can see that's, they're
11 happening in shipping lanes. There's a definite
12 connection here.

13 Offshore and high seas tends, continues
14 to be a challenge for forecasting. You know,
15 every so often we're reminded that we can't see it
16 all, we don't know it all.

17 We just don't have as many observations
18 out at sea as we have along the coast. And then
19 we have, you know, frustrating issues like the
20 scatterometer image at, you know, at the bottom
21 where the middle of that low is right in that
22 blank spot.

1 So we're, you know, we're facing those
2 challenges. And then we're still dealing with
3 antiquated systems. So ships more and more have
4 satellite on them.

5 But we're still having to do the HF FAX
6 and things like that. So and sometimes those
7 messages get garbled, as you guys are familiar.

8 If I can master this remote it will be
9 good. Just a snapshot, a year in weather. You
10 know, National Weather Service is huge. It deals
11 with a lot of different things not just marine.

12 On any given year we're taking 76
13 billion observations and issuing 1.5 million
14 forecasts. So I just wanted to give you a little
15 bit of context about National Weather Service and
16 where marine fits into that.

17 There's obviously a very close, bless
18 you, interaction between what we're doing and what
19 NOS Navigation Services is doing. So where we fit
20 National Weather Service is broken into what we
21 call Service Program Teams all dealing with
22 different aspects of weather.

1 Where we sit is with marine and coastal
2 although I'm also the branch chief for tropical
3 and tsunami. So I'm happy to answer questions
4 about that too although I'm going to focus on
5 marine today.

6 You guys have probably seen this map
7 before. We've got local weather forecast office
8 and weather service offices around all U.S.
9 coasts. And what I've highlighted in red are
10 those that produce the marine forecasts.

11 Here's our coastal and offshore zones.
12 You guys are familiar with these maps too. What
13 you might not realize is that these areas are very
14 closely dictated by National Weather Service
15 policy just who is responsible for what.

16 The coastal zones are, the forecasts
17 are issued by the weather forecast offices out to
18 about 40 to 60 nautical miles depending where you
19 are. And then there's offshore forecasts beyond
20 that and high seas forecasts beyond that.

21 And those are done by the national
22 centers like the Ocean Prediction Center in the

1 back. So here you see a little bit more of the
2 high seas area of responsibilities.

3 I have mentioned the Ocean Prediction
4 Center. We've also got a Tropical Analysis
5 Forecasting Branch out of the National Hurricane
6 Center. And we also have offices, our office in
7 the Pacific that's issuing high seas forecast for
8 the Pacific.

9 You guys are very familiar with this.
10 I just wanted to, you know, list out some of the
11 main products that we issue and the policy that we
12 oversee from our office. I'm happy to answer any
13 questions on these.

14 And you've probably seen our website as
15 well. I just wanted to mention that we're well
16 aware of the fact that this is a very clunky
17 website.

18 It's just a long list of lots of links.
19 We're in the process of streamlining that right
20 now.

21 So the Marine Service Program Team,
22 Mary used a version of this slide as well on

1 Monday, the goal really is to make sure that all
2 marine users meet their safety and economic needs
3 through ready access to accurate and timely and
4 easily understood coastal and marine forecast
5 warning and other products.

6 So everything we do is really focused
7 around that goal. How do we reach more people?
8 How do we reach them in better ways? How do we
9 improve the information that they're getting, all
10 of that.

11 So the Service Program Team is
12 comprised of our Policy Branch where I sit, the
13 national centers where Joe and Allison sit, all of
14 the National Weather Service regions, National
15 Data Buoy Center and then our Port Meteorological
16 Officers and our VOS program.

17 So that's really making sure that any
18 decision that we make about a marine product or
19 how things or what words we use, every decision we
20 make is very balanced and we're thinking about
21 every possible region and constituent to try to
22 make sure that we don't take those decisions very

1 lightly.

2 One of the exciting things that we're
3 working on right now, you know, for terrestrial
4 weather you have access to what we call the point
5 and click forecast. So pretty much anywhere on
6 the earth you can or in the U.S. you can click and
7 get a point data forecast.

8 That doesn't exist for a lot of the
9 ocean. So one of the things that we're working is
10 expanding our National Digital Forecast Database
11 to be able to do that in more areas at sea.

12 I would be remiss if I didn't talk a
13 little bit about the National Weather Service role
14 in precision navigation. Maybe I can get it
15 right, Liz.

16 You guys know what this is. But I just
17 wanted to highlight the fact that Weather Service
18 does play an important role. So, you know, I
19 applaud the work that NOS is doing in bringing
20 together the bathymetric and the topographic
21 information, the meteorology, the oceanography.

22 We're heavily committed to this effort

1 as well. We play a big role in the marine
2 forecast and the waves and the visibility. I
3 heard fog mentioned. You know, we certainly issue
4 those fog forecasts.

5 One of the exciting things that I think
6 is happening with this advent of precision
7 navigation is that it also opens the door to
8 really increase the efficiency between the two
9 pieces of NOAA. So I've really liked seeing how
10 that's going.

11 And what you see in this graphic, I'm
12 sure it's familiar to you, is the Marine Channel
13 Forecast Pilot Project that came out through
14 precision navigation. And we're looking forward
15 to replicating that approach in other places.

16 So then I wanted to talk a little bit
17 about extreme weather avoidance which is a key
18 goal of our program. This particular graphic is
19 right before Hurricane Florence.

20 You know, of interest you're seeing the
21 Navy ships sortied off of the Florida coast. But
22 what I want to highlight is that big red box and

1 the fact that in an area that's 165,000 square
2 nautical miles you've got no ships, at least no
3 ships that have active AIS on there, which is
4 great.

5 That's what we want to see. This is
6 the type of behavior we want to see.
7 Unfortunately we don't always see it. And so
8 we're doing everything that we can to try to make
9 sure that this becomes the norm.

10 Sorry, it's animated. So you guys are
11 probably familiar with the S-100, the IHO
12 overlays. So I just wanted to highlight the fact
13 that we're doing this now for weather.

14 To be able to do what we call S-412
15 it's a vector and gridded product specification to
16 be able to manage the content structure and
17 metadata for marine weather so that we can get it
18 as an overlay in ECDIS.

19 It doesn't currently, there is
20 currently no marine weather at ECDIS so this is a
21 big step forward. What I wanted to highlight
22 though is also it's a very large undertaking.

1 And so what we've proposed which was
2 recently accepted is that this will be broken up
3 into three steps basically and three separate
4 product specifications. So S-412 which was
5 previously all of it will be the weather hazards
6 so we can make sure that gets out there as quickly
7 as possible.

8 And then we would go into the weather
9 conditions and the weather observations. As a
10 piece of the S-412, you know, we've been looking
11 at how to generate warning polygons in a more
12 automated way.

13 And so what you're seeing in the purple
14 box here is a hurricane force wind warning.
15 Currently we don't have the ability to, you know,
16 take polygons like this and get them into ECDIS.

17 So that's the goal through S-412 and
18 through some of this work. We're also like, as I
19 mentioned we're continuing to look at vessel
20 avoidance behavior and impacts of not doing that.

21 And to that end Weather Service is
22 looking much more at AIS and is purchasing some

1 additional systems to be able to look at that
2 behavior. And the goal is really if we understand
3 what people are doing and we understand what
4 information is out there we can better adjust.

5 Is it a matter of people not getting
6 the information, not understanding the
7 information? That's really at the core of what
8 we're doing in the marine program.

9 We're also obviously aware of
10 challenges presented by the Gulf Stream, the West
11 Wall, the North Wall, some of those hazards there.
12 So what you see here is the global real time ocean
13 forecast system.

14 We are in the process of trying to
15 improve that system with additional wind and
16 current information to be able to better forecast
17 for some of those hazards. Through AIS we're
18 looking at how vessels are behaving in the Gulf
19 Stream and we're seeing, you know, particularly
20 during the cold weather outbreaks we're seeing
21 that even huge tankers are having to slow down.

22 There's obviously a safety issue there.

1 There's an economic issue there. And so we're
2 trying to get ahead of that.

3 For those of you who are familiar with
4 El Faro and I know Admiral Gallaudet mentioned it
5 yesterday and Mary mentioned it on Monday as well,
6 there were a number of recommendations in that
7 report for the National Weather Service.

8 Although no fault was found for the
9 Weather Service it was in an area that was warned
10 for. There's still a lot that we can do and we're
11 taking that really seriously and we're working
12 closely with the Coast Guard and with NTSB to make
13 sure that we're making progress on those
14 recommendations.

15 What you see in this graphic is just a
16 snapshot of where the warnings were and the purple
17 location is where the ship was just three hours
18 before its last transmission. So I didn't show
19 you the whole time series.

20 We've got the whole time series. But
21 this is just, you know, to show you that we're
22 doing, we have done the forensics, NTSB has done

1 forensics and we're looking really closely at it.

2 So we've made over the last two years
3 or so since the report came out we've made a lot
4 of progress on those recommendations. I haven't
5 listed all of them here.

6 I've listed some of the ones that I
7 think might be most relevant. National Hurricane
8 Center has agreed to adjust its forecast and
9 advisory product to be able to mention not just
10 the time of the next full advisory but also the
11 intermediate advisory package which was one of the
12 things that was requested.

13 There was also some discussion about
14 when to issue a special advisory, whether that
15 would have mattered for El Faro or not. And so
16 NHC has come up with some quantitative criteria
17 for when they would issue those quantitative,
18 those special packages.

19 All of the criteria that existed before
20 still exists. But these are, you know, focused on
21 intensity changes and location changes and, you
22 know, whether the storm is moving from tropical

1 storm to depression, et cetera, et cetera.

2 And then not on this slide is also the
3 National Hurricane Forecast Improvement Program
4 which has been going on long before El Faro. But
5 there's a number of things that that forecasting
6 improvement program is doing that will improve
7 some of the recommendations in this report.

8 So, in particular we are looking,
9 Weather Service is looking at improving model
10 forecast skill for tracking intensity by 50
11 percent in the next couple years and also reducing
12 the uncertainty for rapid intensification by 50
13 percent which, you know, as you guys saw during
14 Harvey and others, it continues to be a challenge
15 for forecasting. Michael was another one.

16 And then we've also had a number of
17 internal discussions with industry and federal
18 partners through the Ship Operations Cooperative
19 Program hosted by MARAD of FTPmail. You guys are
20 familiar with FTPmail and the fact that right now
21 there's only text products going through that.

22 One of the recommendations from the El

1 Faro report was to look at some graphical products
2 and whether those could be delivered by FTPmail as
3 well. So we're looking at that and working,
4 getting input on which of those products would be
5 most valuable.

6 Another one of the recommendations in
7 El Faro focused on receiving weather observations
8 by AIS. So I know I heard Admiral Gallaudet
9 yesterday talk about getting weather information
10 out over AIS.

11 But this is looking at ship
12 observations and getting them in and being able to
13 use those to improve forecasts. So just this year
14 we have done a pilot project which has been
15 successful so far.

16 We did a bench test and then we did a
17 test on a docked ship. We're undergoing right now
18 a test on a MARAD ship that's at sea. So far this
19 is looking really promising. So the hope is that
20 we would continue to move forward with this and
21 we'll continue to keep NTSB updated as well.

22 Moving coastal just for a couple

1 minutes I want to talk a little bit about storm
2 surge. For those who work in the coastal realm
3 you're familiar with the fact that just two years
4 ago the National Weather Service started to do a
5 storm surge operational watch and warning.

6 So we have taken the storm surge
7 information out of the hurricane forecast
8 recognizing that the hurricane forecast is so
9 strictly dependent on wind that we had people that
10 were letting their guard down even though there
11 was a low category storm but a high impact storm
12 surge, for instance.

13 So we're decoupled those things. What
14 has come out of that however, is that there's now
15 an imbalance in the level of service between
16 tropical storm surge and non tropical storm surge.

17 So we're working to bridge that gap and
18 use some of those lessons learned for tropical
19 storm surge for nor'easters and other surge events
20 that are not tropical in nature. We've worked
21 very heavily with the emergency management
22 community on that.

1 And just in this graphic what you see
2 in the green is our current coastal flood product.
3 So that's currently all we can use for a non
4 tropical event.

5 Those are zone based warnings. They
6 are very large. People tend to not to pay as much
7 attention probably as they should if they are far
8 away from the coast for instance.

9 What you see on this side, and this was
10 just a prototype that we did of what the tropical
11 approach would look like for the same non tropical
12 event, is this grid based warning that we used for
13 tropical.

14 So it's much more refined and that
15 allows us to be able to pursue the wireless alert
16 system. So, you know, the WEA on people's phones.

17 So all of that stuff is moving forward
18 in tandem. And then the last main topic that I
19 wanted to mention to you is just that there's a
20 lot of work going on right now in the National
21 Weather Service to simplify warning products
22 recognizing that the terms watch, warning,

1 advisory tend to still be misunderstood.

2 People tend to think of them as a
3 hierarchy even though they're not. They're kind
4 of orthogonal. The words watch and warning might
5 sound similar to some people.

6 There's obviously some translation
7 issues as well, being that watch and warning and
8 advisory sometimes can be translated into the same
9 word in Spanish. So trying to fix all of those
10 things.

11 This is the number of Watch, Warning
12 and Advisory products that National Weather
13 Service has right now. It's well over 100.

14 And actually their policy numbers are
15 all associated with, if you really take out a
16 magnifying glass and want to look at this slide
17 later, all the policy numbers are associated with
18 them and this is the color that they show up on
19 that watch warning map which if you've ever looked
20 at that during like a big nor'easter you just see
21 a long list of products and you see a mish-mash of
22 colors and it can be really hard to follow.

1 And so while fixing the map is not the
2 primary goal that would, you know, be a product of
3 being able to do this. So we've been doing this
4 twostep process of consolidating the products
5 where it makes sense to consolidate them.

6 And then we're looking at whether we
7 need to re-envision the entire program which is
8 obviously a much longer term decision. Just for
9 marine some of the things that are coming up. I
10 would call your attention to the top half of this
11 slide.

12 It says Small Craft Advisories we
13 currently have four different ones. There's a lot
14 of discussion about whether those need to be four
15 separate VTEC codes, four separate headlines or
16 whether we can just have a single small craft
17 advisory and have the detailed information
18 underneath that.

19 And so we've done public surveys. We
20 work closely with the Navigation Managers and
21 others to make sure that we got out there. And
22 this top proposal received a lot of overwhelming

1 feedback.

2 The other piece that we're working on
3 in terms of consolidation is looking at hazards in
4 the surf zone. And I would say don't worry about
5 the words here because they're actually going to
6 change.

7 But the point was to take things like
8 high surf and rip currents that are currently in
9 two separate products and wouldn't it be nice if
10 we could just issue one hazardous surf warning for
11 people that are at risk at the beach.

12 So those are the types of things that
13 we're working on. Only the top one right now is
14 slated to go forward.

15 And we're also reformatting all of our
16 products. And so in the marine realm you're going
17 to see this very soon, just a much more simple
18 what, where, when bulleted format.

19 So this is pretty streamlined. This
20 will go through all of the normal notifications
21 and things like that. But this one is also moving
22 forward for all of the marine products.

1 So again, the bottom line is just
2 making sure that we're trying to reach as many
3 people as possible in the best ways possible with
4 the right information. And with that I'll yield
5 the floor the chairs for questions.

6 CHAIR SAADE: Thanks, Allison. Anybody
7 have any questions?

8 MEMBER THOMPSON: So do, I know in
9 years past there was an experiment with CORS data
10 for GPS meteorology. Is that data being used now
11 in your weather forecasting?

12 I know it went from NOAA I think to a
13 private sector. So is that data being used in any
14 forecasting?

15 MS. ALLEN: You know, I'm not aware,
16 Gary of it being used actively in any of the
17 marine forecasts. I don't know, Joe, if you know
18 anything else?

19 Yes. But I will do some digging and
20 see and I'm happy to get back to you.

21 MEMBER THOMPSON: Okay.

22 CHAIR SAADE: Sal.

1 MEMBER RASSELLO: Firstly, I would like
2 to say thank you. I will sail around much and I
3 appreciate your work.

4 I think NOAA weather data available and
5 we do cooperate with the National Weather Service
6 and sharing daily observation. I don't know if
7 you have access to this data, do you?

8 MS. ALLEN: To your observations?

9 MEMBER RASSELLO: Yes, we transfer the
10 data from the ship.

11 MS. ALLEN: Yes. We, so through the
12 VOS program we have access to some ship
13 observation data. But we are definitely
14 interested in increasing that.

15 MEMBER RASSELLO: We are consistent in
16 transferring data especially when we are within
17 300 miles from any major system. We do every
18 three hours.

19 The data recorded. And then it will be
20 decoded when, on your side. This is done via
21 email. It's very simple. It doesn't take much
22 band width.

1 Another question for you on the
2 standard of the ECDIS 412, that's a great tool if
3 the operator can read the weather on the ECDIS.
4 Are you going to do that because did you discuss
5 this with the maker?

6 MS. ALLEN: Yes. I'm going to invite
7 Joe. The effort is really being led by OPC. So
8 I'm going to invite Joe to chime in. No pressure,
9 Joe.

10 MR. SIENKIEWICZ: Thanks for your
11 question. Can you hear me? I'm Joe Sienkiewicz.
12 I'm with the Weather Service Ocean Prediction
13 Center in College Park, Maryland.

14 We are aware of the challenges of
15 having data, a different type of data set
16 displayable in electronic chart and display
17 information systems. I have a NOAA Corps officer
18 who works for me and she just came back from the
19 S-100 Working Group meeting with Julia Powell in
20 Auberge, Denmark.

21 And this was a pointed discussion. And
22 in the community, in the charting community, yes,

1 we haven't, we don't have a solution yet as to how
2 exactly we're going to do it.

3 But we're well aware that we cannot
4 destroy the underlying or cover up the underlying
5 information, that this is additional information
6 that will be displayable.

7 MEMBER RASSELLO: Yes, because if it's
8 done via satellite how much band width this data
9 will take. And our ships have a very restrictive,
10 do we use the band width for the guests to
11 communicate emergency.

12 So if the data can be transferred in
13 real time it would be great things because we do
14 operate with people on the open decks and we would
15 like to know if a line or a squall, what kind of
16 wind do we predict ahead of us.

17 So it's a lot of data we can use for
18 our safe operation.

19 MR. SIENKIEWICZ: We're aware of the
20 opportunities coming forward. And we're working,
21 weather requirements right now internationally are
22 relatively antiquated. I think it's okay to say

1 that.

2 The transmission format, text, our own
3 forecasters are challenged with writing text
4 bulletins now because there is so much information
5 in front of them. We have these wonderful
6 satellites, the next series of GOES that's up
7 there flying now and we're seeing things we never
8 saw before.

9 And they count, they matter. So with
10 that we certainly believe that the systems that
11 we're doing now are antiquated and need to be
12 updated. Internationally WOM through JCOM and
13 even IMO realized that we need to up the game.

14 The information needs to be in more
15 modern formats and perhaps in multiple formats.

16 MEMBER RASSELLO: And an easy way to
17 transfer it is then up to the ships.

18 MR. SIENKIEWICZ: Yes. All those
19 discussions are either ongoing or going to be
20 ongoing. This is going to be a long process in
21 order to get to the point.

22 MEMBER RASSELLO: A passenger ship has

1 the capability to receive stuff maybe a cargo ship
2 like El Faro did not have enough capability to
3 receive data in real time.

4 MR. SIENKIEWICZ: I think the hallway
5 conversations are basically the GMDSS requirements
6 are going to be updated, that this will be
7 basically a portion of GMDSS or whatever follows
8 on behind GMDSS.

9 MEMBER RASSELLO: I have another
10 question regarding precise navigation and
11 especially in closed waters. Are you going to get
12 the data in port?

13 Our challenges with the larger vessel
14 when we enter the port is linked to a very low
15 margin of operability. And we need to know what
16 kind of wind we have when we are about 100 feet
17 from the pier or what kind of visibility we have
18 when we are 100 feet from the pier because that's
19 where the critical point is.

20 During navigation in fog the ship can
21 steer safely into the channel considering the
22 traffic around mostly. But once we are to dock

1 the ship that's when the question comes are my
2 power enough, is my power enough to overcome the
3 wind when I dock?

4 How are you going to source that data?

5 MS. ALLEN: Right. So I think that's
6 the power of precision navigation. I'll certainly
7 invite Shep or anybody else to chime in. But what
8 this brings is information that was previously in
9 all different places together.

10 So, yes, it will include the ports and
11 it will include all of the National Water Level
12 Observation Network and, you know, the net data
13 associated with that as well as what the Weather
14 Service has and all of the watches and warnings
15 associated with, you know, fog or wind or whatever
16 it might be all together in one integrated
17 package.

18 MEMBER RASSELLO: That would be good
19 because so far we rely on people's judgment. We
20 call the pilot boat which can be ahead of us and
21 say what kind of wind, what kind of current do you
22 have there.

1 In their judgment they say, okay, we
2 have 25 knots wind when my limit is 27. So I'm
3 really on the limit to do it or not do it or
4 cancel.

5 MS. ALLEN: Yes, I think, you know,
6 there's recognition that it's a sophisticated
7 group of users with highly nuanced needs. And
8 there's just so much information out there.

9 So being able to bring it together is
10 a powerful thing for just what you're describing.

11 MEMBER RASSELLO: Thank you.

12 MS. ALLEN: Yes.

13 CHAIR SAADE: Okay, Sean.

14 MEMBER DUFFY: So I just want to say
15 thank you to the Weather Service. I will tell you
16 that we often have to call from our offices to get
17 some updates not having everything available and
18 that when we do whether it's river stages, wind,
19 storm, visibility the response is very quick and
20 much appreciated.

21 And we distribute that or make
22 decisions based on the information provided. So

1 thank you.

2 MS. ALLEN: Thank you, sir.

3 CHAIR SAADE: Ed P.

4 MEMBER PAGE: Thank you for the cold
5 weather here in D.C. I feel very comfortable. Ed
6 Page from Alaska so I'm very comfortable in this
7 environment.

8 So you mentioned ice briefly. And I
9 was wondering like the ice forecasting and the
10 information is very complicated, I think, as far
11 as presenting and how do you see that proceeding
12 in the future as more ships come operate in the
13 Arctic as far as disseminating that information
14 and getting that information in the first place.

15 Do you feel comfortable that's
16 something that the National Weather Service is
17 going to be able to provide that detail? It seems
18 pretty detailed right now.

19 I'm not really that familiar with
20 operating in ice and the fact there's all
21 different kind of conditions, if you will that the
22 multi-year and what have you and density and it's

1 pretty complicated when you start giving ice
2 reports.

3 Not just ice it's what level of ice and
4 whether your vessel is capable of going through
5 that ice. Yes.

6 MR. SIENKIEWICZ: So am I -- well let
7 me answer it this way, okay. So NOAA basically,
8 in the past we've been sort of line office has
9 different responsibilities.

10 Ice analysis in Alaska has been
11 combined with Weather Service ice analysis, ice
12 forecasting is all underneath the Weather Service.
13 On the larger scale the National Ice Center has a
14 NOAA component in the satellite service primarily
15 because it was an analysis issue.

16 And how do you analyze and see ice is
17 via satellites. So we are in the middle of a
18 merger basically of taking the NOAA component of
19 the Ice Center which is also conjoined with the
20 Navy and moving that, not physically but moving
21 that organizationally into the Weather Service,
22 into the organization that I work in within the

1 Ocean Prediction Center.

2 The largest factor in doing that, one
3 it would be efficiency. But the other is
4 basically because ice prediction is the next step
5 is to get beyond doing analysis and starting to
6 predict the conditions.

7 On the science side it is a challenge.
8 Basically all the things, in numerical modeling
9 basically you're talking fluxes, you're talking
10 full three dimensions earth system modeling.

11 So we are working, we're very cognizant
12 at NCEP where I work, National Centers for
13 Environmental Prediction we are building the
14 framework and the modeling systems in order to
15 move forward so we have an ocean coupled with
16 waves, coupled with ice.

17 And there will be challenges as we're
18 moving forward in understanding because there are
19 gaps that we just don't know. On the other side
20 of it also we do rely on satellites.

21 Internationally there is an effort
22 because there is a realization that this is a

1 challenge for humans as activity increases at
2 higher latitudes. And so there are efforts to
3 improve observing systems at higher latitudes and
4 primarily by satellites whether it's altimeters or
5 imagers or a variety of different things.

6 RDML SMITH: Thanks. That's great. I
7 just got permission from the Chair to get on a
8 soapbox for a minute because I think this is all
9 really exciting.

10 But I also think that we're, we NOAA
11 and this is all navigation services really
12 worldwide are still approaching this in a little
13 bit of an old fashioned way where we think we have
14 to control how the user uses the information and
15 how they look at it.

16 And a lot of what I heard, you know,
17 Joe talking about, about what the path was to
18 completion here before Sal could get it is the
19 same thing I hear about changes in charting and
20 changes in oceanographic services.

21 And that it comes down to portrayal and
22 IMO, right. When those words come out decades get

1 added to the timeline. What we really need is
2 consistent, high quality and coordinated
3 information worldwide.

4 The app people will figure out how to
5 show it. They already have. They just don't have
6 really good data.

7 And if we backed off from the portrayal
8 part and much less when we start worrying about
9 how it looks with other things, well how are they
10 going to look at these three combination of things
11 together, we're assuming they only have one screen
12 on the ship or that they can only, you know, that
13 it always has to be configured the same way.

14 I think we can back off from that
15 general assumption and we can drastically
16 accelerate the provision of these services if we
17 back off from portrayal and control and use case.

18 The other thing is IMO and ECDIS is one
19 user set. And in my world and when I think about
20 our maritime users that's like one percent of our
21 users that are regulated through IMO and have
22 ECDISes on board.

1 ECDISes are not the best navigation
2 systems out there anymore and they're not the most
3 numerous. And we can make a much bigger impact by
4 having high tech adoption in other communities
5 which will flow to ECDIS.

6 Eventually the big ships and the cruise
7 ships will say why can't I just use the best
8 navigation systems that are on the market? That's
9 the one I need.

10 It already does everything I need and
11 we didn't have to over regulate it from the
12 beginning. So anyway, that's my two cents for
13 this.

14 Precision navigation we are trying to
15 stay way away from, you know, trying to control
16 the way that the information is compiled and used
17 by the users focusing instead on providing it in
18 a coordinated and authoritative way.

19 That's my little soapbox. Thank you
20 for humoring me.

21 MR. SIENKIEWICZ: Can I respond? So I
22 mean I carry an ENC right on here, okay. And I

1 understand, and I agree in part what you're
2 saying.

3 But so in the hallway conversations in
4 the S-412 is the one thing, one of the reasons
5 they're dividing out the hazards is because it
6 would be something that would easily be grabbed
7 and portrayed in anything from here, any kind of
8 electronic navigation system.

9 So we do realize and appreciate that.
10 I'm going to flip it the other way and I hope this
11 doesn't sound so bad. We just went through an
12 event with the loss of El Faro.

13 And if you've read the report you will
14 see in there that maybe not having, utilizing the
15 standards on the vessel or having a third party of
16 information in a format that maybe a little bit,
17 may not be the time yet.

18 I guess I'll say it that way. That may
19 have been a contributing factor to the decision
20 process as to where the vessel was. So, yes.

21 RDML SMITH: Our users don't go around
22 us if we provide the services they need. So if we

1 were the ones doing that it could have been
2 better, reduced the latency, et cetera.

3 MEMBER CHOPRA: Anuj Chopra, RightShip.
4 I was going to say regarding the El Faro case and
5 generally on all the vessels like we have on under
6 the U.S. flag tonnage new technology and updating
7 of vessels is required.

8 If a vessel operator does not do that,
9 that should not hold the rest of the pack back.
10 We still need to move forward with technology.

11 So I support that the more we move
12 forward and make it available I think it would
13 make it better. I think all of us realize that
14 post El Faro scenario.

15 MR. SIENKIEWICZ: Thank you, I
16 appreciate that. I'll carry that back.

17 CHAIR SAADE: Sal.

18 MEMBER RASSELLO: So connecting what
19 Admiral Smith said, why NOAA doesn't include in
20 the forecast recommended routes to avoid the, that
21 would be easier. We would be ECDIS already and to
22 the weather forecast.

1 The operator just needs to adapt to
2 that kind of routes and recommendation to avoid
3 the severe weather. I know it's a liability
4 there. But it's easier, the data.

5 MR. SIENKIEWICZ: It's more than a
6 liability. It's actually not our mission. Yes,
7 if you are in danger and you call us we will
8 answer the phone. Our mission is life and
9 property, yes.

10 MEMBER RASSELLO: We need to work on
11 prediction right?

12 MR. SIENKIEWICZ: Yes.

13 MEMBER RASSELLO: We do work a lot on
14 forecasts. I never look at the weather when I am
15 into the weather. It's too late.

16 MR. SIENKIEWICZ: Yes, I understand.

17 MEMBER PAGE: If I could just add I
18 mean there are, each ship has different
19 particulars and whether it's a cargo ship,
20 container ship, passenger vessel, whatever and
21 stability considerations and the time of arrival
22 and charter's interests and charter parties.

1 So I just think there are so many other
2 aspects of voyage planning that you just provide
3 information on weather and they can crank
4 everything else into it. So I can understand
5 that, why the Weather Service doesn't do that.

6 I would also say that, you know, like
7 the ECDIS solution I would agree with the Admiral
8 that, you know, it's not necessarily the best
9 solution. But a lot of what the Coast Guard
10 international community does is say at a minimum
11 you have to have this.

12 And so I think the fact is that some
13 people are going to rise well above that and have
14 better technology or whatever. But having played
15 Coast Guard for 30 years I knew that unless there
16 was a Coast Guard many vessels would just sail
17 without anything.

18 But fortunately the Coast Guard, not
19 just the Coast Guard, any regulatory agency or IMO
20 or what have you they set the basic standards.
21 That doesn't mean that's the top, the best.

22 They say at the minimum you have to

1 have this capability if you can set sail from a
2 port. You have to have these certain things. And
3 then some will go above and beyond and say, well
4 that's not good enough for me, we have a higher
5 standard.

6 (Off microphone comment.)

7 MEMBER PAGE: That's true, yes. It's
8 craft warnings. You can go out or not.

9 MEMBER RASSELLO: I would like to see
10 that kind of recommendation because we pay an
11 independent service that to use your data and gave
12 us the recommended routes which we use or we don't
13 use. It's up to the captain to judge, okay, this
14 is too conservative or too aggressive.

15 And he does a risk assessment based on
16 the recommendations received. And that service is
17 basically New York and probably sell us something
18 that we already have directly from NOAA because
19 the data is the same, the sources.

20 MR. SIENKIEWICZ: Thanks. I took some
21 notes.

22 CHAIR SAADE: Okay. I think we're

1 going to move to public comment. So thank you
2 both. I really appreciate it.

3 (Applause.)

4 MS. MERSFELDER-LEWIS: I have one
5 public comment from the webinar. It says certain
6 NGA charts are declassified and provided to NOAA.

7 This is not a completely transparent
8 process. See the inquiries I mentioned in
9 yesterday's comments for more information, William
10 Nye. So I don't know if the Admiral wants to just
11 comment on that.

12 RDML SMITH: Yes. I guess I have not
13 had time to research the inquiries that he
14 references.

15 But I do want to say if he's listening
16 that we have asked our folks that are tracking
17 those comments to pull them up and make sure that
18 he got an answer. Thank you.

19 MS. MERSFELDER-LEWIS: Okay, perfect.
20 I hope that there's other comments in the
21 audience. If you guys have comments the mic is
22 here and we would welcome those. Qassim.

1 DR. ABDULLAH: Thank you, hello. Yes,
2 thank you. I have a few views on this morning's
3 discussion and yesterday. I have a few
4 suggestions if you don't mind.

5 As we talked Ed brought a lot about
6 like we can drive a car now driverless in New York
7 why can't we do it here for example. And that's
8 a very valid concept definitely.

9 I try to catch up on it. And by all
10 means the GIS community and GIS tool and
11 geospatial tool can serve the maritime activities,
12 you know, because we're collecting a lot of
13 geospatial whether bathy, whether topo, online,
14 offline, offshore, onshore.

15 So definitely for certain weather
16 condition where the fog, you know, people can't
17 see visibly GIS can work definitely because we're
18 doing it on the airport. I mean airport they all
19 map everything there and provide it to the
20 database of the plane.

21 With the GPS they can land, you know,
22 without a pilot. I think we can probably steer

1 boats around certain ways where we have good map,
2 good bathy. We can combine bathy and GIS map of
3 the facility, the fixed facility.

4 And it will be in a nice setup, for the
5 captain, you know, to steer his boat. That
6 doesn't solve the problem is a small boat is not
7 complying on approach.

8 I mean that's going to need a sensor or
9 transporter from them. But for the bathway, for
10 the bathymetric for the routes for where they, you
11 know, the port's facility how far we can give ten
12 centimeter accuracy in estimating the bath,
13 whether bathy or the on land facility.

14 So that's definitely we can help a lot
15 as a community here. And it will evolve to what
16 Dr. Mayer mentioned to the virtual reality and
17 augmented reality.

18 Augmented reality would work with the
19 fog and things if you have cameras on the boat.
20 But definitely is virtual reality.

21 And sometimes definitely augmented
22 reality you can give them a scene in 3D. He can

1 see under the water and above the water what is
2 surrounding him here.

3 The maritime navigation resiliency and
4 that's an important thing. Everybody concerned
5 about the GPS. I mean this is resilience of our
6 systems the maritime.

7 We need to consider the resiliency very
8 seriously definitely. As other GPS and
9 vulnerability this is a big thing. This is a
10 national concern.

11 That's not our, only this community,
12 you know. This is a national concern. We should
13 not fight it on our own. We should go with the
14 Department of Homeland Security and DHS with the
15 DOT.

16 But we need to find a solution. I mean
17 the least we can do to make sure people are using
18 GNSS not just GPS receiver. Receiver can receive
19 from a GLONASS from Galileo.

20 So in case something happened to GPS
21 for example at least we could rely on the European
22 or the Russian. I don't know if you want to do on

1 the Russian.

2 But at least it gives us an option,
3 yes. For that I'm not sure if we did concept of
4 operation for it. I mean and if we did probably
5 all with the, time technology.

6 Probably we need to develop a new
7 CONOP, you know, for the operation of the
8 maritime, you know, activity to highlight the
9 threats and the risk, you know, especially the
10 GPS.

11 And we have mitigation. And maybe we
12 can approach the DHS and DOT we're concerned about
13 the GPS. But CONOP, designing a new CONOP I mean
14 to propose it to NOAA administrator is really
15 important now.

16 We need to look at the risk of all our
17 operations and see what we can mitigate and what
18 we couldn't. We need to do serious think about
19 it. Thank you. That's all I have here.

20 MR. DASLER: Hi, John Dasler, Dave
21 Evans and Associates. I guess just to the issues
22 of fog. I mean granted you can be using radar and

1 AIS.

2 In fact, our vessel right now is
3 working Southwest Pass. And so we have both a rib
4 and a larger vessel supporting that. So there, I
5 know one of the bar pilots has developed MRTIS
6 which provides tremendous information on AIS.

7 To Sean's point, I mean a lot of it is
8 the small vessels, right that are out there that
9 can't do that. And how do you get that kind of
10 information in and clear where ships aren't having
11 to worry about the small fishing vessels or
12 vessels that don't have AIS.

13 And so it's either enhancing vessel
14 traffic services to do that. I mean fog could be
15 funding or grounding or focused operational
16 guidance, whatever the acronym you want to use to
17 that end.

18 But I think it's coming up with a
19 system, right, that not only incorporates AIS and
20 radars on vessels but observational systems that
21 are focused on the small vessels that are out
22 there.

1 You know, and in the meantime you have
2 escort vessels that are allowing vessels to
3 transit in the fog that, they're a little more
4 maneuverable and can be out ahead looking for
5 those kinds of vessels that are going to create a
6 problem for the bigger ships making the transits.

7 But I think there is a way to do it.
8 Like I said, a lot of it is done operationally.
9 I mean I think the issue with the airports and
10 using that analogy I mean most of those have
11 requirements for transponders and you know where
12 things are and there are traffic controllers that
13 are coordinating that.

14 So I think that just needs to be
15 expanded to the maritime community. Thank you.

16 CHAIR SAADE: Any other public
17 comments? David.

18 MR. MILLER: Yes, David Miller with
19 Fugro. I guess my comment is related to a point
20 that Lindsay made, I think earlier, which relates
21 to the automation and the regulatory regime around
22 automation.

1 So I think we are certainly advancing
2 very rapidly with regards to automated platforms,
3 automated systems. But I think the real ROI and
4 the real benefit economically comes from over the
5 horizon operations, force multiplication truly,
6 true automation.

7 And I am very sure that we will be at
8 a place technologically and not be able to
9 implement because of the regulatory regime.

10 So I guess my comment is I think this
11 group and this community in general can't lose
12 sight of that and should be at the table and
13 pushing from a regulatory standpoint to try to
14 facilitate the technologies that are being
15 implemented and will soon be stuck, I believe.

16 CHAIR SAADE: Thanks, David. I think
17 that's the, we have a couple more comments from
18 the Panel. Okay, to go to there, okay. First of
19 all, Sean.

20 MEMBER DUFFY: So I just wanted to
21 respond to John's comment very quickly. And I
22 think, you know, I'll continue to talk about the

1 hunter, duck hunter, fisherman that doesn't know
2 what's going on and just wants to get to his spot.

3 But the one thing you said and Captain
4 Sal has understood the complexity I have in my way
5 of representing the four pilot groups is when you
6 mention the AIS system, MRTIS, you said the bar
7 pilots. It's actually the Crescent River Port
8 Pilots.

9 And it's very important to keep that
10 straight. And you understand the world I live in,
11 the minefield. If you want to step in it please
12 do.

13 But I would like to correct that.
14 Thank you.

15 CHAIR SAADE: Okay, Juliana.

16 MS. BLACKWELL: Juliana Blackwell.
17 Just for the awareness of the Panel as well as the
18 public, related to the comments and discussion
19 about backup for GPS, there is surprisingly, not
20 surprisingly, a federal advisory board that
21 provides feedback to NASA and to DoD and other
22 agencies related to GPS.

1 So there's a Space-based Positioning,
2 Navigation and Timing Advisory Board. They have
3 meetings. They have topics. They have issues
4 that they comment on.

5 If you go to GPS.gov you'll see a lot
6 more information about the membership. There are
7 a lot of special government employees on that
8 group as well as representatives from other
9 agencies.

10 And just from my involvement in the PNT
11 community I'll just let you know that there is a
12 lot being discussed that can't be discussed in a
13 public forum just about the backups, you know,
14 backups to GPS and the utilization of other
15 countries' navigation satellite systems.

16 So this is much bigger than us. But
17 how the maritime industry or how any of our
18 industries, you know, utilize GPS and plan for
19 failures of GPS, that I think is within, you know,
20 a great discussion here.

21 But just wanted to let everybody know
22 that there are lots of smart people that are

1 trying to come up with ways to make this a safer
2 thing and thank you.

3 CHAIR SAADE: Thanks, Juliana. Okay.
4 We're going to take a lunch break. HSRP has a
5 working lunch. Everyone else please be back in
6 the room by 1:00 p.m. for the afternoon session.

7 It will be a short session this
8 afternoon. And please allow yourselves some time
9 to reenter the building or take advantage of an
10 excellent cafeteria and convenience store with
11 food.

12 Okay, all right. Thanks, everyone.
13 Let's take a break.

14 (Whereupon, the above-entitled matter
15 went off the record at 11:54 a.m. and resumed at
16 1:01 p.m.)

17 CHAIR SAADE: Okay. Welcome back.
18 We're going to hear from the NOS Offices with
19 primary responsibility for the HSRP, NGS, CO-OPS
20 and OCS.

21 So in no particular order that's
22 Admiral Shep Smith, Juliana Blackwell and Richard

1 Edwing. Whoever wants to go first.

2 But you guys, do you want to just do it
3 from your chairs or do you want to sit up there?
4 Your choice.

5 RDML SMITH: Madam Chair, how much time
6 do we have, 20?

7 VICE CHAIR THOMAS: About 20. It's
8 actually closer to 15.

9 RDML SMITH: Closer to 15, okay. All
10 right. So I'm going to talk about three things.

11 We often talk about the hurricane
12 supplemental and overall what did we, you know,
13 but we never maybe close out what we did with
14 those surveys. So I was going to give you some
15 examples of a few surveys.

16 And then I'm going to talk about the
17 changes in nautical charting that we have been
18 making recently. These are sort of a small update
19 to the National Charting Plan rollout and how
20 we're going with ENCs.

21 But I'm going to rush this a bit
22 because I want to add a last bullet which is just

1 a quick synopsis of our international activities
2 because I think that's something that we have not
3 reported to the Panel on and might be interesting
4 context for your considerations about whether to
5 pursue more thinking on the Panel.

6 What is all that? This doesn't make
7 sense. All right. So one project, Florida Keys
8 you'll see a couple of themes emerge here. One is
9 that these are pretty big projects because they
10 were in, it was not an insignificant amount of
11 money.

12 The other is that we really consider
13 these projects as a bundle with our regular
14 appropriated funds for the year and sort of spread
15 out our work for efficiency. So these are pretty
16 big projects.

17 So this is down off the Florida Keys.
18 This is pretty shallow water work in an area in
19 the sanctuaries. So this is a, this has a high
20 impact not only for navigation but also for
21 habitat work, high involvement with the Sanctuary
22 Program with these surveys.

1 In Port Lavaca, Texas, this is a big
2 fishing port. As I recall, again this is the
3 coastal series all along the Gulf Coast as you're
4 all well aware there's quite a bit of coastal
5 change.

6 And so this really shallow water, the
7 most shallow water parts of the Gulf Coast are
8 susceptible to the most significant from a
9 navigation point of view, change taking care of
10 the approaches but also the adjacent areas with,
11 that would have the anchorages and the increased
12 traffic.

13 Tampa Bay, this is again extending to
14 the sides of the very narrow First Pass. So just
15 a little bit of hydrographic history.

16 When we first got multibeam and
17 sidescan we did a lot of projects which were
18 pretty narrowly constrained to these little
19 triangles in the approaches to ports. And a lot
20 of the adjacent areas which did have still a lot
21 of traffic were not covered.

22 And so this is an example of one of

1 those projects to broaden out the coastal area.
2 Corpus Christi we've heard several times is one,
3 is a booming export port. And so we've got some,
4 we had some surveys in the direct, in the sort of
5 fairways.

6 And, but this is a whole series in
7 shore from there. These are hard surveys. So
8 they don't show up as a lot of square miles
9 because the water is so shallow.

10 You could do this in an hour, you know,
11 in deep water for the same amount of square miles.
12 But these are hard won.

13 The other point I wanted to make in
14 this, with this example is see all those little
15 things that are not soundings on the chart. Each
16 one of those are, you know, a piling or a wreck or
17 something that's been reported to us over the
18 years.

19 And they accumulate on the charts and
20 some of them are quite hazardous. But in
21 aggregate they're mostly a distraction and many
22 mariners we hear ignore them because there's a

1 high false alarm rate.

2 So it's really important to the safety
3 of the maritime public to get those straightened
4 out so only the ones that are really hazardous
5 remain charted. But that takes a lot of work too.

6 Traffic lanes again working inshore of
7 the traffic lanes. Puerto Rico, I don't know
8 whether you can see the red surveys there were
9 done mostly by the NOAA Ship Nancy Foster over the
10 course of the last ten years or so.

11 Those were more biogeography. So these
12 were coral reef mapping. And we have a great
13 relationship with them. They always do things to
14 our specs.

15 It flows really easily in our system.
16 So we treat them essentially as if they were one
17 of our surveys. But they don't always go where we
18 need them to.

19 So this is filling the gap between
20 those offshore biogeography surveys and the LIDAR
21 work inshore. So while these boxes are pretty big
22 on here a lot of that blue tint was well covered

1 by bathymetric LIDAR. And so these surveys just
2 had to junction into where the LIDAR was.

3 Shutdown impacts, so you might have
4 heard about the shutdown. We were shutdown. The
5 only block of sustained capability that we
6 maintained in coast survey was the ability to
7 update the charts for reported Notice to Mariners.

8 So this is information within the
9 government, in the Notice to Mariners. We need to
10 update the charts and keep them going out. We did
11 not apply normal source.

12 The hydro processing pipeline was shut
13 down. We didn't do any more surveys. Our
14 contractors kept working like those of us that
15 were working with the government without being
16 able to be paid.

17 And so we couldn't pay bills. And so
18 this did add up to a big impact in our community.
19 We had a reasonable plan for how we were going to
20 manage this during a shutdown.

21 And it was, and we had actually
22 rehearsed it a couple of times with one week

1 shutdowns. But there's a different level of
2 sustainment of a program that's necessary after a
3 few weeks.

4 And we realized that we could not
5 sustain what we were doing. And after a few weeks
6 we suspended the raster coverage, the raster
7 updates.

8 So we were only updating the ENC's still
9 keeping them going out on a weekly basis. But we
10 were able to keep them at a very high level of
11 service.

12 Just as a, sort of a rule of thumb the
13 Marine Chart Division applies about 20,000 changes
14 to charts every year. And we track those
15 applications.

16 This is all, this as Admiral Glang used
17 to say this is cupcakes and wedding cakes all
18 mixed together in this number. Sometimes it's one
19 little buoy changes. Sometimes it's an entire new
20 section of coastline from a LIDAR survey.

21 This is our normal internal tracking
22 for how we track our source application backlog.

1 So this is the number of applications that we have
2 in the queue. They've been registered. We know
3 they're there. We know which charts they need to
4 be applied to.

5 And we count all those. The two here
6 are the red is the ENC. The blue is the raster
7 charts.

8 And so you could, you know, we have
9 retained in fact the suspension of the updates to
10 the raster charts since the shutdown until we
11 could catch up the ENCs with all the rest of the
12 source.

13 So we've essentially not done very much
14 on our raster charts since December. And so not
15 surprisingly the source backlog on that has gone
16 pretty high.

17 So we now have the ENCs, as you can see
18 in this graph we now have them sort of under
19 control. They're no longer spiraling out of
20 control and we're ready to start catching up on
21 the raster charts.

22 Overall we have been shifting our

1 resources in anticipation of a much bigger suite
2 of raster, of ENC's. We've been shifting resources
3 to simplifying the maintenance of the raster
4 charts and enriching the quality of the ENC's.
5 I'll give you a couple of examples on that.

6 For those of you that have been
7 watching charts for a while know that we had and
8 still have in some places channel tabulations
9 which take Army Corps often just condition surveys
10 which sometimes can just be single beam and update
11 the corridors and reaches of each section of a
12 channel and put it in a big table which, you know,
13 is on the paper chart and, you know, out on the
14 Notice to Mariners and you cut it out and you
15 paste it onto your paper chart.

16 Those are really laborious to make.
17 And because they take us a little while and
18 because the Army Corps data is available on the
19 website more or less the same time we get it, they
20 really were not being used in the way that they
21 once were.

22 Portable Pilot Units and other ways of

1 getting those condition reports were superseding
2 the chart even before we could do this laborious
3 process. So we stopped doing it.

4 So this isn't really achieving its end.
5 We're going to instead concentrate on taking those
6 same condition surveys and making better ENC's that
7 can be updated quickly and distributed quickly so
8 that the NOAA chart and the condition survey on
9 the Army Corps site are better matched.

10 So how we did that for, we still need
11 to put something on the paper chart. Instead of
12 trying to establish the controlling depth for
13 every corridor, you know, continuously we used the
14 project depth that the Army Corps is dredging too.

15 Now sometimes that is a good
16 representation of the condition of the channel and
17 sometimes it's not. When it was systematically
18 not we did not change the chart to a project
19 depth.

20 But where they were actively maintained
21 and it was a rolling cycle we have, we've just
22 changed the chart to be the project depth and

1 have, and make a note that updating, more updated
2 information is available in the ENC and on the
3 Army Corps site.

4 When we did that there was quite a bit
5 of prediction internally that the world would end
6 and in fact it didn't. And we didn't hear very
7 much negative feedback from our customers.

8 And when we explained the rationale and
9 the way we were going everybody has been very
10 supportive. So just as an example reach name, see
11 tabulation was a little of what I said before.

12 The reach name project depth 45 is now
13 what it says. Of note if there is a point
14 obstruction like that 34 that we know about in the
15 channel we'll leave that on the chart. We didn't
16 just white out the entire channel if there's, kept
17 those obstructions on there.

18 ENC updates. So we have been talking
19 very bravely about how we need this big new suite
20 of ENCs.

21 And one of the areas that we used as an
22 example of how poorly charted a section of the

1 U.S. coast was, was western Alaska where the
2 largest scale chart in this area was over one to
3 a million.

4 And we had actually been doing surveys
5 in this area but had no way of showing that
6 information on the paper chart or at that scale on
7 an ENC either. And so it was a source of internal
8 frustration and we were just not delivering value
9 to our customers.

10 So in accordance with our new scheme
11 these are all one to 80,000 scale. So this is
12 actually, this is a lot of charts over a pretty
13 big area. And we were able to apply those new
14 surveys to this chart.

15 So this is the existing paper chart,
16 one to one and a half million. I don't have a
17 picture of it in here. But there was a fairly
18 prominent grounding right there where it says
19 shoaling 1977 in that vicinity.

20 Remember the name of the ship?
21 Champion Ebony about four or five years ago now,
22 something like that.

1 So we were, you know, we designed some
2 surveys to establish where the best water was
3 going through that sort of apparent cut between
4 the white spots and also to see whether we could
5 figure out if there was a route that went to the
6 southeast.

7 And so that survey was here. Again,
8 not bank to bank we were dealing with the
9 navigable water. This is a really important area
10 because it's not, there's not very many natural
11 refuges in western Alaska.

12 And hiding behind Nunavik Island is one
13 of the places that you can get out of the weather.
14 But we needed to have it, you know, charted so
15 that ships could go anchor there.

16 In addition, it's a lightering area for
17 tankers offloading to barges that then go into the
18 small communities along the coast and it's a bit
19 of a shortcut for some traffic going back there
20 despite the fact it's a little bit discouraged to
21 go back there. But there is traffic. Say again?

22 MEMBER RASSELLO: Metric?

1 RDML SMITH: Metric, of course. We
2 still think about square miles though because I
3 don't think we're going to shake that one for a
4 while.

5 So it hadn't been surveyed in a while.
6 An idea, so some, you know, high resolution
7 contours and, you know, soundings. I think it's
8 worth noting that we're being, how do I go back?

9 We're being a bit more rigorous about,
10 as you can see the tip of that blue shoal at the
11 sort of base going up to the northwest how it
12 shows a solid curve and then goes to dashed.
13 That's the sort of edge of where we have proper
14 survey data.

15 So we're being a bit more rigorous than
16 we have been able to in the past about where we
17 have, about the quality of our data. So an
18 approximate contour means it's not, you know,
19 means it hasn't been surveyed.

20 And so we're passing along that
21 information to the user. A couple more. New York
22 Harbor, I was happy to see Ed also used the

1 example of the complete coverage or relatively
2 complete coverage that we have in New York Harbor.

3 We're using this region as a test bed
4 for a new way of data-basing our bathymetry and
5 being able to handle, you know, a whole bunch of
6 surveys of different vintages and, you know, pull
7 them together and get them chart ready so that
8 it's not just one little piece of source after
9 another applying to the chart, but that you pre-
10 compile the bathymetry into a coherent set before
11 we try to, before we start to do the charting.

12 And so we've done that in this area.
13 This is some of our preliminary, you know, the
14 contours out of that. Just, I did want to fess up
15 to couple of places where the data is beautiful as
16 Ed showed in most areas.

17 There are a couple of interesting weak
18 places. So this area, this whole blue area we
19 don't have the record of the digital source for
20 this area.

21 So we don't really, we haven't actually
22 figured out where this soundings came from. But

1 it was not, you know, an NOS survey with number
2 blah, blah, blah done in 19 blah, blah, blah.

3 So as a result we're having to pull
4 through the soundings from the chart as the only
5 source. But, you know, it also does give us some
6 pause about exactly how much confidence we should
7 have in that.

8 And so we're being careful with the way
9 that we attribute that and describe that. So this
10 is what it would look like without it. We did
11 digitize it and put it in.

12 And the cornering, and here's another
13 example in Seattle of some automated contouring
14 from high resolution bathymetry.

15 And this is the type of technology
16 that, and I wish I had an example and a channel,
17 but we are putting the finishing touches on those
18 now, of the type of automated contouring and
19 automated cartography that we will be using for
20 what we're calling high definition charts in deep
21 draft channels.

22 And a little vague on what that means.

1 But in my mind that's a basket of things, that
2 could be points and lines charts or gridded
3 bathymetry for systems that can take that. But we
4 need to support the installed base of points and
5 lines cartography for now.

6 So let me just duck over to
7 international. So the International Standards
8 Organization that governs hydrography is the
9 International Hydrographic Organization.

10 So hydrography in the international
11 context, we tend to think of it as the survey side
12 of what we do and specifically kind of the
13 bathymetric. Hydrography more internationally
14 encompasses the charting as well, services like
15 the Coast Pilot, light lists, Tides and Current
16 Tables which is kind of the way it was, you know,
17 thought of in years past.

18 And so there are standards and
19 coordination mechanisms in the IHO for all of
20 these different subjects or all of these different
21 services. Over the course of the past ten years
22 or so we have embarked with quite a bit of NOAA

1 leadership on a modernization of digital versions
2 of all of these services.

3 So if you're a student of SOLAS you go
4 back to charts and pubs is what we're responsible
5 for. What did that mean in 1974? It meant
6 charts. It meant oceanography.

7 It meant, you know, it meant, you know,
8 the information about regulations. And if you
9 start to pick that apart and think about the
10 information content that was meant by that and
11 think about what's the most modern representation
12 of that type of information.

13 So there's a series of standards under
14 S-100. You saw the weather ones that are intended
15 to, eventually to supersede or to complement and
16 eventually supersede the sort of more analog
17 versions of that information.

18 The IHO, so Julia Powell from Coast
19 Survey chairs that S-100 Working Group and has for
20 a number of years and is a strong international
21 leader in that. The IHO itself has a number of
22 larger bodies, one of which is the council which

1 looks after the policy of the IHO in between
2 assemblies, so a three year assembly cycle.

3 I chair that council which meets once
4 a year and really has the sort of programmatic and
5 policy authority for the IHO between sessions.
6 There's a Secretariat that keeps the momentum
7 going on the administration of the whole
8 organization and documentation. And they're based
9 in Monaco.

10 So that's one part of the IHO. The
11 other is a related set of organizations called
12 Regional Hydrographic Commissions. The world is
13 divided up into something like 15 of these.

14 And the ones that are relevant for
15 NOAA's work are the U.S. Canada Hydrographic
16 Commission which covers basically North America,
17 the Arctic Regional Hydrographic Commission which
18 covers the Arctic Ocean and is made up of the
19 coastal states, members states that have land
20 above the Arctic Circle.

21 So we're one of five. The Meso
22 American and Caribbean Hydrographic Commission.

1 So the Gulf of Mexico, Caribbean and the Pacific
2 side and, you know, all the way down to South
3 America.

4 And the Southwest Pacific Regional
5 Hydrographic Commission which goes all the way
6 from, which goes, you know, across the southwest
7 Pacific, you know, including Australia, New
8 Zealand and a lot of small island states.

9 So we're very active in that. My
10 deputy, Katie Ries is the chair of the Meso
11 American Caribbean Hydrographic Commission. We
12 alternate chairs of the others.

13 I'll be chairing the U.S. Canada
14 Hydrographic Commission in a few weeks. The
15 purpose of this really varies by the different
16 commissions.

17 In the Southwest Commission, for
18 instance, there's a lot of capacity building
19 between the five big established hydrographic
20 offices and all the small island nations. In the,
21 in Meso American Caribbean there's a lot of
22 capacity building and a lot of service

1 coordination.

2 In the Arctic the challenge that we
3 share is remote access, new technology trying to
4 establish and trying to understand and manage the
5 risk in that, navigation risk in the region.

6 And U.S. Canada is a much more
7 collegial, you know, peer type relationship having
8 to do with advances in technology and coordination
9 of hydrographic policy. And so those are, you
10 know, that's sort of that part of the landscape.

11 More recently, the UN GGIM has stood up
12 a marine, I'll get, I think I've forgotten the
13 name of the subcommittee has a Marine Information
14 Subcommittee that is really focused on
15 coordinating marine spatial data infrastructure
16 and coordination of marine data, more broadly the
17 outside of the navigation context.

18 John Nyberg, the chief of the Marine
19 Chart Division is chairing that and he's in Korea
20 doing that this week. So there's a lot, we have
21 a lot of international involvement and a lot of
22 strong leadership and a lot of, you know, both

1 regional and standards organizations.

2 So to the extent that, you know, that
3 your view is we need, you know, to marshal more
4 international leadership on things we have some
5 mechanisms to marshal that leadership.

6 So with that I probably have over done
7 my time and I will pass the baton. So thank you.

8 MS. BLACKWELL: All right, good
9 afternoon. I'm Juliana Blackwell, Director of the
10 National Geodetic Survey. Can you hear me in the
11 back?

12 Excellent. I just wanted your heads to
13 nod to make sure you're awake, so thank you. I'll
14 check on you again in a little bit.

15 Okay, so very briefly I'm going to run
16 through six different topics. This is the outline
17 of the priorities that I'm going to provide the
18 panel a brief update on. I realize that some of
19 the new members are going to be a little bit not
20 sure exactly what I'm talking about here, but
21 don't worry over time I will get through to you
22 and explain GRAV-D until you're tired of hearing

1 about it, and we can certainly help you with
2 understanding some of the other benefits and
3 considerations with the geodetic side.

4 So, first of all, a couple of slides on
5 the NSRS, the National Spatial Reference System
6 modernization efforts. I'm going to talk a little
7 bit about how we're using crowdsourcing data and
8 how that's improving our geoid model, talk about
9 some of the product testing that's underway and
10 how we are working with our partners and our
11 industry partners in particular about getting
12 information out to them quicker, about what's
13 coming next in 2022. Our update to our CORS
14 network, Continuously Operating Reference Station
15 network and how we've just completed the new
16 computation of coordinates for that entire system,
17 talk briefly about the hurricane supplemental and
18 our coastal mapping efforts, and then a plug for
19 our Geospatial Summit and other learning
20 opportunities at the end.

21 So, first of all, on our NSRS
22 modernization efforts the key activities that

1 we've accomplished in the recent past here
2 probably since we last met in Alaska and the fact
3 that not only did we complete the mainland Alaska
4 collection for our Airborne Gravity Survey, but we
5 are able this year with a little bit of a delay of
6 about six or seven weeks in January, we're able to
7 get the newer aircraft, the Gulfstream IV out to
8 the Pacific Islands and begin our 2019 survey in
9 the Pacific Islands area, Hawaii, and we are
10 hopefully on our way to American Samoa here within
11 the next week. Our field season for collecting
12 that data is going to be a little bit shortened
13 because we got a late start on that, so we won't
14 get it all done, but we're making progress.

15 We also recently developed a new Least
16 Squares adjustment model that's going to be used
17 for our OPUS tool and will enable a better way for
18 data to be submitted to NGS and go through all the
19 standard rigorous process of blue-booking to be
20 accepted into the Geodetic Control Integrated
21 Database we manage for the nation. We have a new
22 blueprint document and I'll talk about this in a

1 little bit more detail that will be released to
2 the public by May when we have our Geospatial
3 Summit.

4 And then we have an update to one of
5 our vertical conversion tools, VERTCON 3.0 that
6 converts between NAVD 88 and NGVD 29, been able to
7 expand that so that it covers more of the U.S. --
8 does not include Hawaii, but we're making
9 progress. We also, the images that you see here
10 that I know you can't read, it's just an example
11 of some of the updates that we provide in a
12 newsletter format that you can get electronically
13 if you sign up and subscribe to our newsletters,
14 the web address there is on the slide. It's
15 basically a one-page update on our modernization
16 efforts just to keep everybody informed.

17 I'm going to go a little bit deeper
18 into GRAV-D because this is our keystone project
19 here for the update to NAVD 88; this will provide
20 the geopotential datum in about 2022. We're not
21 sure how this shutdown is going to impact our
22 final date for release, but we still have a few

1 years to try to catch up and see what happens.

2 As of this morning we are at 75 percent
3 complete for the U.S. and the territories that we
4 have planned. I think this is a better indication
5 of where things stand than the one I showed you on
6 Monday, but the areas in green are completed,
7 process and the data is available. The squares
8 that you see in blue on this main, the big map,
9 are the areas that are under processing. And then
10 the orange-y, yellow areas are those that we've
11 started collecting and they haven't completed, and
12 then the white areas are those that are planned
13 next. So we've had a lot of progress.

14 Again, you see Alaska, the Aleutians
15 are not complete; we've got to figure out how
16 we're going to get that done, but we will. And
17 then in Hawaii where the plane is most recently
18 surveyed, so I would say about half of it done
19 before it had to go into scheduled maintenance.
20 And then when we get back online we'll be working
21 American Samoa so that we get the data covered
22 there.

1 So, so far so good, we're on track with
2 GRAV-D. We'll update you in August and let you
3 know how it played out the rest of the year.

4 As far as planning goes, we've got some
5 planning documents, one that was just recently
6 released; you all should have gotten an email, or
7 the panel members should have gotten an email
8 about our revised, strategic plan that's shown
9 here, 2019-2023. This is really a revision, an
10 update to our 10-year plan. So now we're halfway
11 there and it seemed like it would be a good
12 opportunity to take a look at what we've done.

13 If I can share with you a quote from
14 Sir Winston Churchill: however beautiful the
15 strategy, you should occasionally look at the
16 results. And so what we wanted to do is take our
17 strategy and the objectives that we have, and
18 you'll see that same quote in the plan. But take
19 a look; how are we doing, what course corrections
20 do we need, what feedback have we received over
21 the past five years that's going to help us in
22 improving the final result of this, the objectives

1 in our strategic plan.

2 So there's not a whole lot different
3 from what we had that said 2013 to 2023, but there
4 are a few things that we I would say call
5 completed; one is the establishment and
6 utilization and implementation of our project
7 management system within NGS. And I won't bore
8 you with details of that, but Galen loves it, Mike
9 loves it, right guys? Right.

10 Okay, so -- but it's really helped us
11 in managing our resources, people, money, time,
12 everything and trying to get, make sure that we
13 get things done in the right order and hold
14 ourselves accountable. The other thing is we
15 established a Regional Advisor Program and I've
16 reported on that in the past, but we were able to
17 go from a state program to a regional program, so
18 we consider that done. But we've also given them
19 a challenge of doing more on the regional outreach
20 piece, so that's a new objective in our strategic
21 plan.

22 And let's see -- the other thing I want

1 to mention is from an enterprise goal is looking
2 at our facilities, the NGS facilities in a way
3 that we can be more efficient with those and other
4 opportunities that will hopefully come through the
5 NOAA-managed facility review that's currently
6 underway.

7 The Blueprint for 2022 Technical Report
8 Series are for those geodesists in the room who
9 really want to know a little bit more details
10 about the decisions that have been made and why
11 that will help frame where we're going with the
12 replacement of NAVD 88, our vertical datum and NAD
13 83, the horizontal datum.

14 So there are two documents that are out
15 that talk about the geometric coordinates and the
16 geopotential coordinates, and then Part 3 we hope
17 to have released again by May, if all goes well,
18 so that we can share that with the public about
19 how we're going to get there, how we're going to
20 work in this modernized NSRS. So that will be
21 coming soon and I'll be able to update you on that
22 in August, if not sooner.

1 Okay, so the next topic that I want to
2 mention is some of the ongoing crowdsourcing
3 opportunities that we have with GPS data. So we
4 have a campaign every year that we started, I
5 don't know maybe seven, eight, nine years ago.
6 Galen's been our lead on that. And basically, you
7 know, how can we collect data on some of these
8 points that we don't have accurate coordinates on,
9 but they're benchmarks in our database, so GPS on
10 benchmark campaign. We've asked people to go out,
11 especially during National Surveyor's Week, to get
12 more data and submit it to us and try to make it
13 as easy as possible for them to get their data in.

14 And we've had great success with that,
15 and I think that in this past year we really hit
16 a high mark in the fact that we were able to pre-
17 populate those areas and those marks that we
18 really were interested in getting data on. And so
19 we had some really beautiful GIS maps of where
20 things are and did a lot more outreach, and as a
21 result in 2018 of the 5,700 marks that we've put
22 out there, we received data on about 3,800 marks

1 but there were 2,600 unique marks.

2 And so with that you see the orange-
3 colored marks there that are hopefully showing up
4 on the screen, are the ones that were done.
5 There's some yellow ones in there that were not,
6 the data wasn't usable, and then the black dots
7 show those that we were hoping for but they were
8 not observed or recovered. But in general we got
9 a lot more data and what that does is provides a
10 better model for us.

11 So we had a number of contributors,
12 there were a lot of state agencies that
13 contributed data, a lot of the Department of
14 Transportation's or environmental protection
15 groups, and then we also had private sector
16 surveyors out there, city/county agencies, and
17 some federal partners, as well as some university
18 students that were told to go out in the field for
19 a while and collect data, so they get to get out
20 of the classroom.

21 So what that means is all that data
22 that was just collected in 2018, as well as the

1 data from 2013, '14, '15, '16, '17 that was part
2 of this GPS on Benchmarks Campaign, got loaded up
3 into the big processing activity that we had, and
4 we added our airborne gravity, the GRAV-D data
5 that we had available also went into this. So we
6 put all these different data sets together and we
7 are going to deliver here very, very soon --
8 although I'm not going to say what date because I
9 don't know -- a new hybrid geoid model that will
10 help our users between now and 2022 get a much
11 more accurate vertical component to their GPS
12 data.

13 So GEOID18 will be a hybrid geoid
14 model, not a purely gravimetric geoid, but it will
15 be in between, between now and 2022, something
16 that will help our users and is based on the
17 contributed data that our stakeholders have
18 provided. So we're very happy that we had such
19 great success in getting folks to help us make
20 that product better for them.

21 Third thing I want to talk about very
22 briefly is our product testing. As a result of

1 feedback that we got from a number of our industry
2 partners last year, we heard from them, if you're
3 planning on doing these things and you're
4 developing mock-ups, share with us your alpha and
5 your beta versions of your algorithms, your
6 products, share those with us so that we can help
7 you and help see how we can implement these things
8 into our software packages.

9 So that was great feedback, and as a
10 result of that we have a number of products that
11 we are developing that are either in the alpha or
12 beta testing phase, and we make those available to
13 our stakeholders; anybody can take them and use
14 them and provide us feedback on them.

15 So Galen has put here some of the
16 images of the different types of things like the
17 beta mark recovery form, our JSON format or Geoid
18 API, all these things if you're interested in
19 looking at your data and how these new tools will
20 make things better, you're more than welcome to go
21 to our NGS.NOAA.gov/web_services/ and take a look
22 at it. So that's all available on our web page.

1 We've got a very nice site on all the different
2 web services that we have available.

3 The fourth thing I want to mention is
4 the update to our CORS network. So as I've
5 mentioned, we've got about 1,800 stations, we've
6 been collecting data on some of these stations
7 since the 1994 era when CORS first started. And
8 over time what happens is things change, we have
9 better ways of processing data, but we also see
10 that there are slight variations in the antenna,
11 and so over time we are collecting that data,
12 we're processing it every day. And when we put
13 all that information together what we end up doing
14 is getting a better starting point for those CORS
15 stations and the description, a velocity of how
16 they're changing over time.

17 So we went through this big
18 reprocessing effort, it was called Multi-Year CORS
19 Solution 2 because the last time we did this was
20 2011. So this is our second big effort. About 23
21 years of CORS data that we processed and connected
22 to the International Reference Frame System and

1 made that -- we have that available in beta. I
2 know it's been on our web page, I think it's still
3 up there on beta, it will be released and
4 operational soon.

5 But basically what we've seen is -- I
6 know it's hard to see the map -- but the major
7 changes in the horizontal and the vertical are
8 shown here -- some of them are really dark, either
9 dark red or dark blue for vertical, mainly because
10 we didn't have those stations, and so it's a new
11 coordinate, and so it pops out a little bit more.
12 But the good news is that we have a lot more
13 stations that we've had in the past so that's
14 densifying the network. We have better
15 coordinates than we've ever had in the past and we
16 have a better understanding of how those stations
17 and those locations, how things are changing over
18 time. The red dots that you see here are new
19 stations, there are about 550 new stations that
20 are in this computation.

21 And I wanted to show you these graphs,
22 not to put you to sleep, but to show you that

1 there are variations depending on where you are.
2 The graph on the left is for a station GODE in
3 Greenbelt, Maryland -- and yes there are
4 fluctuations in the northeastern up component, but
5 as you can see there, they're not changing all
6 that drastically. When you look at a station, the
7 graph in the middle, it's P105 in Utah, and you
8 can see that there is some greater fluctuations in
9 that, in particular in the up component. And so
10 trying to understand what's happening at these
11 sites and seeing how, what's causing it, is it
12 seasonal, is it hydrology effects on this, what's
13 happening, each site is a little bit different.

14 And the last graph that you'll see here
15 is the fact that we're aligning it with the levels
16 of water in wells in that region, and as the water
17 levels go down you'll see that the height of the
18 station goes down and it kind of follows that same
19 -- oh, we're going to restart the computer --
20 anyway, so every station is a little bit different
21 and we're looking at all the ones that are not
22 behaving as we would hope and expect that we'll

1 have all that data looked at. And we may lose a
2 few stations out of the final wrap-up, but I think
3 in general we'll just end up with a lot more
4 accurate coordinates and understanding of how
5 they're changing over time.

6 Fifth topic out of six that I want to
7 mention is the hurricane supplemental, our
8 progress and our outlook for that work. You'll
9 see here the areas that we've been conducting
10 remote-sensing work on. We've got three areas
11 that we've been doing, the high resolution topo-
12 bathy LIDAR, the RGB near-infrared imagery, both
13 the stereo and ortho-imagery formats, and then
14 also how that gets updated and applied as the
15 national shoreline product.

16 So we've got work areas, and it's cut
17 off a little bit, but you can see in the Texas
18 area that was a result of Hurricane Harvey. We've
19 got 70 percent of that acquired in yellow, and so
20 in Texas it's from Hurricane Irma and we're
21 working on that, about 80 percent acquired. And
22 then Hurricane Maria and its impact in Puerto

1 Rico, so we're a little further behind there with
2 acquisition at 33 percent. And then some of the
3 remote-sensing images of the types of products
4 that are available once those data are collected.

5 So the data primarily is being used to
6 update the nautical chart, but the data are used
7 for many, many other purposes; storm surge,
8 inundation modeling. I'll talk about that a
9 little bit more on the next few slides. But you
10 get the understanding where we've got multiple
11 uses for it, even though the primary use is to
12 update the chart, there's a whole lot more that
13 goes into it and that we get out of it, the return
14 on the investment here is tremendous. I know that
15 you've seen a number of these slides from Mike and
16 I'm not going to go into too much detail here, but
17 we can certainly continue to improve the
18 technology and the results of those data
19 collection.

20 The last thing I want to talk about as
21 far as the coastal mapping work goes is the
22 dissemination of that data. We heard about the

1 Geospatial Data Act, we heard about how we need to
2 share this information. I want to make sure that
3 people understand we process the data, we QC it,
4 the data goes to Digital Coast as part of NOAA,
5 people are able to get that data and utilize it
6 there. It also gets archived through NOAA's
7 National Centers for Environmental Information.
8 It's there, long-term storage, it's in the right
9 format, it's not going anywhere, it's available.
10 And it also then gets used by NCEI to develop
11 additional products such as the Topo-Bathy DEM
12 Development that's pictured there on the lower
13 right.

14 How is that then used? Well, from the
15 modeling side, the DEM's that are developed help
16 support tsunami and storm surge inundation
17 modeling and mapping. Some pretty pictures there
18 that will show you a little bit more about that.
19 Improved hazards mitigation and inundation
20 vulnerability, and then being able to refine
21 hurricane surge on demand forecast system grids.
22 So there are a lot of additional applications that

1 happen after it leaves our shop.

2 Okay, last topic is just an invitation
3 to our 2019 Geospatial Summit that's happening in
4 Silver Spring, close to where you were the other
5 day for our briefings on Monday. There'll be a
6 lot more details about what we've accomplished and
7 where we're going with our NSRS modernization
8 effort, it's free, people are welcome to attend in
9 person, and also welcome to attend remotely. And
10 if you're interested and you've been working with
11 our geodetic data for a while and have some case
12 studies that you'd like to propose or talk about
13 how comparisons of some of our beta products and
14 what you're seeing, you're welcome to submit some
15 ideas for case studies; if not for this year, then
16 for future years because we plan on holding
17 geospatial summits annually and hopefully get that
18 out into a regional outreach opportunity in the
19 next year as well.

20 And lastly for those who want more
21 information about NGS, we've got a number of short
22 educational videos about three minutes long, talks

1 about what geodetic datums are, talks about
2 coastal mapping work. They're very short and very
3 informative. We've got a number of things that
4 you can subscribe to if you want to know more
5 about what's happening, you can subscribe to our
6 NGS news, you'll get updates, including job
7 opportunities and new products and updates to our
8 products.

9 Or if you just want to find out when
10 our monthly webinar series are and what the topic
11 is, you can subscribe to just that email list. Or
12 if you want to go out and collect data so that
13 your dots can pop up on the next geoid thing, you
14 can subscribe to our GPS on Benchmarks newsletter
15 and feedback and get more information on that.

16 So we've got a Testing and Training
17 Center we've put a lot of courses on, both in
18 person and remotely as well as out with our
19 advisors in the region, so there's always
20 something coming up on the training site, so if
21 you're interested in that. Or if you have folks
22 that you think might be interested, please point

1 them to our website so they can learn more.

2 Thank you very much.

3 MR. EDWING: Okay, good afternoon. I'm
4 Richard Edwing, Director of the Center for
5 Operational Oceanographic Products and Services.
6 I'm going to talk today about -- I'm going to
7 highlight some of the main activities we're
8 pursuing under our new strategic plan. And just
9 as a reminder, you guys provided some great input
10 at our last meeting in Juneau. After that, we
11 finalized and published a plan around October.
12 Three goals, the products and services, our
13 observing and modeling systems and organizational
14 performance. I'm really just going to highlight
15 things under the first two goals because I think
16 that's what's of most interest to you.

17 So products and services, and that's
18 the last part of our office name, obviously very
19 important to us. Our products and services span
20 a broad range of societal benefits, and just a few
21 are really illustrated here. The top one is a
22 PORTS graphic, you saw something very similar to

1 that in Captain Viso's presentation yesterday for
2 the maritime community. In that lower left is our
3 Storm QuickLook product, and that's really just
4 the tip of the iceberg, it's a website that
5 provides, it kind of pulls together all the water-
6 level stations and sensors that are being affected
7 by a storm and it's somewhat interactive where you
8 can select different ways to look at the data.
9 That lower right is a harmful algal bloom which
10 you heard me speak a little bit about on Monday,
11 informing coastal managers, local agencies with
12 information to make decisions on whether they need
13 to close beaches or shell fisheries or fresh water
14 intakes up in the lake, those sorts of things.

15 So these next few slides are going to
16 talk about two really big lists for us, and it's
17 kind of similar to what Juliana's doing with the
18 National Spatial Reference System, the Tidal Datum
19 Epoch comes around once every 20 years or so. The
20 next slide is on the International Great Lakes
21 Datum which is more of every 25 to 30 year effort,
22 but they're kind of happening at more or less the

1 same time here.

2 And these are heavy lists for the
3 organization because there's a lot of additional
4 work on top of the already pretty full plates
5 people have to just getting things out the door as
6 it is. So we have to update tidal datums
7 periodically because of sea level rise and other
8 things, or changing that basic mean sea level
9 elevation. It's kind of defined by what's called
10 a metonic cycle, it's a 18.6 astronomic cycle and
11 you measure tides over that period and you kind of
12 eliminate -- it's the most accurate way to produce
13 a datum, and we rounded it off to 19 years to get
14 rid of any seasonal effects.

15 But you can see we've done three tidal
16 epochs in the past. Actually, we're on the fourth
17 one which is '83 to 2001 and we'll be moving to
18 2002 to 2020 time frame. We're starting our
19 planning now even though we're not quite at the
20 2020 -- and yes, so I guess the other thing I'll
21 say about this is we also do in some locations,
22 it's less than ten, we do a five-year update, kind

1 of a mini tidal epoch update because -- and that's
2 where our few stations out in the Gulf and a few
3 stations up in Alaska, and that's because of the
4 land motion subsidence down in the Gulf and the
5 land motion rebound up in Alaska.

6 People came to us and said, hey, your
7 last epoch is just too far out of date for us, and
8 that's because we're picking kind of the mid-point
9 for that 20-year period to kind of establish mean
10 sea level at. So one thing I've asked my folks to
11 do is look at, is maybe we should be moving for
12 the next epoch update, maybe we should move that
13 point to the right, you know, to the three-quarter
14 mark, because it's pretty clear sea level is going
15 to keep on going up. The mid-point was originally
16 selected because sea level could be going up and
17 down, but given they're trimming up pretty
18 consistently, so that might be one way to do it.
19 Or maybe we need to do five-year updates or
20 something; we're going to look at that issue and
21 that might be something you guys might want to
22 weigh in on too, we appreciate any input.

1 So we talked about the IGLD datum
2 update up at the Cleveland meeting a couple years
3 ago; kind of same reasons, water levels are
4 changing, but for different reasons, the lakes are
5 tilting, the west end's coming up because of
6 rebound, eastern end is kind of sinking -- that's
7 Juliana's fault.

8 (Laughter.)

9 But there's a number of other
10 differences about this as well. It's a bilateral
11 effort, we share the Great Lakes with the
12 Canadians, right, so we have to get together with
13 them and make sure we're doing things consistently
14 between water level stations and geodetic
15 connections and those sorts of things. And the
16 tidal datum epoch is completely not my
17 responsibility, and even though I have the lead on
18 the IGLD, you know, NGS is a huge partner in
19 making that happen because there's a lot of
20 geodetic connections that have to, and GNSS
21 connections that have to happen between water
22 level stations.

1 And unlike the tidal datum epoch, which
2 is mainly a data management analysis kind of
3 exercise, there's a lot of field work that goes
4 on, a lot of field work on Juliana's side, the
5 geodetic campaigns, and then we also put in
6 seasonal gauges of a lot of the smaller ports and
7 harbors where we need to update IGLD.

8 So another big effort is we're really
9 trying to modernize our website, there's a lot of
10 things that can be improved. Our website over
11 time developed as somewhat of a legacy of
12 different systems, PORTS, and still does display
13 some information one way, currents another way,
14 different types of things. So we're really trying
15 to bring that all together. If you look at a
16 plot, no matter what data you're plotting you're
17 kind of seeing the same plot.

18 We're trying to make it more compatible
19 with mobile devices, we want to bring together the
20 real-time observations and predictions and the
21 model data where we can do that. And tidal
22 current data, we've always plotted or displayed

1 the data pretty well, but a lot of the other kind
2 of metadata information has not really been there,
3 so we're kind of, I'm going to say give equal
4 footing with the water level on some of the other
5 information. So there's a whole bunch of, I'll
6 say relatively minor things, but together I think
7 make a big difference.

8 Another thing is just using information
9 from surveys, a company called FourSee Survey or
10 Google Analytics, where we can change and
11 hopefully improve the navigation to lessen clicks,
12 find out where people are going most and kind of
13 reduce the number of clicks it takes to get from
14 our home page to something you want. Our
15 programmatic content needs a little updating.

16 And then for our models we're going to
17 be leveraging the environmental data server, a
18 viewer that IOOS has put together I think in
19 collaboration with industry, and pull some things
20 out of there that I think will help, because our
21 visualization products for our models are pretty
22 outdated and rather than reinvent the wheel on our

1 own, we're going to leverage this system.

2 If you were at the Monday presentation
3 you heard Paul talk about with our models are kind
4 of pre-set points where you can click on and get
5 information, and those are usually kind of
6 coordinated with the maritime community. But with
7 this capability you can click on anywhere in that
8 water body and you're going to get simulated
9 observations and predictions. And there's some
10 thought that people can start doing some transit
11 planning and so forth with this, so there's a lot
12 of power there that we're going to leverage to
13 improve how we put our model information out.

14 Precision navigation, I stole this
15 slide from Coast Survey, but we provide a lot of
16 that forecast information. If you look kind of
17 down on the left-hand side and the real-time obs
18 along the right-hand side, certainly other people
19 provides a lot of data, weather service as well.
20 And I think some of the website improvements we're
21 making that I talked about in a previous slide
22 helped with this at our level, but then there's a

1 lot of work to be done to kind of get our data to
2 be a part of the precision navigation into that
3 dissemination site, which we'll feed into things
4 like dynamic under keel clearance systems, to
5 PPU's, charter systems and other applications and
6 hardware that we probably don't even know about.

7 I think I'm going to skip this next
8 slide because it just really says the same thing.

9 And then the last product I'll talk to
10 you about -- I talked to you a little bit about
11 the Coastal Inundation Dashboard up in Alaska, but
12 a big improvement we're going this year is we're
13 going to be migrating the Storm QuickLook product
14 into this. The Storm QuickLook is something we
15 stand up when a storm's approaching; now it's kind
16 of going to be there all the time. This is a --
17 you can go to any area of the country and look at
18 water level stations and if that little pin is
19 pinging it means that some sort of threshold is
20 being approached or passed for inundation.

21 And I think I said in Alaska the
22 Inundation Dashboard is something I'm excited

1 about because it pulls together kind of the three
2 spectrums of data, it pulls together a lot of our
3 historic data because when you click on one of
4 those stations you can go back and look at what
5 were the last top ten storm water level
6 elevations, that may help you understand what's
7 happening right now. And it also pulls in the
8 real-time data and the forecast data.

9 And just some other things that are
10 going on there. You know, we're pulling in all of
11 our stations and our partner stations right now,
12 another thing we're going to try and do is pull in
13 stations beyond that and just display them like
14 USGS and other water levels stations that are out
15 there. There's going to be a custom kind of web
16 page design feature which exists in PORTS right
17 now, it's called MyPORTS. You may not use all the
18 sensors within PORTS on a daily basis, but you
19 might -- if you only use a few you can kind of
20 pull those out and create your own web page and
21 save it, and that's what you use going forward.
22 You can do the same thing with the water level

1 station with this tool.

2 And then we've just been working to
3 make sure we're consistent with the weather
4 service. They kind of define the local minor,
5 moderate and major flooding levels, and we're
6 using some of their same graphics and colors and
7 definitions. We're also being careful with our
8 wording because even though we may be getting up
9 into some of those areas, we don't really know if
10 there's flooding going on, only the local person
11 knows that. So we're kind of saying significantly
12 elevated instead of flooding.

13 Okay, moving onto my observing and
14 modeling systems. The bottom left image is kind
15 of a typical water level station that we used
16 along the coast, in the middle is one of the
17 hardened single pile platforms that there's ten of
18 them now that are in the Gulf designed to
19 withstand hurricanes. We have a current meter
20 deployed in that buoy right there, and then the
21 upper image is just a reminder. For water levels
22 it's really almost a two-observation system;

1 you're measuring the water levels but you need
2 those periodic geodetic measurements to be able to
3 reference.

4 So one major effort that we actually
5 started in 2014 is transitioning away from our
6 acoustic sensor as a primary water level sensor to
7 microwaves, and we're always upgrading different
8 parts, different components of our
9 instrumentation, but the primary water level
10 sensor is the one we are most conservative and
11 careful about, and it was years of tests and
12 evaluation before we really accepted microwave
13 water level as being acceptable for our use
14 because we really needed to understand it.

15 And I can tell some horror stories, but
16 other countries just kind of went out and bought
17 stuff and deployed them and pulled their oil
18 sensors out and all of a sudden they're having
19 issues and they really had major gaps in their
20 time series. But we're moving to it for a couple
21 reasons; one is it's a more cost-effective sensor.
22 The sensor itself is really not that much

1 different from the acoustic but it gets rid of all
2 that in-water stuff that's subject to corrosion
3 and bio-fouling and have divers to maintain it.
4 So it's more cost-effective to maintain. It's
5 probably a better sensor in terms of -- we had
6 some biases in that stilling well, that protective
7 well in high-energy environments; just moving to
8 that, microwave gets rid of that.

9 So you can see the numbers here where
10 we've installed 69 of 152 NWLONS. We have 210
11 LONS but the rest are up in the lakes and we don't
12 really need to microwave up there. And you can
13 see fully transitioned, we do a year overlap with
14 the Aquatrack, because again, we're very
15 conservative about that measurement and we want to
16 make sure we understand any differences. So we do
17 a full-year comparison between the two sensors
18 before we're comfortable and pulling out the
19 Aquatrack. So we're taking our time, we're doing
20 10 or 15 a year; hope it will be 2028 but that's
21 the planned completion date.

22 I did a big presentation on this in

1 Miami where we're really trying to leverage and
2 integrate GNSS technology into our systems for
3 really a number of reasons; one is if we can
4 continuously monitor the stability of our water
5 level sensor versus just a once a year check,
6 that'd be huge. It might also help us realize
7 some efficiencies and how we survey between our
8 sensor and our local benchmark network. It's
9 certainly going to connect the stations to the
10 ellipsoid which is a big benefit.

11 And we also have a responsibility, at
12 least at our 26 stations that are a part of the
13 global sea level measuring network to understand
14 land motion. We really want to do that
15 everywhere, so NGS has been a huge help on this.
16 And then I think it was in Dr. Abdullah's
17 presentation yesterday, he mentioned using GNSS's
18 water level sensors, there's people doing work on
19 this. We haven't started looking at it yet but
20 we'll probably -- that's kind of next on the
21 horizon for us.

22 Hurricane supplemental, affects a lot

1 of the water level stations. After a hurricane we
2 have to quickly run through all the water level
3 stations and just look at them, make sure what
4 damage there's been, we do a quick survey just to
5 make sure nothing's moved. All that works -- and
6 assess the damage from minor to maybe it's not
7 even there anymore.

8 So we did all those assessments in
9 these three areas, we've completed all the minor
10 to major repairs by now. And for the three
11 stations that were destroyed we put in temporary
12 stations to minimize the data gaps in Rockport
13 down in Texas as well as the two Caribbean
14 stations that were destroyed are going to be
15 rebuilt this year.

16 So you heard Nicole LeBoeuf yesterday
17 mention we were fortunate enough to receive a
18 million and a half extra dollars in FY19 to
19 rebuild some stations. Some guidance came along
20 with that and said Dauphin Island and Port Moller
21 are the top two in the list. We're hoping to go
22 a little bit further than that and pick up a Great

1 Lakes station if we can.

2 Dauphin Island was one of the few
3 stations that survived Katrina and Rita and kind
4 of helped inspire the hardening concept for the
5 rest of the Gulf. So this was put in in 1980, it
6 was way, way past its lifespan and we were getting
7 ready to have to pull it down and put in a station
8 somewhere else, so we're really happy that money
9 -- to replace that with a hardened design.

10 And in Port Moller you heard we talked
11 about a little bit this up in Juneau; pier burned
12 down, it was actually more than we could afford to
13 replace, so now we've got the money to go back and
14 put that one in, so that's great. And we've got
15 about three Great Lakes stations that are really
16 in bad shape; it's much more significant
17 infrastructure up there. I won't get into that
18 right now.

19 So modeling, these are my last couple
20 of slides. So there's a lot going on with
21 modeling; modeling keeps -- paradigms keep
22 changing very rapidly. We really just started our

1 modeling program back in 2003, so it's only 16
2 years old, really. These are areas of coverage
3 that we have now and there's different kinds of
4 models and operation different places. Some of
5 these have very old legacy models that need to be
6 replaced.

7 So one simple thing to focus on and
8 measure progress is just kind of coverage, so
9 that's existing. Here's what's planned in the
10 next few years. I can't give you years right now
11 because of the shutdown and other reasons, we're
12 having to kind of reconstruct that timeline. But
13 a modeling plan is something we're going to come
14 out with here hopefully in the next few months
15 really, maybe we'll circulate that around.

16 And just as well as coverage; there's
17 all sorts of other types of I'll say improvements.
18 There's certainly coupling our models to the
19 harmful algal blooms models that are coming on.
20 We did a Gulf of Maine one a year ago and that's
21 kind of in preparation for a harmful algal bloom
22 model that's being contemplated up there. There's

1 probably going to be ways to add modules onto our
2 models to help also forecast hypoxia in the areas
3 on the slide there.

4 Real-time data assimilation is a big
5 effort. There was a really nice project, joint
6 project for the West Coast model that IOOS
7 contributed funds to, coast survey. It was run
8 out of Coast Survey Development Lab that NESDIS
9 contributed funds to, CO-OPS contributed funds to,
10 but we kind of developed the capability to do this
11 and we're actually assessing how beneficial is it
12 to bring in real-time data because there's a high
13 overhead with that in terms of computational
14 power, and then there's also a big learning curve
15 in how to deal with that. But we're at a point
16 where we've got really, I'll say some initial
17 success and we're confident we can do this, it's
18 just a matter of what parts of it do we want to
19 do.

20 Ice modules can be added onto models.
21 We got a Cook Inlet model on the way and we're
22 looking at adding ice modules onto our Lake Erie

1 and Cook Inlet ones.

2 And the last, last thing I'll say is,
3 you know, and this is kind of outside of our
4 immediate control if you will, but we're part of
5 this total water initiative and there's a lot of
6 modeling/coupling going on between the river
7 models and our models, and then the offshore
8 global models that we're participating in. And
9 that should I think help deliver a lot of benefits
10 as well, so I think that was my -- yes, that's it.
11 Thank you.

12 Well, so Julie, I think maybe one thing
13 for the metrics because I saw you try to work in
14 Total Water Initiative there, somewhere that might
15 be kind of a new road, just kind of if you guys
16 learn more about because we're all playing
17 significant roles in that.

18 VICE CHAIR THOMAS: It keeps coming up
19 the Total Water initiative, it keeps popping up.
20 Yes, the Total Water Initiative just the caption
21 keeps popping up in different conversations, so.

22 MR. EDWING: Right. Yes, so food for

1 thought.

2 VICE CHAIR THOMAS: Okay.

3 CHAIR SAADE: Okay, we have some time
4 for some questions, if anybody's got a few. There
5 was plenty of information, it's always good to see
6 the update on all the activity. That's great
7 news.

8 VICE CHAIR THOMAS: I have a real quick
9 question.

10 CHAIR SAADE: You can go slow.

11 VICE CHAIR THOMAS: Can I go slowly or
12 quickly? Rich, I mentioned to you that in San
13 Pablo Bay in San Francisco where the crude oil
14 tankers are having so much trouble with the tides
15 there; is that a place you can just look at the
16 tidal datum? Again, you do the 19-year tidal
17 datum revisit. Like, is it possible -- I don't
18 even know when it was last looked at there, but is
19 that something to check and see if there's a
20 possibility there?

21 MR. EDWING: Yes, so if the tide
22 predictions are inaccurate, really the solution is

1 you put a tide gauge in for 30 days.

2 VICE CHAIR THOMAS: Okay.

3 MR. EDWING: Because that's enough to
4 get the harmonic constituents and you compare that
5 30 days to the long-term NWLON station, and by
6 that comparison you can significantly reduce the
7 uncertainty.

8 VICE CHAIR THOMAS: See where the
9 offset is or what --

10 MR. EDWING: Yes. So, but it'll
11 probably take a tide gauge installation to address
12 that issue.

13 VICE CHAIR THOMAS: Well, this is
14 Marathon who is paying for Long Beach and they're
15 pretty concerned about it right now.

16 MR. EDWING: Right.

17 VICE CHAIR THOMAS: So I'm going to
18 follow up with Julie and I'll get you in the loop
19 on it.

20 MR. EDWING: Okay, that'd be great.

21 CHAIR SAADE: Rich, I have a question;
22 you showed your approximately five years cycle of

1 updating the tide baseline.

2 MR. EDWING: You're talking about the
3 tidal data map?

4 CHAIR SAADE: Yes, the tidal data.

5 MR. EDWING: So typical is 20, but
6 there's a few locations where we're doing a five-
7 year tidal update, yes.

8 CHAIR SAADE: Okay, so the question I
9 have is, is this all in sync with the rest of the
10 world or is this just a U.S. thing on the cycle
11 that you're on? Does everybody update their tides
12 globally on the same tidal cycle to try to be in
13 sync with each other?

14 MR. EDWING: We don't try to do it to
15 be in sync with each other because I don't know
16 that it's really needed, because it's really just
17 about the elevation which is very local. But
18 that's a good question, I'm not aware of -- I
19 belong to a group called GLOSS which is under the
20 UN, it's under the International Oceanographic
21 Commission, but we're really focused on the gauge
22 networks to make sure that the gauges from each

1 country that are contributing the measurements to
2 the sea level archive which is in England, it's
3 all to the same level of standards so you're
4 comparing apples to apples and not apples to
5 oranges.

6 CAPT ARMSTRONG: But just for my
7 clarification; your five-year update is a five-
8 year moving 19 years, is that right?

9 MR. EDWING: Yes, it's kind of just
10 doing five-year increments, but yes.

11 CHAIR SAADE: Sorry, Gary. Go ahead.

12 MEMBER THOMPSON: So Juliana, when the
13 CORS -- I saw the upgrade -- when are they going
14 to be published? When will the data sheets be
15 updated for the CORS?

16 MS. BLACKWELL: So the new coordinates
17 based on the multi-year solution, they're about
18 ready. We're waiting to see if we can pair that
19 with the new hybrid geoid model so that when we
20 update the OPUS and all, everything gets pulled
21 together rather than having a two-step process.
22 So I can't give you an exact date, but I'm going

1 to look at Galen and see, do we think within the
2 next month, two months, do you have any sort of
3 range that's going to be months from now?

4 MEMBER THOMPSON: I'm not as concerned
5 about exact date as that if you'll let us know
6 because our real-time network I would need to
7 upgrade that at the same time. So I just need to
8 know.

9 MS. BLACKWELL: Yes, so when we have an
10 estimate let you know?

11 MEMBER THOMPSON: Right.

12 MS. BLACKWELL: Okay. Galen, do you
13 have any other --

14 MR. SCOTT: I was just going to say
15 right now --

16 MS. BLACKWELL: I can repeat what you
17 say.

18 MR. SCOTT: GEOID18 is up for beta
19 testing right now and we're looking at summer
20 before we go into production, which it'll probably
21 be around June that we'll be able to roll those
22 out to production.

1 MS. BLACKWELL: Okay, so the new hybrid
2 geoid, GEOID18, is expected to be ready in summer,
3 early summer. And if that's the case and we do --
4 this is still under discussion if we wait that
5 long to then produce the new data sheets for the
6 CORS -- if we wait until that June-ish time frame
7 to put them both out there at the same time and
8 update our products and services, but we will let
9 you know via our website, newsletters, et cetera
10 when we plan on doing it and if we are planning on
11 doing it jointly, okay?

12 MEMBER THOMPSON: Okay, thank you.

13 CHAIR SAADE: Go ahead, Andy.

14 CAPT ARMSTRONG: A question for Juliana.
15 When I look at the VDatum transformation site
16 there's a page on transformation uncertainties;
17 those numbers seem rather large to me. Is the
18 GRAV-D program going to reduce those uncertainties
19 or is that all in the transformation?

20 MS. BLACKWELL: With every piece of
21 data that goes into that you've got some
22 uncertainty. And so if you're using older

1 information and we're trying to tile those things
2 together you are going to have higher numbers. I
3 would say that it's still going to take time even
4 after we have the airborne gravity GRAV-D in
5 there, you're still going to have all these other
6 data components that you're going to need to tie
7 to that. So I think it's going to be an iterative
8 process, but I will also say I'm not the expert on
9 VDatum. It is a three-office shared product, but
10 that's my answer. We can certainly follow up and
11 find out more about that, but I believe it's going
12 to take, again, new observations and being able to
13 tie those things together even once we have a new
14 geopotential datum. So, and I'd say ask if Rich
15 or Shep have any other --

16 RDML SMITH: Yes, we were just
17 whispering. I think the number you're referring
18 to is the single transformation uncertainty for an
19 entire model, and recognizing that that is
20 probably more like a worst case and not really
21 illustrative of the performance of the model in
22 various places. The new versions have a spatial

1 varying uncertainty built into the model.

2 CAPT ARMSTRONG: Yes, so I'm referring
3 to a spatial varying uncertainty. So there's a
4 table and for each place there's an uncertainty on
5 each transformation that takes place, and then a
6 total transformation uncertainty for the region.
7 Those numbers are larger than I had expected to
8 see.

9 MR. EDWING: Yes, so I think when
10 VDatum first came about we went around the coast
11 and we built the models. And first they were
12 built to meet hydrographic specifications which
13 are relatively large, but now we're in the process
14 of going back around and doing additional tide
15 gauging and GNSS connections and things to kind of
16 reduce that uncertainty, and we've done a fair
17 number of them but there's still more ahead of us.
18 So I think you'll see those numbers go down as
19 time goes along.

20 CHAIR SAADE: Sean?

21 MEMBER DUFFY: So Rich, I'm trying to
22 figure out how I can word this without throwing a

1 hand grenade; so algal blooms are -- in my
2 backyard that's a swamp surrounding by brackish
3 and fresh water -- and for instance we're in
4 Bonnet Carre Spillway being operated right now --
5 there's a lot of concerns about algal blooms and
6 the estuary. Maybe just to mention that if algal
7 blooms is mentioned in a New Orleans meeting, we
8 should have some more information prepared and it
9 may even lead to being a good topic. So I don't
10 want to ask you a question or put you on the spot,
11 but just to reference that that's a very hot
12 topic. I won't even tell you all the reasons it's
13 a very hot topic, but I'm sure Admiral Smith will
14 be happy to.

15 MR. EDWING: I'm not surprised it's a
16 hot topic and I appreciate the heads up, Sean.

17 CHAIR SAADE: Algal blooms on our list,
18 make it Number 24.

19 Okay, while we've got everybody's
20 attention, why don't we -- if anybody wants to
21 speak up before we break. We're going to break in
22 less than ten minutes because we have a hard stop

1 for the next event and we leave here. So if anyone
2 has anything they want to say today or tomorrow
3 morning, take your pick, but the floor is open.

4 VICE CHAIR THOMAS: So I'm just about
5 ready to send out a revised priorities matrix --

6 CHAIR SAADE: Add the algae.

7 VICE CHAIR THOMAS: Add the algae --
8 it's an ongoing thing -- well, I don't know if we
9 can -- do we need to add that into priorities?

10 CHAIR SAADE: Yes.

11 VICE CHAIR THOMAS: Okay, but -- yes,
12 so I thank everybody -- Kim, Rich, Shep, a lot of
13 people have given input -- and it's just a draft,
14 so don't take anything too seriously. I tried to
15 group it, it's just suggestions, but I wanted to
16 get it out today so you could bring it -- so you
17 could look at it before tomorrow because we will
18 discuss it tomorrow and we don't have printer
19 capability here. So, anyway, we're going to email
20 it out to folks, I just wanted to let you know.
21 Thank you.

22 MEMBER THOMAS: I want to say thank

1 you, I don't know who's responsible, but during
2 this government shutdown the NGS and NOAA online
3 products were available which didn't occur back in
4 the last government shutdown, so I was receiving
5 the calls the day of the government shutdown,
6 people worried that -- and you all made them
7 available which we really thank you for that
8 because it was really helpful to have all those
9 products available during the government shutdown.

10 MR. EDWING: Well, I don't know if
11 you're aware, but we're classified as a mission
12 essential activity in NOAA's COOP Plan, so we're
13 kind of allowed to keep our websites going.

14 MS. BLACKWELL: I will say that while
15 NGS has mission essential functions, that the
16 decisions are made -- whether or not your mission
17 essential function is determined regardless, but
18 the decisions about the website and things like
19 that are made at a higher level.

20 I also will say that I did not get
21 angry emails as a result of the shutdown, but we
22 did have banners on our web pages letting people

1 know that data that was being fed in and delivered
2 back out automatically was not being validated in
3 any way. So it was a user beware, that the
4 information is coming to you but there's nobody
5 that's really behind the scenes looking at it. So
6 it's a double-edged sword; the information's
7 available but it's not going through the rigorous
8 process that we like to make sure happens. Thank
9 you.

10 CHAIR SAADE: Okay, I want to thank
11 Juliana and Rich and Admiral Smith. That was as
12 always extremely informative and thanks a lot.

13 (Applause.)

14 So we need to pack up all your personal
15 items. You can leave various miscellaneous things
16 on the desk. We'll be back here again tomorrow
17 at, a little bit before 9:00, and we're going to
18 head over to the Hyatt now and for the rest of the
19 afternoon's activities.

20 So thanks everyone and we're adjourned.

21 (Whereupon, the above-entitled matter
22 went off the record at 2:24 p.m.)

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Before: US DOC/NOAA

Date: 03-06-19

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