Virtual Meeting Summary
NOAA Hydrographic Services Review Panel
Webinar, April 28, 2020, 1pm EDT

Tuesday, April 28, 2020

On the call of the Designated Federal Official (DFO), Rear Admiral Shepard M. Smith, NOAA, the Hydrographic Services Review Panel (HSRP) virtual public meeting was convened on April 28, 2020, 1pm EDT via webinar. The following report summarizes the deliberations of this meeting. The agenda, presentations, and documents are available for public inspection online at: http://www.nauticalcharts.noaa.gov/hsrp/meetings.htm

Opening and Introductions

Rear Admiral Shepard Smith, Acting Deputy Assistant Administrator, National Ocean Service (NOS), National Oceanic and Atmospheric Administration; Director, Office of Coast Survey, and HSRP Designated Federal Official, called the virtual meeting to order at 1:02 p.m. and welcomed attendees. The meeting was held by webinar due to the COVID-19 pandemic and RDML Smith expressed his gratitude for the work of first responders, especially those in the health care sector. There have been severe impacts to NOAA's partners in shipping, trade, cruise lines, and the overall maritime economy. Many NOS and NOAA operations have been affected, including an operational pause in field work. The HSRP will pick up the agenda they tabled for this meeting at its next in-person meeting September 22-24, 2020, in Oahu, HI. RDML Smith recognized new HSRP members Dr. Qassim Abdullah and Dr. Nicole Elko, and four reappointed members. He reminded Panel members that they are serving as federal employees in their personal capacity as subject matter experts and to consider that as they provide questions, comments, and guidance to NOAA and the Administrator.

Ed Saade, Chair, HSRP; Group Director, Americas Region, President USA, Fugro, thanked the attendees for joining. He discussed meeting logistics and called for HSRP members and NOAA leadership to introduce themselves and briefly describe their areas of expertise.

Nicole LeBoeuf, Acting Assistant Administrator, National Ocean Service, NOAA, said that these challenging times offer opportunities to re-examine how and where NOS works and forces staff to prioritize their health and well-being and that of their loved ones, which she welcomes. NOS will not waver from their robust partnerships with stakeholders and the Ocean Service's collaborative spirit is stronger than ever. NOAA and NOS are proving themselves as adaptive, innovative, and resilient as they press forward with mission-essential functions. There will be ongoing impacts, especially in field work and vessel/aircraft operations, but the agency is doing what they can to press forward while ensuring the health and safety of the workforce. Thus far, there have been no mission-related emergencies requiring NOS to mobilize significant resources, but they are fully aware that hurricane season is approaching and are taking appropriate steps to ensure they are prepared to respond as needed. During this crisis, Ms. LeBoeuf has focused her efforts on communicating clear expectations to staff across the country working remotely. Her expectations are: (1) Employees' health and safety and that of their loved ones comes first; (2) That they be gentle on themselves and patient for not getting all of their decision making right the first time; (3) That some work will slip because many people are balancing educating their kids, taking care of parents, and much else; and (4) Resilience and stamina are what is needed to get through this crisis. She encouraged the HSRP members as well to be kind to themselves as the entire nation endures this crisis. NOAA and NOS appreciate the extraordinary efforts of those on the front lines, first responders, health care workers, and many others.

Congress enacted the FY20 appropriation for NOS at its highest level yet: $606 million. The programs under the purview of the HSRP generally received level funding or modest increases over the previous year. The President's FY21 Proposed Budget was released in February,

which initiates the appropriations process but, given the disruption due to COVID-19, Ms. LeBoeuf was doubtful that an FY21 budget will be enacted before November. COVID supplemental funding has been primarily focused on individuals and businesses, but NOAA has received a small amount of funding for IT and continuing operations remotely. Congress has been discussing recovery funding for infrastructure and, if this goes forward, NOAA has several ideas to put people to work. The U.S. Maritime Transportation System has many areas that would benefit from job creation and economic investment, whether in precision navigation or in activities like hydrographic surveying, shoreline mapping, geodetic modernization, and water level network requirements. This crisis has demonstrated how important the maritime industry is to the American people and the U.S. economy, getting critical goods to stores and into the hands of people that need them most.

Dr. Neil Jacobs, Assistant Secretary of Commerce for Environmental Observation and Prediction, performing the duties of Under Secretary of Commerce for Oceans and Atmosphere, expressed his pride in NOAA for its ability to carry on its mission-essential duties and continue to work diligently across the agency despite very challenging times. He has been pushing down through the agency the message of setting realistic expectations on productivity and putting health and family first. Dr. Jacobs discussed his background and extensive coastal experience and how he has personally and professional benefitted from the work of navigation services. NOS, OCS, National Geodetic Survey (NGS), and the Center for Operational Oceanographic Products and Services (CO-OPS) are all critical to the nation's blue economy as well as the larger economy and provide many examples of excellent public-private partnerships. They provide critical data for emergency response and many other applications. One item Dr. Jacobs has been working with the agency on is trying to couple storm surge modeling capabilities with inland flooding.

Dr. Jacobs briefly discussed the Presidential Memorandum entitled "Ocean Mapping of the U.S. Exclusive Economic Zone (EEZ) and the

Shoreline and Nearshore of Alaska." The existence of a Presidential Memorandum on ocean mapping is a testament to what a high priority this topic is for the administration. NOAA will lean heavily on HSRP guidance in developing strategies to address the goals laid out in the document. NOAA currently has several artificial intelligence (AI) and machine learning (ML) initiatives, underway, as well as unmanned systems (UxS) projects related to hydrographic and marine navigation activities. As the agency develops the ability to collect a tremendous amount of data, it is important to be aware of a potential bottleneck in how the data and metadata are stored and managed. The Big Data Project has been an ongoing pilot project working with cloud service providers to address this issue. Private sector interest in access to NOAA's data is incentivizing cloud providers to give the agency good deals on storage. Dr. Jacobs thanked the HSRP for their recommendations from the last meeting. He acknowledged that the Physical Oceanographic Real Time System (PORTS), the National Spatial Reference System (NSRS), and precision navigation are going to be critical to the nation's economic recovery and strengthening NOS' connections with the National Weather Service (NWS) will greatly enhance NOAA's hydrographic products and services.

An Ocean Mapping Moment of Big Ideas

Rear Admiral Shepard M. Smith, Director, Office of Coast Survey, presented updates on ocean mapping topics, Seabed 2030, and the Presidential Memorandum on ocean mapping. A very large coalition is required to undertake the mapping of global oceans and all of the necessary components are coming into alignment. One remaining item is to update the Ocean and Coastal Mapping Integration Act (OCMIA) which authorized the NOAA's Integrated Ocean and Coastal Mapping (IOCM) program and has not been reauthorized since 2009. NOAA suggests to the HSRP that it may be a good time to review this legislation as the Presidential Memorandum could provide an opportunity for much-needed attention and momentum on authorization.

Integral to the national strategy is coordination between agencies and the OCMIA is one of the mechanisms for that coordination. One piece that is currently missing is the ability to better receive and expend funds between agencies in order to facilitate partnering. NOAA played a big role in developing the memorandum and worked very hard to honor its original intent while also incorporating as many coordination functions and existing authorities as possible into the national strategy in order to build on the momentum they have built over the last decade. Goals of the Presidential Memorandum include: (1) Coordinating interagency efforts and resources to map, explore, and characterize the U.S. EEZ; (2) Mapping the U.S. EEZ; (3) Exploring and characterizing priority areas of the U.S. EEZ; (4) Developing and maturing new and emerging science and technologies to map, explore, and characterize; and (5) Building partnerships beyond federal agencies to map, explore, and characterize. NOAA has envisioned a Standard Ocean Mapping Protocol to be updated every few years which will facilitate coordinating and executing regional campaigns so that large areas are mapped in a standardized manner. In order to do this, first NOAA will need to catalog and analyze existing ocean data, seek out external source data, include broader mapping analyses, design regional ocean mapping campaigns, and be in a position to track and report on progress going forward. A mapping priorities exercise is under way through the Interagency Working Group on Ocean and Coastal Mapping (IWG-OCM) which has demonstrated great value and led to several interagency projects. A regional way of thinking about prioritization will be necessary for this strategy. The Presidential Memorandum also emphasizes the importance of efficiency in the regulatory environment, particularly reducing duplication and promoting efficiency across agencies to increase permitting and authorization efficiencies for this work.

Nichole LeBoeuf discussed Section 3 of the Presidential Memorandum, which focuses on completing a strategy for mapping the Arctic and sub-Arctic shoreline and nearshore of Alaska through a collaboration between NOAA, the State of Alaska, and the Alaska Mapping Executive Committee (AMEC). NOAA has led the effort in coordinating with these partners as well as the Alaska Ocean Observing System (AOOS) and others to draft an Alaska coastal mapping strategy. This draft strategy is currently with the White House for review. It will guide the effort to provide foundational geospatial data and maps and map the coast of Alaska by 2030. The strategy contains high level goals, including: (1) Build on existing mapping partnerships to meet Alaska's coastal mapping needs; (2) Expand coastal data collection to deliver the priority geospatial products stakeholders require; (3) Leverage innovation in mapping technology development; and (4) Conduct strategic communications to promote widespread stakeholder engagement. NOAA expects the final version to be released in late Spring/early Summer.

Rear Admiral Shepard M. Smith presented a progress report on unmapped U.S. waters. 97% of the level of effort needed for getting the U.S. EEZ mapped to modern standards is in water less than 200 meters deep. From 2017 to 2019, U.S. waters went from 59% unmapped to 54%. A large portion of that 5% came from retrieving various existing datasets and getting them into the public domain. The Great Lakes is the least mapped region of the U.S. with only 5% bathymetric coverage. Partnerships and technological innovations will be key to fulfilling NOAA's seafloor mapping goals. As technology improves, there are two primary ways to contribute: (1) Participate in U.S. mapping coordination activities, and (2) Share your data. Publicly accessible bathymetry benefits numerous communities of users and the coordinated collection

of new data promotes the integrated ocean and coastal mapping goal to map once, use many times.

Flash Updates: Opportunities and Challenges for NOS' Navigation Services Portfolio

Dr. Larry Mayer, Director, Center for Coastal Ocean Mapping and Co-Director, NOAA-UNH Joint Hydrographic Center, University of New Hampshire, provided and updated the Center's autonomous vehicle activities and the impacts of COVID-19 on their work. The program was well-positioned to move their work out of the lab thanks to a highly competent IT team. University courses have transitioned to online courses with relative ease. Summer field acquisition will be canceled, though the students will be provided with data collected last year in order to continue their work. The other impact is to the international GEBCO Scholars whose ability to acquire new visas in time for September courses is uncertain. The early summer field program at Thunder Bay National Marine Sanctuary has been postponed and the Annual Review will likely be converted to a virtual meeting.

The Center has deployed C-Workers from the *Fairweather* off of Point Hope, Alaska, and in high-risk environments off of the Channel Islands in California. They also conducted shore-based C-Worker operations in Thunder Bay National Marine Sanctuary, which operated up to 24 kilometers offshore. Using a combination of aerial drones for very shallow water and land, ASV for 0-500 meters, and the deep water multibeam on the E/V *Nautilus*, the team was able to conduct shore-to-deep water mapping of Nikumaroro Island, Kiribati, in a very efficient manner. Developing these kinds of coordinated multi-system protocols that facilitate completing an entire mission from a single platform will be important as NOAA moves forward with mapping the Pacific Islands. Another major operation for the Center has been pushing forward on the

DriX sea trials, which is a very seaworthy hydrographic vehicle that can operate at up to 12 knots without any degradation of data. The Center has designed a new Universal Delivery System for the launch and recovery of DriX and AUV modules, as well as transportable cranes, which will open up many opportunities for AUV-ASV collaborations. Another project the Center has been working on is the Saildrone SURVEYOR, a 72-foot long UxS that can carry a large deep water multibeam system and acoustic systems for shallow water and water column mapping, along with a full suite of environmental tools. They expect to launch the SURVEYOR in July. The Center's research also extends to better understanding the transition to truly autonomous vessels, exploring feeding chart information into the autonomous vessel, decision systems, UxS machine learning and AI, and object detection and response. They have also taken the work done in their visualization lab with augmented reality and virtual reality to design an autonomous operating center where operators can get the full environment from the autonomous vessel.

Juliana Blackwell, Director, National Geodetic Survey, provided the update on the NSRS modernization effort. Operational, workforce, and other issues have arisen and compounded, causing NGS to re-evaluate whether a successful roll-out by 2022 is possible. NGS will continue to update the HSRP on their progress and updates between meetings are available by signing up for NGS News or visiting their New Datums webpage. Since the last HSRP meeting, NGS has completed the evaluation of their third Geoid Slope Validation Survey and the results have given them the confidence that they will be able to deliver a 1-centimeter accuracy in coastal regions, a 2-centimeter accuracy in the Great Plains, and a 3-5 centimeter accuracy in the Rocky Mountains. NGS also completed a comprehensive review and reprioritization of projects integral to the modernization effort. They have integrated their

VERTCON 3.0 tool into the NGS Coordinate Conversion and Transformation Tool (NCAT). NGS' goal for their Gravity for the Redefinition of the American Vertical Datum (GRAV-D) project in FY20 was to get their total airborne gravity collection up to 87% of the U.S. and its territories. Unfortunately, since data collection is on hold until further notice, it would be very unlikely that they achieve that goal by the end of the fiscal year. The collection is currently up to 81.59% of the total area. The other key component of the modernization effort that is under way is the establishment of the Foundation CORS (Continuously Operating Reference Stations) of the NOAA CORS Network. There are several challenges, but they have made progress in identifying the number of stations they seek to establish, which is 36. NGS is exploring different ways of bringing these stations up to par, including incorporating partner stations, upgrading existing NGS CORSs, and constructing about nine new stations. NGS' coastal mapping work is continuing with the funding from hurricane supplementals from the last couple years. Data collected from areas affected by hurricanes Harvey, Irma, and Maria have been acquired and are in the process of being reviewed. Acquisition is under way in response to hurricanes Florence and Michael and Typhoon Yutu. NGS will be using deep channel lidar in select areas of North Carolina to obtain enhanced coverage of those areas that experienced storm-induced sound side flooding and inundation. The Remote Sensing Division collected damage assessment imagery following the tornado that hit Tennessee in March. This imagery not only supported the emergency response effort, but also tested out a new process to improve delivery efforts and support AI users who utilize the imagery as training datasets. As part of NGS' VDatum effort, they have been working on an update to the West Coast Regional Model which has an expected release date of Q4 2021. They have been leveraging a model for Alaska developed by

Notre Dame and running it through VDatum to discover what areas are usable and where improvements are needed in their modeling. NGS' Strategic Human Resources Plan is a companion document to the NGS Strategic Plan 2019-2023 and covers strategic direction, current workforce/future workforce, gap analysis, succession planning and career development, workforce strategies, and implementation, monitoring, and evaluation of the success of the plan. A final draft of the HSRP will be released soon.

Richard Edwing, Director, Center for Operational Oceanographic Products and Services, provided the update, focusing on the impact of COVID-19 to CO-OPS work and visibility observations and forecasts. Provision of real time oceanographic data is considered a mission-essential activity, PORTS and NWLON (National Water Level Observing Network) are the primary systems for collecting and disseminating that information and NOAA has to keep those systems going throughout the pandemic. CO-OPS felt it was appropriate to defer any scheduled maintenance by its employees or contractors and only conduct emergency work on a case-by-case basis in order to keep critical sensors in operation. CO-OPS has been identifying and mitigating single points of failure for key functions through cross-training. With travel suspended until at least June 1, scheduled maintenance on ~50 NWLON stations will have been missed. The Columbia River Currents Survey, Kings Bay's PORTS installation, the IGLD (International Great Lakes Datum) GNSS (Global Navigation Satellite System) campaign, VDatum surveys in the Virgin Islands and Puerto Rico, Great Lakes, Southeast Atlantic and Gulf of Mexico are all delayed and at risk for FY20. NWLON station reconstruction projects in Ogdensburg, NY, and Dauphin Island, AL, are also at risk for FY20. Long-term effects may include the potential degradation of contract services if small businesses contracted for field operations go out of business.

CO-OPS is currently operating 14 visibility stations across the U.S. and Corpus Christi, TX, is in the process of adding seven new visibility sensors to their PORTS. The current sensor in use has some drawbacks, so CO-OPS released a proposal through the NOAA Small Business Innovation Research Grant and have since completed concept development. The new device, FogViewer, uses a low power, robust, easy to maintain, passive multi-spectral sensor suite and multi-modal processing workflow to estimate meteorological visibility from imagery. A two-year period of development is underway testing and integrating the sensor into CO-OPS systems. The Tampa Bay NWS Weather Forecast Office (WFO) has developed the capability to do visibility forecasts and have incorporated them into the Tampa Bay Operational Forecast System (OFS). NWS will be adding the Probability of Visibility forecast to its National Blended Model update in September 2020. The Northern Gulf of Mexico OFS update in Spring 2021will include a broader geographic scope to cover the entire Gulf coast as well as higher resolution nested grids up into seaports up the Mississippi River to Baton Rouge, which will allow for the Probability of Visibility to be incorporated.

Rear Admiral Shepard M. Smith, Director, Office of Coast Survey, provided the update. OCS staff is working remotely and routine field operations have been curtailed. Navigation Response Teams (NRTs) are in a ready state for emergency response but are not conducting routine operations. Awarding tasking orders to individual contractors continues to be a priority for the Operations Branch, with impacts and mitigative strategies to be discussed on a case-by-case basis during task order negotiations. Contractors are encouraged to monitor the pandemic situation and incorporate any COVID-19-related impacts into their proposals. Following award, the government will address any unanticipated impacts on a case-by-case basis through consultation with

the contractor and the contracting office. Charts are being released every Thursday as usual, but the amount of new source data has diminished somewhat. Shoreline and hydrographic surveys are still in the queue and they will be making routine chart updates. During this time, OCS has been able to focus considerable effort on their effort to rescheme charts.

Last fall, OCS announced the beginning of a five-year sunset of raster chart production, working with interagency partners on the impacts to regulation, training, and testing of mariners. OCS is increasingly focusing on digital charting with a provision for printing in order to meet the need for paper charts. They are working to incorporate more landside topography and feature names into their electronic navigational charts (ENCs), but advantages already evident include having true metric contours and more rigorous capturing of unsurveyed areas. RDML Smith presented the NOAA S-100 Services Timeline for the development, testing, and deployment of those services. The surface currents are already developed and they are waiting for the dissemination process to be mature. This will be an entirely cloud-based system coordinated internationally, as well as through value-added resellers. There has been a big push for S-102 bathymetry and now that that standard is set, OCS is developing the database and the services to provide high-resolution gridded bathymetry that will be suitable for navigation but will have many applications beyond as well.

HSRP Discussion, Part 1: Issue Papers, Working Groups, Matrix Presentation, Other

Julie Thomas, HSRP Co-Chair and Co-Chair, Planning and Engagement Working Group, led the discussion.

Gary Thompson, Chief, North Carolina Geodetic Survey, discussed the status of the issue paper entitled “High Demand for Automation and

Artificial Intelligence in NOAA Post-disaster Products and Services." The disaster recovery products NOAA provides are very valuable, but users spend a lot of time analyzing that information. AI could be used to do this in a more efficient manner which would lead to recovery efforts getting under way more rapidly and get resources where they are needed more quickly. The paper includes two recommendations: (1) NOAA NOS offices should invest in and undertake research and development in artificial intelligence related specifically to data collected in support of disaster response with the intent of creating on-demand actionable information/products for disaster response and recovery; and (2) NOAA NOS offices should review current disaster-related products and services and identify areas for improvement. In response to questions raised about funding for this work, Mr. Thompson said that there are funding sources, such as FEMA task orders, to provide this information. Utilizing AI to analyze imagery could alleviate using people and resources to do it manually. Co-Chair Thomas and Mr. Thompson will discuss this further offline and circulate another draft among the HSRP members for final review.

Additional member comments on the issue paper included: more specifics are needed because AI is a very broad area; perhaps include that the models should be self-learning; taking care to ensure the paper is not bogged down in the details of recommending solutions, but instead raise the issue and leave it to the specialists; specific lists of what is needed to reopen ports around the country may already exist and it would be worth reaching out to organizations that may have done this kind of study in their own areas; and including one or two images that demonstrate the kinds of things can be done with AI. HSRP members are able to send in any further comments in writing.

Co-Chair Thomas and Mr. Duffy will be working on the HSPR's Letter to the Administrator after the meeting. It will be distributed to members for review before it is submitted.

Seven Public Comments

Jon Dasler, Senior Vice President, Director of Marine Services, David Evans and Associates, said his organization applauds NOAA's outreach effort and the use of external data to analyze priority areas. While they also commend NOAA for the outreach efforts in support of contracting and agree with the increase to support in-house operations to meet the needs of the nation, they question why an additional contractor is needed when the contracting budget was reduced by $5.1 million from $32 million in FY20 Enacted, to $26.9 million FY21 Estimated. Many current contractors have capacity through subcontractors that is currently not being tapped. He asked if NOAA could explain the rationale behind the desire for an additional contractor when budgets are being cut and there is adequate capacity among the existing seven contractors. This in effect undermines the capacity and expertise of the existing pool of contractors.

Rada Khadjinova, General Manager – Alaska, Fugro USA, said NOAA hydrographic data have uses far beyond accurate knowledge of water depth. For instance, backscatter is valuable to characterize seafloor habitat and to make resource assessments (mineral, including critical minerals, hydrocarbon, biological etc.), among many other uses. She expressed her support for NOAA's co-collecting backscatter data along with bathymetry and encouraged them to continue to do this in the future.

Denis Hains asked if NOS ensures international linkages and how they are interfacing internationally to ensure smooth transition with Mexico and Canada, particularly for the Great Lakes.

Sean Murphy, Business Unit Manager, Subsurface Applications, Maritime Tactical Systems, said he was interested in creating a multiple boat USV solution for swarm bathymetry that is driven by AI. He has previously accomplished a swarm USV survey, monitoring and controlling all sensors and USVs, but believes the next step is for AI to adjust survey lines and automatically post-process the data collected. He asked who to contact to start the conversation about obtaining some of the bathymetric data from the cache mentioned during RDML Smith's presentation.

Colleen Roche asked on behalf of Captain Scott Ireland, Senior Pilot, Hudson River Pilots Association, if NOAA had any plans to install visibility sensors on the upper Hudson River, as fog is a big issue there during the spring and fall seasons.

Captain Scott Ireland, Senior Pilot, Hudson River Pilots Association, said, back in 2017, NOAA undertook a resurvey of the Hudson River. As the existing soundings are 100+ years old, pilots there are anxious to see the new surveys published. He asked when this might happen.

Edward Albada asked what the best mechanism is for private entities that have emergent remote sensing (satellite and hyperspectral imagery) derived bathymetry technology to get involved with NOAA's initiatives.

These comments and questions will be forwarded to the appropriate individuals in NOS for a response.

HSRP Discussion, Part 2: Working Group Updates

Ed Page, Chair, Arctic Working Group, discussed the working group's strategic plan. The situation in the Arctic is changing due to climate change issues, the price of oil, interest in offshore exploration, and other dynamic issues. The U.S. maritime activity in the Arctic has been stagnant over the last few years, with ~500 vessels through the Bering Strait each year. The list of needs identified in the existing strategic plan is still relevant regarding the use of technology and surveying and tools to aid safe navigation.

Lindsay Gee, Chair, Technology Working Group, provided an update on the working group's activities. The working group has not directly worked on any issue papers in the last six months, but they have had general input into the meetings and issues raised. Technology is the new infrastructure across all of the HSRP topics. Areas of interest that the working group would like to explore include the impact autonomous systems would have on operations and how industry is adopting some of these technologies. Addressing the issues related to workforce and the resources is also a topic of interest for the group. The Technology Working Group intends to take the lead on considering the OCMIA update. Now is also a good time to review the working group membership to see if new people are interested in coming on board.

Dave Maune, Co-Chair, Planning and Engagement Working Group, said that the HSRP will likely want to review strategies related to The Presidential Memorandum Sections 2 and 3. He will be looking for someone to assist him on an issue paper or other approach to addressing Section 3 and the working group will be looking for volunteers to address Section 2. The HSRP should look critically at the strategies being developed to see how they align with the current thinking and if they have specific recommendations for improvement.

Julie Thomas said IOCM was added to the priorities matrix and may be combined with others to create one larger mapping priority. The topics of relative sea level rise and incorporating authoritative sources into hydrographic products were tabled for this virtual meeting but will be taken up at the next in-person meeting. Co-Chair Thomas wanted to include an update of the priorities matrix with the Letter to the Administrator, so she encouraged members to submit any edits or comments they have once it is circulated.

Anuj Chopra highlighted the need for good management of restricted visibility sensors in precise navigation. The U.S. Gulf just ended a very tough season of fog and it had a huge economic impact. He requested that NOAA consider this so that ships can navigate safely in fog and commerce can continue. Co-Chair Thomas said that restricted visibility was one of the HSRP's recommendations from the last meeting and it may be good to include sensor management in the priorities matrix in order to track its progress.

Meeting Recap and Round Robin with HSRP Members, Actions, and Wrap-up

HSRP members provided final comments on the meeting, including: they were pleased to hear about progress on efficiencies across agencies, standardization protocols, and partnerships; volunteers will be needed to work on issue papers once Section 2 of the Presidential Memorandum is released and interested members should contact Dr. Maune or Co-Chair Thomas; there is a lack of clarity on whether COLREGS exist with respect to AUV/ASV and what they are (Sean Murphy from MARTAC offered to provide more information on this offline); members were pleased to hear about the advancements in technology at UNH; NOS needs to move toward increased use of technology and AI; the Technology Working Group is willing to take the lead on reviewing the Presidential Memorandum Section 2 strategy; members are interested to find out how VDatum and the NSRS has been progressing into the Pacific; members commended NOAA for continuing their work in these

difficult times and on their emphasis on employee health and well-being; Dr. Abdullah volunteered to join the Technology Working Group and would like to see them take up restricted visibility as one of their topics; members look forward to the HSRP developing the AI topic and particularly identifying associated research needs and opportunities; and members commending the HSRP staff for making the virtual meeting work successfully. RDML Smith said that the health of the HSRP is stronger than it has been in a long time and he is proud of the advances made during his time as DFO. Interagency coordination is hard but it is critical and underlies NOAA's credibility and the continued relevance of their programs.

Lynne Mersfelder-Lewis read the following statement from **Rear Admiral Tim Gallaudet, Ph.D., USN Ret., Assistant Secretary of Commerce for Oceans and Atmosphere and Deputy NOAA Administrator**:

Thank you all, both HSRP, NOAA employees, and partners for advancing our hydrographic capabilities and services over the years. That is what gave the White House confidence in getting the Presidential Memorandum signed and that is what is ensuring that NOAA and the U.S. government are applying ocean science and technology (S&T) to benefit the American people. It also delivered in a big way in our COVID-19 response, where OCS surged support to USNS Comfort's deployment to L.A. (and NYC) to establish a safe navigation exclusion zone.

We are grateful for your efforts during this meeting to review and recommend how we apply emerging S&T, and how we are implementing the Presidential Memorandum. For UxS, we are surging UxS this week and in May to mitigate the collection gap created by having our ships and aircraft halt their operations. This work is being enabled by our new UxS Program, the FY20 budget and appropriations growth for UxS. It will serve as a remarkable validation for our NOAA UxS Strategy, the Executive Order on AI, and the Commercial ENgagement through Ocean TEchnology (CENOTE) Act.

Lastly, I look forward to seeing you all in person again. I have thoroughly enjoyed our past meetings - Miami and Juneau were especially memorable and Nicole was right, you are one the funnest Federal Advisory Committees that we work with.

Next Meeting

The next HSRP meeting will be September 22-24, 2020, in Oahu, Hawaii.

The meeting was adjourned at 4:30 p.m.

HSRP VOTING MEMBERS IN ATTENDANCE:

Qassim Abdullah, Ph.D.	Chief Scientist and Senior Associate, Woolpert, Inc.
Capt. Anuj Chopra	Vice President – Americas, RightShip
Sean M. Duffy, Sr.	Executive Director, Big River Coalition
Nicole Elko, Ph.D.	Science Director, American Shore and Beach Preservation Association; Executive Director, South Carolina Beach Advocates; President, Elko Consulting
Lindsay Gee	Mapping and Science Coordinator, Ocean Exploration Trust
Deanne Hargrave	Senior Geomatics Operations Surveyor, Geo Operations Group, Shell International Exploration and Production
Edward J. Kelly, Ph.D.	Executive Director, Maritime Association of the Port of NY/NJ
Capt. Ann Kinner	Owner, Seabreeze Books and Charts; Chair, San Diego Harbor Safety Committee
David Maune, PhD	Associate Vice President and Senior Remote Sensing Project Manager, Dewberry Engineers, Inc.
Capt. Anne McIntyre	Business Director, San Francisco Bar Pilots
CAPT Ed Page (USCG, ret.)	Executive Director, Marine Exchange of Alaska
Edward J. Saade	Chair President USA, Fugro Inc. and Group

	Director Americas
Julie Thomas	Co-Chair, Senior Advisor, Southern California Coastal Observing System; Program Manager, Coastal Data Information Program, Scripps Institution of Oceanography (ret.)
Gary Thompson	Chief, North Carolina Geodetic Survey

<u>NOAA and NOS LEADERSHIP PRESENT:</u>

Neil Jacobs, Ph.D.	Assistant Secretary of Commerce for Environmental Observation and Prediction, performing the duties of Under Secretary of Commerce for Oceans and Atmosphere
RDML Tim Gallaudet, Ph.D., (Navy, ret.)	Assistant Secretary of Commerce for Oceans and Atmosphere and Deputy NOAA Administrator
Nicole LeBoeuf	Acting Assistant Administrator, National Ocean Service, NOAA
RDML Shepard M. Smith	Director, Office of Coast Survey, NOS, and HSRP Designated Federal Official
Capt. Andy Armstrong (NOAA, ret.)	Co-Director, UNH-NOAA Joint Hydrographic Center, University of New Hampshire
Juliana Blackwell	Director, National Geodetic Survey, NOAA
Richard Edwing	Director, Center for Operational Oceanographic Products & Services, NOAA
Larry Mayer, Ph.D.	Center for Coastal and Ocean Mapping and Co-Director, UNH-Joint Hydrographic Center, University of New Hampshire

NOS AND NOAA STAFF PRESENT via webinar:

Lynne Mersfelder-Lewis	HSRP Program Coordinator, OCS
Christine Burns	OCS, Lynker Tech
Virginia Dentler	CO-OPS
Amanda Phelps	OCS
Galen Scott	NGS
Jill Stoddard	OCS,

ATTENDEES via webinar:

Caitlin Adams	Joke Adebowale	Alison Agather
Hafez Ahmad	Serah Akojenu	Edward Albada
William Alford	Laura Allhoff	Justin Anderson
David Armstrong	Straud Armstrong	Mike Aslaksen
Joy Baker	Terri Baldwin	Megan Bartlett
Anthony Bastidas	John Bean	Laurie Bennett
Brent Bingaman	Glenn Boledovich	George Bosarge
Richard Bougerie	Mary Bourgoyne	Michael Brady
Lawson Brigham	Mark Brooks	Scott Brotemarkle
Daniel Brousseau	Samantha Bruce	Kelley Brumley
Bart Buesseler	Jill Burke	Michelle Burt
Amber Butler	Desiree Butler-James	John Byrd
Dana Caccamise	Hannah Cacner	Leslie Canavera
Kasey Cantwell	Edward Carlson	Wing Chan
Ashley Chappell	Ray Chartier	Shawn Choy
James Clarke	Nora Cohen	Chris Collins
Jonathan Conner	Brian Connon	Jose Cordero
Joe Courange	Wendi Couvillion French	Aryn Cowley
Jason Creech	Peter Croker	Megan Cromwell
Kristen Crossett	Robin Czerwinski	Karen Dacres
Nick Darley	Donald Darling	Jon Dasler
Michael Davidson	Ian Davies	Sam De Bow
Gabriela De Oliveira	Lauren Decker	Jim DelBene
Freedom Dennis	Julien Desrochers	Daniel Determan
Andy Dippolito	Christopher DiVeglio	Erin Donahue
Yvonne Donis	Jeff Donze	Jeffrey Douglas

Rob Downs	Darla Duet	Clint Edrington
Bill Embach	Hollis Europe	Ben Evans
Rod Evans	William Evensen	Tom Ewing
Sarah Fakhari	Jeffrey Ferguson	Nicole Fernandes
Erin Ferrara	Jason Ferron	Ben Fisher
Katherin Fitzenreiter	Joanne Flanders	Hillary Fort
Chris Freeman	Grant Froelich	Gregory Gahlinger
Jacob Garcia	John Gerhard	Heather Gilbert
Kim Bernadette Goode	Kyle Goodrich	Grace Gray
Megan Greenaway	Brent Greenfield	Stuart Griffin
Mark Gundersen	Denis Hains	Bill Hanson
Warren Hausman	James Haussener	Dwayne Hemmer
Jack Herbert	Lucy Hick	Haley Hollis
Amanda Holt	Tricia Hooper	Nathan Hopper
Victoria Houston	Janet Hsiao	Irvin Huang
Clifford Jordan	Brad Kearse	John Kelley
Jonathan Kemmerley	Jo Kemper	Richard Kennedy
Rada Khadjinova	John Kidd	Corlyn Keift
Tim Killeen	Kris Kirby	James Kirkpatrick
Brittaney Koehler	Marta Kumle	Beth Lenz
Michelle Levano	Lou Licate	Jeff Lillycrop
John Lindberg	Nathan Littlejohn	Meme Lobecker
Carol Lockhart	Robert Loesch	Jay Lomnicky
Anita Lopez	Andrew Lovo	John Lowell
Steven Loy	Mark MacDonald	Ross Mackay
Chris Macon	Akim Mahmud	Sladjana Maksimovic
Matthew Malphurs	Damian Manda	Richard Mannix
Dickie Martin	Hamza Mazih	Adam McCullough
Sean McGurgan	Chris McKinnon	Laura Rear McLaughlin
Rachel Medley	James Meeks	Todd Metzler
Mike Michalski	Jackie Miech	David Millar
Kevin Miller	Joyce Miller	Crescent Moegling
Rick Morton	Bob Moshiri	Sean Murphy
Nate Murry	Ed Myers	Amr Nabil
Widia Nanta	Noah Nardone	Dominic Ndeh

P. Medoune Ndir	Robert Nehorayoff	Richard Newhouse
Thomas Newman	Felix Neinstadt	Guy Noll
Mark Nueslein	John Nyberg	William Nye
Olalekan Odunaike	Andrew Orthmann	Edward Owens
Trent Palmer	Diane Pancoskaq	David Parker
Endicott Parks	Chris Paternostro	James Paterson
Michael Paulucci	Miya Pavlock	Meredith Payne
Scott Perkins	Leigha Peterson	Sarah Phillips
Chris Pickens	J.J. Plunkett	Julia Powell
Jacquelyn Putnam	Steve Quan	Steve Raber
Caitlyn Raines	Aneemieke Raymond	Benjamin Richards
Jose Rivera	Starla Robinson	Colleen Roche
Jim Rogers	Randy Rosenfeld	Martin Rosengreen
Audrey Rubel	Mark Safran	Kaori Saito
Yahaira Sanchez	Rick Schwabacher	Galen Scott
Brian Shaw	Chelsea Sheehy	H. Shiels
Noriko Shoji	Gabrielle Sinnott	Christopher Sisson
DanaAnn Sisson	Joshua Small	Mark Smits
Patrick Snyder	Kristen Spinelli	Leslie Cannon, Sr.
Heather Stafford	Jay Sterne	Helen Stewart
Colin Stewart	Peter Stone	Lucas Stotts
Kelly Stroker	Quentin Stubbs	Simon Swart
Michael Swedberg	Charlene Sylvester	William Szeles
John Tamplin	Tarice Taylor	Jim Taylor
Brian Teteault	Edward Van Den Ameele	Jan van Smirren
Steve Vogel	Jennifer Walden	Dylan Walker
Collin Walker	Stewart Walker	Eric Wallner
Gerard Walter	Catherine Wardell	Nathan Wardwell
Mike Wernau	Dick West	Marian Westley
Neil Weston	Jeremy Wetzel	Dave White
Tim Wilkinson	LaTonya Wilson	Matt Wilson
Charles Wisotzkey	Douglas Wood	Jennifer Wozencraft
Darren Wright	Daniel Wright	Neil Zerbe
Mike Zieserl	Mohd Massuoadi bin Mohd Zukri	