

Meeting Summary
Hydrographic Services Review Panel
April 4-5, 2018
Miami, FL

Wednesday, April 4, 2018

On the call of the Designated Federal Official (DFO), Rear Admiral Shepard M. Smith, NOAA, the Hydrographic Services Review Panel (HSRP) meeting was convened on April 4-5, 2018, at the Atton Brickell Hotel, 1500 SW 1st Ave., Miami, FL. 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/ocs/hsrp/meetings.htm>

Copies can be requested by writing to the Director, Office of Coast Survey (OCS), 1315 East West Highway, SSMC3, N/CS, Silver Spring, Maryland 20910.

Welcome, Introductions, Goals, and Deliverables

Joyce Miller, HSRP Chair

The meeting was called to order at 8:39 a.m. Chair Miller welcomed the attendees and discussed the Panel's visit the day before to the PORTS dedication at PortMiami. She provided an overview of the day's agenda and expressed the Panel's pleasure at having a representative from Congressman Mario Diaz-Balart's office. New HSRP members Ed Page, Julie Thomas, and Sean Duffy were sworn in the previous day by Dr. Callender. Chair Miller reviewed the agenda and goals for the meeting. RDML Shep Smith provided further details for the meeting and introduced NOAA staff members that were attending as subject matter experts. Chair Miller provided a brief overview of what the Panel heard the previous day on their site visit to PortMiami. The port has seen significant growth and will continue to grow in the years to come with its extensive expansion plans. Tropical weather is the port's main threat. Rapid port openings following disasters are critical to the cruise ship industry. The port area needs immediate access to survey capabilities following closures due to storms. Possible solutions include NOAA's Navigation Response Teams (NRTs) and equipping pilot boats with sensors. Pilots could use additional weather sensors in certain areas. Panel members introduced themselves and shared their thoughts on the site visit.

W. Russell Callender, Assistant Administrator, National Ocean Service

Dr. Callender provided an update on National Ocean Service (NOS) activities. The issues the HSRP will be hearing about at this meeting relating to post-event response and coastal community risk reduction and resilience are not only timely, but highly relevant to southern Florida. Dr. Callender congratulated the new HSRP members on their appointments and thanked CAPT Sal Rassello on behalf of Acting Administrator Tim Gallaudet for arranging the tour of the Carnival Cruise Lines terminal. The new PORTS installation at PortMiami is a perfect example of informational infrastructure that is critical for safe and efficient maritime navigation. PortMiami's challenges provide a great opportunity for the HSRP to put their expertise towards advancing NOAA's navigation programs.

Dr. Callender acknowledged the Panel's continued effort on their issue papers, particularly the timely updates on the paper addressing NOAA's hydrographic services fleet. NOAA's fleet has already shrunk from 19 to 16 ships, and another 8 ships are due to be retired in the coming 10 years. NOS is encouraged

that Congress is appropriating funding to acquire new ships. Dr. Callender provided a brief overview of some of the new political appointees at NOAA. He has been working to build a relationship with this new team and they have been very receptive. RDML Gallaudet is very supportive of navigation writ large and of the purview of the HSRP. Precision navigation, in particular, is an area where this Panel's advice would be valuable to the Administration. The new political team is looking for returns on investment and connections to the private sector.

In February, Congress and the White House reached a two-year budget deal. Part of that deal includes an agreement on hurricane supplemental funding. For NOAA, some of these funds will be applied to repairing facilities, observational sensors, and other infrastructure. The budget provided \$40 million for mapping, charting, and geodesy programs to conduct surveys and update products for the areas impacted by last year's storms. The President's FY18 request for NOS was \$376 million; Congress' appropriation added an additional \$185 million. The FY19 request will be consistent with the FY18 request. The FY18 enacted funding for the Navigation, Observations, and Positioning line item is \$219 million, about \$13 million more than FY17. There are increases to the contract surveys line, increases for regional partners in the IOOS program, and funding for geospatial modeling grants. The Coastal Zone Managements Grants line includes \$50 million for resilience-related activities and NOS is working with Fish and Wildlife Service and National Marine Fisheries Service to sort out how they will administer those funds. The budget includes about \$20 million to address deferred maintenance on the NOAA fleet and about \$75 million for fleet recapitalization.

RDML Gallaudet has made clear his commitment to the blue economy. The blue economy, as defined by the World Bank, is "a sustainable use of ocean resources for economic growth, improving livelihoods and jobs, and ocean ecosystem health." The Acting Administrator's key priorities include: enhancing maritime commerce; fisheries and aquaculture; recreation and tourism; and deep ocean mapping (Seabed 2030). Missing from this list is a focus on enhancing preparedness and risk reduction. HSRP could be valuable in helping to identify and quantify the value of what NOAA's hydrographic services offer and explore opportunities for innovative partnerships. Dr. Callender discussed some of his recent outreach efforts. One example of the increased awareness of the value of hydrographic services was Secretary of Commerce Wilbur Ross discussing precision navigation at length and referring to it as "transformational infrastructure." With larger ships navigating already constrained ports and the increasing threat of coastal storms and disasters, there is clearly a need for foundational, authoritative, and accurate hydrographic and positioning data and services. Emerging technologies as well as partnerships with industry and academia will be the key to success.

Richard Edwing, Director, Center for Operational Oceanographic Products and Services

Mr. Edwing provided a status update of the PORTS program and its growth over 27 years. The program's growth has dramatically accelerated in the last 5-8 years, though the reasons why are unclear. The PortMiami system is the 31st PORTS, with Port Everglades and Corpus Christi soon to come online. By some measures, Corpus Christi is the last top ten U.S. seaport to get PORTS installed. PORTS is now covering 85% of the tonnage that passes through U.S. seaports and 95% of the value. The system now offers every observation parameter that the community has identified as being important; the last feature added was a visibility sensor. CO-OPS is continuing to improve and infuse new technology into the system including electronic Aids to Navigation (eAtoNs). NOAA's Chief Economist Eric Wolfe has studied what the economic benefits of a national system would be and has developed a strategic approach to identifying ports that would most benefit in terms of accident reduction. PORTS funding models have evolved and vary by port. CO-OPS has tried to be as flexible as possible in order to keep the program going. The program's success has led to capacity challenges for maintaining it within CO-OPS.

Rear Admiral Shepard Smith, Director, Office of Coast Survey

RDML Smith provided a recap of the latter half of the hurricane season as experienced within NOAA. Some of the survey response challenges encountered included not always knowing ahead of time how much of the U.S. Army Corps of Engineers' (USACE) resources were taken out by the storm or what type of response they will be able to provide. There was little consistency between the Captains of the Port about what types of surveys were required. CAPT James Crocker is putting together brief descriptions of survey types to improve decision making following future storms. The MIST (Mobile Integrated Survey Team) kits proved to be a great way to get equipment and expertise on-site quickly and a second MIST kit will be available next year. Object detection surveys of impacted ports revealed large amounts of debris and hazards that single beam surveys had not detected. NOAA ship *Thomas Jefferson* was able to get to Puerto Rico very quickly after the storm and open one port after another around the island and the U.S. Virgin Islands.

The Miami Boat Show 2018 was a great opportunity for NOAA to reach out to recreational boaters. Most of the boaters that interacted with NOAA had 30-60 ft boats and use electronic chart plotters as their primary means of navigation with an outdated chart booklet onboard as a backup. Boaters in southern Florida often complain about the poor quality of the charts of the Bahamas; NOAA has opened discussions with the UK Hydrographic Office and BoatUS to see if there is anything NOAA can do to improve these charts. Power users of NOAA products and services are increasingly buying electronic charting systems that have the ability to update charts automatically or frequently. NOAA was also able to demonstrate their hydrodynamic models and got some providers very excited about the possibilities for integration into their own navigation products.

RDML Smith provided an overview of Safety of Life at Sea (SOLAS), Section 5, Regulation 9. SOLAS is an international maritime treaty which sets minimum safety standard in the construction, equipment, and operation of merchant ships. Regulation 9 addresses hydrographic services requirements and was last updated in 1979. If the U.S. does not have surveys adequate to the requirements of safe navigation, they are not upholding their obligation under this treaty. This is a fundamental point of departure for discussions on collaboration with USACE and the Navy. SOLAS also includes an obligation for navigation products to be uniform in order to be internationally compatible. Hydrographic and nautical information is to be made available on a worldwide scale as timely, reliably, and unambiguously as possible. Distribution systems are currently in place for ENC's. As NOAA develops new services that utilize IHO formats and are more dynamic in nature, fulfilling the worldwide dissemination obligations needs to be kept in mind.

Navigation Services Support and Federal Emergency Response: Lessons Learned and Future Directions

Mike Aslaksen, Chief, Remote Sensing Division, National Geodetic Survey, NOS, moderated the panel presentations and discussion focusing on the navigation services support that is available from the NOS, such as remote sensing, storm surge forecasts, Storm Quick Views, regionalized Navigation Response Teams (NRTs), and the role of Navigation Managers. It looked at broader topics and lessons learned from Federal emergency response including the 2017 hurricane season impacts from Irma and Maria to Florida and the U.S. Caribbean as well as future directions for collaboration. Over a period of 26 days, three Category 4 U.S. landfalls occurred (Harvey, Irma, and Maria); the previous three occurred over a span of 56 years. In terms of accumulated cyclone energy, 2017 was the most active hurricane season in 167 years. Hurricane Harvey set a U.S. tropical rainfall record of 60.58" in Texas. U.S. damages from the storms reached \$265 billion, surpassing the 2005 record.

Dr. Callender provided an overview of the NOS tools for navigation-related emergency response. NOAA's role begins with planning and relationship building and continues through recovery. Prior to landfall, NOAA was embedded early on in the FEMA National Response Coordination Center to provide a link between FEMA and the NOAA response operation. As the storms approached, NOAA's regional

Navigation Managers were embedded at U.S. Coast Guard (USCG) Incident Command Centers to coordinate post-storm surveys. Scientific Support Coordinators were also embedded to assist with hazardous material response efforts. Through mission assignments, FEMA requested emergency response imagery from NOS for damage assessment and response priorities. In the days leading up to the storms, CO-OPS monitors and disseminates near-real time observations on water levels, current, and weather information through Quicklook. These allow the Weather Service to validate and adjust their forecasts and observed conditions are essential to emergency responders making critical decisions. Immediately following the hurricanes, pre-positioned NRTs provided emergency hydrographic services to impacted port areas. Throughout the storms, the NRTs opened up 26 ports across the region. The loss of trade at these ports is conservatively estimated to cost about \$500 million a day. As soon as weather permits, aerial surveys were conducted over areas impacted by the storms. The collected data is rapidly processed and provided to emergency responders, often within hours of collection. In over a month of operations, the survey team (primarily on the King Air platform) flew about 40,000 miles collecting more than 65,000 images. Although NOAA has many trained responders, the response effort really pushed their capabilities. In some circumstances, they were very close to having single points of failure. NOAA found that response operations that work for the Continental U.S. do not always work for islands. NOAA's planning and preparedness prior to the storms was invaluable.

Captain LaDonn Allen, Prevention Chief, Marine Transportation System Recovery Unit, U.S. Coast Guard, District 7 discussed marine transportation system recovery from Hurricanes Irma and Maria. Every deep water port within District 7's area of responsibility was closed during Hurricane Irma, the majority of these were opened 3-5 days following the storm. The Maritime Transportation System Recovery Unit (MTSRU) consisted of USCG, NOAA, USACE, Navy, state, local, and industry resources. Predetermined shelter and evacuation areas were essential to protect resources. CAPT Allen discussed the various considerations in determining port prioritization, including fuel, commodities, humanitarian aid, product supply, and hazardous materials. For two weeks following Hurricane Maria, Sector Miami screened all of the incoming ships for Sector San Juan due to the loss of communications on the island. As soon as ports were opened, Marine Safety Information Bulletins (MSIBs) were put out by the Captain of the Port on USCG's Homeport website. For Maria, MTSRU port survey resources and Aids to Navigation resources were extremely challenging. Priorities were determined by necessity and impact of port opening versus survey resources available. Daily interactions with NOAA and USACE were invaluable but it would have been better to have a representative from each agency physically present at the MTSRU. USCG was not receiving advanced notice of arrivals from DoD or FEMA which caused difficulty for berthing spaces, vessel queues, and exams for first-time callers. For Maria, special authorizations were given to passenger vessels to moor as temporary berthing vessels. eAtoN was successful in Florida but adequate reception was not available in Puerto Rico and the Virgin Islands. In addition to eAtoNs, bridge vertical clearance updates, chart nodes, changes in mean tidal range, and current direction were used significantly. Operational planners used NOAA's weather, tide, and current predictions. Aerial data was used for port assessments. The use of the MISTs, NRTs, and the NOAA ship *Thomas Jefferson* was extremely valuable. The D7 Waterways Team has worked with industry to great success on installing smart weather stations on buoys and AtoNs; CAPT Allen recommended that NOAA work with USCG to install similar instruments on the entrance buoys at major ports. It is also possible to integrate weather information into some of the AtoNs that already have AIS transponders installed. She further recommended strengthening partnerships with ports by developing an annual plan. Kyle Ward was commended for his incredible efforts during the storms.

Captain Sam Stephenson, J.D., President, Florida Harbor Pilots Association, discussed the role of the pilots associations in disaster recovery. PortMiami has a \$40 billion economy and supports a huge tourism industry in southern Florida. Thousands of jobs are at stake every time a ship transits its channel. Florida's channels are single point failures and if surveys are incorrect or if mechanical issues occur on the ship causing loss of propulsion, the channel is blocked. Removing a large ship from the channel can

take up to three years. With larger ships, the margin of error is far narrower than it has been historically. PortMiami has found that it needs more water for squat and this lesson is being applied to the dredging project underway at Port Everglades. South Florida ports are unique due to the Gulf Stream current that courses by them which can bring six knots of current. In order to get through these currents, ships have to travel fast but the faster they go, the deeper they sit in the water. During the hurricanes, CAPT Stephenson provided two updates a day on the status of Florida's ports. These were used by several state and Federal partners. Florida's governor was unhappy with the speed at which ports were being opened. CAPT Stephenson suggested putting survey equipment on pilot boats which can go out in any sea condition. Pilots are happy to use their boats as a platform but do not want to be responsible for maintaining equipment or acting as equipment technicians. Some of Florida's pilots are getting certified through FEMA's Incident Command System courses. Pilots are also working with the Florida Emergency Management Center on contingency plans for a blocked channel. The main concerns are how to get fuel flowing into the state and how to mitigate consequences to the cruise industry.

Christopher Vaughan, Geospatial Information Officer, Federal Emergency Management Agency, discussed the role of technology and data in disaster management. His use of NOAA products is primarily through aerial imagery for damage assessments. About 85% of FEMA was deployed and \$6.5 billion from the Disaster Relief Fund was obligated to the recovery effort. Mr. Vaughan discussed how FEMA thinks of the lifecycle of an event, beginning with preparation and going through initial response, short-term recovery, and long-term recovery. Using NOAA's aerial imagery, FEMA's geospatial analysis unit provides support for each of these steps through grants and expediting debris removal. For Hurricane Harvey alone, FEMA was able to provide about 155,000 house by house damage assessments within the first two days following landfall. Having that number drives many operations including understanding how many resources are needed. They used stream gauge information (forecasted and observed) intersected with remote sensing data (satellite and aerial from NOAA) and applied that in various modeling methodologies to identify impacts to structures. In Puerto Rico, the lack of power and communications meant the standard ways of reading this information in real time was hindered, and they had to default to other capabilities, principally imagery. FEMA issued NOAA mission assignments and they have a good relationship with NGS' Remote Sensing Division. Port and airport status updates from NOAA were critical. Imagery was used to find out which roads were open in order to get resources to people who needed them. FEMA launched a crowdsourcing operation during Irma, which consisted of over 5,000 volunteers combing through imagery helping to determine impacts to roads and hospitals. Having aerial imagery early drove operations and reduced chaos.

Terry Thornton, Senior Vice President, Port Operations, Guest Care and International Carnival, Carnival Cruise Line, discussed post-Hurricane Maria recovery and working with FEMA. Carnival had ships homeported in every area that got hit by the storms. 19 of the 25 ships in their fleet were impacted. Every decision the cruise industry makes is based on the safety of their guests, crew, and ships. The cruise industry also has enormous flow-through financial implications to the communities they visit. Carnival drills internally for hurricanes all the time. Critical factors in delicate situations are fuel, provisions, and fresh water. Itinerary decisions are based on two guiding principles: make the decision as late as possible and minimize changes to the guests' itinerary to the greatest extent possible. The cruise industry maintains very close working relationships with USCG, local pilot's associations, vendors and suppliers, and local communities. Communication and coordination is very challenging. Communication with guests is also very important as to what's happening. The best tool for relaying information about ship status and upcoming voyages is the company's website, which is constantly updated. The industry would like to be a partner in coordinating the reopening of ports and would like to see a much more organized preplanning effort as storms approach. They would like to see a more organized process from all stakeholders that would allow safe navigation into ports under reduced visibility in good weather conditions. The industry would also like to see better communication protocols with local municipalities and full simulations once a year with all stakeholders to help iron out kinks in the system. For private

companies that don't often contract with government entities, Mr. Thornton would like to see a contracting process put in place before it is needed, to allow the private industry to assist as quickly as possible. Carnival also has some capability for transporting supplies and could be a partner in a broader sense than they currently are.

Steve Detwiler, FPED, Emergency Management Planner (Recovery & Public-Private Partnerships), Miami-Dade Fire Rescue Department, Florida, discussed PortMiami and the emergency management program. He provided an overview of the Emergency Operations Center (EOC) which coordinates with all of the industrial stakeholders in the area. The infrastructure branch addresses issues related to power, water and wastewater plants, and opening roadways and clearing debris. They conduct at least two exercises each year. The Drawbridge Operations Plan was created in collaboration with many partners due to the large number of drawbridges in Miami-Dade County that directly impact evacuations. Mr. Detwiler discussed the details of the plan for getting boats out of the Miami River and Intracoastal Waterway (ICW) in a timely manner. Hurricane Irma was not as bad for Miami as it could have been. PortMiami went to Port Condition ZULU on September 8 and were completely reopened by September 13. This quick turnaround was only possible because of the seamless partnership between the Captain of the Port, USCG Miami District, NOAA, and USACE. Mr. Detwiler briefly discussed Miami-Dade's Resilient305 initiative that will be further discussed later in the meeting.

Brian Brodehl, Chief, Surveying and Mapping Branch, U.S. Army Corps of Engineers Jacksonville District, discussed the Surveying and Mapping Branch's work performing Federal navigation surveys of authorized harbors. USACE provides NOAA with survey data that can be used in charting operations, pushing the data out through the eHydro tool. They participate in storm planning with NOAA, as well. Most of the time, the boats and equipment USACE has are sufficient for their work. Post-storm response is another issue and as many partners as possible are needed to reopen ports. After Irma, USACE could not have been successful without the support of NOAA, contractors, and pilots' surveying efforts. Over 20 survey requests came in all at once following the storm, which is equivalent to about a year's worth of work for the district. Mr. Brodehl has one employee that is solely assigned to support USCG operations and to coordinate with NOAA throughout the year. Communication was excellent during the operations. USCG personnel were present on USACE survey boats and can make assessments and contact the Captain of the Port to get ports opened quickly. This is a major improvement over the old process which could take days. NOAA coordination went very well throughout all phases of preparation and response. The dedication of the workforce was an outstanding demonstration of self-sacrifice to support the impacted areas. There were situations where there was potential for things to go wrong and USACE will be reviewing those and how to avoid risks in the future. Managing expectations and staying on-script would be areas for improvement, along with having fewer people making decisions. With the hurricane supplemental, significant amounts of funding will be available for USACE to acquire new equipment and boats that will better support storm response.

HSRP Q&A

Mr. Aslaksen asked each panelist to propose one thing NOAA could do better. Panelists' responses included: more NRTs and MISTs, as well as more all-encompassing ships; eliminating single points of failure for services; looking for ways to involve the private sector with specialized training and partnerships to augment the Federal assets; and more exercises on worst case scenarios with state, local, and Federal stakeholders.

Member Rassello asked who the private sector's point of contact would be for trying to find out the condition of the ports and when they will be opened. CAPT Stephenson said his reports are purely factual and do not predict when openings are anticipated. CAPT Allen said that as soon as ports are opened an MSIB goes out and is available on the publicly accessible Homeport website.

Vice Chair Saade asked if operations are back to normal. From the pilot's perspective, the ports are back to normal. Cruise lines are also back to normal; the only lingering issue is the perception people have about the state of the islands. The Miami-Dade EOC is still dealing with issues related to reimbursement and providing assistance to Puerto Rican evacuees. USACE is still supporting post-Maria work in Puerto Rico.

Public Comment

There were no public comments.

HSRP Updates from the Tri-Office Directors and University of New Hampshire, Center for Coastal Ocean Mapping and NOAA Joint Hydrographic Center

Juliana Blackwell, Director, National Geodetic Survey, provided the update focusing on their plan to develop Foundation Reference Stations as part of the modernization of the National Spatial Reference System (NSRS). This is part of NGS' current ten-year plan and will be part of the revised plan that is underway. While passive controls will still be important, Continuously Operating Reference Stations (CORS) will serve as the foundation of the 2022 Reference Frame. The CORS network is a partnership of more than 200 organizations that own approximately 2,000 CORS. NGS receives information from each of these stations on an hourly basis, manages the data, and makes it available to the public. Part of NGS' role is to make connections to the International Terrestrial Reference System (ITRF), which will continue to be the worldwide standard reference system. NGS will continue to support the ITRF through International GNSS Service reference sites. Currently, NGS owns too few CORS stations and they are not spaced adequately to make this framework viable. NGS plans to continue working with international partners on the four tectonic plates that NGS supports, developing frameworks for each independently that can be used by all. The new Foundation CORS sites need to be collocated in areas with preexisting infrastructure with other geodetic techniques. Other sites with space-based technology have been identified where NGS would like to establish Foundation CORS sites that NGS either owns or works with other Federal agencies through interagency agreements to ensure they are long-lasting, high-quality stations equipped with GNSS. A minimum of three Foundation CORS are needed per tectonic plate.

In order to achieve the Foundation CORS network, significant effort is needed to build new stations or to improve the existing sites. 28 existing CORS have been identified that can be converted and adopted into the Foundation CORS network; seven existing CORS have been identified that can be upgraded to GNSS. The final phase of project implementation will be the construction of eight new Foundation CORS sites in order to fill out the rest of the network. It is a manageable project but it needs to get underway promptly in order to meet the 2022 requirements for the modernization effort. The socioeconomic benefits of having a CORS network that NGS has more ownership and control of is estimated as having a net present value of \$18.5 billion at a 15% growth rate. The CORS system supports 35 NOAA products and services within two mission goals and six Mission Service Areas.

Richard Edwing, Director, Center for Operational Oceanographic Products and Services, provided the update. The National Water Level Observation Network (NWLON) supports many applications, but its primary function is to establish the reference system of tidal datums and the International Great Lakes Datum (IGLD). NWLON is a more challenging observing system than others because it is two sets of observations – water level monitoring and periodic geodetic observations to document the stability of the system. NWLON stations are linked to the NSRS allowing users to compare datums and stations against each other. NWLON stations determine local sea level rise, which integrates land motion, global sea level change, and other oceanographic dynamics. Mr. Edwing further discussed the operations at the station level and the network level. In 2016, CO-OPS began looking at how they could leverage advancements in GPS and GNSS to modernize how they operate, including monitoring the stability of the sensors, ensuring every benchmark is connected to the NSRS, and better determining land motion at the stations.

CO-OPS has been working on hardware and data management solutions. They have established two long-term test platforms and have been doing field work through collaboration with Old Dominion University. CO-OPS will be looking at possible next-generation water level gauges and is seeking new partners interested in better leveraging GNSS.

Rear Admiral Shepard M. Smith, Director, Office of Coast Survey, provided the update. The draft National Charting Plan received 280 comments and the final version was published in November of 2017. The implementation plan is now under development, particularly focused on coming up with the end-state chart scheme. OCS is prototyping some additional tools to serve the residual paper requirements. With the database now fully populated, OCS has the opportunity to make raster charts directly from the database. NOAA's Custom Chart tool is now available on the NOAA website, which allows users to design their own chart and create a printable geoPDF. At this point, these charts are not for navigation and some constraints are probably needed. For the National Bathymetric Source Database, OCS has started collecting all of the bathy that has been validated and compiling it into one accessible place. This database will be built out over the coming years and serve as the foundation for the bathy component of the rescheming effort.

External source data continues to be a priority. Last year, OCS set a goal for 30% of surveys that are incorporated into the chart to be surveys NOAA did not pay for. A project is underway now to convert two existing survey launches to optionally-manned. NOAA can advance the state of the art of unmanned systems using their existing platforms. NOAA's university partners are continuing to advance the state of the art of ASVs. NOAA contractors are also using unmanned systems more and more each year, which is helping to move the industry forward. The CENOTE bill introduced to Congress would change the governance structure for unmanned maritime systems in NOAA and could be a disrupter for progress being made on the hydrographic program. OCS is starting to move away from channel tabulations, shifting efforts to publishing condition surveys in a more effective way through ENC's, overlays, and other means.

Seabed 2030 is an international effort to get the ocean mapped by 2030. As part of NOAA's effort to understand what they need to do for U.S. waters, OCS, NCEI, and UNH did a gap analysis looking at what data is currently available. They included all soundings dating back to 1960, broke the chart of U.S. waters into 100 meter bins, and found that 41% of the bins had at least one sounding. Multibeam or continuous coverage is closer to 30%. The coverage map is proving useful in getting others to submit their existing data to a national archive.

HSRP Q&A

Member Thompson asked if there would be any flexibility with NGS' 70 km spacing rule. Ms. Blackwell said nothing has changed with that requirement. NGS is looking to get a refresh of the program along with a CORS Program Manager and this issue will be taken into consideration at that point.

Jim Rice, NOS, asked for clarification and further detail on the growth rate of the CORS network. Ms. Blackwell said that CORS products/services and associated usage have grown at a 22% rate since 2003. The number of people using the network for positioning, control for their projects, and processing other GPS data has continued to grow. The network itself continues to take in new stations, though some get decommissioned because their hosting organization is not supporting them any longer. Ms. Blackwell confirmed that the eight new stations will be solely constructed by NGS.

Member Atkinson said that coastal communities are very concerned about subsidence rates around pumping stations. He asked if InSAR reflectors will be installed at each of the CORS sites. Ms. Blackwell said that having InSAR reflectors is not currently in the plan.

Member Thomas asked if the tide gauges were set at a one second sampling rate. Mr. Edwing said all the water level station sensors sample at one second, but take an average over six minutes for CO-OPS' purposes. For the Indian Ocean tsunami, they were able to break it up into one minute averages for a higher resolution view of the water levels. The stations themselves are collecting 15 second data that is used for research after an event.

Member McIntyre thanked RDML Smith for the SOLAS slide from the morning's presentation. This is a good example of the complexities of meeting industry's requests to gather data from different agencies and reconcile it. RDML Smith said that an evaluation of which countries provide the best navigation services against the navigation risk ranked China first, though the U.S. performed well. The checklist of what they were looking at is illustrative of the types of things that can help to guide a national program on how to provide better services.

Vice Chair Saade said that Fugro had a UKHO contract to survey several islands and were told specifically that they encourage people to come to them and tell them where they need mapping. RDML Smith noted that, by law, OCS is not allowed to chart non-U.S. waters. While data is available, the UKHO has not seen a requirement based on their customers to make larger scale charts for the smaller islands of the Bahamas. Vice Chair Saade said their new policy seems to be working to get mapping done, whether or not it gets on the chart.

Mr. Armstrong asked for more elaboration on where the savings are on removing information from the tabulations. RDML Smith said there is a certain amount of overhead just in doing the Notice to Mariners as opposed to a more automatable system, but really the goal is to make the product better by providing more detail.

Member Gee asked what the plan is for addressing discrepancies in the charts; if this would be done through regular contract surveys or in specific areas, perhaps with autonomous vessels. RDML Smith said they would parcel them out through various mechanisms, including external source data, the sum of which would meet the survey requirement for the program. NRTs are well-suited to this type of small job. Member Gee said he is starting to see more small companies with autonomous vessels around that could supplement for smaller projects.

Fleet Recapitalization

RDML Nancy Hann, Deputy Director for Operations, NOAA Office of Marine and Aviation Operations

RDML Hann provided an update on the Fleet Recapitalization Plan publicly released in October of 2016. The time frame of the plan is 2016-2028, which was chosen because this is when half of the NOAA ships are set to be decommissioned. Half of NOAA's ships were inherited from other services, so they have not had a complete fleet that was designed specifically for NOAA's mission, which has been a limiting factor. The plan looked at agency-wide requirements, prioritized them, and determined what was needed to sustain these requirements and mission areas for the long term. The plan is available for review on OMAO's website. The American Bureau of Shipbuilding conducted end of service life assessments on all of the ships and NOAA is now doing additional analysis. As part of the plan, a stable funding profile was needed. \$75 million was appropriated in FY16 and '17 and was included in the FY18 omnibus bill. OMAO is working to maintain that level of funding each year. They are working with the Navy to build the first vessel, which will be an AGOR derivative. Through an assisted acquisition, the Navy Acquisition Office is helping design using OMAO's in-house Platform Acquisition Division. The appropriations have allowed this office to grow and gain economies of scale and holistic fleet advantages. OMAO released an RFI to query industry on what other capabilities are available. The FY18 omnibus bill includes a \$23

million increase for ship maintenance. RDML Hann is very cognizant of the need to maintain continuity in programmatic ship support.

RDML Hann further discussed aircraft. The previous hurricane season made it very apparent that NOAA's products and services have an important role to play for the nation. The value of the data was incredible for a host of operations and the setting of priorities. NOAA had one King Air platform to do the work and one G4, the only high-altitude jet to inform those forecasts. The G4 is aging and is operating at about 75% reliability. The Weather Act mandates that NOAA have back-up redundancy capability for their hurricane hunters. NOAA has two lower altitude P3s which have been undergoing major overhauls. During the hurricane season there was a lot of media and congressional attention around getting redundancy for the King Air and G4. \$133 million were appropriated in the FY18 omnibus, and \$12 million is to get a new King Air which will replace the current Turbo Commander; the rest of the funding is for a G4 replacement to perform hurricane and offseason work.

Chair Miller asked for an update on the status of NOAA ships *Rainier* and *Fairweather*. RDML Hann said they both had assessments and further in-house analysis is underway. OMAO is very aware of their age (50 years) and the attention they need. She was unable to give exact dates on when the ships will be replaced, but OMAO is currently doing requirements analysis and preliminary acquisition work.

HSRP Working Group Discussion, Issue Paper Discussion, and other Topics

HSRP Planning and Engagement Working Group

Dr. Dave Maune and Kim Hall, Working Group Co-Chairs, led the discussion and revision of the *NOAA Hydrographic Survey Fleet: A Critical National Asset* issue paper. There were time-specific details in the original paper that needed to be updated. Language was changed because OCS would like to move away from using "square nautical miles" in reference to mapping requirements. The Hydro Health model will provide a better idea of what is needed. Another change was that HSRP generally encourages NOAA to think more broadly in finding funds for its ships rather than the original language specifying where money should come from. Other minor wordsmithing changes were made.

Most of the Panel's recommendation on the *Marine and Geospatial Data Infrastructure* issue paper had been incorporated. Mr. Boledovich suggested including language referencing and supporting Secretary Ross' statement on NOAA's hydrographic services as an example for the administration's infrastructure initiative. Ms. Thomas also wanted to add "blue economy" to the paper. Further wordsmithing and factual updates were needed.

Chair Miller asked that members submit recommended edits before telephone conferences. RDML Smith asked if the MGDI acronym for Marine and Geospatial Data Infrastructure is already a term of art, because MSDI is already established for Marine Spatial Data Infrastructure. Member Maune said it is a new acronym created specifically to include geospatial data infrastructure that is not marine.

The Panel decided to continue prioritizing topics as they have been. Member Hall asked for additional participation from the Panel. Chair Miller emphasized that the topic prioritization list is not limited to issue papers; it also guides agenda planning for meetings and webinars. Member McIntyre said that the Panel should be conscientious about staying within their purview. Member Maune commented that RDML Gallaudet suggested autonomous systems as a topic HSRP should address. RDML Smith noted that the Panel reviewed the hydrographic-specific unmanned vehicles strategy and it would be beyond the remit of the HSRP to advise on a NOAA-wide approach. Member Gee asked if there was anything more the Panel could do in support of NOS' unmanned hydrographic strategy. RDML Smith suggested calling attention to the work they have already done. Chair Miller said someone may want to revisit the precision navigation issue paper to better align it with the administration's priorities and to reflect new

developments. Member McIntyre said the Panel should hear more about the Acting Administrator's vision for the blue economy. Dr. Callender thought asking for additional information and clarification would be appropriate and a white paper is being developed within NOAA that may provide additional commentary.

Member Maune asked if the issue of hydrographic licensure was of interest to NOAA. RDML Smith said it is an issue of keen interest, but it is outside of their span of control and they cannot act on any recommendations related to licensure. The Panel had ranked it as one of their top topics of interest and had a webinar on the topic. Member Maune asked if NOAA would be interested in reviewing exam questions if NCEES (National Council of Examiners for Engineering and Surveying) came up with a standardized hydro test that could be used by states. CAPT Brennan said the contractors OCS works with have said they are very interested in a national license because maintaining a license across multiple states is very onerous. Currently, hydrographic surveyor certification requires boundary survey experience, which is having a detrimental impact on the profession. NCEES assembled a task force to study the surveyors' exams and more will be known after NCEES' August meeting. The issue was tabled for the day.

Member Thomas will replace Member Hall as the Co-Chair of the Planning and Engagement Working Group. Member Hall will continue maintaining the topic prioritization list.

Captain Richard Brennan, Chief, NOS OCS Hydrographic Surveys Division, provided a brief update on precision navigation. Spatial and geodetic information underlies all of the components of precision navigation, which consist of modeled inputs and observations, both of which are necessary for safe navigation. Precision navigation components are conceptually conceived of as a data cable, which would ideally plug into an ECDIS platform and be displayed in a format that the user doesn't have to think about. CAPT Brennan also provided an update on the Port of LA-Long Beach precision navigation project. He played video of the Andeavor ship TAQAH coming into port. The video highlighted that fewer ships mean less pollution, which is a major issue for the area. LA-Long Beach's underkeel clearance system provides a display of go-no go time tables for ships coming into different areas of the port. OCS has now turned its attention to New York and has had survey operations on the Hudson River over the past two summers all the way up to Albany, using NRTs and NOAA Ship Bay Hydro II. This is the area where the National Charting Plan's rescheming efforts are starting and where they are rolling out the National Bathymetric Source Database. Mississippi River survey operations will start this summer. OCS will be creating a Project Manager position to manage these operations on a more robust and active schedule. They are conducting cost-benefit models for each of the ports to understand what the requirements are and what they will cost to build out and maintain. OCS has been working with Rosepoint, who has been ingesting operational forecast models into their software to improve visualization formats.

Member Gee noted that the plug will go through an integrating step before feeding into an end user's PPU and asked if OCS was working with any industrial partners on what this intermediary would be. CAPT Brennan said they were not. This is still in the early stages of development and OCS has no funding to do it. He added that the exciting part about the public-private partnerships is that you can explore lots of possibilities with PPUs and if they come up with something that really works, they can push that through to the IHO and lead the development of those standards. Member Gee added that the ports need to be actively engaged in how to solve their problems utilizing this infrastructure.

Member Duffy said the economics of being able to include more data sets is difficult to quantify. The draft restrictions on the Mississippi River have led to ships going elsewhere and you can't tell how much impact this is having.

Adjournment The Panel stood in recess at 5:33 p.m.

Thursday, April 5, 2018

The meeting was called to order at 8:39 a.m.

Chair Miller welcomed everyone to the second day of the meeting.

Overview and Discussion of Day One, Recommendation Letter, Issue Paper, and Other Topics

Chair Miller invited Panel members to discuss key issues from the previous day's session. Members suggested thanking the panelists for the work they did during the hurricane responses. In response to Mr. Boledovich's presentation over lunch, the Panel wanted to emphasize the importance of NOAA being properly compensated for its support of FEMA missions and wanted assurance that NOAA's core mission is not negatively impacted by response support.

HSRP Working Group Report Outs and Discussion

Ed Saade and Lindsay Gee, Technology Working Group Co-Chairs, reviewed the activities of the working group since the September meeting. The working group received updates on OCS' autonomous strategy and National Charting Plan. RDML Smith provided further updates. OCS is moving through the steps outlined in the plan, converting select platforms to optionally manned and figuring out what sort of feedback mechanisms are needed between the mission execution and the operation of the vessel. OCS would like the program to be nimble enough to keep up with the cutting edge of the industry as it evolves. Many overestimate the maturity of the available technologies. The working group received an overview on the application of remote sensing technologies by Mr. Aslaksen. CAPT Brennan had provided a presentation on the National Bathymetric Source project. If it is done correctly, it will integrate every stitch of bathymetry that is currently housed at NCEI and include USACE data to provide better products. OCS hopes to have this one built out in 18 months. Vice Chair Saade briefed the working group on wind farm activity and the industry's use of NOAA's products and services. The offshore wind farm industry is booming right now and it continues to accelerate. Seafloor maps and soundings, weather and wind, and other PORTS capabilities are very valuable to the industry.

Going forward, the working group asked the HSRP if continuing to hold meetings every other month was appropriate. The Panel agreed that they liked this format, but there was a complaint about the number of invites to working group meetings that do not go forward. RDML Smith asked staff to work on the issue. Chair Miller noted that some meetings have been cancelled due to low attendance and asked that members let Ms. Mersfelder-Lewis know early whether they can come or not. Member Hall said she would like meetings to be more interactive.

In upcoming meetings, Briana Sullivan from CCOM will talk about taking supplementary data. Seabed 2030 will likely be a topic for the working group to take up. Member Gee asked if NGS and CO-OPS have an equivalent of the CCOM-UNH partnership or if that is something that would be worthwhile. Mr. Edwing said he doesn't have enough of a requirement that a standalone center would be needed. Expanding the mission of the JHC to include CO-OPS requirements could be beneficial. Ms. Blackwell agreed that there could be opportunities with JHC, especially in the remote sensing side. Vice Chair Saade suggested a presentation on subsidence. Member Thomas said she is interested in the validation behind the Operational Forecast System models. Member Thompson felt artificial intelligence is a topic the working group should delve into. Chair Miller said these should be filtered into the prioritization effort.

NOAA's Science Advisory Board has reached out to the HSRP to explore overlap with their work and opportunities for dialogue between the two panels. Dr. Callender said that the SAB has focused primarily

on weather and satellites, and not the marine sector. The time is overdue to push them in this direction because they could add significant value to what the HSRP does. The Panel agreed that this would be a good idea and will send a formal letter to the group. Vice Chair Saade will attend the SAB's upcoming meeting in Washington, D.C., to convey the HSRP's interest.

Coastal and Maritime Community Risk Reduction

Dr. Larry Atkinson, HSRP Member, introduced and moderated the panel.

The Honorable Kristin Jacobs, Florida House of Representatives, discussed the current priority needs for increasing resiliency in Florida. Ms. Jacobs discussed the value of communities learning how to speak with one voice and work together. Last year, she was successful in getting major climate change legislation in the State of Florida passed and signed into law by the governor. That this was a bipartisan effort demonstrates Florida's a more pragmatic approach to earth science than what is seen in the rest of the country. \$3.6 million were allocated in the state's budget to enhance the Florida Resilient Coastlines Program, specifically addressing Adaptation Action Areas. One of Ms. Jacobs major efforts over the past nine years has been designating the southeast Florida coast from the Dry Tortugas to St. Lucie inlet as a conservation area. In the last two years, Florida has lost 21 of the 35 coral reef species and they're not sure why. The three-tier coral reef system that runs along this part of the coastline is essential to resiliency, both to the coastal area and to the industries that depend on a healthy marine environment. Hurricane Irma taught the entire state, not just coastal areas, the importance of having evacuation plans and preparedness in place. Shelters were overwhelmed across the state and special needs populations like nursing homes were without power. Utilities did not have infrastructure in place to protect against calamities such as raw sewage overflows. The Florida House of Representatives worked very hard to draft bills that would address these issues, but the effort went nowhere due to a lack of companion bills in the State Senate.

Anthony Reynes, Marine Program Leader, Miami Forecast Office, National Weather Service, NOAA, discussed Marine Weather Forecast Products and Support Services in the Wake of Irma. Communication was a major issue during Hurricane Irma, in particular people not knowing where to get authoritative information. The Miami Forecast Office is collocated with the National Hurricane Center and issue marine products, including the Small Craft Advisories, Marine Weather Statements, and Special Marine Warnings for potentially hazardous marine weather. During Irma, the office was on lockdown for 72 hours. Tropical storms bring the whole package of weather impacts, including thunderstorms, rough seas, and water spouts – which are one of the most underestimated marine weather risks. Thunderstorms can be highly disruptive to port operations and should be a consideration in their planning and response procedures. One of the major issues for southeast Florida is how port operations need to interact, keeping in mind the significant impact that the Gulf Stream can have. More awareness is needed about the dangers of hurricanes when they are not heading directly for your location, this is when people generally make wrong decisions. This happened in southeast Florida during Irma, which came no closer than 80 miles overland from Miami but which saw serious impacts from the storms. Hurricanes build fetch – the interaction of strong winds over a large area that build the seas to the point of creating long waves and coastal inundation. The track of Irma was ideal for creating hazardous conditions in the area. Responding to water spouts must be included in port operation preparedness plans because NWS will not see them on their radar. Mr. Reynes reviewed the products available from their website, www.weather.gov/miami. One thing that would benefit southeast Florida is NOAA buoys. There is not currently a reliable source of observations in the area. In order to continue expanding their model products, they need verification. Dr. Atkinson noted that when the Gulf Stream slows down off the coast of Florida, the water levels off Virginia's coast rise by 1-2'.

Dr. Samantha Danchuk, Science Coordinator, Southeast Florida Climate Compact, and Assistant Division Director, Broward County, Environmental Protection and Growth Management

Department, Environmental Planning And Community Resilience Division, discussed the progress of resilience initiatives and the pending challenges. The four counties in southeast Florida have been working together for nearly ten years on climate policy collaboration. Dr. Danchuk gave credit to Ms. Jacobs for initiating the compact to communicate to the state legislative priorities that ensure that the state is planning for future conditions related to sea level rise and planning to reduce emissions as a region. Each of the counties have conducted vulnerability assessments and have gained a better understanding of what their emissions are and have projections that go out to 2100. They have just updated their five-year regional plan, which is available at www.rcap2.org, where stakeholders of all kinds can develop action plans that would help the region move towards its goals. Southern Florida is very much dependent on flood management and Dr. Danchuk discussed several of the infrastructure protections in place for mitigating risks. Serious flood risks will be increasing in the future and the Climate Compact is seeking Federal assistance in analyzing these problems and coming up with solutions. Industry is an essential partner and they have been very productive to work with, aligning advocacy efforts at the state and Federal level. New design and construction standards need to be developed that reflect the current understanding of risks. Southeast Florida is undergoing a boom in development and there is an incredible opportunity to build resilience into the community; policies and standards need to be developed as quickly as possible. It is very important to have consistency in infrastructure standards. The area has invested in PORTS at Port Everglades and PortMiami because all of their projections have been based on Key West measurements. Dr. Danchuk echoed Mr. Reynes suggestion that the area would really benefit from NOAA wave buoys. Nearshore current data would help with beach projects, planning for ports, and environmental resources. Better and more recent bathymetry in the ICW would help support modeling efforts under development. Real time storm monitoring would also be very helpful.

James F. Murley, Chief Resilience Officer, Regulatory and Economic Resources Department, Miami-Dade County, discussed the Rockefeller Foundation's 100 Resilient Cities Program and strategies to make communities more resilient. The entire sandy coastline of Miami-Dade County is a Federally authorized beach renourishment project. Beaches play a major role in an area that depends on tourism. Southern Florida's destiny is its geography. In order to still be here 100 years from now, Florida needs to learn to live with water and manage it in an active and iterative way. Without a strong economy, the area cannot invest in resiliency activities. The state is in the process of a large upgrade to its water and sewer utilities, designed to withstand predictions for the length of their expected service life. Every piece of infrastructure in the county is being assessed for vulnerability and criticality which are input to the local mitigation strategy and capital improvement plans. Rockefeller 100 Resilient Cities Program is an experiment to explore how large urban areas think about all kinds of resilience, not just climate or events, but a series of shocks and stresses. Sea level rise is a stressor, not an event. Elected officials need to understand that sea level rise is a constant change in the ambient condition behind events that makes them more severe. The 100 Resilient Cities approach helps put all of that in context. A lot of the data has been picked up by commercial interests, taking risk information and forming a business model around it. This is a strong signal that the private sector is going to play a big role in how people come to understand this information.

David Anderton, Assistant Director, Port Everglades, provided an overview of Port Everglades and the efforts underway to make the port more resilient. Port Everglades is the number one container port in Florida and the number two petroleum port. It is a huge economic engine for the region. Royal Caribbean and Carnival Cruise Lines are both homeported at Port Everglades. Mr. Anderton discussed capital improvement projects, expansion, and environmental mitigation efforts, as well as the operations and features of the port. Port Everglades has taken advantage of DERA grants to purchase new vehicles and retrofit pilot boats to be more environmentally-friendly. The port has done scenario planning studies on flooding and sea level rise and used lidar data to conduct internal assessments of the port, particularly for monitoring its security infrastructure. The port will be replacing their aging bulkheads over the next 30 years and designing them in such a way that they can add linear footage as sea levels rise.

The Honorable Chip LaMarca, Broward County Commission, shared the local perspective on some of the most critical short and long-term needs and the lessons that can be drawn from shoreline protection as a model for community resilience. The business and science communities begin working together when models measuring the impact of sea level rise are available. Mr. LaMarca discussed impacts of wave activity following Superstorm Sandy on the beaches and roads in Broward County and the recovery efforts. In addition to advocating on behalf of the ports, it is just as essential to southern Florida to advocate for beaches. In addition to wanting to maintain healthy beaches, there is \$4 billion of upland infrastructure at risk if anything happens to them. Including a dune system along Broward County's 25 miles of shoreline was extremely important and must be maintained. In 2014, Broward County passed a referendum to put a percentage of document stamps into a land acquisition trust fund. They now have roughly 120 projects that are on the list each year, prioritized by science and economics. One sign of progress is that there are now elected officials from both parties, at the state and Federal level, supporting this kind of work.

HSRP Q&A

Member Maune asked which of the panelists use lidar, how, and what benefits they receive from it. Dr. Danchuk said they use lidar in nearly every study they do. Critical infrastructure monitoring, surge modeling, etc. The Florida Department of Transportation is collecting higher resolution lidar and providing the dataset for a small study area that will allow researchers to be able to see very small structures that will require large investments to adapt, such as caps on seawalls. As part of the Adaptation Action Area designation, the entire coastline of Broward County was lidar mapped to better understand its vulnerabilities and to set priorities. Mr. Murley also pointed to its use in the Everglades Restoration project. Dr. Danchuk said they are very anxious to have another comprehensive dataset for southeast Florida because the one they are using is from 2007.

Mr. Edwing asked Dr. Danchuk what kind of data she was looking to get more quickly. Dr. Danchuk said there are Federal and state agencies that are collecting the same data that Broward County is collecting post-storm. It is very expensive to do the surveys and if they could get the images (satellite, lidar, and bathymetry) as soon as possible, that would be helpful in avoiding duplication of efforts.

Mr. Edwing asked the panelists if there was a particular type of data that is missing that would really help with what they are trying to achieve. Ms. Jacobs said that Florida has a highly unequal distribution of coastal science expertise and NOAA has been instrumental in the success of the southeastern part of the state. Similar compacts should be created around the state that can leverage NOAA's capabilities. Perhaps NOAA could host workshops on how to emulate what has been accomplished in southeast Florida.

Chair Miller asked if the weather.gov website is overwhelmed during events. Mr. Reynes said that when NWS centralized the individual websites there were problems, but they performed much better during the two previous storm seasons. The National Hurricane Center had some bandwidth issues but those have been revisited and it should have more capacity now. Chair Miller commented that knowing where to get the data you need is a big problem.

Mr. Armstrong asked for elaboration from Dr. Danchuk on the kind of nearshore current data she was looking for. Dr. Danchuk said longshore currents would be very helpful for managing sediment and to gain a better understanding of their ephemeral reef system. They would like to also better understand the speed changes of the Gulf Stream. Mr. Armstrong also asked about the need for bathymetry in the ICW. Dr. Danchuk said many of the datasets in the ICW further away from inlets are very old and there have been significant changes.

Dr. Maune asked whether Dr. Danchuk was involved with the 3D Nation study. She said she was not aware of it but would love an opportunity to participate. As she is part of a compact, the benefits will

extend regionally. Dr. Maune said the most challenging part of the process is determining the dollar benefits that would be received if you got what you ask for. Mr. Murley said that, on the insurance side of the equation, Florida has done a lot but they find themselves in the morass of the Federal Flood Insurance Program, which they do not trust. 3D Nation's data would be very helpful.

Member Atkinson opened the floor for the panelists to provide any further information or requests they would like relayed to NOAA through the HSRP. Mr. LaMarca said the Fisheries requirements in permitting were very frustrating. Mr. Anderton said real time data near the inlet related to currents would be helpful. Mr. Murley said the Regional Associations approach has been very positive. Dr. Danchuk requested continued support for technical assistance, particularly using tools to make the best use of available datasets. Mr. Reynes reiterated his request for NOAA buoys (for wave height, periodicity, and wind) and more offshore data for southeast Florida. Ms. Jacobs said NOAA should ask that programs seeking grants demonstrate a commitment to regional compacts.

Member Thomas noted that a high-resolution wave buoy was just deployed off of Key West. It could not be installed off of Miami due to the Gulf Stream, but if Mr. Reynes could identify a suitable location, they could talk to USACE about getting one installed.

Public Comment

Dave Dellinger, Voluntary Observing Ship Program, National Weather Service, commented on the need for offshore weather observations. Some local forecast offices run a report broadcasting VOS ship observations, which are often fairly high-quality. Miami has a plan to set up some of these stations along their coastline and VOS will be increasing their resolution to within 50 meters. In the future, these ship reports will be able to be used as climatological studies. Chair Miller said that the small boating community could be a resources if they were deemed trusted sources. Mr. Dellinger said there is a partnership wherein this community is recruited to take weather observations and launch ocean research buoys. This partnership has been at the wayside for a few years due to lack of funding but NWS is starting to make more of an investment in it.

Member Discussion and Recap

Planning & Engagement Working Group

Co-Chairs Maune and Hall discussed the latest revisions to the *Marine and Geospatial Data Infrastructure* issue paper. The Panel voted unanimously to approve the paper as amended.

In reviewing *Marine and Geospatial Data Infrastructure* issue paper, CAPT Brennan recommended deleting the entire paragraph related to square nautical miles uncharted – inserting a specific performance measures that has not yet been vetted would be premature. The \$104 million allocated figure was changed to \$150 million to reflect the information provided by RDML Hann.

Member Maune said his informal query of the HSRP showed consensus on dropping the issue of licensure for hydrographers. NCEES is responding to the issues that have been raised. An exam task force will be responding to these issues this August. The Panel will respond to the National Society of Professional Surveyors memo that it is beyond the purview of the HSRP to advise NOAA on this topic.

Member Hall reviewed the topic prioritization list and provided clarification on the intent of each topic. Member McIntyre said that some topics the Panel just wants updates on and some are action items for the HSRP, maybe they could be categorized in that way. Member Duffy said he would like to provide some edits to the *Precision Navigation* issue paper and would like to receive a Word version of the issue papers

so that he can track changes. Other topics of interest that were added included: NOAA research on artificial intelligence, particularly related to disaster recovery or big data management; public-private partnerships in relation to the blue economy, precision navigation, modeling, resilience, and IOOS; hydrodynamic modeling and validation; NOAA's disaster response; infrastructure; improving charting of secondary channels; autonomous surveying and other autonomous uses; information dissemination; charting for Arctic traffic and Polar Code needs; subsidence; the 3D Nation Elevation Requirements and Benefits Study; quantifying return on investment for NOAA's navigation products and services; and enhancing navigational assistance to support the blue economy. Member Hall requested assistance from staff with tracking the HSRP's actions on these items.

Emerging Arctic Priorities Working Group

Ed Page, Working Group Chair, said that he disseminated a draft summary of issues to start the dialogue on areas the working group should address. The Member Page wants to update NOAA's Arctic Action Plan and will be discussing NOAA's role in fulfilling Polar Code requirements. Chair Miller encouraged the working group to revisit the report Dr. Brigham developed three years ago.

HSRP Recommendation Letter Discussion

Chair Miller led a discussion on possible recommendations the Panel should give to the Acting Administrator. The top five recommendations were: (1) reimbursement from FEMA; (2) precision navigation in the blue economy; (3) the value of NOAA products and services for disaster response and the importance of enhancing their delivery; (4) the need for charting in secondary channels; and (5) collaboration with the Coast Guard on information integration. Recommendations 1 and 3 were combined into one item and recommendations 2 and 4 were combined.

RDML Smith expressed some concern about diverting too far into resilience applications of NOAA data considering that they are not strictly hydrographic services as defined by the statute. Ms. Blackwell said all of these components connect and resiliency is within NOS' mission, whether it's a primary or secondary application of the data. Mr. Edwing agreed and stated that HSIA encourages use of these services to support coastal resource management. RDML Smith felt it was important to talk about resiliency, but there are other programs within NOAA that are tasked with this and should be included in any discussion of it.

RDML Smith encouraged the Panel to be very clear about what they mean by public-private partnerships. Member Kelly said the paper should only include issues that are within the HSRP's primary scope.

An invitation letter will also be drafted inviting RDML Gallaudet to the next HSRP meeting and requesting more information on his vision of the blue economy.

Next Meeting

The next HSRP meeting will be August 28-30 in Juneau, AK. Staff will reach out to Panel members about availability for 2019 dates in New Orleans and the Washington, D.C. area.

The meeting was adjourned at 4:29 p.m.

HSRP VOTING MEMBERS IN ATTENDANCE:

Larry Atkinson, Ph.D.	Slover Professor, Old Dominion University
Sean Duffy, Sr.	Executive Director, Big River Coalition
Lindsay Gee	Mapping and Science Coordinator, Ocean Exploration Trust
Kim Hall	Principal & Founder, Brizo Maritime Consulting, LLC
Edward J. Kelly,	Executive Director, Maritime Association of the Port of NY/NJ
Carol Lockhart	President, Geomatics Data Solutions, LLC
David Maune, PhD	Associate Vice President and Senior Remote Sensing Project Manager, Dewberry Consultants
CAPT Anne McIntrye	Pilot, Columbia River Pilots
Joyce E. Miller, Chair	Director of Seafloor Data Services, Hawaii Mapping Research Group Research Group, University of Hawaii School of Ocean and Earth Science and Technology (retired)
CAPT (ret. USCG) Ed Page	Executive Director, Marine Exchange of Alaska
CAPT Sal Rassello	Director, Nautical Operations, Carnival Cruise Line
Edward J. Saade, Vice Chair	President, Fugro (USA) Inc. & Regional Director Americas - Marine
Julie Thomas	Senior Advisor, Southern California Coastal Observing System; Program Manager, Coastal Data Information Program, Scripps Institution of Oceanography
Gary Thompson	Chief, North Carolina Geodetic Survey

HSRP NON-VOTING MEMBERS IN ATTENDANCE:

Capt. (ret. NOAA Corps) Andy Armstrong	Co-Director, Center for Coastal and Ocean Mapping, 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, PhD

Co-Director, Center for Coastal and Ocean Mapping,
Joint Hydrographic Center, University of New
Hampshire

DESIGNATED FEDERAL OFFICIAL:

RDML Shepard M. Smith

Director, Office of Coast Survey, NOAA

NOAA STAFF PRESENT:

Courtney Barry

CO-OPS, NOS

Glenn Boledovich

Policy Director and Chief of Policy, Planning and
Analysis Division (PCAD), NOS

Captain Rick Brennan

Chief, Hydrographic Surveys Division, OCS

W. Russell Callender, Ph.D.

Assistant Administrator, NOS

Captain James Crocker

Chief, Navigation Services Division, OCS

David Dellinger

Voluntary Observing Ship Program, National Weather
Service, NOAA

Virginia Dentler

CO-OPS, NOS

RDML Nancy Hann

Deputy Director for Operations, OMAO
(via conference call)

Captain Elizabeth Kretovic

Deputy Hydrographer, OCS

Rachel Medley

Chief, Customer Affairs Branch, NSD/OCS

Lynne Mersfelder-Lewis

HSRP Program Coordinator, OCS

Nikki Ndubisi

OCS

Chris Paternostro

CO-OPS, NOS

Jim Rice

NOS/PCAD

Denis Riordan

NGS

Kyle Ward

OCS, Navigation Manager

SPEAKERS AND ATTENDEES:

Kurt Allen	Quantum Spatial
CAPT LaDonn Allen	Prevention Chief, Maritime Transportation System Recovery Unit
David Anderton	Assistant Director, Port Everglades
Mike Aslaksen	Chief, Remote Sensing Division, NGS/NOS
Jennifer Blanco	Office of Congressman Mario Diaz-Balart (FL – 25 th District)
Brian Brodehl	Chief, Surveying and Mapping Branch, Jacksonville District, U.S. Army Corps of Engineers
Samantha Danchuk, Ph.D.	Science Coordinator, Southeast Florida Climate Compact; Assistant Director, Broward County Environmental Protection and Growth Management Department, Environmental Planning and Community Resilience Division
Steve Detwiler, FPEM	Emergency Management Planner, Miami-Dade Fire Rescue Department
Jeff Donze	Esri
Carlos Estrada	Carnival Cruise Lines
Russ Faux	Quantum Spatial
Honorable Kristin Jacobs	Florida House of Representatives
Honorable Chip LaMarca	Broward County Commission
Jeff Lovin	Woolpert
Mark Luther	University of South Florida, CMPS
James F. Murley	Chief Resilience Officer, Regulatory and Economic Resources Department, Miami-Dade County
Lacy Pfaff	U.S. Army Corps of Engineers
Anthony Reynes	Marine Program Leader, Miami Forecast Office, National Weather Service
Quin Robertson	APTIM

CAPT Sam Stephenson, J.D.

President, Florida Harbor Pilots Association

Terry Thornton

Senior Vice President, Port Operations, Guest Care and
International Carnival, Carnival Cruise Lines

Christopher Vaughan

Geospatial Information Officer, Federal Emergency
Management Agency