Meeting Summary
Hydrographic Services Review Panel
March 15-17, 2016
Galveston, Texas

Tuesday, March 15, 2016

On the call of the Designated Federal Official (DFO), Rear Admiral Gerd F. Glang, NOAA, the Hydrographic Services Review Panel (HSRP) meeting was convened on March 15-17, 2016, at the Tremont House Hotel, 2300 Ships Mechanic Row, Galveston, TX. 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 and Introductions

Scott Perkins, HSRP Chair

The meeting was called to order at 9:02 a.m. Chair Perkins welcomed panel members and public attendees. He thanked the members and staff for assembling a robust meeting agenda, and Neils Aalund and Gary Jeffress for moderating panels. After 33 years of active duty and dedicated service, RDML Glang will be retiring from the Office of Coast Survey before the next HSRP meeting. Chair Perkins commended him on his service to NOAA, the country, and to the HSRP. Panel members did self-introductions and RDML Glang introduced NOAA staff. Five new HSRP members are in various stages of onboarding. Dr. Russell Callender administered the oath of office to new members Kim Hall and Ed Saade.

Dr. Craig Brown, City Council Member, City of Galveston, Texas

Councilmember Brown welcomed the panel to Galveston and provided a historical perspective on the city and island. Galveston has a long history of working closely with NOAA on their beaches and the ocean. The island's Great Storm of 1900 is considered one of the most catastrophic natural disasters in the history of the US. The rebuilding efforts, including raising the island eight feet and the constructing a seawall, are among the country's great engineering feats. In 2008, Hurricane Ike devastated the island. The city is looking to develop a surge suppression system in the near-future. Galveston is experiencing an increase in temperatures, sea level rise, and hurricane probabilities each year along with the constant concern of erosion. Partnering with USACE and the Texas General Land Office (TGLO), Galveston recently finished a $6 million beach nourishment project using dredged material from the ship channel. The city plans to repeat the cycle for all of the beaches along its seawall. The functions involved in maintaining these beaches are vital to the city's economy and continued existence.

Jed Webb, District Director for Congressman Randy Weber, 14th District of Texas

Mr. Webb described the 14th District of Texas which runs along the Gulf Coast from Freeport to the Louisiana border and includes five ports. The district has seen a massive amount of growth and has very busy ports and waterways involving industrial use, cruise lines, and recreational uses. Mr. Webb relayed

Congressman Weber's frustration with the appropriations process and the challenges it poses since the elimination of earmarks. Regional projects are incredibly difficult to get funded, even when they are essential to the viability of the community, storm surge and coast barrier protection, and may save billions of dollars later on. In the 14th District of Texas, this includes protecting the home of America's petrochemical industry. The Congressman is regularly engaged on this issue with other members of Congress.

Captain Brian Penoyer, Sector Commander, Port of Houston/Galveston, US Coast Guard

Captain Penoyer discussed the maritime industry's SCADA (Supervisory Control and Data Acquisition) revolution and the procession from data to information to knowledge and, finally, to wisdom. The US Coast Guard, in addition to being a combatant force, is one of the four corners of maritime governance force, along with USACE, CBP, and NOAA. The ports of the Houston/Galveston Sector are actually an intermodal port and industrial manufacturing complex very different from other seaports. Together, they operate with a positive net balance of trade. Galveston Bay is one of the most intensely used waterways in the country with 60-70 deep draft transits a day on the Houston Ship Channel and 450-550 tug and barge transits a day in the Vessel Traffic Service (VTS) area. An important topic of interest for commercial and safety reasons is the nearest 50 foot depth in the Gulf of Mexico and what the implications are for getting there and maintaining access to that water. Regional NOAA staff are an integral part of the Coast Survey led Navigation and Response Team (NRT) in addition to their day-to-day services and real-time data acquisition they provide. The PORTS system and real-time hydrological services are vital to all users of the ports. As the ports continues to grow, the Coast Guard and others need to get a handle on what eNavigation and the SCADA revolution can do to ensure the safety and efficiency of vessel traffic.

Colonel Richard P. Pannell, Commanding Officer, USACE, Galveston District

Colonel Pannell discussed USACE's work on the management of the Gulf Intracoastal Waterway and ship channels for the district's ports. NOAA's efforts are critical to the success of USACE's mission. USACE supports a shared vision for a protected and resilient Texas coast. Over $200 billion of nonfederal investment has been spent on the Texas coast and USACE is trying to keep pace to ensure that the infrastructure supports that in the best way possible. Colonel Pannell discussed several of their projects in the Galveston District's portfolio related to their navigation mission and coastal resiliency/protection. The Gulf Intracoastal Waterway and the six deep draft systems on the Texas coast support nearly a quarter of all waterborne tonnage for the nation. Two of the largest USACE studies in the nation are happening in the region, the Houston Ship Channel improvements study and the Texas Coastal Study. Partnerships make all this work possible, including the partnership with TCOON (Texas Coastal Ocean Observation Network) which provides foundational information for the entire lifecycle of USACE projects.

Q&A

Vice Chair Hanson expressed his gratitude for Congressman Weber's support of coastal activities.

Mr. Edwing compared and contrasted TCOON with other regional associations. The longstanding partnership has expanded to encompass all of the water level needs along the coast and is the largest regional network of water level stations to NOAA standards. It is a model for how partnerships should work in other areas. There is currently not a TCOON website, but the data is published on NOAA's site.

Member Miller asked how the PORTS system is funded for the Port of Houston/Galveston. Mr. Edwing said that the Port Authority for the Port of Houston/Galveston pays for it. Captain Penoyer added that the Port of Houston Authority provides several services that extend all the way out to the Galveston jetties, such as fireboats.

Member Armstrong asked Captain Penoyer to elaborate on the issue of the port's nearest 50 foot water depth. Captain Penoyer said it concerns the efficiency of loading for modern size ships. Berth capability and channel width are factors in the transit limits but economic loading, which is all about depth, drives industry far more. This becomes particularly relevant in light of the Panama Canal expansion and modernization.

NOAA Leadership Remarks on HSRP Priorities

Dr. W. Russell Callender, Assistant Administrator, National Ocean Service

Dr. Callender updated the panel on NOS activities and suggested ways that the HSRP can be of service to NOAA. Dr. Callender is working to solidify the rest of the NOS leadership team and working to recruit a Deputy Assistant Administrator for NOS. He thanked RDML Glang personally and on behalf of NOAA for the tremendous progress he has made within OCS, NOAA, and the HSRP advancing mapping, charting, navigation, and hydrographic priority missions. Dr. Callender acknowledged the HSRP's progress on the six questions he posed to the panel at the LA/Long Beach meeting and urged them as they move forward to continue to be very forward-looking in their thinking. He asked the panel to consider what concepts NOS should consider as they aim to better understand the themes of identification, analysis, and action in the navigation services and resilience operations of the future. Technology and innovation, as well as the evolving role of partnerships are areas of special interest. NOAA will continue to look to the HSRP for advice on the future needs of future users.

With the upcoming change of Administration, a transition team will likely be assembled to meet with NOAA senior leadership and learn about agency programs and services. The HSRP needs to be active in thinking about what kinds of messages they want to deliver to that new team, both within NOAA and further up in the Administration. A new Administration will want to explore new ideas and employ new terminology, but issues such as storm surge and sea level rise will continue to be important. Regardless of Administration changes, NOAA leadership support of HSRP will continue. Dr. Callender and NOS Office Directors will serve as linkages to the new leaders, but the panel will have to establish new connections with the incoming Administration. Ensuring strategies and initiatives remain relevant to key constituents, officials, and industry partners will be a challenge to every organization, but he stressed that the navigational, observation, and geospatial programs are foundational to NOAA's larger mission and services.

Member Miller asked Dr. Callender to discuss the process for replacing RDML Glang. Dr. Callender described the process from the Flag Advisory Board to approval by the Secretary of Commerce (at which point an announcement could be made of a Director Designee) and on to the White House for appointment by the President. The official change of command will be on or around September 1. Member Brigham emphasized the importance of a hydrographer filling the position and that the panel should explore how it can express this to the Flag Advisory Board either as individuals or as HSRP members.

National Ocean Service's Navigation Program Updates

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

Mr. Edwing presented on the milestones and accomplishments CO-OPS has planned for the remainder of FY2016 and FY2017. In FY2016 and FY2017, CO-OPS will be installing at least three new PORTS systems to the network, bringing the national total to 28. Mr. Edwing reviewed the funding mechanisms and partnerships for each new system. Additional sensors are being added to several existing PORTS systems to expand and enhance capabilities, including station hardening. CO-OPS will continue working with the US Coast Guard to integrate PORTS data with its Automated Identification System (AIS) and

eventually incorporating NWLON and modeling forecast data as well. CO-OPS is switching over to offshore regional models that will nest up into the larger ports and estuaries data. Several local Operational Forecast System enhancements are happening across the country. Tidal resurveys in Puget Sound, Cape Fear, and South Texas will continue in FY2016 and FY2017. CO-OPS is installing water level gages to support upgrades to VDatum, the tool used for conversion between geodetic and tidal datums. CO-OPS is transitioning the primary water level sensor in its network to a Microwave Water Level (MWWL) technology that is more accurate and cheaper to maintain. These can likely be dual-purposed for use as wave gages as well. Deployment of these sensors requires a year-long transition each to ensure no local or systemic issues are being introduced. To date, 27 NWLON and 22 non-NWLON stations have MWWL technology installed, 23 of which have been fully transitioned.

Harmful algal bloom (HAB) forecasting models are operational in the most HAB-active parts of the Gulf coast. Experimental HAB forecasting models in Lake Erie are being developed and will transition to fully operational in 2017. The Inundation Dashboard will expand upon the Quick Look products to include an alert system, historic data, and data from partner stations. Embedded into this is the Inundation Landmark project to aid in communicating storm surge to the public. CO-OPS is looking to release sea level indicators that make regional comparisons of tide gage and altimeter sea level measurements. These will assess the trajectory of regional sea level indices relative to the global sea level rise scenarios of the 2013 National Climate Assessment for planning guidance. Mr. Edwing concluded his presentation by discussing some of the observation network partnerships, including work with USGS and NPS.

Juliana Blackwell, Director, National Geodetic Survey

Ms. Blackwell reviewed the NGS mission and stakeholder base. NGS has developed a ten-year strategic plan (2013 – 2023) based on stakeholder needs and advancements in science and technology. The goal of the plan is to support the users of the National Spatial Reference System (NSRS), modernize and improve the NSRS, expand the NSRS stakeholder base, develop and enable a workforce with a supportive environment, and improve organizational and administrative functionality. New geometric and new vertical datums will be released in 2022 to replace NAD 83 and NAVD 88; NGS will provide the tools to easily transform between the new and old datums. In FY2016, the GRAV-D (Gravity for the Redefinition of the American Vertical Datum) project is expected to complete 53% of its surveys of the US and its territories, including 60% of Alaska. The new geopotential baseline will make all elevation information more accurate and easy to combine. Benefits of the program are estimated to be $240 million from improved floodplain mapping alone. As GRAV-D data becomes available it is fed into experimental geoid models that are released on an annual basis. NGS expects to install one foundation CORS (Continuously Operating Reference Station) per year as part of its foundation CORS network. This ultrastable CORS network will improve the NSRS and to allow for tying into the International Terrestrial Reference Frame. NGS plans to develop an RTN validation procedure prototype which will enable locally-owned real-time networks around the US to link to the NSRS for positioning validation. NGS has a goal to deliver 350,000 Online Positioning User Service solutions this year.

The Coastal Mapping Program is looking to update 5.5% of the National Shoreline with current and new aerial imagery and elevation data to improve navigational safety. They will update the shoreline in 35 priority ports and analyze 35 ports for changes. NGS is processing and will create special Superstorm Sandy LIDAR deliverables for OCS to update nautical charts. Oblique georeferenced imagery for the entire West Coast is being collected to provide pre-event imagery and enable the assessment of impacts to several NOS mission areas. The data is publicly available along with historical information from the previous collect. NGS hopes to release a revised San Francisco Bay vicinity VDatum model covering 3,300 miles. NGS has increased its focus on customer engagement. This year they will complete the transition to a Regional Geodetic Advisor Program and provide training to 50% of states. NGS will be conducting monthly educational webinars on programs, projects, products and services to educate its constituents and will continue to expand their web presence and YouTube video library.

RDML Gerd F. Glang, Director, Office of Coast Survey

RDML Glang discussed OCS' key activities in relation to the office's Road Map priority areas of Be the Experts, Transform Charting, Innovate Hydrography, and Change Navigation. For organizational purposes, OCS has developed an Enterprise GIS strategy, and will begin the work of the GIS Steering Committee. George Mason University has agreed bring their GIS certification program to the NOAA offices in order to build workforce expertise. The hulls of NRT-3 and NRT-4 have been completed and are ready to perform acceptance testing. The workforce challenge for NRTs is an object of daily management attention. OCS will continue working towards the Nautical Charting System II, a collection of databases that will enable a single production system for all of NOAA charting products. The NIS database is expected to be loaded by the end of 2017. Template tools developed in partnership with ESRI can now produce a fit-for-use nautical chart in four working days. Tools have been built to automate channel tabulations on charts. The IHO S-4 charting specification requires a shift from the legacy source diagram to CATZOC (Category Zone of Confidence) to enable mariners to assess the limitation of hydrographic data. OCS is engaging with key stakeholders concerning their Weekly Updates Webpage, which informs users where changes to the charts have occurred.

RDML Glang discussed proposed improvements to make NOAA Hydrographic Survey Priorities a more adaptive plan by using GIS with contemporary data sources, using a risk-based model that accounts for degradation of "hydrographic health" in areas of change, allowing for meaningful incorporation of outside source data into survey plans, and publishing plans to a web service for public and inter-agency review. He discussed the Buzzards Bay and Barnegat Bay projects as examples of using multiple sources to inform field hydrography. An SBIR (Small Business Innovation Research) program is looking into how to operationalize radar-derived bathymetry. The quality is currently not up to chart standards, but it can provide insight into how an area is changing over time. Due to time constraints, RDML Glang only briefly mentioned the precision navigation developments happening in LA/Long Beach. The raster chart tile service has been rolled out and the next release will allow users to download the tiles for use offline. He concluded the presentation by displaying a commercially available AIS app that incorporates multiple sources of coastal intelligence.

Q&A

Member Brigham asked about the relationship with DoD, and the Navy in particular, as users of the PORTS system. Mr. Edwing responded that the Navy is a partner in two PORTS systems and other bases have NWLON stations. The relationship has been a base-by-base approach.

Member Miller asked how the 2022 datum change is going to affect charts. Mr. Edwing said that coincident with the vertical datum update are the Tidal Datum Epoch transition and International Great Lakes Datum (IGLD) update. The water level change will potentially affect the charts but the scale is not known.

Member Saade asked if the Great Lakes models are being coordinated with Canada. Mr. Edwing said that several committees are in place to ensure coordination and responsible bilateral management of the Great Lakes. The hydrodynamic models do cover the entire lake which is not really coordinated, however the IGLD update is a joint effort and that is closely coordinated. Ms. Blackwell said that NGS is working with Canada, Mexico, and countries further south on all of the new datums. Really good progress has been made working with Canada and Mexico on agreeing to the geopotential starting points, and NGS is trying to make better inroads with South American countries.

Member Gee asked where the services see next generation navigation heading and how the public-private relationship will work. Mr. Edwing said that, between PORTS systems and hydrodynamic models, there is going to be a lot of information available. NOS needs to be able to integrate that data and make it

readily available. RDML Glang added that different places have different requirements for environmental intelligence. Getting to know your stakeholders and understanding the decisions they need to make is part of that.

Panel - Navigation: Industry Demands and Future Developments

Moderator: Neils A. Aalund, Senior Vice President, West Gulf Maritime Association

Mr. Aalund introduced the panel assembled to discuss the four major "mega-trends" facing the Texas Gulf Coast: significant rise in population, continued growth of oil and gas production, larger ships with the expansion of the Panama Canal, and increased international trade. The panel examined how mariners use NOAA's navigational, positioning, and coastal data, and explored the next generation navigation service solutions. A common theme in the Houston/Galveston region is collaboration amongst various groups working closely together for safety, navigation, and environmental initiatives.

Captain Sherri Hickman, Houston Pilots

Captain Hickman discussed PORTS, AIS, and related safety on the Houston Ship Channel. She played a Houston Pilots video to provide an overview of the port and the challenges pilots face in the ship channel. Regardless of congestion, Houston Pilots bring in some ships that are 1,200 feet long and others that are 156 feet wide with a 45 foot draft. Captain Hickman uses a computer loaded with NOAA S57 charts that can be updated all the time and the AIS plug on the ship allows her to see other vessels. Every day, the PORTS system is essential for the area pilots' decision-making. Real-time water level and current information is critical given the significant tidal swing in Galveston Bay. She said she looked forward to having the HSRP come out on the pilot boat to demonstrate how she looks up the real-time AIS information and how invaluable it is.

Peter Simons, Deputy Port Director, Port of Galveston

Mr. Simons discussed the Port of Galveston and the case for reduced visibility. The four main economic drivers for the port are cruise, automotive, grain, and fruit. Galveston is the fourth largest cruise homeport in the US. Larger cruise ships present significant logistical challenges for the port, especially when reduced visibility forces the port to hold an arriving ship. Fog-related delays in the ship channel amounted to 680 hours in 2015. A poll of the top 1,000 logistics companies found that the highest ranked criterion for selecting ocean shipping carriers was schedule reliability and consistency. PORTS is a critical component of planning and incident response, particularly for planning where an oil spill is going to go. There's no question that the system makes the port safer and that consumers relying on the port maritime activity benefit from it. An integrated PORTS system is essential to making go/no go decisions and expanding the possibilities of safe vessel navigation. NOAA does an excellent job maintaining the system and Mr. Simons said he would argue for more federal funding. He suggested integrating an analysis of the current system with the efforts of other agencies, including USCG's Ports and Waterways Safety Assessment (PAWSA), Waterways Analysis and Management System (WAMS), and NTSB's Accident Reports.

Brian Hill, Director, MARAD Western Gulf Gateway

Mr. Hill presented an update on the Maritime Administration's efforts to improve and strengthen the US marine transportation system and to meet the economic and security needs of the nation. The Office of Intermodal Systems Development is involved with many projects aimed at reducing congestion in the nation's ports and port development. The Maritime Administration has developed StrongPorts to help ports compete more effectively for grants. A growing population is going to stress capacity in the nation's already constricted ports. Out of 35 TIGER grants for ports, only $1.9 billion has been applied to addressing infrastructure needs. Another discretionary round of financing for ports is coming up called

the Fixing America's Surface Transportation (FAST) Act, which provides $305 billion for five years for nationally significant freight and highway projects. Under the Port Conveyance Program, if federal property is not being effectively used the Maritime Administration can give that property to ports for free. A high priority for the agency is the Marine Highway call for projects that will establish marine routes between port cities. Mr. Hill discussed other efforts to help ports finance their projects, such as the Planning & Investment Toolkit. He noted that navigation grants normally have a 20% matching requirement and ports can use dredging as the match.

Captain Bill Diehl, President, Greater Houston Port Bureau

Captain Diehl discussed the Greater Houston Port Bureau's database for port information, which tracks ships moving in and out of Texas and provides the information to people who can use it to improve efficiency. They have been part of the global Avanti Group effort to develop a web portal providing standardized global port data. The web portal presents all of the available technical information for the port along with contact numbers, schedules, etc. Captain Diehl provided a demonstration of how the program works for scheduling an arrival. The next step will be to transition to Pronto, a dynamic program that incorporates dispatch information for prioritizing schedules and managing logistics. With this system users will be able to tell not only when the pilot is going to move the ship but if cranes and trucks will be available for cargo transfer. The efficiency of the Houston-area ports is key to the efficiency of partner ports. Partnering globally with other ports has allowed the Greater Houston Port Bureau to look at things like LNG bunkering and green initiatives, and see how ports in other countries operate. The goal of the effort is to create predictability for operators.

Captain George Pontikos, Vice President, Port Operations, Odfjell USA Inc.

Captain Pontikos presented an update on Lone Star Harbor Safety Committee (LSHSC). The LSHSC provides a public forum to address Marine Transportation issues with particular emphasis on navigation safety-related matters involving the ports of Houston, Galveston, Texas City, and Freeport, as well as the associated waterways of the Gulf Intracoastal Waterway and offshore lightering zones. The bulk of the work of the LSHSC is done through the subcommittees (Waterways Utilization, Navigation Operations, Dredging & Marine Construction, and Marine Education, Training, & Outreach) and working groups. Captain Pontikos provided an overview of the various subcommittees and working groups along with their objectives. He reviewed some of the Vessel Traffic Services' (VTS) accomplishments, such as redesigning the VTS area to include a third geographic sector that allows for better tailored traffic reports and greater watch-stander situational awareness. VTS is proud of their incident-to-transit ratio of about 5/10,000. VTS in sponsoring the Port Coordination Team that convenes to assist VTS after extended channel closures to facilitate the safe navigation of brown and blue water vessels via implementation of a transit traffic separation scheme for vessels impacted by an extended closure. LSHSC holds three-day educational conferences, called Brownwater University, to bring together stakeholders across all facets of brown water operations in the Western Gulf. Captain Pontikos provided a description of the ports' preparations for Hurricane Ike in 2008 and how they worked to evacuate, monitor, and restore the port after the storm.

Q&A

Mr. Simons was asked if he would support user fees to fund PORTS. He said he supports a cost-share between the federal government and the local sponsor, with the local sponsor continuing to contribute towards the cost of acquisition and expansion. He would be concerned about the risk of developing a Harbor Maintenance Trust Fund scenario that requires Congress to ensure funding gets into the ports. NOAA should be responsible for operations and maintenance.

Captain Diehl was asked if the Port Info effort he discussed aligns with other international efforts. He said that the sponsoring companies have control of it so he does not know for sure, but he assumes that they sought to synchronize with other efforts. He was also asked how data updates will be maintained. He said the sponsoring companies are paying for it now, but when the system goes to scale it will be monetized by users.

Captain Diehl was asked to describe a common operating picture for management transit port facilities and if there is any interest from other users, such as American Waterways Operators (AWO) or Gulf Intracoastal Canal Association (GICA). He described the Harbor Lights dynamic program and how it is used to schedule a ship's movement and prioritizing after fog-related delays. He also commented on efforts to install AIS on the International Space Station to get accurate ship arrival information several days in advance.

Mr. Hill was asked how the Marine Highway designation benefits inland ports. He said that it is necessary in order to be eligible for Marine Highway Grant funds. Chair Perkins asked if those grant funds could then be used for surveys or dredging. Mr. Hill said that generally they are used for equipment, but would find out if surveys qualify.

Captain Hickman was asked how important recreational boating and commercial fishing are in the region. She said recreational boaters are integral to the ports they go into and the marinas that house them. Fishing is an extremely large industry in the area. Fishing boats are one of the biggest fears pilots have when navigating in the fog because their boats do not have AIS and pilots have to monitor the radar instead. Captain Pontikos was asked what his primary challenges are in dealing with recreational boaters. He responded that, in his view, there are two types of recreational boaters: one type just goes out for fun and does not know the regulations or monitor what is happening around them; the other is the opposite and wants to go out as prepared as possible. How to alert the first group that something is happening is a challenge, but both groups need to have information easily accessible.

Captain Hickman was asked how long the transit is from sea buoy to the deep water draft berth furthest up the channel, what happens when weather changes en route, and if forecasting be valuable PORTS data. She said the transit is 56 miles; however there are cut-off points for certain drafts (only vessels with 36 feet of draft or less go to the furthest dock). A lot of variables are at play when weather changes, including how much opposing traffic there is and the quality of radar being used. If the pilot feels comfortable, they can finish the job, otherwise the only option is to go to anchor and wait out. Houston Pilots use a subscription weather service that monitors dew point, air and water temperature, and historical data. Forecasting is currently acquired from news and weather stations, and so it may not be that helpful to include in PORTS.

The panel was asked what limitations there might be to future growth and how these might be overcome. Captain Diehl said the port is not really congested for moving to an oil tanking dock, bulk dock, or break bulk dock. There are massive inefficiencies in moving chemical ships through because of the way the cargo is handled. Improved scheduling has demonstrated significant improvements in efficiency.

Public Comment

Philip Kropf, Texas Mariners Cruising Association, commented on the activities of his association in the Houston/Galveston area and some of the challenges of recreational boating. He described some of the instruments he uses regularly for sailing in Galveston Bay, the most valuable being a depth meter. He said that some of the artifacts, hazard markings, and spoil areas shown on charts are inaccurate artifacts. RDML Glang responded that removing things from nautical charts is very easy, NOAA just needs documentation of the salvage operation. Out of an abundance of caution, cartographers sometimes leave markings on charts and it takes time to conduct a full area survey.

Jon Dasler, David Evans and Associates, Inc., commented that, for boaters who are not mariners, it would be best to get information on devices they already have rather than expecting them to purchase new equipment. He also mentioned that he is seeing tide stations that do not list NAVD 88 and the tidal datums on them. It's really important for validating VDatum. Moving forward, looking at putting those observations into OPUS IDB would be really helpful for the engineering and surveying community. He encouraged the group not to forget about partnerships for NRTs. The update to the Gulf Coast plan will be key to coastal resilience moving forward, but at current funding levels the timeframe for completion is 120 years. More needs to be done to increasing funding for contracted work.

Adjournment

The meeting was adjourned at 3:38 p.m.

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Wednesday, March 16, 2016

The meeting was called to order at 8:14 a.m.

Chair Perkins welcomed HSRP members to day two of the meeting and reviewed the topics discussed on the previous day. One item that was missed was to acknowledge the service of the three outgoing HSRP members: Rear Admiral Evelyn Fields, Rear Admiral Ken Barbor, and Dr. Frank Kudrna. RDML Glang has prepared an official thank you letter to be sent to them.

Panel Discussion

Chair Perkins opened to the floor to the panel for further discussion/Q&A on the NOS program updates.

Member Lockhart responded to the question about how datums would affect nautical charting. All of the LIDAR systems currently collect on the ellipsoid as do many multibeam and acoustic collects. She asked Ms. Blackwell if the LIDAR data collected as part of the Coastal Mapping Program is going to OCS to be put on charts. Ms. Blackwell said all of their data is available to everyone including OCS. Things are in process now to determine how to best utilize the LIDAR data for charting purposes, this may fall under auspices of IOCM. Mike Aslaksen said that the challenge is getting the data into hydrographic and charting formats. Member Gee asked if part of the delay in getting it onto the charts is assessing the suitability of the data. Captain Brennan said the hydrographic branches have been processing LIDAR data for many years, the issue now is the sheer bulk of data coming in on top of the existing backlog of survey data. He said all of those surveys should receive an H number and be put in queue and processed as expeditiously as possible.

Member Gee asked how much impact the quality of shallow water bathymetry has on supporting surge models or other coastal modeling efforts. RDML Glang said that NCEI's resolution requirement for modeling is much coarser than what NOAA provides and for a lot of modeling they will take whatever they can get. Mr. Aslaksen said data collected from the Sandy Supplemental Funding is available on Digital Coasts but the modeling community says the resolution is too high and can't handle the volume. Chair Perkins asked if the Sandy topo-bathy collect data is assigned an H number and put into the NOAA

chart process or if it is only going into Digital Coast. Mr. Aslaksen said that everything that has gone to Digital Coast has been put in queue to be applied to the nautical chart.

Member Lockhart asked is measurements can be made from the oblique imagery being captured. Mr. Aslaksen said the data is geo-referenced and GIS-ready so it can be measured from. Some of the recommendations they have received on the El Nino collect include higher frame rates in order to get more overlap between images to do structure promotion analysis and getting a more oblique angle than the current 45 degrees.

Member Shingledecker asked the services directors what their biggest challenges are right now and how the HSRP can offer assistance. Mr. Edwing said his biggest concern is NOAA's ability to keep expanding the PORTS program. The workforce is already stressed keeping up with the existing system. Despite efforts to find new efficiencies, CO-OPS has had to tell customers that they may have to wait a year or two. Dr. Callender said one of the fundamental issues with the Navigation Services portfolio is the inability to recapitalize the aging fleet. A lot of days at sea are lost because of the difficulty in keeping the ships running. It is a huge ticket item and making a case for it is very political, but it is also fundamental to the work of NOS.

Chair Perkins asked if the current surveys in the Gulf Coast area are acoustic Doppler profiling or if they are buoyed devices and request more information about how those surveys are conducted. Mr. Edwing said they are acoustic Doppler profilers that capture the entire water column. The deployment methodology depends on the region the measurements are taken in; some use bottom mounts, some use sub buoys. Chair Perkins asked if the surveys are collected using NRTs, NOAA assets, or hydrographic survey contracts. Mr. Edwing said they have used contracts in the past, but as budgets have shrunk more in-house assets are used along with vessels of opportunity.

Member Saade asked about overlap among agencies processing LIDAR data and if it would make more sense to focus energy and expertise into a single office. Ms. Blackwell said NGS does a lot of coordination with other agencies from the executive level all the way down to the technical working group level. Through IOCM and interagency technical working groups, they have demonstrated that they have the ability to do it right and have the capability exist in different agencies. She said that there is value in having different groups engaged in topo-bathy efforts and would not advocate for pulling it all into one office in one agency. RDML Glang said he would invite Ashely Chappell from IOCM to give a presentation on interagency coordination on day three of the meeting. Member Lockhart commented that the work of Ashley Chappell and IOCM has been a sea change in how these agencies coordinate. Member Miller said that, while it has gotten better, coordination hasn't improved as much on the in-water side.

Vice Chair Hanson said that NOAA and NOS need to be survey-ready with a long list of needs and projects on-hand. Superstorm Sandy recovery efforts provided an excellent opportunity for coastal interests to show what they could do. Many projects were ready to start the week after the storm. It is also important to have a collaborative message that as many inefficiencies as possible have been eliminated.

Member Lockhart asked for further discussion on the workforce issues with the NRTs. RMDL Glang said they have changed the staffing profile for the six NRTs, going from two to three and changing the classification of one of the positions. Unfilled vacancies combined with the general difficulty of getting

workforce hiring packages through the system have exacerbated the issue. Four NRTs are being kept operational currently.

HSRP Working Group Reports

Joyce Miller, Chair, Legislative and Policy Working Group

Working Group Chair Miller reported. Three of the four working group members have rolled off of the panel since the last meeting. It was decided the Legislative and Policy working group would work with the Planning and Engagement working group. The Legislative and Policy working group will address the charter update when it comes due again in about a year and a half. The other item the group works on is the standard operating procedures, which will be updated as things happen. How long the Panel Chair's term should be and how the succession should proceed may need to be addressed. She suggested that new panel members read through the SOP to understand responsibilities and timeframes for panel actions. The working group is currently dormant in favor of preparing the one-pagers for publication, some of which are extremely time-critical.

Chair Perkins asked Dr. Callender if it would be best to get the paper in to the current Administration or hold it back and be prepared to delivery it promptly after the change in Administration. Dr. Callender suggested both and to get something to Dr. Sullivan or vice Admiral Brown as quickly as possible because of the FY2017 budget discussions underway. Chair Perkins will find out when the earliest opportunity to reach out to Vice Admiral Brown will be.

Dave Maune, Chair, Planning and Engagement Working Group

Working Group Chair Maune reported on the development of the one-page issue papers to be sent to the NOAA Administrator. The format for the papers includes: explanation of the issue and its status, challenges associated with the issue, current ongoing activities with the issue, and recommended federal actions in relation to the issue. A section on partners was added for the papers. Lead authors will be called upon later to explain their paper and work with the panel to try to finalize them. It will be up to the NOAA Administrator, current and incoming, to determine how to use these advice papers.

Member Brigham noted that the papers are not just internal documents, they will be published on the website and potentially used by congressional staffers and others on the Hill.

Member Saade volunteered to take over the Technology paper and requested five minutes in the agenda to discuss it. Member Maune suggested considering how technology can be used, in light of the backlog of hydrographic surveys, to get large areas on the chart.

Member Miller said that some of the recommendations she has reviewed have been very broad and not NOAA-focused. It is important to be clear about what NOAA can do.

Member Brigham suggested, given the complexity of some of the issues, only attaching some of the issue papers along with the Recommendation Letter and sending others later. Member Kelly added that the panel should inform the Administrator of the key topics that were identified and being worked on. He asked if the panel needed to wait until the next formal Recommendation Letter to send the additional papers. Chair Perkins said the panel can send them up at any frequency it chooses.

Member Kelly suggested segregating some of the topics while cross-referencing might help to abbreviate the length of the papers.

Lawson Brigham, Chair, Emerging Arctic Priorities Working Group

Working Group Chair Brigham reported on the activities of the Arctic working group. The working group revisited the Arctic report to address questions posed by Dr. Callender at the LA/Long Beach meeting and sent the finalized version to the Administrator along with the Recommendation Letter from the previous meeting. The Letter strongly suggested acknowledging or even taking action on the President's words about charting and hydrography in the Arctic. Working Group Chair Brigham asked if this process has been useful to NOAA staff. He believes it is a good model for the working groups to use for their issues. Dr. Callender responded that it was extremely useful from his perspective; the questions helped engage and focus the work of the panel into some larger strategic issues that NOAA wanted their opinions on. Mr. Edwing said he thinks it has been useful in two ways: coalescing the collective wisdom of the panel around key strategic and tactical issues, as well as providing a toolkit for the panel to educate and promote the activities of NOAA's Navigation Services to the public, Congress, and others. Chair Perkins said the Arctic report is the benchmark that each of the topics should try to match and observed how far the panel has come in how they operate and the value and timeliness of what they are delivering. RDML Glang said the document provided practical and actionable recommendations that NOS can follow up on to see if they bear fruit. NOAA has planned an Arctic Nautical Charting workshop to take place in Anchorage as a way to engage a wider group of stakeholders.

Working Group Chair Brigham said the working group will continue to meet. People think that because Shell and others have departed, nothing is happening in the US Arctic. A lot is happening in the US Maritime Arctic and across the whole Arctic. The working group needs to keep reminding NOAA that charting and hydrography should be the highest priority for Arctic issues. The linkage between this issue and acquiring new survey ships should also be emphasized.

Vice Chair Hanson said that the absence of oil exploration changes the dynamic of the discussion and other stakeholders need to be identified that would push for charting and hydrography. Member Saade said that there are cable route surveys and the Navy has a presence, along with several other activities.

Member Armstrong noted recent comments by the President on working with the Canadian Prime Minister to support safe and low-impact shipping, specifically issues with navigation data quality. This presents an opportunity for the group to focus its efforts with some specificity.

<u>Panel – Regional Vulnerability and Coastal Resilience</u>

Moderator: Gary Jeffress, Professor of Geographic Information Science; Director, Conrad Blucher Institute for Surveying and Science, Texas A&M University – Corpus Christi

Gary Magnuson, NOAA, introduced the panel assembled to discuss the risks facing the Houston/Galveston port area and the entire Texas Gulf Coast region. These include susceptibility to extreme weather events and flooding, coastal erosion and subsidence, challenging channel maintenance, hazardous materials transiting its waters, and the need to reinforce and modernize critical coastal infrastructure. The panel examined these challenges and discussed potential measures to reduce risk and improve resilience and recovery.

Dr. Jeffress provided some background for the discussion, starting with the Great Storm of 1900, the deadliest natural disaster in US history. The landscape of the Texas coast has been shaped by hurricanes. Another issues for the area is the importance of knowing where the ocean stops and the land starts. He discussed the court case that prompted the founding of the Texas Coastal Ocean Observing Network (TCOON) and establishing tide stations in order to find MHHW elevation to determine the legal littoral boundary. The other principle background issue for the Texas coast is sea level rise (SLR). The Galveston tide gage shows a 6.34 mm/year rise in sea level, though it is believed to be a combination of SLR and subsidence. GPS receivers have been installed on tide gages around the Gulf to directly measure the rate of subsidence.

Stephen Blaskey, Licensed State Land Surveyor, High Tide Land Surveying

Mr. Blaskey discussed the everyday use of tidal datums in land surveying in Galveston. The four main uses for tidal datums are determining the extent of private ownership in Texas, determining dredging and channel depth, wetland mitigation, and determining accurate elevation for structures within a flood zone. The practical applications of determining extent of private ownership include coastal boundary surveys, dune creation and mitigation, and shoreline stabilization. Tying private development projects to a tidal datum can help predict the frequency of dredging projects at several points in the future, which allows them to estimate future costs. Tidal datums are used in wetland mitigation because the elevation of the tide at MHW and MLW has a strong correlation with what types of vegetation should go where and how to protect the vegetation going forward. The last major reason for using tidal datums is to help plan where to put structures and how high to place them within a flood zone.

Mr. Blaskey went on to discuss the Texas Open Beaches Act and problems with the Severance case. The act originally provided a rolling easement that went from MLW to the line of vegetation along the beach and it was reserved for all public use. In 2012, Carol Severance sued the Texas General Land Office (GLO) on the validity of the act. She won but it was a constrained ruling stating that the state only had right to have an easement where one could be easily perfected. With the shoreline eroding, a prescriptive easement could never be established and the status of the open beach has been brought into question on the west side of the island of Galveston.

Ray Newby, Coastal Geologist, Texas General Land Office

Mr. Newby discussed coastal engineering concerns and implementation challenges for the future of the Texas coast. Texas has almost 400 miles of Gulf shoreline and more than 3,300 miles of Bay shore line; the 18 coastal counties represent 26% of the state's population. The Texas coast is the largest petrochemical complex in the world with 25% of the nation's refining capacity. Cruise, tourism (including ecotourism), and commercial and recreational fishing are significant components of the state's economy. The Galveston Bay wetlands have an estimated $6 billion value to fisheries, not including the ecosystem functional values derived from water quality purification and floodwater retention. But these ecosystems are in stress. Some of the top issues of concern include habitat loss and impacts to wildlife, shoreline and dune erosion, flooding and storm surge, and impacts to marine resources. The fundamental coastal engineering concern is the limited knowledge of coastal processes. These coastal processes include sediment transport, sediment budgets, inlet and beach dynamics, estuarine processes, and numerical model validation. The lack of cost-efficient sediment sources is a major concern for Texas, which is a sand-poor coast. Texas GLO has developed the TxSed Coastal Sediments Geodatabase

accumulating geotechnical and geophysical information from various sources to assist in regional sediment management. Additional coastal engineering concerns relate to climate change and relative sea level rise. There is wide variability in predictions for sea level rise which have significant implications for coastal protection and restoration. Most of the available sea level rise models are inundation models that use existing topography, but Texas shores are retreating an average of four feet per year with some areas experiencing losses of 30-40 feet per year. Implementation challenges include a lack of funding along with little planning to prioritize and allocate resources, increased coastal development, and a lack of public or political awareness of coastal needs. Texas GLO has signed a feasibility cost-sharing agreement with USACE for a $20 million study for the Texas coast within the context of coastal storm risk management and ecosystem restoration. Significant funding is coming to the area from the Deepwater Horizon oil spill settlement, the RESTORE Act, and the Gulf of Mexico Energy Security Act creating a generational opportunity to try to better address the issues of concern on the Texas coast.

Christopher C. Frabotta, Deputy Chief, Operations Division; Chief, Navigation Branch, US Army Corps of Engineers Galveston District

Mr. Frabotta discussed USACE's navigation mission and partnerships in the Galveston District. The USACE Galveston District Navigation Program is responsible for maintaining six deep draft jettied inlets along with 379 miles of the Gulf Intracoastal Waterway. 21.5% of all maritime commerce tonnage, domestic and foreign, travels through the Texas ports. Galveston has seen an uptick in O&M funding for navigation projects from $83 million in FY2007 to $155 million in FY2016. Planned activities for FY2016 include maintenance dredging and associated activities, placement areas improvements and beneficial use applications, hydrographic surveying, repairing coastal structures, reporting channel conditions, removing hazards to navigation, and coordinating with other institutions and agencies. Mr. Frabotta described some of the District's partnerships, including the Gulf Coast Joint Hurricane Response Protocol and TCOON. The Galveston District is using CBI and TCOON to transition to MLLW data, aligning USACE with NOAA and the Coast Guard. The Galveston District eHydro website presents all of the survey data for each of the federally maintained channels in Texas. These surveys are updated at a minimum of once per year. Another example of USACE's partnerships is related to the beneficial use of dredge material. The Houston deepening project created about 3,400 acres of new marshes.

Dr. Philippe Tissot, Associate Director, Conrad Blucher Institute for Surveying and Science, Texas A&M University – Corpus Christi

Dr. Tissot discussed relative sea level rise around the Gulf of Mexico and the impacts from nuisance flooding to large surges. He presented a comparison of water levels measured over the previous ten days with the tidal predictions to demonstrate the impact of wind and atmospheric forcing along the Texas coast as opposed to tides, and that tidal predictions do not meet NOS standards for water level predictions anywhere along the coast. The Northwest Gulf of Mexico is home to the largest rates of relative sea level rise (RSLR) in the US. Dr. Tissot discussed methods to quantify, compare, and communicate future changes in inundation frequencies. There are substantial differences in surge ranges and distributions depending on location, in large part related to the extent of the continental shelf offshore of the study stations. He compared the spatial variability of RSLR impact assuming an increased eustetic SLR of 60cm between 2011 and 2100. Better statistics are needed to help the coastal managers and tidal datum

inundation frequency could be helpful. There is significant variability in estimated RSLR even within small areas. Better means of communicating inundation frequency levels are also needed.

Christopher McHugh, Survey Technician, TerraSound Limited

Mr. McHugh discussed the educational and career pathways for hydrologists. He discussed the history of hydrography and described what present day hydrographers are capable of capturing. We live in a dynamic world – the coast is an ever-changing place. Modifications like seawalls or levees create environmental changes elsewhere. It will be a constant struggle to control and measure the impacts of those changes. Mr. McHugh discussed the importance of informing boaters about the limitations of the charts. Recreational boaters are traveling along shorelines and into marsh inlets where there is so much dynamic change that it is almost impossible to keep the charts up to date. A key issue for the future of hydrography is: What kind of education are hydrographic students getting today? There are very few formally trained hydrographic degree programs in the US and only three that are recognized by the IHO. He gave an overview of these programs and stressed the need for more in order to enhance the hydrographic workforce. From his own inquiry, less than 25% of private industry employees have any formal training in hydrography. The only professional certification offered in the US is the ACSM/THSOA Hydrographer Certification Program.

Q&A

Mr. Blaskey was asked about the source of Open Source GIS he is using for his records project. He is using the Quantum GIS platform because it is readily available and free. He has also experimented with Manifold GIS and the ESRI suite.

Mr. Blaskey was asked how the replacement of NAD 83 and NAVD 88 will impact his work. He said that as long as there is a straight conversion, it won't.

Mr. Newby was asked if the Texas Coastal Resiliency Plan is incorporating natural infrastructure. He said they do have a preference for soft solutions, like wider beaches and wetland buffers, over hard structures. They are also looking at non-structural solutions, such as code changes and relocations or buy-outs.

Mr. Newby was asked what is needed to produce a more precise inundation visualization prediction model. He said more hydro data, LIDAR data, 3D building and impervious information. One thing limiting inundation and morphological models is the lack of reliable vertical data.

Mr. Newby was asked if he is incorporating sea level trends into projects susceptible to SLR. He said most wetland restoration projects are on a 20-year planning horizon, and they are incorporating enough elevation to allow for SLR in some of the designs so that vegetation will survive. USACE studies have a 50-year planning horizon and are required to consider several different SLR scenarios.

Mr. Frabotta was asked what sensor he uses for hydrographic post-dredge surveys. He said it depends on what the survey is for. Post-dredging surveys typically use single-beam and run cross-sections on the channel because the Texas coast has soft bottom channels that lay out very flat and the data from single-beam is easy to work with. When looking for navigation hazards they will use side scan multibeam.

Mr. Frabotta was asked how long it usually takes to get survey results into eHydro. He said they are required to have the results uploaded within 5 days.

Mr. Frabotta was asked how he has engaged port coastal communities on the impact of changing the datum and how have they responded. He said the Corps has been working on the conversion for about six years and have an annual dredging conference to brief stakeholders. About half of the Houston/Galveston/Texas City complex is now converted now and the rest is expected to be converted by July. In addition to attending public meetings and conferences, USACE has created a public notice for the whole Texas coast on how to convert permits to the new vertical datum.

Mr. Frabotta was asked if NOAA is able to apply eHydro survey data to the charts in a timely manner. He said that USACE officials are ensuring that NOAA can import the data and will be alerted when data is available. He was also asked if the survey data is currently being picked up by other users and displayed on other websites. He said he is aware of harbor pilots using it and that they hired companies to help them put it on their chart plotters.

Mr. Frabotta was asked to briefly discuss approval process timeline for the region's ambitious channel deepening projects. He said it has been a big problem for USACE that some of these projects take 12-20 years to get approval. He described how ports have used Section 204 pay for deepenings themselves. The Corps' planning process has undergone some improvements but more remains to be done.

Mr. Frabotta was asked if USACE's post-hurricane hydrographic surveys coordinate with NOAA's NRTs. He said USACE is in charge of restoring navigation within the federal channels and coordinating surveys. The team, which includes Coast Guard, NOAA, brown water industry, and harbor pilots, all provide input on recommendations to the Captain of the Port.

Mr. McHugh was asked what he believes is the biggest challenge to getting today's students interested in hydrography. He said that they don't hear about the profession until it is too late and they have chosen their career track. Early exposure and basic knowledge are needed.

Mr. Frabotta was asked who he believes should regulate hydrographic surveys. He said he thinks some kind of licensure is needed and a requirements that surveys have to be reviewed by a registered hydrographer surveyor.

Public Comment

Jon Dasler, Dave Evans and Associates, commented that there is a national certification program, but it is a recognition by peers not a license to practice. Many states require that the work be done under a professional surveyor. Moving forward, academic programs should prepare students to take the National Council of Examiners for Engineers and Surveyors' Fundamentals of Survey exam, which starts the track towards professional registration and would benefit the nation. He also commented on underwriters as a funding avenue following closure due to crowding vessels blocking entrances. He said that nearshore bathymetry is needed in the Gulf to enable predicting where oil spills are going to progress. There is also a lot of inaccurate nearshore data on charts. He said that OCS does a great job with the resources they have available, the issue is that it shouldn't take a hurricane supplemental in order to find problems and correct the chart; the bigger problem is how the program is funded.

Discussion

Planning and Engagement Working Group – Issue Papers

Member Miller presented the issue paper on recapitalizing the NOAA hydrographic fleet. The original design life was about 30 years, and they are now operating well beyond that. The latest Presidential budget included $80 million for a new NOAA ship, which is not nearly enough for a new ship, but she understood that the FY2017 budget will include a similar appropriation for outfitting the new ship. Since then there has been great uncertainty inside of NOAA as to what kind of ship the funding will be applied, a general oceanographic ship, hydrographic ship, or potentially two fishery ships. She read a draft of the paper and panel members provided editorial comments. NOAA staff provided statistics and the publication department will make final improvements. Chair Perkins suggested that the Administrator is familiar with the issue and the paper should be shortened and more succinct. Members suggested putting the bottom line up front and presenting the data graphically (showing the diminishing productivity and monetizing it), and including the 200-year backlog. Captain Brennan said the IWGFI report on the national research fleet is expected to clear the White House Office of Science and Technology Policy within a week. Also, the OMAO Fleet Recapitalization Plan will also be released soon. The Independent Review Team is looking critically at the non-fisheries side of the fleet to understand where the needs are. These will be directly relevant to the efforts of the working group.

The panel unanimously consented to recommending full funding for a replacement hydrographic survey vessel. The primary objective guiding the rewrite of the paper is the competition for the ship funding and so it is necessary to make the case for a hydrography vessel. Member Brigham suggested not limiting the wording of the request to a single ship. Chair Perkins said he felt that asking for the single ship is a compromise position in anticipation of political opposition and acknowledgment that not everyone in the hydrographic community is in favor of vessel replacement. Member Armstrong proposed saying that this is the most pressing need in NOAA fleet replacement, which does not rule out other needs. Several issues related to fleet recapitalization were excluded from this limited issue paper but will be included in a longer document. The longer document may be of great value to the transition team and the next Administrator and will remain relevant even if a hydrographic vessel is not funded.

Mapping the US Maritime Arctic Issue Paper

Member Brigham said the issue paper is built upon extensive study and is consistent with what the HSRP has recommended. A few numerical statistics remained to be validated, such as how much of the US maritime Arctic is mapped to modern international navigation standards. Member Hall said the paper needs some context upfront for why 1% is bad and suggested adding some mention of all the activity happening in the Arctic. Member Brigham did not wish to give the impression that the current operations in the Arctic were hampered by the lack of charts, simply that future operations may be constrained. Member Saade said that if there were adequate charts, the operators may conceive a more efficient approach. Member Brigham said that modern charts are also enhancing marine safety, environmental protection, and other benefits. Member Saade suggested raising the recommended annual line item budget of $20 million because it will always be cut; $30 million is not big number for being productive in such a challenging environment during such a short season. Raising the annual minimum survey rate of 500 square nautical miles was also suggested. Member Lockhart said that square nautical miles are greatly affected by depth, so it is a very difficult number to use for survey progress rates. She suggested

qualifying the number of square nautical miles with an average depth. To avoid complications, members agreed to use square nautical miles recognizing there may be some technical issues with it.

Recommending a database for seabed ice gouging for laying telecommunications cable, pipelines, science cables, or anchorages and construction activities was added to the list. Vice Chair Hanson wanted to add to the list of partners stakeholders mentioned in the paper itself. Brigham said the list of partners could be very long, but would look into including others.

Hampton Road Pilot Project Issue Paper

Member Atkinson reported provided background on the project and the whole of government/whole of community approach to coastal flooding. The Hampton Roads area has 17 key DoD sites in a particularly vulnerable area. The project has gotten a lot of attention for being a model of coordination among federal agencies and working with communities. Member Maune suggested adding federal partners to the paper. Member Brigham suggested recognizing the strategic aspect, including having the largest Naval base in the world and a large shipyard that builds aircraft carriers.

Ports and Harbors Issue Paper

Member Kelly said that this issue involves a lot of overlap with the cruise and megaship issue papers, so they will collaborate and reformat the papers. The key issue is that adequate resources are needed to update the surveys in all major navigational areas. He reviewed the recommendations of the letter and provided some context from his own experiences. Member Maune asked if, for issues that are partly the responsibility of NOAA and partly of USACE, there is a way to separate out what is relevant to the Administrator. Member Kelly didn't think that was necessary; this is what NOAA needs and if NOAA needs partners to achieve it, then that's part of the charge we make to them. USACE is listed first in the partners section. Member Miller said that going straight for PORTS funding has not been successful and suggested enhancing precision navigation capabilities. Member Brigham thought the paper was broad and covers a wide variety of users; precision navigation is a separate issue that will be discussed later. Member Kelly said precision navigation for larger vessels is of utmost importance, but they're not the only ones using the ports. If the issue is ports and harbors the paper to address all users, to include security and resiliency issues. Member McIntyre said that not focusing on PORTS as being a critical part of port and harbor operations would be a big mistake. Member Rassello suggested including a recommendation for coordinated effort between the ship's operator, the pilot, and VTS working under one common platform. Vice Chair Hanson asked Mr. Edwing if NOAA has ever developed a plan to manage PORTS as a fully funded federal system. He answered yes, and Vice Chair Hanson asked if that was something worth adding as a specific bullet point, including cost estimates and organizational specifics. Mr. Edwing suggested simply stating that PORTS should be implemented more strategically and a more sustainable business model should be developed.

Recreational Boaters Issue Paper

Member Shingledecker circulated an early working draft of the paper. The needs of the more than 12 million recreational boaters vary greatly. She wants to emphasize that recreational boaters are not commercial boaters and meaningful information needs to be easily accessible. She is trying to figure out

the appropriate level for recommendations. Members were asked to email suggestions to Ms. Shingledecker.

Defense Community Issue Paper

Vice Chair Hanson said this topic has morphed into getting people to consider ports and waterways as national security and homeland security issues. He is still grappling with the issue and what it means and would like to continue working on it. Additional help would be appreciated. Member Maune asked if the Navy is conducting hydrographic surveys that they are not sharing with NOAA. RDML Glang said that that is not his understanding. The Navy operates mostly in areas outside of US EEZ, but anything they can share from US waters they do. Member Brigham said Arctic issues should be worked into the Defense topic.

Technology Issue Paper

Member Saade said the lead-in for the issue is the size of the backlog and the need to accelerate processing it. The areas listed as needing further development include: improving acquisition, autonomous surface vessels, unmanned aerial vehicles, next generation tide gages, data transfer, cloud-based solutions, product delivery, partnerships, climate change, and Arctic focused connections. Methods for contract modification may be needed to allow for the transfer of technology. By definition, this topic is going to be very technical; Member Saade asked if he should we find a way to discuss it without getting into the weeds. Member Thompson suggested defining the acronyms. He also suggested considering looking into a BIM platform. Member Brigham said the topic is larger than just an issue paper and the panel should consider establishing a Technology working group. Others agreed and said that much of what is being discussed could be taken up to a tactical and strategic level. He also wanted to look at how to bring everyday technology, like apps, into the realm of hydrography. The value of openness in the platforms that NOAA works in and the criticality of human resources were also mentioned. Chair Perkins made a motion to form a working group on technology and Member Maune seconded. The motion passed unanimously. Member Saade will develop a purpose statement for the scope of the working group.

Replacement of NAD 83 and NAVD 88 Issue Paper

Member Thompson discussed the paper on the transition from a plate-fixed datum to a geometric and geopotential reference frame in 2022. Users need to be prepared because this will be different from previous datum updates. He discussed the challenges and recommendations for how NGS can assist to make the transition smooth and efficient, including bringing together users of this information to determine the best approach. Mr. Edwing requested that this be expanded to include the Tidal Datum Epoch and IGLD updates. He also championed an effective communications and outreach campaign. Member Lockhart asked if GRAV-D needs to be mentioned somewhere in the paper. Chair Perkins asked if NGS will be the authoritative source for the conversion to the new datum. Ms. Blackwell said they are and they are working with USACE and other agencies on conversion tools, making sure they are accurate and easy to use. Member Gee suggested ensuring that commercial developers are using the correct conversions.

Panel Discussion - HSRP Response to Dr. Callender

Member Miller presented the panel's responses to Dr. Callender's list of questions. The Coastal Resilience/Coastal Intelligence working group lacked clarity on the terms of reference. CI/CR Working Group Co-Chair Lockhart said she felt they may just be buzzwords for things the panel is already talking about. The terms may be useful when requesting funding, but shouldn't necessarily be a driver for panel discussions. HSRP's time is better spent on issue papers. Member Brigham disagreed that the concepts would disappear with a new Administration. The CI/CR Working Group Co-Chairs both felt it would be best to dissolve the group.

The responses for the other questions were reviewed. Member Hall suggested using stakeholder demand signal as an additional criterion for prioritizing ports for precision navigation. Member Brigham felt the HSRP should not comment on marketing NOAA beyond the Navigation Services. Mr. Edwing said that OMB guidance states that taxpayer-funded data needs to be made freely available to the public, so NOAA could not engage with a commercial entity seeking to finance PORTS for profit.

Adjournment

The meeting was adjourned at 5:06 p.m.

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Thursday, March 17, 2016

The meeting was called to order at 8:13 a.m.

Chair Perkins welcomed HSRP members to day three of the meeting.

Overview and Discussion of Day Two

Chair Perkins reviewed the panel's activities from day two, thanking Dr. Jeffress for assembling a very informative panel. He reviewed the business actions for the third day of the meeting. In honor of his upcoming retirement, Member Miller commended RDML Glang for his 33 years of service with NOAA and presented him with a small token of the panel's appreciation and respect.

Update on IOCM Activities

Ashely Chappell, IOCM Coordinator, Office of Coast Survey, NOAA

Ms. Chappell provided an update on the recent activities of the Integrated Ocean and Coastal Mapping program. NOAA is working with many agencies toward developing a singular mapping plan and increasing efficiency/reducing duplication of efforts. The first stage of the National Coast Mapping Strategy builds upon the existing work between NOAA, USACE, and USGS at JALBTCX, and has cleared OMB after deleting the aspirational piece of surveying the entire US coast with topo-bathy LIDAR on an 8-year cycle. Other pieces have remained intact, such as quality levels and an annual mapping summit. It will soon be released for public comment. Linked to this effort is the online coordination site, SeaSketch.org. This tool is designed to link people who need data in a particular area with people who have plans for acquiring it. Ms. Chappell provided a demonstration on the utility of the tool. The JALBTCX Work Shop is the home base for the Annual Coastal Mapping Summit. Last year's

summit in Oregon included about 100 participants in person and 60 joining by webinar. In addition to federal agencies (USACE, FEMA, USGS), there was significant interest from the private sector, academia, and states. The summit taught organizers that a more regional focus is necessary and in the future they will be latching on to regional meetings that various agencies are hosting.

RDML Glang added that the Ocean and Coastal Mapping Integration Act is due to be reauthorized and if the panel views the IOCM and the interagency coordination it has supported as important, it would be terrific if they would express that. He was unaware of anyone currently championing reauthorization. Chair Perkins asked if there was a legislative opportunity to combine the reauthorization of IOCM with the Digital Coast Act. Ms. Chappell responded that the Digital Coast Act states that it is in conjunction with all of the existing laws including Ocean and Coastal Mapping Integration Act.

Member Gee asked if the tool incorporates all of the surveys that have previously been done. Ms. Chappell said it does include an "existing data" option that links to existing data portals, but it does not include every data source. RDML Glang added that SeaSketch harvests the data from archives. IOCM is looking into building another component to the tool that would be coupled with the crowdsourced bathymetry database effort to highlight areas where uncertainties/gaps exist and where the crowd may help NOAA to improve the charts.

Vice Chair Hanson asked where the funding for SeaSketch comes from and how much it costs. Ms. Chappell said the initial funding came from Sandy Supplemental Funding. It was developed by UC-Santa Barbara and built on web services. The total cost so far has been about $60,000. RDML Glang added that there is no base funding dedicated for IOCM, it comes out of NOS' mapping and charting base for the program. Vice Chair Hanson said it would be valuable to highlight this given how important the work is for the overall mission. He said that the next step should be to have an example of where this collaboration has resulted in cost savings and more comprehensive surveys. Ms. Chappell provided one example of this following Hurricane Sandy and said there have been several instances of small estuarine reserves benefiting by getting ongoing projects to extend their surveys slightly to acquire data on their NERRs.

Ms. Blackwell asked Ms. Chappell to expound upon FEMA's engagement with this process. Ms. Chappell said that FEMA is one of the more active IWG-OCM participants and she believes they will be growing more interested in topo-bathy LIDAR as the coastal-nearshore interface becomes even more important to their efforts. After some initial pushback, FEMA has become a strong proponent of SeaSketch.

Chair Perkins asked what was objectionable about the 8-year cycle of topo-bathymetric LIDAR of the nation's coasts that led to it being discarded from the strategy. Ms. Chappell said that it may be that OMB, representing the Administration, did not want the public to assume that the government could pay for the cost of an 8-year cycle of topo-bathy LIDAR mapping. It was conceived as being something a collaborative effort could aspire to, but OMB did not want to give the wrong impression. Chair Perkins said that it seems like a great strategic initiative to have in a national mapping strategy.

Chair Perkins also commented that in-land projects are now acquiring topo-bathy data and encouraged Ms. Chappell to reach out to the Bureau of Reclamation and other potential interior stakeholders. Ms. Chappell said that the IWG-OCM has teamed up very strongly with 3DEP to the point that they now have

an overarching umbrella initiative called 3D Nation, aimed at creating a seamless nationwide elevation data set. The Bureau of Reclamation and the National Soil Conservation Service are partners in the effort.

HSRP Nominations

Panel members moved and seconded the following nominations: Bill Hanson as HSRP Chair; Joyce Miller as HSRP Vice Chair; Ed Saade and Lindsay Gee as Technology Working Group Co-Chairs. Chair Perkins moved to accept the slate of nominations in its entirety, Member Maune seconded the motion. The slate was approved unanimously and will go into effect at the conclusion of the present meeting. The title of Past Chair will be informal until such time that the charter is revisited and established as an official position.

Planning and Engagement Working Group - Issue Papers

Fleet Recapitalization Issue Paper

Member Miller presented the revised issue paper which incorporated the panel's input from the previous day. The panel contributed some additional editorial comments. The accuracy of the information contained in the letter will be confirmed by NOAA staff as well as any further editing that may be required. It was decided to remove the partners section from the paper given the sensitivities and urgent time frame. Chair Perkins moved to adopt the issue paper, subject to final editing and validation; Member Miller seconded. The motion passed unanimously.

Urgent Letter to the NOAA Administrator

Dr. Armstrong presented for the panel's consideration a draft letter from the HSRP to the NOAA Administrator on the issue of funding for fleet replacement. The letter covers one specific topic: to urge the Administrator to use this year's available funds for a hydrographic vessel. Member Brigham expressed some concern that the letter assumed to know the most pressing needs of NOAA; the HSRP may not be qualified to make such a strong statement. Member Miller noted that NMFS has five fishery vessels all under five years old and she felt certain that the most pressing need was for a hydrographic ship. Member Shingledecker suggested incorporating the fleet age data, if it could be done quickly. Chair Perkins was comfortable with the statement and thought bringing in more statistical data was unnecessary. Adding "Arctic-capable" and "multiple launch carrying" were considered necessary and beneficial additions. The letter will be a standalone document, not attached to the issue papers. Member Miller moved to adopt the letter subject to further grammatical edits and addition of bulk signatures; Member Brigham seconded. The motion passed unanimously. The intent is to distribute the letter within 72 hours.

Hampton Roads Pilot Project Issue Paper

Member Atkinson presented the working group's issue paper explaining that many coastal regions are experiencing increased flooding and encouraging NOAA to facilitate federal coordination to address this. The Hampton Road Pilot Project provides a model for these activities. Member Atkinson will continue to condense the body of the letter which mostly concerns a description of the project. Members provided editorial comment. Member Maune encouraged the lead authors to write their papers with a compelling first sentence, getting attention upfront and clearly spelling out the ask of the paper.

Mapping the US Maritime Arctic Issue Paper

Member Brigham said that the panel's comments have been incorporated into his issue paper and the technical points have been tweaked to state that 4.7% of the US Maritime Arctic has been charted to modern international standards. HSRP members will have the opportunity to comment further on the revised draft.

Discussion

Megaships and Cruise Ships

Member Brigham presented the issue related to the challenges of larger ships operating in America's ports. The issue was prompted by the ultra-large container ship Ben Franklin coming to dock last December, the largest ship ever to come to an American port. The megaship is 1,310 feet long, weighs 178,000 tons, and has a 177 foot beam. From water level, the height of the ship is 197 feet and it barely cleared the Golden Gate Bridge. Two ultra-large container ships smaller than the Ben Franklin have grounded in Europe, highlighting the issue of megaships. Mr. Edwing noted that the current vertical clearance for the Golden Gate Bridge is 199 feet, which can change up to two meters based on traffic loads and heat, making the case for the PORTS system's air gap gages. Member McIntyre presented comparison slides to demonstrate the enormous size of the megaships and showed videos of the Ben Franklin going in and out of port. She further discussed some of the complications with bringing in the ships.

RDML Glang commented on the variety of PPUs used by San Francisco pilots including not using anything. Member McIntrye said using nothing is really being discouraged and her group is using an AID-based PPU system developed in conjunction with the Volpe Center that layers multiple types of information from various agencies. RDML Glang said that it would be good for the panel to provide their input on what products it would envision being useful for handling megaships. Data interoperability was cited as a key principle.

RDML Glang asked how ports decide what the upper limit is for vessel size. Member McIntyre said that when a new ship is coming into port, all of the stakeholders involved will hold pre-planning meetings to assess all of the factors. There are guidelines and parameters in place, but the ultimate decision is left to the pilot organization, with over-riding safety concerns from the Coast Guard. Member Kelly said that the real constraint is the configuration of the port itself. He added that anyone who says ships can't get any bigger is probably wrong and the challenge of technology against physical constraints of ports is going to continue. Member Brigham agreed but added that these ships present physical challenges that are going to demand larger, deeper ports – the groundings demonstrate that ships are at the max for now.

Port Infrastructure and Hydrography

Member Rassello presented on the issues of available depth of water and dredging concerns versus dynamic draft that takes into consideration squat and heel angle, the desire for better instrumented ports (Port ECDIS), and the coordination and standard systems for precise eNavigation. He explained how he arrives at his calculations for under keel clearance coming into a new port, particularly how squat is figured. Prismatic channels create additional challenges for pilots. Carnival Cruise Lines uses the PORTS system where available, but in areas of the Caribbean it is not and navigation is left to the mariner's skill.

Within ports, cruise ship operators are very restricted in their maneuvering and so good assessments need to be made in advance.

Member Rassello asked NOAA to consider improving the resolution of charts in channels. He emphasized that high resolution topographic and bathymetric data needs to be incorporated into the mapping because larger vessels have very little tolerance for wind within channels. Member Armstrong asked if, instead of topography, a higher resolution wind model would be helpful. Member Rassello said it would be. He would also like to see higher resolution ENCs. NOAA data streams can support a precision navigation support tool, such as PROTIDE. His vision for the future of navigation includes Port ECDIS and a harmonized coordination between the ship's operator, pilot, association, and VTS working on the same ECDIS navigation platform.

Member Armstrong asked how the Zone of Confidence number is arrived at. Member Rassello said the calculation is done through the simulator along with a captain's experience.

Member Brigham said that follow-on actions would be to integrate precision navigation into the issue papers. HSRP members, particularly the captains, should review the NOAA paper on precision navigation to come up with language better attuned to these issues.

RDML Glang asked how captains make their decision when they are bringing their ships into USACE-surveyed federally maintained channels whose standards don't necessarily support the CATZOC definitions that captains rely on. Member Rassello said that he takes into consideration all the data but in the end doesn't trust any data points; the numbers are there and have been verified but a buffer is needed on top of that according to the conditions of that day and that ship. Some areas need to be analyzed in real-time, such as Mississippi River, particularly as ships get bigger. Member McIntyre said she uses USACE data sets every day and finds them to be very reliable. Where it becomes critical in passage planning is having real-time information, particularly water level information. Member Armstrong said that the goal for eHydro is to get the USACE surveys into a digital form in near real-time from when they get them. Eventually it is hoped that these could be delivered in a unified navigation product from NOAA. RDML Glang presented a high-resolution multibeam survey of the Charleston Harbor displaying a variety of details that are not visible when using USACE single-beam engineering surveys. A grid built from this data is what is needed to support a port-scale ENC.

Member Brigham reemphasized Member Rassello's comment about harmonizing the information.

Public Comment

Jon Dasler said it is not a matter of accuracy with USACE data but rather timeliness. Having their sounding set on an overlay to see what is currently happening in rivers is what precision navigation is all about - full coverage object detection as well as temporal changes. Member Armstrong agreed and said that in some places the multibeam is more important and in others the timeliness is more important. Mr. Dasler added that Columbia River surveys are done following the spring freshet and single-beam surveys miss several obstructions. Member Gee said that harbors like the Port of Rotterdam do surveys every day and could provide a model for a more comprehensive approach. Member Kelly suggested that NOAA look at comparable models in other industrialized international deepwater ports. Many smaller coastal countries recognize the importance of coastal traffic and their national budgets reflect that. Vice Chair

Hanson said that the work is getting done and USACE is very responsive; the missing piece is how to get it into the NOAA mandate. Captain Brennan said that NOAA does get those surveys but what gets charted is determined by the user group's needs. If mariners feel that putting soundings in the channel is critical (and at a higher resolution), that would be a helpful recommendation. Right now, however, NOAA is guided by what is in the CFR and how those get calculated. He added that he thinks the CFR is in dire need of being updated. Mr. Dasler said it's not just in the channel, the Columbia has a 100-mile transit so anchorages are at a premium. NOAA could really assist on the effort of finding where additional anchorages could be found and getting that information into a PPU.

Chris Freeman, Geodynamics, provided an online comment on the value of low cost systems, such as X Band radar, in natural inlets that serve smaller ports. This reduces maintenance costs by increasing knowledge of trends so management can be more efficient.

Todd Mitchell, Fugro, provided an online comment commending Ms. Chappell's work with SeaSketch but that the breadth of communication remains largely at the federal level. Local level agencies are collecting both topographic LIDAR and oblique imagery. Despite being a large undertaking, he strongly recommended getting involvement of local agencies to bring more resources to the program as well as ensure more use and value is derives from the work that is being done.

Discussion on Existing Working Groups

Chair Perkins reviewed the expectations of the current HSRP working groups. He asked if the Legislative and Policy and Planning and Engagement working groups could be combined for the sake of efficiency. Member Miller said the Legislative and Policy working group is a sporadic need and nothing is particularly compelling right now, but in a year the charter will need to be reviewed. Chair Perkins said the topic of recommending an update to the CFR raised by Captain Brennan may require the working group's efforts. RDML Glang said that OCS' efforts through eHydro in getting the information NOAA wants from USACE is where the majority of the work lies. Updating the CFR is a bureaucratic follow-up that will happen in due course, but the key is to get the substance of the relationship steered where it needs to go. Chair Perkins recommended communicating to Mr. Nyberg that the eHydro monthly users webinar for stakeholders hosted by the USACE Portland District is an opportunity for access and that whoever is going to be the user on the marine charting side of NOAA should get involved with those meetings. Member Miller made a motion to discontinue the Legislative and Policy working group and Member Maune seconded it.

The Planning and Engagement working group and the Emerging Arctic Priorities working Group will continue on. Working Group Co-Chair Atkinson said that the Coastal Intelligence/Coastal Resilience working group is looking to be dissolved. RDML Glang suggested the group use its response to Dr. Callender's six questions as a way of closing out the working group. Member Brigham said that this is a good example of why clear direction and definition is necessary when working groups are being established. The Technology working group was created along with a mission statement and will produce a report for the next meeting. Member Kelly moved to adopt the Technology working group objective statement as presented; Member Maune seconded it. The motion passed unanimously.

Next Meeting

The panel decided that its next meeting will be held in Cleveland, Ohio, on August 30-31, with an optional third day for an HSRP site visit. Member Miller suggested that, if it's going to be a two-day meeting, the agenda should be minimized with the first day being the public engagement session and the second reserved for panel work. Other members stressed the value of local interface and the educational component of the field trips. Chair Perkins moved to accept the plan for the next meeting; Member Miller seconded. The motion passed unanimously.

Recommendation Letter to the NOAA Administrator

The panel went around the table gathering suggestions for inclusion in the letter. These included:

- Addressing the importance of the next HSRP DFO being a hydrographer
- Addressing the workforce challenges that NOS has been experiencing, staffing of the NRTs, and the delays in getting panel members fully processed
- Point out that stakeholders view the PORTS system as an essential service
- The importance of tracking sea level rise and nuisance and serious flooding in the Gulf area
- The value of NRTs
- NOAA being one of the four corners of maritime governance
- Thanking the Corps, NOAA, USGS for collaboration and the push towards getting more data into stakeholders' hands
- The need for efficient access to data without having to go to multiple locations
- Including language that recognizes NSRS-supported navigation issues outside of marine transportation
- Mention of the new working group on technology and why it was created
- Reiterate the concern about Arctic hydrography and geodetic/oceanographic measurements, highly recommending a line item in the budget for those efforts
- The voluminous data and information available to the maritime industry
- The urgent need for a new hydrographic vessel
- Point out that ports are in crisis due to the megaships and it is necessary to proceed as rapidly as possible for the production, refinement, and installation of precision navigation tools
- Making a statement on the reauthorization of the Ocean and Coastal Mapping Integration Act

The issue papers that are completed will be attached to the letter and sent to the Administrator. The panel should rank the recommendations in order of importance and keep to the top three. Member Brigham said the HSRP should not be constrained to three recommendations, but maybe make more concise recommendations. Chair Perkins agreed that a long letter is not necessarily a bad thing. Members made suggestions on how to frame the letter and Member Miller drafted an early version of the letter. The draft will circulate within two weeks amongst HSRP members for comment.

Members discussed developing new issue papers. Member Maune expressed concern about the process of having these go out for comment between meetings given that no feedback was received on Member Miller's paper and then there was a lot of feedback during the meeting. Member McIntyre said she would like to create an issue paper on the utility of the PORTS system. Member Miller suggested adding precision navigation to that paper. The Technology working group will take up the integration of data challenge.

Adjournment

Vice Chair Hanson congratulated RDML Glang on a very honorable career with NOAA and thanked Chair Perkins for his service on the HSRP. The meeting was adjourned at 1:22 p.m.

HSRP VOTING MEMBERS IN ATTENDANCE:

Larry Atkinson, Ph.D.	Professor of Oceanography, Old Dominion University, Virginia
Lawson W. Brigham, Ph.D.	Professor of Geology and Arctic Policy, University of Alaska Fairbanks
Lindsay Gee	Independent Hydrographic Consultant
Kim Hall	Director of Technical and Regulatory Affairs, Operational and Security, Cruise Lines International Association
William Hanson, Vice Chair	Vice President of US Business Development, Great Lakes Dredge & Dock Company
Edward J. Kelly	Executive Director, Maritime Association of the Port of NY/NJ
Carol Lockhart	Owner, Geomatics Data Solutions
David Maune, Ph.D.	Senior Remote Sensing Project Manager, Dewberry Consultants
Captain Anne McIntyre	Columbia River Pilot
Joyce E. Miller	Certified Hydrographer
Scott R. Perkins, HSRP Chair	Director Federal Programs, Surveying and Mapping, LLC
Captain Salvatore Rassello	Director, Nautical Operations, Carnival Cruise Lines
Edward J. Saade	President, Fugro, Inc.

Susan Shingledecker	Assistant Vice President and Director of Environmental Programs, BoatUS Foundation for Boating Safety and Clean Water
Gary Thompson	Chief, North Carolina Geodetic Survey

HSRP NON-VOTING MEMBERS IN ATTENDANCE:

Andy Armstrong	Co-Director, Center for Coastal and Ocean Mapping, Joint Hydrographic Center, University of New Hampshire
Juliana Blackwell	Director, National Geodetic Survey, NOAA
Rich Edwing	Director, Center for Operational Oceanography Products and Services, NOAA

HSRP NON-VOTING MEMBERS NOT IN ATTENDANCE:

Larry Mayer, Ph.D.	Director, Center for Coastal & Ocean Mapping; Co-Director, Joint Hydrographic Center, University of New Hampshire

DESIGNATED FEDERAL OFFICIAL:

RDML Gerd F. Glang	Director, Office of Coast Survey, NOAA

SPEAKERS:

Neils Aalund	Senior Vice President, West Gulf Maritime Association
Dr. Craig Brown	Councilmember, City of Galveston
Captain Bill Diehl	President, Greater Houston Port Bureau
Christopher Frabotta	Deputy Chief, Operations Division; Chief, Navigation Branch, US Army Corps of Engineers Galveston District
Captain Sherri Hickman	Houston Pilots
Brian Hill	Director, MARAD Western Gulf Gateway
Dr. Gary Jeffress	Professor of Geographic Information Science; Director,

	Conrad Blucher Institute for Surveying and Science, Texas A&M University – Corpus Christi
Christopher McHugh	Survey Technician, TerraSond Limited
Ray Newby	Coastal Geologist, Texas General Land Office
Colonel Richard P. Pannell	Commanding Officer, USACE, Galveston District
Captain Brian Penoyer	Sector Commander, Port of Houston/Galveston, US Coast Guard
Captain George Pontikos	Vice President, Port Operations, Ofjell USA, Inc.
Peter Simons	Deputy Port Director, Port of Galveston
Dr. Philippe Tissot	Associate Director, Conrad Blucher Institute for Surveying and Science, Texas A&M University – Corpus Christi
Jed Webb	District Director for Congressman Randy Weber

NOAA STAFF PRESENT:

Mike Aslaksen	Chief, Remote Sensing Division, NOS/NGS
Glenn Boledovich	NOAA/NOS
Captain Rick Brennan	NOS/OCS
Alan Bunn	NOAA Regional Navigation Manager
Russell Callender, Ph.D.	Deputy Assistant Administrator, NOAA/NOS
Ashley Chappell	NOS/OCS
Gina Davenport	NOAA/NOS
Dan Jacobs	NOAA NRT
Christa Johnston	NOAA
Gary Magnuson	NOAA/OCS
Laura Rear McLaughlin	NOAA Customer Affairs Branch
Rachel Medley	NOS/OCS

Lynne Mersfelder-Lewis	HSRP Coordinator
Savannah Norvell	NOAA NRT
John Nyberg	NOS/OCS
Russ Proctor	Chief, Navigation Services Division, NOS/OCS
Dr. Neil Weston	Acting Chief, Coast Survey Development Lab, NOS

IN-PERSON ATTENDEES:

William J. Baran	Cheniere Energy
Samantha Bruce	QPS
Jeff Carothers	Fugro, Inc.
Jon Dasler	David Evans and Associates
Henry de la Garza	Houston/Galveston Pilots
Graylin Gant	Gulf NW Marine
Wallace Hogan	Galveston/Texas City Pilots
Joe Hrametz	US Army Corps of Engineers
Philip Kropf	Texas Mariners Cruising Association
Coraggio Maglio	US Army Corps of Engineers
Steve Nerheim	US Coast Guard
Emma Pannell	Student, University of Texas

WEBINAR ATTENDEES:

Dawn Forsythe	NOAA, Silver Spring, MD
Jaclyn James	NOAA, Silver Spring, MD
Chris Freeman	Geodynamics, NC
Jason Creech	Dave Evans and Associates
Todd Davison	NOAA OCM

Briana Sullivan	UNH, Durham, NH
Steven Vogel	NOAA, Silver Spring, MD
Jessica Lazarus	NOAA
Tara Levy	Oceaneering International, Lafayette, LA
Heidi Stiller	NOAA OCM, FL
Tim Hale	Woolpert, Dayton, OH
Todd Mitchell	Fugro, Ventura, CA
Michael Jarvis	NOAA, Washington, DC
Erin Nagel	UNH CCOM, Durham, NH
Kim Hansen	Woolpert, NC
Megan Bartlett	NOAA, Silver Spring, MD
Juliet Kinney	NOAA UNH, Durham, NH
Rod Evans	Leicos Inc, Newport, RI
Ray Niles	Degrove Surveyors, Jacksonville, FL
Micah Wengran	NOAA, Silver Spring, MD
Beth Levine	Fugro USA Inc, Houston, TX
Christel Frantz	TransPak Packing Logistics, Houston, TX
Jason Smith	Fugro, Houston, TX
Emily Norton	Maine Coastal Program, Augusta, ME
Deanna Schmidt	Houston, TX
Yael Seid-Green	American Meteorological Society, Washington, DC
Patrick McHugh	Environmental Consulting Firm, Parsippany, NJ
Donald Kesterson	
John Kidd	NOAA, Durham, NH
Jacklyn James	NOAA, Silver Spring, MD
Samantha Bruce	QPS, Portsmouth, NH