

**Meeting Summary**  
**Hydrographic Services Review Panel**  
**August 28-30, 2018**  
**Juneau, AK**

*Tuesday, August 28, 2018*

On the call of the Designated Federal Official (DFO), Rear Admiral Shepard M. Smith, NOAA, the Hydrographic Services Review Panel (HSRP) meeting was convened on August 28-20, 2018, at the Elizabeth Peratrovich Conference Hall, 320 W. Willoughby Ave., Juneau, AK. The following report summarizes the deliberations of this meeting. The agenda, presentations, and documents are available for public inspection online at:

<http://www.nauticalcharts.noaa.gov/ocs/hsrp/meetings.htm>

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

**Welcome, Introductions, Goals, and Deliverables**

**Joyce Miller, HSRP Chair** called the meeting to order at 9:04 a.m. and welcomed attendees to the joint meeting of the HSRP and Integrated Ocean Observing System (IOOS) Advisory Committee.

**Rear Admiral Shepard Smith, Director, Office of Coast Survey**, acknowledged that the meeting was being held on the traditional lands of the Haida and Tlingit people and paid his respect to elders, both past and present.

**Glenn Boledovich, Policy Director, NOS PCAD**, noted that this was the first joint session of the two advisory groups, which he has supported for many years. The two programs share much in common and increased communication between staff and their advisory committees is important to foster in the future. Dr. Russell Callender has departed from his position as NOS Assistant Administrator and Nicole LeBeouf will be taking over those duties in an acting role.

**Nicole LeBeouf, Deputy Assistant Administrator, NOS**, was delayed by weather and apologized for not being present but was able to participate telephonically. She acknowledged Dr. Callender's departure for his new role as Director of the Washington Sea Grant. Ms. LeBeouf noted that work of the HSRP is very important to the state of Alaska and she thanked the Panel for coming to Juneau.

**Vice Admiral Conrad C. Lautenbacher, Jr., Ph.D., (Navy, ret.), Chair, U.S. Integrated Ocean Observing System Advisory Committee (U.S. IOOS AC)**, was delighted, as a former NOAA Administrator, to see such a large group of people gathered together to discuss ocean and coastal issues. The U.S. IOOS AC positions are not staggered and so this will be the last meeting for 10 of the 14 panel members. He thanked those transitioning off the committee for their hard work and their continued dedication to ocean issues. The two groups have a lot of work to do to address matters that cross venues. The earth is a system of systems and all of the component parts need to be brought into a bigger picture.

**Carl Gouldman, Director, Integrated Ocean Observing System, NOS/NOAA**, thanked the people that put the joint meeting together. The products and services that the HSRP reviews are a fundamental component of IOOS. The two groups have a lot of overlap in mission interest and expertise areas, but NOAA and IOOS do not have enough resources to duplicate effort. The network of 11 IOOS regions is nonfederal and is mandated to bring nonfederal data into common standards and the federal system. He announced that all of the Regional Associations (RAs) are now certified to meet NOAA standards, extending liability coverage to the use of RA data. This is a significant step in the evolution of IOOS' data integration mission.

**RDML Matthew T. Bell, Commander, 17<sup>th</sup> Coast Guard District, U.S. Coast Guard**, discussed some of the change in Alaska since the HSRP last met there in May 2012. Outer continental shelf drilling in the Arctic has come and gone, but may return. The *Crystal Serenity* has transited the Northwest Passage twice, and the widened Panama Canal has brought larger cruise ships to Alaska with many more anticipated in the coming years. Terrestrial-based GPS is on its way out and nationwide automated information systems (NAIS) is coming online, which has the capability to change the way the government delivers navigation services to mariners. Alaska is the exception to this, with mariners relying on the Marine Exchange and their network of terrestrial-based AIS sites. USCG's partnership with NOAA is one of the most important relationships of their far-reaching service. RDML Bell recognized the work of RDML Smith in keeping Alaska issues a priority, including ensuring that there is always someone in the ranks with a deep understanding of Alaska's unique maritime environment and economy. RDML Bell discussed the sinking of the F/V *Destination* in Alaska waters and the critical role of the Marine Exchange data and the NOAA Ship *Fairweather's* ability to locate the vessel. Without the capabilities that OCS brought to the table, USCG never would have found this vessel and the valuable lessons learned from its sinking would not have been possible. RDML Bell also discussed the grounding of the *Fennica* and the NOAA investigations that discovered the uncharted shoal responsible. While not a direct cause, the rate of change in Alaska and the Arctic sets the stage for this kind of event. New activity on the outer continental shelf after decades of dormancy was bringing larger and deeper drafting vessels to Alaska's waterways. Dutch Harbor has at times been close to or over its capacity, leading ships to anchor in new locations or take different routes to avoid congestion. This use of Hog Island Channel by larger ships was being driven by activity occurring 1,000 miles away – RDML Bell asked that the HSRP keep this in mind as they provide input to NOAA on how best to prepare for potential changes in the Arctic and rest of Alaska. There is a lot of work to be done in the state, but investing in Alaska does pay off. The use of tank vessels as part of a fuel distribution logistics chain did not exist on a large scale in Western Alaska when the Panel visited last. In Alaska, partnerships are important and NOAA's support of USCG's Port Access Route Study for the Bering Strait is a good example. USCG looks forward to continuing this partnership as they expand their efforts in the Chukchi and Beaufort Seas.

### **HSRP and IOOS Q&A**

Tom Gulbransen, IOOS AC, asked if USCG felt they had adequate pathways through university systems and developmental programs for influencing the next generation of leaders. RDML Bell said it is really hard for District 17 to know where things stand on this in relation to USCG headquarters in D.C. USCG has great working relationship with universities in Alaska and run numerous exercises throughout the year that include education networks to inform them not only of the decisions being made and the direction Coast Guard is moving.

Member Maune asked for RDML Bell's thoughts on the need for a port of refuge for ships that run into trouble in the Arctic. RDML Bell said that most sailors would want to know where those are. Nome is the most northerly port of refuge and it is limited for longer or deeper draft vessels. The leeward side of islands north of the Aleutians do not offer sufficient protection for vessels needing to make repairs. He believed there should be a port of refuge, but securing the level of investment and support needed would be a challenge.

Member Kelly asked, in light of the increasing geopolitical importance of the Arctic region, if USCG is adequately supplied with the proper fleet to manage their responsibilities for Arctic operations, particularly with regard to icebreaking vessels. RDML Bell said no, but USCG Commandant Admiral Karl Schultz is working to procure six new polar icebreakers, three of which would be heavy, and one to be delivered immediately. Both of the icebreakers currently available need recapitalization and Admiral Schultz has gone on record saying USCG is doing that. There is great support right now for getting this authorized but more work is needed.

Justin Manley, IOOS AC, requested examples of new tools or innovative approaches that are helping USCG D-17 perform their work in the large domain they oversee. RDML Bell said they have a great information exchange with terrestrial AIS, especially south of the Aleutian chain. VHF towers are sparse further north and when they work with commercial fishing operations around the villages on Kotzebue their ability to communicate with them is limited. USCG established a VHF tower at Utqiagvik in the summertime, but they have no other capability up there. USCG is exploring launching CUBE satellites in November. Given the costs, it is unlikely that the Coast Guard will be putting much into polar orbit, but will instead take advantage of partnerships.

### **Alaska Navigation Services and Observations**

**Senator Lisa Murkowski**, addressed the Panel and IOOS by video, welcoming the HSRP to Alaska and emphasizing the importance of the two groups to Alaska's maritime economy. She hoped that the meetings will result in real benefits for coastal and maritime end users in the state. There is a lot of work to do as an immense portion of the U.S. Arctic remains uncharted and under-observed. She remains committed to doing her part in Congress to support efforts to better understand this critical region. The Arctic must be a focus of the nation's work on hydrographic charting and ocean observing, now and in the years to come. With increased vessel traffic, the U.S. needs to be even more proactive to ensure we have proper charts, maps, and observational capacity. She looks forward to supporting HSRP in fulfilling this mission, charting a safe and sustainable future in the Arctic. She thanked the Panel for their work supporting the blue economy in Alaska.

**Senator Dan Sullivan**, addressed the Panel by video. Alaska has more than double the shoreline of the lower 48 states – more than 44,000 miles. Given that 75% of Alaska's population lives in coastal regions, the ability to have accessible coastal data is vital to the safety of citizens and the state's economy. The Arctic region has experienced an unprecedented increase in vessel traffic and they do not have the necessary supporting infrastructure or data to match this growing traffic. NOAA has recognized this need and has pursued increasingly robust plans for mapping in the Arctic. Some of the work the Senate is doing to support NOAA's mission includes passing the Coordinated Ocean Monitoring and Research Act to reauthorize IOOS and passing the Digital Coast Act authorizing the next phase of mapping at NOAA. The Senate is working hard to pass the Hydrographic Services Improvement Reauthorization Act which

would not only bring more funding to these activities but adds an Arctic emphasis and incentivizes the use of contractors in this work.

**Lieutenant Governor Byron Mallott**, thanked the Panel for holding their meeting in Alaska. He acknowledged the work of Senator Murkowski and the Alaska delegation and the importance of NOAA's products to the state. He discussed his own history growing up in Sitka and Yakutat, seeing hydrographic vessels as a sign of opportunity for Alaska Natives, at a time when few Alaskan Natives worked for the federal government. What NOAA provides to the state is in addition to all they do to meet their responsibilities. Everything state and federal governments do affects people's lives in intimate ways. They not only allow commerce to flourish but allow everyday people to go about their lives with a sense that there are those who are helping to make their lives better. It is important to palpably feel, understand, and acknowledge this impact. NOAA serves people, and Lt. Governor Mallott grew up in a place where that service is critical to people's everyday lives; he thanked them for steadily going about their work.

**Heidi Hansen, Deputy Commissioner, Department of Natural Resources, Alaska**, discussed Alaska's vast and plentiful resources and the state's work to benefit residents. The high cost of energy makes living in the state prohibitive for some natural resource extraction and production. Mines continue to yield resources beyond initial expectations. There is a great need to better understand the landscapes and potential hazards as well as mineral potential. There are significant access challenges for resource extraction due to limited entrance and exit points. NOAA's work on ports is very important and the State of Alaska would like to increase collaboration in order to the benefit of the state's blue economy. Alaskan needs are unique with regard to navigational resources and transportation of goods for the support of communities. State public servants know their state better than anyone else and she asked that NOAA engage with them earnestly and trust the information they provide. Alaskans are very interested in their special rights to access and use of their land and they need NOAA's assistance in realizing this. Implementation of broad federal regulations in a place like Alaska often lacks practicality. Regulations need to be as flexible as possible and those on the ground need the authority to analyze and make thoughtful decisions that are pragmatic and work for Alaska. There is an incredible opportunity to increase the state's cooperative federalism and she asked the Panel to think about how Alaskans can contribute to that effort and how NOAA might be able to increase engagement with state and local communities to enhance that opportunity.

#### **HSRP Special Session: Alaska Water Level Partnerships**

**Rich Edwing, Director, Center for Operational Oceanographic Products and Services (CO-OPS), NOS/NOAA**, introduced the panel which focused on programs collecting and disseminating tides and water level data in data-sparse Alaska for a range of purposes using the NOAA National Water Level Observation Network (NWLON) as an authoritative backbone. Water level data has many societal benefits, including supporting maritime commerce, storm surge and tsunami warnings, habitat restoration, and sea level trends for long-term coastal planning. NWLON is a trusted source for water level, air and water temperature, wind speed/direction, and barometric pressure, providing long-term data series to establish vertical reference systems and trends. CO-OPS annually deploys 25-50 short-term tide gauges for hydrographic surveys, VDatum projects, habitat restoration, and a variety of other applications. In Alaska there are 27 stations, 10 of which are north of the Aleutian Islands. Around the nation, there are 111 coastal NWLON gaps and three in the Great Lakes. 32 of the NWLON gaps are in Alaska, 21 of

which are north of the Aleutians. Absence of physical infrastructure is the main reason for the lack of NWLON stations in the Arctic, in addition to its remoteness and ice. In most areas, CO-OPS is transitioning away from acoustic sensors to microwave water level sensors as their primary sensors with fairly inexpensive pressure sensors as a backup. This approach does not work in the Arctic, so they instead use a dual-digibub, which consists of two pressure sensors. CO-OPS has developed new methods for infrastructure-free real-time water level measurement systems that have been used in Alaska and have gotten to technology readiness level 6, but had to be shelved because of the decline in NOAA's Arctic resources. Not everyone needs water levels to NWLON standards so CO-OPS has developed several partnerships throughout Alaska for local applications.

**Julie Thomas, HSRP Member**, served as moderator and introduced the panelists who discussed their collaborative approaches to handling water level information to expand ready access to water level data required for decision-making across multiple societal needs.

**Don Moore, Director of Operations, National Weather Service (NWS) Alaska**, discussed coastal observation gap area and areas for model improvements necessary for NWS Alaska products and forecasts, highlighting the reasons for NWS investments in and use of water level observations in Alaska. The jaggedness of the west coast of Alaska is very different from other U.S. coasts and makes weather forecasting difficult. On top of that, NWS Alaska is resource-challenged, making intrastate partnerships essential for getting anything done. He discussed the "Snowicane" that came through the Bering Strait at the level of a Category 2 hurricane, threatening the whole western coast. Communities were struggling to decide whether they should shut off power, which would leave people without heat and forcing them out into the elements to relocate. The decision was especially difficult because NWS did not have the observations or modeling for what the water was going to do. Using NOAA model guidance that included tides and currents, NWS Alaska was able to assure local communities that the worst impacts of the storm had passed. NWS Alaska doesn't need high-resolution information, they need real-time information as they try to predict coastal flooding, erosion, and impacts to fresh water supplies. Utilizing visualizations to convey the data from observations and models is very helpful in assisting communities with their decision making. More of this is needed in the state. He discussed deploying iGage as an inexpensive gauge that can be used to monitor river levels.

**Jacquelyn R. Overbeck, Coastal Hazards Geologist, State of Alaska, Department of Natural Resources, Division of Geological and Geophysical Studies**, provided a summary of progress-to-date on coordinating water level observing in conjunction with partners through the Alaska Water Level Watch program. This program evolved from Alaska Water Level Workshops in 2015 and 2018 that enabled a broad stakeholder group to identify challenges, assets, gaps, and next steps for a collaborative water level network. The Alaska Department of Natural Resources (DNR) is doing work throughout the state to map, monitor, and model both coastal flooding and erosion, with a heavy focus on western and northern Alaska, a region with about 60 communities that they work to provide coverage for. DNR worked with AOOS to establish the Alaska Water Level Watch, a collaborative group working to improve the quality, coverage, and accessibility to water level observations in Alaska's coastal zone. The group is developing a strategy for moving forward and a build-out plan to identify which locations are most important to have water level information collected at and what types of technologies are available. In addition to getting NWLON information, they have been able to expand upon some of the research capacity within the region and are working to get all of the bridges in western Alaska outfitted with low-

cost sensors. GNSS reflectometry has produced promising results in comparison to co-located NWLON gauges. For rapid response, pressure transducers have been installed in remote areas on tripods and mounted on tidal benchmark locations. Within the next year, Alaska Water Level Watch plans to improve water level sensing capabilities by installing more sensors and developing a method for extracting the water level data from plate boundary observation sites. Prioritized gaps include the state's ports and harbors (this updated figure was provided on Sept 28, 2018 - 57% of Alaska's municipal ports and harbors do not have tide gauges and 18/42 do have tide gauges), tsunami-prone areas, areas that coastal storm modelers have identified as being important for improving their models, barge navigation areas, and areas with opportunistic infrastructure. Tidal datums are incredibly important for any work being done in Alaska and not having them is the main barrier to being able to get reliable forecasts for coastal communities. Alaska Water Level Watch is working with NOAA to install short-term water level sensors for tidal datums. Alaskan users need water level data in a consistent format and served from one location. Data gaps in Alaska are so vast that cooperative measures and new technologies must be used to fill them.

**Molly McCammon, Executive Director, Alaska Ocean Observing System (AOOS)**, discussed AOOS' work developing a specialized data management system and associated interface that will complement the water level products provided by NOAA Tides & Currents. AOOS is also partnering with universities and the private sector to demonstrate emerging water level observing technologies designed for Alaskan environments and to explore options for an Alaska "PORTS-lite" system. Alaska and the Arctic do not have very good communication systems, it is critical to devote more resources to improving this vital infrastructure. Thanks to Alaska's congressional delegation, the support of Congress, and the support of IOOS, the Bering Strait will be getting HF radar installed in the coming year. AOOS has the largest collection of ocean and coastal data in the state. Users are able to access their GIS-integrated mapping services, data and metadata from their catalog, and assimilate and compare different data streams. Their challenge is to make elevation and water level observations where conventional methods don't work, in order to create products such as color index maps for flood communication. This is a simple product to make but highlights the need for maps and charts, tidal datums, and the ability to tie together terrestrial maps with bathymetry so they have an accurate coastline. In most of Alaska, Google Maps does a better job displaying where the coastline is than the current NOAA's charts. AOOS is piloting two systems for attaining real-time water level observations, one a GNSS reflectometry system typically used for space weather and another typically used for seismic monitoring of plate tectonics. These systems are cheaper and easier to maintain than NWLON stations, though they are not as robust because they lack the redundancy. However, they do provide high quality real-time data. AOOS is exploring how they can test these in remote locations and incorporate the real-time data into products and services that CO-OPS and NWS can use. AOOS has been working with CO-OPS on what they call Tier 2 and Tier 3 data that can supplement NWLON for users in Alaska. This effort pulls together various pieces of data from several sources, standardizes them, and incorporates them into something visually useful for many different purposes. This practice enhances IOOS' contribution to the blue economy by densifying water level observations beyond the NWLON backbone, and serves as a pilot for CO-OPS' Tiered Data Policy vision that they have not been able to implement. It also encourages the use and development of new products that put water level evaluation in the hands of users. The website for this project mirrors CO-OPS' pages and services but with Tier 2 and 3 datasets. Ms. McCammon recommended the following actions for growing the water level network: fund pilot implementation of both observations and data portal; integrate and serve up data, especially historical data; use for water level build-out planning and

prioritization; explore options for an Alaskan “PORTS-lite system”; serve as model for other IOOS regions; grow the partnership; and couple water levels with the mapping initiative.

### **IOOS and HSRP Q&A**

RDML Gallaudet commented on the importance of CO-OPS’ work to the blue economy and commended Mr. Edwing and his staff. He acknowledged the hard work of the forecasters in the Alaska Weather Field Office and encouraged everyone to thank them for their service.

RDML Smith said that gap analysis is very important. The flexibility and creativity exemplified in all of these approaches is very exciting. Ms. Overbeck said that barge navigation is an issue she hears about from communities along the Alaskan coast. Sedimentation in rivers has reduced navigability and led to concerns about communities being able to get fuel for the winter. She would like to get more input from the barge navigation community as Alaska Water Level Watch develops its priorities.

Chair Miller asked how much bandwidth is available in Alaskan communities to enable use of these websites. Ms. McCammon said this is a big issue because their website is bandwidth-heavy. This is why AOOS has been focusing on data views, which take information from a few data streams and develop those in a way that requires a lot less bandwidth. As cell service usage has increased around the state, the footprint of many cell towers are now half of what they used to be.

Member Shingledecker said she was pleased to hear about partnerships with the National Park Service and asked the panel to speak to how the Department of Defense (DoD) is playing a role in helping to fill in infrastructure gaps. Ms. McCammon said Alaska does not have any military sites that are currently at risk due to sea level rise, but the military is looking at the opening of the Arctic and the issues that could bring. DoD is looking at partnering with AOOS on the HF radar in the Bering Strait and Ms. McCammon expects there will be more collaboration in the future than there is now.

Member Maune asked if the panel has tried using the new IfSAR data to identify shoreline issues. Ms. Overbeck said that there is even better data than IfSAR for western Alaska using recent technologies such as photogrammetrically-derived elevation models. The challenge is in getting those datasets processed and applied. Ms. McCammon said the priority of the state for the last ten years has been mapping the terrestrial portion of Alaska to a higher standard, particularly for mineral and oil/gas resources and pipeline corridors. The majority of this is now completed and they hope that the focus will shift to the coast so they can knit together the land and the ocean better.

Member Kelly said that the question of how good the data needs to be in order to be useful is something the HSRP hears from stakeholders across the country. He asked how good their data is overall and if the format AOOS is using would also be useful to standardize across other IOOS RAs. Ms. McCammon said RAs around the country are facing similar issues and there is definitely the possibility of one replicating it elsewhere. A lot of AOOS’ historical data comes from the U.S. Army Corps of Engineers (USACE) and gaining access is sometimes cumbersome. Inserting a requirement that all USACE project data be made public in some quality-controlled fashion with proper metadata on a centralized site would be very helpful. AOOS is also housing a lot of data that was collected by oil and gas companies.

Member Kelly asked Mr. Edwing at what point CO-OPS would be able to accept and integrate this information into NOAA, or even PORTS data. Mr. Edwing said the Tiered Data Policy helps bin the data

in such a way that people can work with it appropriately. His goal is to have local-national connectivity and exchange of data. This is an area where IOOS RAs can play a huge role. CO-OPS has begun inserting some flexibility with PORTS users. Member Gee said that technology is evolving to allow for integration of multiple tiers of data into one product and he hoped that this will be a course that CO-OPS follows.

Juliana Blackwell recognized the importance of tying water level stations to the terrestrial reference frame. The importance of having an accurate statewide/nationwide reference frame for the vertical and horizontal datums is something NGS is working towards in their modernization efforts. NGS appreciates all the work that has been done by Alaska to help them get to that point. A continually updated shoreline product is something they believe has great value to the state, even if it is not perfect.

Tony MacDonald, IOOS AC, asked how one could back-engineer out of the emergency management storm readiness/response into the flood management and resilience/adaptation world, and specifically how this data could feed into products that are more focused on management and planning. Ms. McCammon said they are very responsive to those needs and have engaged with these groups at workshops across the state. AOOS has incorporated a lot of the management and planning community's needs, which is not generally real-time data. Their identified priorities reflect the top priorities of all of the various user groups.

### **HSRP Special Session: Stakeholder Perspectives**

**LT Bart Buessler, Alaska Navigation Manager, OCS/NOS/NOAA, and Dr. Nicole Kinsman, Alaska Regional Advisor, National Geodetic Survey, NOS/NOAA**, co-moderated the panel of Alaskan stakeholder highlighting how NOAA's Navigation Services portfolio and other partner data and services impact their daily operations. Presentations focused on current products and services used as well as recommendations and requests for expanded products and services.

**Frances Leach, Director, United Fishermen of Alaska (UFA)**, presented the perspective of UFA, a statewide commercial fishing umbrella association representing over 35 member organizations from fisheries throughout Alaska and its offshore waters. Commercial fishing in Alaska is a very big business with over 6.1 billion tons harvested annually (>61% of the U.S. harvest and greater than the U.S. estimate of annual seafood consumption). The commercial fishing industry employs more than 60,000 people in Alaska, making it the state's largest sector. There are over 9,000 fishing vessels in Alaska that rely heavily on NOAA navigation services for accurate real-time and forecasted weather information, accurate charts, and tidal and current information. The safety of fishermen and their vessels requires constantly making risk assessment decisions based on the weather. The addition of more real-time weather sensors and improved dissemination of forecasts and weather observations via smartphones and AIS will enhance efficiency and safety. The recent expansion of weather sensors by AOOS and the Marine Exchange has been a tremendous asset and is widely used by fishermen. VHF radio broadcasts are too cluttered with irrelevant information. The people tuning in to these broadcasts are professional mariners that want specific information that will help them make informed decisions that can be a matter of life or death. Synopses do not give enough information – being told a low is coming is inadequate; fishermen need to know which direction it is coming from, how fast it's moving, and the size of it. Currently none of this information is given. NOAA's observation sites and buoys are extremely helpful, as are the 3-4 day out forecasts.



**Capt. Carl Uchytel (USCG, ret.), President, Alaska Association of Harbormasters and Port Administrators (AAPHA) and Juneau Port Director,** presented the perspective of AAPHA. AAPHA represents 43 municipal harbors in Alaska with membership representing the full range from large commercial ports to small community facilities. The association serves and promotes the state's harbors by advocating for legislative changes and grant opportunities. AAPHA members make use of NOAA's bathymetric charts, tide data, buoy wind/wave data (which is essential to marine facilities design), Coast Pilots, and NWS forecasting. The Port of Juneau partnered with the Marine Exchange of Alaska to install real-time current sensors, which has been highly utilized by pilots of cruise ships and commercial fishing vessels; other ports in the state are following suit. AAPHA members have requested more detailed bathymetry in nearshore areas and more buoys near Alaska coastal communities, real-time or near real-time water level monitoring, electronic nautical charts (ENCs) with near real-time update capability around Anchorage, updates to tidal stations data, and relative sea level change data that includes both sea level change and geologic uplift/subsidence. AAPHA is just now becoming aware of the AOOS Water Level Watch and they believe this will be a great opportunity for their members. A coast-wide real-time or near real-time water level monitoring program could help to reduce the misinformation situations that exist in earthquake and potential tsunami events. Harbormasters need better access to information that will provide greater certainty during these instances.

**Capt. Carl Uchytel (USCG, ret.), American Society of Civil Engineers (ASCE),** also presented the perspective of ASCE. ASCE represents more than 150,000 members of the civil engineering profession in 177 countries and has over 800 members in Alaska consisting of public and private sector engineers and students. Engineers need data from NOAA and AOOS to design shoreline improvements, offshore structures, inland waterways, and onshore improvements. Reliable data is needed to perform reliable, safe, cost-effective, and situationally appropriate design. Members said their data needs include documentation of peak water levels for storm surge modeling and validation of flood mapping, more tidal datums and standardized vertical references, quantification of long-term relative sea level trends arising from climate change and variables associated with isostatic rebound, correct bathymetric and shoreline survey measurements, and analysis of temporal trends in coastal storm frequency, magnitude, and durations. More air temperature monitoring stations in western and northern Alaska, as well as ground temperature profile data acquisition at various points in Alaska, would be desirable. Wind and precipitation data in rural Alaska, particularly Unalaska, would be helpful. The city is trying to collect their own data to better design their water supply system, teaming with DNR and the U.S. Geological Survey (USGS) on groundwater level monitoring and would probably be happy to team with NOAA. Engineers would like any information NOAA can provide on the feasibility of alternative energy sources in Alaska. It would also be helpful to provide sounding data in .dwg format. ASCE would like NOAA to collect data that may be useful to support expediting permitting reviews. More investment in weather stations and observations throughout Alaska would also be desirable.

**Capt. Hans Antonsen, Southeast Alaska Pilots Association (SEAPA),** discussed SEAPA's efforts to ensure the safe navigation of all large commercial traffic, including cruise ships, in southeast Alaska. Southeast Alaska sees over 2,500 ship movements per year, with an average of 34 cruise ships bringing over one million passengers to the region annually. Scenic cruising depends on accurate and frequent updates to the charts. Accurate tide and current data is essential given the lower tolerances of big ships and the increase in ships requires tighter sequencing of traffic. Weather predictions and real-time information are used for long-term planning and short-term decision-making. SEAPA members would

like to see an expansion of real-time current and wind sensors, improved ease of access to frequently used weather tools that provide at-a-glance information to help inform decision-making, and updated surveys of rapidly retreating glaciers. Most of the ships that are going through Tracy Arm/Endicott Arm are limited due to wind. Pilots are taking the lead on modeling ships for wind, utilizing the tools that NOAA provides to come up with safety parameters. Capt. Antonsen encouraged NOAA to continue to partner with the Marine Exchange of Alaska to help get sensor data to mariners in a manner they can use.

**Angie Thrower, Staff Captain, Allen Marine Tours**, discussed the challenges and opportunities for the charter boat company, the largest operator of USCG-certified tour boats in southeast Alaska. Allen Marine Tours is a local, family-owned operation offering day tours, overnight cruises, charters, and transportation with 450 seasonal employees (150 year-round employees). Their current tour range is ~300 nautical miles, including remote access to Tracy Arm, Glacier Bay, and Misty Fjords. All fleet captains and remote-site staff use daily marine weather observations and forecasts. Nautical charts are used at all times by all captains in all ports to determine site-specific safety protocols and for making decisions on tour expansion or when a tour may no longer be appropriate. Requests for NOAA navigation services and AOOOS data included a Midway Islands (Stephens Passage) real-time weather observation station and up-to-date surveys of glacial fjords, sandbars, and areas of interest. Accuracy increases safety and reliability, which in turn increases consumer confidence. Many of the nautical charts for Alaska are well out-of-date. Charts that are more responsive to the change would be more accurate, which would open additional areas of interest and opportunity.

**Mark L. Smith, CEO, Vitus Energy LLC**, discussed the challenges and opportunities for the company, a tug and barge operator providing critical fuel and freight deliveries to remote communities along the coasts and rivers of western Alaska. Western Alaska does not have highway infrastructure and so the communities rely on lighterage from barge distributors. Vitus is one of four marine distributors in western Alaska. They have introduced new equipment and a new supply chain paradigm, saving western Alaskan consumers millions since its introduction. Vitus' coastal operations rely heavily on NOAA charts and tide tables for basic day-to-day navigation. For critical last mile and inland navigation, Vitus uses sounding skiffs and known track lines from internal and external sources, which are of increasingly dubious value as the terrain changes. Vitus uses every tool available to safely execute its mission, including utilizing crowdsourced data when official data does not exist. In Western Alaska, the perfect truly is the enemy of the good – any data is better than nothing. Many of the areas Vitus operates in have no cell service so they rely on extremely expensive satellite services which offer limited browser use. Mr. Smith discussed the various data sources used for creating Vitus' voyage plan into Kongiganak and the utility and limitations of each.

### **HSRP Q&A**

RDML Smith noted that none of the panelists mentioned the percentage of Alaska's water being mapped to modern standards as being important, only small areas that need attention. The value and the percentage are not always in alignment. OCS is committed to surveying everything, but not everything has high value.

Chair Miller asked if any of the panelists do any surveying on their own or if they have they considered doing so. Ms. Thrower said Allen Marine Tours does not do any of its own surveying because they don't have the necessary equipment for doing the level of survey needed, especially for glacial arms where

there is fine glacial silt in the water. They do pass along any information they have on shifting sandbars to other vessel transiting those areas. Since there is no broader public access to that information, recreational users are probably not always informed, despite there being a maritime community that would be eager to share that information with them. Mr. Smith said crowdsourcing has a lot of potential and is currently used by the crab and trawling community in the Bering Sea. The spread of AIS usage around Alaska provides data that shows the best places to start surveying.

Dr. Mayer said that crowdsourcing works best when there is a crowd, which there is much less of in Alaska. He asked how each of the panelists would feel about carrying an inexpensive, authoritative black box that would provide NOAA with data that is one step above crowdsourced data. Mr. Smith said he has been an advocate for this, though a few captains and companies have said their special advantage is navigation know-how and did not want everyone to know their paths. Ms. Leach did not think many fisherman would be eager to make their information public, as most do not like people knowing where they are going at any given time. Ms. Thrower said that any partnership opportunity with NOAA would very exciting for passenger vessels and she would be interested in hearing more.

Colby Harmon asked if any of the panelists use ENCs, and if not, what it would take to make that transition. Panelists said they use every available form of ENC. Mr. Antonsen said pilots have some issues with the quilting of the vector chart, especially in areas where you go from a small-scale chart to a large-scale chart. There are also issues with what is visible on the presentation of a full vector chart, which often has more to do with the software provider.

Member Maune asked if the panelists have taken part in the 3D National Elevation Requirements and Benefit Study questionnaire process. None had. Member Page noted that in some places it is easy to quantify benefits of better data, but it is very hard to quantify accidents that have been prevented.

Dr. Mayer said he felt there is some obligation to convey the uncertainty of soundings or other non-authoritative sources of information and asked if users would want those uncertainties transmitted, how they would use them, and how they would want them presented. Capt. Antonsen said that, from the standpoint of large ships with a lot of people and a lot of fuel, bad data is worse than no data. Pilots proceed cautiously when there is little or no data, but if they rely on incorrect information and have a false sense of confidence, it can lead to less safe decision-making. Mr. Smith said incomplete data is fine for his purposes, since they use skiffs to take soundings as they go, but the less they have to do that the more cost effective it is. A large amount of incomplete information helps him to create a composite picture. Vitus does not have the option of not going; they are providing essential services. Capt. Uchytal said Alaska is a young state with the opportunity to build ports and infrastructure and it is important that engineers have the best possible information available. Six inches or one foot of isostatic rebound makes a big difference when designing a harbor or a launch ramp.

Chair Miller asked how long a chart would be good for in some of these areas given the rapid changes. Capt. Uchytal said isostatic rebound is about a foot a decade in the Juneau area. Ms. Thrower said the glacial silting depends on how much outflow there is in a particular area and the depth of the water. The retreat of glaciers varies, but she guessed a chart would be good for about a decade. Capt. Antonsen agreed that they vary and that local knowledge can give an idea of the longevity and usefulness. Prioritizing higher traffic areas and areas with more uncertainty would be a big help. Mr. Smith said that it seems like the dynamic nature of some of these entrances are used as an excuse to not do anything. It's

really a challenge to industry and NOAA to rethink how they provide navigation services to mariners. Having crowdsourced information to compare to the chart brings an ability to look at very small areas to update. This can be done with a high degree of specificity with the use of AIS data.

Member Lockhart commented that the HSRP tends to think of vessels as a solution to a lot of these problems. There are ways of using structure from motion and inexpensive drones with a camera to get elevations quickly. This may be a better way to monitor in smaller channels. RDML Smith said Terrasond, working on behalf of NOAA, has done a lot of innovative work with drones for mapping intertidal areas. The technology is well-matched to this application.

Member Gee asked if there is a way to get more data, such as track lines, distributed to other users in the region rather than just internally. Mr. Smith said that creating a new chart for every change is not possible; it will require new technology to get this information out. He has heard people from NOAA say that they are not interested in anything above three meters below mean low water. USGS is interested in the coastline, but the disenfranchised transition zone is the most critical for Vitus navigation and for providing their services. This is not an issue concerning a chart update, but what can be done differently. There is a lot of data, it is just a matter of finding who will take responsibility of that zone. RDML Smith said the four meters boundary was meant to keep hydrographers from counting every rock in Alaska in areas where nobody cared, but that is not a blanket rule. Their tools are generally not well-g geared to those areas, but bathymetric lidar is and satellite-derived bathymetry could be. OCS does envision the chart as being the right way to carry information that may be very fresh. Capt. Antonsen said software developers and surveyors/data collectors need to get together to identify the medium necessary to get the information to end users in a format that can be used by many software providers and disseminated to the public. Member Gee said end users should be part of that discussion because they have requirements and the developers need to know what capabilities they want. Capt. Uchytel said the port in Anchorage receives 85% of the goods that enter the state and they would really like real-time shoaling updates. The importance of the port economically and militarily would justify additional investment to provide that service, if possible.

Member Kelly suggested NOAA give IOOS direction to promulgate some type of program or requirement that would be in accordance with NOAA's strategy and goals in this area which could be passed to RAs so that they could have these types of meetings locally and report their findings back to the HSRP.

Capt. Armstrong asked how useful depth information is for the fishing community. Ms. Leach said depth is very important for navigation and setting gear. Right now, fishermen rely on charts and the fathometers on their boats. A product that shows depth in greater detail would be very beneficial.

### **Public Comment**

Jon Dasler, David Evans and Associates, commented that it is not just the freshness of the data but also the scale. He asked if higher sounding density would be more beneficial to get into some of the areas the panel discussed. Capt. Antonsen said that excursion vessels want to go in close to glaciers and other attractions and so they would be the ones to say where greater sounding density would be helpful. Scale is hugely important, particularly in places like Endicott Arm which is an unproven area with no detail, but that will not going to stop ships from going. More detail would provide more safety through better

understanding, particularly with the larger ships going through. Ms. Thrower said there are coalitions of groups that operate in some of these difficult areas; there is high traffic in those areas and better detail would improve safety margins. Mr. Dasler said it is important to get this kind of input to NOAA as they are looking at the scale of charts for the nation.

Jon Dasler responded to Member Page's suggestion that a Waze-type app is needed for maritime users. The HSRP received a presentation in Galveston on ActiveCaptain, which does just that. He asked if anyone uses it and if NOAA assess charting needs based on what ActiveCaptain data shows. Member Shingledecker said ActiveCaptain was an interesting resource, but it has changed ownership and the crowdsourced nature of it has changed substantially. There is a gap right now in the area of crowdsourced information applications. Ms. Thrower said that establishing a Wikipedia-like platform for maritime information is a great idea, but that commercial operators would hesitate to actively and openly participate in something like that not knowing what the liability limitations are.

Rada Khadjinova commented that Alaska's surveying backlog remains formidable, requiring NOAA's continued vigilance, however, this challenge has a responsible owner. A need that does not have a responsible owner is the transition zone of Alaska's coast. The future of Alaska's coastal zone is of national consequence, impacting national security, maritime transportation, economic development, and energy policy. Growing Alaska's blue economy while managing effects of climate change will require shared access to coastal mapping data which merges shallow water, shoreline, and coastal elevation datasets from across the government spectrum. While a comprehensive coastal mapping program does not yet exist in Alaska, stakeholder engagement to establish one is well under way. An output of the Alaska Coastal Mapping Summit was the strategic plan to guide Alaska's coastal mapping program, which is anticipated to be released this year. It is also encouraging to see NOAA's participation on the AMEC. Data needs should remain central to developing data specifications. The private sector is a great resource for developing efficient scopes of work and they should have a seat at the table to provide their provisional input. Environmental permitting has been the longest lead-time activity for infrastructure or resource development projects, taking from 5 to 25 years or more with no certainty in outcome. While they applaud the efforts made by some agencies, there is plenty more to be done. One of the best things NOAA can do is to acquire authoritative baseline data, such as upfront collection of land and marine elevation data. This would give permitting agencies information for good management and withstand legal scrutiny once decisions are made, reducing cost and schedule impacts for all parties. She requested that HSRP consider the delivery of transparent and systematic updates on progress towards goals and objectives stated in the Alaska Coastal Mapping Summit report and continue the Alaska Coastal Mapping Summit on an annual basis, support for improved effectiveness of existing framework by which multiple agencies can contribute funds and specify their coastal mapping priorities, meaningful contributions or inputs the State of Alaska can champion to kick-start the planning phase of the program, and incentivizing industry to come up with ideas for authoritative data collections through unconventional methods.

John Warrenchuk, Oceana, said that one thing that is lacking in ocean datasets used for predicting changes and impacts to life in the ocean is currents and seasonal changes to the currents, as well as temperature. Alaska is seeing a litany of impacts from changing temperatures. The governor recently had a fishery disaster declaration for Chignik, which usually catches over a million salmon but only caught

128 this year. These changes are ending ways of life and collecting this data would be an investment in future generations' models for mitigating impacts and addressing some of these changes.

Guy Noll, Esri, submitted a comment via webinar. Regarding the .dwg format issue, there is a new alliance between AutoDesk and Esri for GIS plus BIM, specifically for infrastructure and design. As most of this is urban-focused, Alaska stakeholders will need to participate in highlighting the value.

Jon Dasler conveyed Scott Frost's thanks to NOAA and the crew of the *Rainier*, which was transiting the Gastineau Channel when a small boat his daughter was on sprung a leak. The Rainier put in a launch and rescued her and her friend. Just being present in these situations is another added benefit to NOAA's work.

Additional public comments were submitted before the meeting and are available on the HSRP website.

### **Adjournment**

The Panel stood in recess at 4:26 p.m.

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*Wednesday, August 29, 2018*

The meeting was called to order at 9:02 a.m.

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

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

**Chair Miller** invited Panel members to discuss key issues from the previous day's session. These included modeling some of the partnerships the panelists discussed to be emulated in other areas, the importance of NWS to the stakeholders (Panelists encouraged NOAA to have someone from the marine weather side participate in future meetings to receive that feedback in a formal manner), the importance of gauges, but also the usefulness of any information including photographs of low tide, and the need for information provided by the government to be in a usable format. There is a tremendous amount of cooperative work going on in the state and NOAA needs to build on that. Prioritizing small areas could help address requirements for 4 meters and shallower. Panelists also discussed the need for real-time observations, and how well the underlying programs (IOOS and NOS) are coordinating. Members were pleased with the panels and the amount of time they had for discussion. RDML Gallaudet commented on the relevance of NOAA activities in Alaska for national/homeland security. USCG and other agencies in the state are underpinned by NOAA's navigation support and they will be partnering on drone work in the future. This meeting helps to reinforce that the U.S. is both a maritime nation and an Arctic nation, which is lost on a lot of people. RDML Smith noted stakeholders' comments on the value of NOAA services for engineering in the ocean environment, which not only makes their lives easier but also buys down risk and schedule. This can make the difference between the project going forward or not. The Panel discussed the need to package information in a way that is accessible and relevant to the intended users. When

NOAA talks about improving navigation services, it does include NWS even though that is not under the purview of this Panel.

**Nicole LeBeouf**, made opening remarks. Surveying, charting, observations, and weather forecasts are essential to not only Alaska's economy, but to the life and safety of Alaskans. In the Arctic, ice is receding and things are changing rapidly. New routes are opening up and the state is seeing increased vessel traffic. In addition, ice is behaving differently. All of this makes NOAA's products and services more essential than ever. NOAA knows that it also needs to be listening to the folks on the ground to inform them of what they want and need. Eleven of the new Arctic charts are going to be coming out in the next few years. NOAA has prioritized almost half of its National Charting Plan around the Arctic. NOAA and USGS have complimentary missions, and with that comes a real responsibility to know what the other is doing in order to work as efficiently as possible. Congress has shown that it greatly values the work done related to the HSRP programs writ large. NOAA takes great pains and pride in executing its funds effectively and transparently. Last year, they executed 99% to plan, the highest across NOAA. In addition to Dr. Callender's departure, other NOS leadership changes include Chief of Staff, CFO, CIO, Comms Lead, and Deputy CFO. Mark Osler has been hired as the Senior Advisor for Coastal Inundation and Resilience Science and Services and Dr. LeBeouf encouraged the HSRP to reach out to him.

**Rear Admiral Tim Gallaudet, Ph.D. (USN, ret.), Acting Secretary of Commerce for Oceans and Atmosphere, and Acting Undersecretary of Commerce for Oceans and Atmosphere, NOAA**, said he learned from the last HSRP meeting in Miami how critical the Panel's role is in supporting NOAA's hydrographic program. He recognized and thanked the three members whose terms were expiring: Joyce Miller, Susan Shingledecker, and Carol Lockhart. The President's National Oceans Month proclamation included the language: "To advance America's economic, security, and environmental interests, it is also critical that we explore, map, and inventory our nation's waters and pursue advanced observational technologies and forecasting capabilities. By exploring, developing, and conserving the ocean resources of our great nation, we will augment our economic competitiveness, enhance our national security, and ensure American prosperity." This gives NOAA a lot to stand on, in addition to the Executive Order Regarding Ocean Policy. RDML Gallaudet was thrilled to have these in place as a license to move forward. He was also excited about the National Charting Plan and Arctic Charting Plan, particularly the plans to improve charts in the Etolin Strait. This is just one example of where advances in charting will help the blue economy in Alaska.

### **HSRP Q&A**

Member Page commented on the importance of the blue economy to Alaska and how visible it is all around Juneau. Lacking roads in or out of Juneau, all of their goods come in by ship. Cruise tourism is the largest industry in southeast Alaska and the ships are getting bigger and more frequent all the time. The concept of blue economy goes one step beyond safety and environmental protection to include the economic well-being of the state and the nation. RDML Gallaudet said he believes in the value of precision navigation, and a fundamental element of this is the vertical datum component. Communication and outreach are critical; Americans in the heartland need to understand the importance of the blue economy. Member Page noted that preventing marine casualties, particularly in high-volume ports like LA-Long Beach, is of inestimable value given the enormous amount of cargo that would be impacted by shutting down such a port. Member Thomas said she is excited about the partnerships that precision

navigation can bring in. It is improving the confidence private industry has in the agency. RDML Gallaudet said it is part of their mission, as called out in the National Ocean Policy, to bring in all of these partners, including academia. He said that USACE is now partnering with NOAA to do multibeam surveys. RDML Smith said they are formalizing some agreements and data transfer issues so they can get the full value from USACE surveys.

Vice Chair Saade asked RDML Gallaudet if he had any guidance or requests for the HSRP. RDML Gallaudet said NOAA has articulated two key priorities: improving the national weather model and the blue economy. He asked that the Panel be mindful of those as they develop recommendations and clearly address how the work of HSRP supports those priorities.

Member Shingledecker commented that the Bureau of Economic Analysis has released statistics on the value of the outdoor recreation economy that shows it growing faster than GDP as a whole and is a larger player than people originally thought. She asked for the Acting Administrator's thoughts on how NOAA is prioritizing or promoting recreation and tourism as it relates to NOAA's mission. RDML Gallaudet said that outdoor recreation and tourism are one of the pillars of the blue economy initiative. It contributes \$375 billion to the economy and is growing faster than other sectors. NWS is supporting safe recreation and tourism across the coasts. The 13 National Marine Sanctuaries bring in \$8 billion of activity every year and are great examples of multiuse that are adapted to the local needs.

**Kevin Gallagher, Associate Director, Core Science, U.S. Geological Survey, U.S. Department of the Interior**, provided an overview of the Alaska Mapping Executive Committee's origins, IfSAR mapping success, and the recently revised Alaska Mapping Executive Committee (AMEC) charter with its new emphasis on ocean and coastal mapping. USGS is deeply partnered with NOAA on projects like 3DEP (3D Elevation Program), GRAV-D (Gravity for the Redefinition of the American Vertical Datum), the National Hydrography Dataset, and a new vision they have for 3D Nation. Mr. Gallagher reviewed the history of Alaskan mapping prior to 2008 and the formation of the AMEC. AMEC meets twice annually to coordinate mapping priorities and increase awareness, collaboration, and opportunities, and to explore joint funding avenues. AMEC has identified five geospatial themes that are essential to update the mapping of Alaska: elevation, hydrography, transportation, shoreline, and GRAV-D. Imagery was not included because the state was already on its way to collecting that at the time. Every AMEC meeting starts with a status update for each of the themes. To date, the status of each of the themes is as follows:

- Elevation – using IfSAR, they have collected 98% coverage for the state, with portions of the Aleutian Islands still needing to be collected.
- Hydrography – 20% updated
- Transportation – 100% completed and publicly available, but maintenance is ongoing
- Shoreline – 48.5% updated
- GRAV-D – 78.4% acquired

AMEC updated their charter in March 2018 to allow for additional themes to be included and tracked. Other mapping requirements and opportunities beyond the initial topographic focus now include: imagery update, coastal zone mapping, bathymetric mapping, targeted lidar acquisitions, enhanced terrestrial hydrography, geologic mapping, geophysical surveys, and land classification. AMEC has been collaborating with NGS on the 3D Nation Survey, an analysis of elevation requirements that will guide



future data collections. There is an opportunity to involve the HSRP stakeholders in the survey of requirements and benefits. With all of the enhanced data coming in, there are many applications for its use in supporting coastal understanding critical to Alaska and the nation. AMEC continues to collect the data and will support future inland bathymetry and nearshore mapping. The current 3DEP lidar acquisition program is supporting several mapping projects in the lower 48 and AMEC would like to see it used in targeted areas either for development reasons or for environmentally sensitive areas. AMEC would like to hear from the HSRP on other areas of focus for this application.

## **HSRP Q&A**

Member Maune commended USGS and NOAA for taking the lead on the 3D Nation Study, particularly in merging the topographic and bathymetric efforts in order to have a seamless high-resolution elevation dataset. He asked Mr. Gallagher to comment on the production of topographic maps of Alaska. Mr. Gallagher said they have completed about 60% of the state for 1:25,000 scale mapping (consistent with the rest of the country). They are following up the collection of the dataset with new USGS topographic maps, many of which are available now as a digital product. These maps can be printed on demand or downloaded, and layers can be turned on or off as the user sees fit.

Chair Miller noted that various agencies and organizations like to host their own datasets and asked how AMEC handles that in their effort to make everything accessible. Mr. Gallagher said this is an important issue. USGS will always point users to the USGS National Map portal. Others host parts of it on their sites and he does appreciate having additional distribution channels. USGS' goal is to bring this content into the public domain and make it as easily accessible as possible. At times it can create confusion for end users that don't know where to look, but there have been efforts to consolidate everything through the federal Geospatial Platform.

Glenn Boledovich noted that Mr. Gallagher used the term "hydrography" in a way distinct from how the HSRP usually uses it and asked for clarification. Mr. Gallagher said that USGS uses "hydrography" to refer to the bathymetry of the inland waterways, whereas "hydrography" for HSRP typically refers to bathymetry of the seafloor. One of the ideas behind 3D Nation is to lose that distinction and recognize that elevation is elevation wherever it is. Because USGS now has enhanced elevation data, they can get a high-resolution surface water dataset. Once that network is created, they will be able to link any object to that network, such as a stream gauge, bridge crossing, public water intake supply, water samples, or any other data with geolocation data. Tying all these surface water observations together will allow for a lot of analytics that would be very interesting from a coastal standpoint as all this water flows into the oceans. Member Thomas said these issues are very pertinent to Southern California and asked how they could get on the list for one of their coastal mapping projects. Mr. Gallagher said they have been speaking with the State of California on how to get state lidar projects underway.

Chair Miller asked if USGS has looked at the issue of groundwater flooding in Alaska due to sea level rise. Mr. Gallagher said they recognize that it is a big issue. It is a much more challenging process and higher resolution geologic mapping is needed to understand the aquifers and how they play into the mix. It is a complicated issue that is quite different across regions of the country, and the challenge is having enough information about the subsurface geology to really do it right.

## **Discussion on Approaches and Opportunities for AMEC/NOAA Ocean and Coastal Mapping Coordination**

Chair Miller asked if there are areas from USGS' standpoint where NOAA could work better with them in moving mapping forward. Mr. Gallagher said he thinks they've been working very closely, and there are a number of applications that really demonstrate the value of this information. The partnership approach has been the most successful thing about it so far. Mr. Gallagher mentioned perhaps developing a pilot application that ties together USGS data on the terrestrial side of the basin and watershed piece and NOAA's updated coastal mapping information in way that would be valuable to end users.

James Reilly, Director, USGS, commented on the close cooperation between USGS and NOAA at the state level. He discussed the melt coming off of Mendenhall Glacier into a basin behind Suicide Glacier is creating an ice dam, behind which the water can rise several hundred feet and create the potential for a catastrophic outflow. USGS gets involved in the spring flow piece and NOAA gets involved with the weather piece; this is also of interest to other agencies like FEMA. USGS wants to foster more of these types of collaborations.

RDML Smith commented on the challenges of water level measurement in Alaska. One of the effects this has on the hydrographic program is that this piece of foundational geospatial infrastructure is needed in order to do surveys or use anyone else's data. This is where VDatum for Alaska would be very useful, pulling all of this information together and providing those separation models that are needed for larger collaborative mapping efforts.

Vice Chair Saade said that when there isn't an authoritative baseline already generated you have to invent it on the spot. Offshore wind farms on the East Coast have saved huge amounts of money from all of the data that has been dumped into IOCM's dataset because a lot of problems have already been solved in these places.

Ashley Chappell said there have been some great assessments of existing data to ensure that IOCM is not collecting redundant data. This has led to some great recent partnerships. Capt. Armstrong said NOAA should have USGS requirements in mind when they do surveys, as well as what would be useful beyond charting. Capt. Rick Brennan said that OCS has projects with USGS doing multibeam and seismic studies simultaneously. They also partner for environmental compliance. There is a growing level of collaboration and they recently completed an MOU that has allowed the agencies to partner effortlessly.

### **Alaska Updates from the NOS Office Directors and University of New Hampshire-NOAA Joint Hydrographic Center**

**Dr. Larry Mayer, Co-Director, University of New Hampshire Center for Coastal and Ocean Mapping and NOAA's Joint Hydrographic Center**, provided an update on autonomous surface vessel (ASV) deployment for Arctic hydrography coming out of UNH-JHC. Their effort is from a research perspective, trying to get an organic capability for autonomous vessels for hydrography. Dr. Mayer discussed the suite of ASVs they use, in particular the C-Worker 4. One of the great constraints is telemetry and they are now looking at a new system that will get them beyond the 7-8 km range and closer to 40 or 50 km. Small modifications have been able to improve stability of the vehicles. Lessons learned for single point lifts have led to very efficient launches. The vessel's biggest benefit was close-

quarter surveying in hazardous areas, which would be useful up against glacier faces where surveyors are concerned about calving. In July 2018, the C-Worker 4 was deployed from NOAA Ship *Fairweather* around Point Hope, Alaska, and next year they hope to go further north to address a number of bathymetry issues up there. The vessel can operate in up 3-4' seas. They were very pleased with the data quality. The ASV company found that a single operator could manage two vessels at the current level of autonomy and they could be operated around the clock. With overnight operations, it would probably be best to have the ship at anchor. The additional data coming from the ASV put no strain on the *Fairweather's* processing load. Moving forward, the software they want to develop is a much more sophisticated planning tool, fusing all of the visualization information, developing a nautical chart-aware ASV, and reactive obstacle avoidance is the next step in moving towards a truly autonomous system. They will be working with an 8 meter long IXBlue DriX ASV in September, purpose-built for hydrographic surveying.

**Capt. Andy Armstrong, Co-Director, University of New Hampshire Center for Coastal and Ocean Mapping and NOAA's Joint Hydrographic Center**, discussed the extended continental shelf seafloor mapping cruise in the Gulf of Alaska. The extended continental shelf program is a partnership between the State of Alaska, NOAA, and USGS to map in support of the U.S. continental shelf beyond 200 miles. The cruise was conducted by Chief Scientist Joyce Miller and collected 28,799 square miles of survey, in addition to sub-bottom profiling, continuous gravity measurements, and continuous acoustic current profiling. The survey brought out a lot of detail about the seafloor and will help to make the decision whether there is potentially extended continental shelf in this area. Requirements were set by colleagues in USGS and the cruise was set to meet those.

**Juliana Blackwell, Director, National Geodetic Survey**, provided the update focusing on enhancing access to GPS-based heights in Alaska. Alaska project areas can be remote, unstable, and difficult to access but it is essential to have to controls aligned to the accuracy standards required for the projects. NGS provides access to the NSRS through data, models, and tools, including Foundation CORS, GRAV-D, geoid models, and the VDatum tool. Foundation CORS is an ultra-stable subset of the large CORS network. In Alaska, the plan is to establish five Foundation CORS and NGS expects to be able to fully cover the state, supplemented with partner-operated CORS. With the end of this field season, NGS has completed the GRAV-D survey of mainland Alaska, collecting airborne gravity data that is critical for the update of the vertical datum. The Aleutians are planned to be flown in 2020 or 2021, and all this data will be included in the GEOID2022 model which will bridge the gap with GPS in getting true elevations relative to mean sea level. The data from the GRAV-D project is used to create experimental geoid models (xGEOIDS), which give users an opportunity to see what the magnitude of change is going to be in their local area and be better prepared for the new geopotential datum that will be released in 2022. In Alaska, they are seeing pockets of change in heights between +46.4cm to -43.2cm. Having geodetic controls are critical for anyone who is going to build datasets on top of that. Topography of Sea Surface (TSS) models provide GPS-based access or transformations to heights relative to local tidal datums. This is developed in VDatum, a tool that allows many different datums to be transformed from one to another. The greater density of water level observations in southeast Alaska allows for exploratory TSS development by VDatum. While there are many water level stations, a lot of them are not tied to the NSRS. Getting this connection of water level datums to the geodetic datums will be critical to getting an accurate model and effort is underway to accomplish this. Constructing exploratory TSS models by blending Satellite Altimetry Data, water level observations, and the xGEOID has provided the

opportunity to utilize a new transformation roadmap framework. Future enhancements to VDatum will include incorporation of Longwave Mean Sea Surface/Sea Surface Height Signal and cross-over adjustments once the development of the U.S. West Coast Model is initiated to create a combined TSS field extending from southeast Alaska to the U.S.-Mexico border. Parts 1 and 2 of the Blueprint for 2022 Technical Report Series, which address geometric and geopotential coordinates, are available on NGS' webpage; Part 3, which addresses working in the modernized NSRS, is in preparation. The NGS Strategic Plan Update should be released by the end of the year.

**Rear Admiral Shepard M. Smith, Director, Office of Coast Survey**, provided the update on improving charting services in Alaska. RDML Smith and Lt. Buessler did a week-long trip through Western Alaska meeting with stakeholders to gain insight for how OCS goes about this programmatically. The Navigation Hydrographic Program has been surveying the shallow water work along the Alaskan coasts, while extended continental shelf work being done in deeper water. A surprising amount of data is available in the far north, which has primarily been extended continental shelf work in the Arctic. Talking about percentages of area mapped doesn't make sense in Alaska, the important consideration is the value of the data. Alaska is a good example of how OCS needs to take innovative and flexible approaches to meeting the challenge of mapping. OCS needs to prioritize where there are problems: glacier faces, community landings, harbors, passages, harbors of refuge, and designated fairways. They start with the problem then look to see what data is already available and incorporate other people's data on the chart. NOAA has created a crowdsourced bathymetry database that is hosted at NCEI to allow users with a navigation system and echosounder to log track line data. The data has limitations, but with enough statistics and an improved tide model NOAA should be able to make better use of it. OCS is using AIS data to focus on where vessel traffic is going now and ensuring they are safe doing what they are doing. The amount of satellite imagery being collected is offering better opportunities to use it to take a first look at a problem rather than with a very expensive ship or contract. RDML Smith discussed a passenger ship that ran aground in Nunavut a few days before the meeting. While the details are still to come, each grounding provides new insights into how to avoid them going forward. The *Rainier* gathered hydrographic data in uncharted territory at the face of the Sawyer and South Sawyer Glaciers. About a ten-year refresh is needed for these tidewater glaciers; NOAA is establishing a list of them and can be made a steady ongoing requirement. USACE channel condition surveys are primarily designed for channel maintenance so the Corps knows when to dredge, they are not navigation surveys. They are complimentary to NOAA's object detection surveys. The agencies are working at the HQ level and at the District level to find ways to collect and share meaningful data. The Philadelphia District does multibeam surveys and NOAA has evaluated their data and procedures. Their data is classified CATZOC A and is now included on the chart. In the lower Mississippi River, NOAA and USACE have complimentary needs for high-resolution information for bank stabilization and navigation. USACE does multibeam surveys every ten years and now NOAA has contracted to do the same out of sequence so that multibeam surveys are done every five years.

### **HSRP Q&A**

Chair Miller said she is very pleased to see progress being made on USACE surveys collaboration even if it's not where they would like it to be yet.

Member Thomas asked where Sairdron fits in the ASV effort and if their relationship with NOAA is competitive or complimentary. Dr. Mayer, from the research side, said that NOAA has been working very closely with Sairdron in the Bering Sea, mostly on Fisheries-oriented projects. UNH's lab is working with Sairdron on a much larger (72') ASV that can carry a deep water multibeam. The concept of Sairdron is being embraced by researchers and NOAA.

Member Gee asked if the relation of partner CORS stations to Foundation CORS stations is analogous to base NWLON stations and tiered data. Ms. Blackwell said that in general, the answer is yes. NGS is trying to make a higher level connection with the international community, which means they will have some additional requirements to tie to other geodetic observing systems, besides GNSS.

**Public Comment**

Jon Dasler said they have often seen that the models don't extend far enough inshore. Shorelines change and as these models get developed, it is important to push those inland, especially on the Mississippi River. He also commented that the way several USACE Districts are conducting multibeam surveys is not adequate for object detection.

**Adjournment**

The Panel stood in recess at 12:14 p.m.

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*Thursday, August 30, 2018*

The meeting was called to order at 9:01 a.m.

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

**Day 2 Recap – Member Round Robin Discussion**

Member comments on day two included how impressed the members were with the Marine Exchange and their innovative approach to filling gaps and sustainable sources of revenue, the difficulty of defining where the shoreline is and its implication, the value of NOAA services for engineering in the ocean environment and how they contribute to the economic development, USCG and NOAA both recognize the importance of getting AIS incorporated into PORTS dissemination and share an interest in doing it, the tech transfer coming from UNH is extremely valuable to private industry, and members were very pleased to see the partnership with USGS continue to grow.

Member comments from the AMEC meeting highlighted the Alaska IfSAR mapping success story and RDML Gallaudet's new role as Co-Chair, which will help transition AMEC to a bathymetric focus. Members felt having IOOS and AMEC join the meeting was very positive and seeing how all these panels can work together does a lot for the synergy of effort.

RDML Gallaudet said it was a strategic move to expand the charter of the AMEC to include the wet side in order to get NOAA closer to USGS and the Department of the Interior. The HSRP tends to focus on the navigation contributions of hydrography, but there are many more applications such as the importance of knowing the seabed in tsunami modeling and planning. Charting in Alaska is very important for this purpose. Mapping is also critical for support for fisheries and habitat characterization and conservation. Offshore mapping will be essential to implementing the President's Critical Mineral Executive Order.

RDML Smith commented that the Marine Exchange is a nimble organization that can get the right people on board, have flexible IT, authority to do things at the right time and place so that it is responsive to its customers. He asked what it is about the structure of government that constrains NOAA from being that agile. RDML Gallaudet said that increased agility is one of his aims by contracting out more hydrography and looking to partner with the private sector. The National Ocean Policy speaks about leveraging the National Oceanographic Partnership Program (NOPP) which is a great vehicle for this. NOAA leadership realizes that a government-only approach is not agile and they are prioritizing that cooperative effort.

### **HSRP Technology Working Group Discussion**

**Ed Saade, Working Group Co-Chair**, summarized the working group's activities since the April meeting and plans for the next six months. The group received a presentation on the Chart of the Future by Briana Sullivan and a presentation on AIS from Ed Page. They had detailed meetings with the NOAA Science Advisory Board (SAB) to include Mr. Saade attending their July meeting. Planned topics for the next six months include a GoTo Meeting with the SAB, an update on Seabed 2030, and a UNH technical presentation on multibeam echosounders and derived products. Some of the feedback from the SAB and where overlap between the two bodies may be include leveraging hydrographic mapping and measurements for Fisheries uses, and taking the data that OCS and NGS collect to use for forecasting and modeling conditions in nearshore, coastal, and estuarine navigable waters. This will take time to develop and consider what is needed to develop such a multiuse forecasting tool within NOAA.

### **HSRP Q&A**

Member Thomas asked for more clarity on what the SAB was looking for in the OCS and NGS data. Member Saade said he thought they meant taking the real-time data and building that into models, trying to predict long-term conditions along the coastline. If there are good examples of things that are already occurring that would be the first step.

RDML Smith thought prediction of sediment transport is an interesting, if aspirational, area. OCS has data that could support that type of modeling for coastal stability. Member Saade said that NOS has a lot of data and it is just a matter of someone asking the right questions.

### **HSRP Special Session: Addressing Arctic Challenges**

**Captain Ed Page, Director, Marine Exchange of Alaska**, introduced the panel covering the current status of U.S./international Arctic policy, and the constraints of the Alaskan Arctic marine transportation system. The speakers covered gaps and suggestions for how finite NOAA resources can be directed to enhance safe, efficient and environmentally sound marine operations.

**Michael Emerson, Director, Marine Transportation Systems Management, U.S. Coast Guard,** provided his perspective on the overarching U.S. Arctic policy and how the Coast Guard is approaching its Arctic mandates in a challenging environment. The current administration and front office at USCG have led to a new emphasis on maritime commerce within the agency and close collaboration with NOAA will certainly be key to that. Continued Arctic presence is essential to national security, maritime domain awareness, freedom of navigation, projecting national sovereignty, and scientific research. USCG has developed an Arctic strategy focused on acquiring arctic-capable vessels (aircraft, boats, and cutters) and people trained to operate in the Arctic. A new emphasis on national security is coming into focus and the Commandant is looking to engage all of the homeland security agencies in analysis and strategy for trade activities, fishery activities, immigration challenges, and other emergent conditions as waterways open. USCG's mobile and seasonal approach involves performing missions and activities in the Arctic, enhancing Arctic Maritime Domain Awareness, broadening partnerships, enhancing and improving preparedness, prevention, and response capabilities. A common theme they hear from stakeholders and partners is the need for data. Relations between NOAA scientists and USCG cutter crews onboard ships have improved greatly. USCG's is working to recapitalize their polar icebreaking fleet to include sensors and weapons, and they will continue to be an asset that is usable for the scientific and academic communities. USCG worked with Alaska agencies and entities, as well as Russia, to put together recommended track lines in the Arctic and areas to be avoided. There is only one area left that needs to be approved by the IMO. This project gave USCG a sense of the data and tools available as well as the number of vessels and opportunities. The next step is continuing the effort for the North Slope so that as the Northwest Passages opens there will already be planning in place. Areas for collaboration between NOAA and USCG include establishing a sustained presence in the area, speaking with one voice on planning for resource development, increased awareness through improved information, and infrastructure.

**Willie Goodwin, Jr., Chair, Arctic Waterways Safety Committee, Kotzebue, AK,** discussed the changes in the U.S. Arctic in recent years, highlighting the impacts on his community, their dependence on the coasts and oceans for transit and livelihoods, and the navigation services improvements that would help fill gaps in their maritime infrastructure. The first step towards developing safe practices for Arctic waters is becoming familiar with those that are on the water and why they are there. Local communities increasingly have to share the waters with developers and researchers. Local peoples' social systems are built around the ecosystems in which they live. As part of the heritage of the subsistence hunting culture, they depend on the Arctic ecosystem for food security and life itself. Protecting the availability of resources and food security is written into federal law in the Marine Mammal Protection Act. Working to protect their food security, however, doesn't mean they are opposed to development. Development can bring jobs to Native communities and these opportunities are important. Communities are happy to share their region with development interests and scientists conducting research when they are willing to work with Natives to bring about resolutions to conflicts that bring about shared opportunities and success. With the increase in vessel traffic, the Arctic marine mammal hunter groups came together in 2012 at the request of USCG to form the Arctic Marine Mammal Coalition. The AMMC has been successful in providing communication and education between coastal communities and USCG, NOAA, and other regulatory agencies. They have joined with municipal governments, industry, and other stakeholders to form the Arctic Waterways Safety Committee to create a stakeholder process where those using the waterways can reach consensus on safety practices for local marine areas. They have developed standards

for operating care for research vessels and are in the final stages of completing the Waterways Safety Plan. The marine mammal hunting groups, especially the Alaska Eskimo Whaling Commission, have worked with NOAA to provide information on sensitive areas for publication in the Coast Pilot. They also provide VHF channels and buffer areas for communities. Funding and capacity have been an issue with providing the Coast Pilot with updated information, but hunter groups are expected to provide more detailed information in the future as they complete the Waterway Safety Plan. Information is currently difficult to access and relies on vessel operators' knowledge and adherence to Coast Pilot guidelines. Providing real-time information to vessels operating in the Arctic could help prevent marine casualties and environmental harm.

**Paul Fuhs, President, Board of Directors, Marine Exchange of Alaska**, provided history on marine transportation and commerce in the Alaskan Arctic, juxtaposing the issues that commercial and local mariners are dealing with today in a changing Arctic and the need for an improved U.S. Arctic Marine Transportation System. The Northern Sea Route and Arctic operations are getting a lot more attention from container operations, potentially using Adak as a hub to connect the Northern Sea Route with the Great Circle Route. Russian LNG production is already using the Arctic Sea route and saving 20 days' voyage time going from the Yamal Peninsula to Japan. If these ships can be used to create fueling stations, we could replace some of the more polluting fuels being used in the Arctic with LNG. A lot of this is facilitated by icebreakers, and the Marine Exchange is looking at an "Uber for icebreakers" concept. Shippers on Northern Sea Route for container operations say they need 6 months of operations guaranteed before they would change their distribution patterns. Disaster prevention is critical for many reasons, including response, infrastructure, and mapping limitations and the importance and vulnerability of marine mammals. The financial and environmental cost of an oil spill in the Arctic would be catastrophic. Essential prevention measures in place currently include: (1) Routing measures, active vessel tracking and monitoring, early response, and vessels of opportunity; (2) Improved hydrologic and meteorological data; (3) Effective provision of data to vessels, weather, ice, currents, marine mammal concentrations, virtual buoys, and hazards to navigation; and (4) International agreements for prevention measures and emergency response. NOAA's role on the Arctic Council puts them in a critical position for supporting these measures as best practices. The weather stations the Marine Exchange put in through funding provided by AOOS provide data that is sent out to vessels through a research agreement. The Marine Exchange needs permission to be able to do this on a permanent basis and be able to take the data NOAA generates and make it usable for vessels.

**Jay Sterne, President, Windward Strategies, LLC**, addressed the significant needs and challenges associated with developing maritime infrastructure in the U.S. Arctic. Maritime infrastructure in the U.S. Arctic needs to support the people and communities in the region, address increasing maritime traffic, respond to the growing strategic interest in the region, develop the significant natural resource potential, and prepare for the unique challenges presented by the Arctic marine environment. Core issues to address for sustainable development and the viability of Arctic communities include subsistence hunting and fishing communities, commercial fishing, regional marine transportation, regional fuel distribution, onshore and offshore resource development, and tourism. National and homeland security missions and protection of the Arctic marine environment are also core issues. Even if Shell operations never return to the Chukchi Sea, oil and gas exploration continues on the Russian side of the boundary and nothing can keep an oil spill in their waters from entering ours and the U.S. needs to be prepared. Congressional effort is often required even to get basic local infrastructure. NOAA's number one priority should be completion



of modern hydrographic charts for navigationally significant areas in the U.S. Arctic. This effort should include NOAA ships, private sector vessels, other federal vessels of opportunity, and outside source data. Coastal mapping should also be incorporated as an integral element to support safe navigation and shore-based activities. NOAA and AOOS are central to providing timely and accurate data for maritime stakeholders and coastal communities, such as sea ice conditions, weather developments, and marine ecosystem changes. The required cost-benefit ratio for creating or expanding ports does not pencil out very well in Alaska, but USACE's authority under WRDA allows for broader non-economic factors to be considered in the study and design of projects in the region. The FY2017 National Defense Authorization Act requires the Secretary of Defense to establish criteria for the designation of DoD Arctic strategic ports. These will include a port capable of accommodating an *Arleigh Burke*-class destroyer and a substantial increase to shore-based infrastructure. The environmental NGO community views Alaska and the Arctic as a park and that it should be off-limits to any development. This fails to acknowledge and respect the needs and goals of the people and communities living there. While the challenges are many, the opportunity exists to chart a successful path forward to achieve sustainable development in the U.S. Arctic.

### **HSRP Q&A**

RDML Gallaudet agreed with Mr. Sterne that NOAA has great support from the Alaska Congressional Delegation. He said that strengthening and expanding the partnerships with USCG has been one of his top priorities for the agency.

Capt. Armstrong asked if the new icebreakers will be equipped with multibeam echosounders. Mr. Emerson said they would have three beam radar, will be able to emulate the capabilities of the Healy, and will collect data wherever they travel. USCG tried to put together a cutter that would still be relevant in 30 years. Mr. Fuhs asked if they will have any emergency response capabilities incorporated into the design. Mr. Emerson said they are in the design phase now, but they do have multimission capability built in to all USCG ships. It will have fundamental towing capability, search and rescue capability, boat lowering, and room for boarding/rescue teams. USCG is waiting on public proposals and expecting cost estimates in October.

Chair Miller said the Panel has heard for years about the need for AIS to be able to broadcast NOAA data and asked what the obstacles are to achieving that. Mr. Emerson said there is a small IT piece, which has been put on the sidelines while funds have been prioritized to operational requirements. He has pushed the issue and will be meeting with NOAA leadership to draft a timeline and key milestones to get there.

Chair Miller asked if the population in the Kotzebue area has remained steady, grown, or declined. Mr. Goodwin said that Native population in the area is back to what it was 200 years ago; diseases wiped out a large percentage of their population but they have since recovered.

Mr. Boledovich asked the panel to provide him with which authorities they believe are the best for current or projected levels of marine transportation in the Arctic. NOAA gets a lot of conflicting information from various sources and would like to know which are correct.

### **Public Comment**

Molly McCammon commented that AOOS is working on two projects in partnership with the Marine Exchange. They are funded by the Arctic Domain Awareness Center to take vessel tracks and use that to prioritize where charting and mapping should be done in the Bering Strait region. The National Academy of Sciences has funded another project for the North Slope to take AIS tracking data, combine it with subsistence harvest areas by species and time, then using oil spill scenarios to conduct risk assessments. AOOS has written several proposals for crowdsourcing pilot projects and they have the capacity to do it in their data center.

Nathan Wardwell, JOA Surveys, commented on the importance of long-term continuous water level measurement and short-term water level measurement in the Arctic. Coastal engineers need a year or more of continuous observation to design ports. The long-term stations add value by reducing the uncertainty in tidal datums.

Rada Khadjinova asked Mr. Fuhs what the main obstacle is in pushing the data through AIS. Mr. Fuhs said it is just the permissions to be able to use the system to transmit the data. A lot of time, the Marine Exchange would like to support the work HSRP is doing but it is difficult the way the channels work between the agencies. He asked the Panel to help identify points where the influence of the end user can be heard. Mr. Emerson said that the actual mechanical connectivity between a data stream and a transmitter requires communication, coding that will tell a device to find a piece of information and turn it into a radio signal. USCG does not have that right now. Hopefully after this meeting, it will get elevated as a priority for the Commandant and Congress. Jon Dasler said David Evans and Associates has explored this and there is an AIS-AtoN message for weather/tide/current broadcast information. The issue has been bandwidth. Though it wouldn't work well in Alaska, in other areas they use Sirius XM Mariner weather overlays and it would be nice to get PORTS information on that system. Member Page said there is an issue with too much nonrelevant information in broadcasts in areas like LA-Long Beach, but Alaska has never had this issue. Member Gee said these IT issues are just as important as any other infrastructure.

Guy Noll asked, via webinar, if there has been any discussion of Ecological Coastal Units, a USGS-led initiative. RDML Smith said this is an interesting area to follow up on.

### **Emerging Arctic Priorities Working Group**

**Ed Page, Working Group Co-Chair**, discussed next steps for the working group. He said the group wanted to hold off on making any decisions on next steps until they heard from the experts who just presented. It would be premature to start identifying issues before having a chance to digest and discuss what was said. The panel provided a wide breadth of issues and perspectives. Perhaps the HSRP should raise the issue that the current regulations are all directed toward vessels carrying oil, and there are no regulations in place for cargo vessels' emergency response requirements or risk-mitigating measures if they run on LNG or nuclear.

Member Gee commented on the visualization labs' need to play the role of psychologist in understanding how people interact with data and maybe that can be raised in research. Visualization is a great way to handle the issue of data overload but you need the fundamental psychological understanding to underpin it. Dr. Mayer said it is critical that we start thinking in these directions, displaying data in a more intuitive visual format. It is a real challenge getting this information from users to ensure that what researchers are developing is useful. Member Page said there isn't one solution; different users want different things

depending on situation and personality. Different presentations are needed that users can choose from and customize.

### **HSRP Planning and Engagement Working Group**

#### **HSRP Comments on CO-OPS Strategic Plan**

**Julie Thomas, Working Group Co-Chair**, presented the comments received on the CO-OPS Strategic Plan and sought concurrence from the HSRP to submit these comments along with the letter to the Acting Administrator. There were no objections. Mr. Edwing said the comments were very helpful and the most diverse set he has received. The plan was kept short and focused because it is intended to be used as a tool to set internal priorities and resource those priorities to get a more limited set of things done.

Chair Miller recognized the passing of RDML Kenneth Barbor, a former HSRP member and founding director of the Hydrographic Science Research Center at the University of Southern Mississippi.

#### **NOS Five Minute Updates**

**Dr. Nicole Kinsman, NGS**, provided an update on NSRS modernization preparedness. NGS is trying to make the transition to the new datums as smooth as possible, but it is a sea change for how positions are defined in the nation. A lot of work is going into making sure there is minimal disturbance and NGS has many outreach avenues for those that will be affected. The monthly webinars average over 400 attendees, the Geospatial Summits and Industry Days have been very successful. NGS also releases a quarterly newsletter, have published blueprint documents for review, and maintain an active presence at national professional and industry conferences. NGS has a fully staffed Regional Advisor Program because they recognize the changes are going to be different for different geographies. This summer, NGS released a study that estimated the economic benefits of the NSRS modernization will be \$18.6-38 million annually. 14 Regional Geodetic Advisors around the nation are available to answer local geodetic questions. Dr. Kinsman described some of her outreach efforts in Alaska as the state's Regional Geodetic Advisor. NSRS modernization will probably have limited impact on offshore maritime activities, but some things will be affected quite a bit, such as coastal maritime infrastructure will benefit from ease of GPS-based access and time-dependent reference frames that provide tools to better account for land motion and sea level change in engineering design.

**Laura Rear McLaughlin, CO-OPS**, provided an update on currents surveys in Alaska. The National Current Observation Program collects, analyzes, and distributes observations and predictions of currents to ensure safe, efficient, and environmentally sound maritime commerce and support environmental needs. Their principle product is information used to maintain and update tidal current tables and they deploy current meters annually to assist with those updates. In 2007, CO-OPS deployed 47 stations in Prince William Sound; in 2008, 51 more stations in Southeast Alaska and two in Cook Inlet specifically for more accurate prediction for the docking of oil tankers at Tesoro Pier. In 2009, they deployed 44 around Kodiak Island. In 2010, CO-OPS completed a detailed study of Glacier Bay and Cross Sound with 10 current meters and deployed 24 stations around Unimak Pass to capture one of the most dynamic shipping channels in the world. In 2012, they studied Cook Inlet to support a model being developed to identify key areas for tidal kinetic energy; this model will be the basis for the new Cook Inlet OFS model. Looking ahead, CO-OPS is seeking to partner on a circulation study of Kachemak Bay, is planning to

deploy another current meter (an elliptical buoy) to update the predictions at North Indian Pass, and is hoping to deploy meters in Aleutian passes in FY23. Ms. McLaughlin noted that in Western Alaska, there are only about 70 entries in the tidal current tables, most of which are from the deployment in Unimak Pass.

**Captain Richard Brennan, OCS**, provided an update on the OCS Ocean Mapping Plan. In the past eight months, they have been working on the OCS Mapping Plan in earnest, gathering information and data to support that. There are two main sections to the plan: (1) the focus areas that OCS intends to target survey work in, reducing charted uncertainties/discrepancies, and collaborative mapping and how OCS can use its expertise and resources to further map the U.S. EEZ; and (2) the execution strategy on how OCS intends to do this. The first step is executing on clear priorities, bringing the Hydro Health Model to completion so that where they go and what they do can be traced back to a clear priority to the nation. The next step is expanding the collaborations and moving towards coalition to fully map the U.S. EEZ. The third step is leveraging the technology. 38% of the uncharted area in the U.S. EEZ sits in Alaska. Depth is critical in determining the level of effort required. 99% of the effort is going to be towards getting shallow water data, even though less than 1/3 of the square nautical miles are shallower than 1,000 meters. The only way to get all of this done is to add more ships and sensors observing.

**Captain Elizabeth Kretovic, OCS**, provided an update on precision navigation. Shortly after the April HSRP meeting, Capt. Kretovic was named program manager for precision navigation and quickly stood up a team dedicated to supporting this effort. They are about to begin a resurvey operation in LA-Long Beach as part of their commitment to the precision navigation project there. They are in the process of drafting a contract for a socioeconomic study that will help answer questions concerning benefits of precision navigation and the return on investment for particular ports. The team is currently conducting a gap analysis to ensure everything is in place to conduct a full blown precision navigation project in the Lower Mississippi River Complex. Capt. Kretovic will be attending to the Harbor Safety Steering Committee meeting in New York to identify requirements for the Port of New York-New Jersey so they can move the precision navigation project there forward. OCS has been contacted by four additional ports to start conversations about getting precision navigation.

**Neeraj Saraf, OCS, CSDL**, provided an update on autonomous and unmanned vessels. There has been extensive testing of underwater vehicles at CSDL (Coast Survey Development Lab) and it was determined that the charting goals could be better accomplished through the use of surface vessels, so that is now their focus. CSDL has engaged with C-Workers, EchoBoats, and Z-Boats and also other technology providers like Saildrone and iXblue. Projects they are working on include partnering with UNH to work with the C-Worker 4. They are hoping to explore more operational methods and gain more shipboard experience as that deployment went very well. CSDL latched on to a PMEL mission in the Chukchi Sea that is underway right now. Fisheries and other NOAA offices have an interest in this mission as well. The CSDL team is very involved in launch conversions to outfit NOAA ships with these vessels. There is one conversion project currently active and another planned for FY19. CSDL is starting to look at aerial drones and the ability to eventually have these outfitted on NOAA ships to aid in data collection. One benefit of Saildrone is that NOAA does not have to acquire or maintain the property or manage the collection. Mr. Saraf is excited to see their larger vessel. Autonomous vehicles are still a long way from replacing people, as a crew with expertise is still needed to manage them and make sure they work as effectively as they can.

**Colby Harmon, OCS MCD**, provided an update on rescheming ENC coverage in Alaska. As of July, all passenger ships over 500 gross tons, and most tankers and cargo ships over 3,000 gross tons on international voyages are required to use ENCs with an ECDIS. Last year, USCG authorized the use of ENCs for commercial vessels on domestic voyages without the additional carriage requirement for paper charts. Thus, NOAA now considers ENCs its primary nautical chart product. Another aspect to making ENCs primary is a plan to rescheme and improve the quality of the entire ENC product. The current suite comprises over 1,200 irregularly shaped ENC cells compiled in over 130 different scales. The new ENC scheme has a standardized regular gridded layout in which larger scale cells fit neatly into the footprint of the next smaller scale cells. In Alaska, work on smaller general scale ENCs in the Chukchi Sea has already begun. Larger harbor and approach scale ENCs in Etolin Strait, the Shumagin Islands, and Southeast Alaska will come next. The reschemed suite will ultimately have 9,000 ENC cells when fully implemented. Improved chart coverage in Alaska will be met by creating new larger scale ENC coverage. The new scheme will support customized chart products such as the new web-based NOAA custom chart application. Although it will take years to complete, NOAA is confident users will start to see benefits of the new chart scheme soon.

**Ashley Chappell, OCS**, provided an update on the 3D National Elevation Requirements and Benefits Study. Since the HSRP's fall 2017 meeting, they have continued gathering information on where people need elevation data and how valuable it is to them. The project is in partnership with USGS with support from Dewberry as a contractor. This study follows on the NEEA study USGS did for terrestrial lidar in 2012, and incorporates ocean and coastal. The study hopes to elucidate inland, nearshore, and offshore bathymetric requirements as well as topographic requirements, taking a sensor agnostic approach. They released the questionnaire and data collection has been ongoing, with almost 900 responses so far. They are in the process of data validation and will be setting up a workshop to ensure they understand what the responses are trying to convey. With this analysis they will determine the different possible scenarios for collecting and providing elevation data to users, trying to identify the optimal cost-benefit ratios.

### **HSRP Q&A**

Member Thomas asked if HF radar helps at all or does CO-OPS need profile currents. Ms. McLaughlin said she doesn't believe there is a place for HF radar in the region they are targeting and it is probably too far offshore. Member Thomas said AOOS is getting some money for HF radar and Ms. McLaughlin should touch base with Ms. McCammon.

Member Kelly asked if there is some way to evaluate which precision navigation projects get done first. Capt. Kretovic said the socioeconomic study will help OCS determine where to go next. Capt. Brennan said they are overlaying the interest they've received from ports with the shipping demands that require precision navigation in determining order.

Vice Chair Saade asked if CO-OPS would be interested in industry current meters scattered around the area. Ms. McLaughlin said that working with outside partners to collect current meter data is something they may want to be looking into. Mr. Edwing said they are interested, even if it is just getting a few months of data that can be used to make predictions or potentially creating a PORTS-type system out of it. CO-OPS would need to look at what equipment is being used but they would like to explore that.

Member Gee asked if the OCS ships doing surveys now are collecting current information. Ms. McLaughlin said they do not collect it, but they do partner with them occasionally if they are transiting through an area CO-OPS is interested in. It is not common for OCS ship to deploy CO-OPS instrumentation. Chair Miller asked if the ship's ADCP data would be helpful. Ms. McLaughlin said that they are looking for a single position so they have 30 days of one location to allow them to do harmonic analysis and create predictions; a transit would not provide that information. It could be useful for modeling purposes, but not tidal current prediction.

Member Gee asked if autonomous systems designed specifically for the NOS tasks are looking at those other ancillary observations and then potentially using GPS to transfer the datums. Mr. Saraf said it is possible they could be used that way. The benefit of autonomous devices is that they can be outfitted with many things. This is why CSDL is taking a focused look at how to integrate various observations.

### **HSRP Member Discussion and Recap: Review of Meeting, Recommendation Letter, Final Comments to Public Documents, Priorities Next Steps**

#### **HSRP Priority Matrix**

Member Maune presented the priority matrix and the number of votes each topic received from members. Autonomous vessels and emerging technologies was voted of the highest interest. Vice Chair Saade said that NOAA has a lot of autonomous activity (airborne, surface, and subsurface), and he was not sure if an issue paper was needed because things are moving forward so quickly.

Member Hall said that her understanding of this exercise was that these were items of interest the Panel wants to be kept apprised of not necessarily topics for issue papers. Member Maune agreed. Member Page suggested keeping a different list of topics that they want to provide input to NOAA on. Vice Chair Saade said that these are informational briefings in which something may emerge that they want to turn into an issue paper. These priorities also help set meeting agendas and to inform NOAA staff and HSRP leadership of the Panel's interests. Chair Miller said that the Panel is providing advice to both NOS and the Acting Administrator, and they need to remember to look more broadly than just NOS. Member Thomas said she would like a report out at the next meeting on whether there has been any progress on using autonomous vessels for shallow water bathymetry. Vice Chair Saade said that given the Acting Administrator's prompting the HSRP to focus on it and the speed at which it is changing, it may be worth having an autonomous technology session at each HSRP meeting.

Member Duffy said that the partnership between NOAA and USACE is his highest priority asked that it be included in future considerations. Dr. Mayer said that this might be a good topic to focus on for the next meeting in the Washington, D.C. area. There has been good progress but they need to keep the pressure on and the discussion may lead to an issue paper.

Vice Chair Saade suggested taking a few topics offline from the bi-annual meetings and making them potential topics for conference calls for interested members. Member Atkinson said that some topics are more relevant to certain geographical areas and may make good subjects for meetings in those places, such as subsidence at the New Orleans meeting next fall.

Vice Chair Saade asked if the Topics of Interest List should be redone every meeting or kept fixed. Member Hall said it is important to understand the expectation for the topics, whether the Panel wants a

full presentation on a topic, just an update, or if there is interest in writing an issue paper. Member Shingledecker challenged the group to use the list as a forward planning mechanism and suggested ranking the topics at the end of meetings, since the rankings may be different after hearing from stakeholders. She also suggested a backward looking tool, reviewing the previous letters written to the Administrator over the last 5 years to see where their recommendations stand now.

Chair Miller pointed out that often the topics in the recommendation letters are items discussed at the meeting but are not high priorities to the Panel. She suggested Member Duffy read the “Improving Access for U.S. Nautical Charts” which addresses the NOAA-USACE relationship to see if it can be updated and improved. Member Thomas wanted to broaden the topic beyond just nautical charting and the channel issues because USACE is a partner in several capacities and coordination is essential.

Member Thomas said sea level rise may become an issue paper, but they will meet as a working group first to discuss it.

### **2022 Datum Change Paper for General Population**

Member Thompson proposed the HSRP draft a general overview paper on how the general population will be impacted by the datum change in 2022, both horizontal and vertical. The basic information from the original elevation paper could be used but without the technical details. Member Maune said he expects to see a lot of resistance from states for changing their State Plane Coordinate Systems. NGS has done everything they can to prepare people for it but it will still be a hard sell. Capt. Armstrong said if the paper is for the Acting Administrator stating that NOAA’s communications need to be improved, that would be advice HSRP can give, but writing directly to the public is not appropriate. Ms. Blackwell said NGS would love to have any ideas the Panel comes up with, a one-pager that is very light on details is something NGS should be putting out, and they would like to hear from the Panel things to highlight or groups to focus the message towards. One of the hardest things is getting the right information to state and federal legislatures to make them an awareness of what is coming.

### **Recommendation Letter Discussion**

Vice Chair Saade led a discussion of key points to include in the letter to the Acting Administrator. These included appreciation for the attendance of RDML Gallaudet and other high ranking officials from several agencies, acknowledging the joint meetings with IOOS and AMEC and the value of their attendance, some mention of the lack of shoreline data and the critical need for mapping and observations in Alaska, the need for barge navigation support, continuing support for pushing forward the Coast Guard AIS issue, recognizing the participation of local stakeholders, appreciation for the Congressional video statements, the Tiered Data Policy, the need to communicate data in a more meaningful way, acknowledge the Panel’s pleasure that RDML Gallaudet is Co-Chairing AMEC and that AMEC is now prioritizing bathymetric mapping and integration of topographic and bathymetric data along the Alaskan shoreline, recognize the critical community service that Marine Exchange provides and that it is a good example of public-private partnerships, the need for a structured approach led by NOAA that finds ways to utilize national organizations with local roots that could bring a grassroots value into solving problems, the need for more real-time data, increasing nimbleness is key to keeping hydro services responsive to mariner needs, an appreciation of the priority that NOAA has placed on the work of HSRP, the interest in the Critical Minerals Executive Order and expanding exploration in the Clipperton Ridge, implementation of

the National Charting Plan, and recognizing that small areas are really important and targeted work can have high value.

Member Hall suggested pushing for more interaction with IOOS and AMEC in future meetings.

Member Page said he and Member Thomas will be drafting a document outlining a relationship between HSRP and IOOS AC.

Dr. Mayer suggested the Panel consider the value of a small boat presence in Alaska.

The letter to the Acting Administrator will be consolidated before being circulated for additional comments by Panel members.

### **HSRP Charter**

Member Thompson made a motion to accept the charter as is, with minor changes by legal counsel. The motion was seconded and passed unanimously.

### **Next Meeting**

The next HSRP meeting will be March 5-7, 2019, in the Washington, D.C. area.

The meeting was adjourned at 3:55 p.m.



## **HSRP VOTING MEMBERS IN ATTENDANCE:**

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

## **NOAA and NOS LEADERSHIP**

RDML Tim Gallaudet, Ph.D., (Navy, ret.)	Assistant Secretary of Commerce for Oceans and Atmosphere, and Acting Undersecretary of Commerce for Oceans and Atmosphere, NOAA
Nicole LeBeouf, Ph.D.	Deputy Assistant Administrator, National Ocean Service, NOAA

**HSRP DFO PRESENT:**

RDML Shepard M. Smith

Director, Office of Coast Survey, NOS/NOAA

**HSRP NON-VOTING MEMBERS IN ATTENDANCE:**

Juliana Blackwell

Director, National Geodetic Survey (NGS), NOAA

Richard Edwing

Director, Center for Operational Oceanographic  
Products & Services (CO-OPS), NOAA

Larry Mayer, PhD

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

CAPT (NOAA Corps, ret.) Andy Armstrong

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

**IOOS NOS STAFF PRESENT:**

Carl Gouldman

Director, IOOS

Jessica Snowden

Physical Scientist and DFO, IOOS Advisory Committee

Dave Easter

Kate Culpepper

Sabra Comet

Marnie Brown

**IOOS ADVISORY COMMITTEE MEMBERS PRESENT:**

Thomas Curtin

University of Washington

Tom Gulbransen

Battelle Memorial Institute, Vice Chair

Jennifer Hagen

Quileute Indian Tribe

Val Klump

University of Wisconsin-Milwaukee

Vice Admiral Conrad Lautenbacher, Ph.D.	GeoOptics, Inc., Chair
Tony MacDonald	Monmouth University
Justin Manley	Just Innovation LLC
Chris Ostrander	University of Utah
LaVerne Ragster	University of the Virgin Islands
Doug Vandermark	University of New Hampshire

**NOS STAFF PRESENT:**

Amy Holman	Alaska Regional Coordinator
Lynne Mersfelder-Lewis	HSRP Program Coordinator, OCS
CAPT Elizabeth Kretovic	Deputy Hydrographer, OCS
Jim Rice	Policy Analyst, Policy and Constituent Affairs Division (PCAD), NOS
Glenn Boledovich	Policy Director and Chief of Policy and Constituent Affairs Division (PCAD), NOS
CAPT Rick Brennan	Chief, Hydrographic Surveys Division
LT Bart Buesseler	Alaska Navigation Manager, OCS
CAPT James Crocker	Chief, Navigation Services Division, OCS
Ashley Chappell	IOCM, OCS
Virginia Dentler	CO-OPS
Colby Harmon	OCS Marine Chart Division
Nicole Kinsman, Ph.D.	National Geodetic Survey
Laura Rear McLaughlin	CO-OPS
Neeraj Saraf	Acting Chief, OCS CSDL

**NOAA STAFF PRESENT:**

LTJG Melissa Mathes	NOAA Commissioned Corps
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Julie Roberts NOAA Communications  
Erica Towle, Ph.D. NOAA Program Coordinator Officer  
Kevin Wheeler NOAA Deputy Chief of Staff

**SPEAKERS:**

CAPT Hans Antonsen Southeast Alaska Pilots Association  
RDML Matthew T. Bell Commander, 17<sup>th</sup> Coast Guard District, U.S. Coast Guard  
Michael Emerson Director, Marine Transportation Systems Management, U.S. Coast Guard  
Paul Fuhs President, Board of Directors, Marine Exchange of Alaska  
Kevin Gallagher Associate Director, Core Science, U.S. Geological Survey, U.S. Department of the Interior  
Willie Goodwin, Jr. Chair, Arctic Waterways Safety Committee  
Heidi Hansen Deputy Commissioner, Department of Natural Resources, Alaska  
Frances Leach Director, United Fishermen of Alaska  
Molly McCammon Executive Director, Alaska Ocean Observing System  
Don Moore Director of Operations, National Weather Service Alaska  
Jacquelyn R. Overbeck Coastal Hazards Geologist, State of Alaska, Department of Natural Resources, Division of Geological and Geophysical Surveys  
Mark L. Smith CEO, Vitus Energy LLC  
Jay Sterne President, Windward Strategies LLC  
Angie Thrower Staff Captain, Allen Marine Tours  
CAPT (USCG, ret.) Carl Uchytel AAHPA President and Juneau Port Director

**ATTENDEES:**

Garrett Boyle	Senator Murkowski's Office
Mark Brooks	Optimal Geo
Todd Buck	District 17, U.S. Coast Guard
Stephanie Bugyis	District 17, U.S. Coast Guard
Bridget Cotti-Rausch	U.S. Environmental Protection Agency
Jon Dasler	David Evans and Associates
Aimee Devaris	U.S. Geological Survey
Alice Edwards	Alaska Department of Environmental Conservation
Janan Evans-Wilent	Senator Murkowski's Office
Ephraim Froelich	Alaska Governor's Office
Tracy Fuller	U.S. Geological Survey
John Gerhard	Woolpert
Tom Gemmell	Halibut Coalition
Kevin Gullufsen	Juneau Empire newspaper
Nick Hatch	Marine Exchange of Alaska
Jen Karnik	Marine Exchange of Alaska
Rada Khadjinova	Fugro
Amanda Landvok	Marine Exchange of Alaska
Chris Macon	USACE
Steve Masterman	Alaska Department of Natural Resources
Shaun McFarlane	Alaska Department of Natural Resources
Connie McKenzie	Alaska Congressional Delegation
Brianne Mecum	Oceana
Ru Morrison	NERACOOS
Tom Newman	Terrasond
Amanda Painter	Allen Marine Tours

Josie Quintrell	Executive Director, IOOS Association
Ann Robertson	Senator Murkowski's Office
Dave Saghy	U.S. Geological Survey
David Seris	U.S. Coast Guard
Mark Smits	Woolpert
Michael Tischler	U.S. Geological Survey
Maria Uchytel	Bartlett Hospital
John Walsh	JM Walsh Company
Nathan Wardwell	JOA Surveys
Jon Warrenchuck	Oceana
Ken Woods	Alaska Department of Natural Resources
Jennifer Wozencraft	USACE
Brian Wright	U.S. Geological Survey
Matthew York	Marine Exchange of Alaska