



Scott Perkins, Chair
Bill Hanson, Vice Chair

October 13, 2015

Kathryn Sullivan, Ph.D.

Under Secretary of Commerce for Oceans and Atmosphere
National Oceanic and Atmospheric Administration (NOAA)
U.S. Department of Commerce
1401 Constitution Avenue, NW, Room 6217
Washington, DC 20230

Dear Dr. Sullivan:

The HSRP extends our thanks to you Dr. Sullivan for the participation of NOAA Senior Leadership at the HSRP meeting. Continuing a direct dialogue between HSRP leadership, you and Vice Admiral Brown is essential during the short time period remaining in President Obama's Administration to urge active engagement on navigation services and to take full advantage of the emerging Arctic priorities he noted in Alaska. The HSRP Chair and Vice Chair will meet with Vice Admiral Brown again soon to discuss and strongly encourage a NOAA response to the President's statements and fact sheet on September 1, 2015, titled "President Obama announces new investments to enhance safety and security in the changing Arctic". Of the referenced agencies, NOAA is the only agency that did not have a formal response.

The HSRP received comments and direct input from stakeholders (there were over 100 live and virtual attendees) throughout the duration of our meeting in Silver Spring. One suggestion to the HSRP was to develop a 15 year plan to complete the charting of the critical areas in the U.S. maritime Arctic. The HSRP will review this timeframe to see if it is a feasible and achievable goal.

The Hydrographic Services Review Panel (HSRP) developed three recommendations resulting from our meeting in Silver Spring, MD, on September 16-18, 2015:

1. Request new funding and place a high agency priority on hydrography, charting and geodetic observations in the U.S, maritime Arctic.
2. Full utilization of the NOAA Hydrographic fleet & Contractor Hydrographic fleet
3. NOAA should be more aggressive in seeking all hydrographic data sets for full utilization of non-NOAA hydrographic data for the Arctic and other U.S. maritime regions.

Each of these recommendations is discussed further below.

Recommendation #1

Request new funding and place a high agency priority on hydrography, charting and geodetic observations in the U.S. maritime Arctic.

The HSRP tasked its Emerging Arctic Priorities (EAP) WG to work on a range of Arctic issues provided by NOS at our April 2015 meeting in LA/LB. We note that the President's recent visit to Alaska and release of a Presidential Fact Sheet on September 1, 2015, titled "President Obama announces new investments to enhance safety and security in the changing Arctic" highlights many of the same issues. The President noted that, "NOAA and the USCG will take action to promote safe marine operations and transportation in the Arctic through mapping and charting efforts in the Bering, Chukchi, and Beaufort seas, regions with newly opened waters for which existing maps and charts are non-existent or outdated."

Rarely since the time of Thomas Jefferson has the President spelled out a strategic requirement for America's charts. The HSRP recommends that NOAA leadership take immediate action to plan for and leverage this mandate to execute the President's direction.

With the President's emphasis on the Arctic, it is critical that NOAA place a very high priority on allocating vessel and personnel resources to Arctic surveys, particularly given the brief Arctic survey season. There is a critical need for fundamental tide, current observations, and access to the National Spatial Reference System in this remote part of the United States.

The HSRP will seek to hold further discussions and dialogue with the NOS staff regarding its EAP working group report and recommendations. The HSRP/ EAP working group's report is attached as Appendix A.

Recommendation #2

Fully utilize the NOAA Hydrographic fleet & Contractor Hydrographic fleet

The HSRP appreciated the opportunity to meet with Rear Admiral Lopez, which provided a better understanding of the challenges facing NOAA's hydrographic survey fleet and the NOAA survey fleet in general to include:

- Aging ships,
- Challenges in hiring and retaining crew,
- The number of available survey days, and
- The need to maintain NOAA's in-house hydrographic expertise.

We would also note that Rear Admiral Lopez and NOAA have already taken significant steps to solve some of the staffing issues, but still face considerable challenges.

We also met with Mr. Jeremy Weirich, who explained one challenge in providing funds for fleet recapitalization was that the Senate Appropriations Subcommittee on Commerce Justice, Science and related agencies did not have access to NOAA's Fleet Recapitalization plan. The HSRP would encourage NOAA to push for forwarding of NOAA's Fleet Recapitalization plan from OMB.

We would also recommend that NOAA consider a wide range of options for short- to mid-term solutions to improve hydrographic survey efficiency including:

- Possible acquisition of the USNS Sumner, which is currently laid up;
- Possible use of other NOAA, USCG, or academic ships with multibeam survey capability for hydrographic surveys;
- Expanded usage of launches and NRTs to meet survey needs;
- Increased use of contracts for vessels or surveys; and
- Increased use of new technologies such as autonomous vehicles and crowd-sourcing.

Recommendation #3

NOAA should be more aggressive in seeking all hydrographic data sets for full utilization of non-NOAA hydrographic data for the Arctic and other U.S. maritime regions.

The HSRP recommends that NOAA explore use of current and seeking future non-NOAA hydrographic data sets in the Arctic and other maritime regions. HSRP urges NOAA to take a leadership role to gain greater leverage from your participation and partnerships in two federal bodies, the Committee on the Marine Transportation System and the new Arctic Executive Steering Committee, in order to facilitate discussion and encourage sharing of such data.

On behalf of the HSRP members, we submit these three new recommendations for your consideration and action and look forward to your response.

The HSRP has benefited from your participation in our meeting and look forward to meeting with you during our next HSRP meeting on March 15-17, 2016, meeting in the Houston and Galveston area.

Sincerely,



Scott R. Perkins, Chair
Hydrographic Services Review Panel



William Hanson, Vice-Chair
Hydrographic Services Review Panel

Report of the HSRP Emerging Arctic Priorities (EAP) Working Group ~ September 2015

Preface

The questions in this report were provided to the Emerging Arctic Priorities Working Group by NOS during the Long Beach/Los Angeles HSRP meeting in April 2015. The EAP worked through the summer in a series of teleconferences to develop a number of key recommendations. Two significant events occurred during summer 2015 that have had direct relevance to the work of EAP & HSRP. In early July the Finnish icebreaker *Fennica*, chartered to Shell for offshore support in the Chukchi Sea, grounded off Dutch Harbor and was damaged. The waters were charted but not to modern, international standards. On August 31 through September 2, 2015, President Obama visited Alaska and became the first President to travel above the Arctic Circle during a visit to Kotzebue. During his Alaska visit he spoke about needed infrastructure in the U.S. Arctic including a requirement for mapping and charting; a Fact Sheet provided by the White House addressed new investments to enhance safety and security in the changing Arctic. The President's focus on mapping and charting provides a unique opportunity for NOAA/NOS to be proactive in gaining much needed funding support for hydrographic surveys in the U.S. maritime Arctic.

Q 1. What criteria should NOAA consider to prioritize its national mission for hydrography and charting between the U.S. Arctic and the rest of the Nation?

The HSRP judges that there are no adequate criteria that can compare the requirements for hydrography/charting in the U.S. maritime Arctic with those requirements for the rest of the Nation, for example, with such ports as Charleston, New York and Los Angeles/Long Beach. Such criteria would have to weigh the current economic viability of U.S. ports and coastal areas with the potential for long-term strategic economic benefits of a frontier area. Such criteria would also have to compare the safety and security concerns of this remote region with that of southern ports. Perhaps safety and national security concerns/interests in Alaska could trump economic issues, but it is unlikely in our judgement that hydrography/charting in the U.S. maritime Arctic would have a higher priority or 'compete' with the needs of America's vital ports and harbors linked to international and domestic trade. The offshore leasing program in Arctic Alaska has provided the Federal Government a unique challenge regarding closing the huge gap in required marine infrastructure for this frontier region. And, importantly, by activating the offshore leases, the USG has assumed (in full or in part) the responsibilities for providing

adequate hydrography/charting in Arctic Alaska to attain a high level of safe navigation, marine safety and environmental protection in this sensitive marine region.

NOAA (NOS) has done a very credible job of initiating surveys to fulfill these requirements without additional funding. NOS re-prioritized more than \$18M for Arctic hydrography despite a shrinking NOS budget. There is an obvious need for additional (new) funding for the region where the USG has already leased areas of the offshore and where industrial activity is taking place in summer.

The emerging U.S. maritime Arctic requires a budget line item on the NOAA/NOS budget for new funding of Arctic hydrography/charting. Such funding would appropriately align these efforts with the U.S. *National Strategy for the Arctic Region*, signed by the President in May 2013, which places an emphasis on 'Chart the Arctic region.' NOAA's internal Arctic strategy should also identify hydrography (and geoid models and data) and charting as the highest priority Arctic items in its annual budget request.

- ***HSRP Recommendations:***

(A) NOAA should seek additional funding (minimum \$20M annually) in a Congressional line item budget for Arctic hydrography, charting and associated geoid observations consistent with the National Strategy for the Arctic Region.

(B) NOAA's internal Arctic Strategy should place hydrography & charting of the U.S. maritime Arctic among the highest priority requirements for program execution, consistent with U.S. national Arctic strategies and implementation plans.

Q 2. What criteria should NOAA consider to prioritize hydrography and charting requirements within the U.S. Arctic?

To establish a priority for hydrography/charting within the U.S. maritime Arctic NOS should consider the following marine operations and uses: the federal offshore lease sites and surrounding approaches; the approaches to Kivalina and the Red Dog Mine complex; national security and maritime law enforcements requirements; coastal community (summer) supply operations (tug-barge operations); summer supply operations to Prudhoe Bay; fisheries needs in the Bering Sea; future emerging Arctic port areas; and the identification and designation of places of refuge. Arctic ship traffic density data derived from AIS (source: the Marine Exchange of Alaska) are being used as a framework or baseline to determine general flow patterns and identify potential areas requiring increased hydrographic coverage. These multiple uses and requirements may or may not overlap with transit lanes being considered. National security requirements may also be significant, but HSRP is not aware of the details of such requirements. Projections of future Arctic Ocean commercial traffic are difficult to determine. However, projections of the traffic related to Arctic offshore development (correlated with the number of exploratory drilling rigs) are available. HSRP believes that the use of a risk-based methodology by NOS in assessing the adequacy of Arctic charting products is a

significant key step forward in evaluating the hydrographic needs of this vast area. CMTS should facilitate the gathering of interagency Arctic hydrographic requirements and work closely with the Coast Guard and NOAA (NOS) to identify safe and secure places of refuge in the region.

- ***HSRP Recommendations:***

(A) National security requirements for hydrography & charting of the U.S. maritime Arctic in light of a changing Arctic should be refined and provided to NOAA/NOS for integration with other marine uses and for planning future surveys; CMTS could be used a facilitator to obtain DOD (USN) and DHS (USCG) critical national security requirements for these requirements.

(B) NOAA/NOS should seek a better understanding of the seasonal traffic levels and charting requirements of coastal tug-barge operations used primarily for resupply of coastal communities and the North Slope within the U.S. maritime Arctic.

(C) NOAA/NOS should seek, perhaps from CMTS, a better understanding of the hydrography & charting requirements for offshore oil and gas exploration (inside and outside the federal leased areas) and a priority list of the places or harbors of refuge within the U.S. maritime Arctic.

Q 3. What criteria should NOAA consider to prioritize tides/currents and positioning requirements within the U.S. Arctic?

Tide station and CORS (continuously operating reference stations) needs for the U.S. maritime Arctic are many. Currently there is inadequate fundamental geospatial and oceanographic infrastructure to service nautical charting and accurate positioning services along the coasts in Chukchi and Beaufort seas (adjacent to the federal oil and gas leased areas). Accurate hydrographic surveys rely on accurate 4D (x,y,z,and t) positioning of the hydrographic vessel and the echo-lator instrumentation, which measures the accurate location of the sea-floor relative to the vessel. Accurate 4D positioning can be obtained from precise differential GNSS (global navigation satellite systems) along with accurate tide station and CORS, preferably co-located at critical coastal locations near the survey area. A minimum of three tide stations, with CORS instrumentation would be required to accurately control hydrographic surveys to cover areas of interest to oil and gas exploration in U.S. Arctic waters. The highest priority locations for tidal gauges and CORS stations include most of the northwest coast of Alaska.

Currents are more difficult to observe and model. Tide gauge measurements along with in situ current measurements are needed over several months or years to drive current circulation models, which may also need atmospheric forcing observations. Doppler current profilers are expensive to purchase and deploy. A large number of current

profilers would be needed to obtain meaningful current prediction results for the vast areas of ocean adjacent the northwest and northern coasts of Alaska.

- ***HSRP Recommendation:***

(A) NOAA/NOS must improve access to the National Spatial Reference System and fundamental oceanographic data on tides and currents in the U.S. maritime Arctic. Additional tide gauges and co-located CORS stations are required in the Bering Strait region, Chukchi Sea, and Beaufort Sea.

Q 4. Given the realities of shorter survey seasons and mobilization costs, what are realistic annual targets in percentage surveyed and charted over the next five years in the Bering Strait? In potential U.S. Arctic deep draft ports and harbors of refuge?

The northwest coast of Alaska (northern Bering, Chukchi and Beaufort seas) is ice-covered fully or partially for 7 to 8 months each year. However, the length of the ice-free season has been observed to be increasing in the autumn as the Arctic sea ice edge moves north of the Alaskan coast into the central Arctic Ocean. We assume that a 3-month survey season is realistic for the NOAA ships *Fairweather* and *Rainier* and one contract survey effort near a port. If the focus for a contract survey on the approaches and harbor at Nome, then a longer survey season may be feasible considering the longer ice-free season in the region south of the Seward Peninsula.

An annual minimum production rate of 500 square nautical miles is proposed given current funding levels; new funding for Arctic hydrography and increasing navigation seasons (perhaps to 4 months) could push this rate higher. The overall goal for a 10-11 year plan would be to complete approximately 5700 sq. nm of surveys. This total area would include: 1200 sq. nm of corridor (USCG access route through Bering Strait) and port approaches; 2500 sq. nm of approaches/areas in the federal offshore lease areas; and, 2000 sq. nm for approaches to and refuge/staging areas. Such a proposed production rate does not include any national security requirements that are unknown to HSRP, and does not address any other traffic requirements such as coastal resupply operations which could change during the survey period.

An annual production rate of 500 sq. nm is based on present technology, standards, and survey areas near shore. An open-water corridor or area survey might be less complex and coverage rates might be higher, although the launches on the NOAA survey ships would be under-utilized.

- ***HSRP Recommendation:***

(A) NOS should plan for a minimum annual survey rate of 500 square nautical miles for the next five years in the U.S. maritime Arctic under existing funding levels; NOAA should also develop an alternative plan for projected, increased funding levels that would consider expanded surveying of corridors, port approaches and refuge areas.

Q 5. Should NOAA look at alternative strategies to Arctic coverage other than our current approach of full bottom coverage? What might be some recommended new/creative approaches to partnerships and funding strategies that NOAA might employ to increase gravity data acquisition, develop Alaska geoid models, install tide gauges and survey for nautical charting?

If only 1% of the U.S. maritime Arctic is charted to modern international standards, the HSRP believes NOAA/NOS should explore all strategies and technologies that would yield *some* baseline hydrographic information in remote areas, despite the accuracy limitations. The current approach of full bottom coverage remains highly important for approaches to ports and potential transit routes through Bering Strait. Noted is the recent grounding and damage to the Finnish icebreaker *Fennica* (chartered to Shell for offshore lease site operations) in the approaches to Dutch Harbor.

NOAA/NGS, giving its highest priority to Alaska, has successfully executed its GRAV-D program using specialized contract commercial aircraft to fly a NOAA gravimeter to expedite its surveys. After completion of the surveys, NOAA is prepared to release a new geoid model for Alaska; a new geopotential (vertical) datum is to be released hopefully in 2022. NGS also has existing contracts in Alaska for tide gauge specialists who could install and operate many more units, but these efforts are held back due to availability of funding. If additional funding for Arctic hydrography/charting were available, NOAA could contract more multi-beam surveys to private firms. HSRP believes NOS and NGS have been proactive and the contract arrangements are in place with commercial firms to conduct even more surveys in the Alaskan Arctic, but funding limitations have held back full program execution.

NOAA should continue to research a range of new hydrographic survey technologies and tools. Unmanned technology includes remotely operated vehicles and autonomous underwater vehicles that might be used in the future to explore and survey remote coastal areas. Satellite-derived bathymetry (SDB) (using Landsat 7 & 8, and Worldview 2 data) has been used successfully for near-shore bathymetry. However, SDB algorithms and overall technique work best in clear, shallow water with minimal wave action, such as in the Florida Keys. SDB did not perform well in Alaskan waters (near Point Hope and Cape Prince of Wales) because of the turbid water and local wave action. Crowd-sourcing bathymetry (CSB) – data collection by volunteers aboard ships and boats – might supplement the work of traditional hydrography in remote coastal areas of the U.S. maritime Arctic. Importantly the International Hydrographic Organization has established a working group to develop a CSB policy. HSRP believes NOS should take a lead role in using CSB techniques for frontier areas such as the U.S. maritime Arctic.

- ***HSRP Recommendations:***

(A) Recognizing the accuracy limitations, NOS should further explore crowd-sourced bathymetry (CSB) focusing on application of CSB for the vast nearshore, remote

regions of the U.S. maritime Arctic (especially focusing on the northwest and west coasts of Alaska).

(B) NOAA/NOS should explore with NSF (and the University of Alaska Fairbanks, the ship's operator) and the Coast Guard the further integration of the UNOLS polar research ship Sikuliaq, additional Coast Guard cutters, and any new U.S. polar icebreaker, into the long-term plan for hydrographic surveys in Alaska.

(C) NOAA/NOS should explore a potential private sector partnership for bathymetric information with the commercial marine firms that operate (typically tug-barge units) along western Alaska routes on summer resupply to coastal communities and Prudhoe Bay/North Slope.

Q 6. How might NOAA think about this region differently?

The maritime Arctic is a unique and fragile environment that has the potential to be a significant source of hydrocarbon resources and a key component of national security activities. As such, the region is of great interest to Alaska, many federal agencies (DOS, DOC/NOAA, DOD, DHS, DOT, DHS, DOI, EPA and more), the nation as a whole, and the private sector firms who have already invested significantly in the region. Rarely is there such broad-based interest in a single region and rarely does a single region offer such great resource potential along with serious environmental challenges. From a NOAA perspective, almost all of the activities envisioned in the Arctic require accurate charts, base-maps and geodetic measurements, putting great pressure on NOAA to collect data in a remote and challenging region during a period of federal budget restraint. The breadth of interest in the Arctic, however, as well as the high-cost and logistical difficulty of working in the region may offer the opportunity for an innovative approach to coordination and funding that will best serve the Nation.

Is it conceivable that an interagency/private sector collaboration might be established as a forum to discuss the coordination of Arctic activities and potentially pool resources to address critical infrastructure needs (perhaps starting with hydrographic surveys)? Such a forum would meet regularly to exchange views on regional priorities and on-going efforts both within the government agencies and with the private sector (and local native organizations). The private sector would not set the priorities for the federal government but when government priorities and private sector interests coincided, accommodations could be made to cost-share efforts and exchange data. The key is that there would be a framework for the frank exchange of data, information on needs, and the on-going needs of NOAA and the Nation.

HSRP strongly believes NOAA must have in its overall (organizational) strategy for the Arctic hydrography/charting and geoid measurements as high program priorities to better

align itself with our national Arctic strategy. Although the northwest coast of Alaska is a new frontier region, federal offshore leasing and oil & gas exploration have commenced long before adequate maritime infrastructure is in place to provide an adequate safety and environmental protection net. A question to be asked of DOI is what responsibility the offshore leasing companies have outside the lease sites for a range of nautical services and needs that are required for safe and secure operations. With increasing human use of the U.S. maritime Arctic, especially the offshore leasing program, the federal government has assumed responsibility for providing regional hydrography & charting without adequate funding and without any cost-sharing mechanism with commercial users.

- ***HSRP Recommendations:***

(A) NOAA and the CMTS must expand interagency-private sector dialogue and collaboration; the potential pooling of critical Arctic marine infrastructure including hydrography must be explored as well as cost-sharing surveys and exchange of marine data as part of our national strategy.

(B) NOAA/NOS should request from the recently established Arctic Executive Steering Committee (coordinated by the White House Office of Science & Technology) the integrated hydrographic/charting requirements for all federal agencies, especially bringing clarity to those critical requirements of DOD/USN & DHS/USCG.