

US Input to Major Bullets Points of the ARHC Strategic Planning Working Group Terms of Reference

September 9, 2011

Bullet Point #1: Provide an overview of the status of surveying of the Arctic based on C-55 and any supplementary information.

The United States recognizes the importance IHO C-55, “Status of Hydrographic Surveying and Nautical Cartography Worldwide” and is working to update this database with current survey and chart information.

The National Oceanic and Atmospheric Administration (NOAA) Office of Coast Survey (OCS) has recognized the growing need for updated charts and data in the Arctic and has developed a plan to address this need. Over 40,000 Square Nautical Miles of Arctic have been identified as “Navigationally Significant”¹. As shown in Figure 2, most hydrographic data in this area dates from the 1970s or earlier and was collected using Single Beam Echo Sounder or lead line methods. To address this vital area, NOAA added a new “Preparing for Emerging Arctic Priorities” section to the NHSP. Figure 3 shows the survey priorities for the entire state of Alaska as of 2011.

Each year, NOAA identifies and prioritizes the areas within NOAA’s scope of navigation safety responsibilities. NOAA determines which areas are in greatest need of hydrographic surveys and publishes these in the *NOAA Hydrographic Survey Priorities (NHSP)* document (<http://www.nauticalcharts.noaa.gov/hsd/NHSP.htm>). Priorities are assigned based on several factors, including survey vintage, vessel traffic, depth, and customer requests.

Based on these priorities, OCS has planned a series of survey projects in the Arctic. The current plan includes surveys through the year 2015, but is reevaluated on a yearly basis, as new priorities emerge. The locations of these planned Arctic projects can be seen in Figure 4.

OCS has also identified the need for additional chart coverage in the Arctic and has developed the *Office of Coast Survey Arctic Nautical Charting Plan* (http://www.nauticalcharts.noaa.gov/mcd/docs/Arctic_Nautical_Charting_Plan.pdf) to address this need. Currently, charting data in much of the Arctic is inadequate or nonexistent. According to the *U.S. Coast Pilot*, much of the Bering Sea area is “only partially surveyed, and the charts must not be relied upon too closely, especially near shore.” The *Arctic Nautical Charting Plan* provides detailed plans for the layout of additional nautical chart coverage and describes the requisite activities needed to build and maintain these charts.

¹ For purposes of this summary, the U.S. uses the definition of the Arctic as defined by the U.S. Arctic Research and Policy Act of 1984 (amended 1990). See Figure 1.

The new Arctic charting plan can be seen in Figure 5, along with the current suite of 1:400,000 and larger OCS charts. This additional chart coverage will enhance the American Arctic Marine Transportation System by depicting shoreline, depths, hazards and recommended routes throughout the region.

All publicly released hydrographic data is posted to NOAA's National Geophysical Data Center (<http://www.ngdc.noaa.gov/mgg/bathymetry/iho.html>), which operates a worldwide digital data bank of oceanic soundings in its role as the IHO Data Center for Digital Bathymetry (IHO DCDB).

Arctic Boundary as defined by the Arctic Research and Policy Act (ARPA)

All United States and foreign territory north of the Arctic Circle and all United States territory north and west of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers; all contiguous seas, including the Arctic Ocean and the Beaufort, Bering and Chukchi Seas; and the Aleutian chain.¹



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Map author: Allison Gaylord, Nuna Technologies. May 27, 2009.
1. The Aleutian chain boundary is demarcated by the 'Contiguous zone' limit of 24-nautical miles.

Figure 1: Arctic Boundary as defined by the Arctic Research and Policy Act

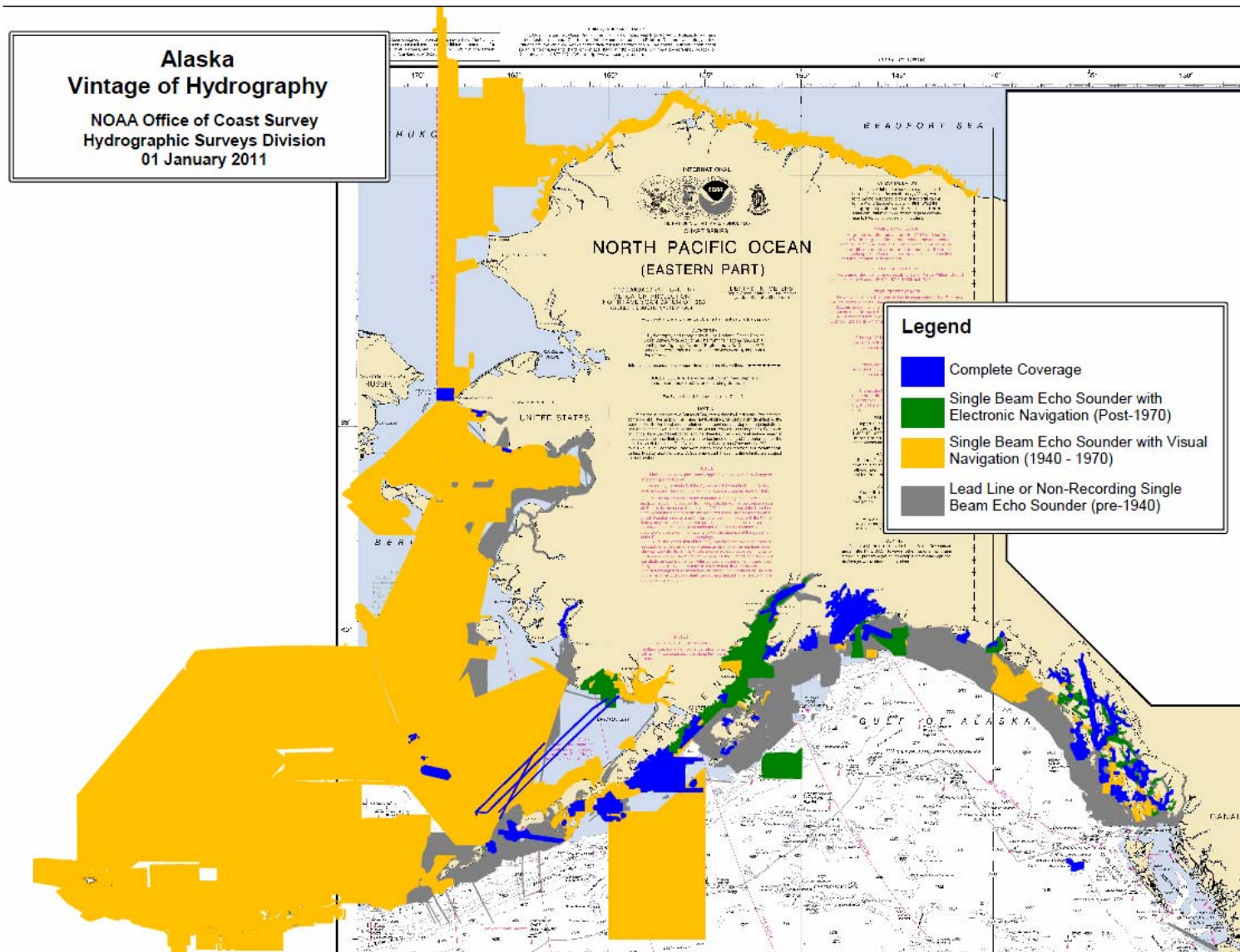


Figure 2: Alaska Survey Priorities Showing Full Bottom Coverage

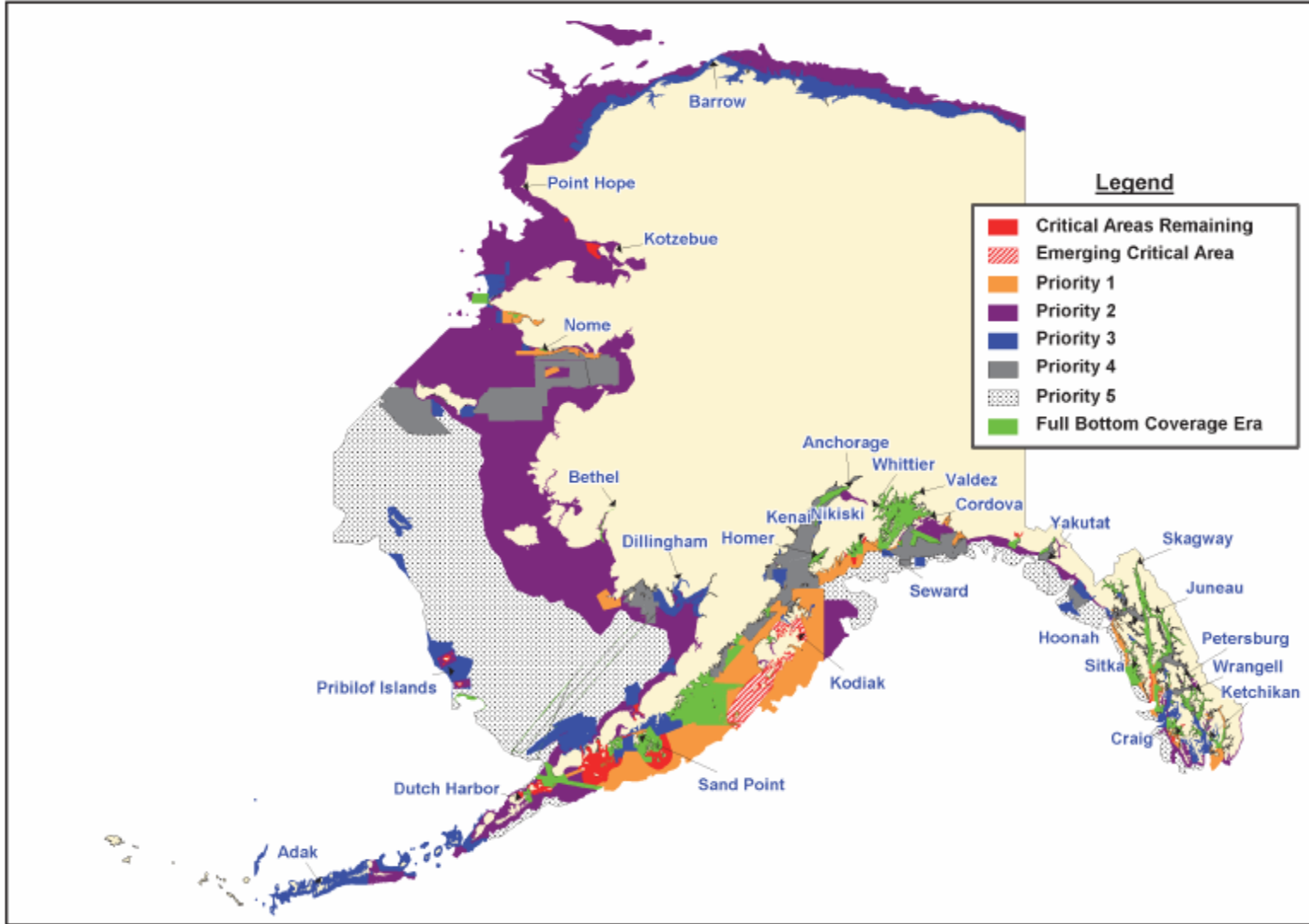


Figure 3: 2011 NOAA Hydrographic Survey Priorities - Alaska

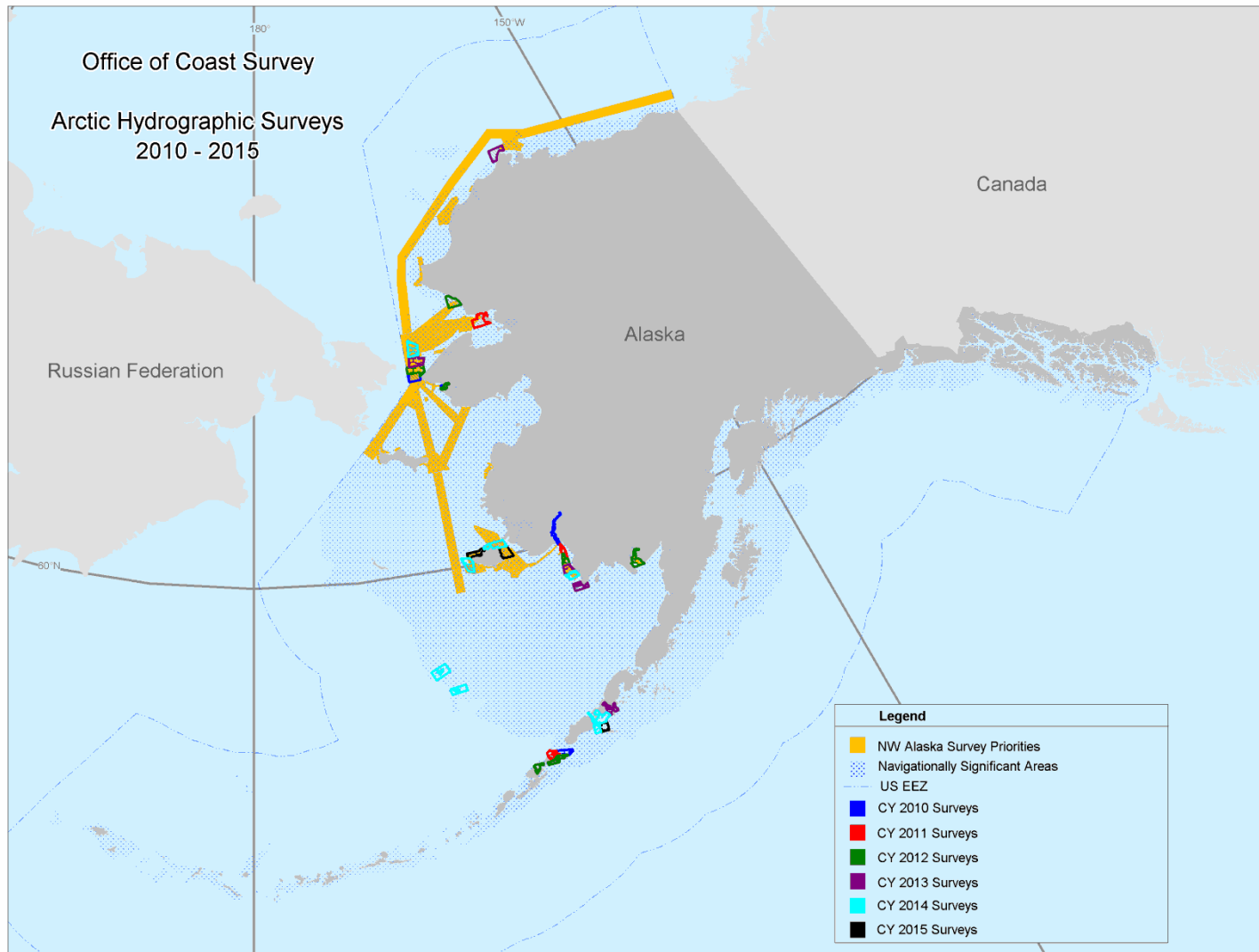


Figure 4: Planned Arctic Surveys 2010 – 2015

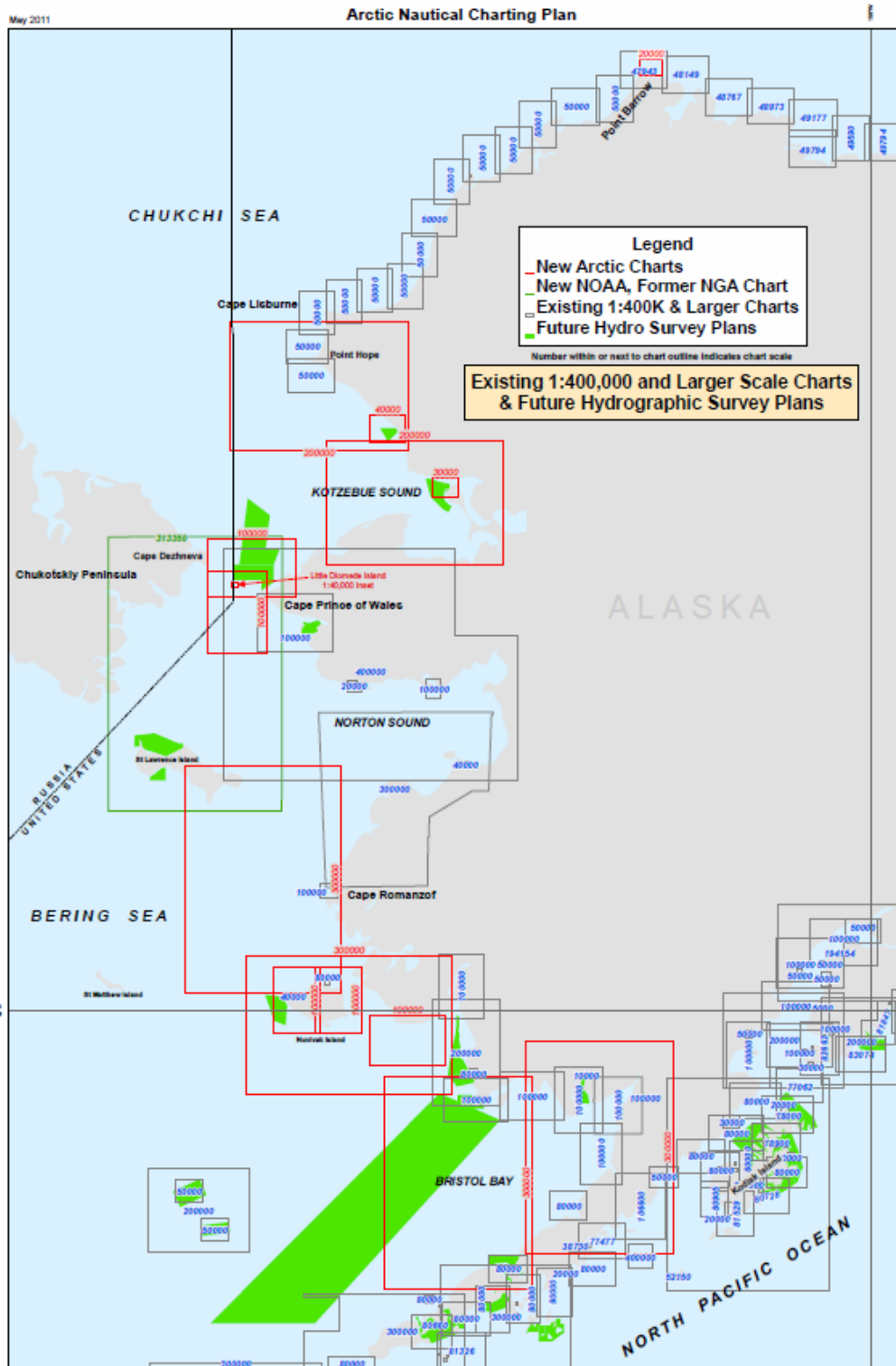


Figure 5: New OCS Arctic Charts

Bullet Point #5: Identify the most relevant stakeholders within the different fields and indicate how ARHC should interact with them

The United States has developed an initial matrix of relevant stakeholders in the following categories:

- National Government Interests
- Regional, Local and Tribal Interests
- Scientific Community and Consultants
- Industry
- Intergovernmental and Political

The U.S. is still developing additional ideas as to how the ARHC should interact with these stakeholders. One recommendation was for ARHC representatives to host a meeting in conjunction with existing scheduled meetings related to Arctic science, issues, or policy. This will allow for the interaction with relevant stakeholders and the possible identification of additional stakeholders. One suggested forum is for stakeholder interaction The Alaska Marine Science Symposium, in Anchorage, Alaska, which is being held January 16-20, 2012 (<http://www.alaskamarinescience.org/>).

The Stakeholders Matrix of U.S.-identified stakeholders is included as Appendix 1 of this report.

NOTE: Appendix I lists a large number of stakeholders and it may not be possible to interface with all of them. The U.S. recommends that other members of the SPWG review and update the matrix with information about potential stakeholders in their countries. Once a comprehensive list has been developed, the SPWG could work to create a subset of only the most relevant stakeholders. The remaining organizations should then be the focus of ARHC stakeholder interaction in regard to charting issues and in situations where ARHC member data might help them and where their data might enhance ARHC member products.

Bullet Point #7: Outline the possibilities for enhanced co-operation between the relevant HOs on a regional, sub-regional and bilateral level

The United States has identified the following possibilities for enhanced co-operation:

Data Exchange and Joint Product Development

Members of the ARHC should be encouraged to share data with neighboring Hydrographic Offices.

The U.S. and Canada have had a very successful multi-year collaboration on the Extended Continental Shelf Project in which valuable bathymetric data and information of the Arctic have been exchanged.

Continued Exchange of publications and between Hydrographic Offices

Members of the ARHC should be encouraged to exchange relevant nautical and hydrographic with neighboring Hydrographic Offices.

Over the past several months, the U.S. and Russian Hydrographic Offices have actively been communicating, leading to the exchange of documents (U.S. National Arctic Plan, National Ocean Service Hydrographic Survey Specifications and Deliverables document, and the Field Procedures Manual). The next step in information sharing and exchange of publications is currently being assessed.

Courtesy Visits and technical exchanges for hydrographic professionals.

ARHC members should be encouraged to participate in courtesy visits and ship rider programs, as they foster the exchange of technical expertise.

OCS has extended an invitation to the Russian Federation Hydrographer and looks forward to his possible visit to the United States in the first half of 2012.

Software development for Updating Nautical Publications

OCS has developed an open source XML-based production system for updating the Coast Pilot Nautical Publications and is interested in sharing this system with other Hydrographic Offices with the possibility of cooperation for continued development of this system (*further background information and details are being developed by OCS for future consideration by ARHC members*).

Address Transboundary ENC Gaps or Overlaps in the Arctic

Neighboring Hydrographic Offices should strive to comply with the Worldwide ENC Database Working Group (WEND) Principles by ensuring that no gaps or overlaps exist in transboundary ENC coverage. Overlaps have already been identified in the US-Russia and US-Canada transboundary areas. The U.S. and Canada had a successful pilot project to address these issues in the Straits of Juan De Fuca, which could be used as a model or reference for addressing other ENC transboundary overlap issues in the Arctic.

Support to IHO Technical Committees needs in the Arctic

TSMAD is in the process of preparing an Arctic test dataset. Display Aspect parameter should be defined and submitted to TSMAD, which would then be added as instructions to the test dataset manual.

The GEBCO-sponsored International Bathymetric Chart of the Arctic Ocean (IBCAO) is intended to be the best compilation of bathymetry for the Arctic area. While it is not intended to be a navigation product for coastal waters, it could be the source for navigation products offshore, in deeper water.

While many members already do, all ARHC members should be encouraged to freely and fully contribute their available depth data to IBCAO for inclusion in the IBCAO product.

Collaborative and/or Coordinated Survey Planning in Arctic

In order to prevent duplication of effort, HO's could work together to develop coordinated annual survey plans for the Arctic region to facilitate potential ship-rider opportunities and/or data collection and exchange opportunities.

Collaborative hydrographic mapping could also help to prevent duplication of effort. One particular area of interest for collaborative mapping is the Russian side of the Bering Strait and the Northern Sea Route. NOAA and Russia do currently have a collaborative program in the Chukchi Sea (RUSALCA website (www.arctic.noaa.gov)).

Creation of cross Arctic INT Charts

ARHC members should be encouraged to consider the creation of electronic and raster INT charts that would cover cross-Arctic shipping routes. IBCAO could help provide the source data.

Support recommendations of the Scientific Forum

HOs should work together to support any recommendations that develop as a result of the Scientific Forum, particularly related to the following themes:

Theme 1: *What are areas or interests in the Arctic that would be most advantaged by modern hydrographic information and charting such as complex or high marine traffic zones; sensitive coastal areas such as communities and landing areas; existing and future resource development areas; and/or ecologically sensitive areas?*

Theme 2: *Interest and investment in the Arctic by governments world-wide, is at an all-time high. What are the facts and/or perceived value and importance of the Arctic and what could hydrography contribute to the realization of this wealth?*

Theme 3: *What lessons can the Arctic Regional Hydrographic Commission gain from the international mapping, hydrography and remote sensing community with polar hydrographic experience?*

Support Actions from ARHC Working Groups

Terms of Reference are currently being finalized for the Strategic Planning Working Group, the Arctic Mariners' Routeing Guide Working Group, and the Operations and Technologies Working Group. ARHC Members should work together to support any actions that arise from these working groups as well as any future working groups.

Consider establishment of a Charting Working Group within the ARHC.

Coordination on Updated Shoreline

ARHC Members should be encouraged to support and cooperate on the extraction of a northern shoreline to update historic chart products from remotely sensed data and exchange of coastal level shoreline data.

NGA is working on shoreline extraction tools R&D that could eventually benefit this. Historically, this region has been problematic due to non-coverage by Electrical Optical satellites and by the difficult logistics for airborne acquisition.

Bullet Point #7: Outline the potential for increased bathymetric data collection by utilizing ships-of-opportunity

OCS is currently investigating the potential of using “crowd sourcing” as a method of acquiring hydrographic data in the Arctic. Crowd sourcing is a method of collecting depth and position data from mariners and boaters, who are not professional hydrographers. Crowd Sourced hydrography is currently being explored in other geographical areas, where bathymetric data is sparse (TeamSurv - <http://www.teamsurv.eu>). Potential sources of hydrographic data include: cruise ships, oil & gas companies, fishing fleets, scientific and research ships, and military vessels.

There are many issues that have yet to be fully explored. Some of these issues include:

- What specific equipment is required (transducers, GPS, data loggers, etc.)?
- How is data transmitted?
- How is data verified?
- How is the data be used (chart updates, survey priorities, obstruction identification, Notices to Mariners, etc.)?
- Can data reduction methods be applied (water levels, settlement & squat, sound speed, etc.)?
- What is the liability of providing or using crowd sourced data?
- How do we handle instances where data providers (industry, military) are reluctant to share information due to fears of aiding competition? Can data be decimated?

Hydrographic Offices should be encouraged to explore partnerships with potential data providers. HO's should also begin thinking about possible resolutions to the issues described above.

ARHC Members should be encouraged to submit any data that is acquired using ships-of-opportunity to the NGDC Data Center for Digital Bathymetry (DCDB).

Develop an annual survey schedule of ARHC Hydrographic Office members intending to operate in the Arctic to facilitate potential ship-rider opportunities and/or data collection and exchange opportunities.