



Arctic Regional Hydrographic Commission (ARHC) 11th Meeting



VTC, 9-10 November 2021

SUMMARY REPORT

(Version 00, 18 November 2021)

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Note: Meeting documents can be found at: <https://iho.int/en/arhc11-2021>

A. Opening and Administration

A1 and A2 Welcome, Opening Remarks, and Participant Introductions

Dr Geneviève Bécharde (CA), as Vice-Chair of ARHC (vc/ARHC) and host of ARHC11, opened the meeting and welcomed the participants. vc/ARHC first introduced the newest ARHC participant, RDML (select) Benjamin Evans, who had recently been appointed the new Director, Office of Coast Survey, NOAA. The IHO Secretary-General (S-G), Dr Mathias Jonas, then provided his opening comments prior to each Head of Delegation introducing their teams.

Upwards of 30 participants attended this video teleconference. Full ARHC Member States Canada, Denmark, Norway, and the United States of America were in attendance. The fifth full member, the Russian Federation, expressed their regrets to the vc/ARHC that they were unable to attend. According to the ARHC Statutes in force, the presence of four of the five full Member States constitutes a quorum and this was duly noted.

Others attendees included delegations from the ARHC Associate Members, Finland, Iceland, and Italy, as well as the IHO Secretariat.

Action ARHC11-A01: Delegations are requested to review the list of participants and report any errors or omissions to Doug at douglas.brunt@dfo-mpo.gc.ca

A3 Approval of the Agenda

Dr. Bécharde introduced the agenda. It was noted that the meeting would have tight timetable and presenters were asked to respect the allotted times to ensure that there was sufficient time for discussion. The Commission approved the agenda. See [Annex B](#).

A4. Review of Actions for ARHC

The ARHCC11 Secretariat (CA & US) presented a summary of the status of past Actions for the ARHC. Most of the items were completed or are still underway (see [ARHC11-A4b Status of Actions](#)). Actions that were up for discussion at this ARHC meeting were highlighted 'Notes' column of the Agenda.

Action ARHC11-A02: a. US to circulate 'Brief History of the ARHC' draft; and, b. MS to comment on text and indicate approval/non-approval.

Action ARHC11-A03: MS to advise the IHO Secretariat of any update/change to their position in relation with the CSB questionnaire (IHO CL 21/2020) (permanent).

Action ARHC11-A04: MS to inform their WWNWSWG representatives to investigate and report to the IMO Secretariat and the Chair of the EGC Coordinating Panel on the progress and status of implementation of newly recognized mobile satellite services by MSI providers.

Action ARHC11-A05: MS to review the IRCC recommendations in document [ARHC11-A4c Recommendations from IRCC13](#).

B. IHO and National Reports

B1 IHO Secretariat's Report to ARHC.

The Secretary-General highlighted three main points from his report. First, the S-100 'ecosystem' is taking shape both on the IMO side where a probable timeline to revising the ECDIS performance standards to include S-100 has been devised, and on the IHO side where the completion of the S-100 priority product specifications has been mapped out. The S-G stressed that it is incumbent on the IHO Member States (MS) to push forward with producing S-100 data and service, regardless of the IMO pace, so that when S-100 ECDIS becomes a reality there is significant coverage of key areas. Related, a regionally coordinated rollout of S-100 based data services is important. Combined, coverage and regional coordination, will be critical to the positive adoption of these data services by the user community.

Second, the S-G discussed the implementation of the IHO Strategic Plan (SP), and, specifically how success towards the goals of the SP is measured. He drew attention to several of the Strategic Performance Indicators (SPIs) that were directly related to MS and Regional Hydrographic Commissions (RHCs). Specifically:

SPI 1.2.2 "Percentage of navigationally significant areas (...) for which the adequacy of the hydrographic knowledge is assessed through the use of appropriate quality indicators". Such an indicator, it was suggested, could be a GIS spatial analysis of ENC cartographic and quality features (e.g. TSS*, CATZOC) currently available, produced automatically using MSDIWG-based Arctic Regional Marine Spatial Infrastructure Working Group (ARMSDIWG) guidelines. During the discussion, NO noted that project team was established to review C-55 but the work was hampered by a lack of technical expertise; therefore, any future work in this area must have the technical resources to see it through.

SPI 1.3.1 "Ability and capability of MS to meet the requirements and delivery phases of the S100 implementation

plan". This requires MS and RHCs to work with the IRCC in order to establish global guidance on the this measure. SPI 2.2.1 "Percentage of adequately surveyed area per coastal state". It was noted that the current C-55 Status of Surveying and Charting, is too SOLAS-focused to capture the detail required for this measure. ARHC was encouraged to have the ARMSDIWG work with MSDIWG and IRCC to develop guidance for a model (e.g. like the Baltic Sea Hydrographic Commission (BSHC)) for all regions, which include extracting S-44 orders information from national databases. The C-55 structure will have to be redesigned to facilitate the automatic generation of this information.

SPI 2.3.1 "Number of Hydrographic Offices (HOs) reporting success applying the UN shared guiding principles for geospatial information management in order to ensure in their national contexts". It was noted that more work with the IRCC was required to develop more precise, easy to collect (preferably, automatically) measure that could be applied globally.

The third item highlighted by the S-G in his presentation was the new IHO-Singapore Innovation and Technology Lab (ITL). The ITL (or 'The Lab') was officially launched in the week prior to ARHC11 and has its first two projects. They are the testing of automated conversion of S-57 to S-101 in support of the dual-fuel concept, and the prototyping of a S-131 database and interface for marine harbour information. The Lab project manager is looking forward for more funded projects.

Recommendation ARHC11-R01 (IHO S-G) ARHC to consider establishing an ENC Scheme for Region N and a transition plan for S-101 ENCs. As a test case, ARHC to consider the possibility of experimenting the provision of coordinated S-100 based products services covering Region N (what products?, who?, where?, when?) in accordance with the amended WEND100 Principles for S-1xx Products. *Discussed during Agenda Item C2.*

Recommendation ARHC11-R02 (IHO S-G) National Support of the IHO strategy on the implementation of S-100 ECDIS in IMO Documents by the respective national IMO delegations.

Recommendation ARHC11-R03 (IHO S-G) ARHC to consider how to contribute to the implementation [of the IHO Strategic Plan] and make this measurable by means of suitable SPIs. *This was addressed under Agenda Item D1.*

Recommendation ARHC11-R04 (IHO S-G) ARHC members are invited to identify further potential sources of bathymetric measurements and survey data providers to be facilitate the further completion of the IHO Data Centre for Digital Bathymetry (DCDB) data holdings (permanent).

Recommendation ARHC11-R05 (IHO S-G) ARHC Members are invited to submit papers for publication in the IHR (permanent).

B2 National Report –Canada

CA reported that 32 000 km² had been surveyed in the Arctic in the past five years under the Ocean Protection Plan (OPP) and that this past survey season, all five of the permanent tide gauges in the Arctic had been visited and serviced. In addition, there were two Arctic surveys carried out under contract during which the first Canadian deployment of uncrewed survey vessels (USVs) in the Arctic took place. The Department of National Defence (DND) reported that the new Royal Canadian Navy (RCN) ship –Arctic Offshore Patrol Vessel (AOPV) class- *HMCS Harry DeWolf* completed a Northwest Passage transit in 2021. This was the first transit of those waters by a RCN ship since 1956.

With the continued surveying activities in the CA Arctic, the gaps in ENC coverage are being filled and by March 2022, the entire Northwest Passage will be covered by ENCs for the first time. CA is further developing a gridded ENC schema in the Arctic and is interested in working with other Arctic partners on this implementation.

CA will continue to focus survey assets on shipping corridors in order to expand ENC coverage, at the same time leveraging trusted sources for crowd-sourced bathymetry (CSB) and remotes sensing technologies to supplement traditional survey data.

B3 National Report –Denmark

DK reported on the reorganizing of the agency and preparing of a new strategy. Denmark identified they needed a longer term strategy which will be focusing on the quality assessment and the distribution of their data with the

sincere hope that their data will benefit society as a whole. For the organization, this means a shift from product focus to data focus.

This mission divided into three main goals for the hydrographic office:

- Provide modern basis for safe navigation by supplying our maritime users with up to date products and services.
- Create a framework for increased utilization of depth data, which can be used in several contexts while also being easily accessible to themselves and their users.
- Provide easily accessible and reliable hydrographic and marine data for the benefit of users and to support the green transition of the Blue Denmark.

These goals have defined focus areas: Efficient production; new technologies for depth data collection; accessible and targeted data and products for maritime users; coordination and collaboration of marine data; integration of S-100; and, a long term finance model.

IHO Assistant Director Yves Guillam noted that when hydrographic offices (HOs) are considering ENC re-scheming, they should do so in consultation with the WENDWG project team on S-101 Scheming Guidelines.

B4 National Report –Norway

NO is mid-way through its 'Marine Base Map' pilot project for coastal zones. NHS leads the project and has partnered with the Geological Survey of Norway (NHS) and Institute of Marine Research (HI). The aim of the project, which hopefully lead to a programme in 2023, is to establish a national authoritative foundational data set that is free and accessible for all aspects of marine spatial planning. If the programme is endorsed, the goal is to have 68 datasets supported by data from 16 agencies and organizations. It has been noted that trustworthy, free, and accessible datasets are key to uptake and the programme success. A pending report is expected to indicate that there is 6:1 expected return on investment for the marine base maps.

NO has a Geodata Act (i.e. a law) to support the authoritative nature of digital data, e.g. Marine Base Maps, as well as a national Geodata Strategy and a Digital Agenda. NHS is the national Geodata coordinator.

Geodata act/law.

NO noted the expanded use of the FAIR (findable, accessible, interoperable, reusable) principles for evaluating datasets. For each dataset in the national infrastructure is rated against the principles. The Mareano Status Register dashboard was shown as an example of what this looks like. Each dataset is rated against the FAIR principles as well as several other requirements from the national geographical infrastructure.

There has also been much progress in NO on the standardization and digitalization of port data. The Port Data 2020 project goal is to make it easy to share and update port data through common national infrastructure for spatial information. In response to a question from ARHC11, NO expressed the intention of aligning Port Data with S-131, at some point.

The concepts of the Norwegian Nautilus programme were highlighted. Nautilus is to ensure the reception, management, and dissemination of high-resolution depth data and other hydrographic data to all users. Nautilus 2022 – 2026 is planned to take 5 years to complete, and will cost 12 million euros, funded from national budget. It will focus on organizational and technological changes to meet user requirements and expectations.

B5 National Report –Russian Federation

n/a

B6 National Report –United States of America

US reported on its survey activities in the Arctic, its continues use of USVs in the region, and the Northwest Passage transit of the *USCG Cutter Healy*. NOAA has embarked on a complete re-scheming of its ENC portfolio. At the same time it is transitioning away from its raster products; a process it hopes to complete by 2025. The transition process also includes crafting an S-101 implementation strategy and the continued development of the NOAA Custom Chart Tool for self-serve paper chart generation.

NGA has begun its transition of Vector Product Format (VPF) Digital Nautical Charts (DNC) to S-57 Electronic Navigation Charts (ENCs), and is working on creating a worldwide ENC grid for use in building its future ENC portfolio and in preparation for S-100 transition.

U.S. approved release of global vessel traffic density data to the public in Fall 2021. Access to this data will be via viewer, link to API, or download and was to be made publicly available via URL within days of this report.

In addition, U.S. announced that it has released its new version of the World Port Index which contains physical characteristics, facilities, and services, major ports and terminals worldwide. It is available as a suite of web-based applications via URL and can be accessed via MSI site: <https://msi.nga.mil/Publications/WPI> or at: <https://nga.maps.arcgis.com/apps/MapSeries/index.html?appid=f9515d53e3e24ae7919f02eb8f554c96> There have been some early discussion on the possibility of a conjunction of the WPI structure and data with S-131.

B7 National Report –Finland

In addition to its written report, FI provided ARHC11 with specific information on its Arctic Policy, chart production, and the national coordination of the S-100 implementation.

The Strategy for Arctic Policy identifies four priority areas:

- Climate change, mitigation and adaptation
- Inhabitants, promotion of wellbeing and the rights of the Sámi as an indigenous people
- Expertise, livelihoods and leading edge research
- Infrastructure and logistics

To address these priorities engagement and cooperation with organizations such as the Arctic Council, the Barents Euro-Arctic Council, and the Barents Regional Council will be essential.

Examples of infrastructure and logistics include leveraging Finish expertise in developing further exchanges between ships, ports, energy efficiency of logistic systems, advancing communication technology and digital services, opening up information systems, and strengthening the development of shipping infrastructure and nautical charting in the Arctic region by means of hydrographic surveys.

FI has implemented a new nautical chart production system and new editions of ENC corresponding to printed charts were released in 2021. Some ENCs e.g. fairway to Port of Vaasa, have been enriched with more depth information which allows for additional depth contour intervals.

Traficom and the Finnish HO are planning to take actions for raising awareness and improving knowledge about S-100 standards among data producers and service providers in Finland.

B8 National Report –Iceland

IS noted that the Hydrographic and Marine Safety Department is situated within the IS Coast Guard and has 8 full-time staff plus three additional personnel for the survey season.

It was reported that in 2020 GNSS RTK positioning was implemented and this has spawned the requirement for IS to re-establish its height models. This is a multi-agency task.

Surveying has continued in several areas and ports where modern surveying has not been conducted. New charts/ENC will follow. New charts (Reykhólar, Brjánslækur) were published from 2017-2020 surveys which replaced some products which date as far back as 1915. Other new charts and updates (e.g. Reykjavík) are planned. New harbour plans and new editions are planned as part of the updating of 30 year-old sailing directions. Once completed, almost all active ports will be covered.

Other items reported included: As of June 2021, IS transitioned to print-on-demand (POD) only; HMSD is implementing CARIS BE and BDB systems; IS hopes to become more active with MSDI, particularly as it relates to marine spatial planning; C-55 information from IS will be updated next year; and, MSI activities, e.g. NAVTEX messages, was also reported on.

B9 National Report –Italy

IT reported on its research and hydrographic activities in the Arctic, including where hydrographic surveys were carried out. The prospects for the High North Campaign programme to be extended is promising. Equally exciting was the news that the IT High North Campaign has been recognized by UNESCO as an official UN Decade of Ocean Science for Sustainable Development (UNDoOS) activity. In support of the action of the UN Ocean decade with ECOP (Early Career Ocean Professional), six young researchers were part of the High North 2021 scientific team.

IT reiterated its data policy for its High North surveys that all the collected hydrographic data will be made available to the Norwegian Hydrographic Service, to the IHO DCDB, to the International Bathymetric Chart of Arctic Ocean (IBCAO) Vers.4.0 and to GEBCO Seabed2030 project. All the hydrographic data were collected and will be shared with the ancillary information in compliance with the IHO standards.

C. Reports of the ARHC Working Groups and other Officers

C1 Operational and Technical Working Group (OTWG) Report

c/OTWG Corey Allen (US-NOAA) delivered this report. It was noted that the ARHC hydrographic/chart adequacy risk assessment was last completed in 2018 and the next iteration is scheduled for 2023. To this end, a call for data to ARHC MS will be made early in 2022.

The next Arctic Shipping Status Report (ASSR) from PAME/Arctic Council is anticipated in 2022. It will be based on data acquired from the Arctic Ship Traffic Data (ASTD) database and will depict the most travelled routes in the Arctic. This information will be useful for completing the chart adequacy assessment.

The report highlighted some of NOAA's Arctic surveying activities, and, in particular, the 2020 Arctic Saildrone Mission.

The presentation ended with a call for interest for collaborative mapping missions in which remote systems could be tested and where collective successes and lessons learned could be compiled into a comprehensive report. MS were requested to consider whether or not they would be interested in such an endeavor.

Action ARHC11-A06 c/OTWG to prepare and distribute a letter calling for data input for the next ARHC Chart Adequacy Assessment. The letter will detail the data requirements including metadata by 2022-03-31.

C2 Arctic International Charting Coordination Working Group (AICCWG) Report

This report was presented by Evert Flier (NO) on behalf of c/AICCWG Edwards Hands (NO).

It was reported that all outstanding instances of overlaps, or potential overlaps between ENC's in the region have now been successfully resolved by the producing nations.

The remainder of the conversation focused on the possibility of a pan-Arctic grid-based ENC schema. A report commissioned by CA outlined a number of potential approaches. The further work required by the ARHC to address the challenges of creating a schema was hampered by the COVID-19 pandemic, but the AICCWG recommended that efforts be renewed to take this initiative from a theoretical discussion to an operational evaluation. To this end, the AICCWG recommended to ARHC that a dedicated project team (PT) be stood up to focus solely on this issue.

US-NGA strongly supported this recommendation, and is willing to participate in a new PT, noting that a regional approach to the ENC scheme would be an advantage to all data producers and lay the foundation for new S-100 data product services.

The IHO Secretariat noted that there could be a positive intersection of this proposed ARHC work and the work of the WENDWG project team on S-101 Scheming Guidelines. It is hoped that these guidelines will address some of the complex and sensitive issues that arise when scheming moves from the national to the international level. The WENDWG PT is slated to provide an interim report to WENDWG12 (Feb. 2022) which could inform the work of the ARHC PT.

CA added that it would be very interested in participating and that it sees great value in testing the approaches presented with real-world data, as well as evaluating the guidelines that come from the WENDWG PT. When working with actual ENC data situations like transboundary coverage and changes to the grid based on latitude can be explored, for example.

NO agreed to stay on as c/AICCWG if another MS would lead the Arctic grid project team.

vc/ARHC reminded ARHC that IRCC recommended that the role of the regional chart coordinators be extended to include the monitoring of the implementation of the S-100 Roadmap. This matter was discussed under agenda item D4.

Action ARHC11-A07 c/AICCWG to contribute to the WENDWG Project Team on S-101 Scheming Guidelines (Leading: Shigeru Nakabayashi, Cc: WENDWG Secretary) in order to prepare the Arctic regional implementation.

Decision ARHC11-D01 A project team (PT) to set up under the AICCWG to test and evaluate schema options with real data and report findings and recommendations to ARHC12. CA has volunteered to lead.

Action ARHC11-A08 All ARHC MS are invited to participate in this PT.

C3 Arctic Regional Marine Spatial Data Infrastructure Working Group (ARMSDIWG) Report

The report and presentation given by the chair of the ARMSDIWG (c/ARMSDIWG), Sebastian Carisio (US-NGA) focused on the highlights of the group's activities after five years' existence and a reassessment of the work and the way forward for the working.

The first five years was very successful in raising awareness of MSDI and MSDI-related issues, and in doing an in-depth inventory of the data available to support activities in the Arctic (e.g. Arctic Voyage Planning Guides (AVPGs)). In addition, the WG effectively engaged in the broader geospatial community to establish the ARMSDIWG (and ARHC) as an important player in key facilitators of hydrographic and hydrographic-related data in the Arctic. An example of this engagement is the ARMSDIWG work with OGC and the Arctic SDI. A *Joint Statement of Intent between the Arctic SDI Board and the Arctic Regional Hydrographic Commission*, was approved by ARHC to institutionalize the cooperation/collaboration between these groups.

However, the report did highlight some of the opportunities for improvement for the ARHC. For example, while individual AVPGs have made advances, study has shown that only 21% of AVPG datasets are currently available as geospatial web services. In addition, there are serious information gaps in some data themes. From the ARMSDIWG report,

“The truth today is that an Arctic user still does not currently have a central or common way to find authoritative Arctic marine spatial data from ARHC’s HOs, nor do they have a total set (i.e. gaps in coverage) of usable web services available to them for the majority of themes they’ve asked for in various studies and surveys”.

The ARMSDIWG urged the ARHC and its member states to continue the push to a truly federated Arctic MSDI and to consider adopting the MSDI Aggregated Data Web Service Checklist for the ARHC as a standard mechanism to report annually the progress towards individual HO provisioning of data web services to support an Arctic federated MSDI approach in response to the various user-driven activities identified by ARHC MS. The recently initiated Federated-MSDI Pilot organized by OGC will be an opportunity to demonstrate applied technologies along with the practical use of OGC and IHO standards through Marine SDI. This project builds upon the foundation of the OGC-IHO MSDI Concept Development Study (CDS) that included the participation of several ARMSDIWG member organizations.

One of the largest challenges for the WG and the ARHC will be finding enough human and technical resources to push these efforts forward; that is, from the aspirational to the operational.

The WG also presented its revised work plan and revised TOR and asked the ARHC for its guidance on the way forward for ARMSDIWG (see also Agenda item D4).

Decision ARHC11-D02 ARHC reaffirmed its endorsement of the *ARHC-Arctic SDI Joint Statement of Intent*.

Action ARHC11-A09 MS to complete the MSDI Aggregated Data Web Service Checklist for ARHC and return to c/ARMSDIWG by 2022-02-01.

C4 ARHC GEBCO and Seabed 2030 Coordinator Report

Evert Flier (NO) reminded the participants that worldwide efforts to improve bathymetry data is largely reliant on volunteer efforts. He presented an overview of the organization and basic concepts of the GEBCO programme and Seabed 2030 project and went on to highlighted where the objectives of these activities intersect and complement the UN Sustainable Development Goal (SDG) 14 –Life below water – target to “Increase scientific knowledge, research, and technology for ocean health” and the outcomes of the UN Decade of Ocean Science for Sustainable Development (the Ocean Decade) that will lead to “the Ocean We Want”.

To date, the ocean-wide acceptable coverage at variable scales for the GEBCO grid stands at about 20.6%, which stands in sharp contrast to the 100% coverage of all landmasses at a 10m resolution.

It was noted that using existing mapping technologies, improving the global ocean coverage will be a decades-long and expensive process, that will be demanding in terms of human resources, material resources e.g. ships, and will leave a significant carbon footprint. To this end, the employment of new techniques and new technologies e.g. unscrewed survey vessels (USVs) which offer long endurance, low [environment] impact (LELI) will greatly aid in making significant progress in ocean mapping.

Creating partnerships and agreements to facilitate third-party data collection, also known as crowd-sourced bathymetry (CSB), and ease of access to this data will also greatly accelerate coverage. The hydrographic community and hydrographic offices must become more accepting of data from these sources and recognize its value beyond just for navigation purposes.

C5 Report of the IHO-EU Network Working Group

DK, as the ARHC representative to the IHO-EU Network Working Group (IENWG), provided this report. This working group meetings annually and is designed to keep both parties up-to-date on each others’ activities and

plans. The report highlighted some of the important that are under consideration and that are relevant to the ARHC. These included:

- The addition of S-57 ENC's to the EU list of "high-value datasets". These datasets are considered foundational and must be made available for free. This impacts many HOs who sell ENC's;
 - Horizon 2020 European Green Deal Call by which €1 billion is to be spent for research and innovation and the Digital Twin of the Ocean and the release of the full EMODnet Bathymetry Digital Terrain Model 2020 product and associated services which is to become a key foundation of the Digital Twin of the Ocean;
 - Further collaboration and coordination on ocean observations; and,
 - An invitation to the IHO and HOs to promote the S-100 framework and selected S-100 products and services as part of new and existing EU initiatives that aspire to increase interoperability and the wider application of hydrographic data e.g. in marine spatial planning projects.
- DK confirmed that it is willing to remain as the ARHC representative on the IENWG.

D. Issues of Strategic Relevance

D1 ARHC implementation of the IHO Strategic Plan (SP)

The vc/ARHC noted in their introduction the desired outcome of the discussion was a way forward for ARHC on its implementation of the IHO SP and that there is a need for expedient initial results given IRCC14 is set for early June 2022 and the 3rd IHO Assembly (A-3) is only about 18 months away.

Matt Borbosh (US-USN) led the discussion by first laying out the background and the approach taken by the South-West Pacific Hydrographic Commission (SWPHC) as proposed by New Zealand. This 'gap analysis' began with MS of the SWPHC being asked to fill out a template on their current situations vis-à-vis the Targets in the SP, the gap(s) between the current state and desired state, and the actions that would be required to close the gap(s).

Once this exercise was completed, which MS were given about one month to complete, the results were collated, and from the results actions were derived and then added to the RHC's work plan.

One shortfall of this methodology was that it did not include the use or reporting of the strategic performance indicators (SPIs), something that the ARHC recognized it should include in its work.

vc/IRCC John Nyberg added that the IRCC held a workshop just before C-5 and this methodology described was well received and the results of that event may further inform the work of the ARHC.

c/ARMSDIWG noted that Target 2.1 of the SP is an item that has been included in that group's proposed TOR.

There was wide support within the ARHC for adopting an approach which mirrors that of the SWPHC and that this approach should focus on the three SP goals and related targets specifically from an Arctic perspective and what is unique to the Arctic region.

It was agreed that a project team (CA offered to chair) would be set up to take on two tasks: First, conduct a regional gap analysis using the SWPHC approach; and, second, in parallel, calculate the SPIs as they are currently defined and examine ways to operationalize the SPIs (e.g. how to automate the process of collecting/collating this information). The PT will be working as soon as practically possible and it should plan to have an ARHC intersessional video teleconference about three months prior to IRCC14.

Decision ARHC11-D03 ARHC agreed to set up a project team to direct the ARHC process for implementing the IHO SP including the reporting of SPIs. CA to chair. USA, DK, and NO have agreed to participate.

Action ARHC11-A10 In liaison with ARMSDIWG, CA to develop and circulate the PT TOR and work plan which will include timelines and deliverables e.g. for IRCC14.

D2 Arctic Council – ARHC Joint Statement activities.

The US, supported by CA, DK, and NO, presented this item as described in its information paper, *Implementation of the Arctic Council – ARHC Joint Statement on Hydrography in the Arctic*.

The Joint Statement recommends that Arctic States commit to finding resources to review and update, where possible, their existing data holdings, as well as collect new data in order to strengthen hydrographic surveying and charting in the region.

The paper goes on to highlight certain activities and engagements that will turn the intent of the Statement into tangible outcomes. Some of the suggested items included: the updating of the Chart Adequacy Assessment, last performed by the OTWG/ARHC in 2018; contributing to updating of the Arctic Ship Status Report (ASSR); Seascope Alaska and Partnership Building in the Arctic; increasing data contributions to the IHO DCDB; BASE content ENC's (DK); data sharing; marine protected areas (MPAs); and, additional ARHC and PAME joint activities.

It was additionally recommended that ARHC consider the appointment of a permanent point of contact for ARHC to PAME/Arctic Council (AC) to manage communications, joint activities, and the ARHC's annual report to the AC. Setting up a small project team in support of the POC, if required, was also suggested.

The concurrence with these recommendations was voiced during the discussion as they would facilitate the telling of the ARHC story regarding the importance of hydrography in the Arctic and leverage the confluence of other activities and projects, such as the Arctic SDI project [MSDI] for a federated approach to Arctic data services and the application of the S-122 specification for MPAs.

It was further noted (by US-NGA), IHO SG, NO) that there may be some benefit in adopting some of the cooperation and collaboration approaches that have been employed in the IHO Hydrographic Commission on Antarctica (HCA). Planning HCA-ARHC meetings periodically, e.g. every two years, was suggested as one way to harmonize activities and engagements (e.g. with research vessels and tourist operators) between the polar regions.

Decision ARHC11-D04 ARHC endorsed the idea of a permanent ARHC point of contact (POC) for AC matters.

Action ARHC11-A11 ARHC MS to put forward volunteers for the AC POC. **NOTE:** USA has agreed to take on this position with Jonathan Justi filling the role.

D3 UN-GGIM IGIF –Hydro

John Nyberg (US-NOAA) introduced this topic by giving a high-level summary of the Integrated Geospatial Information Framework (IGIF) that continues to develop under the auspices of the UN initiative on global geospatial information management (UN-GGIM)

Anchored by nine Strategic Pathways, the IGIF is a mechanism for articulating and demonstrating national leadership in geospatial information, and the capacity to take positive steps. As the Framework is adopted, it will reduce institutional barriers that currently hinder the exchange and use of geospatial information that could contribute to the achievement of the UN Sustainable Development Goals (SDGs).

The Working Group on Marine Geospatial Information (WG-MGI) is developing the Operational Framework for Integrated Marine Geospatial Information Management (also known as IGIF- Hydro or IGIF-H) to ensure alignment between the land and sea data frameworks.

The IGIF-H document has two parts. Part 1 contains background, challenges, and a value proposition for the marine domain. Part 2 is broken down by IGIF Strategic Pathways for the water domain. The scope of IGIF-H includes oceans, seas, rivers, waterways/watercourses, lakes inland waters, wetlands, glaciers, etc.

The next steps in the IGIF-H development include worldwide workshops for each pathway. A briefing (MACHC) and a workshop (BSHC) have already been planned.

It was noted that the WG-MGI works closely with the MSDIWG and ARMSDIWG and, indeed, there are many of the same people involved. Naturally, the ARMSDIWG will be looking at the challenges from the Arctic perspective. The advantage of these close ties is that efforts will not be duplicated and experiences (e.g. OGC Arctic SDI project) can be shared.

Ultimately the WG would like to see this activity become an officially-recognized project of the UN Decade of Ocean Science for Sustainable Development (UNDoOS).

D4 Discussion: Are the current WGs TOR fit for purpose? That is, will the mix and function of the WGs adequately support ARHC for the short and midterm?

The ARHC working groups have been active for many years and it was felt that this was an appropriate time to discuss if the current arrangements are sufficient to help achieve the goals of the IHO SP and the implementation of the S-100 Roadmap. In addition, there were three specific recommendations from IRCC13 to the RHCs that would need to be assigned to an ARHC working group.

It was suggested that the AICCWG TOR be extended to include the tracking of the S-100 Implementation Roadmap (IRCC13 Rec. 7), in particular focusing on the S-101 roll-out.

It was generally agreed that a separate working group should be set up to coordinate the ARHC efforts on the implementation of S-100 and promote the cooperation and exchange of experiences, however, there were questions related to how this group would be resourced and no decision was made.

The OTWG was suggested as the likely WG to apply Resolution 1/2005 in case of disasters occurred to support the affected States in their regions.

ARMSDIWG had already proposed a revised TOR which has a good alignment with the IHO SP. DK, supported by US and CA, suggested that the task of implementing S-122 Marine Protected Areas in the Arctic be assigned to

ARMSDIWG.

All ARHC MS and WG Chairs were asked to review the TOR of each group in light of these discussions and suggestions and return their comments to the c/ARHC.

US-NGA offered to construct a common TOR template for the working groups.

Action ARHC11-A12 USA (NGA) will propose a standardized template for all ARHC WGs and circulate for consideration.

Action ARHC11-A13 Chairs of each working group to review their TOR to ensure they are current and fit for purpose.

Action ARHC11-A14 MS to review proposed updated ARMSDIWG TOR for endorsement by 2021-12-01.

Action ARHC11-A15 ARMSDIWG to consider the way and means to support Action ARHC11 xx above (SP Implementation and automated provision of SPIs - see IHO SecGen slide 5).

E. Other Items of Interest

E1 ARHC Statutes

The process and the objectives of revising the ARHC statutes were presented. On 1 October 2021, the final draft of the ARHC statutes were circulated to full members for endorsement. Aside from a few editorial changes there were no descending votes. Under the Statutes *en vigueur*, and given a quorum had been established for ARHC11, the new statutes were approved and came into force that day. It was agreed that this edition of the statutes would re-signed by all full and associate members.

With the new statutes in place it was also agreed that the application from the UK for Associate Membership would be reviewed as soon as practically possible.

Decision ARHC11-D05 ARHC approved ARHC Statutes Ed 3.0 and are in effect as of 2021-11-10.

Action ARHC11-A16 c/ARHC to circulate ARHC Statutes Ed 3.0 for signature.

Action ARHC11-A17 c/ARHC to Initiate the review of the application from the UK for Associate Membership.

E2 NOAA Custom Chart

John Nyberg (US-NOAA) presented this update to the Custom Chart application which has seen many improvements incorporated in the latest release (Ver 1.1).

The custom chart service is a part of a package of Office of Coast Survey initiatives which include the re-scheming of the NOAA ENC portfolio and the cancellation of raster navigational chart product. NOAA reported that while there was general acceptance of these changes, there was some push-back, and that the recreational boating market does present some challenges.

The latest outputs are automatically generated to the user's selected parameters. They include the chart notes (on a separate sheet) and are suitable as a hard-copy chart backup. NOAA will continue to offer its ENC Viewer via a REST service and a OGC WMS.

Related, NOAA intends to submit a paper to the 7th Nautical Cartography Working Group (NCWG7) regarding the direction of work of NCWG PT on a unified symbol set for paper charts and ENCs. NOAA's main messages are: be expedient, be flexible, and be pragmatic. The expedient adoption of a standard will have a significant impact on chart production, allowing for a more efficient and effective use of HO resources. Given that S-57 ENCs will be in use for several years, the PT should also include working with current S-57 ENCs and not just S-101 ENCs.

There were questions in the discussion related to the possibility of a paper chart automatically generated from an ENC becoming an 'official' chart that would satisfy SOLAS carriage requirements. The answer was that would be some time off, mostly due to the lack of an IHO standard for this type of product. US-NGA noted that they, as primary charting authority for a number of nations and with an interest in producing paper charts in a much less resource-intensive way, are looking into how to address the SOLAS issue. The IHO Secretariat recommended an impact study on the concept of a new standard for a back-up paper chart for

ECDIS.

E3 USV Update from Canada

Chris Marshall (CA) provide this update on the CA experience using uncrewed surface vessels (USVs) for surveying in Lake Superior and the Arctic. For the Lake Superior survey, the units were operated from various locations in Europe with on-shore technical support. This survey was a collaborative effort with freshwater science and it collected weather, chlorophyll, backscatter, and fish tag information in addition to the bathymetric data collected.

The two operations in the Arctic were contract surveys and the USVs were used in concert with a ship platform to collect the data. These were successful projects, but there were challenges, including difficult weather conditions, some mechanical issues with the USV, COVID-19 restrictions meant no community contact, and some other logistical issues related to shipping the USV and refueling.

However, the deployment of the USVs reduced the overall carbon emissions for the cruises, as well as reducing the noise generated by the survey operations. Both impacts are significant, and for the Inuit communities, noise, in particular, is always an issue.

E4 Survey Technology Developments in Norway

NO highlighted some of its experiences in developing and testing sensors and platforms suitable for shallow water surveying. This included the use of drone-borne bathymetric LIDAR for smaller areas. These drones can carry a 5kg payload and can fly for about 35 minutes, limiting their utility to smaller areas.

Airborne (light airplane) LIDAR showed very good results, in some cases down to 30m, for bathymetric data, and to model the distribution and height of marine vegetation. For some of these tests, high quality RGB imagery was also collected and was a pleasant 'bonus' output.

E5 Denmark's New Production System

DK gave a brief description of its new chart production system. The two different systems employed at the Greenland and Danish offices were consolidated into one.

The project met its main goals of having one production system for ENCs and paper charts for all of GST's geographic areas, and to have a system that is prepared for a data-driven flow. The third goal of having a more efficient system (e.g. where redundancy and manual step are minimized) cannot definitively be declared as achieved, as of yet.

Data management (or clean-up) is still required, especially for data that was digitized from raster charts, or where data was not otherwise captured appropriately as source data. In addition, along with the training up to the competencies required to master the new system, the organization must adapt its way of thinking from product-centric to data-centric.

The road ahead for the DGA includes re-scheming in a sensible way and in collaboration with neighbouring countries, the reduction of paper chart scales (perhaps to one), and preparing for S-100 products and services.

DK generously shared its 'Lessons Learned' with the ARHC which provoked very interesting discussions, as most HOs are facing many of the same challenges and questions.

E6 S-100 Production Survey

Related its own challenges, DGA produced and distributed a production questionnaire to neighbouring HOs to gather their thoughts, experiences, and plans. They receive 12 responses.

The three main sections of the questionnaire were on production, ENC gridding, and paper chart production. Some highlights:

- 11 of the 12 HOs are using a database system, with 3 of them being a combination of systems.

- 90% try to maintain a 1:1 relationship data layer feeding both ENC and paper charts.

- 50% employ a gridded ENC scheme

- 46% plan to maintain their current paper chart portfolio; 18% plan to increase; and, 36% plan to decrease.

- 100% of the respondents said they have no intention to produce 'back up' paper charts.

- 75% said they are looking to fully automate chart production.

F. Coda

F1 Next Meeting ARHC12

CA will host ARHC12 in St. John's, Newfoundland and Labrador. ARHC12 will be held in cooperation with the Marine Institute of Memorial University and will run from the evening of 12 September 2022 to noon of 16 September. The programme will include the ARHC12 meeting proper, an ARHC Open Forum, and an innovation science and technology day.

F2 Summary of Actions

The ARHC11 Secretariat is to draft the List of Actions, Decisions, and Recommendations and circulate to meeting participants by 2021-11-16. The draft Summary Report will be distributed by 2021-12-01.

F3 Confirmation of Chair and Vice-Chair

In keeping with the recommended rotation of officers, CA assumed the role of Chair of ARHC and DK accepted the position of Vice-Chair.

F4 Closing Remarks and Observations

Closure of Meeting

Annex A

ARHC11 Participants List (as of 2021-11-08)

MS/Org	Preface	Name	e-mail	Role(s)
DK/DG A	Mrs.	Pia Dahl Højgaard	pdh@gst.dk	Head of DGA Delegation; National Hydrographer Director General, DGA
DK/DG A	Mrs.	Elizabeth Hagemann	ehage@gst.dk	Member of DGA Delegation; Head of office
DK/DG A	Cdr.	Lars Hansen	larsh@gst.dk	Member of DGA Delegation; Commander Danish Navy.
DK/DG A	Mr	Jens Peter Weiss Hartmann	jepha@gst.dk	Member of DGA Delegation; Senior Advisor
CA/CH S	Dr	Geneviève BÉCHARD	genevieve.bechard@dfo-mpo.gc.ca	Head of CA Delegation; National Hydrographer Director General, CHS
CA/CH S	Mr	Doug BRUNT	douglas.brunt@dfo-mpo.gc.ca	Member of CA Delegation; Senior Advisor
CA/CH S	Mr	Chris MARSHALL	chris.marshall@dfo-mpo.gc.ca	Member of CA Delegation; Director, CHS Ontario, Prairie, Central, and Arctic Region
CA/CA F	Maj.	Peter MCRAE	Peter.McRae@forces.gc.ca	Member of CA Delegation; GEOINT Partnerships, Canadian Forces Intelligence Command
CA/CA F	Mr	Andy MUIR	Andrew.Muir@forces.gc.ca	Member of CA Delegation; Superintendent, Hydrographic Services Offices (DND)
CA/CH S	Mr	David PALMER	David.Palmer@dfo-mpo.gc.ca	Member of CA Delegation;

				Data Specialist, MSDI
CA/CH S	Mr	Dave SINNOTT	Dave.Sinnott@dfo-mpo.gc.ca	Member of CA Delegation; Multidisciplinary Hydrographer
NO/N MA	Ms	Birte Noer BORREVIK	birte.noer.borrevik@kartverket.no	Head of NO Delegation; National Hydrographer Director, NHS
NO/N MA	Mr	Evert FLIER	Evert.Flier@kartverket.no	Member of NO Delegation; International Coordinator NHS
US/OC S	R.Adm (sel)	Benjamin Evans	benjamin.k.evans@noaa.gov	Member of US Delegation; NOS Chief of Staff; Incoming Director, OCS
US/OC S	Mr	John Nyberg	john.nyberg@noaa.gov	Head of US Delegation; Deputy Hydrographer
US/OC S	Mr	Jonathan Justi	jonathan.justi@noaa.gov	Member of US Delegation; International Specialist
US/OC S	Ms	Alexis Maxwell	alexis.maxwell@noaa.gov	Member of US Delegation; International Specialist
US/OC S	Mr	Corey Allen	corey.allen@noaa.gov	Member of US Delegation; OTWG Chair
US/OC S	Ms	Christy Fandel	christina.fandel@noaa.gov	Member of US Delegation; Operations Branch Chief (acting), Hydrographic Surveys Division
US/OC S	Mr	Colby Harmon	colby.harmon@noaa.gov	Member of US Delegation; AICCWG; Cartographer/Progr am Manager
US/NG A	Mr	John Lowell	john.e.lowell@nga.mil	Member of US Delegation
US/NG A	Dr	Mike Brady	Michael.B.Brady@nga.mil	Member of US Delegation

US/NG A	Mr	Sebastian Carisio	Sebastian.P.Carisio@nga.mil	Member of US Delegation; ARMSDIWG Chair
US/US N	Mr	Matthew Borbash	matthew.borbash@navy.mil	Member of US Delegation; Deputy Hydrographer of the Navy
FIN/ Trafico m	Mr	Rainer Mustaniemi	rainer.mustaniemi@traficom.fi	Head of FIN Delegation; National Hydrographer
FIN/ Trafico m	Mr	Seppo Mäkinen	seppo.makinen@traficom.fi	Member of FIN Delegation; Senior Expert
IS/ICG	Mr	Georg Kr. LÁRUSSON	georg.larusson@lhg.is	Head of IS Delegation; National Hydrographer Director General, ICG
IS/ICG	Mr	Árni Þór VÉSTEINSSON	arni.vesteinsson@lhg.is	Member of IS Delegation; Head of Hydrographic and Maritime Safety Dept.
IT/IIM	RADM	Massimiliano NANNINI	massimiliano.nannini@marina.difesa.it	Head of IT Delegation; National Hydrographer Director IIM
IT/IIM	PROF	Roberta IVALDI	roberta_ivaldi@marina.difesa.it	Member of IT Delegation; Marine Geology Professor Scientist in charge High North21
IT/IIM	CAPT	Marco GRASSI	marco.grassi@marina.difesa.it	Member of IT Delegation; Vice Director IIM
IT/IIM	CDR	Maurizio DEMARTE	maurizio.demarte@marina.difesa.it	Member of IT Delegation; Head Marine Geophysics Dept.
IHO	Dr	Mathias JONAS	mathias.jonas@iho.int	Head of IHO Delegation; Secretary-General, IHO
IHO	Mr	Yves GUILLAM	yves.guillam@iho.int	Member of IHO Delegation;

				Assistant Director, IHO
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Annex B

International Hydrographic Organization (IHO)



**Arctic Regional Hydrographic Commission (ARHC)
11th Meeting**



**ARCTIC REGIONAL
HYDROGRAPHIC
COMMISSION**

Notes:

ARHC11 is a virtual meeting and is scheduled to run from 07h00 to 10h30 EST each day.

The meeting link will be active 30 minutes before the start of the meeting to enable testing of connections.

Day 1 link: <https://global.gotomeeting.com/join/679599445>

Day 2 link: <https://global.gotomeeting.com/join/465970621>

VTC protocols:

-Please keep cameras off and microphones muted until you are given the floor by the host.

-To indicate a desire to address the meeting, please type, ‘floor’ in the chat window. Comments are also welcome in the chat window.

-Interventions should be concise.

Agenda(s) Item / duration	Day/Time	Topic	Discussion Lead	Notes
A. Opening and Administration				
A1 , A2 /20 min	Day 1 07h00	Welcome, Opening Remarks, and Participant Introductions <i>DOC: <u>ARHC11-A1 List of Participants</u> <u>ARHC11-A2 List of meeting documents</u></i>	Dr. Geneviève Béchar,; vc/Chair and Host; Dr. Mathias Jonas ; All	Heads of Delegation to introduce their team members. Establishment of a quorum.
A3 /5	Day 1 07h20	Approval of the Agenda <i>DOC: <u>ARHC11-A3 Agenda</u></i>	Dr. Geneviève Béchar	
A4 /5	Day 1 07h25	Review of Actions for ARHC <i>DOC: <u>ARHC11-A4a ARHC10 Final Minutes</u> <u>ARHC11-A4b Status of Actions from ARHC10, IRCC, and IHO Council</u> <u>ARHC11-A4c Recommendations from IRCC13</u></i>	Doug Brunt Jonathan Justi	The following action is suggested from ARHC10: ARHC11 Action xx US to circulate ‘Brief History of the ARHC’ draft for comment and approval. – ARHC10 Action 02. The following actions are suggested from IRCC13: ARHC11-Action xx MS to advise the IHO Secretariat of any update/change to their position in relation with the CSB questionnaire (IHO CL 21/2020) – IRCC13 Rec. 3.

ARHC11 Report

				<p>ARHC11-Action xx MS to inform their WNWSWG representatives to investigate and report to the IMO Secretariat and the Chair of the EGC Coordinating Panel on the progress and status of implementation of newly recognized mobile satellite services by MSI providers. –<i>IRCC13 Rec 11</i>.</p> <p>ARHC11-Action xx MS to review the IRCC recommendations in document ARHC11-A4c Recommendations from IRCC13</p>
B. IHO and National Reports				
B1 /10 min	Day 1 07h30	IHO Secretariat’s Report to ARHC <i>DOC: <u>ARHC11-B1 IHO Report</u></i> <i>DOC: <u>ARHC11-B1 IHO Report -Presentation</u></i>	Dr. Mathias Jonas	
B2 /10	Day 1 07h40	National Report -Canada <i>DOC: <u>ARHC11-B2 Canada National Report</u></i> <i>DOC: <u>ARHC11-B2 Canada National Report - Presentation</u></i>	Chris Marshall, Maj. Peter McRae	
B3 /10	Day 1 07h50	National Report -Denmark <i>DOC: <u>ARHC11-B3 Denmark National Report</u></i> <i>DOC: <u>ARHC11-B3 Denmark National Report -Presentation</u></i>		
B4 /10	Day 1 08h00	National Report -Norway <i>DOC: <u>ARHC11-B4 Norway National Report</u></i> <i>DOC: <u>ARHC11-B4 Norway National Report - Presentation</u></i>		
B5 /10	Day 1 08h10	National Report –Russian Federation <i>DOC: <u>ARHC11-B5 Russian Federation National Report</u></i> <i>DOC: <u>ARHC11-B5 Russian Federation National Report -Presentation</u></i>		
B6	Day 1	National Report –United States of America		

ARHC11 Report

/10	08h20	<i>DOC: <u>ARHC11-B6 United States National Report</u></i> <i>DOC: <u>ARHC11-B6 United States National Report -Presentation</u></i>		
15	08h30	Break		
B7 /10	Day 1 08h45	National Report -Finland <i>DOC: <u>ARHC11-B7 Finland National Report</u></i> <i>DOC: <u>ARHC11-B7 Finland National Report - Presentation</u></i>		
B8 /10	Day 1 08h55	National Report -Iceland <i>DOC: <u>ARHC11-B8 Iceland National Report</u></i> <i>DOC: <u>ARHC11-B8 Iceland National Report - Presentation</u></i>		
B9 /10	Day 1 09h05	National Report -Italy <i>DOC: <u>ARHC11-B9 Italy National Report</u></i> <i>DOC:</i>		
C. Reports of the ARHC Working Groups and other Officers				
C1 /15 min	Day 1 09h15	Operational and Technical Working Group (OTWG) Report <i>DOC: <u>ARHC11-C1 OTWG - Presentation</u></i>	US	ARHC10 Action 7. a) Call for MS CATZOC data for 2023 Assessment; b) Explore methodology enhancements; c) Consider other data sources e.g. ASTDB; and d) Inventory and assess V-datum tools.
C2 /10	Day 1 09h30	Arctic International Charting Coordination Working Group (AICCCWG) Report <i>DOC: <u>ARHC11-C2 AICCCWG – Report</u></i>	NO	ARHC10 Action 8. a) Way forward on regional ENC [gridded] chart scheme.
C3 /20	Day 1 09h40	Arctic Regional Marine Spatial Data Infrastructure Working Group (ARMSDIWG) Report <i>DOC: <u>ARHC11-C3a ARMSDIWG - Report</u></i>	US	

		<p><u>DOC: ARHC11-C3b ARMSDIWG – Presentation</u></p> <p><u>DOC: ARHC11-C3c Arctic SDI - ARHC Joint Statement of Intent Final</u></p> <p><u>DOC: ARHC11-C3d MSDI Data Web Service Checklist (.doc) (.pdf)</u></p> <p><u>DOC: ARHC11-C3e ARMSDIWG ToR ver 21Oct2021</u></p> <p><u>DOC: ARHC11-C3f ARMSDIWG Work Plan 2021-2026</u></p>		
C4 /20	Day 1 10h00	<p>ARHC GEBCO and Seabed 2030 Coordinator Report</p> <p><u>DOC: ARHC11-C4 ARHC GEBCO-Seabed 2030 -Report</u></p>	NO	<p>ARHC10 Action 13: a) With adoption of the IBCAO as a basis for assessing progress, continue to support Seabed 2030 project in the Arctic, including utilization of progress measures for the decade IRCC13. Recommendation 14: RHCs to encourage all Member States to actively contribute with new data to GEBCO and to discuss how MS can share existing data.</p> <p>IRCC13 Recommendation 15: Encourage RHCs and relevant Bodies to contribute to the recommendations provided by Shell to increase the cooperation between HO's and Natural source Regulators and reduce permitting requirements for transits through countries EEZ's.</p>
C5 /10	Day 1 10h20	<p>Report of the IHO-EU Network</p> <p><u>DOC: ARHC11-C5 Report of the IHO-EU Network –Report</u></p>	DK	
5	10h30	Group Photo		
		End of Day 1		

D. Issues of Strategic Relevance				
D1 /45 min	Day 2 07h00	ARHC implementation of the IHO Strategic Plan (SP) -SP Gap Analysis -the SWPRHC approach and experience. <i>DOC: <u>ARHC11-D1 Proposed ARHC Way Forward on Implementation of IHO Strategic Plan</u></i> <i>DOC: <u>ARHC11-D1a SP Gap Analysis</u></i> <i>DOC: <u>SWPRHC documents</u></i> <i>DOC: <u>IHO Strategic Plan -brochure</u></i>	Matt Borbash/John Nyberg	IRCC13 Action 6: RHCs and WGs to include the measurement of the SPI attributed by IRCC in their annual Work Plans (Permanent).
D2 /15	Day 2 07h45	Arctic Council – ARHC Joint Statement activities. e.g. Arctic Shipping Best Practices Information Forum 16-18 November. <i>DOC: <u>ARHC11-D2 AC-ARHC Joint Statement Activities INF</u></i> <i>DOC: <u>Arctic Council-ARHC Joint Statement on Hydrography in the Arctic Region (May 2021)</u></i> <i>DOC: <u>Third Arctic Science Ministerial Joint Statement of Ministers (May 2021)</u></i> <i>DOC: <u>Third Arctic Science Ministerial Final Report (May 2021)</u></i>	US	
D3 /15	Day 2 08h00	UN-GGIM IGIF –Hydro <i>DOC: <u>ARHC11-D3 GGIM IGIF-H</u></i>	US	
D4 /20	Day 2 08h15	Discussion: Are the current WGs TOR fit for purpose? That is, will the mix and function of the WGs adequately support ARHC for the short and mid term?	All	IRCC13 Recommendation 7. RHCs to consider extend the role of Charting Regional Coordinators for the implementation of the S-100 Implementation Roadmap.

		<p><i>DOC: <u>ARHC Strategic Planning Working Group TOR</u> [Note: WG dismantled at ARHC5]</i></p> <p><i>DOC: <u>OTWG TOR</u></i></p> <p><i>DOC: <u>AICCWG TOR</u></i></p> <p><i>DOC: <u>ARMSDIWG TOR</u></i></p>		<p>IRCC13 Recommendation 9. RHCs to coordinate the efforts on the implementation of S-100 and promote the cooperation and exchange of experiences.</p> <p>IRCC13 Recommendation 10: RHCs to apply Resolution 1/2005 in case of disasters occurred to support the affected States in their regions.</p>
15	Day 2 08h35	Break		
		E. Other Items of Interest		
E1 /10 min	Day 2 08h50	<p>ARHC Statutes</p> <p><i>DOC: <u>ARHC Statutes in Force (last updated 2017)</u></i></p> <p><i>DOC: <u>ARHC11-E1a Summary of ARHC Statutes Revisions</u></i></p> <p><i>DOC: <u>ARHC11-E1b Revised ARHC Statutes ED3.0</u></i></p>	Jonathan Justi Doug Brunt	
E2 /10	Day 2 09h00	<p>NOAA Custom Chart</p> <p><i>DOC: <u>ARHC11-E2 NOAA Custom Chart</u></i></p>	John Nyberg	
E3 /10	Day 2 09h10	<p>USV Update from Canada</p> <p><i>DOC: <u>ARHC11-E3 Uncrewed Survey Vessels CA Update</u></i></p>	Chris Marshall	
E4 /10	Day 2 09h20	<p>Survey Technology Developments in Norway</p> <p><i>DOC: <u>ARHC11-E4 Survey Technology Developments in Norway</u></i></p>	Evert Flier	
E5 /10	Day 2 09h30	<p>Denmark's New Production System</p> <p><i>DOC: <u>ARHC11-E5 DGA New Production System</u></i></p>	Jens Peter Hartmann	
E6 /10	Day 2 09h40	S-100 Production Survey	Jens Peter Hartmann	

		<i>DOC:ARHC11-E6 DGA Production Questionnaire</i>		
		F. Coda		
F1 /10 min	Day 2 09h50	Next Meeting ARHC12 <i>DOC:ARHC12 -Overview</i>	Dr. Geneviève Béchar Paul Brett	
F2 /5	Day 2 10h00	Summary of Actions <i>DOC:</i>	Jonathan Doug	
F3 /5	Day2 10h05	Confirmation of Chair and Vice-Chair	All	
F4 /10	Day 2 10h10	Closing Remarks and Observations	Dr. Geneviève Béchar Dr. Mathias Jonas	
	10h20	Closure of Meeting	Dr. Geneviève Béchar	

Annex C

ARHC Actions, Decisions, and Recommendations

**From ARHC11 November 9-10, 2021 (Virtual/VTC)
Version 00 (2022-11-16)**

Ref # A=Action D=Decision R= Recommend- ation	Agend a Item	Actions	Responsible	Deadline	Status
ARHC11- A01	A1	Delegations are requested to review the list of participants and report any errors or omissions to Doug at douglas.brunt@df-mpo.gc.ca	All	2021-12-01	Ongoing
ARHC11- A02	A4	a. US to circulate 'Brief History of the ARHC' draft; and, b. MS to comment on text and indicate approval/non-approval.	a. US b. All	a. 2021-12-01 b. 2021-12-17	Ongoing
ARHC11- A03	A4	MS to advise the IHO Secretariat of any update/change to their position in relation with the CSB questionnaire (IHO CL 21/2020)	All	n/a	Permanent
ARHC11- A04	A4	MS to inform their WNWNSWG representatives to investigate and report to the IMO Secretariat and the Chair of the EGC Coordinating Panel on the progress and status of implementation of newly recognized mobile satellite services by MSI providers.	All	As soon as practically possible.	Ongoing

ARHC11-A05	A4	MS to review the IRCC recommendations in document <i>ARHC11-A4c Recommendations from IRCC13</i> .	All	ARHC12	Ongoing
ARHC11-R01	B1	(IHO S-G) ARHC to consider establishing an ENC Scheme for Region N and a transition plan for S-101 ENCs. As a test case, ARHC to consider the possibility of experimenting the provision of coordinated S-100 based products services covering Region N (what products?, who?, where?, when?) in accordance with the amended WEND100 Principles for S-1xx Products.			<i>Discussed during Agenda Item C2.</i>
ARHC11-R02	B1	(IHO S-G) National Support of the IHO strategy on the implementation of S-100 ECDIS in IMO Documents by the respective national IMO delegations.	All	Before each IMO meeting.	Ongoing
ARHC11-R03	B1	(IHO S-G) ARHC to consider how to contribute to the implementation [of the IHO Strategic Plan] and make this measurable by means of suitable SPIs.			<i>This was addressed under Agenda Item D1.</i>
ARHC11-R04	B1	(IHO S-G) ARHC members are invited to identify further potential sources of bathymetric measurements and survey data providers to be facilitate the further completion of the DCDB data holdings.	All	n/a	Permanent
ARHC11-R05	B1	(IHO S-G) ARHC Members are invited to submit papers for publication in the IHR.	All	n/a	Permanent
ARHC11-A06	C1	Prepare and distribute a letter calling for data input for the next ARHC Chart Adequacy Assessment. The letter will detail the data requirements including metadata.	c/OTWG	2022-03-31	Ongoing

ARHC11-A07	C2	Contribute to the WENDWG Project Team on S-101 Scheming Guidelines (Leading: Shigeru Nakabayashi, Cc: WENDWG Secretary) in order to prepare the Arctic regional implementation.	c/AICCWG	ARHC12	Ongoing
ARHC11-D01	C2	A project team to set up under the AICCWG to test and evaluate schema options with real data and report findings and recommendations to ARHC12. <i>CA has volunteered to lead.</i>	PT members	ARHC12	n/a
ARHC11-A08	C2	All ARHC MS are invited to participate in this PT.	All	n/a	Ongoing
ARHC11-D02	C3	ARHC reaffirmed its endorsement of the <i>ARHC-Arctic SDI Joint Statement of Intent</i> .	n/a	n/a	n/a
ARHC11-A09	C3	MS to complete the MSDI Aggregated Data Web Service Checklist for ARHC and return to c/ARMSDIWG by 2022-02-01.	All	2022-02-01	Ongoing
ARHC11-D03	D1	ARHC agreed to set up a project team to direct the ARHC process for implementing the IHO SP including the reporting of SPIs. <i>CA to chair. USA, DK, and NO have agreed to participate.</i>	n/a	n/a	n/a
ARHC11-A10	D1	In liaison with ARMSDIWG, CA to develop and circulate the PT TOR and work plan which will include timelines and deliverables e.g. for IRCC14.	CA	IRCC14	Ongoing
ARHC11-D04	D2	ARHC endorsed the idea of a permanent ARHC point of contact (POC) for AC matters.	n/a	n/a	n/a
ARHC11-A11	D2	ARHC MS to put forward volunteers for the AC POC.	All	n/a	Closed <i>USA has</i>

					<i>put forth Jonathan Justi for this role.</i>
ARHC11-A12	D4	USA (NGA) will propose a standardized template for all ARHC WGs and circulate for consideration.	US	2022-01-01	Ongoing
ARHC11-A12	D4	Chairs of each working group to review their TOR to ensure they are current and fit for purpose.	c/ARHC WGs	2022-01-10	Ongoing
ARHC11-A13	D4	MS to review proposed updated ARMSDIWG TOR for endorsement by 2021-12-01, and	All	2021-12-01	Ongoing
ARHC11-A14	D4	ARMSDIWG to consider the way and means to support Action ARHC11 xx above (SP Implementation and automated provision of SPIs - see IHO SecGen slide 5).	c/ARMSDI WG	2021-12-01	Ongoing
ARHC11-D05	E1	ARHC approved ARHC Statutes Ed 3.0 and are in effect as of 2021-11-10.	n/a	n/a	n/a
ARHC11-A15	E1	Circulate ARHC Statutes Ed 3.0 for signature.	c/ARHC	2021-12-17	Ongoing
ARHC11-A16	E1	Initiate the review of the application from the UK for Associate Membership.	c/ARHC	2021-12-01	Ongoing

Annex D

ARHC11 Participants Group Photo

