USCHC – IHO Strategic Plan 2021-2026: GAP Analysis

Date of last edit 2022-05-26 (Ref: IHO Strategic Plan 2021-2026)

GOAL 1	Target	Current State	Gap	Actions
Goal 1: Evolving the hydrographic support for safety and efficiency of maritime navigation, undergoing profound transformation	1.1 Deliver standards for hydrographic data and specifications of hydrographic products; support their regular production; and coordinate regional and global services for their provision 1.2 Develop standards, specifications and guidelines in the areas of data assurance, including cyber security and data quality assessment 1.3 Use capacity building and training to develop and increase the ability of Member States to support safety and efficiency of maritime navigation	**n/a**	**n/a**	**Highlights/observations:** -Both USCHC (US and CA) Member States (MS) are active in IHO bodies which are responsible for the development of standards, specifications, and guidelines for products, services, and data quality. -They work with each other, participate in the IHO WENDWG and/or are members of RENCs in an effort to coordinate the production and the secure delivery of quality national, regional and global products and services. US is a member of IC-ENC and CA has a Digital Super-dealer agreement with PRIMAR. -Both MS are capable of supporting safe and efficient navigation in most of their waters, however, in some areas of INT Region A, there still exist shortcomings in the quality and coverage of hydrographic data. -MS are generally well advanced with respect to their capacities for deliver hydrographic services. Both MS actively support capacity building (CB) efforts both in terms of the IHO 3-phase CB Strategy and other CB-related projects such as e-learning development and the IHO project on *Empowering Women in Hydrography*. -Training (in-person and on-line) is an ongoing activity for CA and US. -Ultimately, a dashboard indicating the progress of the all SPIs in the Strategic Plan should be developed. -MS are promoting the use of S-xxx to other potential data providers.
Strategic Performance Indicators **1.1.1**	Percentage of Member States having operationalized production and distribution of hydrographic data products and services based on IHO Universal Hydrographic Data Model (S-100), under an implementation framework of coordination and agreed timelines **(2026: 100%)**	**100%**	**0%**	**Highlights/observations:** -This SPI requires a better definition (see Questions below). -Both MS have done some preliminary development on products and services for the 'First Step' noted in the *Roadmap for the S-100 Implementation Decade, Annex 2* plan and are confident they will achieve this goal. -Not all products/services in the Roadmap fall under the authority of the hydrographic offices. -S-101 ENCs will be the highest priority for both MS HOs. -S-102 (bathymetric surface) production will be targeted for selected waterways and areas. -The US is regularly producing and distributing S-102 data, and two are producing S-111 (surface currents) data. -Both MS are taking the opportunity to improve/review the content

				of ENCs e.g. CATZOC, uncertainty values, etc. **USCHC outstanding challenge(s):** -Having adequate coverage with S-100 products/services will be critical to the end users' demand. S-101 alone will not likely be enough to convince users to upgrade their systems. -Not all the specifications in the 'First Step' have been completed and fully tested for production environments. -The implementation of S-128, in particular, needs to be better understood. -The line between route monitoring and route planning can be fuzzy and mariners may demand more those planning product/services prior to 2026. -Dual-fuel and backward/forward conversion issues are still being sorted out. -For US and CA, domestic inter-agency coordination and collaboration will be required to deliver the entire suite of the S-100 products/services in the Roadmap. **USCHC outstanding question(s):** -As previously stated, this SPI needs a defined and applied consistently across all MS. For example, the numbers given for the 'Current State' is 100% because both (or 2 of 2) of the 2 MS are producing some products/services. Is this meaningful? If both MS produce *only* S-101, does this constitute 100%? -Does 'operational' mean through a RENC, or does any delivery mechanism count? -How can the SPI be modified to capture the 'package' of First Step S-100 products and services? -How can the aspect of coverage be measured? -Is more than one measure required? -Could the IHO on-line catalogue/INToGIS leveraged to generate these measures? -Can the calculation of this SPI be done automatically? **USCHC outstanding action(s):** -Redefine this SPI. This should be coordinated with other RHCs, MS, and HSSC.

				-MS to report annually on this measure. Doing so should consider the question whether the US and CA should report one consistent figure per year although they each are members of more than one RHC. This is believed would support the IHO Secretariats global assessment- ie, 97 member states of the IHO each report once so the number of responses is equal to the number of member states.
1.1.2	Number of hydrographic data products and services based on the Universal Hydrographic Data Model that cater for the new requirements: autonomous shipping, reduction of emissions	**TBD**	**100%**	**Highlights/observations:** -IHO has stood up a MASS project team (PT). Both USCHC MS participate on this PT. -S-111 data is available globally at small scale. S-102 is available in selected, dynamic, and high-traffic areas, and S-104 data should become available in similar areas beginning in 2022. -This information should be collected and reported by HSSC. HSSC -It is unclear which subset of the Roadmap elements are tied to autonomous shipping and the reduction of emissions. -SPI 1.1.2 is quite similar to SPI 1.2.1 -HSSC (HSSC12 2021 4.3A) indicates that the 7 product specifications of 'Step 1' should be included in this count. **USCHC outstanding challenge(s):** -The S-xxx products and services required for MASS and the reduction of emissions have not been defined and the timeframe for doing this has not been determined. -MASS will require a massive coordinated approach between many domestic and international entities; this includes regulations. The knowledge and understanding of how this system will work is still developing. -A positive business case for implementing a S-100-based system has not been widely acknowledged. -The amount of HO resources required to support these new products and services remains unknown. **USCHC outstanding question(s):** -How are these requirements to be defined? -Does the 'number' refer to the types of data, e.g. S-101, S-102 etc., or the number of datasets for each type of data? -Can the calculation of this SPI be done automatically?

				USCHC outstanding action(s): -USCHC to begin preliminary work on determining which routes in the region may be used by autonomous vessels.
1.2.1	Percentage of hydrographic data products and services based on the S-100 model that are covered by IHO standards, specifications and guidelines on cyber security **(2026: 100%)**	**TBD**	**100%**	**Highlights/observations:** -This information should be collected and reported by HSSC. -For both USCHC MS, the implementation of cyber-security will be done at the RENC/VAR level. -HSSC (HSSC12 2021 4.3A) notes, "7 Product Specifications includes cyber security and data quality assessment". **USCHC outstanding challenge(s):** -Establishing cybersecurity measures on all parts of the value chain, including those outside the control of the HO. **USCHC outstanding question(s):** -Have the cyber-security specifications been finalized? -How is the denominator in this equation calculated? -What is the difference between SPI 1.1.2 and SPI 1.2.1? -Does 'covered' mean that the data [during transfer] is supposed to be encrypted? -Do all S-xxx datasets have to be encrypted? -What if an HO (e.g. US) does not wish to encrypt its products and services? Will this measure for them always be 0%? **USCHC outstanding action(s):** -None
1.2.2	Percentage of navigationally significant areas (e.g. charted traffic separation schemes, anchorages, channels) for which the adequacy of the hydrographic knowledge is assessed through the use of appropriate quality indicators **(2026: 100%)**	**25-100 (TBBD*)**	**75-0**	**Highlights/observations:** -The IRCC direction with respect to this SPI is to "Derive one estimate figure for the RHC in %" (IRCC CL 01/2021 Annex A). -Both MS report that the products that they provide have been assessed for adequacy in some systematic way with quality indicators. -For some areas many of these products may be at a small (offshore) scale. -These factors lead to a wide range in this SPI. (*TBBD -To be better determined.) -The area (km^2) of navigationally significant areas needs to be empirically calculated and serve as a baseline for both MS. -US (100%) is now at or very close to this target.

				-In many areas in INT Region A demand for products is user-driven, so the target may keep moving. -This determination of this measure will be supported by HSSC - DQWG/ENCWG/HSWG-CATZOC/Quality of Bathymetry (HSSC12 2021 4.3A). **USCHC outstanding challenge(s):** -In C-55 the coverage of charts is categorized by usage (i.e. Offshore passage/landfall and coastal passage/approaches and ports) and not by navigational significance. That requires some further data distilling to arrive at this SPI. For example, NOAA (US) does have a "hydrohealth model" that governs its assessment of navigationally significant areas. **USCHC outstanding question(s):** -Could this measure can be considered subset of the SPI 2.2.1? -Are there any areas of the high seas that are considered navigationally significant? -Would the IHO consider adding the layer(s) of navigationally significant areas to INToGIS? This could pave the way to using INToGIS to generate this measure. **USCHC outstanding action(s):** -The USCHC (and RHCs?) should come to a common definition of 'navigationally significant', which also considers the IMO definition, if it exists. -At upcoming USCHC-45 (June 2022) meeting, consider establishing and tasking USCHC working group to calculate this SPI based on this definition and using any information e.g. CATZOC already captured in INToGIS, if possible.
1.3.1	Ability and capability of Member States to meet the requirements and delivery phases of the S-100 implementation plan **(2026: 50%)**	**TBD**	**TBD**	**Highlights/observations:** -From IRCC, "Derive a figure for each region of the percentage of MS, that are capable to provide S-101 and S-102 products data". -It is assumed that the distinction from SPI 1.1.1 that is being sought by this measure relates to the technical capacity to produce as opposed to actual production and delivery. -Both MS of the USCHC report this ability and capability and are confident about meeting the Roadmap timelines. -Both MS of the USCHC are active in the IHO bodies working on

				developing the standards, abilities, and capabilities required meet the Roadmap timelines. -References to the *Roadmap for the S-100 Implementation Decade (2020-2030)* should be clear, unambiguous, and consistently applied. For example, this SPI refers to the "delivery phases" of the S-100 implementation, but that phrase does not appear in the document itself. Related, it is suggested the Roadmap document be more readily available and easier to find on the IHO web page. **USCHC outstanding challenge(s):** -As mentioned previously, the production of some of the S-xxx products and services are the remit of the HOs; for those that are outside the exclusive role of the HO, inter-agency coordination will be needed to meet the requirements. **USCHC outstanding question(s):** -Is S-101 data converted from S-57 considered sufficient or must this be native S-101 production? -How is the element of geographic coverage to be reported or integrated into this measure? **USCHC outstanding action(s):** -none defined at this point.

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GOAL 2	Target	Current State	Gap	Actions
Goal 2: Increasing the use of hydrographic data for the benefit of society	• Build a portal to support and promote regional and international cooperation in marine spatial data infrastructures (MSDI) • Promote new tools and methods to accelerate and increase coverage, consistency, quality of surveys in poorly surveyed areas • Apply UN shared guiding principles for geospatial information management in order to ensure interoperability and extended use of hydrographic data in combination with other marine-related data	**n/a**	**n/a**	**Highlights/observations:** -The scope and governance of any portal must be clearly defined. -Both USCHC MS are active internationally in the areas of spatial data infrastructures e.g. IHO MSDIWG, and the management geospatial data e.g. UN-GGIM. See also SPI 2.3.1. -Both USCHC MS are actively testing new technologies, e.g. uncrewed survey vessels (USVs), and methods, e.g. crowd-sourced bathymetry to in data coverage and data quality. **USCHC outstanding challenge(s):** -Due to varying business models, the accessibility to data is challenging to harmonize across agencies and countries. -HOs require IT professionals to implement some of these changes, putting additions stress on resources. -Implications and opportunities of the 'S-100 World' not fully understood, yet. -Building a portal is only one part of the equation. Communicating its existence and usefulness to the rest of society is another, equally important part. **USCHC outstanding question(s):** -Does USCHC need strategy (including communications) particular for INT Region A, "…to accelerate and increase coverage…"?
2.1.1	Number of hits downloading data/information from the portal	**In progress**	**TBD**	**Highlights/observations:** -IRCC proposed that the MSDIWG provide a procedure of the development of the portal at the IHO Secretariat. -Currently, there are no regional 'portals'. -Both IHO MS of the USCHC have well-developed data/information portal(s) with significant offerings. -Any approach to a portal must be standards-based and the FAIR principles should be applied. **USCHC outstanding challenge(s):** -The design, standing-up, and maintenance of the portal(s) represent a further resource commitment. -There may be technical and policy issues related to consolidated or federated portals e.g. access to, and sharing of, national data.

				USCHC outstanding questions: -Does portal = MSDI in this situation? -What is the scope of the data and the information to be provided to and accessed by or through the portal? -Who (i.e. which MS) will 'own' this portal? -Is this portal to be linked to the IHO e.g. to the IHO online catalogue? -What is the timeline for this SDI? Yearly, would be appropriate. -What analytics should be employed? **USCHC outstanding action(s):** -USCHC to make a concerted effort to develop federated and/or consolidated MSDI(s)/portal(s) for the region.
2.2.1	Percentage of adequately surveyed area per coastal state	**In progress**	**TBD**	**Highlights/observations:** -It is assumed that 'adequately surveyed' equates to the measure described in C-55. -see Annex A for the C-55 for status of each member state reported within INT Region A -There may be some elements of this SPI that may complement the bathymetric data gap analysis (see 3.2.3). -It is interesting to note that while both MS report excellent chart coverage in the area, adequately surveyed area percentages are generally lower. -IRCC suggested that, using C-55 status of surveys data, areas where the value is less than 50% (33%) [?], be the focus and that the CBSC "derive rough figures from current C-55 and implement a routine procedure to derive percentage per coastal state in a simple manner, using also CATZOC information…". **USCHC outstanding challenge(s):** -The methodology for computing adequacy is not the same between HOs. E.g. CA uses the methodology proposed by UKHO and SHOM (Document CBSC16-08.3B (2016)). -Both Seabed 2030 (see SPI 3.2.3) and C-55 request information about 'adequately surveyed' areas, but the parameters for each differ both technically and geographically, which makes the collection of this information quite demanding for HOs.

				USCHC outstanding questions: -Currently, C-55 information is broken down by depth (greater and less than 200m) and quality of coverage (adequate, re-survey required, and never systematically surveyed) so what is the best method to calculate the overall 'percentage'? -Should the SPI be divided into one element for data suitable for navigation and one element suitable for non-navigation uses e.g. Seabed 2030? -Could some C-55 information be captured in INToGIS to facilitate the extraction of this data? **USCHC outstanding action(s):** -USCHC to agree upon a common methodology for determining 'adequacy'. -Engage with CBSC on this endeavor. -Ensure both USCHC MS provide or update adequately surveyed area data for INT Region A in C-55 as soon as possible.
2.2.2	Number of new applications of the new version of Standards for Hydrographic Surveys (S-44)	**TBD**	**TBD**	**Highlights/observations:** -All USCHC MS conduct hydrographic surveys in accordance with, or rely heavily on, the S-44 specifications. Surveys contracted by the HOs must also meet this standard, depending on the purpose of the survey. -S-44 is referenced on MS web sites. -New methods, technologies, and operations for hydrographic surveying are being tested and deployed with the expectation that these innovations will be able to deliver outputs that conform to the S-44 specifications. -HSSC (HSSC12 2021 4.3A) indicated that the HSWG should monitor and report on this measure. **USCHC outstanding challenge(s):** -Continuing to improve the awareness of S-44 throughout the hydrographic communities. -Setting up mechanisms within HOs to track and/or identify data sources and systems that conform to the 'new' S-44 specification. **USCHC outstanding questions:** - What is the connection between this SPI and Target 2.2 "*Promote new tools and methods to accelerate and increase coverage,*

				consistency, quality of surveys in poorly surveyed areas"? -What is meant by 'new applications'? Is this data that has been collected to the specifications or systems (hardware, software, or procedures) that utilize S-44 in some way? -Is there a metadata element that could be utilized to assist in this counting? -What is the timeframe for this measure? -Is there a target number? -How would the counting of any of these elements be conducted and who would be responsible for collecting this data? -Does the download of the S-44 standards document constitute an application of the new/current standards? Would this type of counting be done by the IHO Secretariat? -Does 'new version' = 'current version' ? **USCHC outstanding action(s):** -Ask HSSC for clarification on this SPI and work with the HSWG, as required.
2.3.1	Number of HOs reporting success applying the principles in their national contexts **(2026: 70%)**	100% (of USCHC MS)	0%	**Highlights/observations:** -Both USCHC MS' report success in their national contexts with respect to the applications UN shared guiding principles for geospatial information management . -US and CA participate in UN-GGIM MDWG. -IRCC proposed way forward is for MSDI WG and UN GGIM HWG to set up definition of what application means. Possibly providing information documents, and that MS (via RHCs) to report figures to IRCC and then to IHO Secretariat annually. -Both CA and US have implemented some type of open data policy. -The Global Maritime Traffic Density Service (GMTDS) and the World Port Index (WPI) from US-NGA are examples of applied FAIR principles. The latter also allows for the crowdsourcing of some ports-related data. These products are, or soon will be available via the IHO. **USCHC outstanding challenge(s):** -To communicate in a cohesive and understandable manner to the general public, how the UN principles across the Region are being applied. -Integrating the IGIF concepts into existing national hydrographic

				and topographic structures. **USCHC outstanding action(s):** -Ensure both USCHC MS report on this item and determine the reporting schedule (i.e. report by what date each year). -Follow the work of the MSDI WG and UN GGIM HWG concerning the definition of this measure and engage as required. -Create a USCHC web presence.

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GOAL 3	Target	Current State	Gap	Actions
Goal 3: Participating actively in international initiatives related to the knowledge and the sustainable use of the Ocean	• Collaborate with other bodies who deliver capacity-building and training to improve effectiveness of capacity- building activities and programs • Improve knowledge of the world's seafloors • Implement a comprehensive IHO digital communication strategy in order to enhance its visibility and accessibility to its work	**n/a**	**n/a**	**Highlights/observations:** -USCHC has a standing Seabed 2030 and a Crowd-sourced Bathymetry (CSB) coordinator (both NO). -Both Members participate in the IHO CSBWG and several have their own national initiatives related to CSB and other data gathering, including engagement with northern communities. **USCHC outstanding challenge(s):** -USCHC has not developed a strategic plan to engage in the UN Decade of Ocean Science for Sustainable Development (UNDoOS) though both MS are active at the national level.
Strategic Performance Indicators **3.1.1**	Percentage of Coastal States that are capable to provide marine safety information (MSI) according to the joint IMO/IHO/WMO manual on MSI **(2026: 90%)**	100%	0%	**Highlights/observations:** -Both US and CA are capable of providing MSI according to the IMO/IHO/IMO manual on MSI. -In some MS the promulgation of MSI is not the responsibility of the hydrographic offices. -The WWNWS should report this annually to IRCC. **USCHC outstanding question(s):** -Could C-55 and INToGIS be redesigned to allow MSI-related status to be drawn automatically from those sources? **USCHC outstanding action(s):** -None
3.2.1	Amount of data received per year by the IHO Data Centre for Digital Bathymetry (DCDB).	**Not applicable to USCHC**	**N/A**	**Highlights/observations:** USCHC believes that this SPI should be reported on by the DCDB. **USCHC outstanding question(s):** -Could SPI 3.2.2 be rolled up under this SPI using the same timeframe and providing a breakdown in contributions and contributors in the ways suggested below for 3.2.2. This may be more suitable for analysis by the RHCs. **USCHC outstanding action(s):** -None

3.2.2	Number of contributors to DCDB who are not hydrographic offices	**Not applicable to USCHC**	**N/A**	**Highlights/observations:** USCHC believes that this SPI should be reported on by the DCDB. **USCHC outstanding question(s):** -What is the timeframe for this measure? E.g. year-over-year; last 10 years; since inception? Suggest using the same timeframe as 3.2.1 -What are the parameters of this measure: E.g. single-beam; multi-beam; all bathy data? -Is there a way for contributions to be broken down geographically, that is, by RHC areas? This would be more relevant to RHCs. -Is there value in knowing amount of data delivered to the DCDB from national HOs? -Is the volume of data received from a contributor relevant? **USCHC outstanding action(s):** -None
3.2.3	Percentage of total sea area that is Seabed 2030 compliant for incorporation into the GEBCO dataset and services	**In progress**	**TBD**	**Highlights/observations:** -USCHC MS are at varying stages of evaluating their coverage vis-à-vis the Seabed 2030 specifications. Those that are not finished the analysis hope to complete the task this year. -It is assumed that the reporting of this measure will be coordinated by the GEBCO GC. **USCHC outstanding question(s):** -Could more precision be given to the definition of 'Seabed 2030 compliant'? -Could more precision be given to the definition of 'total sea area'? That is, does this mean within coastal state EEZ or within the limits of the RHC limits? What about the high seas within the RHC? Is this the realm of the RDACCs? -Is there any value in the better coordination of the activities of the RHCs and the RDACCs vis-à-vis Seabed 2020 activities. -Should the measure differentiate between what is publicly available and overall coverage? **USCHC outstanding action(s):** -Both MS to complete the evaluation of their bathymetric data coverages vis-à-vis the Seabed 2030 specifications in time to report to

				C6/A3.
3.3.1	Number of visits, likes, re-postings, etc. associated with the IHO social media sites	**Not applicable to USCHC**		**Highlights/observations:** USCHC understands that this SPI, and SPI 3.3.2, are the responsibility of the IHO Secretariat and that the Secretariat will employ the analytical tool(s) that best derive the information desired. **USCHC outstanding question(s):** -What are the goals or objectives of these measures and how do they inform the success of the Strategic Plan? In other words, will this information be used to make adjustments to the implementation of the Strategic Plan? If not, why collect it. -Could the data be broken down into Regional (e.g. USCHC) pieces, so that the RHCs could use this information to influence their work plans? **USCHC outstanding action(s):** -None
3.3.2	Volume downloaded from the IHO website and Geographical Information System (GIS)	**Not applicable to USCHC**		**Highlights/observations:** -USCHC understands that this SPI, and SPI 3.3.1, are the responsibility of the IHO Secretariat and that the Secretariat will employ the analytical tool(s) that best derive the information desired. **USCHC outstanding question(s):** -What is the breadth and depth of information for which the IHO Secretariat is considering assuming the role of data provider, particularly from the IHO GIS? Can this be done with the same level of IHO resources? -What are the expectations of MS with respect to contributing data to the IHO GIS? -What are the goals or objectives of these measures and how do they inform the success of the Strategic Plan? In other words, will this information be used to make adjustments to the implementation of the Strategic Plan? If not, why collect it? -Could the data be broken down into Regional (e.g. USCHC) pieces, so that the RHCs could use this information to influence their work plans? **USCHC outstanding action(s):**

				-None

Annex A

C-55 Reporting for INT Region A for US and CA[1]

[1] chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://iho.int/uploads/user/pubs/cb/c-55/c55.pdf

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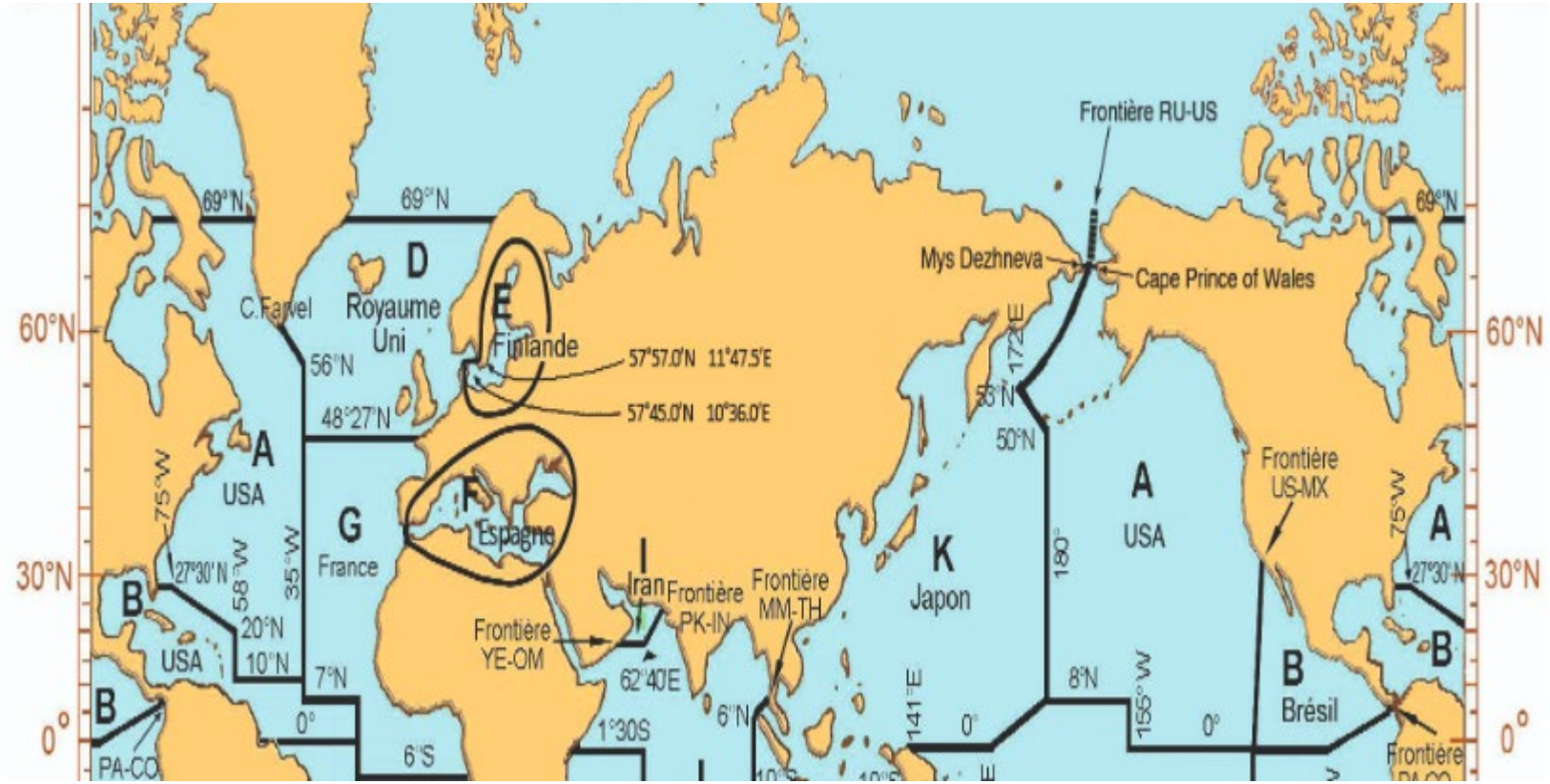

Below: CA Pages 82 & 83 "IHO Publication C-55 Status of Surveying and Charting Worldwide" (April 2022)

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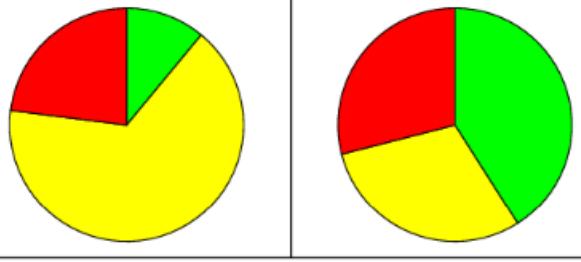
Canada (A)

Hydrographic surveying / Levés hydrographiques / Levantamientos hidrográficos

Survey coverage Couverture hydrographique Cobertura hidrográfica	Depth < 200m Profondeur < 200m Profundidad < 200m			Depth > 200m Profondeur > 200m Profundidad > 200m		
% Adequately surveyed Correctement hydrographié Adecuadamente levantado	11	66	23	41	30	29
% Re-survey required Nécessitant de nouveaux levés Requiere nuevo levantamiento						
% Never systematically surveyed Jamais hydrographié systématiquement Nunca levantado sistemáticamente						



Notes
Notes
Notas

Status of Surveys:
This section is more complex than 2018 because of the change in classification scheme. CHS now match the Classification in Annex A of the Proposal for Review: Status of Hydrographic Surveying and Nautical Charting Worldwide, submitted by the United Kingdom and France.

There is a decrease in the 0-200m Adequately surveyed areas because CATZOC B is now split between "Adequate" and "Resurvey" areas based on the 50m depth contour. CATZOC B above 50m is considered "Resurvey" and CATZOC B below 50m depth is considered "Adequate" This is consistent for every region except inland waters.

There is an increase in all >200m Adequately surveyed areas because CATZOC C is now included in the "Adequate" classification below 200m depth. This is consistent for every region.

There is an increase in the 0-200m "Resurvey" classification. This is due to the "Resurvey" classification now including CATZOC D and U. Previously in 2018 CATZOC D and U were not used in any classifications. This is consistent for all regions.

Correspondingly, there has been an overall decrease in areas not surveyed in areas both above and below 200m depth. This is due to the inclusion of CATZOC D and U in the study.

Supporting Notes:
1. Regional Boundaries (Canada-Atlantic, Canada-Pacific, Canada-Arctic and Canada-Inland Waters) were based on the regional boundaries used for the production of ENC, RNC and INT charts.
2. Canadian shoreline and depths were derived from GEBCO 2014 30 arc-second grid retrieved January 22, 2019.
3. Inland waters comprising of the St. Lawrence Seaway and all five Great Lakes were included in these calculations.
4. The high proportion of inadequacy surveyed waters is predominately due to the large area of Arctic waters that are un-surveyed or covered by frontier surveys only.
5. Ecotourism, climate change and resource development are increasing demand for surveys in Arctic and frontier areas.
6. Canadian shoreline and depths were derived from GEBCO 2014 30 arc-second grid retrieved on January 22, 2019.
7. Status of survey classifications were based on Annex A: SHOM C-55 CATZOC conversion table of the Proposal for Review of C-55: Status of Hydrographic Surveying and Nautical Charting Worldwide, proposed by the United Kingdom and France. (2016) Doccument N. (CBSC16-08.3B) Available from: https://www.iho.int/mtg_docs/com_wg/CBC/CBSC16/CBSC16-03B-Actions-CBSC15.pdf
8. Due to the change in Status of survey classifications from the previous year, large differences in statistics are expected
9. "Adequate", "Resurvey" and "No Survey" areas were classified using CATZOC survey data extracted from Canadian Hydrographic Service database on April 11, 2019.

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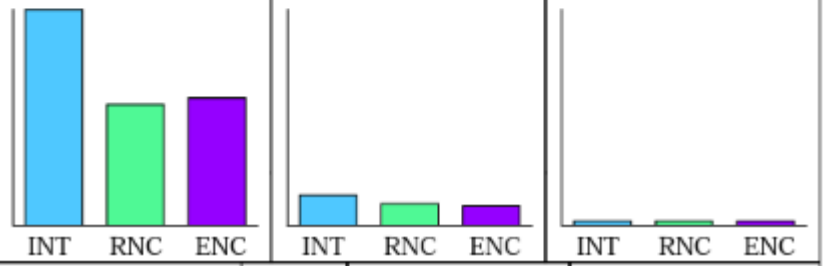
Maritime Safety Information / Renseignements sur la sécurité maritime / Información sobre seguridad marítima

GMDSS implementation Mise en œuvre du SMDSM Implementación SMSSM		Status Status Estado	Notes Notes Notas
	Master plan Plan cadre Plan principal	YES	- GISIS updated as required - Canadian Coast Guard publication, Radio Aids to Marine Navigation - Arctic maritime safety information services based on Canadian NAVAREAs XVII & XVIII
	A1 area Zone A1 Zona A1	YES	
	A2 area Zone A2 Zona A2	NO	- A2 not declared - Where located, MF RT Distress and Safety Services provided
	A3 area Zone A3 Zona A3	YES	
	NAVTEX NAVTEX NAVTEX	YES	
	Safety NET Safety NET Safety NET	YES	- NAVAREA XVII & XVIII - METAREA XVII & XVIII, and the Hudson Bay area of METAREA I

Canada (A)

Nautical charting / Cartographie marine / Cartografía náutica

Coverage of charts published Couverture des cartes publiées Cobertura de cartas publicadas	Offshore passage Navigation au large Pasaje offshore			Landfall and Coastal passage Atterrissage et navigation côtière Recalada y Pasaje costero			Approaches and Ports Approches et ports Aproches y puertos		
% Covered by INT or other paper charts meeting S-4 Couvert par des cartes papier INT ou autres conformes S-4 Cubiertas por cartas de papel INT o otras cumpliendo S-4	100	56	59	14	10	9	2	2	2
% Covered by RNC meeting S-61 Couvert par des RNC conformes S-61 Cubiertas por RNC cumpliendo S-61									
% Covered by ENC meeting S-57 Couvert par des ENC conformes S-57 Cubiertas por ENC cumpliendo S-57									
	INT	RNC	ENC	INT	RNC	ENC	INT	RNC	ENC



Paper charts showing depth in meters Cartes papier avec les profondeurs en mètres Cartas de papel con profundidades en metros	66 %	Paper charts referenced to a satellite datum Cartes papier rapportées à un système géodésique satellitaire Cartas de papel referidas a un datum satelital	87 %	Data source Source des données Origen de los datos	

Notes
Notes
Notas

1. Regional Boundaries (Canada-Atlantic, Canada-Pacific, Canada-Arctic and Canada-Inland Waters) have been divided based on the regional boundaries used for the production of ENC, RNC and INT charts.
2. Chart Coverages have been divided based on the minimum scale of each chart.
3. "Passage" comprised of charts from 1:150 001 and above, "Coastal" comprised of charts ranging from 1:50 001 - 1:150 000, "Port" comprised of charts 1:50,000 and below.
4. RNC, ENC and INT chart coverages were extracted April 11, 2019.
5. Satellite datums were assumed to be WGS 84 and NAD83 in the calculation of paper charts referenced to a satellite datum.

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Maritime Safety Information / Renseignements sur la sécurité maritime / Información sobre seguridad marítima

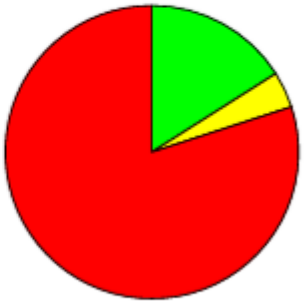
Navigational information Informations nautiques Información náutica		Status Status Estado	Notes Notes Notas
	Local warnings Avertissements locaux Avisos locales	YES	
	Coastal warnings Avertissements côtiers Avisos costeros	YES	
	NAVAREA warnings Avertissements NAVAREA Avisos NAVAREA	YES	NAVAREA XVII and XVIII
	Information on ports and harbours Information sur les ports et rades Información sobre puertos	NO	Limited to navigational warnings within ports/harbours.

Last update / Mise à jour / Actualización: 01/12/2021

Below from pages 489-490 of "IHO Publication C-55 Status of Surveying and Charting Worldwide" (April 2022). Note: Page 490 indicates US including Alaska and Aleutian Islands in calculations of INT Region N.

United States of America (A)

Hydrographic surveying / Levés hydrographiques / Levantamientos hidrográficos

Survey coverage Couverture hydrographique Cobertura hidrográfica	Depth < 200m Profondeur < 200m Profundidad < 200m			Depth > 200m Profondeur > 200m Profundidad > 200m		
	Adequately surveyed Correctement hydrographié Adecuadamente levantado	Re-survey required Nécessitant de nouveaux levés Requiere nuevo levantamiento	Never systematically surveyed Jamais hydrographié systématiquement Nunca levantado sistemáticamente	Adequately surveyed Correctement hydrographié Adecuadamente levantado	Re-survey required Nécessitant de nouveaux levés Requiere nuevo levantamiento	Never systematically surveyed Jamais hydrographié systématiquement Nunca levantado sistemáticamente
%	11	39	50	16	4	80
						

Notes
Notes
Notas

Amplifying information:
1. Special national circumstances which influence the statistical break-down above (e.g. geographical factors such as narrow continental shelf or fringing reefs, or constraints such as areas of unstable seabed which require a routine re-survey programme.
The definitions provided regarding C-55 are very broad and general as to how the Hydrographic Office defines survey coverage. For this analysis Coast Survey used the following survey date ranges to determine the C-55 category.
Depths less than or equal to 200 meters:
• 1994 - Present = A
• 1940 - 1993 = B
• Pre 1940 or un-surveyed = C
Depths greater than 200 meters to the extent of the EEZ:
• 1940 - Present = A
• Pre 1940 (1851-1939) = B
2
Rev 1
• Un-surveyed = C
2. Significant shortfalls in sea areas of high priority for maritime traffic:
a. Maritime Shipping Routes: None

Maritime Safety Information / Renseignements sur la sécurité maritime / Información sobre seguridad marítima

GMDSS implementation Mise en œuvre du SMDSM Implementación SMSSM		Status Status Estado	Notes Notes Notas
	Master plan Plan cadre Plan principal	YES	
	A1 area Zone A1 Zona A1	Partial	Planned completion Dec 2012
	A2 area Zone A2 Zona A2	NO	
	A3 area Zone A3 Zona A3	YES	
	NAVTEX NAVTEX NAVTEX	YES	
	Safety NET Safety NET Safety NET	YES	

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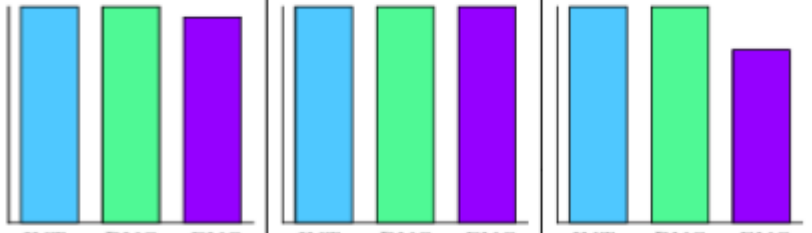
United States of America (A)

Nautical charting / Cartographie marine / Cartografía náutica

Coverage of charts published Couverture des cartes publiées Cobertura de cartas publicadas	Offshore passage Navigation au large Pasaje offshore			Landfall and Coastal passage Atterrissage et navigation côtière Recalada y Pasaje costero			Approaches and Ports Approches et ports Aproches y puertos		
% Covered by INT or other paper charts meeting S-4 % Couvert par des cartes papier INT ou autres conformes S-4 % Cubiertas por cartas de papel INT o otras cumpliendo S-4	100	100	95	100	100	100	100	100	80
% Covered by RNC meeting S-61 % Couvert par des RNC conformes S-61 % Cubiertas por RNC cumpliendo S-61									
% Covered by ENC meeting S-57 % Couvert par des ENC conformes S-57 % Cubiertas por ENC cumpliendo S-57									
	INT	RNC	ENC	INT	RNC	ENC	INT	RNC	ENC



Paper charts showing depth in meters Cartes papier avec les profondeurs en mètres Cartas de papel con profundidades en metros	100 %	Paper charts referenced to a satellite datum Cartes papier rapportées à un système géodésique satellitaire Cartas de papel referidas a un datum satelital	100 %	Data source Source des données Origen de los datos	Ask USA

Notes Notes Notas	Details in the table apply only to the forty-eight contiguous U.S. States. Details for Alaska and Hawaii are shown in the tables within section 2.2(

Maritime Safety Information / Renseignements sur la sécurité maritime / Información sobre seguridad marítima

Navigational information Informations nautiques Información náutica		Status Status Estado	Notes Notes Notas
	Local warnings Avertissements locaux Avisos locales	YES	
	Coastal warnings Avertissements côtiers Avisos costeros	YES	
	NAVAREA warnings Avertissements NAVAREA Avisos NAVAREA	YES	
	Information on ports and harbours Information sur les ports et rades Información sobre puertos	YES	

Last update / Mise à jour / Actualización: 19/12/2016

ANNEX B

This annex is included as a reference for USCHC.
It is a copy of Annex A of the ARHC IHO SP Gap Analysis and it contains the ARHC list of actions identified as part of the IHO Strategic Plan gap analysis.
These actions may form the basis of specific Work Plan items for ARHC and many of them may also be relevant to USCHC.

1. GENERAL

1.1 Develop a schedule or calendar for reporting dates/cycles on SPI by MS to ARHC and for ARHC to IRCC.

GOAL 1 Actions

G1a. Redefine SPI 1.1.1*. This should be coordinated with other RHCs, MS, and HSSC.
**Percentage of Member States having operationalized production and distribution of hydrographic data products and services based on IHO Universal Hydrographic Data Model (S-100), under an implementation framework of coordination and agreed timelines*.

G1b. ARHC to begin preliminary work on determining which routes in the region may be used by autonomous vessels. (In support of SPI 1.1.2.)

G1c. ARHC to come to a common definition of 'navigationally significant', which also considers the IMO definition, if it exists. (1.2.2)

G1d. Task OTWG to calculate this SPI based on this definition and using any information e.g. CATZOC already captured in INToGIS, if possible. (1.2.2)

G1e. Ask remaining MS to report on SPI 1.3.1: *Ability and capability of Member States to meet the requirements and delivery phases of the S-100 implementation plan.*

GOAL 2 Actions

G2a. ARHC to agree upon a common methodology for determining 'adequacy' for SPI 2.2.1, and engage with CBSC on this endeavour.

G2b. Ensure all ARHC MS provide or update adequately surveyed area data for Region N in C-55 as soon as possible.

G2c. Ask HSSC for clarification on SPI 2.2.2 (*Number of new applications of the new version of Standards for Hydrographic Surveys (S-44)*) and work with the HSWG, as required.

G2d. ARHC to make a concerted effort to develop federated and/or consolidated MSDIs for the region.

G2e. ARHC to create a web presence to better communicate its activities and the data available from MS that could be of value to society.

G2f. Follow the work of the MSDI WG and UN GGIM HWG concerning the definition of SPI 2.3.1 *Number of HOs reporting success applying the principles in their national contexts* and engage as required.

G2g. Discuss the need for an ARHC strategy (including communications) particular for the Arctic, "…to accelerate and increase coverage…" of hydrographic data.

G2h. Consider adding 'Outreach to Indigenous peoples and Northern communities in the region' as a standing ARHC agenda item as part of the efforts to amplify use of hydrographic data for the benefit of society.

GOAL 3 Actions

G3a. ARHC MS will complete their Seabed 2030 data gap analysis, broken down into publicly and non-publicly available data, working with the RDACCs if possible/practical in time to report to C6/A3.

G3b. ARHC to work with PAME to deliver tangible results under the ARHC-PAME MOU. For example, assist PAME in developing an S-122 layer for marine protected areas (MPAs)

G3c. ARHC to consider if it wants a UNDoOS engagement strategy and what that would look like. This could be related to the previous point and development of a regional MSDI.

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