Paper for Consideration by CBSC16

Proposal for Review of C-55: Status of Hydrographic Surveying and Nautical Charting Worldwide

Submitted by:	United Kingdom, France
Executive Summary:	The definition of the C-55 and the mechanism for providing the information should be reviewed.
Related Documents:	C-55: Status of Hydrographic Surveying and Nautical Charting Worldwide Guidelines for C-55. S-44: IHO Standards for Hydrographic Surveys. IMO CL 3425 (5 Dec 2013): Auditor's Manual for IMSAS
Related Projects:	Relevant RHC databases

Introduction / Background

The definition of IHO Publication C-55, and its objectives, has been discussed in the past (IRCC3, action IRCC03/09; IRCC5-12B) and was included in the IHO 2013-17 Work Programme (task 3.4.3: enhance C-55), but continues to raise questions related to its use by the IHO Member States, other coastal States, governments and supporting international organisations.

As explained in the C-55 guidelines *'The aim of this third edition of IHO Publication C-55 is to present a clear picture of the worldwide coverage of surveys and nautical charts and of the extent of effective organizations for the timely promulgation of navigational safety information. The content of the reports is now held in a live database on the IHO web site from which up to date reports can be extracted at any time. The data base covers the waters of 90% of the coastal States of the world.'*

Furthermore, the guidelines state that '*The C-55 data-base will underpin IHO advice to the UN, IMO and other agencies.*' This has become of increased importance since January 2016, as the data within C-55 is now being used within the IMO Member State Audit Scheme (IMSAS), which aims to of determine the extent to which Member States '*give full and complete effect to their obligations and responsibilities contained in a number of IMO treaty instruments*'. To support MS commitment to SOLAS, it is imperative that the information in C-55 is pertinent, comprehensive, consistent and up to date.

IMO Circular Letter 3425 (5 Dec 2013) includes at page 59, an annex to document MSC81/24/4 which is provided for guidance to coastal States and auditors in relation to compliance with SOLAS V/4 and V/9. This provides a prompt to provide information relating to the status of hydrographic surveys, nautical charting and maritime safety information, '*as reported in IHO Publication S-55'* [now renamed C-55]. When this annex was first written in 2006, the audit scheme was voluntary.

Since January 2016, IMSAS has become mandatory for all IMO Member States.

There is also a potential link to shipping insurance premiums if risk assessment is based on survey quality.

Analysis/Discussion

The guidelines for C-55 state that *'The categorisation in the reports is underpinned by detailed national assessment using S-44 criteria, the zones of confidence (CATZOC) defined in S-57, or some other systematic classification of source data'.* However, it is left to each nation to determine how to use these to estimate percentages of adequate survey coverage. Consequently, the information is provided by different coastal States is variable due to the use of different parameters and references. Without knowledge of how the percentages are estimated, there is no way of comparing the level of accuracy of figures provided by different coastal States, or indeed the level of detailed assessment carried out.

The guidelines for C-55 do not give guidance on the precision of estimation required. By considering C-55 entries it is clear that some costal States quote to the nearest 5% or 10%, whilst other quote to 0.1%. The sometimes-considerable differences in estimates of the hydrographic surveying status in waters of coastal States with

comparable hydrographic services clearly demonstrate the lack of a consistent and harmonised methodology which severely limits the confidence placed in such assessments.

UK uses a combination of S-44, CATZOC and source data diagrams. As there is no direct mapping of S-44 to CATZOC, the process of estimating C-55 categories is not straight forward.

France uses a CATZOC assigned to each individual survey to calculate a C-55 status of hydrographic surveying indicator using the conversion criteria shown in annex A.

The current C-55 remains simple and offers a quick view of the state of bathymetric knowledge and chart coverage. This generalised information could, however, be better presented by taking advantage of the new possibilities offered by GIS, to get for example, a geographical presentation of which areas are inadequately surveyed or where chart coverage is poor.

C-55 may also incorporate indicators for gaps with respect to existing and planned ports and destinations around the world, or provide elements for a gap analysis.

Conclusions

In current C-55, the status of hydrographic surveying indicator is not populated uniformly by all coastal States due to insufficiently prescriptive guidelines which limits its relevance and validity as it becomes increasingly used, including in the mandatory framework of IMO audits.

The presentation of the information is not as helpful as it could be, particularly considering GIS technology availability, and expectations of the information age.

It is therefore questionable whether it is fit for use, particularly within IMSAS and potential risk assessment related where ships are permitted to navigate and their insurance premiums. Greater convergence with the hydrographic services' own needs must also be sought so as not to duplicate efforts and to get as much interest in the process as possible.

Having less than satisfactory content in C-55 may reflect badly on the IHO.

Recommendations

Taking into account, on the one hand, the current use of C-55 and its main weaknesses and, on the other hand, the time needed for a complete review of indicator-55, UK and France recommend a two-step approach:

- Firstly, guidelines to estimate the C-55 status of hydrographic surveying indicator should be more prescriptive or at least more documented through sharing of national experiences, in order to get more standardised and relevant results.
  The use the CATZOC survey qualification to derive the C-55 indicator as a standardised methodology could be considered as a transitional solution in the short term, pending a full review of the indicator. Member States are invited to share their methodology in order to strengthen this solution and move towards greater harmonisation.
  However, this harmonisation process must remain pragmatic and limited in order to be able to devote the necessary resources to the review of C-55.

- Secondly, a review of the purpose, use and mechanism for collecting, managing and presenting C-55 data is recommended.
  The C-55 indicator relating to the state of hydrographic surveying could be considered to have two purposes:
  - On one hand, to respond to safety of navigation issues, in particular in order to identify the areas for which coastal States must develop hydrographic services in order to meet their SOLAS obligations. This indicator should then focus only on areas of interest for navigation. Limited areas adequately surveyed, in relation to all waters under national jurisdiction, may be sufficient to meet navigation issues alone. It should be directly linked to the risk assessment methodologies and national hydrographic plans.
  - And on the other hand, to reflect the state of global bathymetric knowledge in coastal State waters according to the principle "Hydrography is Much More than Just Nautical Charts". Unlike the previous one, this indicator must be calculated on all waters and not only on the areas of interest for navigation alone.

  It is therefore appropriate to consider the desired purpose of this indicator and, if necessary, to define two different indicators (which may nevertheless derive from the same knowledge base).

This should consider whether (i) GIS tools would provide a better solution, and (ii) overhaul the guidance to ensure that MS are clear on what data to provide.
Several options may be considered (non-exhaustive list):

- Given the increasing availability of ENCs, a link to the IHO ENC Catalogue should be considered. Suitable development of the catalogue would allow access to CATZOC values as the means to providing C-55 percentages.
- The future "Quality of Bathymetric Data" indicator (S-101) should also be considered.

This review of the purpose, use and mechanism for collecting, managing and presenting C-55 data should take note of the work of the thematic working groups (DQWG and MSDIWG), the regional commissions (especially BSHC, NSHC-RWG and MACHC-MIP), within the framework of the 2018-2020 IHO work program (1.2.2 "Maintain and extend the IHO GIS, webserver and web mapping services in support of RHCs, ENC production coordination, INT chart coordination, C-55 and other related activities" & 3.2.4 "Maintain and enhance the underlying database and IHO Publication C-55–Status of Hydrographic Surveying and Nautical Charting Worldwide").

Justification and Impacts

Suitable review and potential development of the mechanism of providing C-55 information would provide a more consistent and reliable source of information.
However, clarification of the methodology to estimate the C-55 status of hydrographic surveying indicator, through more methodological sharing, should be sought in the short term in order to maintain the credibility of this indicator.

An advanced geographical based (GIS) output would provide issue-specific indicators and additional useful information, strengthen confidence and would reflect well on the IHO as a centre of geospatial expertise.

Resources required for development are as yet unquantified. This paper simply aims to trigger a review that can lead to future planning of work items.

Action Required of CBSC

The CBSC is invited to:

a. note this paper;
b. consider the recommendations provided;
c. establish a correspondence group to prepare the first draft of revised C-55 to be submitted to CBSC17;
d. request to IRCC to include the revision of C-55 in the IRCC Work Programme 2018-2019;
e. request to IRCC to task RHC Chairs to inform the RHC Members and Associate Members on the importance of sharing their methodologies on inputs to C-55;
f. take any other action considered appropriate.

Annex A: SHOM C-55 CATZOC conversion table

C-55 Status of hydrographic surveying	CATZOC	Comment
Depth < 200m		
A Adequately surveyed	A1 A2 B for depth > 50m	50m threshold adopted by Shom in accordance with the national hydrographic survey scheme. Can be adapted to 40m for consistency with the S-44
B Re-surveyed required	B for depth < 50m C D U	50m threshold, see previous comment. CATZOC C & D & U: limited to systematic surveys only. Ideally, the bathymetric database should not contain surveys without CATZOC (U). However, the CATZOC of some old surveys remains to be defined at the base level. When calculating the C-55 indicator, surveys without CATZOC (U) of significant area are analyzed and assigned a CATZOC.
C Never systematically surveyed		All that is not C-55 A or B.
Depth > 200m		
A Adequately surveyed	(A1) (A2) B C	The database should not contain qualified CATZOC A1 or A2 surveys in this depth range. CATZOC C: limited to systematic surveys only
B Re-surveyed required	D U	CATZOC D & U: limited to systematic surveys only See also previous comment about CATZOC U.
C Never systematically surveyed		All that is not C-55 A or B.

Remarks:

- The qualification of surveys according to a ZOC criterion (S-57), in addition to the S-44 qualification and other surveying qualifications specific to individual HOs, is a relatively recent practice - the workload “to CATZOC” ‘lead-line’ and other old surveys should not be underestimated.
- Even if the CATZOC calculation methodology is questionable there is now consensus on the final CATZOC indicator, and, as it must be calculated to populate the nautical charts and ENCs, it could constitute the common basis of calculation of the C-55 status of hydrographic surveying indicator.