

## Paper for Consideration by NCWG

### Results of the Future of the Paper Nautical Chart Survey of IHO Member States

<b>Submitted by:</b>	NCWG Future of the Paper Chart Sub-working Group Lead
<b>Executive Summary:</b>	This survey was prepared by NCWG to accompany its report on the Future of the Paper Nautical Chart to the IHO Hydrographic Services and Standards Committee. The survey was conducted June to September 2019, during which 49 IHO Member States responded to the online questionnaire.
<b>Related Documents:</b>	<a href="#">HSSC11-05.4B</a> , "Preliminary Report on Future of the Paper Nautical Chart"
<b>Related Projects:</b>	None

### Introduction / Background

The action for writing a paper on the Future of the Paper Nautical Chart originated several years ago. After a few false starts, a significant effort to write the report began at the NCWG-3 meeting in May 2017. A preliminary version of the report was presented to HSSC-11 in May 2019, which included a set of suggested survey questions that NCWG wanted to ask of IHO member states.

Several hydrographic offices are now exploring different ways to reduce the burden of raster chart production, such as decreasing the number of charts in their suite of raster chart products, or developing simplified raster chart products that are easier to produce. Some efforts are also being made to make use of ENC's, or products derived from ENC's, more attractive to mariners and recreational boaters. The intent of the survey was to gather more information about these efforts and determine the general trends for the production and use of paper nautical charts and Electronic Navigational Charts (ENC's).

The survey was conducted from June to September 2019. Forty-nine IHO member states submitted answers to the online questionnaire. The results of the survey, presented here, will supplement and inform the content of the final Future of the Paper Nautical Chart report, which is to be presented at HSSC-12 in May 2020 in Bristol, United Kingdom. Two additional survey responses were received too late to incorporate into this report, but will be accounted for in the final report to HSSC-12.

### Analysis/Discussion

Generally, the survey responses are simply presented as they were received. In a few cases, additional analysis is provided to assist the reader in interpreting the results. Responses to each of the survey questions are reported in the same order in which the questions were presented in the online questionnaire.

Section headings separate categories of questions as they did in the questionnaire. The Future of the Paper Nautical Chart questionnaire is provided in Annex A. In the survey results, a blue bar showing each question number, as listed in Annex A, separates each summary of question responses. Depending on the type of question, a summary of the survey responses are presented either graphically or textually. An asterisk or numbered notes within [brackets] are used to point out additional information important to interpreting the survey results.

### Conclusions

Over half of the IHO member states responded to the survey. Although some large hydrographic offices did not participate at all and some choose not to provide answers to some questions – such as paper chart and ENC sales data – it appears that general trends can be discerned from the survey data. This information should be helpful for NCWG and HSSC in making recommendations for how the IHO may support the future of the paper nautical chart.

**Recommendations**

- NCWG should consider any additional analysis or commentary that should be added to the survey results.
- The survey results should be presented in an annex to the final Future of the Paper Nautical Chart report.
- NCWG should consider any modifications that should be made to the Future of the Paper Nautical Chart report based on the survey results.

**Justification and Impacts**

The actions above are necessary to finalize the Future of the Paper Nautical Chart report for presentation at HSSC-12 in May 2020.

**Action Required of the NCWG**

The NCWG is invited to:

- a. review the survey results,
- b. recommend any changes needed in the summary of the survey results
- c. recommend any changes needed in the Future of the Paper Nautical Chart report based on the survey results.

# Results of the Future of the Paper Nautical Chart Survey of International Hydrographic Organization Member States

Conducted June to September 2019

by the International Hydrographic Organization – Nautical Cartography Working Group

## 1 Introduction

### 1.1 Participants

Survey responses were received from 52 of the 89 IHO member states.<sup>1</sup> These are listed in Table 1 and shown graphically in Figure 1

Argentina	Ecuador	Korea (Rep of)	Saudi Arabia <sup>[2]</sup>
Australia	Estonia	Malaysia	Singapore
Bahrain	Denmark <sup>[1]</sup>	Malta	South Africa
Bangladesh	Finland	Mauritius	Spain
Belgium	France	Mexico	Suriname
Brazil	Germany	Netherlands	Sweden
Canada	Greece	Norway	Thailand
Chile	Iceland	Oman	Tunisia
China <sup>[1]</sup>	India	Peru	Turkey
Colombia	Indonesia	Poland	Ukraine
Croatia	Iran	Portugal	United Kingdom
Cuba	Italy	Romania	United States
Cyprus	Japan	Russian Federation	Venezuela

Table 1, IHO member states responding to the future of the paper chart survey.

[1] Survey responses from China and Denmark were received too late to incorporate into this report.

[2] Saudi Arabia responded to IHO Circular Letter 29/2019, but abstained from submitting a survey questionnaire.

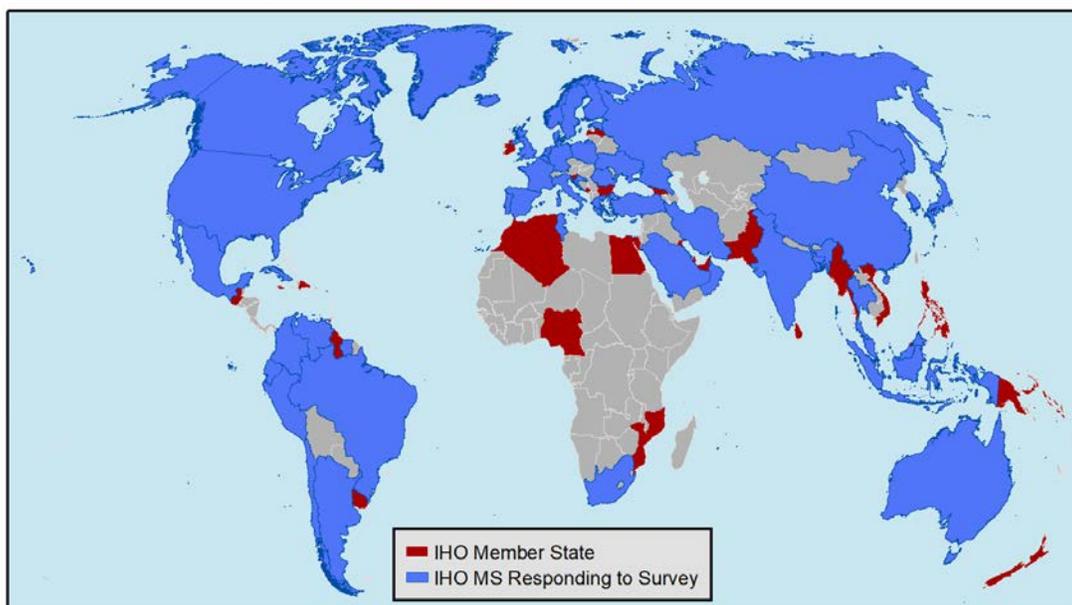


Figure 1, IHO member states responding to the future of the paper chart survey.

<sup>1</sup> Memberships of three additional states are currently suspended. A list of IHO member states is on the IHO website at: [https://www.iho.int/srv1/index.php?option=com\\_wrapper&view=wrapper&Itemid=452&lang=en](https://www.iho.int/srv1/index.php?option=com_wrapper&view=wrapper&Itemid=452&lang=en)

## 1.2 Purpose

This survey was prepared by the International Hydrographic Organization (IHO) Nautical Cartography Working Group (NCWG) to accompany its report on the Future of the Paper Nautical Chart to the IHO Hydrographic Services and Standards Committee, under which the NCWG is a working group.

## 2 Survey Results

Responses to each of the survey questions are reported below in the same order in which the questions were presented in the online questionnaire. Section headings separate categories of questions as they did in the questionnaire. A sample of the survey form is provided in Annex A. A blue bar showing each question number, as listed in Annex A, separates each summary of question responses.

Depending on the type of question, the survey responses are then summarized, either in a graph or textually. An asterisk or numbered notes within [brackets] are used to point out additional information important to interpreting the survey results.

Generally, the survey responses are simply presented as they were received. In a few cases additional analysis is provided to assist the reader in interpreting the results.

### 2.1 National Regulatory Information

#### 2.1.1 Information about your national maritime regulations for commercial vessels on domestic voyages. (Ref FPNC 2.2.b)

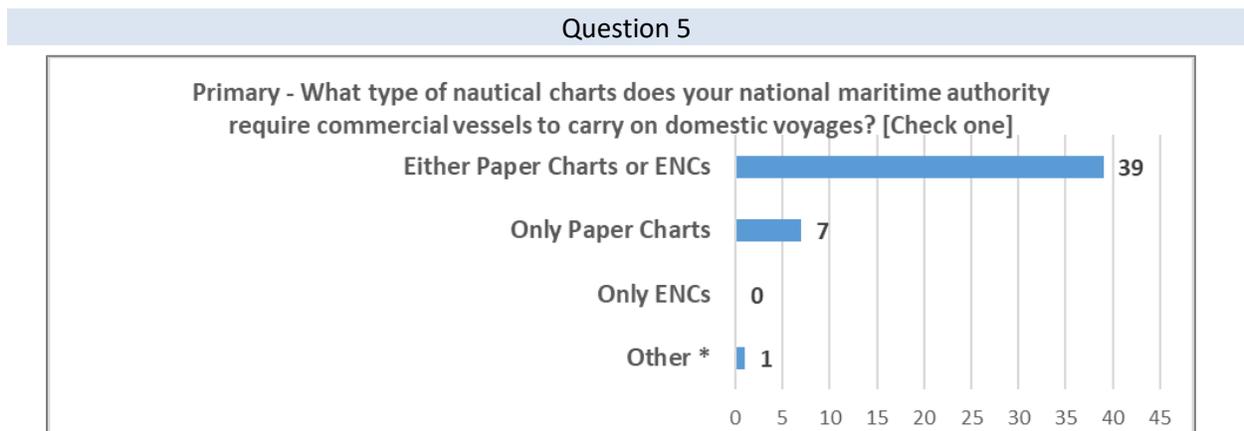


Figure 2.

\* One member state responded "ENCs and Paper Charts."

## Question 6

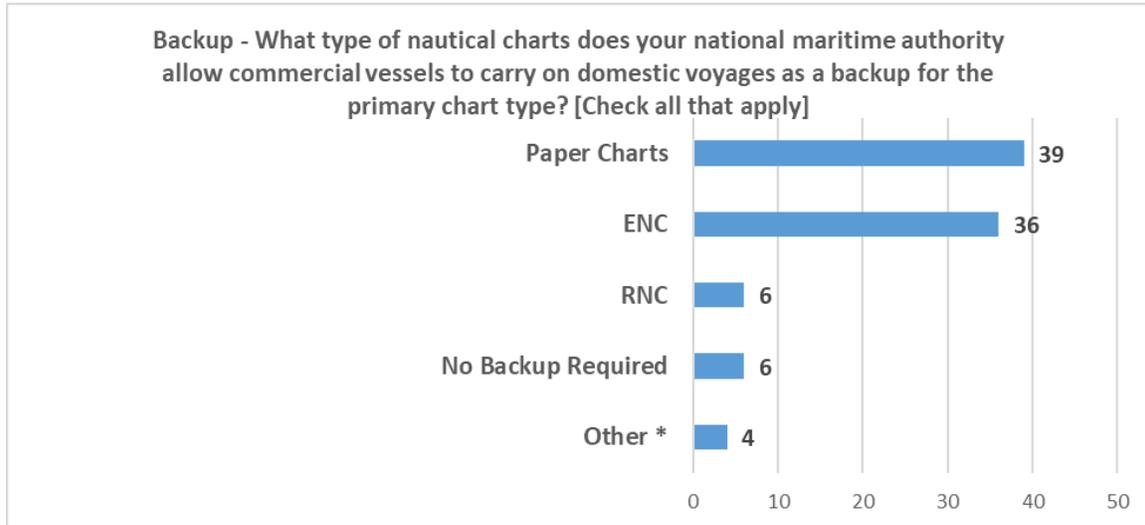


Figure 3.

\* Four member states provided the additional "Other" chart types, shown in Table 2, that are accepted as backups.

Member State	"Other" item in addition to the chart options identified as acceptable backups
Croatia	No backup required if use Paper Charts as primary chart type. If use ENCs then it can be other independent ECDIS or Appropriate Paper Charts (APC)
Malaysia	[Also] Electronic Chart System (ECS) - Driven Product
Mauritius	When ECDIS is being used, can be either paper chart or another independent electronic system.
Portugal	IAW SOLAS Chapter V/19 and IMO resolutions MSC. 232(82)/MSC.64(67) annex 5 and MSC.86(70)

Table 2

## 2.2 Backup Chart Development

### 2.2.1 Backup Charts

Information about any existing or development plans for a "fit for purpose" paper chart to be used as a backup. (Ref FPNC 2.3.a)

Question 7

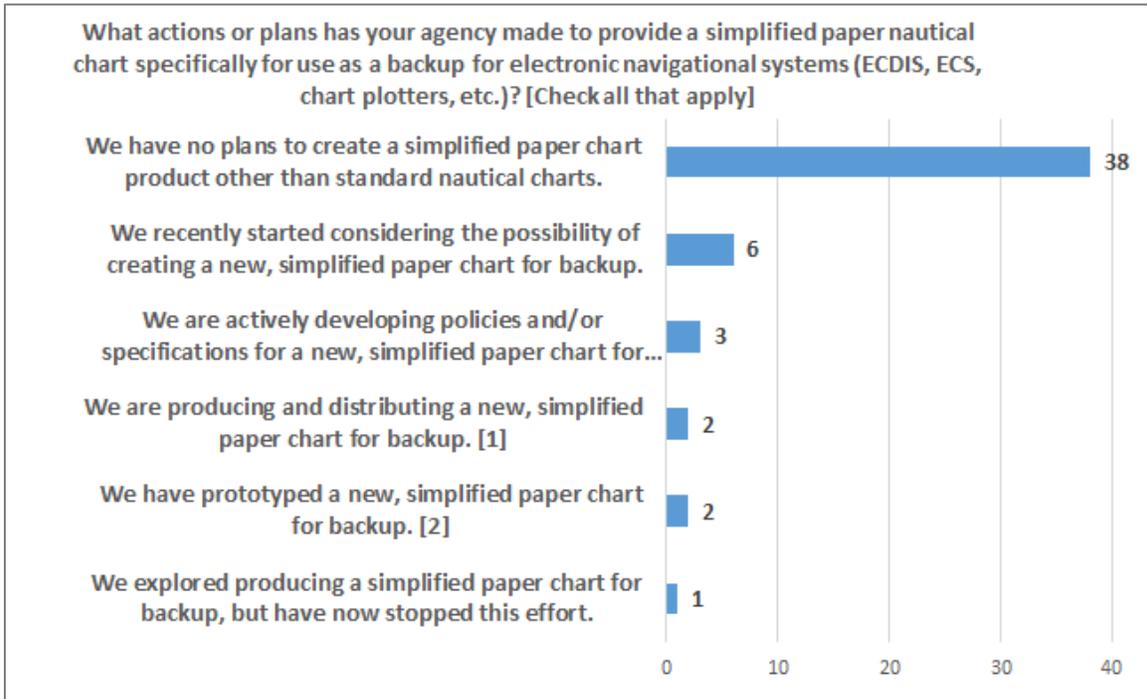


Figure 4.

[1] Colombia, Germany  
 [2] Canada, United States

Question 8.

Is your agency doing any other activities related to development of any product to be used as a backup for electronic navigational systems?

Australia	<p>a) We suggested a new definition for 'backup chart'. Refer to paper HSSC11-05.4F.</p> <p>b) To assist in the burden of paper chart production and maintenance the AHO has initiated a review process intended to permanently cancel excess paper charts in ports and coastal areas where the Electronic Navigation Charts (ENC) provide detailed coverage at a larger scale. The review process is based upon:</p> <ul style="list-style-type: none"> <li>- Overall demand for ENC is five times greater than for paper charts, with that difference increasing annually.</li> <li>- Paper charts used as a back-up for ECDIS equipped vessels should provide sufficient coverage and detail to enable a vessel to proceed to an anchorage or pilot boarding ground for subsequent guidance into port.</li> <li>- Vessels not subject to pilotage requirements, such as domestic commercial vessels, do not require the same level of large scale detail as larger vessels, but still benefit from charts of adequate scale covering the overall pilotage area.</li> <li>- This involves retaining the smaller scale chart product but migrating key information not previously displayed at that scale level and referring to areas covered at larger scale by ENCs only (use of a Chart note and associated reference on the face of the chart).</li> </ul> <p>c) We are looking into NOAA's online 'Chart on demand' solution (by ESRI) as a possible solution to support non-commercial vessels</p>
Suriname	If ENC is considered as primary, the paper chart should be the backup.

Malta	In respect of paper charts and nautical obligations, we meet our obligations through a bilateral agreement with UKHO.
Croatia	Not at the moment, but we are aware of the situation (indication in the national regulations and IHO activities regarding their views on the future of paper charts). Being aware is an initial phase for further consideration and corresponding activities.
United Kingdom	UKHO had developed a get-you-home folio which could be used as back-up for ECDIS failing, this has not been actively pursued since the prototype was proposed. It could not be confirmed if this concept would adequately meet the user requirement.

Table 3

## 2.3 Chart Production System

### 2.3.1 Information about the use of a single production system for maintaining both ENC and paper chart nautical products.

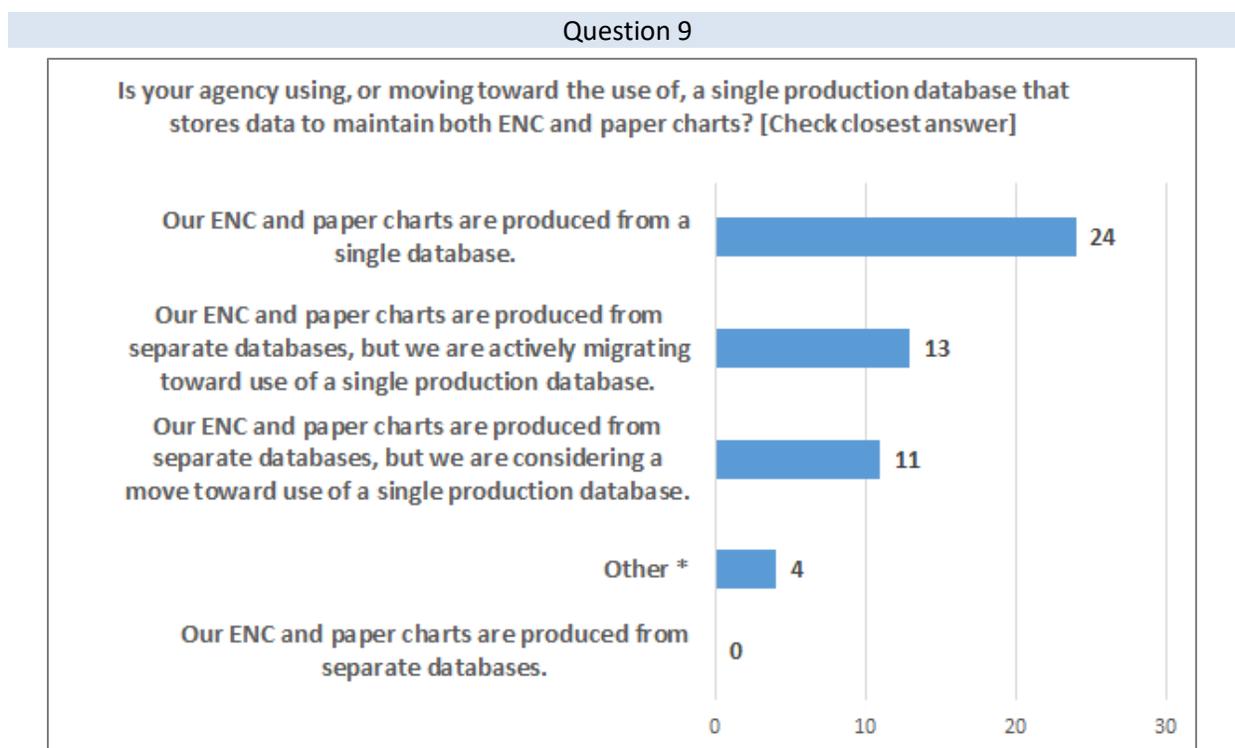


Figure 5.

\* Four member states provided the "Other" responses shown in Table 4.

Brazil	Currently, some ENC cells and paper charts are produced from a single database, while others are still based on single files. Brazil is still migrating towards the use of a single production database. [Also tallied among the 13 "... actively migrating toward ..." in Figure 5.]
Cyprus	Our nautical publications are produced by UKHO. In the future we intend to produce both ENCs and charts from a single database [Also tallied among the 11 "... considering a move toward ..." in Figure 5.]
Malta	Malta HO has only ENC production and maintenance capabilities.

United Kingdom	Our ENC and paper charts are produced from a single database, for all home waters and areas of primary responsibility. [Also tallied among the 24 "... produced from a single database ..." in Figure 5.]
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Table 4

Question 10

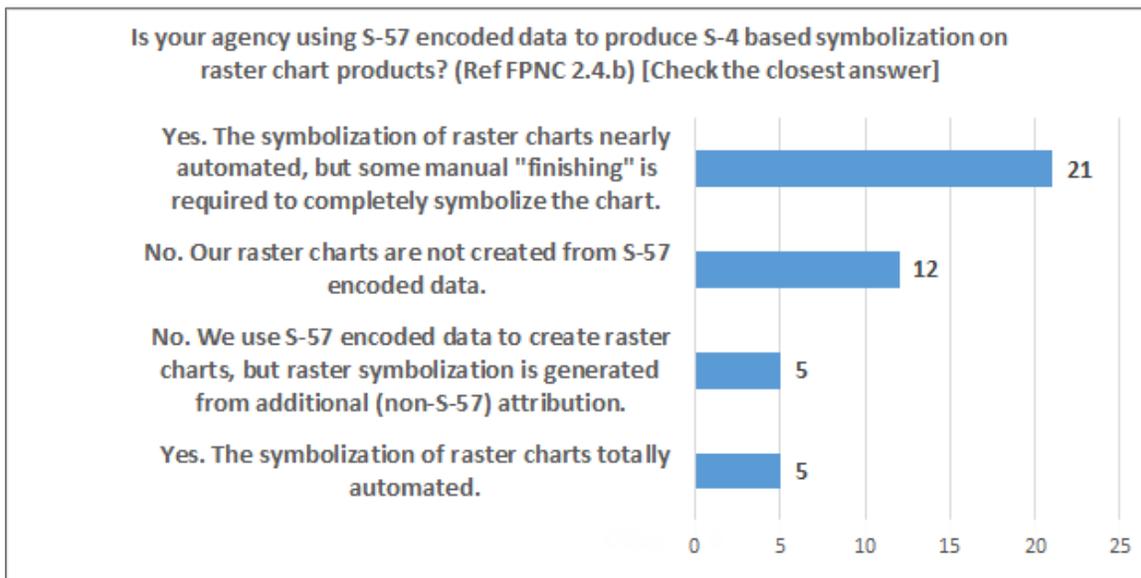


Figure 6.

## 2.4 Distribution of Paper Nautical Charts

### 2.4.1 Paper Nautical Chart Sales

Information about sales of paper nautical charts between 2008 and 2018. This section asks about pre-printed stocking of paper nautical charts and Print-on-Demand (POD) distribution methods.

Ten years paper chart and ENC sales numbers were aggregated to produce the graphs shown in sections 2.4 and 2.5. The intent of this portion of the survey was to get an idea of the current state and trends of the production and use of paper charts and ENCs. This goal has clearly been achieved as the trends portrayed in the graphs are unmistakable:

- Reported sales of ENCs surpassed those for paper nautical charts in 2009.
- Reported sales from 2008 to 2018 show the following
  - ENC sales increased by 766%
  - Paper chart sales decreased by 52%
  - Paper charts reproduced in large press runs decreased by 32%
  - Paper charts reproduced by print-on-demand methods increased by 217%

**Note these caveats to understanding the aggregated chart and ENC sales shown in section 2.4 and 2.5.**

- Not every chart and ENC producing nation responded to the survey (see Section 1.1)
- Not every survey respondent provided paper chart sales numbers. These were:

Canada <sup>1</sup>	Tunisia	Venezuela
Germany <sup>2</sup>	Ukraine	
Russian Federation	United Kingdom <sup>3</sup>	
- Not every survey respondent provided ENC sales numbers. These were:

Bangladesh	Russian Federation	United Kingdom <sup>5</sup>
Germany <sup>4</sup>	Tunisia	Venezuela
Oman	Ukraine	
- Some countries explicitly noted distributions to military and other government users as part of their "sales." It is likely that other countries did so as well without noting so. These distributions were included in the aggregated sales shown in the graphs.
- The United States reported paper charts distributions to military and other government users in each of five years, 130 623 (2014), 136 330 (2015), 129 104 (2016), 165 977 (2017), and 160 012 (2018). However, many of these charts are categorized as "Limited Distribution" and not available for public sale. These chart distributions were not included in the aggregated sales shown in the graphs.
- As do most other ENC producing nations, the United States distributes its ENCs through a Regional ENC Coordination Centre (RENC), but it also enables free downloads of all US ENCs from the NOAA website. Only the ENCs distributed through the RENC were tallied in the aggregated sales shown in the graphs.

<sup>1</sup> Canada only provided POD chart sales for 2017-2018 and did not provide any bulk chart sales numbers.

<sup>2</sup> Germany did not provide bulk or POD chart sales, but stated that all paper chart sales decreased by 81.5% from 2008 to 2018.

<sup>3</sup> The UK did not provide bulk or POD chart sales, but stated that while POD sales increased by 41% from 2008 to 2018, overall paper chart sales decreased by 52% during the same period.

<sup>4</sup> Germany did not provide ENC sales, but stated that ENC sales increased by 45% from 2008 to 2018.

<sup>5</sup> The UK did not provide ENC sales, but stated that ENC sales increased by 1461% from 2008 to 2018.

Question 11.

What methods do you use for stocking and distributing your paper nautical charts? (Ref FPNC 2.4.c)

This question was meant to determine the *current* method(s) of paper chart reproduction in use by each member state. Member states were provided with two options (plus "Other") to select an answer from, and were prompted to "Check all that apply." The options were:

Large stocks of charts are printed in advance and stored for distribution

Single charts, or small quantities, of charts are printed or plotted as orders are received

Many hydrographic offices use both methods, or are in a transition from one to the other. Thus, the results are portrayed in a pie chart in Figure 7 that shows HO's using "Large Stock" or "Bulk" printing in blue, HO's using "Small Quantity" or POD printing in yellow, and HO's that use both in green.

Several of the "Other" responses clearly inferred use of either one method or the other, or both. Thus, eleven of the "Other" responses were categorized as POD, Bulk, or POD & Bulk, as shown below, for the purpose of their inclusion in the Figure 7. Three remaining "Other" responses were left as "Other" and are not included in the pie chart.

Pie Chart Category	"Other" entry
POD	Generally a print-to-order service is provided, when high selling charts are printed additional small quantities are produced to satisfy anticipated customer demand.
POD	Print on Demand
POD	Single charts, or small quantities, of charts are printed or plotted as orders are received. Print on demand
POD	Distributed directly to end-users via distributors.
POD & Bulk	Large stocks of charts are printed in advance and stored for distribution. Single charts, or small quantities, of charts are printed or plotted as orders are received. As info only: For 2018 91.8 % pre-printed, 8.2 % Printed on Demand
POD & Bulk	Large stocks of charts are printed in advance and stored for distribution. Single charts, or small quantities, of charts are printed or plotted as orders are received. Large stock for new editions to meet initial market demand.
POD & Bulk	Large stocks of charts are printed in advance and stored for distribution. When out of stock, the charts are plotted [as orders] are received.
POD & Bulk	We still keep large stocks of charts printed in advance for quick demand. At same time, print small quantities for online order which need latest correction.
Bulk	Number of copies printed based on annual consumption and distributed through chart agents.
Bulk	Since, India is the Primary Charting Authority for Mauritius, charts are demanded from India and stocked up at the Cartography Section of the Ministry of Housing and Lands, Mauritius.
Bulk	Reasonable amount of charts is printed according to need and stocked for distribution. Reprints are ordered when necessary.
-	At present, we are not distributing our paper nautical charts
-	The HO has Bilateral Agreement with UKHO for paper chart production.
-	We do not print paper charts

Table 5

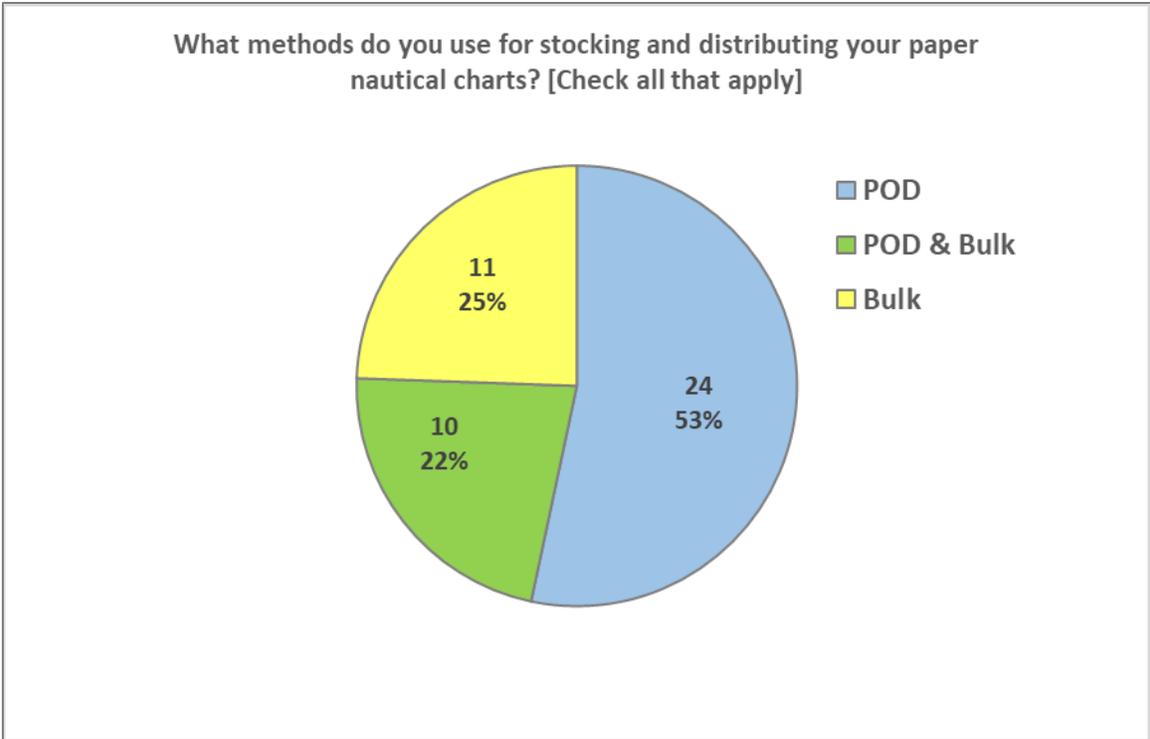


Figure 7.

Questions 13 – 23 and 24 – 34  
 Sales of [bulk / large press runs] "pre-printed" paper charts for years 2008-2018  
 Sales of "print on demand" [POD] paper charts for years 2008-2018

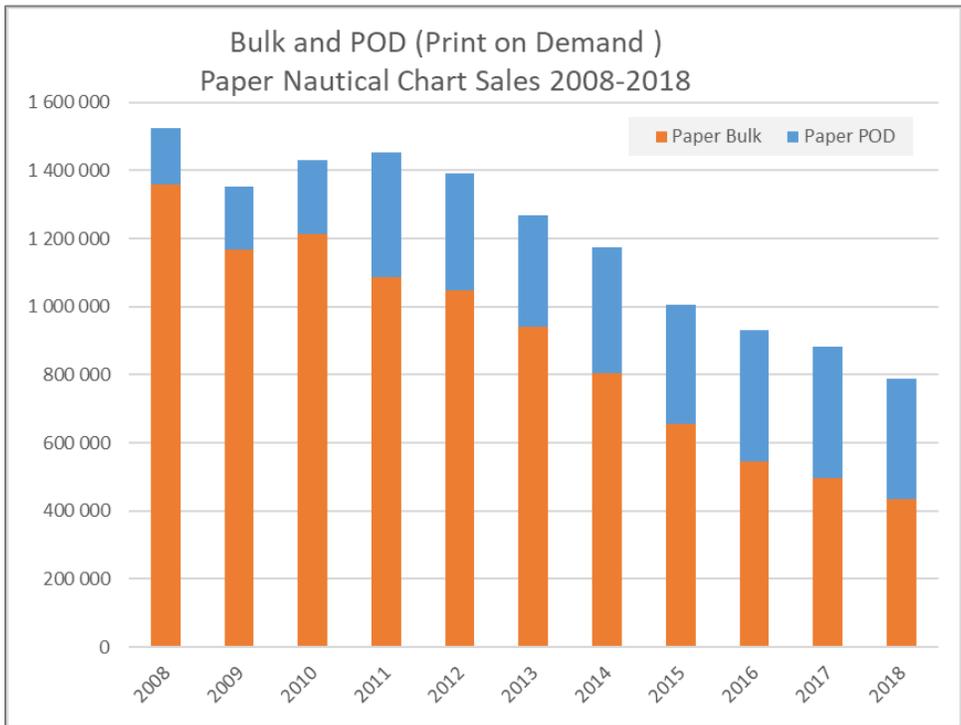


Figure 8.

Reported paper chart sales fell from 1 523 048 in 2008 to 789 207 in 2018, a drop by almost half.

The ratio of the number of paper charts reported to be reproduced in large press runs verses those created by print-on-demand methods steadily decreased from 2008 to 2018. This can be seen clearly in Table 6 and Figure 9.

Reproduction Method	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Bulk	89%	86%	85%	75%	75%	74%	68%	65%	58%	56%	55%
PoD	11%	14%	15%	25%	25%	26%	32%	35%	42%	44%	45%

Table 6

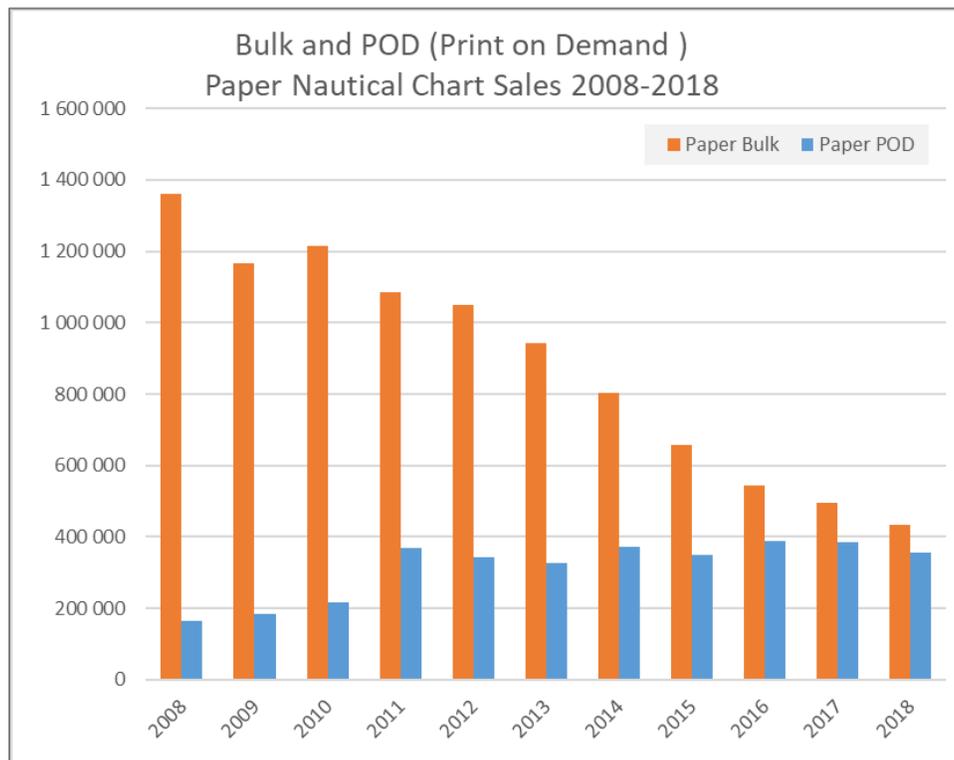


Figure 9.

## 2.5 Provide ENC Sales Data

### Question 36

ENC usage can be counted in several ways.

Please indicate the method that you are using to report ENC sales.

About two-thirds of member states count one ENC sale if an ENC is sold or licensed for use in any part of a year; about a third count ENC sales on a pro-rated basis, depending on the portion of the year for which each ENC is licensed.

For the purposes of the compiling the graphs showing ENC sales over the past decade, sales numbers from both methods of reporting were treated equally and added together to obtain a total of reported sales in each of the years 2008 through 2018. This approach was used to simplify the tasks of compiling and interpreting the survey data. As the goal of the chart and ENC sales questions was to determine general trends over time and not exact sales numbers, this approach provided good results. Obtaining

exact sales numbers is not possible, because several major providers of paper charts and ENC's declined to provide sales information by year.

### 2.5.1 ENC Sales

Information about sales of ENC cells between 2008 and 2018.

Questions 37 – 47  
Sales of Electronic Navigational Charts for years 2008-2018

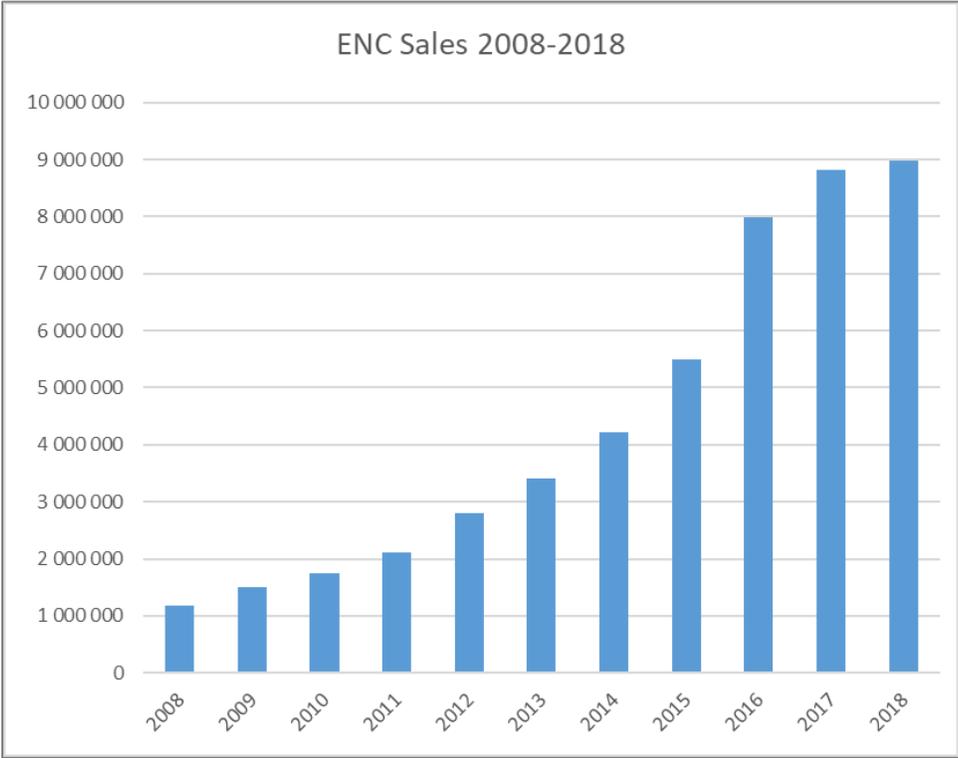


Figure 10.

Reported ENC sales increased from 1 171 585 in 2008 to 8 975 654 in 2018, nearly a seven-fold increase. Figure 11 shows the trends of paper chart and ENC sales in the same graph.

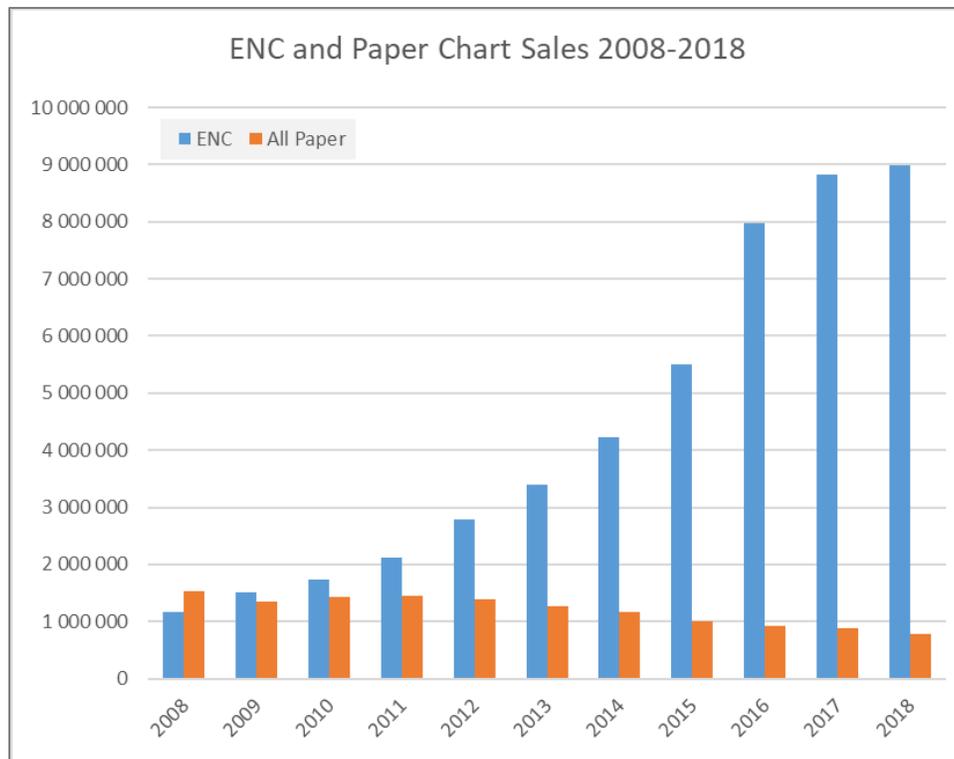


Figure 11.

## 2.6 Nautical Chart Types

### 2.6.1 Information about the relationship between your paper chart products, Raster Navigational Charts (RNCs), and Electronic Navigational Charts (ENCs) (Ref FPNC 25.c)

#### Question 48

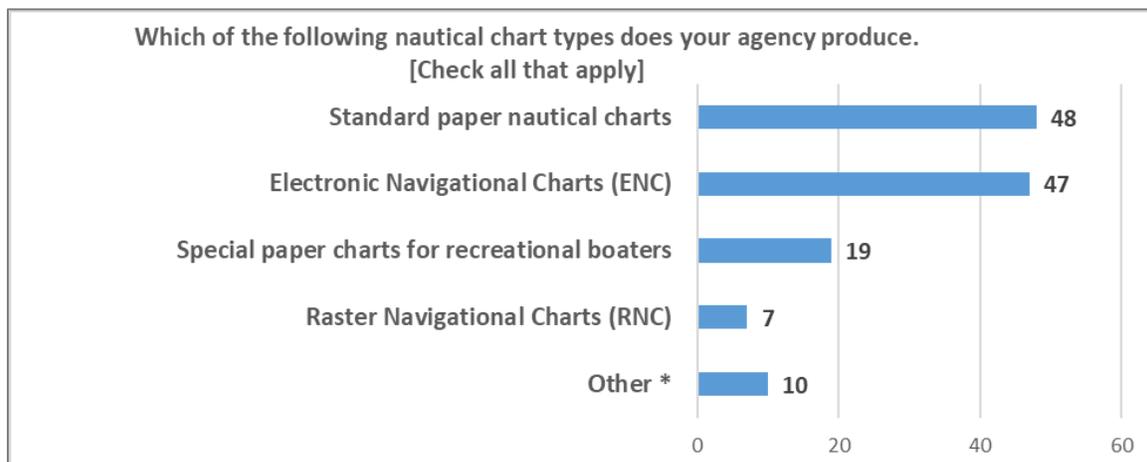


Figure 12

\* Ten member states provided the additional "Other" responses shown in Table 7.

Argentina	Croquis
Belgium	ECS for pilots, Inland ENC
Brazil	IENC in non-SOLAS rivers
Croatia	Thematic Charts

France	Up-to-date GeoTiffs, which can be used for navigation of leisure boats
Netherlands	Mariners Routeing Guide, Deep Draught Planning Guide
Portugal	Fishery Support Charts
Spain	Military Nautical Charts and AML
United Kingdom	Port Approach Guides, Mariners Routeing Guides, Routeing Charts, MagVar charts, Security Charts, Bespoke ENC's for cruise companies
United States	Digital Nautical Charts are produced by the US NGA

Table 7, Additional nautical chart types produced by some member states.

Brazil and Belgium noted that they produce Inland ENCs. The [Inland ENC Harmonization Group](#) reports in their [IENC Production Overview](#) that 55 629 km of IENC coverage has been produced by the countries listed in Table 8.

Australia	France	Russian Federation
Belgium	Germany	Serbia
Brazil	Hungary	Slovakia
Bulgaria	Luxembourg	Switzerland
China	Netherlands	Ukraine
Croatia	Poland	United States
Czech Republic	Romania	

Table 8, Countries producing IENC.

Although much of this survey is focused on "blue water" ocean navigation. It should be noted that a significant amount of some member states' efforts are devoted to supporting "brown water" navigation. Brazil, for example, reports that 59% of its paper chart production effort is focused on non-SOLAS riverine areas.

Question 49 What products or services does your agency provide specifically for recreational boaters?	
Argentina	Special Paper Chart
Australia	Nil. Products such as 'Boating charts' or 'Beacon to Beacon guides' are compiled by some State government agencies
Bangladesh	No demands from recreational boaters.
Belgium	Production of small craft paper charts
Brazil	Raster Navigational Charts (RNC).
Canada	Small craft charts and atlases. CHS is in the process of reviewing and rationalizing this portfolio
Chile	None
Colombia	Nautical and tourist Guides of Colombia review
Croatia	Paper charts: One folio consisting of 29 A2-sized charts
Cuba	Yachting charts (8 Albums)
Cyprus	none
Estonia	We provide gpx format coordinates for shipping routes and produce 4 chart albums
Finland	Chart folios and special yachting charts. Atlases cover nearly all sea areas and major lakes. Yachting charts are available from some lakes. Both have content and portrayal nearly identical with standard nautical charts. Only format differs.

France	Folded charts printed on special paper (cartes L). Customized compilation of nautical products in an area (Sailing directions, List of Lights, Tides predictions, but no charts: NautiShom). refer to <a href="https://diffusion.shom.fr/loisirs/">https://diffusion.shom.fr/loisirs/</a>
Greece	Nautilus Charts Android application.
Iceland	None
India	NIL
Italy	Print on demand service: Charts for recreational boaters are updated and printed every 2 weeks
Japan	We do not have any products and services primarily geared toward recreational boaters for now. However, some of the Japanese private sectors definitely offer the yachting chart and the electronic reference chart to that user segment.
Korea, Republic of	Small craft charts and yacht charts
Malaysia	Malaysia did not have any demand for recreational boaters yet. We only produce standard paper nautical charts.
Malta	Malta does not have any products for recreational services at the moment.
Mauritius	NIL
Mexico	Paper chart and raster chart, we also have agreements with Jeppesen maritime and EVG OceanGrafix and Indumar UKHO
Netherlands	Small commercial vessels and leisure craft usually use the 1800-Series (8 atlases). These official charts cover all of the Dutch coast and major inland waters.
Norway	Nothing
Oman	Oman Maritime Book
Peru	None
Poland	Small Craft Charts
Portugal	Recreational and inland charts; wave forecast; publications.
Romania	No products or services
Russian Federation	Not produce
Singapore	Electronic Chart Systems (ECS)
South Africa	Small craft charts which includes large scale inset panels of small harbours, sailing directions and facilities diagram; Charts for Inland Waters (Dams)
Suriname	IC-ENC VAR services
Sweden	Small craft charts and S-57 licenses
Thailand	None
Tunisia	Standard paper nautical charts; Electronic navigational charts (ENC)
Ukraine	Albums of Nautical Charts - Navigational and Hydrographic Overviews
United Kingdom	Admiralty Leisure Folios
United States	Some "small craft" charts are produced, but these are being phased out in favour of standard nautical charts.

Table 9

## 2.7 Future Products

### Question 50

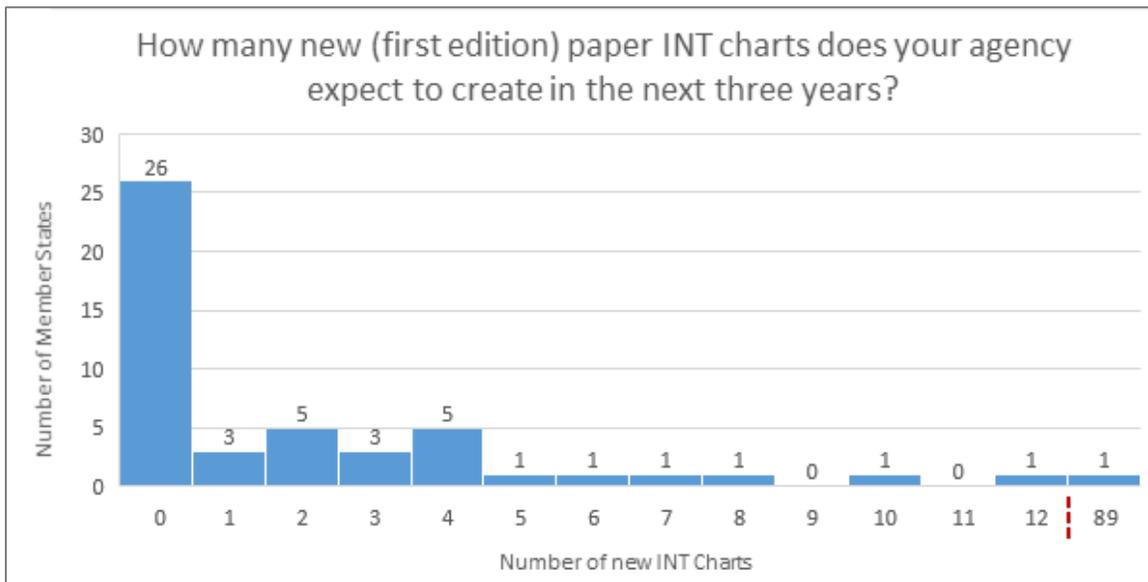


Figure 13

Twenty-six member states either provided no answer or stated that they planned on making no new INT charts in the next three years. All responses are shown in Annex B and are summarized in Figure 13. If a range was provided (e.g., "2-3 charts") the higher value was used in the graph above.

### Question 51

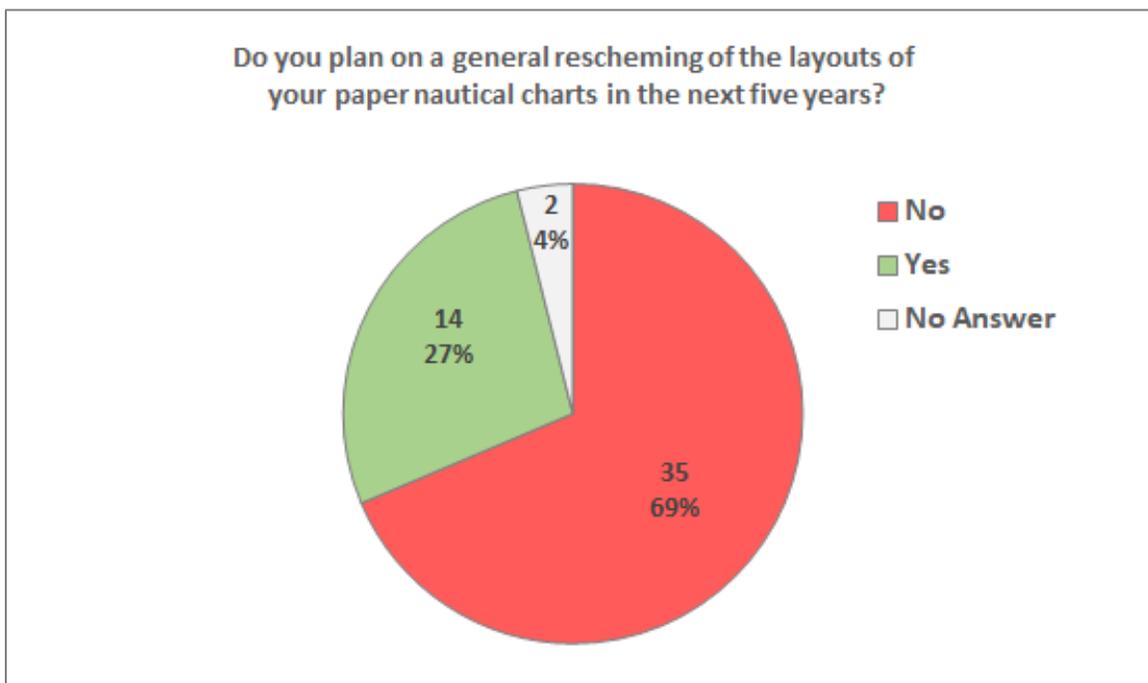


Figure 14

Question 52	
If rescheming paper nautical charts is planned, please explain the rational for rescheming (to better align with ENC coverage and scales, reduction in raster chart coverage, etc.)	
Answered "Yes" to Question 51	
Argentina	To better align with ENC coverage and scales
Canada	CHS is moving to a gridded scheme for ENCs and will be re-aligning paper charts to be auto-generated from S-57 ENCs. This will also aid in the rationalization of the CHS portfolio to a rule of a maximum of 3 coverages per geographic area.
Cyprus	Maintain the basic schema of ENCs, and all other products shall be produced based on the ENC database
Iran	Our Paper Charts will be aligned with already produced ENCs
Japan	We are looking at making paper chart lineups even more selective from its coverage perspective for every charts from wider area to detailed version. We really look to do this because there still seems many overlapped parts of the coverage caused by more than two distinct charts so we definitely work on it for making overall chart coverage less messy and more optimized for every its end user.
Korea, Republic of	To make better data with ENC scales
Mauritius	In order to have a better coverage of Nautical products within the EEZ of Mauritius.
Mexico	For larger scale charts, cover with approximation use and only obtain a portulan or mooring chart, that is, two charts in some cases depending on the importance of the port covering it with only a chart of portulano use, aligned to the paper scale.
Netherlands	Further optimization, reduce overlaps
Portugal	Reduction of redundant coverage; Cancel national charts where INT chart exists; create special maps/charts for low usage areas/harbours without relevant navigation and cancel existing nautical charts, namely, in areas where maintaining update information is unpractical
Spain	To better align with ENC coverage and scales
Thailand	1. Base of updating paper chart and ENC in Thai waters. 2. To be both of paper chart and ENC have the same limit and scale.
United Kingdom	To better align with ENC coverage and scales, reduction in raster chart coverage Rationalising coverage, reducing maintenance of the paper products.
Venezuela	There are information gaps identified by the CHR
Answered "No" to Question 51	
Colombia	Not [rescheming], the scales of papers charts and ENC are different
Croatia	There is a need for partial re-scheming to better align with ENC coverage and scale and reduction in the number of paper charts.
Malaysia	Rescheming is required when there is extension or new construction of berth, jetty and other conspicuous structure that need new scheme to help the user to navigate safely.
Russian Federation	We don't have plan [to rescheme]

Table 10

Question 53

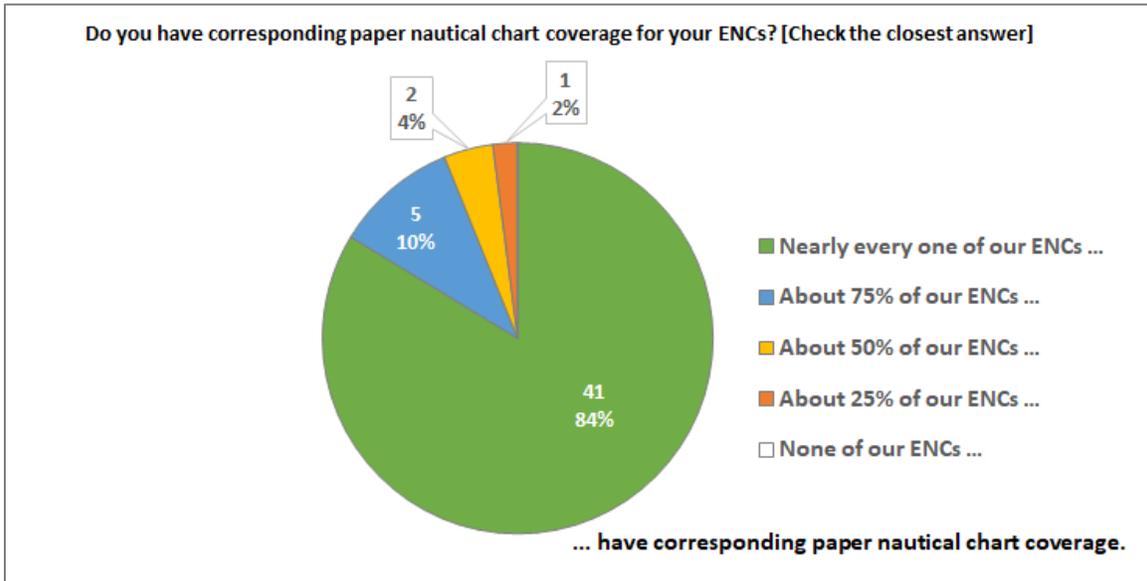


Figure 15

Question 54

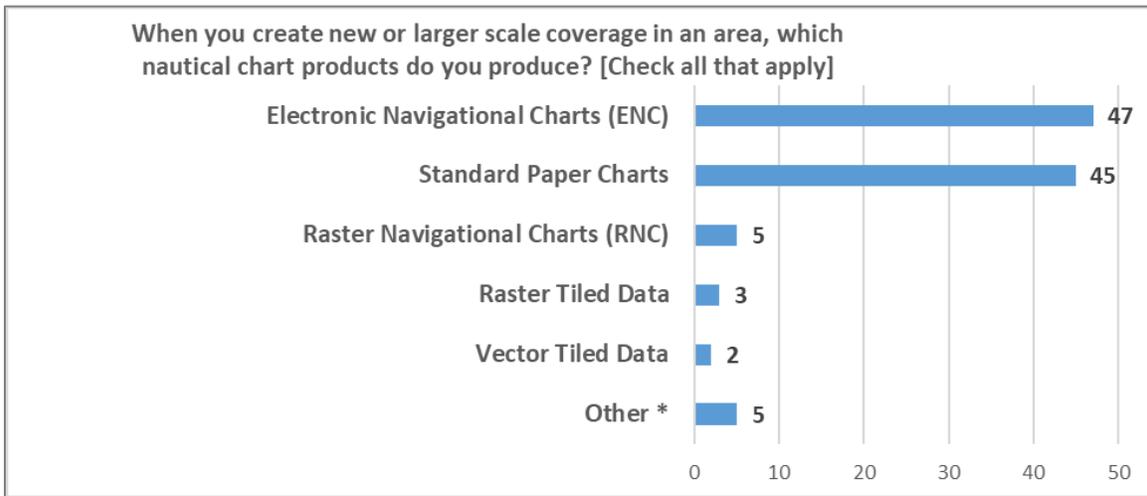


Figure 16

\* Five member states provided the additional "Other" responses shown in Table 11.

Brazil	IENC in non-SOLAS rivers
Estonia	Berthing and harbour coverage for chart albums for recreational boaters
Suriname	Small Craft Charts
United Kingdom	New ENC coverage does not automatically generate equivalent paper charts (but all safety critical data is provided to the mariner).

United States	The US NOAA no longer creates any new, first edition paper or raster nautical charts, only ENC data when new or larger scale coverage is needed. The US NGA continues to create both ENC data and new standard paper nautical charts. [Figure 16 only includes ENC data for the US.]
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Table 11, Additional nautical chart types produced by some member states.

### Question 55

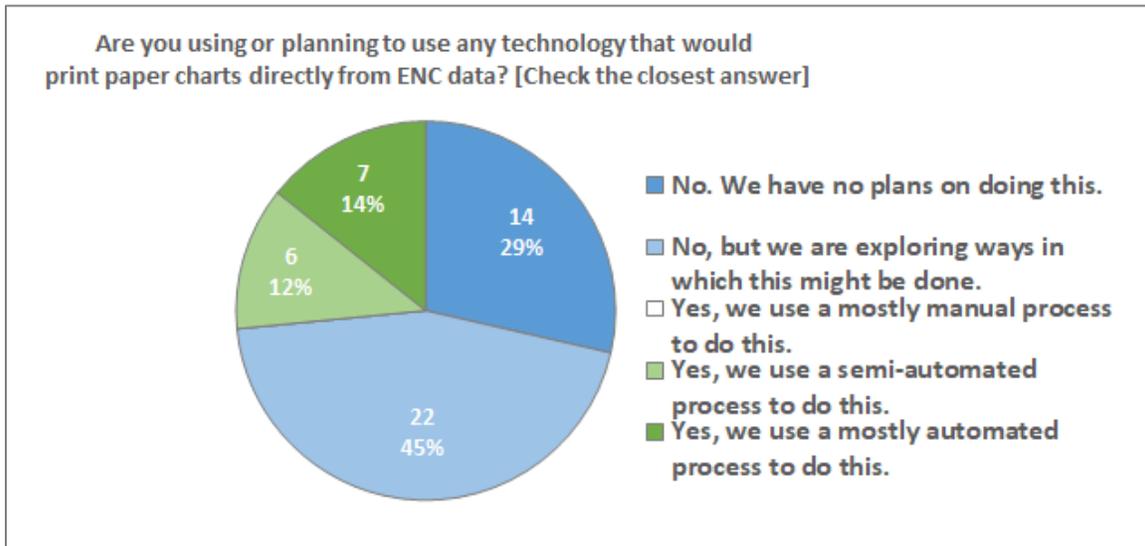


Figure 17

### Question 56

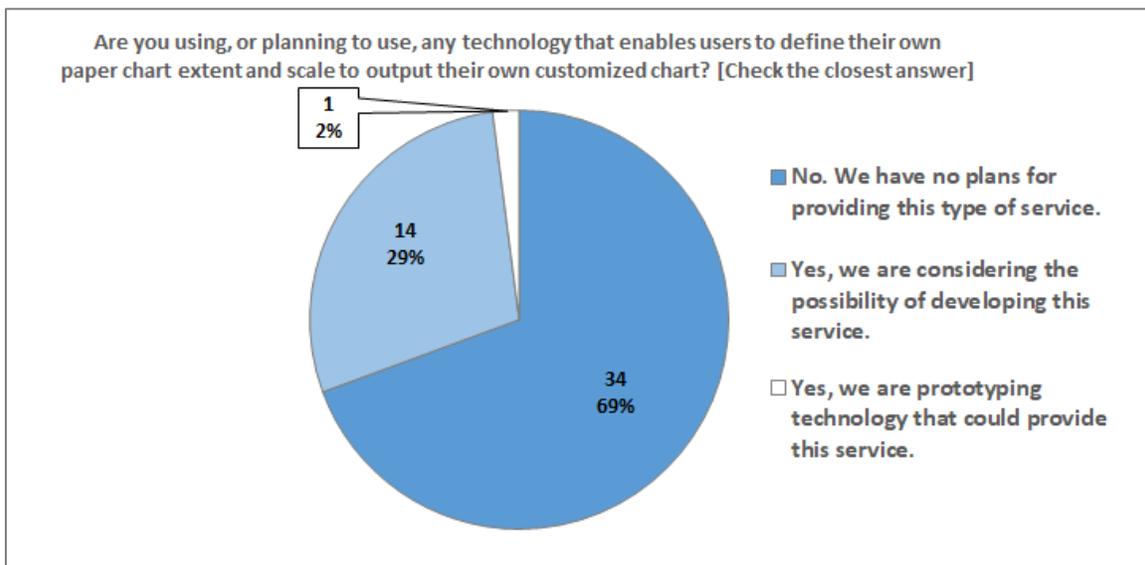


Figure 18

## 2.8 Impact of Change

### 2.8.1 Assessment of the potential impacts of a world without paper nautical charts.

Question 57

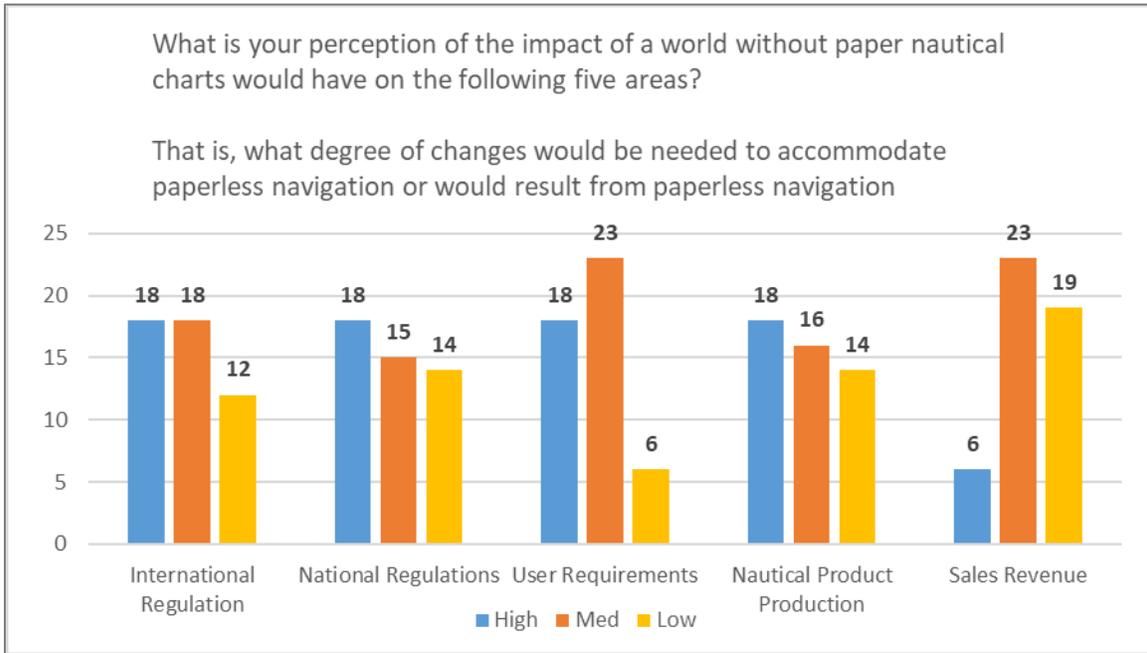


Figure 19

Question 58

What types of changes in your maritime national regulations would be required to enable the disuse of paper nautical charts?

Argentina	High changes will be necessary
Australia	Minor changes to the Navigation Act 2012 in subsection 224 to clear up reference to type of nautical charts needed for carriage. The Navigation Act requires use of official charts, whether ENC or paper. Of the two types, it is SOLAS that drives a legacy view of paper charts and infers a level of detail within them that already differs from practical experience. This inference arises from the combination of several separate clauses.
Bahrain	New laws to allow for paperless navigation.
Bangladesh	Maritime national regulations are required to be amended accordingly to ensure the strict compliance of using ENC for International voyage. But the backup arrangement of simplified paper charts are to be ensured by all ships.
Belgium	There will be a need to adjust the current Belgian legislation.
Brazil	Update chart carriage regulations for Brazilian jurisdictional waters and ports; Update the ECS carriage national regulations for some ship classes; Update national training regulations in navigation on some ship classes for mariners.
Canada	National regulations will need to recognize digital representations of the official navigational product i.e. the ENC, as backups in different media such as tablets or stand-alone laptops. Currently, in Canada, ECSs are not officially accepted as primary or back-up systems for navigation.
Chile	
Colombia	anyone

Croatia	Reviewing and amending the existing Maritime Law and other related regulations and guidelines,
Cuba	
Cyprus	Minor changes on regulations
Ecuador	
Estonia	Changes in different national regulations related to use of paper chart
Finland	Ship voyage planning regulations should be renewed and extended to small vessels. Chart plotters should be authorized as proper navigational charts. This would require significant changes in chart plotter update mechanism and production chain.
France	None, as it is already possible to navigate without any paper chart.
Germany	
Greece	The regulations are set by the Ministry of Mercantile Marine and Island Policy.
Iceland	
India	The regulations for Indian flag shipping would be promulgated by DG Shipping, Ministry of Shipping, Govt. of India based on IMO regulations.
Indonesia	None
Iran	Considering the software and hardware needs, this subject should be carry out by Iranian Maritime Administration, of course with the cooperation of Iranian ship owners and shipping companies.
Italy	
Japan	Some of the official notifications have had specific paper chart names and numbers explicitly. Therefore we think there would have to be a definition which can bring clarity on how this sort of notifications should be essentially well suited.
Korea, Republic of	No specific comment
Malaysia	No change is required since we follow international regulation (SOLAS Chapter V) for national laws.
Malta	Such changes would be in the form of an amendment to our subsidiary legislation and/or code of practice.
Mauritius	The maritime national regulations are promulgated by the shipping Division under the Ministry of Ocean Economy Marine Resources Fisheries and Shipping based on the regulations promulgated by IMO.
Mexico	A) Laws and regulations b) Ships of certain size it could be mandatory c) Fishermen could be the exception (little boats) d) Production of digital charts in all the formats by national maritime authority
Netherlands	Required changes to national regulations would be few, as NL regulations already allow paperless navigation. Paper is allowed as a back-up. If paper would cease to exist, this would only mean that description of back up facilities would have to change.
Norway	Minor changes.
Oman	
Peru	It would be necessary a change on a National Decree which approves the regulation that or flag ships must have paper charts

Poland	If the IMO regulations are put into practice, the national maritime regulations will have to be amended. In Poland, the Ministry of Marine Industries and Inland Navigation is responsible for introducing these amendments.
Portugal	IAW SOLAS CHANGES
Romania	Laws for the implementation of law 395 of October 11, 2004 on maritime hydrographic activity should be promoted and approved.
Russian Federation	Changing of the national laws
Singapore	Nil.
South Africa	
Spain	none
Suriname	Our national regulations refers to the requirements of SOLAS as reference for official charts.
Sweden	The use of paper charts must then be prohibited for navigation.
Thailand	Regulation of SOLAS Convention should be enabled the disuse of paper nautical charts.
Tunisia	The Tunisian maritime regulation deals usually with IMO regulations and recommendations
Turkey	
Ukraine	The issue is out of the SHSU competence.
United Kingdom	No change is required to specific regulations to enable a Future without Paper Charts, as SOLAS Chapter V and national laws are written at a sufficiently high level to avoid mentioning specific products. However, changes would be required to IMO recommendations and national guidelines for all sizes of vessels where specifics are currently mentioned. That is, where paper or raster charts are specifically cited, as opposed to the more generic terms "chart" or "nautical chart," which are used in some regulations and are commonly understood to include both paper and digital (raster and vector) nautical charts. Adapting these existing regulations and guidance for use on ENCs will require action from national maritime administrations, which are often distinct from Hydrographic Offices.
United States	The US Coast Guard already allows commercial vessels to use ENCs. However, adjustments would have to be made to the way Notices to Mariners were written, as many of the notifications (not just chart corrections) make references to particular chart numbers.

Table 12

## 2.9 Additional Comments

59. Are there any other comments that you would like to add regarding the future of the paper nautical chart?

Twenty-four countries provided additional comments at the end of the survey. Of these, 16 indicated either a continuing need for paper charts, such as for recreational boaters, small fishing or trading vessels, or riverine traffic; or a desire for paper charts to be maintained as a back up for ECDIS or ECS. A few other member states strongly endorsed a complete transition to ENCs.

The Future of the Paper Chart Survey did not ask member states directly to indicate a preference for or against the continued use of paper charts. Thus, these comments should not be considered as a "vote" for or against the future of paper charts in general, but as an indication of needs shaped by local circumstances.

All "additional comments" are shown below. Some responses have been lightly edited to correct typos.

IHO Member State	Are there any other comments that you would like to add regarding the future of the paper nautical chart?
Argentina	<p>As regards the printing of paper nautical charts, we consider it is most necessary to continue to create new editions, without the possibility of derogation. People sailing for recreational purposes or practicing artisan fishing are a mere example of users who, for the performance of their activities, either occupational or recreational, rely in the paper chart production being printed by our service. Another qualified user is warships that must carry paper nautical charts as a last resort to a collapse of electronic systems on board.</p>
Australia	<p>The AHO presented a paper at HSSC11 (HSSC11-05.4F) proposing the development of a new S-100 Product Specification to support a new looking 'official' paper chart automatically derived from S-101 data. The purpose of this new product would be to serve as backup (under a new definition proposed in the same paper) of ECDIS and not to be used as the principal means of navigation.</p> <p>Differences in symbology must be addressed - future navigators and mariners familiar with only ENC symbology will struggle with unfamiliar paper chart symbology. If the switch back to paper charts is because they have been forced to use backup arrangements, they are likely to be under time pressure, and therefore unlikely to have time to refer to symbology guides.</p> <p>PLEASE NOTE: The following comments are applicable to our response to questions 13 - 23: These figures include sales of Australian charts plus Papua New Guinea charts (which AHO published as Primary Charting Authority) and sold as AUS charts.</p> <p>PLEASE NOTE: The following comments are applicable to our response to questions 24 - 34: These figures include sales of Australian charts plus charts which AHO publishes as Primary Charting Authority: Papua New Guinea charts (from 2008) sold as AUS charts and Solomon Islands charts (from 2017) sold as SLB charts. The total does not include printing of charts adopted by the UKHO.</p>
Bangladesh	<p>Before ensuring a world without paper nautical charts, ENCs of all national and INT series charts are to be ensured by all the member countries of IHO. Back-up arrangement of simplified paper charts are to be ensured as carriage requirement at sea and for domestic voyage.</p>
Brazil	<p>59% of the Brazilian paper chart production effort is focused on non-SOLAS riverine areas. Therefore, at the moment, Brazil will continue to produce nautical charts in order to meet the mariners' demand for this type of product in inland waters.</p>
Colombia	<p>Currently, not all users have ECDIS in their ships. So, they must use the paper charts.</p>

Croatia	<p>1. It is important to understand that the pace of technology development is much quicker than the charting authority and user community can keep up with. Some negative consequences of that disharmony are visible in the case of ECDIS and ENC. Even though the period of ENC/ECDIS implementation has ended, there are still some problems regarding ENC/ECDIS which should have been fully eliminated before mandating them as primary navigational aids.</p> <p>2. Making distinction and the existence of differences between professional and recreational mariners / users of navigational charts, that in fact come from the SOLAS Convention, brought a huge problem in regulating chart requirements for non-SOLAS ships, particularly for yachts and recreational boats.</p> <p>If safety of life at sea depends among others on the quality of navigational charts and publications, the question arises why regulations (INT and National) make a difference between safety of life on big and small ships, even though all can be equally endangered if using lower-quality and less reliable unofficial navigational charts and publications, whether paper or electronic. In that sense, one could argue that it would be worthwhile to consider introducing in INT regulations or guidelines the relevant provision on mandatory carriage of official navigational publications for non-SOLAS vessels, especially yachts and boats. This is supported by the fact that good ENC coverage has been achieved for all navigation areas, including those for non-SOLAS vessels, yachts and boats. Mandatory use of ENCs in ECS or simplified ECDIS could be a good and quality solution. In that case, other alternative mentioned options regarding the requirement for availability of customized paper charts would be more likely and acceptable to both national HOs and users.</p>
Cyprus	<p>Cyprus, with the exception of international shipping, has a minor domestic maritime sector covering mostly tourism. Apart from that, there is an increasing need of recreational use for charts. Cyprus, for the time being, covers its charting obligations through bilateral agreements with UKHO. In the next few years we intend on taking over the responsibility of producing our own ENCs. We shall maintain a whole ENC coverage that covers all the demands of the mariners. All interested parties, with the exception of international shipping, shall buy services online.</p>
Ecuador	<p>Nautical Paper Charts should be maintained as a security measure in the event that the ship's energy is damaged in order to safeguard human life at sea.</p>
France	<p>Comment on question 56: As for "chart-on-demand", SHOM provides a service in which a user can create and print his own customized chart (with added information), based on our raster-tiled data for instance (cf. <a href="https://data.shom.fr/dessin">https://data.shom.fr/dessin</a>), but not for navigation purposes.</p> <p>General comment: The user requirements and needs should be at the center of the reflection, and non-SOLAS users (Navy ships, leisure boats, fishing boats, ...) and their needs are to be considered as well.</p>

Germany	<p>Paper charts do not allow detailed bathymetry. Update cycles of paper charts are a barrier in the age of big data.</p> <p>Paper charts cannot be overlaid with other information such as AIS, radar or currents.</p> <p>Young nautical officers are more oriented to digital information.</p> <p>The hardware is getting more and more powerful and can generate a navigation image even on battery power for weeks.</p> <p>Paper charts do not offer optimal safety. It is questionable whether a redundant nautical chart will improve safety in the future.</p> <p>The use of paper charts is diminishing significantly and the production resources are disproportionately high compared to ENC.</p>
Greece	<p>Greece is a country with so many islands and waterways. For this reason, it is very difficult to stop producing paper charts. Therefore, our Paper Chart folio will not be reduced.</p>
Indonesia	<p>If it's possible, to innovate the portrayal of paper chart (INT 1) on ECDIS instead of S-52 display or it can be called ECDIS smart display.</p>
Iran	<p>Considering the huge number of wooden dhows which are active in fishing and trading goods in the world , especially in the Middle East and East Asia, and since they are not easily accessed to ENC Charts , also you could add to this, supply vessels, pilot boats, etc., which are using paper nautical charts. Therefore paper charts should be produced printed and distribute among potential users for some years to come.</p>
Japan	<p>1. Question No.13-23, we know obviously offset lithographic pressed chart is being represented for what we should report to you here are based on, but then that also makes us wonder how digital print chart should be treated for answering your Questions correctly. What we ended up bringing clarity on this concern is that just Counting digital print chat IN our answers here. If it wouldn't meet with what you expect from us, Please let us know.</p> <p>2. Question No.24-34, continuously looking at introducing POD model into our print production line but not still in place down here. This is absolutely the right reason why our answers to the Questions are simply more of drawing 0 (zero)-series at this point.</p>
Malaysia	<p>In order to fully replace the usage of paper nautical charts, a new type of ENC hardware must be develop which does not rely on ship power supply instead of battery and alternative power supply such as solar and other kind of renewable energy.</p>
Malta	<p>There is still considerable interest and demand from the maritime industry for paper charts but the demand will decline significantly in the coming years.</p>
Mauritius	<p>The usage of paper charts is likely to continue until the requisite infrastructure to use ENC/ Digital products is available with all the sea going vessels which are in compliance with the regulations of SOLAS and IMO.</p>

Mexico	Maybe is not appropriate to stop producing paper charts, it can be in some years later.
Netherlands	Sales figures provided in this survey (question 13-34 and 37-47) are to be treated as commercially confidential. Not to be published separately on the internet
Peru	It will be necessary to have a secondary option as a contingency plan that will supply ENC, nowadays paper charts are used for that.
Poland	Despite the fact that more and more new technologies and ENC display systems are being deployed on board, paper charts should be kept available and used. These charts are the only means to navigate when e.g. ship power circuits fail.
Romania	In connection with question 58 and all Romanian ships should in future be fully equipped with ECDIS and Electronic back-up navigation equipment, so that no more Paper Chart are required.
Spain	Some nautical paper charts will continue to be used for quite some time due to the type of boats.
Thailand	We are agree to use any technology that would print paper charts directly from ENC Data.
Tunisia	We consider that the paper nautical chart would still be used for the next years and could be provided on demand for all users.
Venezuela	I think we should focus on the production of electronic cartography, the technological era demands it that way.

Table 13

## **Annex A – Future of the Paper Nautical Chart Survey Questions**

# IHO Future of the Paper Nautical Chart Survey

This survey was prepared by the International Hydrographic Organization (IHO) Nautical Cartography Working Group (NCWG) to accompany its preliminary report on the Future of the Paper Nautical Chart (FPNC).

The results of the survey will be incorporated into the final FPNC report, which will be presented by the NCWG at the twelfth meeting of the IHO Hydrographic Services and Standards Committee (HSSC), 11-15 May 2020.

Each IHO Member State may submit only one survey response.

The deadline for completing your survey is 31 August 2019.

## Survey Submitter Information

Information about the submitting IHO Member State and the associated Point of Contact

1. **First name of person submitting this survey response**

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2. **Last name of person submitting this survey response**

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3. **E-mail of person submitting this survey response**

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**4. Which IHO Member State is this survey response from?***Mark only one oval.*

- Algeria
- Argentina
- Australia
- Bahrain
- Bangladesh
- Belgium
- Brazil
- Brunei Darussalam
- Bulgaria
- Cameroon
- Canada
- Chile
- China
- Colombia
- Croatia
- Cuba
- Cyprus
- Denmark
- Dominican Republic
- Ecuador
- Egypt
- Estonia
- Fiji
- Finland
- France
- Germany
- Greece
- Georgia
- Guatemala
- Iceland
- India
- Indonesia
- Iran
- Ireland
- Italy
- Jamaica
- Japan
- Korea, Democratic People's Republic of

- Korea, Republic of
- Kuwait
- Latvia
- Malaysia
- Malta
- Mauritius
- Mexico
- Monaco
- Montenegro
- Morocco
- Mozambique
- Myanmar
- Netherlands
- New Zealand
- Nigeria
- Norway
- Oman
- Pakistan
- Papua New Guinea
- Peru
- Philippines
- Poland
- Portugal
- Qatar
- Romania
- Russian Federation
- Saudi Arabia
- Seychelles
- Singapore
- Slovenia
- South Africa
- Spain
- Sri Lanka
- Suriname
- Sweden
- Thailand
- Tonga
- Trinidad and Tobago
- Tunisia
- Turkey

- Ukraine
- United Arab Emirates
- United Kingdom
- United States
- Uruguay
- Vanuatu
- Venezuela
- Viet Nam

## National Regulatory Information

Information about your national maritime regulations for commercial vessels on domestic voyages. (Ref FPNC 2.2.b)

**5. Primary - What type of nautical charts does your national maritime authority require commercial vessels to carry on domestic voyages? [Check one]**

*Mark only one oval.*

- Only Paper Charts
- Only ENCs
- Either Paper Charts or ENCs
- Other: \_\_\_\_\_

**6. Backup - What type of nautical charts does your national maritime authority allow commercial vessels to carry on domestic voyages as a backup for the primary chart type? [Check all that apply]**

*Check all that apply.*

- Paper Charts
- ENCs
- RNCs
- No Backup required
- Other: \_\_\_\_\_

## Backup Chart Development

### Backup Charts

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Information about any existing or development plans for a "fit for purpose" paper chart to be used as a backup. (Ref FPNC 2.3.a)

**7. What actions or plans has your agency made to provide a simplified paper nautical chart specifically for use as a backup for electronic navigational systems (ECDIS, ECS, chart plotters, etc.)? [Check all that apply]**

*Check all that apply.*

- We have no plans to create a simplified paper chart product other than standard nautical charts.
- We recently started considering the possibility of creating a new, simplified paper chart for backup.
- We are actively developing policies and/or specifications for a new, simplified paper chart for backup.
- We have prototyped a new, simplified paper chart for backup.
- We are producing and distributing a new, simplified paper chart for backup.
- We explored producing a simplified paper chart for backup, but have now stopped this effort.

**8. Is your agency doing any other activities related to development of any product to be used as a backup for electronic navigational systems?**

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## Chart Production System

Information about the use of a single production system for maintaining both ENC and paper chart nautical products.

**9. Is your agency using, or moving toward the use of, a single production database that stores data to maintain both ENC and paper charts? (Ref FPNC 2.4.a) [Check the closest answer]**

*Mark only one oval.*

- Our ENC and paper charts are produced from a single database.
- Our ENC and paper charts are produced from separate databases.
- Our ENC and paper charts are produced from separate databases, but we are actively migrating toward use of a single production database.
- Our ENC and paper charts are produced from separate databases, but we are considering a move toward use of a single production database.
- Other: \_\_\_\_\_

**10. Is your agency using S-57 encoded data to produce S-4 based symbolization on raster chart products? (Ref FPNC 2.4.b) [Check the closest answer]**

*Mark only one oval.*

- Yes. The symbolization of raster charts totally automated.
- Yes. The symbolization of raster charts nearly automated, but some manual "finishing" is required to completely symbolize the chart.
- No. We use S-57 encoded data to create raster charts, but raster symbolization is generated from additional (non-S-57) attribution.
- No. Our raster charts are not created from S-57 encoded data.

## Distribution of Paper Nautical Charts

### Paper Nautical Chart Sales

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Information about sales of paper nautical charts between 2008 and 2018. This section first asks about pre-printed stocking of paper nautical charts and then about Print-on-Demand distribution methods. Please report sales numbers for each separately.

**11. What methods do you use for stocking and distributing your paper nautical charts? (Ref FPNC 2.4.c) [Check all that apply]**

*Check all that apply.*

- Large stocks of charts are printed in advance and stored for distribution.
- Single charts, or small quantities, of charts are printed or plotted as orders are received.
- Other: \_\_\_\_\_

**12. The questions that follow ask that you enter paper chart sales numbers for the years 2008 through 2018, one year at a time. If you prefer, you may alternatively e-mail a spreadsheet or table to [colby.harmon@noaa.gov](mailto:colby.harmon@noaa.gov) with this information. If you prefer to e-mail your information, please indicate so below.**

*Mark only one oval.*

- I will provide individual year sales information within this survey.
- I will e-mail this information *Skip to question 35.*
- We do not sell paper nautical charts *Skip to question 35.*
- We do not have this information *Skip to question 35.*

### Provide Paper Chart Sales Data

You will first be asked to provide numbers for sales of "pre-printed" charts for years 2008-2018. You will then be asked to provide numbers for sales of "print on demand" paper charts for years 2008-2018..

### Please provide the number of your agency's standard, pre-printed, paper nautical charts sold in each of the calendar years below. (Ref FPNC 25.a)

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These are charts printed in large batches, usually by offset lithography, and then warehoused for subsequent distribution to customers.

**13. 2008**

\_\_\_\_\_

**14. 2009**

\_\_\_\_\_

**15. 2010**

\_\_\_\_\_

16. **2011**

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17. **2012**

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18. **2013**

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19. **2014**

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20. **2015**

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21. **2016**

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22. **2017**

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23. **2018**

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**Please provide the number of your agency's standard, Print-on-Demand, paper nautical charts sold in each of the calendar years below. (Ref FPNC 25.a)**

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These are charts printed one or a few at a time as they are ordered by customers.

24. **2008**

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25. **2009**

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26. **2010**

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27. **2011**

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28. 2012

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29. 2013

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30. 2014

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31. 2015

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32. 2016

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33. 2017

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34. 2018

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## Distribution of Electronic Navigational Charts (ENCs)

35. The questions that follow ask that you enter ENC sales numbers for the years 2008 through 2018, one year at a time. If you prefer, you may alternatively e-mail a spreadsheet or table to [colby.harmon@noaa.gov](mailto:colby.harmon@noaa.gov) with this information. Please indicate your preference below.

*Mark only one oval.*

- I will provide individual year sales information within this survey.
- I will e-mail this information *Skip to question 48.*
- We do not produce or sell ENCs *Skip to question 48.*
- We do not have this information *Skip to question 48.*

## Provide ENC Sales Data

36. ENC usage can be counted in several ways. Please indicate the method that you are using to report ENC sales.

*Check all that apply.*

- If an ENC is sold or licensed for use in any part of a year, it is counted as 1 sale in that year.
- If an ENC is licensed for use for a portion of a year, the count for that ENC is pro-rated. For example, if a particular ENC is licensed for a ship's use for 6 months, it is counted as 0.5 sale for that year.
- Other: \_\_\_\_\_

## ENC Sales

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Information about sales of ENC cells between 2008 and 2018.

**Please provide the number of your agency's ENCs sold in each of the calendar years below. (Ref FPNC 25.b)**

---

37. **2008**

---

38. **2009**

---

39. **2010**

---

40. **2011**

---

41. **2012**

---

42. **2013**

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43. **2014**

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44. **2015**

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45. **2016**

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46. **2017**

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47. **2018**

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## Nautical Chart Types

Information about the relationship between your paper chart products, Raster Navigational Charts (RNCs), and Electronic Navigational Charts (ENCs) (Ref FPNC 25.c)

**48. Which of the following nautical chart types does your agency produce. [Check all that apply]**

*Check all that apply.*

- Standard paper nautical charts
- Special paper charts for recreational boaters
- Raster Navigational Charts (RNC)
- Electronic Navigational Charts (ENC)
- Other: \_\_\_\_\_

**49. What products or services does your agency provide specifically for recreational boaters? (Ref FPNC 25.d)**

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## Future Products

**50. How many new (first edition) paper INT charts does your agency expect to create in the next three years? (Ref FPNC 3.1.a)**

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**51. Do you plan on a general rescheming of the layouts of your paper nautical charts in the next five years? (Ref FPNC 3.1.b)**

*Check all that apply.*

- Yes
- No

**52. If rescheming paper nautical charts is planned, please explain the rationale for rescheming (to better align with ENC coverage and scales, reduction in raster chart coverage, etc.) (Ref FPNC 3.1.b)**

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**53. Do you have corresponding paper nautical chart coverage for your ENC's? (Ref FPNC 3.1.c) [Check the closest answer]**

*Mark only one oval.*

- Nearly every one of our ENC's have a corresponding paper chart covering the same area.
- About 75% of our ENC's have a corresponding paper chart covering the same area.
- About 50% of our ENC's have a corresponding paper chart covering the same area.
- About 25% of our ENC's have a corresponding paper chart covering the same area.
- None of our ENC's have a corresponding paper chart covering the same area.

**54. When you create new or larger scale coverage in an area, what nautical chart products do you produce? (Ref FPNC 3.1.c-d) [Check all that apply]**

*Check all that apply.*

- Standard paper nautical chart
- ENC
- RNC
- Raster titled data
- Vector tiled data
- Other: \_\_\_\_\_

**55. Are you using or planning to use any technology that would print paper charts directly from ENC data? (Ref FPNC 3.2.a) [Check the closest answer]**

*Check all that apply.*

- Yes, we use a mostly automated process to do this.
- Yes, we use a semi-automated process to do this.
- Yes, we use a mostly manual process to do this.
- No, but we are exploring ways in which this might be done.
- No. We have no plans on doing this.

**56. Are you using, or planning to use, any technology that enables users to define their own paper chart extent and scale to output their own customized chart? (Ref FPNC 3.2.b) (Ref FPNC 3.2.b) [Check the closest answer]**

*Check all that apply.*

- Yes, we already provide this service to our customers?
- Yes, we are prototyping technology that could provide this service.
- Yes, we are considering the possibility of developing this service.
- No. We have no plans for providing this type of service.

## Impact of Change

Assessment of the potential impacts of a world without paper nautical charts.

57. What is your perception of the impact of a world without paper nautical charts would have on the following five areas? That is, what degree of changes would be needed to accommodate paperless navigation or would result from paperless navigation? (Ref FPNC 4.) [Check one level for each row]

Mark only one oval per row.

	High	Med	low
International Regulation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
National Regulations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User Requirements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nautical Product Production	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sales Revenue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

58. What types of changes in your maritime national regulations would be required to enable the disuse of paper nautical charts? (Ref FPNC 4.1.a)

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### Additional Comments

59. Are there any other comments that you would like to add regarding the future of the paper nautical chart?

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## Annex B – Individual Responses to Question 50

Member State	Question 50: How many new (first edition) paper INT charts does your agency expect to create in the next three years? (Ref FPNC 3.1.a)
Argentina	12
Australia	Nil
Bahrain	1
Bangladesh	Nil. All INT Charts have already been published.
Belgium	None
Brazil	Two.
Canada	0. CHS does expect 30-50 new editions per year due to new funding.
Chile	0
Colombia	
Croatia	Four (4)
Cuba	None
Cyprus	none
Ecuador	
Estonia	7 INT first editions
Finland	None, all schemed charts have already been produced
France	10
Germany	
Greece	3
Iceland	3 - 4
India	NIL
Indonesia	
Iran	89 INT Charts
Italy	2 new INT charts
Japan	0
Korea, Republic of	5
Malaysia	We do not plan any
Malta	Malta does not have any INT paper Charts
Mauritius	3
Mexico	TWO NAUTICAL CHARTS
Netherlands	No new INT-coverage, however due to rescheming first editions may be created
Norway	App. 2
Oman	
Peru	None
Poland	1 - 2
Portugal	8
Romania	4 INT charts

Russian Federation	No new paper INT charts
Singapore	One
South Africa	4 - 6 new charts
Spain	0
Suriname	None. The whole coastal area is already covered within 2 INT charts.
Sweden	0
Thailand	No
Tunisia	INT 3212
Turkey	
Ukraine	Four
United Kingdom	
United States	NOAA has no plans to make any INT charts. NGA expects to make 3 INT charts in the next three years outside of US waters in areas where they serve as a PCA.
Venezuela	4