



International Hydrographic Organization

IHO Stakeholders' Forum

September 2012

Status report on global survey data coverage

A leap into ... the unknown?

Gilles Bessero

IHB

Whatever the media ...

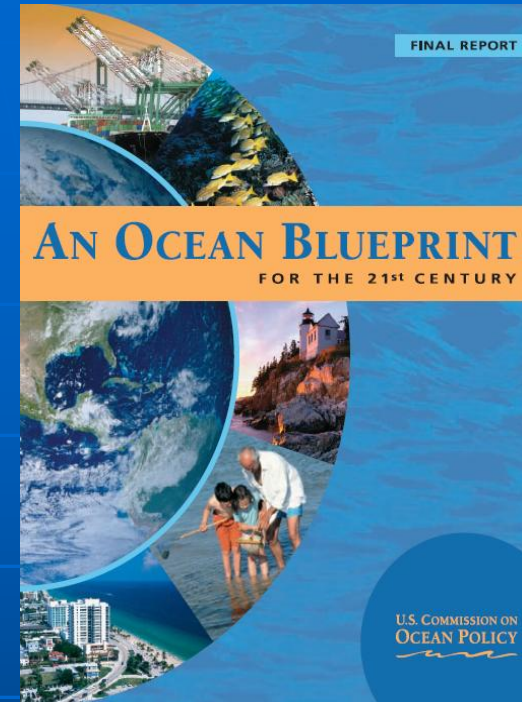


... a nautical chart is only as good as the survey data it renders!



Yet ...

Extract from UKHO NP 100 The Mariner's Handbook



Charted depths

1.5

Before using a chart to plan or navigate a passage, mariners should make themselves aware of the quality of the survey data that has been used to place the soundings and contours on the chart, since not all sea areas have been surveyed to modern standards or even systematically surveyed at all. Indeed large areas of sea, especially in offshore areas, have never been systematically surveyed to any standard. The chart will have been compiled from the best data available but this does not mean that shoal areas dangerous to navigation will not exist.

“About 95 percent of the ocean floor remains unexplored, much of it located in harsh environments such as the polar latitudes and the Southern Ocean.”



Background

- ★ SOLAS Convention (revised - 2002):

Contracting Governments to provide and maintain hydrographic services and products, in particular by ensuring “... *that hydrographic surveying is carried out, as far as possible, adequate to the requirements of safe navigation*”.

- ★ UN General Assembly Resolution on Oceans and Law of the Sea (2003)

IHO and IMO invited to continue their efforts “*to increase the coverage of hydrographic information on a global basis, especially in areas of international navigation and ports and where there are vulnerable or protected marine areas*”.



Background

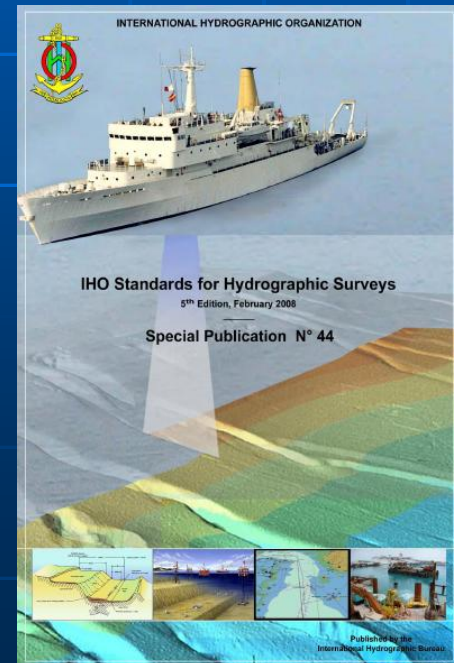
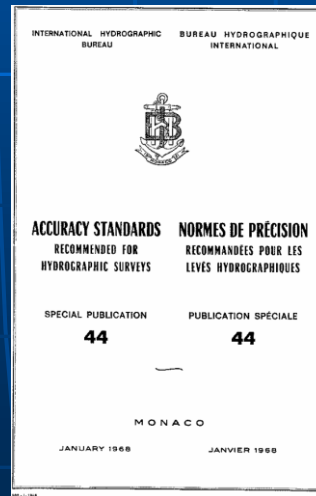
★ IHO Convention:

It shall be the object of the Organization to bring about:

(...)

c) the adoption of reliable and efficient methods of carrying out and exploiting hydrographic surveys;

IHO Publication S-44
“Accuracy standards
recommended for
hydrographic surveys”.



Background

Minimum standards for hydrographic surveys

TABLE 1
Minimum Standards for Hydrographic Surveys
(To be read in conjunction with the full text set out in this document.)

Reference	Order	Special	1a	1b	2
Chapter 1	Description of areas.	Areas where under-keel clearance is critical	Areas shallower than 100 metres where under-keel clearance is less critical but <i>features</i> of concern to surface shipping may exist.	Areas shallower than 100 metres where under-keel clearance is not considered to be an issue for the type of surface shipping expected to transit the area.	Areas generally deeper than 100 metres where a general description of the sea floor is considered adequate.
Chapter 2	Maximum allowable THU 95% <i>Confidence level</i>	2 metres	5 metres + 5% of depth	5 metres + 5% of depth	20 metres + 10% of depth
Para 3.2 and note 1	Maximum allowable TVU 95% <i>Confidence level</i>	a = 0.25 metre b = 0.0075	a = 0.5 metre b = 0.013	a = 0.5 metre b = 0.013	a = 1.0 metre b = 0.023
Glossary and note 2	Full Sea floor Search	Required	Required	Not required	Not required
Para 2.1 Para 3.4 Para 3.5 and note 3	Feature Detection	Cubic <i>features</i> > 1 metre	Cubic <i>features</i> > 2 metres, in depths up to 40 metres; 10% of depth beyond 40 metres	Not Applicable	Not Applicable
Para 3.6 and note 4	Recommended maximum Line Spacing	Not defined as full sea floor search is required	Not defined as full sea floor search is required	3 x average depth or 25 metres, whichever is greater For bathymetric lidar a spot spacing of 5 x 5 metres	4 x average depth
Chapter 2 and note 5	Positioning of fixed aids to navigation and topography significant to navigation. (95% <i>Confidence level</i>)	2 metres	2 metres	2 metres	5 metres
Chapter 2 and note 5	Positioning of the Coastline and topography less significant to navigation (95% <i>Confidence level</i>)	10 metres	20 metres	20 metres	20 metres
Chapter 2 and note 5	Mean position of floating aids to navigation (95% <i>Confidence level</i>)	10 metres	10 metres	10 metres	20 metres

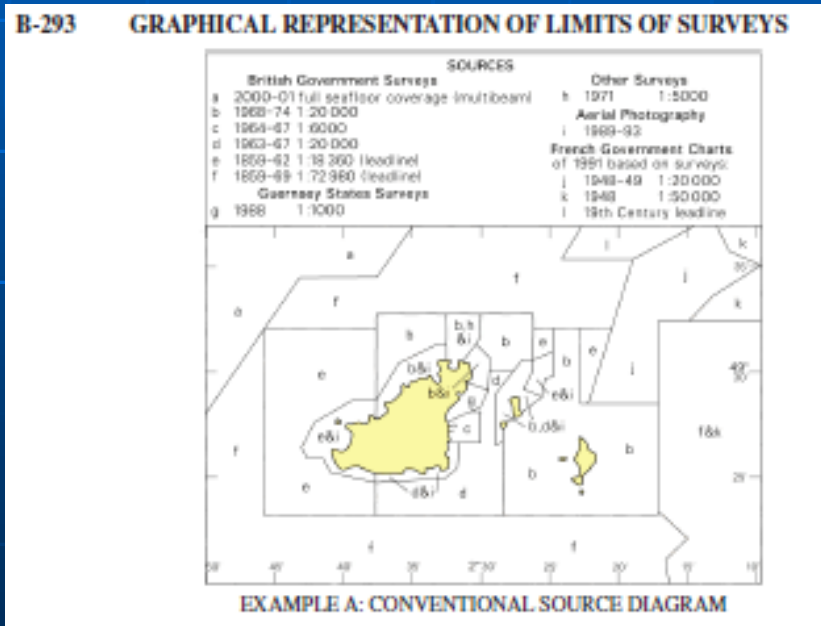


Background

IHO Chart Specifications

- CATZOC

- source diagrams



B-297.9 CATEGORY OF ZONES OF CONFIDENCE IN DATA - ZOC TABLE
(S-57 Edition 3.1 Supplement No. 2 Appendix A Chapter 2)

1	2	3		4	5
ZOC ¹	Position Accuracy ²	Depth Accuracy ³		Seafloor Coverage	Typical Survey Characteristics ⁴
A1	± 5 m + 5% depth	-0.50 + 1% d		Full area search undertaken. Significant seafloor features detected ⁵ and depths measured.	Controlled, systematic survey ⁶ high position and depth accuracy achieved using DGPS or a minimum time high quality lines of position (LOP) and a multibeam, channel or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	± 0.6 ± 0.8 ± 1.5 ± 10.5		
A2	± 20 m	- 1.00 + 2% d		Full area search undertaken. Significant seafloor features detected ⁵ and depths measured.	Controlled, systematic survey ⁶ achieving position and depth accuracy less than ZOC A1 and using a modern survey echosounder ⁷ and a sonar or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	± 1.2 ± 1.6 ± 3.0 ± 21.0		
B	± 50 m	- 1.00 + 2% d		Full area search not achieved; uncharted features, hazardous to surface navigation are not expected but may exist.	Controlled, systematic survey achieving similar depth but lesser position accuracies than ZOC A2, using a modern survey echosounder ⁷ , but no sonar or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	± 1.2 ± 1.6 ± 3.0 ± 21.0		
C	± 500 m	- 2.00 + 5% d		Full area search not achieved, depth anomalies may be expected.	Low accuracy survey or data collected on an opportunity basis such as soundings on passage.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	± 2.5 ± 3.5 ± 7.0 ± 52.0		
D	Worse than ZOC C	Worse than ZOC C		Full area search not achieved, large depth anomalies may be expected.	Poor quality data or data that cannot be quality assessed due to lack of information.
U	Unassessed - The quality of the bathymetric data has yet to be assessed				



Status of survey coverage: C-55

Firefox Normes et Publications C-55

C-55

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[Introduction](#)
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[Hydrography and Maritime](#)
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[Recommendations](#)

Main Reports

- * [Hydrographic Surveys](#)
- * [Nautical Charting](#)
- * [Maritime Safety](#)

[Information](#)

- * [GMDSS Information](#)
- * [Composite Report \(World-wide\)](#)
- * [Composite for INT](#)

[Region A](#)

- * [Composite for INT](#)

[Region B](#)

- * [Composite for INT](#)

[Region C1](#)

- * [Composite for INT](#)

[Region C2](#)

- * [Composite for INT](#)

[Region D](#)

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[Region E](#)

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[Region H](#)

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[Region I](#)

- * [Composite for INT](#)


[Region J](#)

- * [Composite for INT](#)

IHO Publication C-55
Third Edition (2004)

Latest Update 27 September 2011

STATUS OF HYDROGRAPHIC SURVEYING AND NAUTICAL CHARTING WORLDWIDE

[Français](#) 

Executive Summary

The aim of this third edition of IHO Publication No. 55 (C-55) is to present a clear picture of the worldwide coverage of surveys and nautical charts and of the extent of effective organisations 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.

Comparing the data in the first and second editions with that presented here, it is clear that significant progress has been made in some areas of great importance to international shipping and to the protection of coastal environments. This has resulted in the main from the firm requirements laid down by the IMO before ships' routing systems can be approved. There is also encouraging evidence of regional co-operation to provide modern coverage of maritime shipping routes.

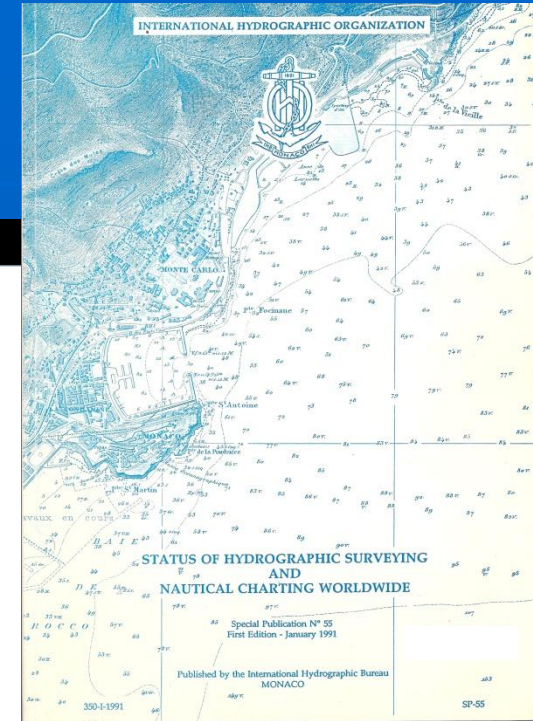
However, in significant areas of the Caribbean Sea, the coastal waters of Africa, the Indian Ocean and adjacent seas, and the Western Pacific Ocean and adjacent seas, there has been little change, and it is here that capacity building efforts must be concentrated.

The IMO and IHO have identified the following key areas of concern arising from the information presented in the C-55 data base:

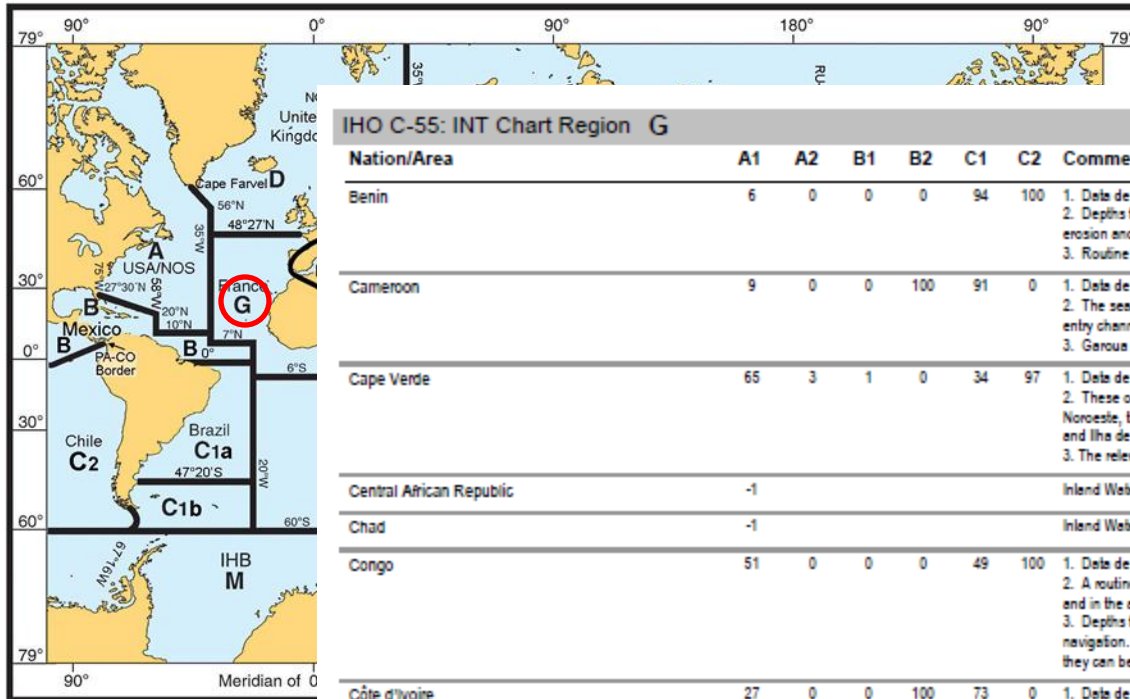
Major Skill Deficiencies:

Many governments have still to put in place an effective organisation for the promulgation of information of importance to safe navigation and the protection of the environment, either as navigational warnings or as inputs to those hydrographic offices with responsibility for charting.

Action is needed to implement the GMDSS in a number of areas, notably in Central America and



Status of survey coverage: C-55



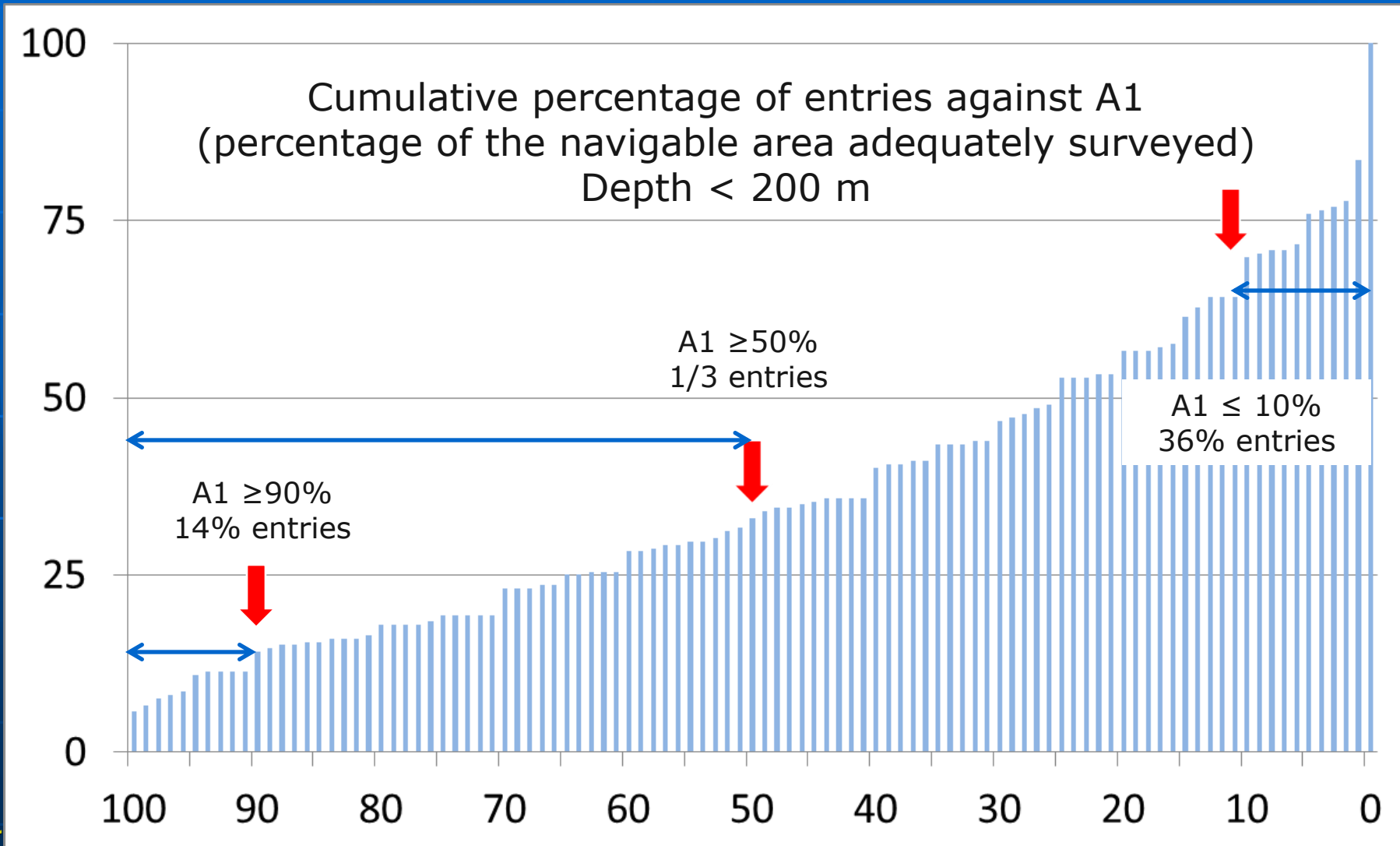
IHO C-55: INT Chart Region G

Nation/Area	A1	A2	B1	B2	C1	C2	Comment
Benin	6	0	0	0	94	100	1. Data derived from EAIHC technical visit. 2. Depths fall away precipitately beyond the narrow continental shelf. The coast is subject to erosion and depths inshore are constantly changing. 3. Routine re-surveys are required for Colonou.
Cameroon	9	0	0	100	91	0	1. Data derived from EAIHC technical visit. 2. The seabed is unstable in all the rivers and estuaries. Routine re-surveys are conducted in the entry channel and port of Douala. 3. Garoua can be operated from July to September, the navigable season on the River Benue.
Cape Verde	65	3	1	0	34	97	1. Data derived from EAIHC technical visit. 2. These oceanic islands are generally steep with depths that fall away precipitately. Banco do Nordeste, the waters of the Ilha da Boavista, and the banks between that island and Ilha do Maio and Ilha de Santiago require modern survey. 3. The relevant harbours were resurveyed between 2005 and 2010.
Central African Republic	-1						Inland Waterways
Chad	-1						Inland Waterways
Congo	51	0	0	0	49	100	1. Data derived from EAIHC technical visit. 2. A routine resurvey programme is needed in unstable areas in the approaches to Pointe-Noire, and in the approach channel and port after dredging operations. 3. Depths fall away quickly beyond the edge of the shelf and there are no dangers to surface navigation. However survey information is required for the extensive offshore installations so that they can be charted to ensure safe navigation in their vicinity.
Côte d'Ivoire	27	0	0	100	73	0	1. Data derived from EAIHC technical visit. 2. Depths fall away rapidly at the edge of the narrow continental shelf. 3. Routine re-surveys are required following dredging in Port d'Abidjen.
DRC	0	0	100	0	0	100	1. Data derived from EAIHC technical visit. 2. A routine resurvey programme is needed in the mouth of the River Congo and in the river channels to Matadi and Boma. 3. Depths fall away quickly beyond the edge of the shelf on the flanks of the River Congo, and there are no dangers to surface navigation. However survey information is required for the extensive offshore installations so that they can be charted to ensure safe navigation in their vicinity.
Equatorial Guinea	0	0	100	0	0	100	1. Data derived from EAIHC technical visit. 2. Modern surveys will be required following the expansion of Malebo and Luba. A routine resurvey programme must be established. 3. Survey data is required for offshore installations to ensure safe navigation in their vicinity.
France Atlantique	81	96	0	4	19	0	

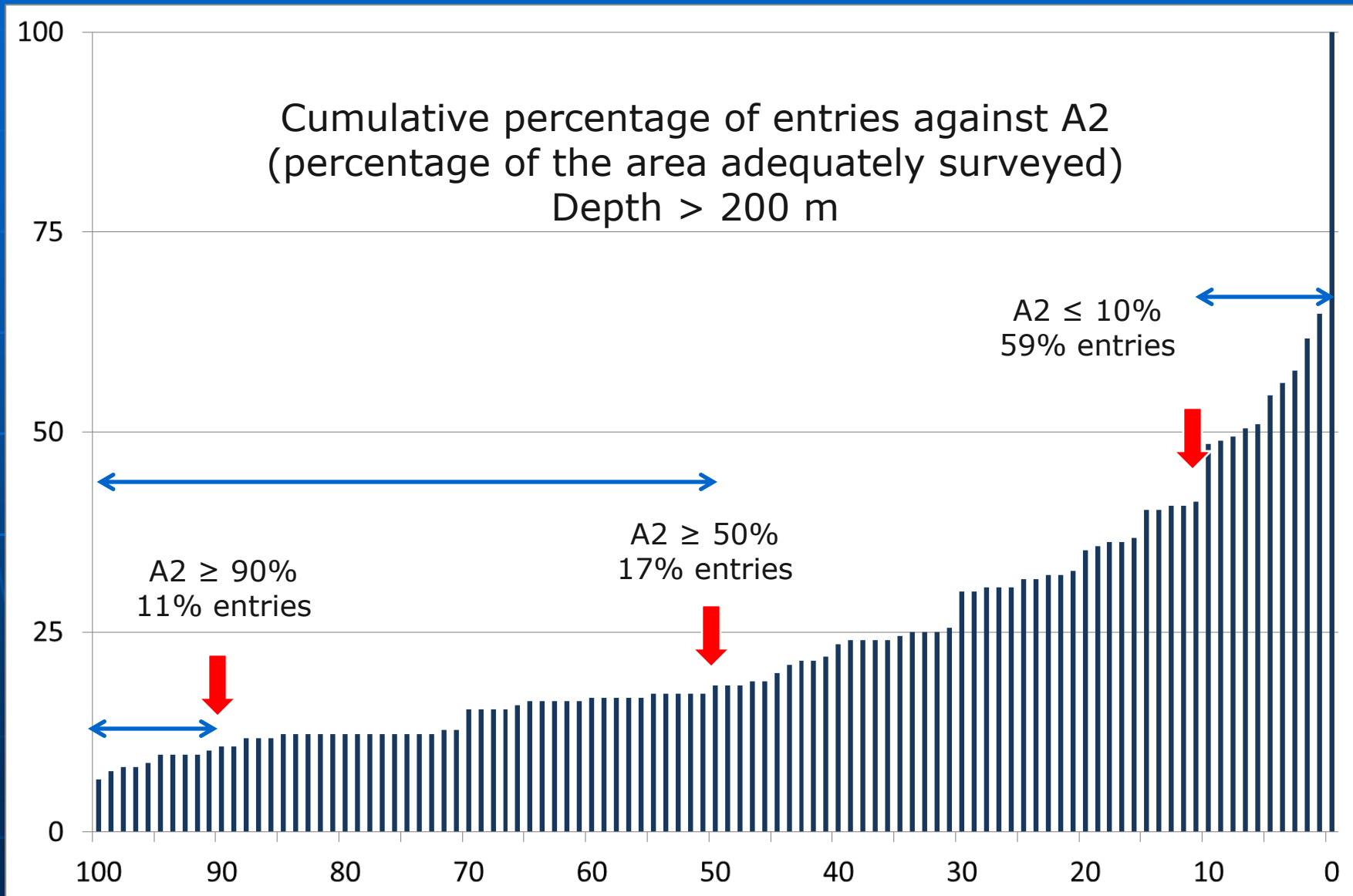
IHO C-55: Status
A1/A2 = % adequate
B1/B2 = % requiring
C1/C2 = % which has



Status of survey coverage: assessment



Status of survey coverage: assessment



Status of survey coverage: assessment

✦ Areas of concern:

- Caribbean Sea
- Western and Eastern Africa
- Indian Ocean and adjacent seas
- Western Pacific Ocean and adjacent seas

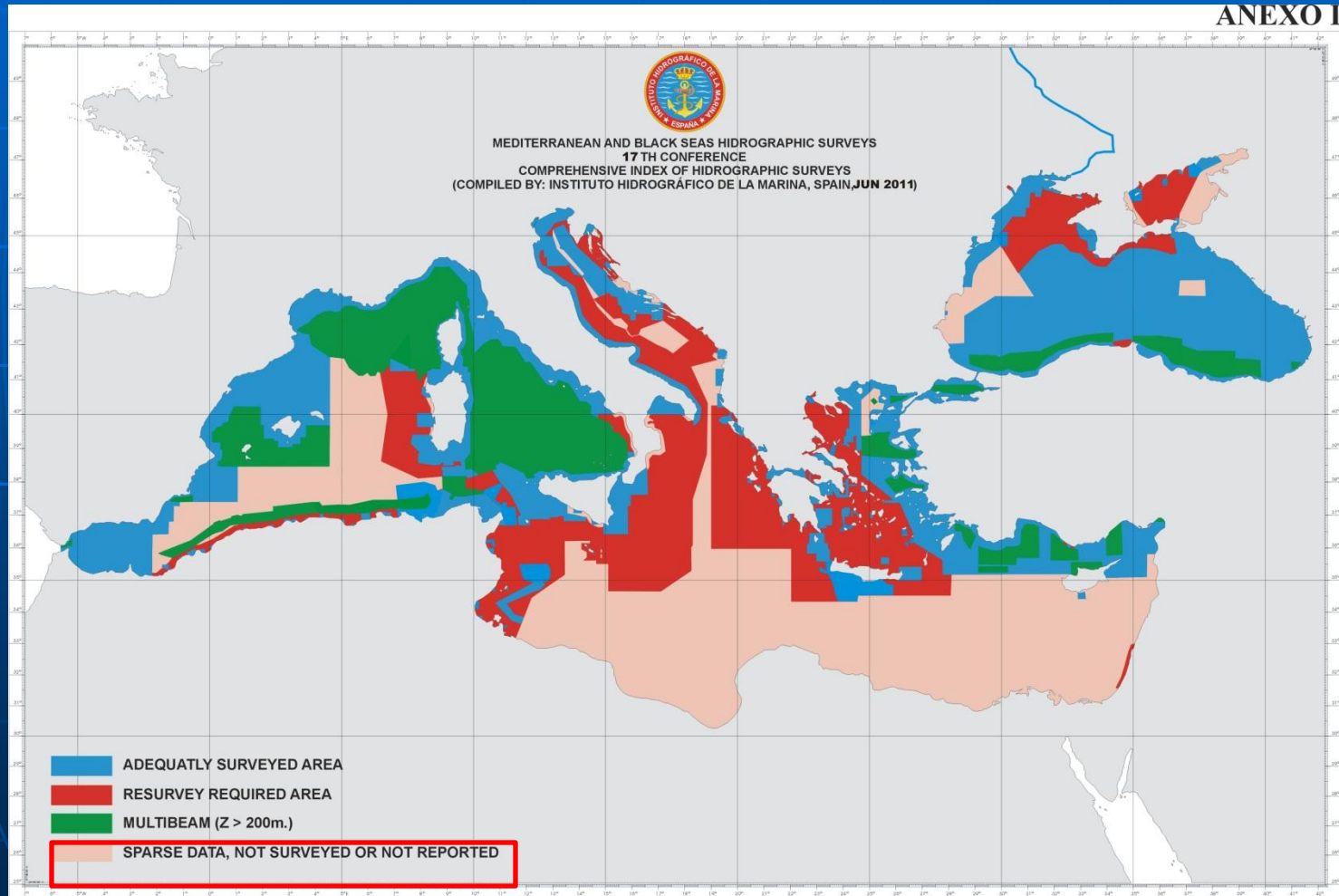
✦ Challenges:

- advent of deeper draught shipping
- expansion of cruise shipping in “exotic” areas
- instability of the seabed in some areas



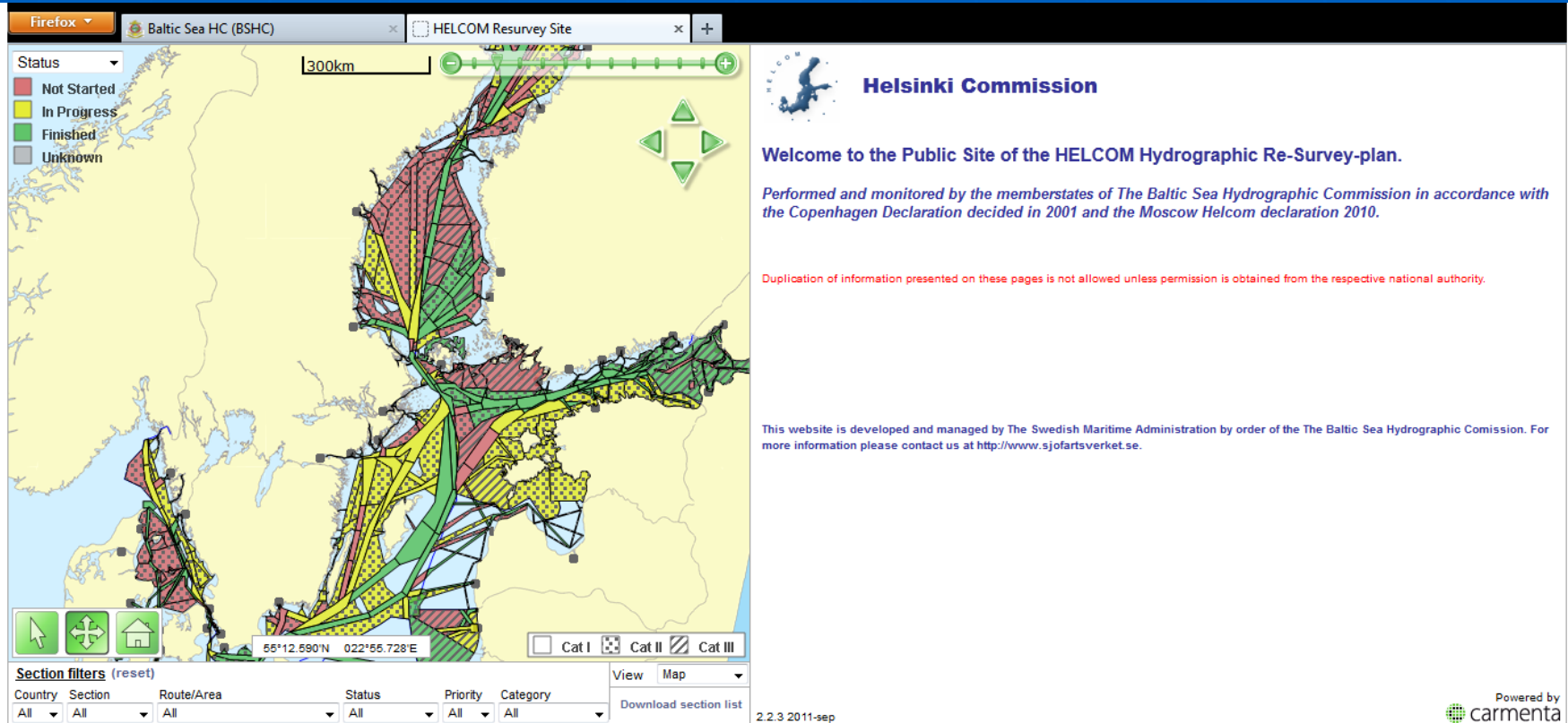
Status of survey coverage: complement

★ Regional monitoring:



Status of survey coverage: complement

★ Regional monitoring:



The screenshot displays the HELCOM Resurvey Site web application. The main map shows the Baltic Sea region with survey coverage status indicated by colors: red for 'Not Started', yellow for 'In Progress', green for 'Finished', and grey for 'Unknown'. A scale bar indicates 300km. The application includes a 'Section filters' table and a 'Download section list' button.

Status

- Not Started
- In Progress
- Finished
- Unknown

Helsinki Commission

Welcome to the Public Site of the HELCOM Hydrographic Re-Survey-plan.

Performed and monitored by the memberstates of The Baltic Sea Hydrographic Commission in accordance with the Copenhagen Declaration decided in 2001 and the Moscow Helcom declaration 2010.

Duplication of information presented on these pages is not allowed unless permission is obtained from the respective national authority.

This website is developed and managed by The Swedish Maritime Administration by order of the The Baltic Sea Hydrographic Commission. For more information please contact us at <http://www.sjofartsverket.se>.

2.2.3 2011-sep

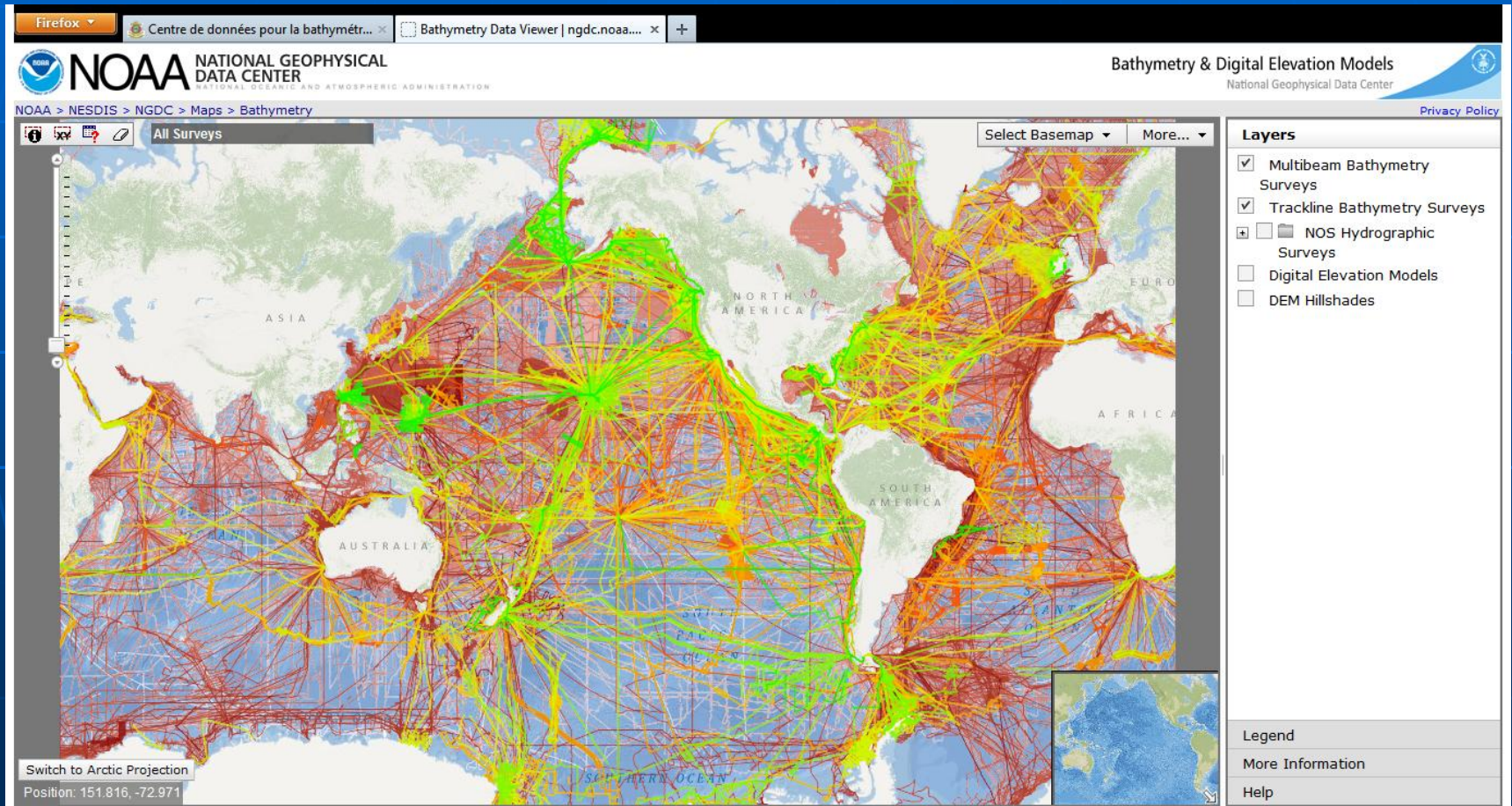
Powered by carmenta

Country	Section	Route/Area	Status	Priority	Category
All	All	All	All	All	All



Status of survey coverage: complement

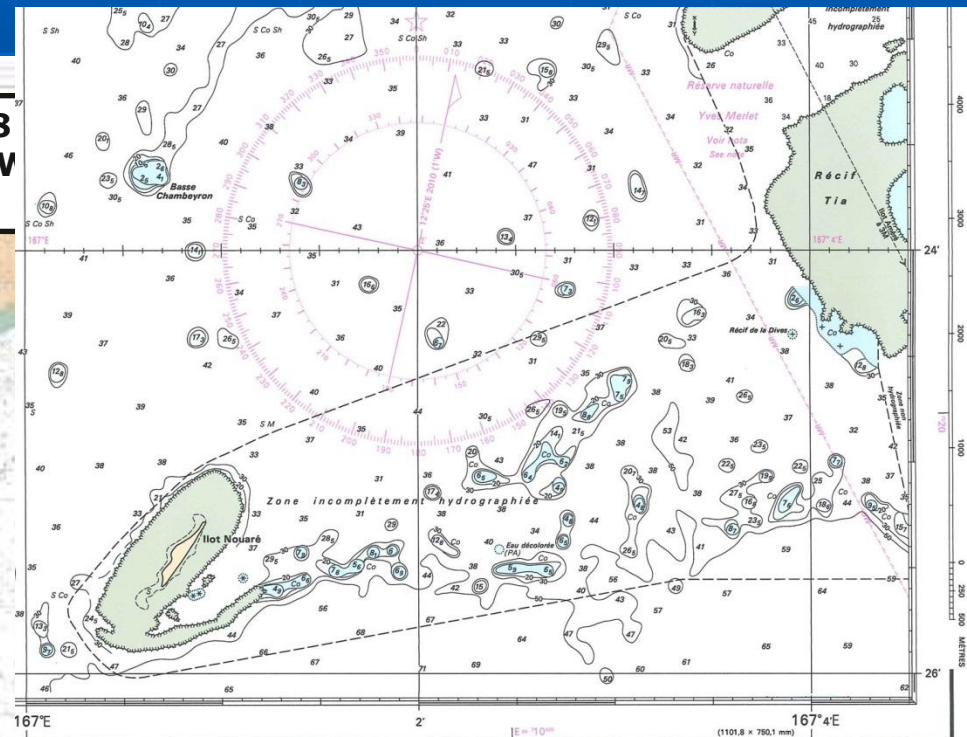
- ★ Oceanic survey monitoring (IHO DCDB):



Status of survey coverage: limitations of C-55

- ✦ No spatial information on location / extent of gaps
- ✦ Adequacy / safety of navigation

Chart FR 7645 - INT 6898
Canal de La Havannah et Canal V
Edition n° 2 - 2010



RE MER PROPRE
WATERWAYS CLEAN



INT 6898
7645



Perspectives

- ✦ One of IHO four Strategic Directions:
 - “Facilitate global coverage and use of official hydrographic data, products and services”
- ✦ Decision of the 18th International Hydrographic Conference
 - progress **whatever actions** are required to **improve the collection, quality and availability of hydrographic data worldwide**, monitor and rectify possible deficiencies and shortcomings, cooperate with other international organizations and stakeholders as necessary, and to keep Member States informed on progress on this issue. Member States are strongly encouraged to **address these deficiencies related to maritime safety worldwide, both within the IMO framework and through national channels.**





Stay tuned!

