

**5th IHO-HSSC Meeting
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Information Paper for consideration by HSSC

Future demand for Paper Nautical Charts

Submitted by: Australia

Executive Summary: Australia has conducted an analysis of ongoing demand for paper charts beyond completion of transition to mandatory use of ECDIS and ENC in 2018. The study identified that demand for Australian paper charts is likely to decline by two thirds to three quarters of current levels. The analysis is likely to be broadly applicable and of interest to other Member States.

Related Documents: Nil

Related Projects: Nil

1 Introduction / Background

ENC coverage

1.1 Australia has completed initial ENC coverage and has a portfolio equivalent to the coverage provided by paper charts. Coverage consists of 862 ENC across five navigation purpose bands. The equivalent paper nautical chart portfolio consists of 464 paper charts. Most ENC were developed from paper chart content, but within this process, all paper charts were brought into metric units of measurement and referenced to WGS84, with numerous new and recent surveys added, and older surveys on unknown datums re-referenced by ships and survey teams, or reconnection to new geodetic frameworks. Over 95% of charts are now also referenced to Lowest Astronomical Tide.

1.2 The ENC are arranged in a regular geographic grid to assist in future data management and, with the exception of ports (and a very few others), do not follow the limits of paper charts. The alpha-numeric identifier of each Navigation Purpose 1 to 4 ENC refers to the latitude and longitude of the SW corner of each ENC. Despite the regularity of the grid, content is trimmed as necessary to avoid overlaps with ENC from adjoining producer nations. A comparison of the ENC and paper chart schemas is shown on the following page and clearly shows the relative simplicity of the regular grid schema.

1.3 Australian ENC are available for international mariners via the IC-ENC network, while the local AusENC service caters for smaller commercial and recreational vessels operating entirely within Australian and Papua New Guinea (PNG) waters.

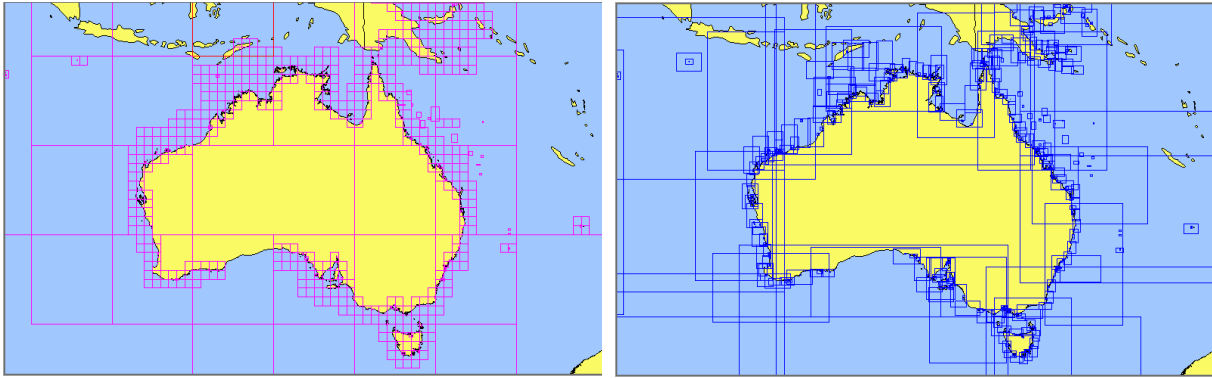


Figure 1 – extracts from the Australian Chart Index (online catalogue) showing limits of Band 1 to Band 5 ENC and paper charts for the equivalent area

Projecting future demand for paper charts

1.4 Considerable debate has been undertaken within the AHS regarding the future of paper charts. To ensure a degree of objectivity a study was undertaken to identify the future demand for paper charts once all vessels required to adopt ECDIS and ENC have completed the transition.

1.5 Australia distributes paper nautical charts via the following methods:

- International chart distribution agents located outside Australia. Any vessel purchasing an Australian chart outside Australia must be planning on undertaking an international voyage, with 90% bought for vessels that will be adopting ECDIS and ENC. Only 10% of sales of Australian charts by these agents are for use in small vessels. The selected Australian paper charts reproduced by the UKHO for international shipping fall into this overall category and are likely to be similarly affected by the ECDIS transition. UKHO reproductions were not included in the study out of respect for potential commercial sensitivities, but are likely to be affected similarly.
- Major national chart distribution agents within Australia. These distribution agents were consulted closely to determine the relative volume of sales to their various user segments. These include:
 - International and other nationally regulated vessels, the latter including commercial vessels operating entirely within Australian waters and subject to laws which specify various chart carriage requirements – an estimated split of 20% and 33% of their total sales respectively.
 - recreational vessels, including power vessels, cruising and racing yachts – known to be 47% of total sales by these agents.
- Local chart distribution agents. These agents cater for recreational vessels only – known to be 100% of their sales. In addition to official charts in one or more formats, they also sell licensed charts and small electronic chart systems. These agents consider their demand to be reasonably stable as the various vessel owners to which they sell paper charts have had access to electronic alternatives for over a decade and have no specific requirement to buy official paper charts, but are choosing to do so

anyway. Racing yachts have detailed requirements to carry paper charts specified in race rules; there are no plans for this requirement to be changed in the near term as paper charts are considered essential in the event of power or systems failure.

- Direct distribution. Royal Australian Navy ships and a variety of Government authorities are supplied charts directly by the Australian Hydrographic Service. Significantly, Navy ships which have transitioned to a full dual-ECDIS arrangement are still required to carry a reduced emergency folio of paper charts sufficient to return to (but not enter) port.

1.6 Assumptions were:

- International shipping will meet mandatory requirements for carriage of ECDIS and ENC and, on balance, are highly unlikely to maintain a full portfolio of paper charts as their IMO approved full back-up arrangement. Feedback indicates this decision is based primarily upon cost, as ENC can be used on multiple systems, whereas a combination of ENC and paper charts approximately doubles the cost of charts for any given area and, for larger areas of coverage, can significantly outweigh the cost of a second ECDIS.
- The IMO (and therefore the Australian Maritime Safety Authority) will continue to consider official paper nautical charts as a suitable backup to a single ECDIS; by inference, they will be expected to exist and, if used, maintained and kept available for immediate use¹.
- International shipping may choose to carry an emergency folio of paper charts, even if they have a dual-ECDIS arrangement. While unlikely, this contributes to the highest predictable demand which the AHS must be prepared to meet. For the Australian Charting Area, the Navy emergency folio² has been used as the model for vessels which may choose to carry a small portfolio of charts while familiarity with ECDIS grows. Exclusion of any tertiary emergency folio by international shipping results in the lower predicted residual demand for paper charts.
- Regulated domestic commercial shipping may choose to carry an emergency folio of paper charts but have no specific requirement to do so. As above, for those choosing to do so, the Navy emergency folio has been used as the model. Exclusion of any tertiary emergency folio by commercial shipping results in the lower predicted residual demand for paper charts.
- Recreational demand is substantially stable – owners have been free to make their choices and have had significant opportunity to do. The price, durability and battery life of tablet computers may gradually influence demand, but has been assumed to have no immediate effect.

¹ Australian Maritime Safety Authority (AMSA) Marine Notice 12/2012

² While the Royal Australian Navy has a specific list of Australian paper nautical charts intended to permit ocean transit and general coastal navigation in the event of total failure of the primary and secondary (backup) ECDIS, neither the IMO or AMSA has a requirement for a tertiary backup arrangement.

1.7 Paper chart demand for the period July 2011 to June 2012 has been used as a baseline for projections. This was the last full year before the start of the roll-out of mandatory ECDIS / ENC carriage requirements.

	2011-12 Paper Chart demand	Projected change	Residual demand (highest)	Residual demand (lowest)
International shipping via international distribution agents	98,119 *	Shift to ECDIS / ENC, retain or not retain emergency folio of paper charts	20,860	Nil
International shipping via major national distribution agents	11,625	Shift to ECDIS / ENC, retain or not retain emergency folio of paper charts	2,471	Nil
National commercial shipping via major national distribution agents	17,437	50% or 80% shift to ECDIS / ENC	8,718	3,487
Navy	24,921 **	Shift to ECDIS / ENC, retain emergency folio of paper charts	6,728	6728
Recreational vessels via major national distribution agents	25,772	Stable, no change	25772	25772
Recreational vessels via local distribution agents	6,334	Stable, no change	6334	6334
Total	184,208		70,883	42,321
Percentage of current demand	100%		38%	23%

* total includes 20860 already identified as useful for including within the emergency folio, plus 77259 other charts

** total includes 6728 already identified as useful for including within the emergency folio, plus 18193 other charts

2. Analysis / Discussion

2.1 While some of the assumptions may not prove strictly correct, the overall trend is significant. Implications include:

- **Update regime** Given that the vast majority of users beyond 2018-2020 will be recreational, what effect could this, or should this have on update regimes for paper charts and the alignment with update services for ENC?
- **Chart Schemes.** Given that the vast majority of users beyond 2018-2020 will be recreational, or carrying charts for emergency use only, will this be an opportunity for Member States to reduce or refine the number of paper charts in their schema? Should international guidelines be developed to meet these new circumstances to drive consistency, or should this be done in isolation? Does the strong trend to satellite

based positioning and away from terrestrial fixing mean overlaps between adjoining charts will no longer be required?

- **Chart specifications.** Does the projected shift heavily in favour of ENC warrant or present opportunities for revisions to symbology on and specifications for paper charts?

3. Conclusions

3.1 This paper has been submitted for information only – Member States may draw their own conclusions regarding the applicability of this study to their own particular circumstances.

4. Justification and impacts

4.1 This paper has been submitted for information only. However, Australia has recognised the expected shift and is actively developing new organisational and production arrangements to permit paper charts to be derived from ENC product level datasets.

4.2 If Member States agree that this study is generally applicable to most nations producing paper charts, then this may form part of considerations regarding future priorities and work items for various IHO technical working groups. In particular, this paper is referenced in a separate submission regarding possible future work items for CSPCWG.

5. Action required of HSSC

5.1 The HSSC is invited to:

- Consider and discuss this paper.
- Note that while the specific predictions may not be directly transferable to other Member States, the overall trend is likely to affect most Member States to a generally similar degree.