

**Paper for Consideration by ENCWG3
High Density Bathymetric ENC**

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Executive Summary:	HSSC9 instructed the ENCWG to investigate issues related to the creation of High Density Bathymetric ENC. The group are to report back to HSSC 10 recommend solutions to enable more HOs to use the current ENC infrastructure to create this data.
Related Documents:	
Related Projects:	

Background

When ENC were first introduced most HOs used their paper chart series as the source for this new vector product. Unfortunately while enabling the relatively quick creation of ENC data, it has also led to some more unforeseen issues. One of the principle advantages of using ECDIS for navigation is that the system enables the setting of a safety contour, differentiating the safe and unsafe water; however this can only accurately be achieved if the data within the ECDIS contains enough contours. Many of our ENC today only contain the minimum number of contours mirroring the paper chart. This results in some vessels having to navigate in waters indicated on the ECDIS as dangerous, when in reality the vessel is still safe and has not reached the maximum permitted water depth.

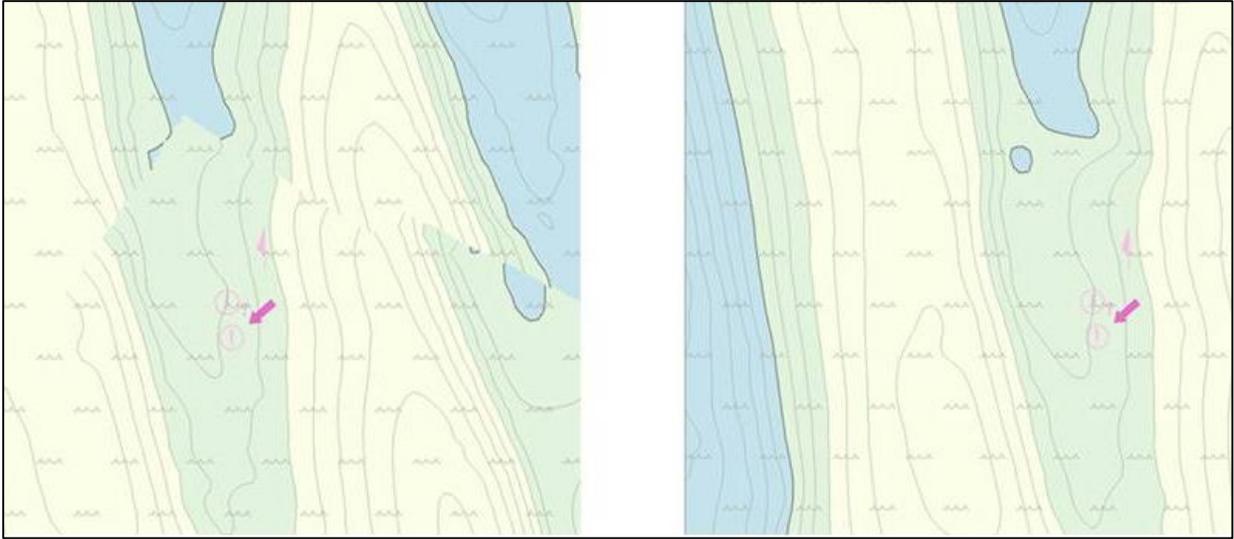
HSSC 8 tasked the ENCWG to investigate the possibility of creating a new Bathymetric ENC overlay standard. This was discussed at length during the ENCWG meeting in Italy, but consensus could not be reached. This was reported to HSSC 9, where it was concluded that a new IHO standard for Bathymetric ENC overlay was not required at this stage. The meeting did however task the ENCWG to investigate any possible barriers HOs may have to creating ENCs with additional bathymetry and recommend possible solutions. The report will also focus on ENC producers experiences to date and considerations HO's will have to plan for when creating these new ENCs.

Analysis/Discussion

Listed below are some of the issues raised by HOs that need consideration when creating High Density Bathymetric ENCs. The list is not exhaustive and the recommended solutions are not approved.

Issue	Recommended Solution
ENC 5mb limit	ENC Product specification to be updated to remove 5mb limit. Some HOs are already issuing data that exceeds this limit. UOC 4.8.20 to be updated.
ENC cells with more than 12499 spatial components referenced by a single feature	Add an additional check within S-58 and include a test in S-64
RENCs only release data on a weekly basis	This is assumption is incorrect as Primar release data more frequently. Survey RENCs to establish if they would consider new validation and data release dates for High Density Contour cells
ECDIS ENC processing	Survey OEMs to determine if there are any issues with increasing ENC file sizes

Considerations	Discussion
How to achieve an accurate set of contours	This relates to where to do the contour smoothing, on the physical surface or on the vector contour file created from the smoothed surface. It's a tradeoff between generalising the surface more, thus creating fewer tiny deeps and shoals for manual editing. But the contours created are further away from their true position. There is still no best approach to take on as it can depend on seabed morphology and the depth ranges within the surface or a combination of both.
Managing shoals and deeps	How much editing do we need to apply to the tiny shoals to make them visible on an ECDIS (tiny deeps are straight forward to remove). How big should the shoal be made? If the shoal is supported by a sounding the shoal is manually made artificially larger to enclose the sounding, this ensures the sounding is not cluttered in the display on the ECDIS.
New coverage vs including in existing coverage	How should the limits be defined ENC based on the channel/area of coverage and not defining the M_COVR cat cov 1 to the limit of the survey supplied, this ensures and future resurvey can be clipped accordingly to the limits defined. A policy needs to be agreed when the ENCs are being schemed on how to define the limits, eg. 200m beyond buoys defining channel limits? Local knowledge will be required as these limits need to cover seabed migration.
Where multiple surveys – combining bathymetric surfaces vs contouring individually	The screen shots below illustrate this issue. Left image clearly shows the difference between the two surveys and how the shoal banks have migrated West. The screenshot on the right shows how the same data looks when the surfaces have been combined before creating contours. Having tested both ENCs at the Naval Collage in Dartmouth all Navigators preferred the right image as the safety contour is a merged into a single feature. The file size was also significantly smaller.



Recommendations

The ENCWG are required to review the table above and make additions and modifications as required to create an input for HSSC 10.

Action Required of ENCWG

The ENCWG is invited to:

- a. review the issues raised that need to be considered and addressed when creating High Density Bathymetric ENC's and based on experience offer recommended solutions.