**Paper for Consideration by ENCWG3**

# Minimum size of isolated shoals

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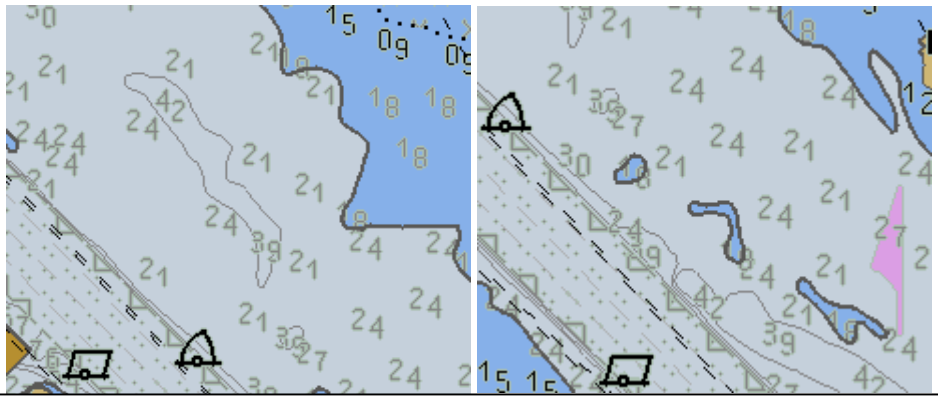
| ***Submitted by:*** | Australian Hydrographic Office |
| ***Executive Summary:*** | Discuss the impact the size of isolated shoals has on ENC display and performance. |
| ***Related Documents:*** | S-4 B-411, S-57 Appendix B.1Annex A - Use of the Object Catalogue for ENC (UOC) |
| ***Related Projects:*** | Nil |

## Introduction / Background

Modern compilation tools are able to auto generate DEPCNTs and DEPAREs based on high density data.
The result of these processes is usually a very detailed set of contours which, depending on the characteristics of the sea floor, may run very close to each other or become tiny polygons when surrounding small shoals.
The next step in the compilation process includes some degree of smoothing and the integration of the final contours with the selected soundings.
At the AHO, we have been discussing (for some time now) the need of pushing contours out to enclose or 'go around' soundings at CSCL or CSCALE (when M_CSCL exists).
Initial guidance provided to our cartographers is given below (Note: high density bathymetric ENCs are considered exceptions to the rule and tiny depth areas are not enlarged nor are contours pushed for soundings.

## Analysis/Discussion

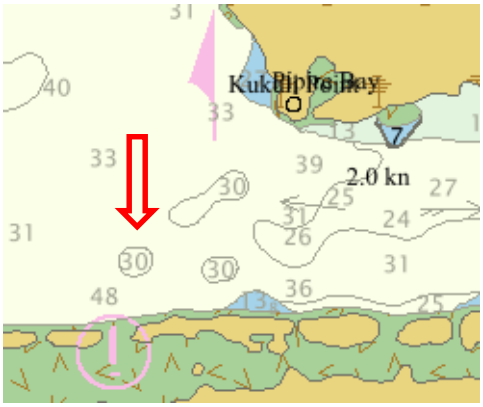
The only guidance found in S-4 is in B-411.1. It says that 'Depth contours must be drawn …. except where the soundings represent isolated shoals. In this case, *they must be encircled by a depth contour* of the same value …'
In practice the AHO draws contours in a way so they do not clash against charted soundings at compilation scale (ENC first). To speed up the conversion from ENC to paper chart, and due to a scale difference, ENC data is usually 'shrunk' (e.g. ENC CSCL=22000 whilst paper chart scale=37500), therefore contours that were not 'touching' soundings in the ENC end up doing it. With the introduction of blue contours early this year, depth contours are no longer gapped for other data however, guidance on how small an isolated shoal can be does not exist in any standard.
On the other hand contours on ENCs are all the same colour (note: safety contours are thicker) and therefore we should discuss how DEPCNTs running onto SOUNDGs may impact on the way mariners use this type of product.

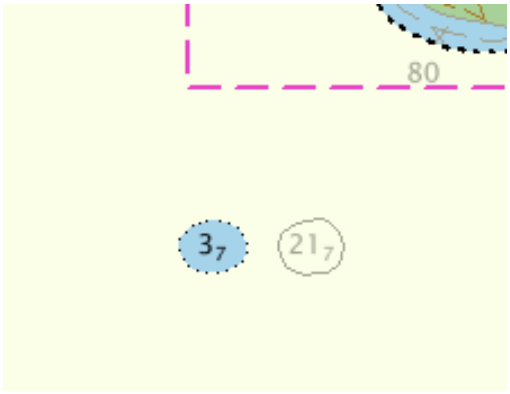


Sounding figures have higher priority than DEPCNTs but they are still hard to read when they clash against a safety contour

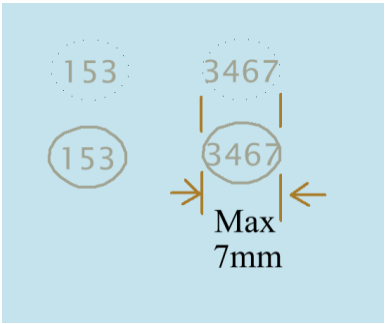
Below is an extract of the latest encoding instructions from the AHO:

1. For purposes of display clarity, Depth contours must not intersect sounding figures when viewed at the cell's compilation scale (or CSCALE if M_CSCL exists). This means depth areas will have to be enlarged to 'surround or clear' the sounding figure.
2. It has been tested that the final diameter of an isolated shoal of 2 digits plus a decimal place is as big as an 'OBSTRN' or 'UWTROC' point feature. This is the maximum size an isolated shoal in depths =< 30m should be depicted.



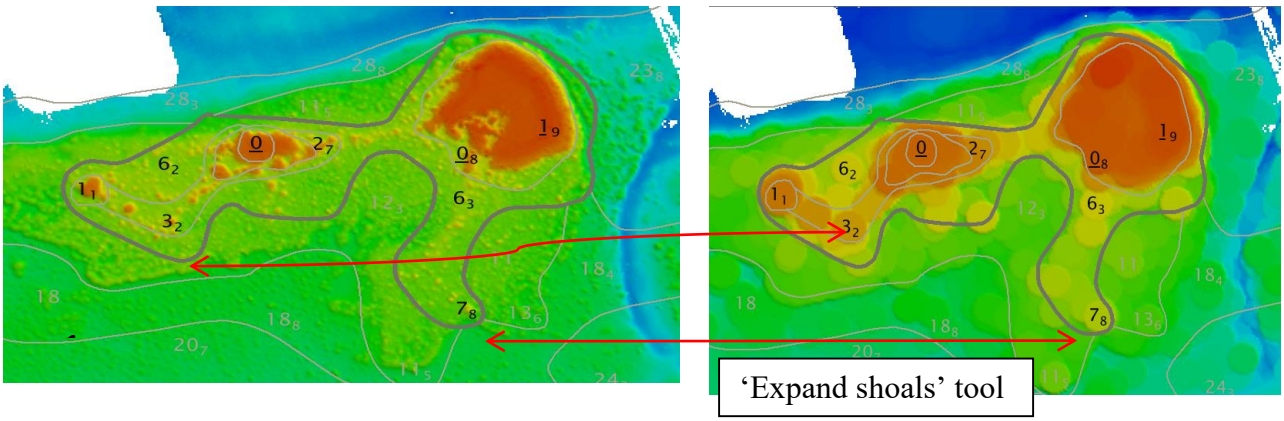




3. For 'isolated shoals' made of soundings with 3 digits or more the expectation is to enlarge the depth area to follow (roughly) the outside boundary of an UWTROC point feature. There's no need to enlarge the area more than that (approx. 7mm across) even if the contour 'intersects' the sounding figure.




<u>Auto contours derived from bathymetric surfaces:</u>

The images below show the effect the 'expand shoals' tool (Caris Base Editor) has on the 'source surface' before auto-contours are run. This process provides a smoother contour depiction at compilation scale and a 'minimum' size for isolated shoals. Although this has a positive impact on presentation it has a negative impact on accuracy because all contours will be pushed out to a certain extent. This is not always a problem because, at compilation scale, the final picture may still be considered 'acceptable' and 'fit for purpose'.
In conclusion, with the right settings and even with some manual editing still necessary in certain areas (e.g. traffic routes along narrow channels), the overall compilation time savings when compared to non automated compilation methods is overwhelming.




**Conclusions**

The minimum size selected for isolated shoals impacts on how production tools generalise and smooth the entire bathymetric surface used as the basis for auto contouring. This parameter affects how much other contours are 'pushed out' from their 'true' position. A compromise is necessary in order to enlarge isolated shoals to a point they are visually detectable without degrading the rest of the bathymetric contours to an unacceptable level.

**Recommendations**

Obtain input from mariners on the impact the following issues have on the clarity and readability of ENC data:

- DEPCNTs running on SOUNDGs
- Minimum size of isolated shoals.

Amend current standards to provide guidance on 'minimum sizes of isolated shoals' and best practices regarding depth contours clashing sounding figures at compilation scale.

**Justification and Impacts**

Informed guidance on this topic would facilitate the introduction of automated tools without degrading the presentation and usability of the resulting product.

**Action Required of NIPWG**

The ENCWG is invited to:

a. discuss the impact of isolated shoals sizes on ENCs
b. discuss the impact of DEPCNTs running on SOUNDGs on ENCs
c. endorse the recommendations
d. share this paper with the NCWG
e. provide further guidance in S-4 and/or S-57 Appendix B.1Annex A - Use of the Object Catalogue for ENC (UOC)