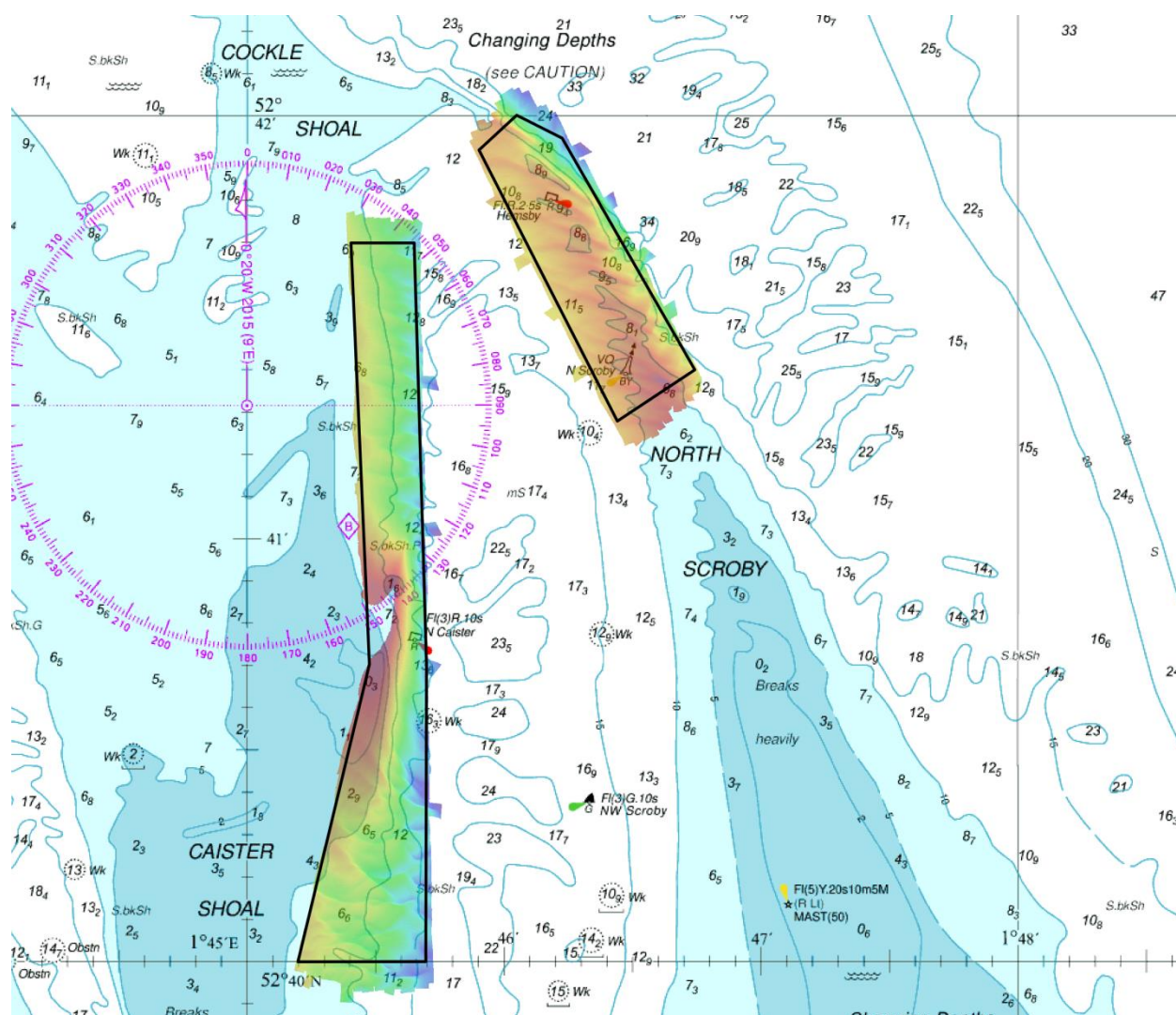




United Kingdom
Hydrographic Office

EAST ANGLIA COCKLE SHOAL

SUMMARY ASSESSMENT ON THE ANALYSIS OF THE
FOCUSED ROUTINE RESURVEY AREA EA3A AND EA3B
FROM THE 2015 SURVEY



ENGLAND - EAST ANGLIA

COCKLE SHOAL

Summary Assessment EA3 A&B /2015

A summary assessment of the 2015 hydrographic survey of the area: to monitor recent seabed movement; to identify any implications for shipping; and to make recommendations for future surveys.

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COCKLE SHOAL, EA3A and EA3B, 2015

1 INTRODUCTION

- 1.1 This Assessment is produced by the United Kingdom Hydrographic Office (UKHO) for the Maritime and Coastguard Agency (MCA).
- 1.2 Analysis of the Routine Resurvey Areas forms part of the Civil Hydrography Programme and the reports are made available to members of the Committee On Shipping Hydrography (COSH) through the UKHO website, before being presented to the Civil Hydrography Working Group. When approved, the recommendations are incorporated into the Routine Resurvey Programme. The report is governed by a Memorandum of Understanding between the Department for Transport (including the MCA) and the MOD (including the UKHO).
- 1.3 The area of EA3 includes two focused areas (EA3A and EA3B) which are re-surveyed annually. The full extents of area EA3 is surveyed every 3 years and was last surveyed in 2014 and fully reported on. This summary report examines the annual focused survey for EA3A and EA3B conducted in 2015 (HI1482) and compares this against the survey data collected in 2014 (HI1458).

2 DESCRIPTION OF THE AREAS

- 2.1 The Area EA3A is sited on the western side of Caister Road Channel, approximately centred over the 10m contour that joins Cockle Shoal to the North and Caister Shoal to the South. The area was extended in 2015 into EA4 due to significant shoaling being reported in 2014 just south of North Caister buoy. The extended area EA3A consist of an area of 0.30 sq NM (1.02 sq km).
- 2.2 The Area EA3B was extended northwards in 2014 to cover predicted bank migration. It is sited over buoyed entrance to Caister Road (Hemsby to North Scroby Cardinal Buoy) Area EA3B consist of an area of 0.17 sq NM (0.58 sq km).
- 2.3 Cockle Shoal is a broad ridge of sand at the head of Caister Road and links the banks of Caister Shoal and North Scroby. It was formed by an ebb-residual current transporting sediment northwards through Caister Road. However much of Cockle Shoal lies north and outside of the current focused survey limits.
- 2.4 The banks are predominantly comprised of fine sand, but across the area range from fine sand to coarse sand with pebbles; three bottom samples were taken during 2011. Irregular symmetrical and asymmetrical sandwaves and megaripples dominate the area. Sandwaves and megaripples lying in Caister Road and across Cockle Shoal link up along the outer limit of the bank, effectively forming an outer ridge. This outer ridge is possibly created by the opposing, south-east bound, sediment transport regime on the eastern side of the bank. The 2015 survey data is overlaid on Chart BA1534 Great Yarmouth and Approaches Scale1:25000 (INT1558) is at Annex B.

3 SURVEY DATA

- 3.1 The 2014 survey HI1458 for area EA3A and EA3B was conducted on 28th June and 7th July 2014 in slight to moderate seastate with wind stated as 3-4, Beaufort scale.
- 3.2 Due to the extension of the 2015 EA3A area the data from 2014 survey HI1458 for area EA4 was used to infill areas not covered by the 2014 survey of EA3A. The 2014 survey HI1458 for area EA4 was conducted from 29th June to 16th August in conjunction with other areas and with days lost due to bad weather.

- 3.3 The 2015 survey HI1482 was conducted from the 3rd October until the 8th October 2015 with weather downtime reported from the 4th until the 7th October.
- 3.4 The Bathymetry data from both surveys was collected using a multibeam echosounder and the data reduced to Chart Datum using post processed GPS heighting combined with the UKHO Vertical Offshore Reference Frame (VORF). Both hydrographic surveys mentioned above were supplied as a 1m gridded Combined Uncertainty & Bathymetry Estimated (CUBE) surface and have been validated by UKHO as meeting IHO S44 standard for order 1a.
- 3.5 The 2015 survey data is overlaid on Chart BA1534 Great Yarmouth and Approaches Scale 1:25000 (INT1558) in Annex B

4 CHANGES SINCE THE 2014 SURVEY

- 4.1 Colour banded depth plots of the 2014 and 2015 Surveys are presented in Annex E and F respectively. A variability plot is at Annex C and comparison of the 5 and 10 metre contours are at Annexes G and H respectively.

EA3A

- 4.2 The survey data of area EA3A from 2015 indicates that the northern end of Caister Road has continued to narrow at an accelerated rate since 2014. This is due to the migration of Caister Shoal by 400metre (circa) North-North East since 2014 shown by a comparison of the 5 metre contour between the 2014 and 2015 surveys.
- 4.3 A further comparison of the 5 and 10 metre contours in Area EA3A show that 450 metres north of North Caister Buoy the 10m contour of Caister Shoal has moved eastwards by approximately 130 metres, reducing to approximately 60m at the charted location of the Buoy. The change in the 5 metre contour shows Caister Shoal advancing eastwards by a maximum of 210m from its charted location.

EA3B

- 4.4 Cross-section profiles E-F and G-H in Annex D of area EA3B supports the 2014 report for EA3 that Cockle Shoal is continuing to move seawards into deeper water and ESE towards the entrance of Caister Road by approximately 60 metres causing the general depths in the north of area EA3B to become shoaler.
- 4.5 Statistical analysis of the variation between 2014 and 2015 survey data (generalised to a 5m bin shoal bias) indicates that depths across the area EA3B have become deeper by 2.2 metres at 2 standard deviations. However as the variability plot (Annex C) shows this is biased by the increased removal of seabed material in the north of the area compared to the south.
- 4.6 The minimum depth within the entrance of Caister Road has become deeper. With the minimum depth of 8.4 metres situated 225 metres NNE of North Scroby Cardinal Buoy 0.3m deeper than the minimum depth in the same locality in 2014.
- 4.7 In the vicinity of Hemsby buoy (EA3B) a minimum depth of 9.1 metres found 200 metres South East of Hemsby buoy, 1.7 metres deeper than in the same location in 2014. This compares to the 2014 minimum depth in the vicinity of the same buoy of 8.9 metres located 120 metres north of Hemsby buoy which has subsequently deepened to 10.4 metres

- 4.8 The changes in 10 metre contour indicate that seabed materials are being transported from the northern end of North Scroby bank both seaward and to the south. This may be contributing to a continued recession SSE of the bank as reported in 2014. However due to the limited area of survey in area EA3B this cannot be confirmed.

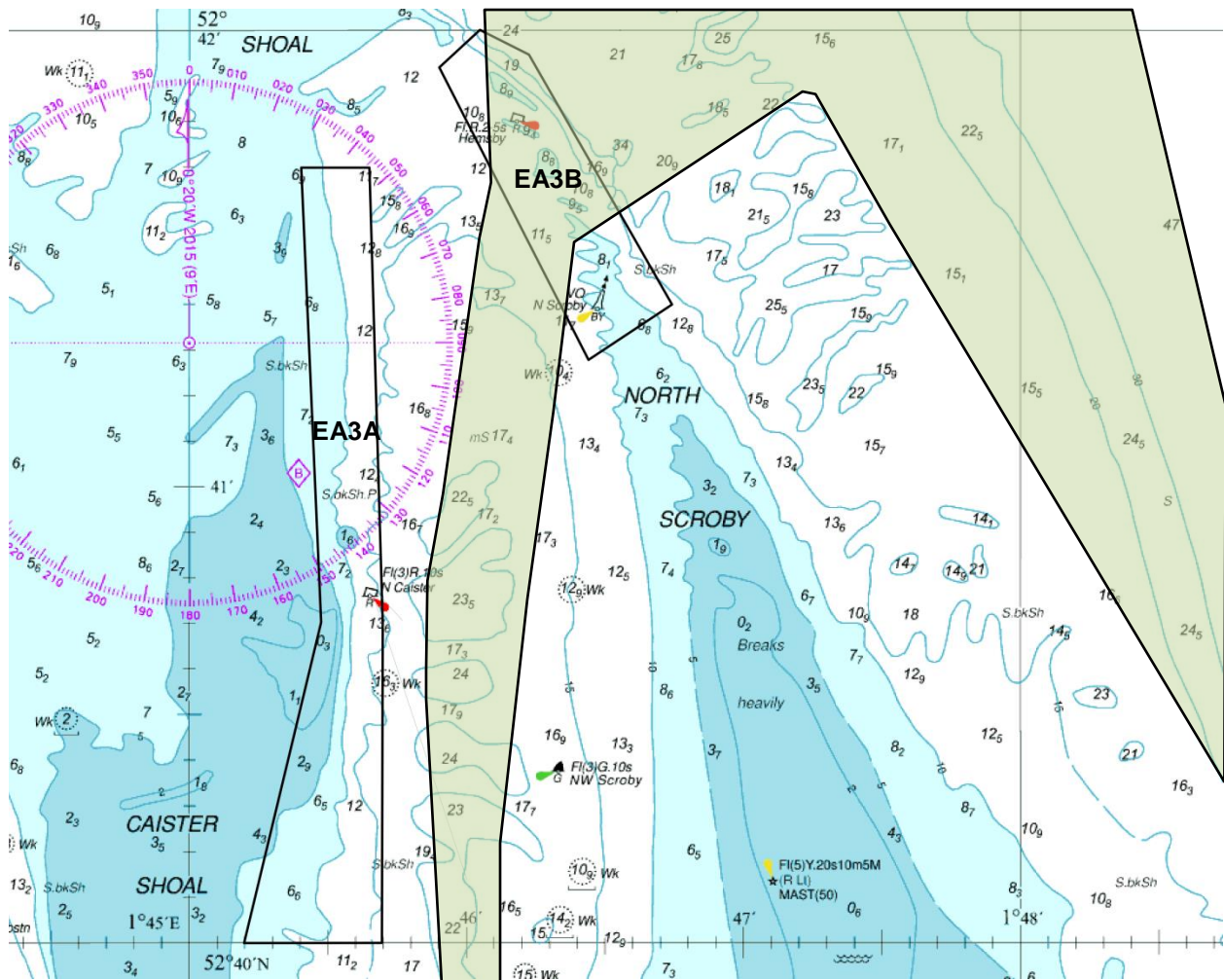
5 IMPLICATIONS FOR SHIPPING

- 5.1 The sample AIS data available to UKHO for 2015 shows the vessels (>2000GT) using Caister Road typically have a draught less than 7 metres however there has been a 8.25 metre draught vessel shown to have used the route.
- 5.2 The Narrowing of Caister Road is in line with developments over recent years but has been shown to be accelerating. In the north of the area EA3B the water depths have become shoaler, due to Cockle Shoal advancing seawards. The maximum depth in the buoyed entrance (Hemsby to North Scroby Buoy) across the bank into Caister Road has generally shown a slight increase.
- 5.3 The indicative shipping routes are shown in Annex A and illustrate that vessels are already using a narrow area in the centre of Caister Road and hence are largely unaffected by the migration of Caister Shoal shown in area EA3A. However the shoaling shown in north of area EA3B may in subsequent years affect current shipping routes as vessel are currently shown to pass either side of the Hemsby channel buoy.

6 RECOMMENDATIONS

- 6.1 The limits of the annual focused survey area EA3A should be altered to ensure that coverage is maintained over the 10 metre contour along the eastern boundary near North Caister Channel Buoy. This will increase the overall area by 0.23km² / 0.07NM².
- 6.2 The limits of the annual focused survey area EA3B should be extended both north and to the east to the boundary of EA3, adjusted following the 2014 assessment. This will enable a comparison of the scheduled 2017 full area survey of EA3 with the proposed adjusted focused area EA3B and hence provide additional data on the migration of Cockle Shoal. This can then inform any adjustment of area EA3 to include sections of area EA1 (Cockle Gateway), due for resurvey in 2023. This adjustment will increase the overall area by 0.37km² / 0.11NM².
- 6.3 The resurvey interval of the focused area should remain unchanged.
- 6.4 The proposed new limits of both focused areas are given in Annex I with a list of the new coordinates.

SHIPPING ROUTE

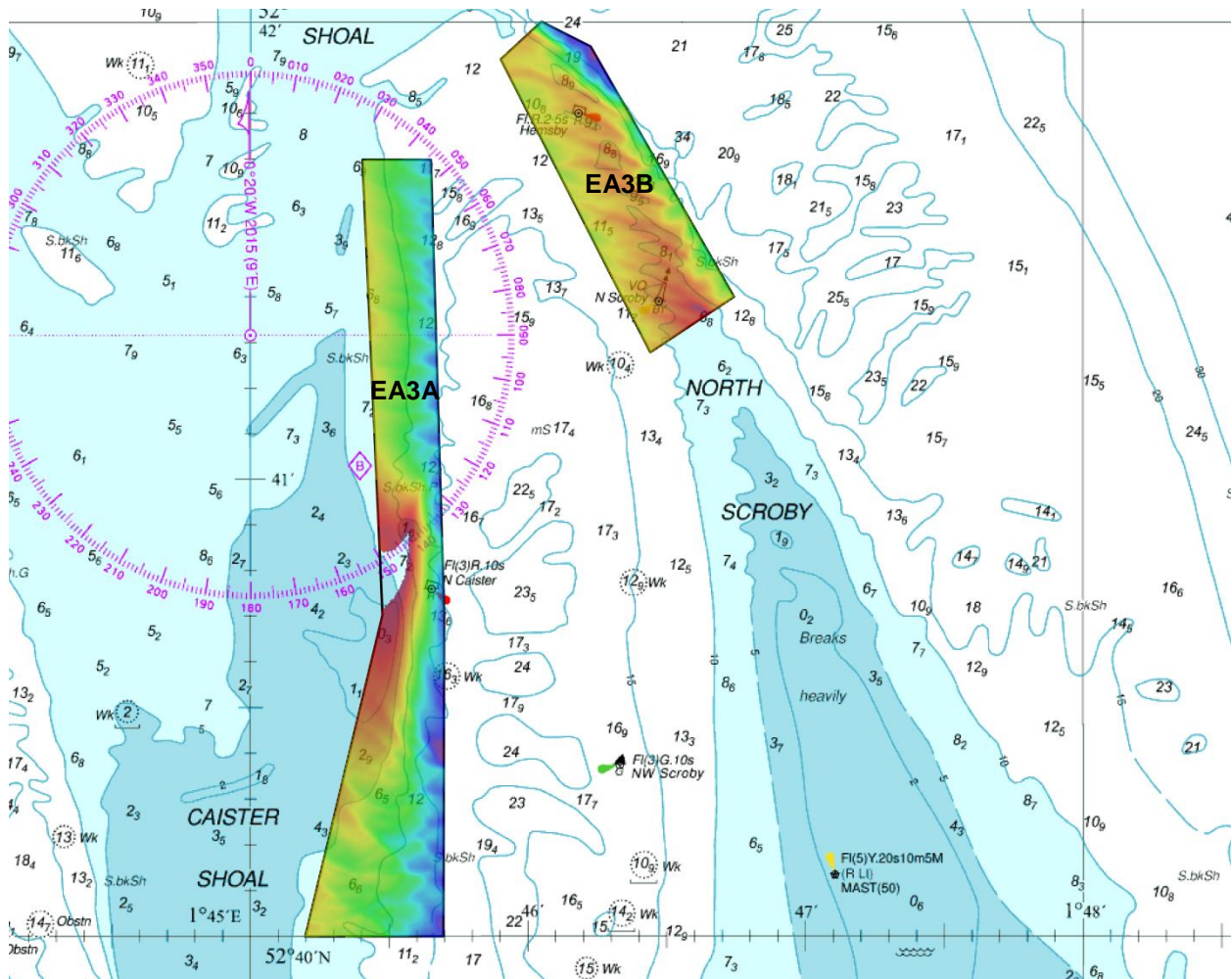


— Limits of EA3A and EA3B survey area

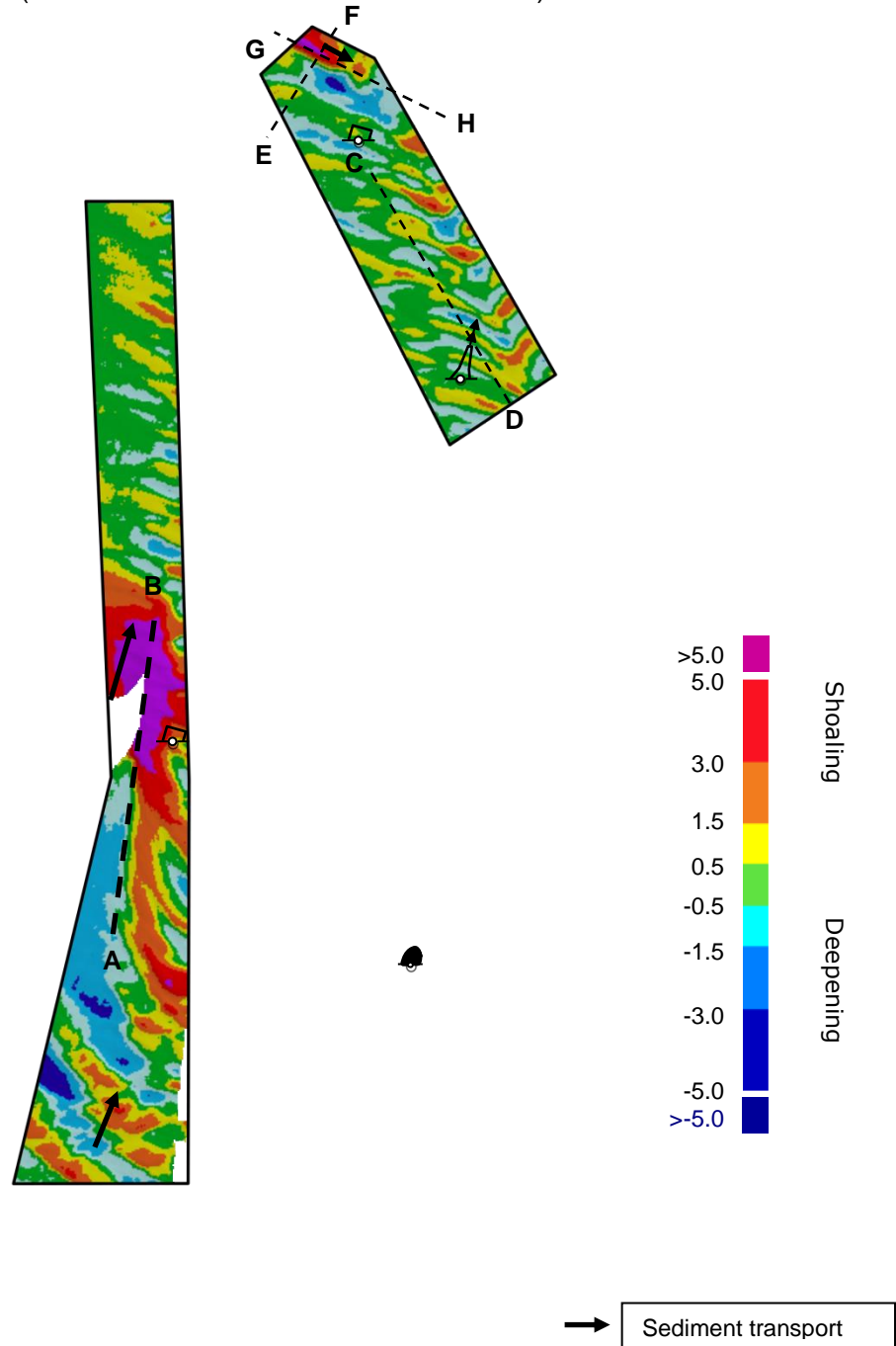
— Indicative shipping routes through the area

Note: Data from satellite AIS data for FY2015/2016 of vessels larger than 2000GT

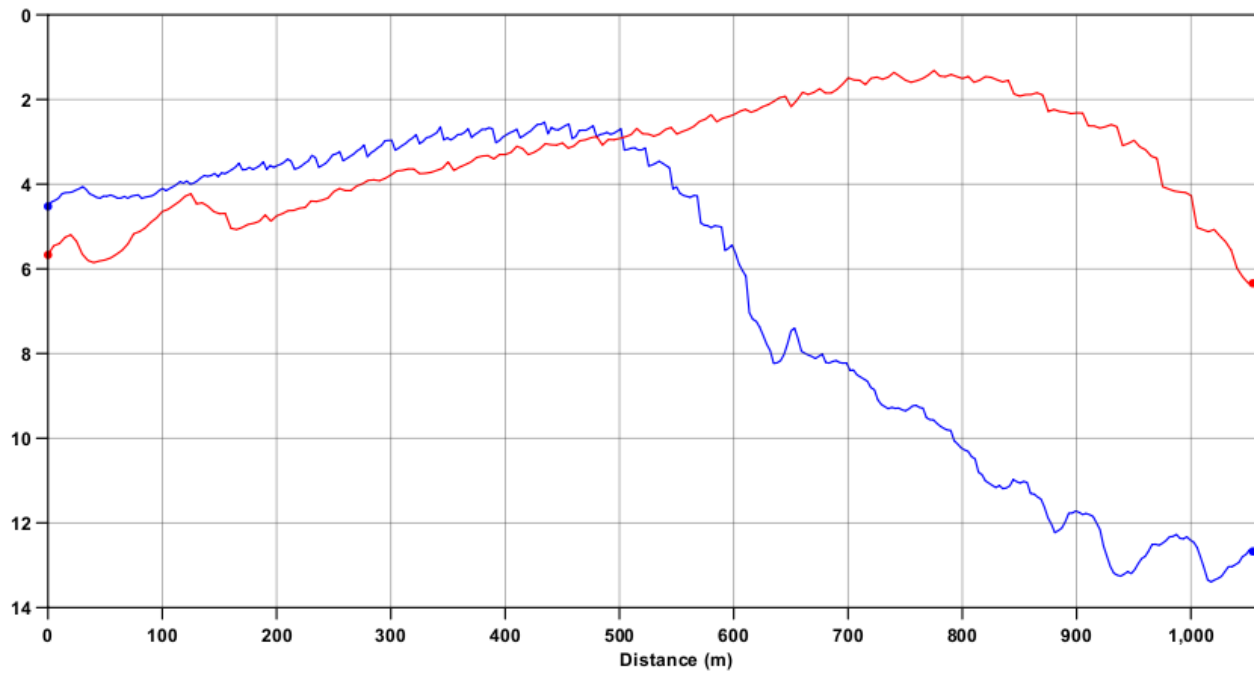
2015 SURVEY DATA OVERLAID ON CHART 1534



VARIABILITY PLOT SHOWING
BATHYMETRIC CHANGES BETWEEN THE 2014 AND 2015 SURVEYS
(See Annex D for Cross-Section Profiles)



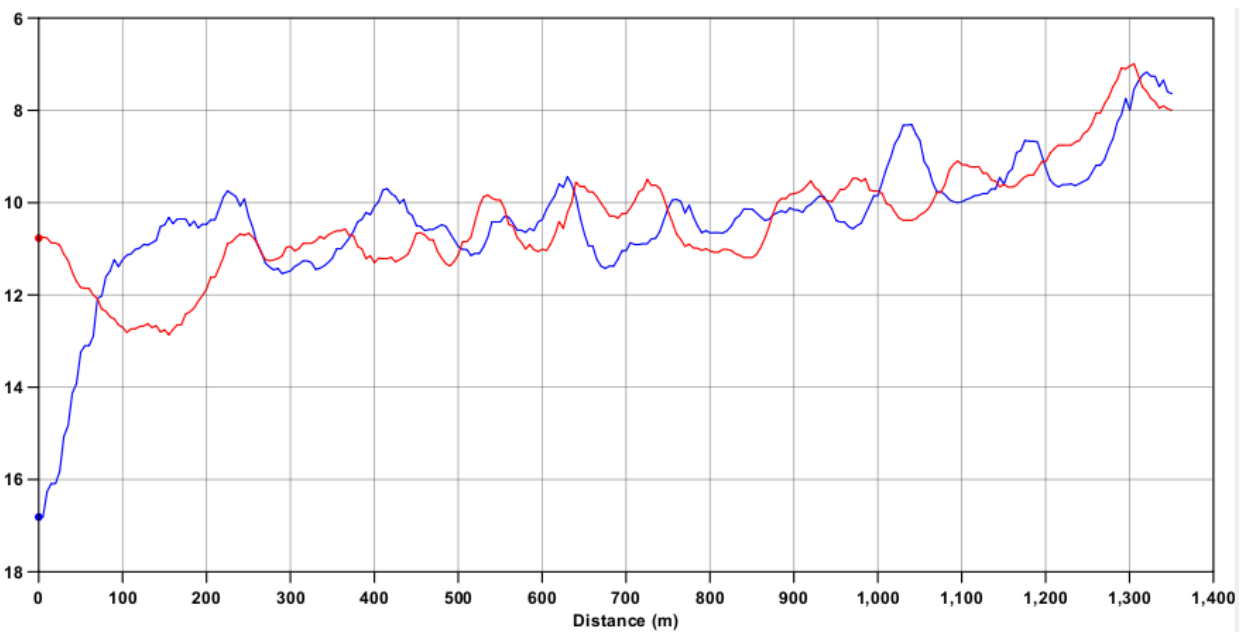
CROSS SECTION COMPARISONS FROM THE 2014 AND 2015 SURVEYS
(See Annex C for Locations)



A

Cross-section of 2014 (blue) and 2015 (red) surveys

B

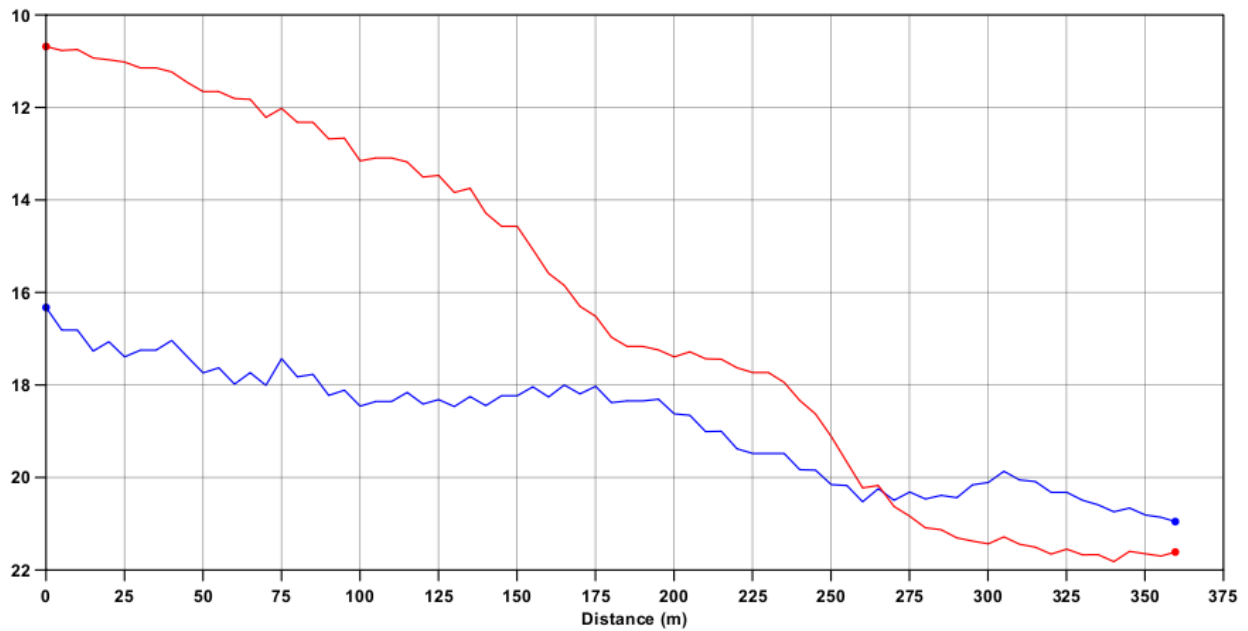


C

Cross-section of 2014 (blue) and 2015 (red) surveys

D

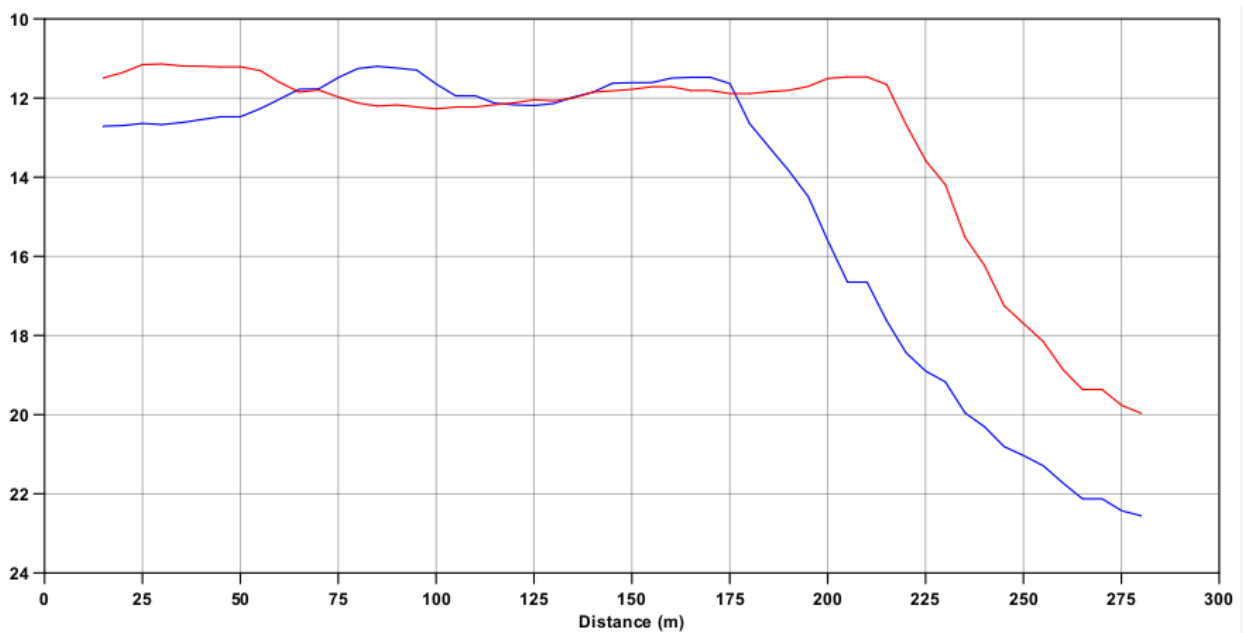
Year of Survey	
—	2015
—	2014



E

Cross-section of 2014 (blue) and 2015 (red) surveys

F

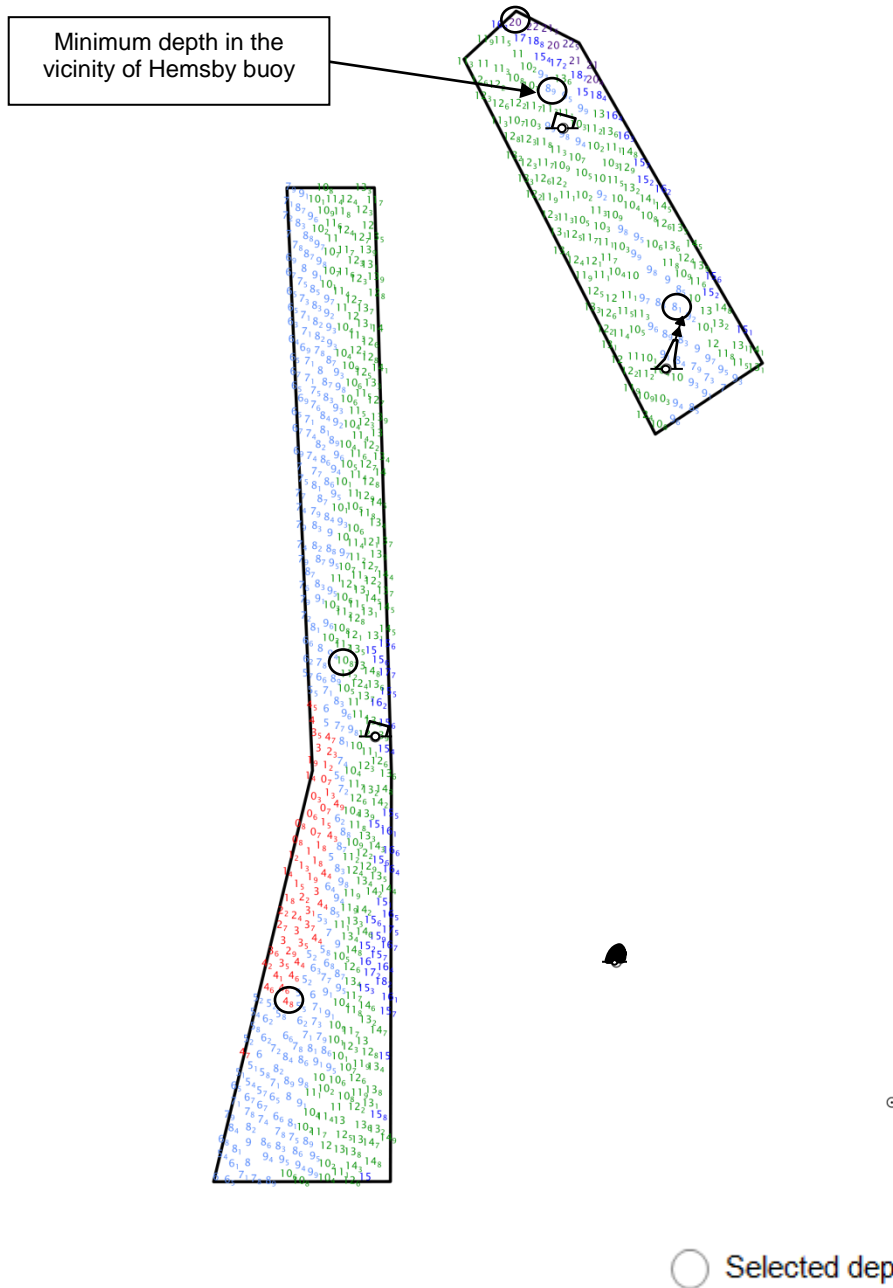


G

Cross-section of 2014 (blue) and 2015 (red) surveys

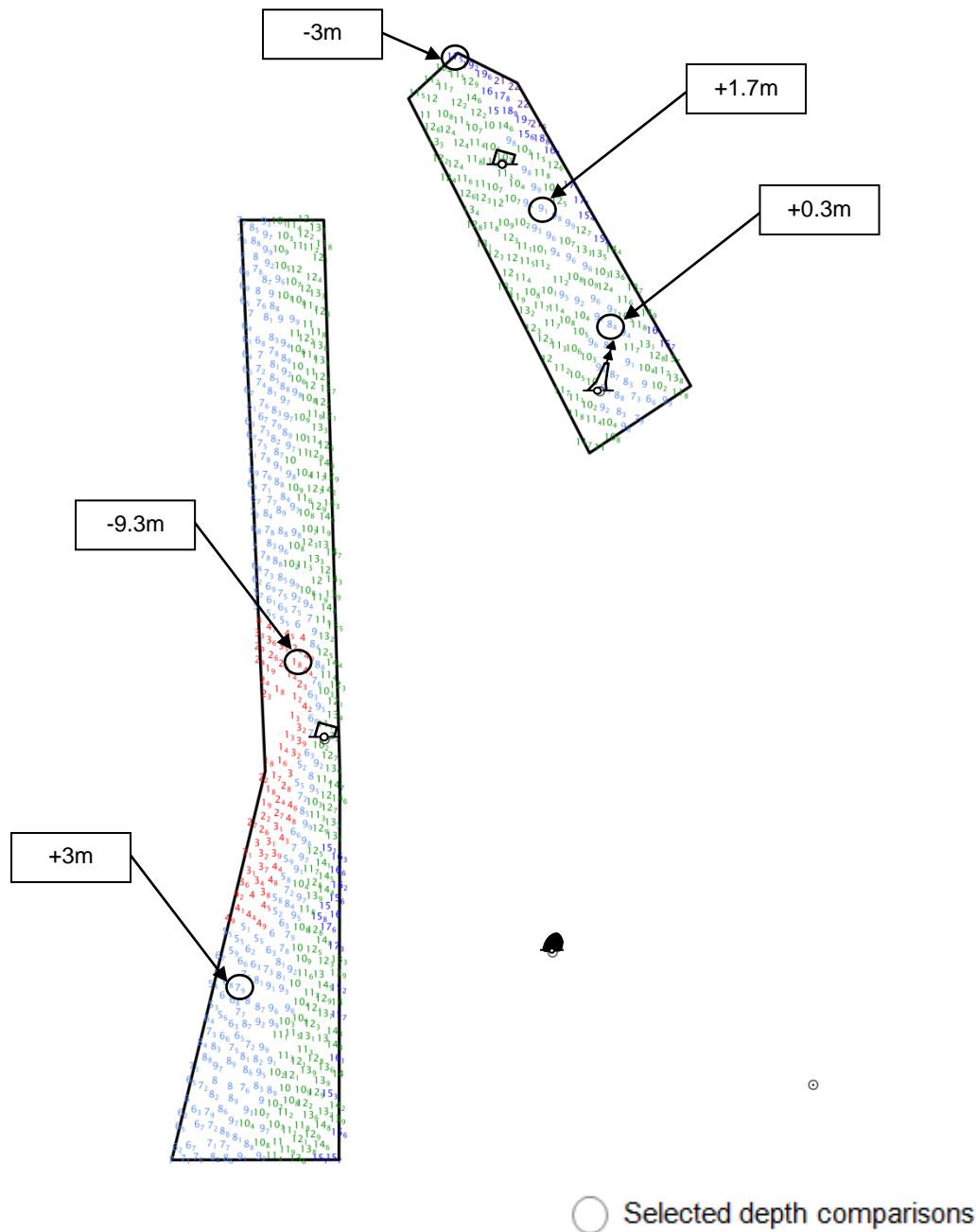
H

COLOUR BANDED DEPTH PLOT
FROM THE 2014 SURVEY
SHOWING SELECTED DEPTHS



Depths in Metres	
	0.0 to 5.0
	5.0 to 10.0
	10.0 to 15.0
	15.0 to 20.0

**COLOUR BANDED DEPTH PLOT
FROM THE 2015 SURVEY SHOWING SELECTED DEPTHS**

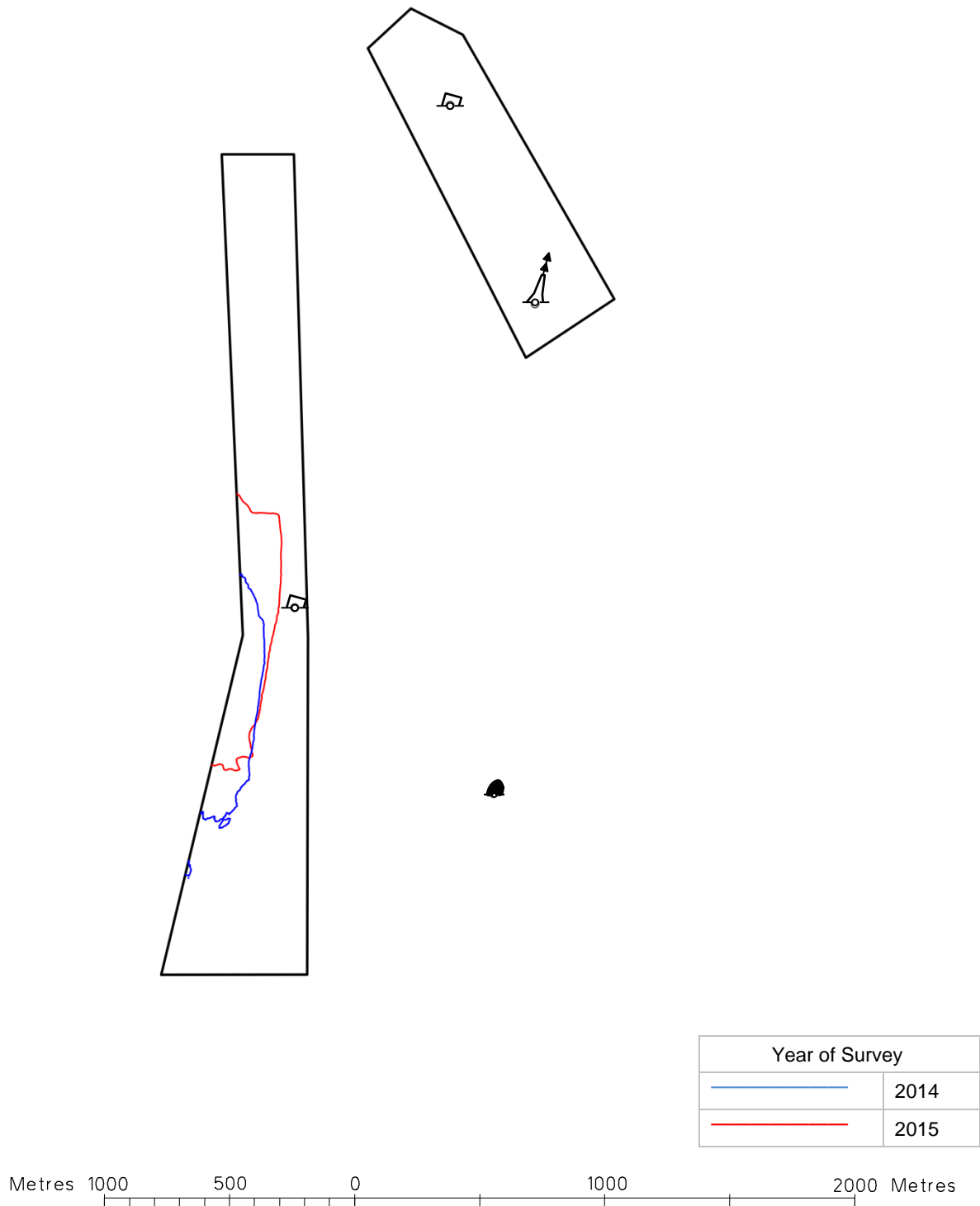


Note: Depth changes indicated above are for the same location as the sounding derived from the 2015 survey data. Hence values may not match the difference between the soundings shown in the 2014 and 2015 depth plots above as shoal bias sounding selection will select different positions that best represent the shoal values in a data set.

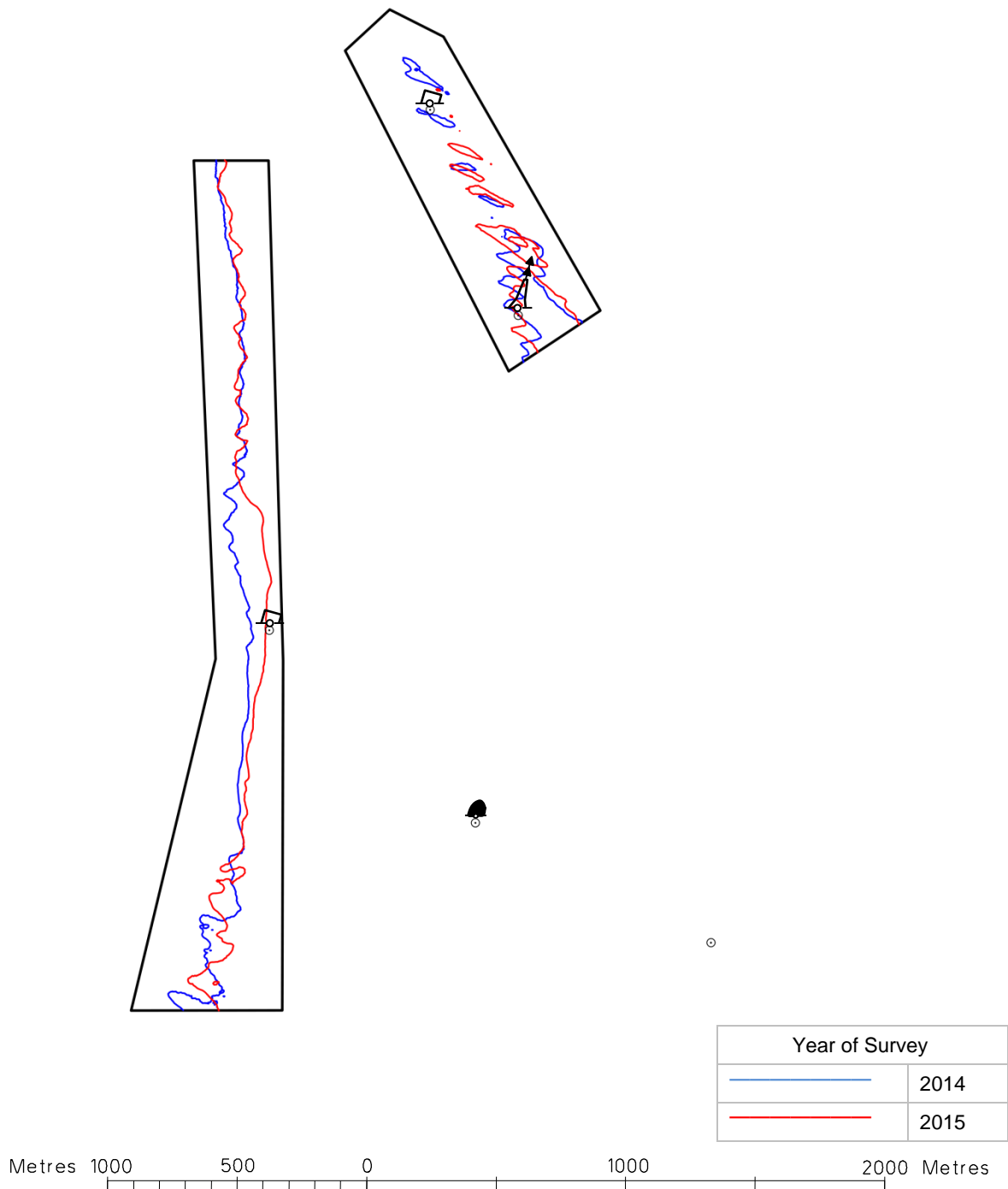
Deepening + Positive value / Shoaling - Negative value

Depths in Metres	
	0.0 to 5.0
	5.0 to 10.0
	10.0 to 15.0
	15.0 to 20.0

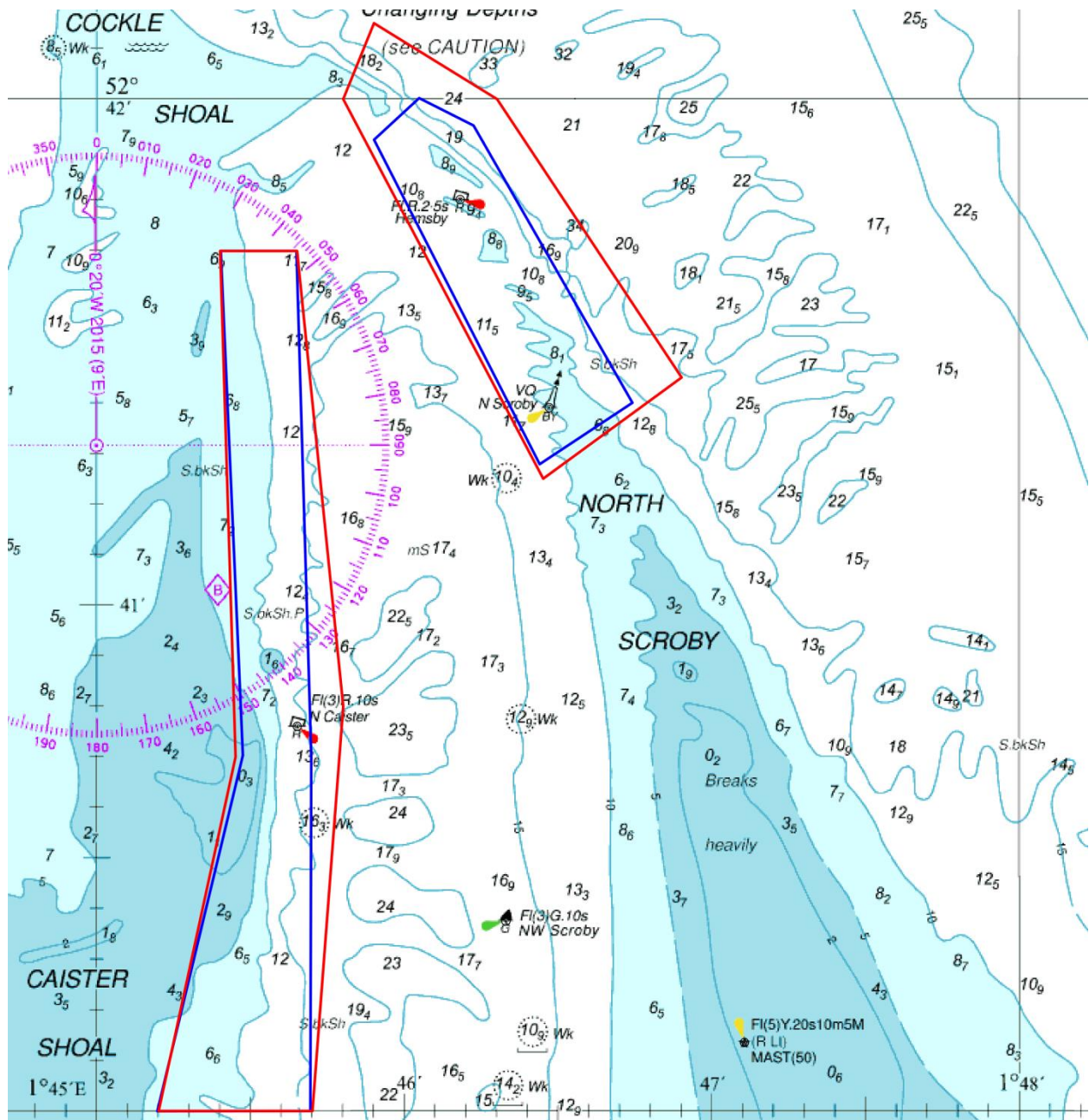
COMPOSITE DIAGRAM OF THE
5 METRE CONTOUR FROM THE 2014 AND 2015 SURVEYS
SCALE 1:25,000



COMPOSITE DIAGRAM OF THE
10 METRE CONTOUR FROM THE 2014 AND 2015 SURVEYS
SCALE 1:25,000



PROPOSED NEW LIMITS



Limits of Survey Area	
—	Revised
—	Current

The coordinates of the adjusted survey area limits for the annual focused areas EA3A and EA3B are shown below.

EA3A total area 1.25km^2 / 0.37 NM^2

- a) $52^\circ 40.80\text{ N } 1^\circ 45.80\text{ E}$
- b) $52^\circ 40.00\text{ N } 1^\circ 45.70\text{ E}$
- c) $52^\circ 40.00\text{ N } 1^\circ 45.20\text{ E}$
- d) $52^\circ 40.70\text{ N } 1^\circ 45.45\text{ E}$
- e) $52^\circ 41.70\text{ N } 1^\circ 45.40\text{ E}$
- f) $52^\circ 41.70\text{ N } 1^\circ 45.65\text{ E}$

EA3B total area 0.85km^2 / 0.25 NM^2

- a) $52^\circ 42.00\text{ N } 1^\circ 46.30\text{ E}$
- b) $52^\circ 41.45\text{ N } 1^\circ 46.90\text{ E}$
- c) $52^\circ 41.25\text{ N } 1^\circ 46.45\text{ E}$
- d) $52^\circ 42.00\text{ N } 1^\circ 45.80\text{ E}$
- e) $52^\circ 42.15\text{ N } 1^\circ 45.90\text{ E}$