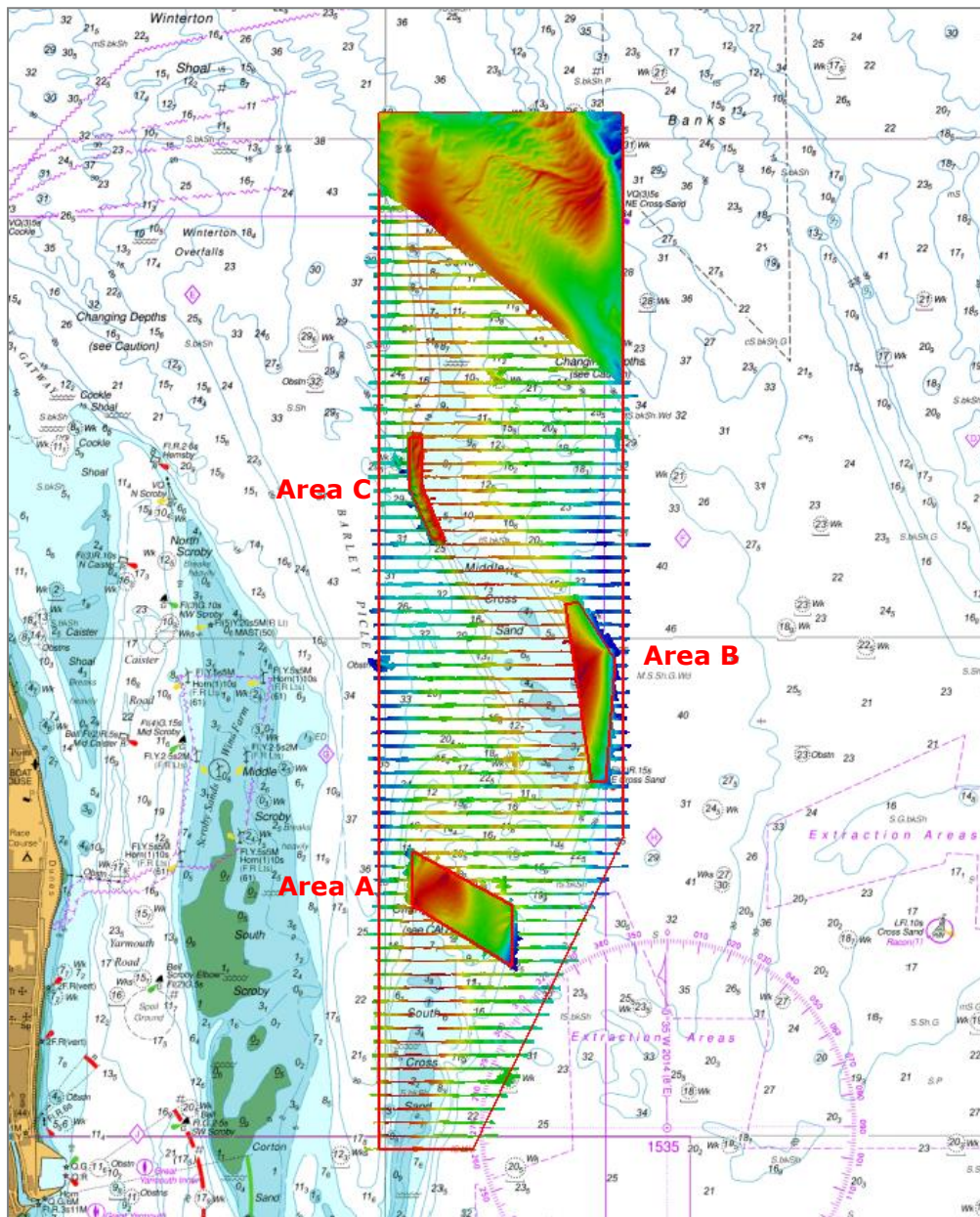




# EAST ANGLIA CROSS SANDS

## SUMMARY ASSESSMENT ON THE ANALYSIS OF ROUTINE RESURVEY AREA EA7 FROM THE 2014 SURVEY



## EAST ANGLIA

## CROSS SANDS

### Summary Assessment EA7/2014

An assessment of the 2014 hydrographic survey of the area: to monitor recent seabed movement; to identify any implications for shipping; and to make recommendations for future surveys.

The Admiralty Chart extracts, other graphics and tables in this Report are included for illustrative purposes only and are NOT TO BE USED FOR NAVIGATION.

This material is protected by Crown Copyright. It may be downloaded from the UK Hydrographic Office's (UKHO) web site and printed in full for personal or non-commercial internal business use. Extracts may also be reproduced for personal or non-commercial internal business use on the condition that the UK Hydrographic Office is acknowledged as the publisher and the Crown is acknowledged as the copyright owner.

Applications for permission to reproduce the material for any other purpose (including any distribution of the material or extracts to third parties) can be made interactively on the UKHO's web site ([www.ukho.gov.uk](http://www.ukho.gov.uk)), by e-mail to [intellectualproperty@ukho.gov.uk](mailto:intellectualproperty@ukho.gov.uk) or in writing to Intellectual Property, UK Hydrographic Office, Admiralty Way, Taunton, Somerset, TA1 2DN.

## **Cross Sands, 2014**

### **1. Introduction**

- 1.1 Area EA7 is fully surveyed every 12 years, with an intervening 6-year check-line survey. Within the full area there are three focused areas A, B and C which are fully surveyed every 3 years, as shown on the cover of this report.
- 1.2 This summary report looks at the 6-year checkline survey and 3-year focused surveys conducted in 2014. The northern part of EA7 was surveyed under the survey 'Newarp Banks to Cross Sands' (HI1428) in 2014 and this survey has been included in the analysis, as this area is not covered by the check-line survey. For fuller details, the full assessment on the 2008 survey should be referred to.

### **2. Description of the Areas**

- 2.1 Cross Sands is an extremely mobile system of banks, formed by North, Middle and South Cross Sand. South Cross Sand extends south of EA7, linking with Corton Sand. A break in the banks between Middle and South Cross Sand leads into Barley Picle and is used as a route by some shipping while on passage off the East Coast, which forms a shorter route to passing east of Cross Sand.

### **3. Survey Data**

- 3.1 The 2008 survey was conducted from 24 May to 6 June. The 2011 survey was conducted from 5 to 8 May, with additional work run on 9 June. The 2014 survey was conducted from 14 August to 6 September, with a number of days lost due to poor weather. The 2014 survey of the northern area, under HI1428, was conducted between 12 April and 14 September. The Vertical Offshore Reference Frame (VORF) and GPS heighting were used to reduce depths to Chart Datum in both 2014 surveys.

### **4. Changes since the Previous Survey**

#### ***Focused Area A: South Cross Sand (Northern Limit): 2011 - 2014***

- 4.1 A shoal area forming the northern part of South Cross Sand has narrowed and extended northwards, as shown in the 10-metre contour comparisons and cross-sections in [Annex A](#). The 2014 and 2011 survey areas differ due to changes in the position of the bank, allowing comparison between the two surveys over only a limited area; the 2008 survey has been included in Annex A for fuller longer term comparison.

#### ***Focused Area B: Middle Cross Sand (Eastern Limit): 2011 - 2014***

- 4.2 The eastern limit of Middle Cross Sand has seen a large north-eastward migration over the last 10 years. Since the 2011 survey the 10-metre contour has extended in a northeast direction by 400 metres, as shown in [Annex B](#). The 2008 survey has been included in Annex B to show the longer term change. The migration of the bank into deep water has resulted in large changes in depth, with up to 28 metres change seen in a surface difference comparison between the two surveys.
- 4.3 The eastern limit is marked by a clear ridge with an area of scour at its base, as shown in figure 1.

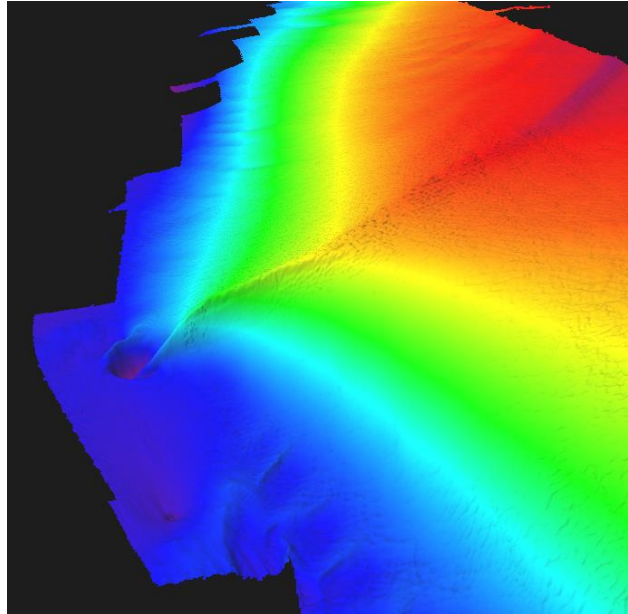


Figure 1: Eastern extent of the bank viewed from the north (x5 vertical exaggeration)

***Focused Area C: Middle Cross Sand (Western Limit): 2011 - 2014***

4.4 The overall position of the bank remains broadly the same, but with some westward expansion in the north of the area, as shown in the 10-metre contour comparison at [Annex C](#).

***Main Area: 2008 – 2014***

***North Cross Sand***

4.5 The 10-metre contour marking the northeast part of the bank has moved 390 metres to the north, with the minimum depth increasing from 8.4 to 8.6 metres. The bank has generally migrated to the northeast, as shown in cross-section [A-B](#) in [Annex D](#).

4.6 On the western side of North Cross Sand, the 10-metre contour has reduced in width, moved west by around 360 metres and extended north, as shown in [Annex D](#) contour comparison and cross section [C-D](#).

***Middle Cross Sand***

4.7 Middle Cross Sand has extended to the east, as shown in cross-sections [E-F](#) and [G-H](#) in [Annex D](#). The southern limit of the bank has receded northwards due to the loss of sediment, resulting in a general deepening shown in cross-section [I-J](#).

4.8 In the channel between Middle and South Cross Sand there have been large changes in depth. Away from the southern limit of Middle Cross Sand, the minimum depth has increased from 9.6 metres to 11.3 metres. However, at the location of the soundings there has been large change, with 9.6 metres increasing to 17.9 metres and 11.3 metres reducing from 17.7 metres. This is shown in figure 2.

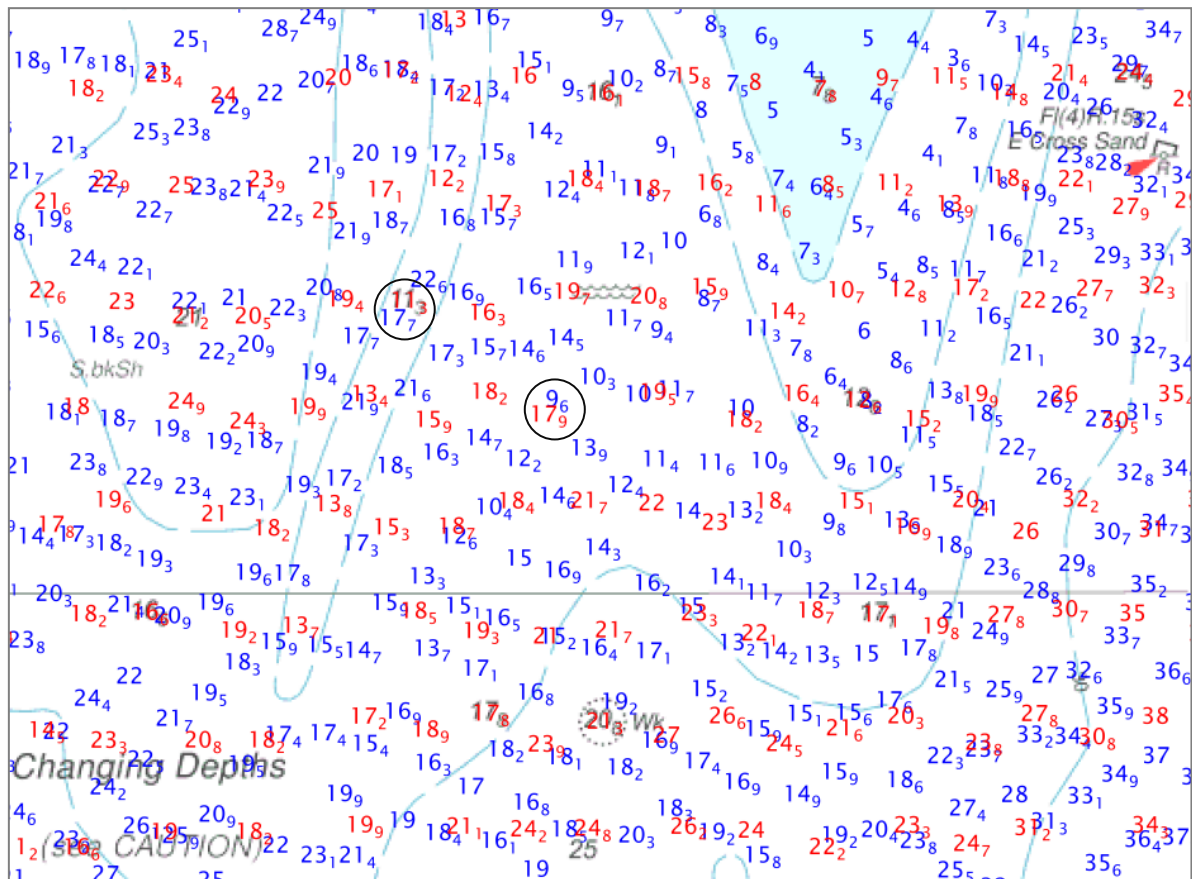


Figure 2: depth changes south of Middle Cross Sand, Blue: 2008 Red: 2014.

- 4.9 In the middle and south of South Cross Sand its width has reduced at the 10-metre contour level. This is a result of a loss of sediment from the eastern side and only slight expansion on the western side, as shown by cross-sections [M-N](#) and [O-P](#) in [Annex D](#). Large amounts of sediment have been removed from the eastern side, with over 10 metres removed in some areas. In the north of South Cross Sand (within Focused Area A), sediment has built up, as shown in cross-section [K-L](#) at [Annex D](#).

## 5. Implications for Shipping

### ***Focused Area A: South Cross Sand (Northern Limit):***

- 5.1 Vessels pass between South and Middle Cross Sand, to or from Barley Picle, as a shorter route to passing east of Cross Sands while on passage off the East Coast. Vessels drawing up to 6.7 metres have been observed in sample AIS data.
- 5.2 Changes that have occurred have largely been parallel to the route adopted by shipping and the 10-metre contour remains southwest of the route observed in the AIS data.

### ***Focused Area B: Middle Cross Sand (Eastern Limit):***

- 5.3 Shipping passing to the east of East Cross Sand buoy in the south of the area, heading to or from Northeast Cross Sand buoy to the north, keep to the east of the area. However continued extension of the bank to the east would be of potential concern.

### ***Focused Area C: Middle Cross Sand (Western Limit):***

- 5.4 Most shipping passes to the east of Cross Sands, but some use Barley Picle to the west of Middle Cross Sand as a shorter route while on passage off the East Coast. Observed

passage tracks are on a NW/SE heading and pass at least 1,200 west of Area C. Therefore, changes that have occurred have no impact on use of the area.

***Main Area:***

- 5.5 The north-eastern limit of North Cross Sand is marked by Northeast Cross Sand buoy, with vessels drawing up to 8.5 metres observed passing close to the east. Continued migration northwards of the minimum depth of 8.6 metres would be of potential concern to shipping should it continue northwards.
- 5.6 The area of most significant change to Middle Cross Sand is to its eastern limit as detailed in para 5.3 above.
- 5.7 Use of the un-buoyed route between Middle and South Cross Sand is detailed in para 5.3. In the 2014 survey there is a minimum depth of 11.3 metres within the route, but with depths of 13.7 metres 830 metres to the southwest of this, where 2012 AIS data shows the main density of shipping. However, large changes in depth are seen between the 2008 and 2014 surveys showing the area to be very dynamic, as highlighted in figure 2.
- 5.8 Changes to South Cross Sand are away from shipping routes, except for the northern limit detailed in para 5.2.

**6. Recommendations**

***Area A: South Cross Sand (Northern Limit):***

- 6.1 The 3-year resurvey interval of this focused area should be retained, but with a revision to the limits to reflect ongoing migration of the bank, as shown in [Annex E](#).

***Area B: Middle Cross Sand (Eastern Limit):***

- 6.2 The 3-year resurvey interval of this focused area should be retained, but with a revision to the limits to reflect ongoing migration of the bank, as shown in [Annex F](#).

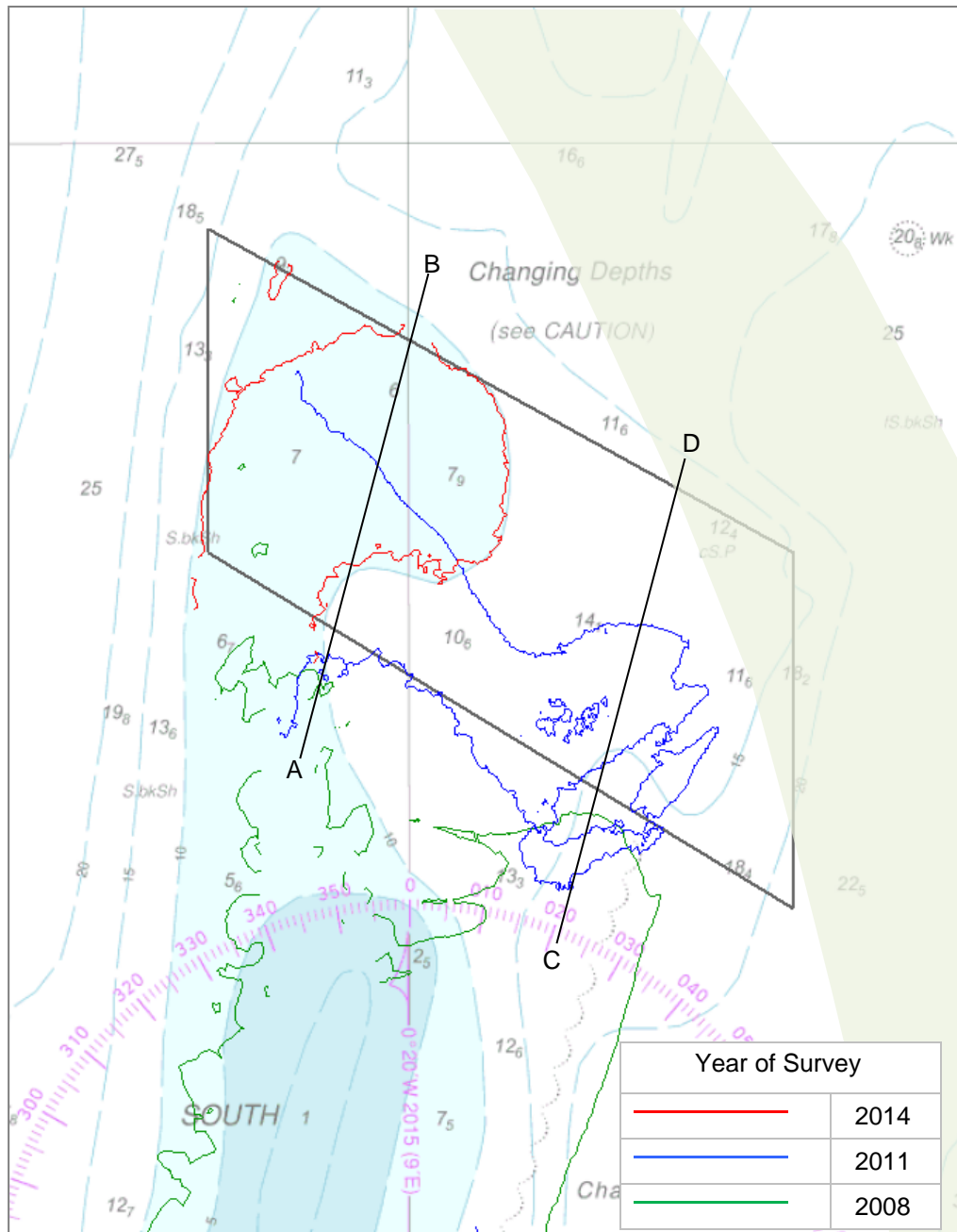
***Area C: Middle Cross Sand (Western Limit):***

- 6.3 The western limit of the bank has not extended, and due to its distance from shipping routes, it is recommended that the area is removed from the programme, with the western extent of the bank monitored by the existing 6-year checkline survey.

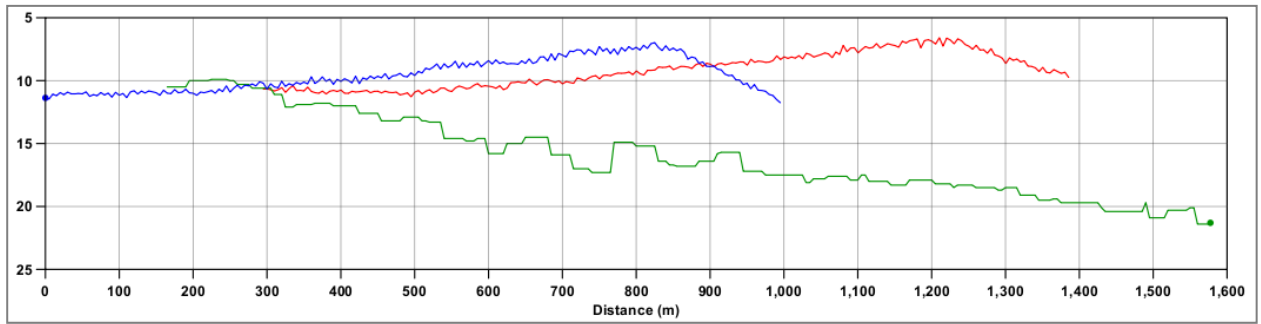
***Main Area:***

- 6.4 The bank has been subject to large changes, but the overall extent of the bank remains adequately covered by the full area limits. The southeast limits should be reduced slightly to reflect changes in the position of the bank, as shown in [Annex G](#). The 6-year checkline and survey interval is considered appropriate and should be retained.
- 6.5 As the northern limit of the area was fully surveyed in 2014, it is recommended that consideration is given to reducing the next full survey, due in 2020, to a checkline survey with the exception of the trafficked route between Middle and South Cross Sand, which should be fully surveyed.

AREA A: 10 METRE CONTOUR COMPARISONS AND CROSS SECTIONS



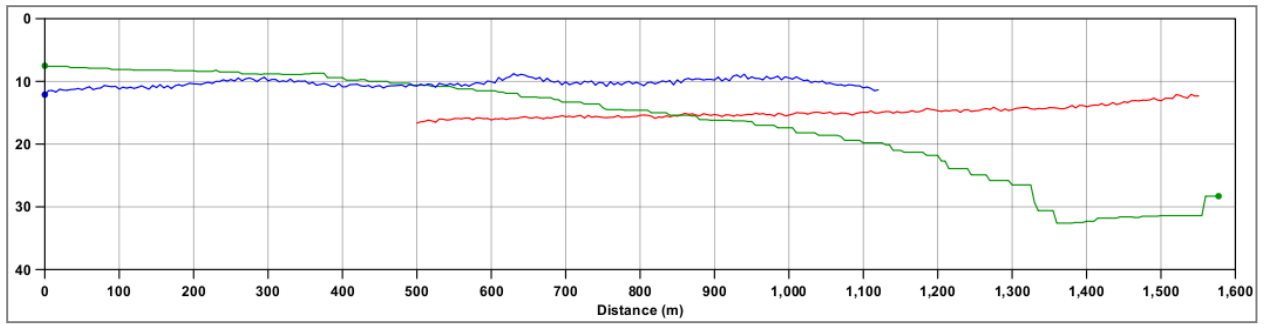
Shipping Route (sample 2012 AIS data)



A

Profile A-B

B



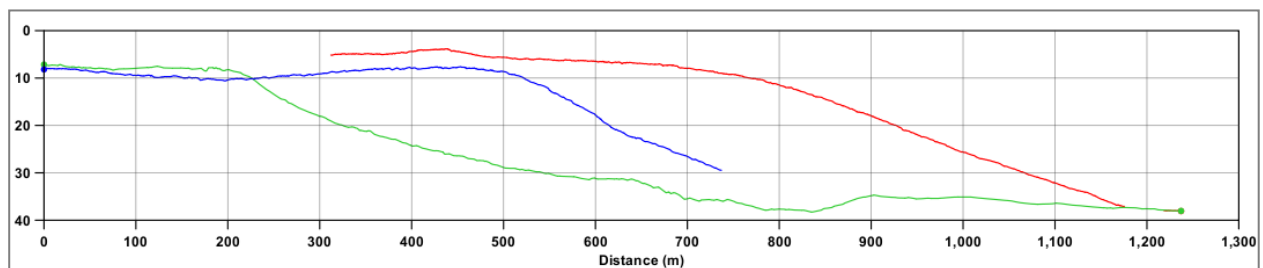
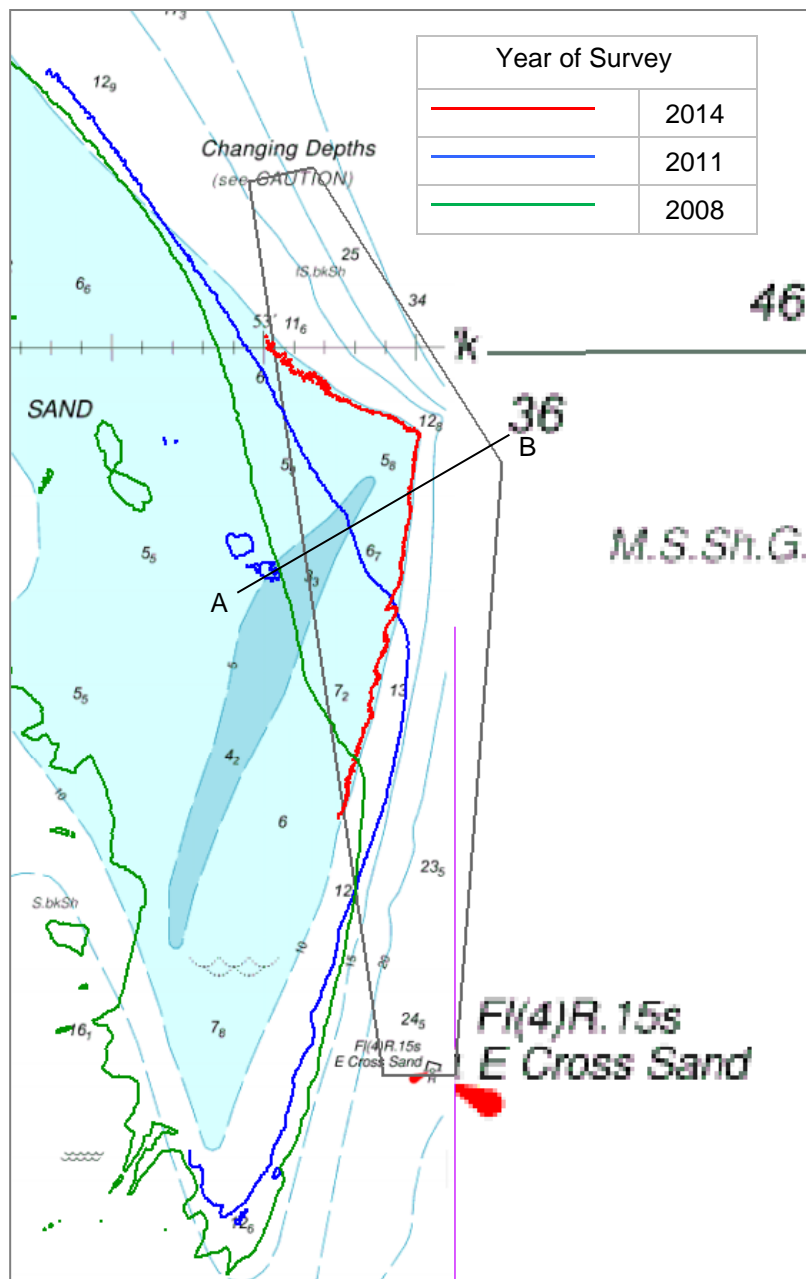
C

Profile C-D

D



AREA B: 10 METRE CONTOUR COMPARISONS AND CROSS SECTIONS

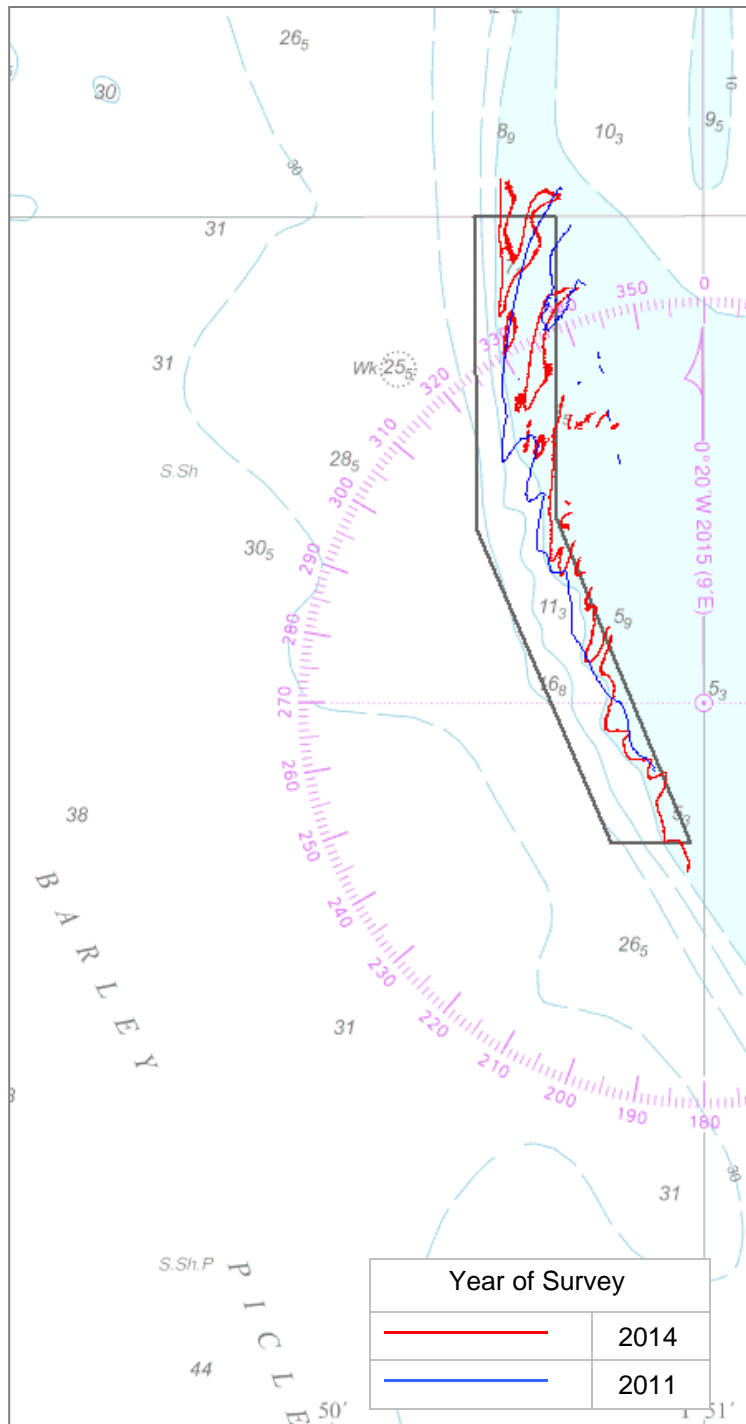


A

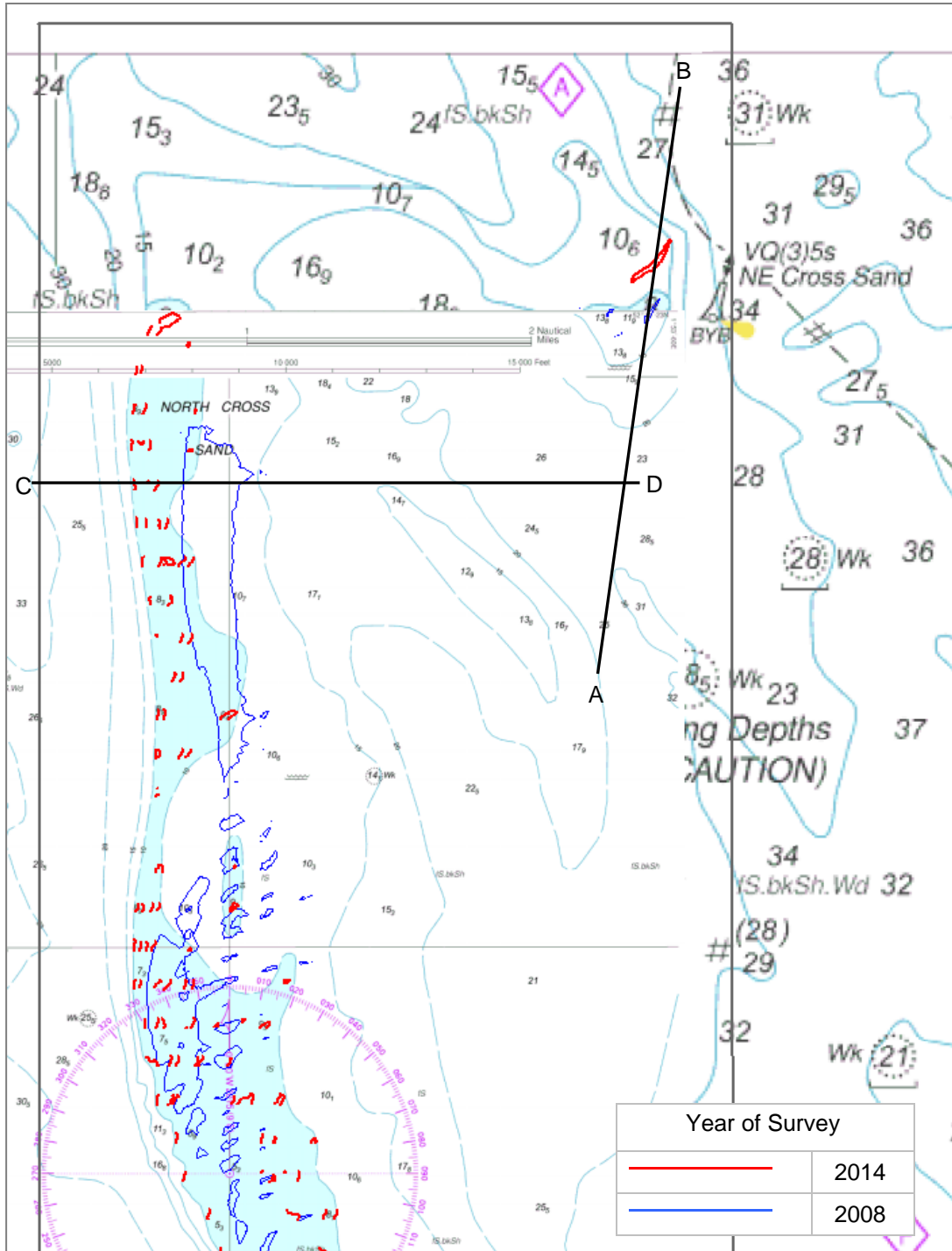
Profile A-B

B

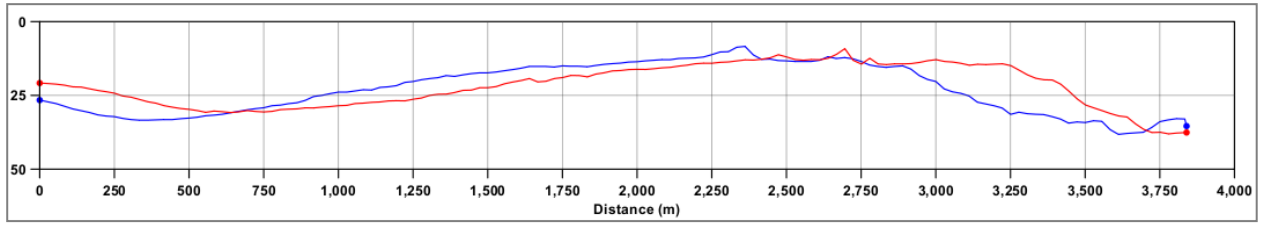
AREA C: 10 METRE CONTOUR COMPARISONS



FULL AREA: 10 METRE CONTOUR COMPARISONS AND CROSS SECTIONS



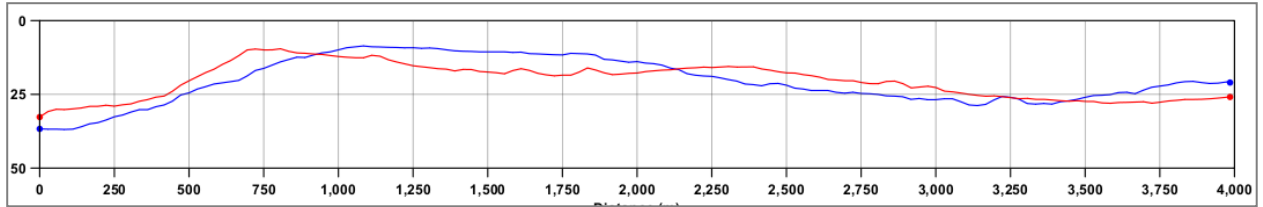
North Cross Sand



A

Profile A-B

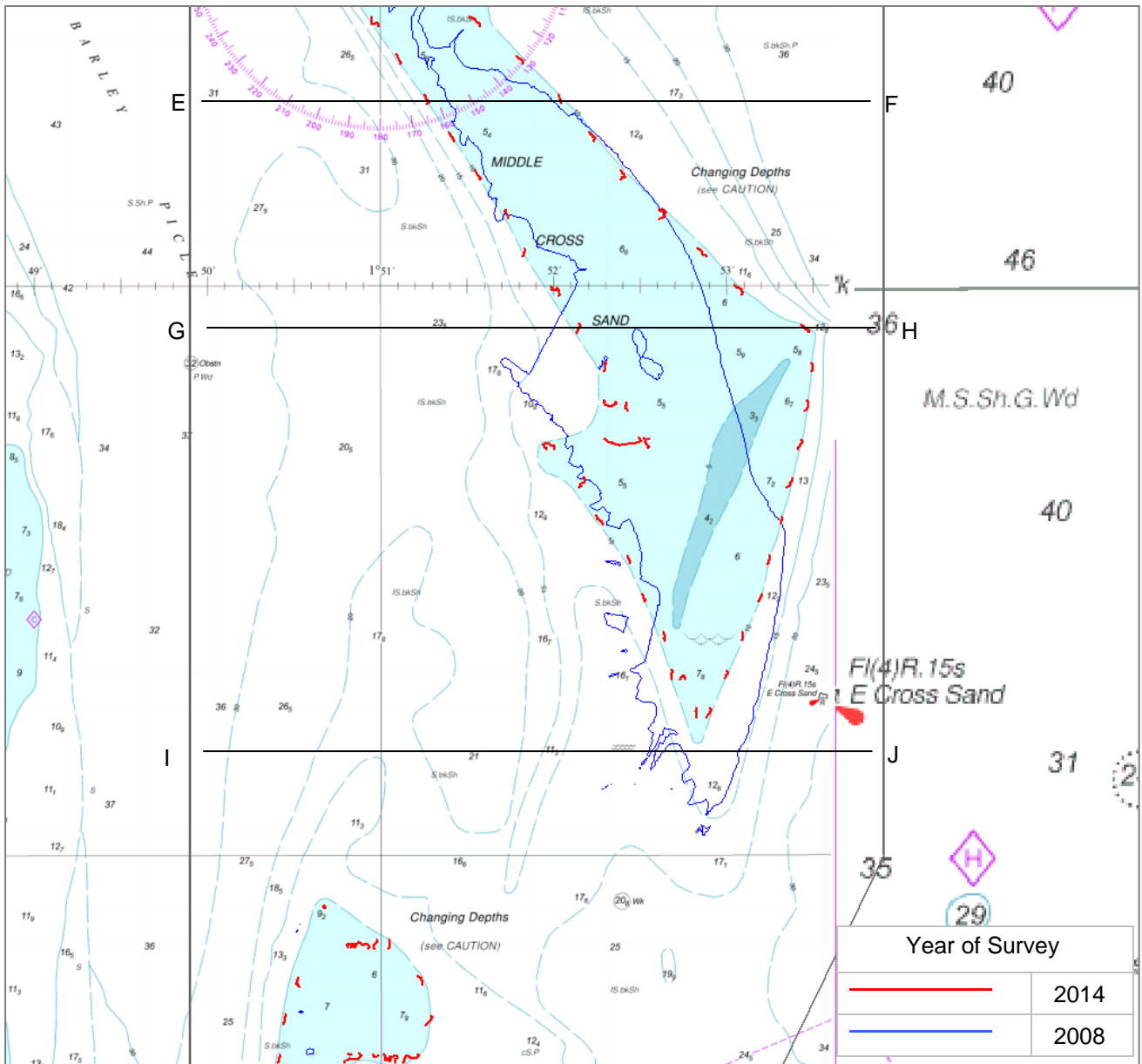
B



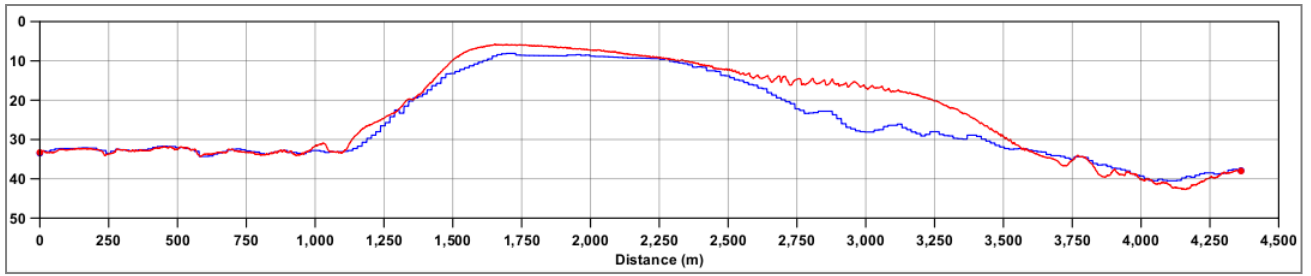
C

Profile C-D

D



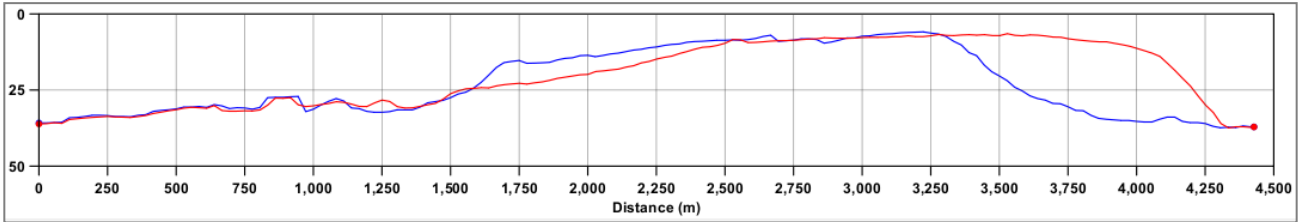
Middle Cross Sand



E

Profile E-F

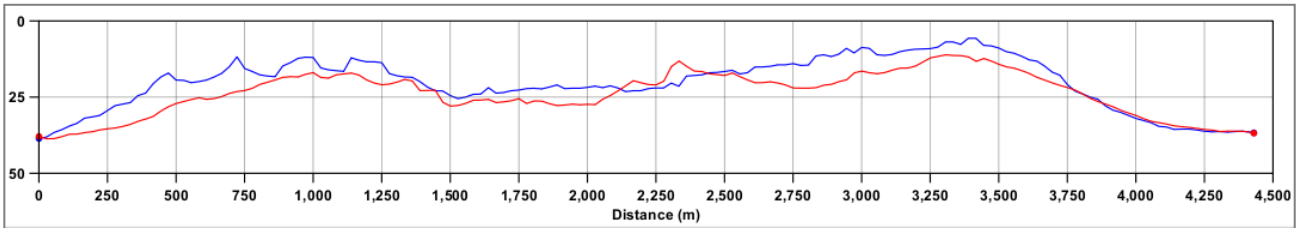
F



G

Profile G-H

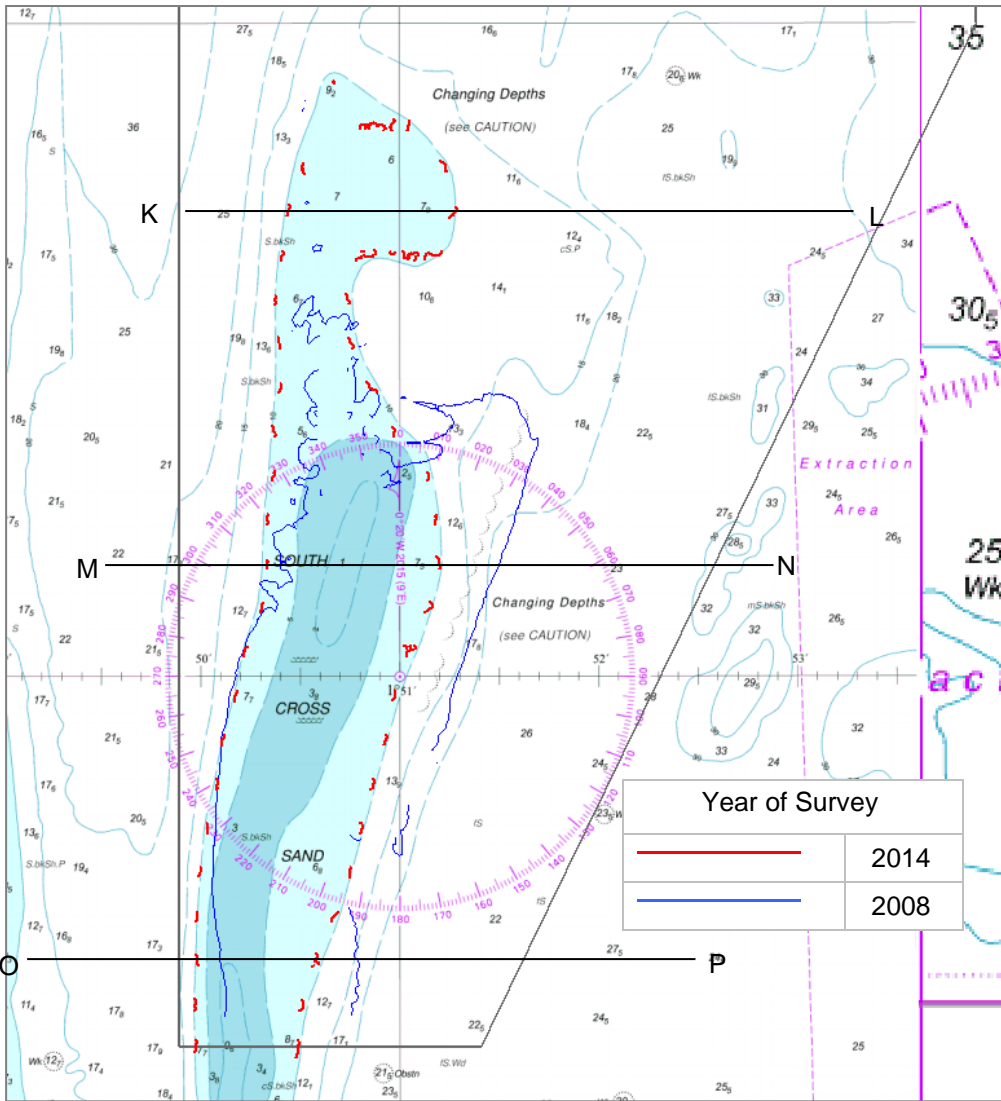
H



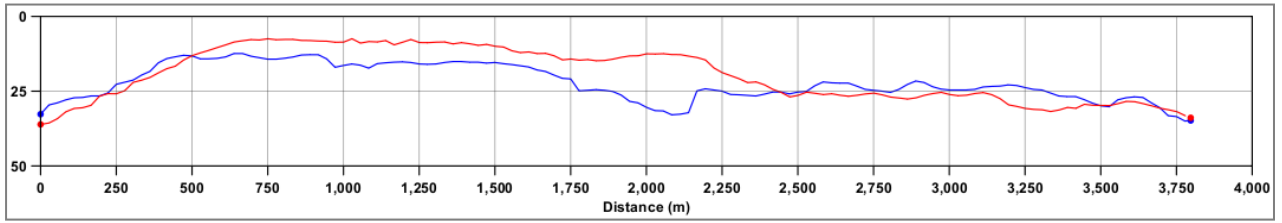
I

Profile I-J

J



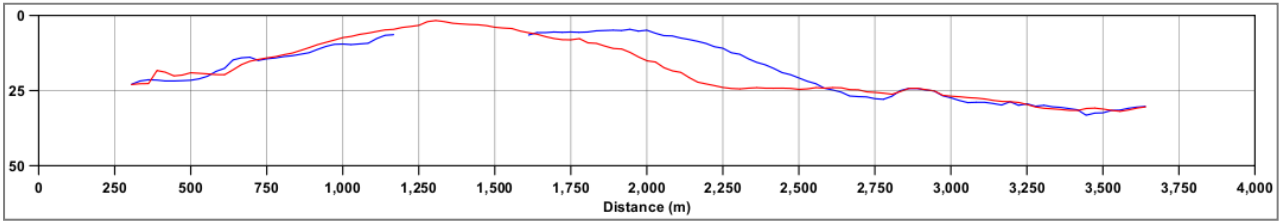
South Cross Sand



K

Profile K-L

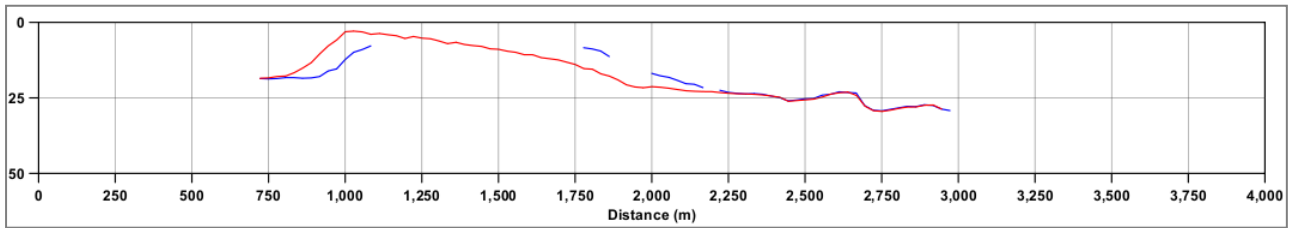
L



M

Profile M-N

N



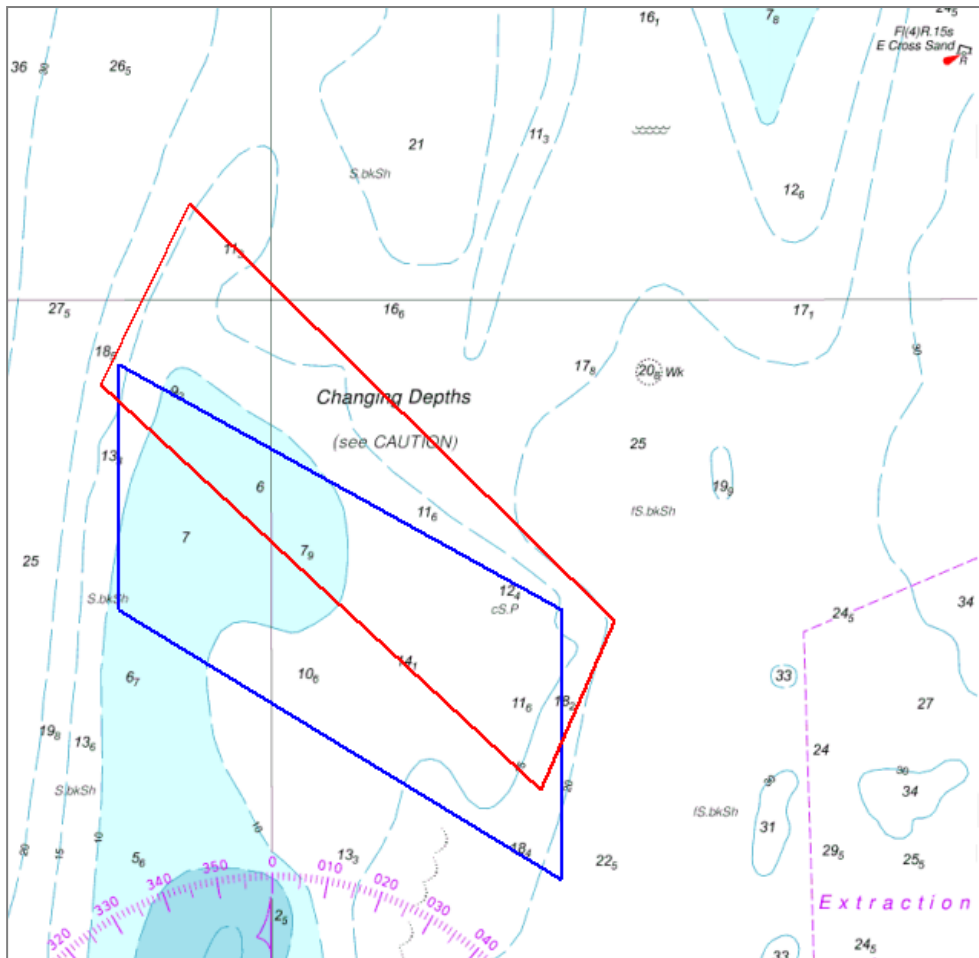
O



Profile O-P

P

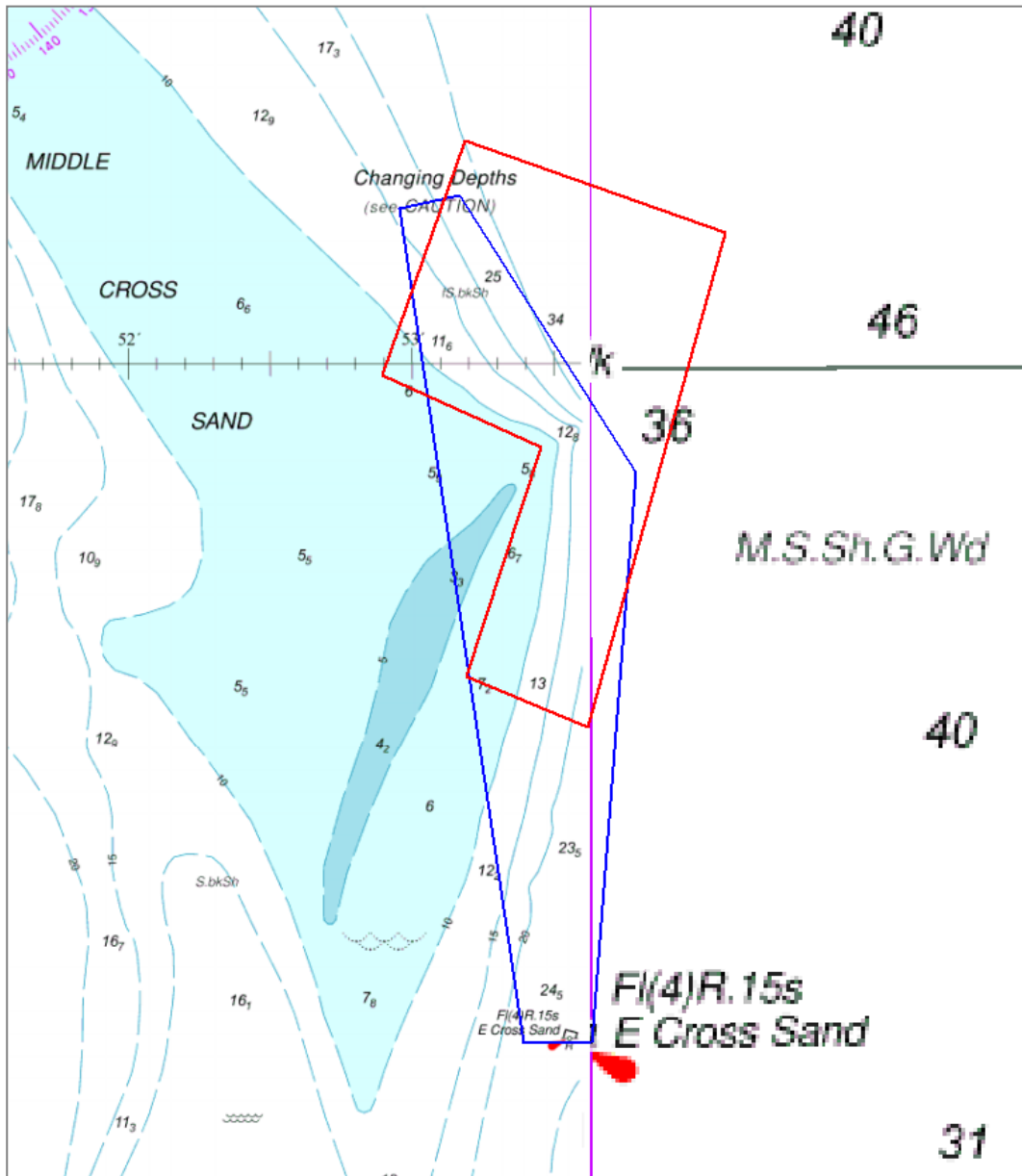




PROPOSED REVISION TO EA7 AREA A FOCUSED LIMITS



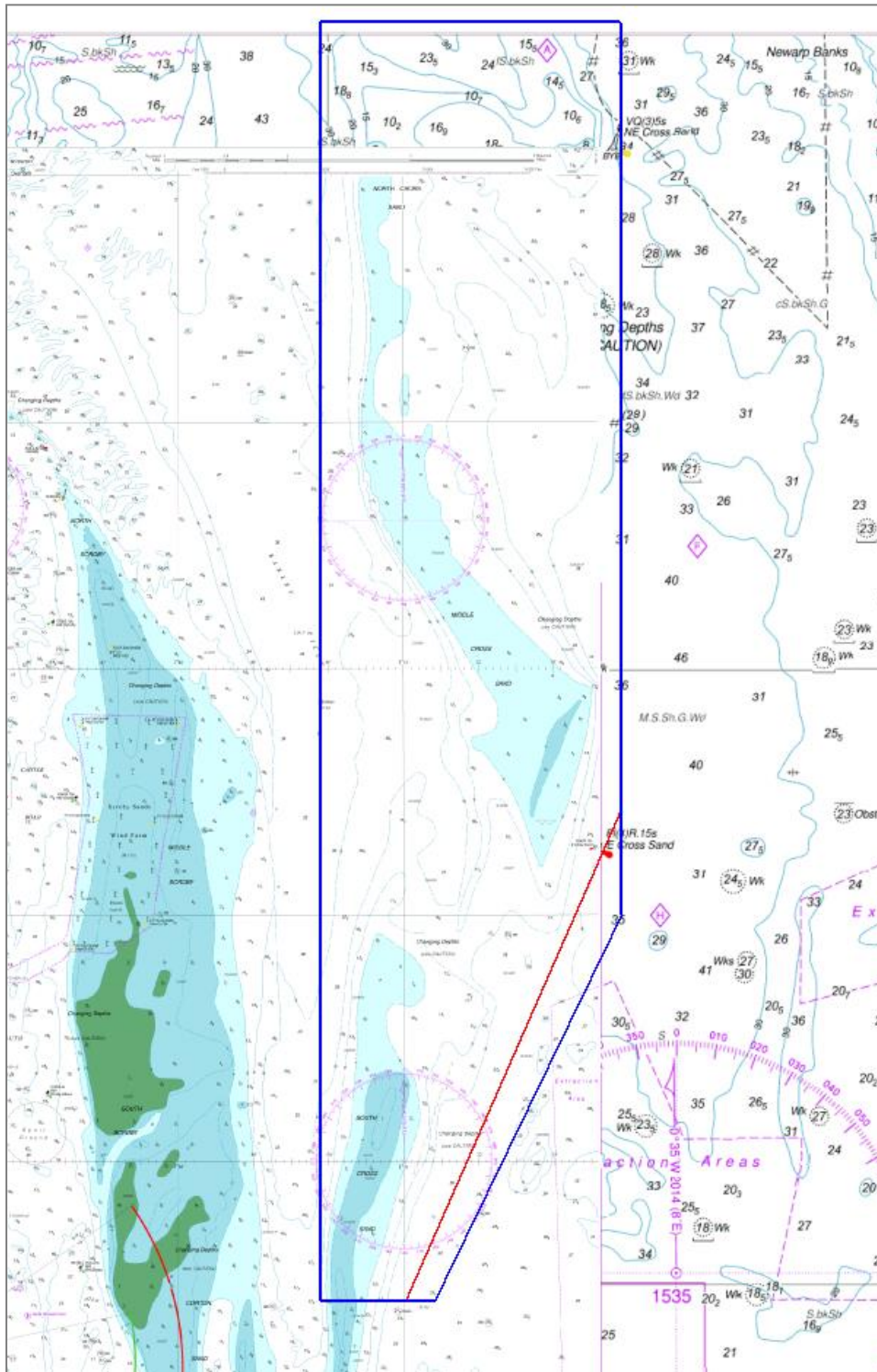
	Current 3 Year EA7 Area A Limits
	Proposed 3 Year EA7 Area A Limits



PROPOSED REVISION TO EA7 AREA B FOCUSED LIMITS



	Current 3 Year EA7 Area B Limits
	Proposed 3 Year EA7 Area B Limits

PROPOSED REVISION TO EA7 FULL AREA LIMITS



	Current EA7 Full Area Limits
	Proposed EA7 Full Area Limits