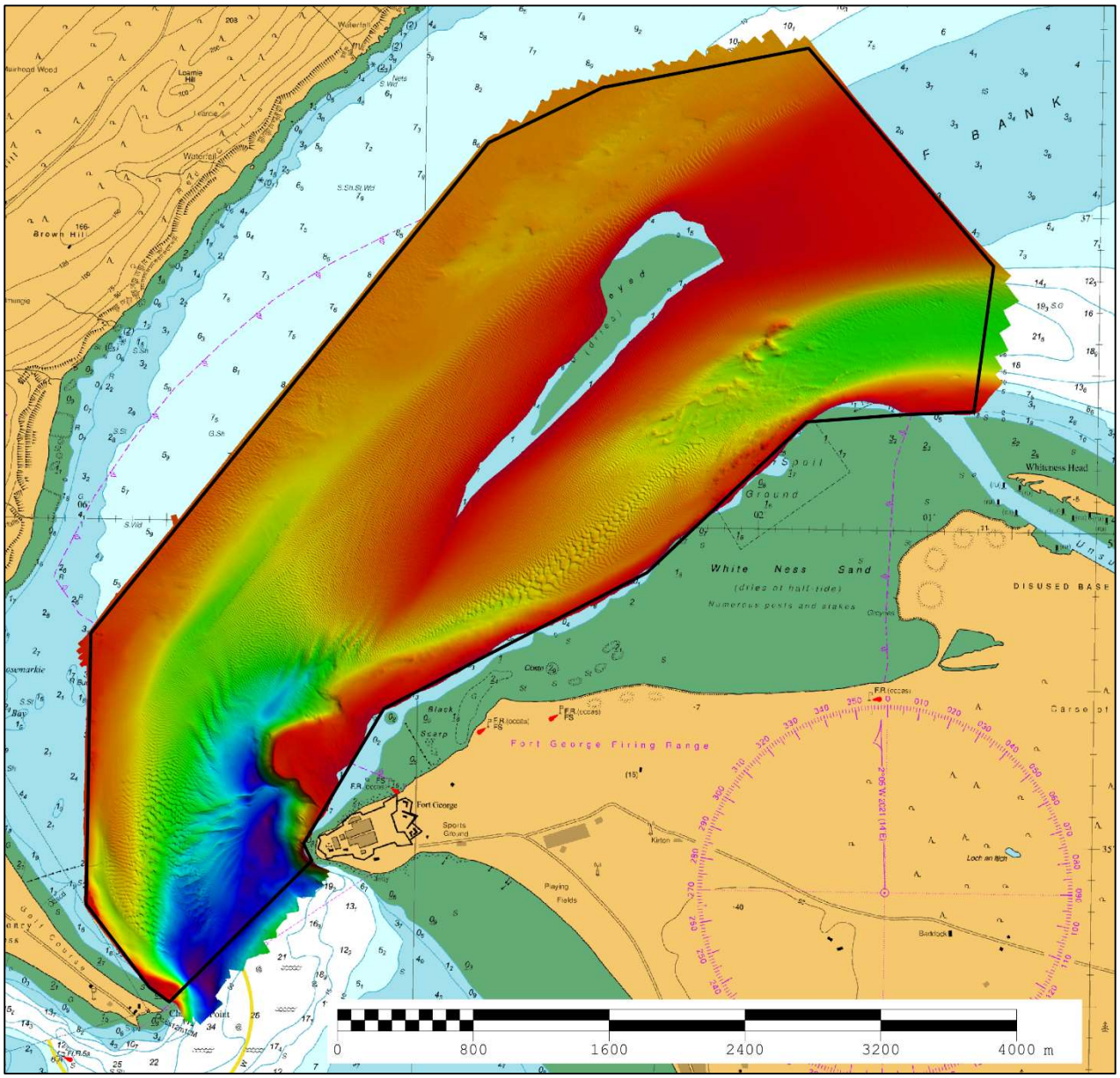
UK Hydrographic Office

MORAY FIRTH
RIFF BANK HI1767 (RB)
2022 ASSESSMENT

An assessment of the 2022 hydrographic survey of the area Moray Firth Riff Bank to monitor recent seabed movement; to identify any implications for shipping; and to make recommendations for future surveys.



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Notes

This Assessment is produced by the UK Hydrographic Office (UKHO) for the Maritime and Coastguard Agency (MCA). Analysis of the Routine Resurvey Areas forms part of the Civil Hydrography Programme and the reports are made available through the UKHO website and are 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 DfT (including the MCA) and the MOD (including the UKHO).

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.

No analysis of shipping traffic has been included within this report due to no AIS data being supplied by MCA.

All depths are to Chart Datum, defined using the UKHO Vertical Offshore Reference Frame (VORF) Model.

MORAY FIRTH RIFF BANK, 2022

1. SUMMARY

Changes Detected

1.1 There has been minimal change between the 2019/2020 and 2022 surveys. Between the 2010 and 2022 surveys, there has been a general movement trend of Riff Bank in a NW direction.

1.2 Between the 2010 survey and the 2022 survey, there have been changes of contours of up to 190 m in a north westerly direction, on the southern edge of Riff Bank, to the north of the South Channel.

1.3 As this area is new to the CHP Routine Resurvey programme, the controlling depths that have been reported in this document have not been compared to previously analysed controlling depths. Further monitoring in future surveys is required.

Reasons for Continuing to Resurvey the Area

1.4 Depths in the area remain hazardous and changeable to any deep draught vessels navigating the area and therefore require continued monitoring through the proposed 12-year resurvey cycle.

Recommendations

1.5 Given the relative stability of the area between the 2019/20 and 2022 surveys, and due to the new Arderseir Port being built, it is recommended that the survey interval be 6 years to analyse the impacts of the building works.

1.6 Due to the survey area currently already covering the two main navigation channels and the main southern extent of Riff Bank, it is recommended that survey area should remain unchanged, except for the eastern corner of the survey, which has been proposed to be trimmed to the port limits for Arderseir Port.

2. LOCATION

2.1 Survey interval at time of resurvey: First survey of the area under routine re-survey with a proposed 12-year survey cycle. Previous survey (HI1582) undertaken between 28/11/2019 and 09/03/2020. Survey previous to HI1582 is HI1336 and was undertaken in 2010.

2.2 Area Covered:13.2 km^2

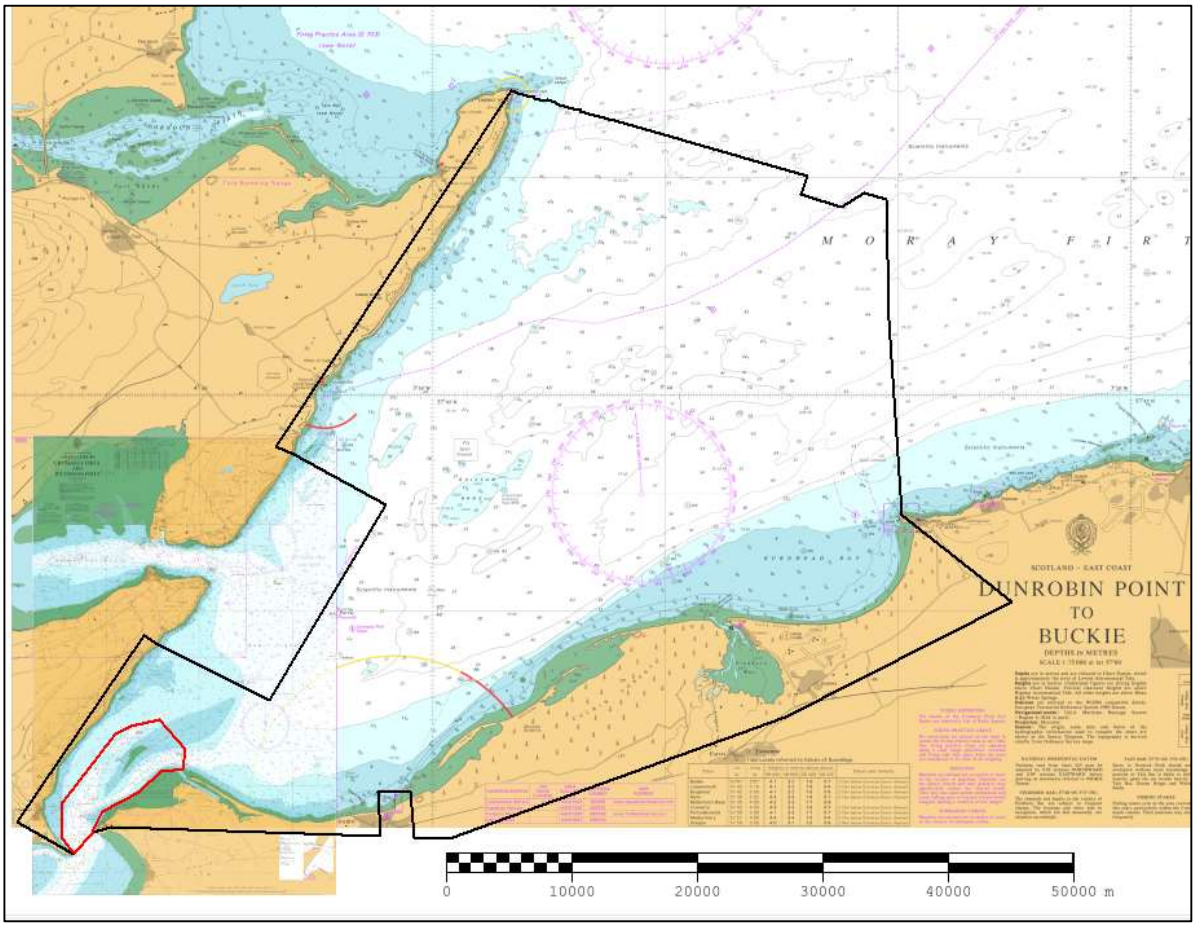


Figure 1: 2019 Moray Firth survey area overlaid on BA Chart 1077 with Moray Firth Riff Bank Routine Resurvey area in red.

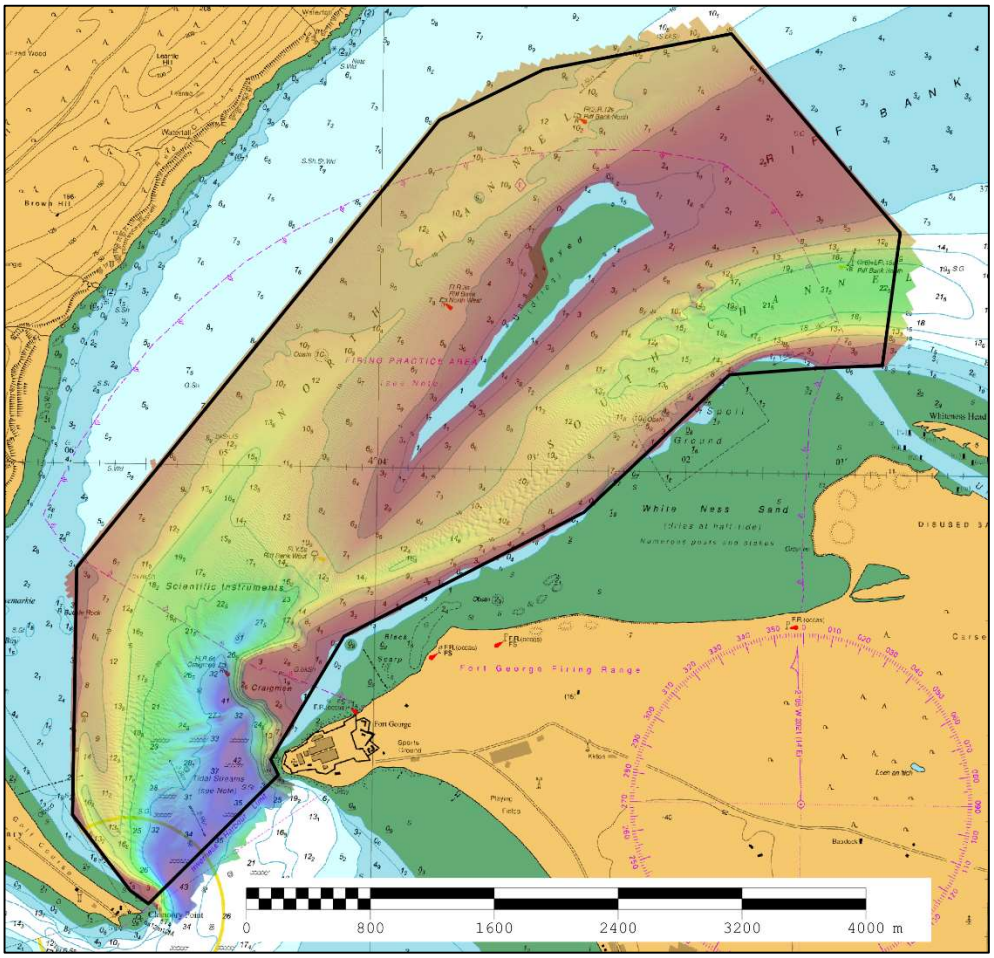


Figure 2: 2022 survey data overlaid on BA Chart 1077.

3. REFERENCE SURVEY DETAIL

3.1 The previous full survey HI1582 was conducted as part of the Civil Hydrography Programme between November 2019 and March 2020. No previous Routine Resurvey in the area.

3.2 The previous full survey to HI1582 was HI1336 and was conducted in 2010 as part of the Civil Hydrography Programme.

3.3 The Report of Survey for this survey is available upon request from the UKHO and the validated bathymetric surfaces are available to download from the Admiralty Marine Data Portal.

4. NEW SURVEY DETAIL

4.1 The latest survey was conducted between May 2022 and June 2022 as part of HI1767.

4.2 The Report of Survey for this survey is available upon request from the UKHO and the validated bathymetric surfaces are available to download from the Admiralty Marine Data Portal.

5. DESCRIPTION OF RECENT BATHYMETRIC CHANGE

5.1 Figure 3 shows the controlling depths of the North and South Channel and the controlling depth at the southern extent of Riff Bank, where it extends into the South Channel. The North Channel controlling depth has shoaled by 0.1 m since 2019/2020. The South Channel controlling depth has remained stable at 6.2 m BCD. The southern extent of Riff Bank, where it extends into the South Channel has shoaled by 0.1 m since 2019/2020.

5.2 Figure 4 shows the difference surface between the 2022 survey and the previous 2019/2020 survey. It shows a migration of sandwaves in a NE direction, from the entrance to Inverness Harbour into the South Channel. The difference surface also shows migration at the northern end of Riff Bank, along the buoy line of the North Channel.

5.3 Figure 5 shows the difference surface between the 2022 survey and the 2010 survey. It also shows a similar migration of sandwaves in a NE direction, from the entrance to Inverness Harbour into the South Channel. The 2022-2010 difference surface also shows migration at the northern end of Riff Bank, along the buoy line of the North Channel. Another trend in the 2022-2010 difference surface is the deepening of the South Channel and the subsequent shoaling along White Ness Sand.

5.4 Figure 6 shows the 5m depth contours from 2010, 2019/2020 and 2022. It shows eastward movement of the 5m contour by 50m, east of Riff Bank North West Buoy between 2019/2020 and 2022. It also shows eastward movement of the 5m contour by 140m, east of the Riff Bank North Buoy between 2010 and 2022.

There is also movement of the 5m contour by 20m NW, southeast of Riff Bank North Buoy toward the North Channel between 2019/2020 and 2022. This has also moved by 255m NW between 2010 and 2022.

5.5 Figure 7 shows the 10m depth contours from 2010, 2019/2020 and 2022. It shows that movement of the 10m contour was minimal between 2019/2020 and 2022, with only one small area of scouring in the North Channel, 230 m northwest of Riff Bank North West Buoy.

Movement of the 10m contour between 2010 and 2022 is also minimal, especially south of Riff Bank West Buoy. There is a general trend of movement of Riff Bank in a NW direction, which, at its maximum, is 190m in a NW direction 1600m west of Riff Bank South Buoy.

5.6 Figure 8 shows a colour banded sounding selection of the 2022 survey. Select depth differences between the 2010, 2019/2020 and 2022 surveys have been highlighted. They show shoaling or deepening in certain areas, consistent with the seabed movement.

5.7 At the eastern end of the survey area, a new port is being built – Arderseir. This has implications for survey area for the RRS. Therefore, it is recommended to amend the area to outside the new port limits. As the port will also be dredging the old port site, and there will be increased shipping activity, it is recommended that the frequency be updated to 6 years, in order to complete a survey after the port is built, to check for knock-on effect post-dredge.

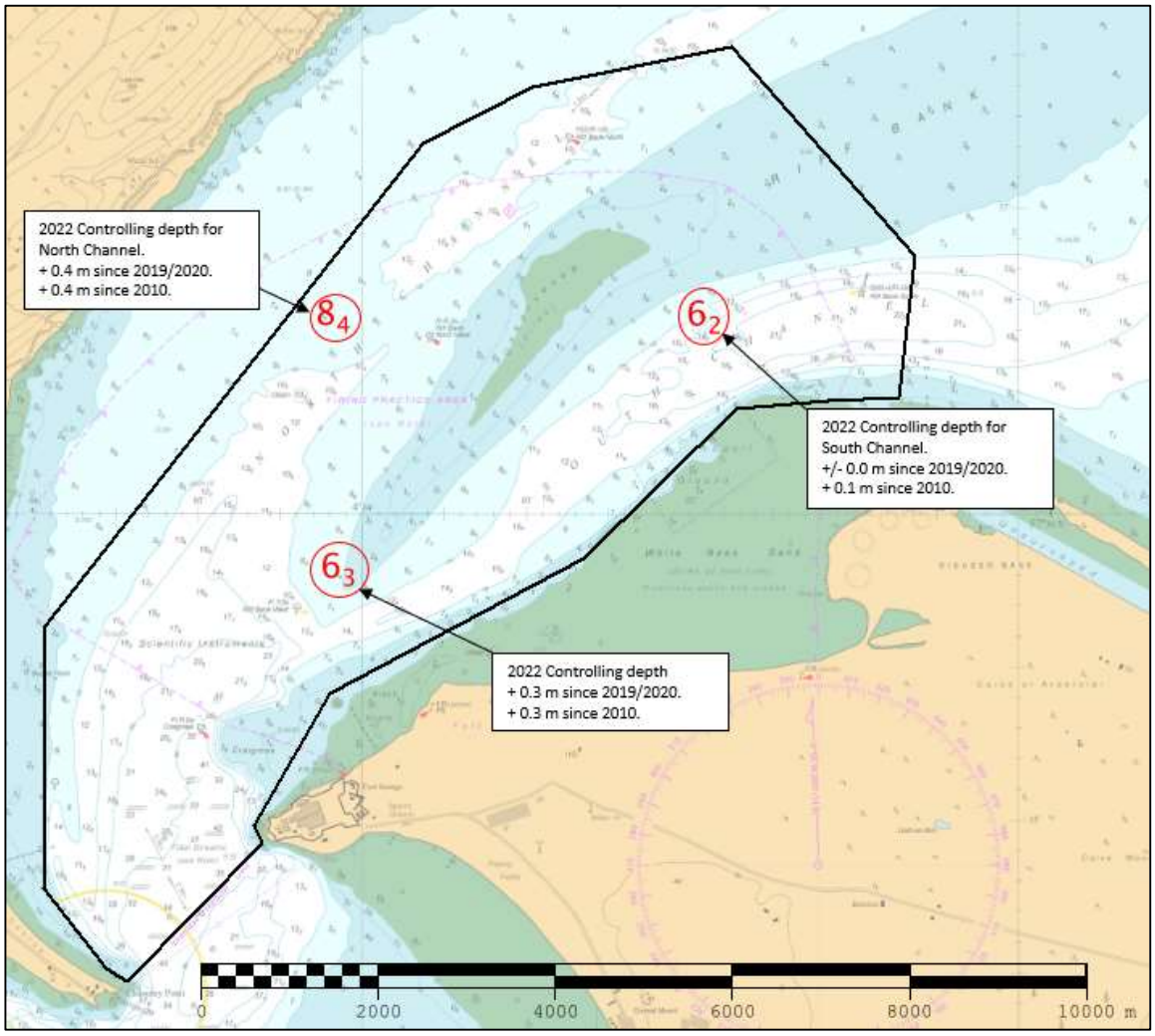


Figure 3: Controlling depth soundings highlighted, overlaid on BA Chart 1077.

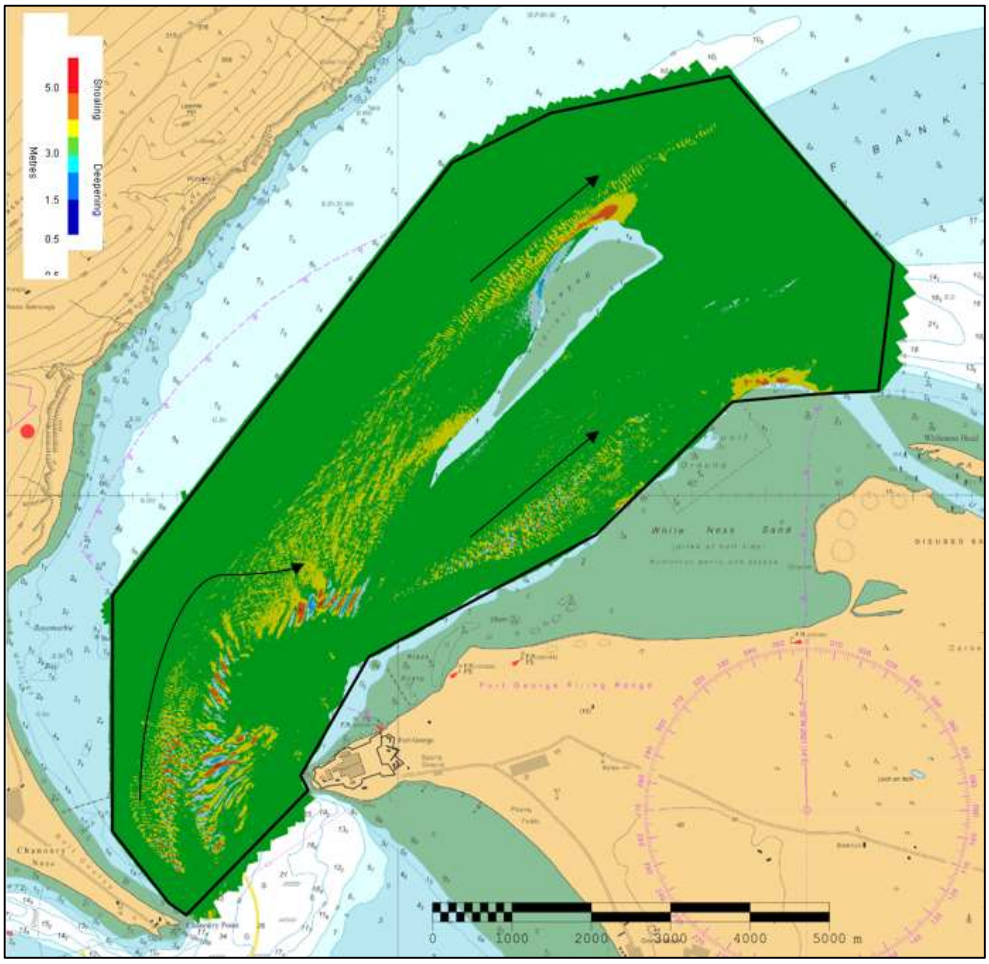


Figure 4: Difference surface showing bathymetric changes between the 2022 Routine Resurvey and the 2019/2020 HI1582 survey, overlaid on BA Chart 1077 (Black arrows indicate direction of sand wave migration since the 2019/2020 survey).

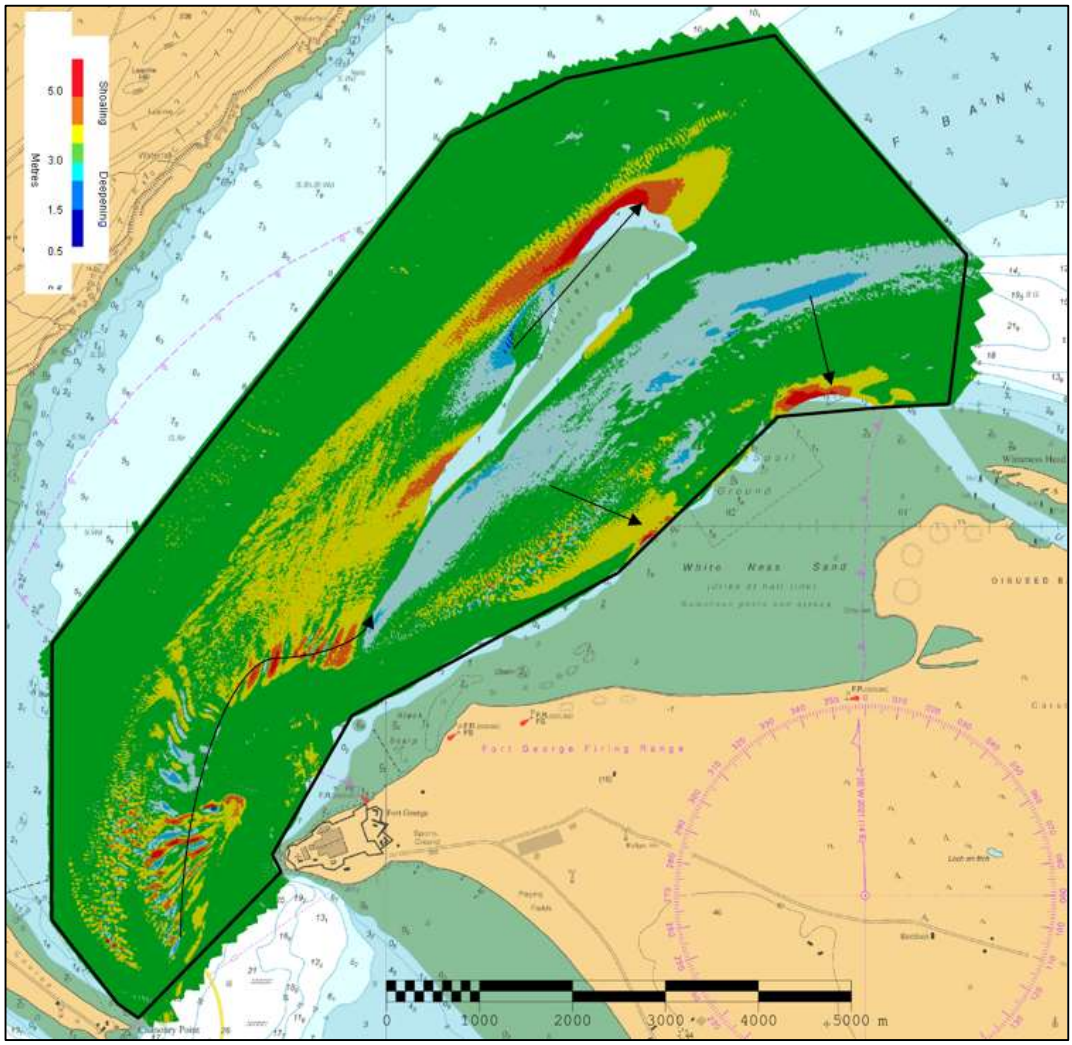


Figure 5: Difference surface showing bathymetric changes between the 2022 Routine Resurvey and the 2010 HI1336 survey, overlaid on BA Chart 1077 (Black arrows indicate direction of sand wave migration since the 2010 survey).

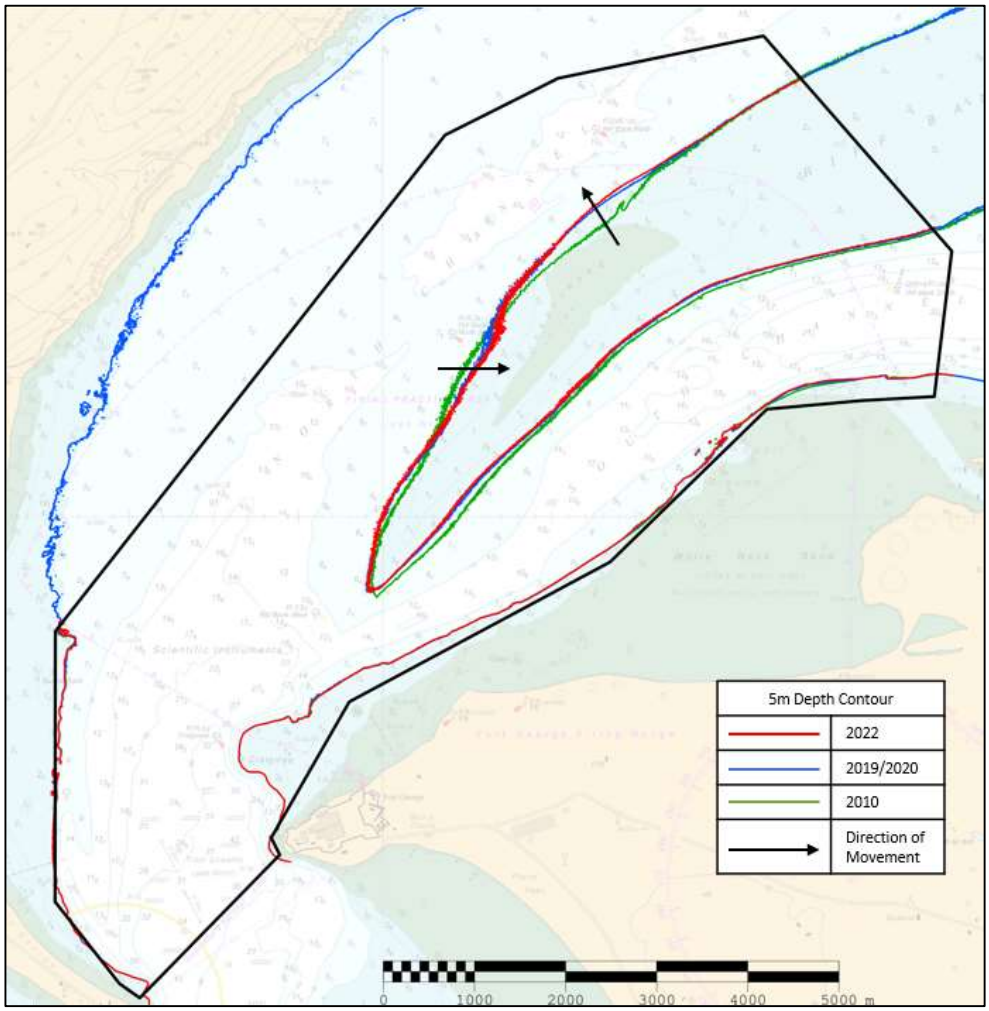


Figure 6: Contour plot showing changes in the 5 m contours between 2022 (red), 2019/2020 (blue) and 2010 (green). Black arrow represents feature migration.

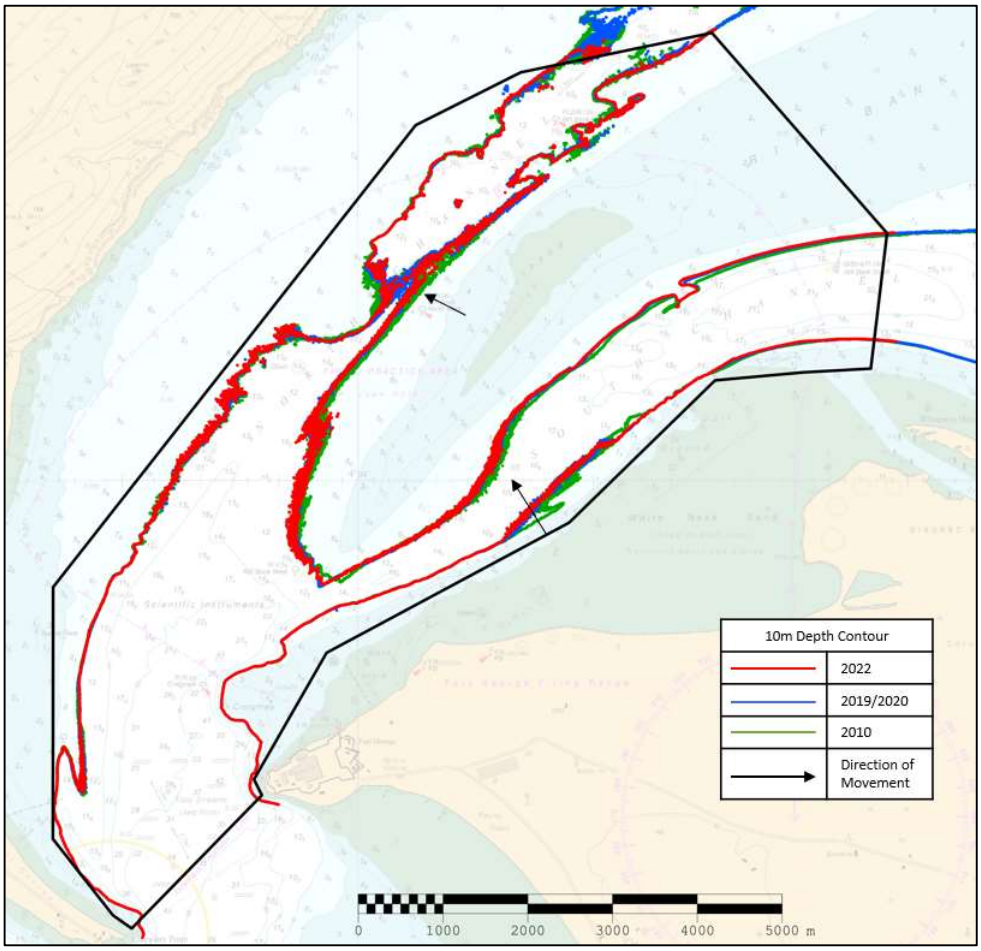


Figure 7: Contour plot showing changes in the 10 m contours between 2022 (red), 2019/2020 (blue) and 2010 (green). Black arrow represents feature migration.

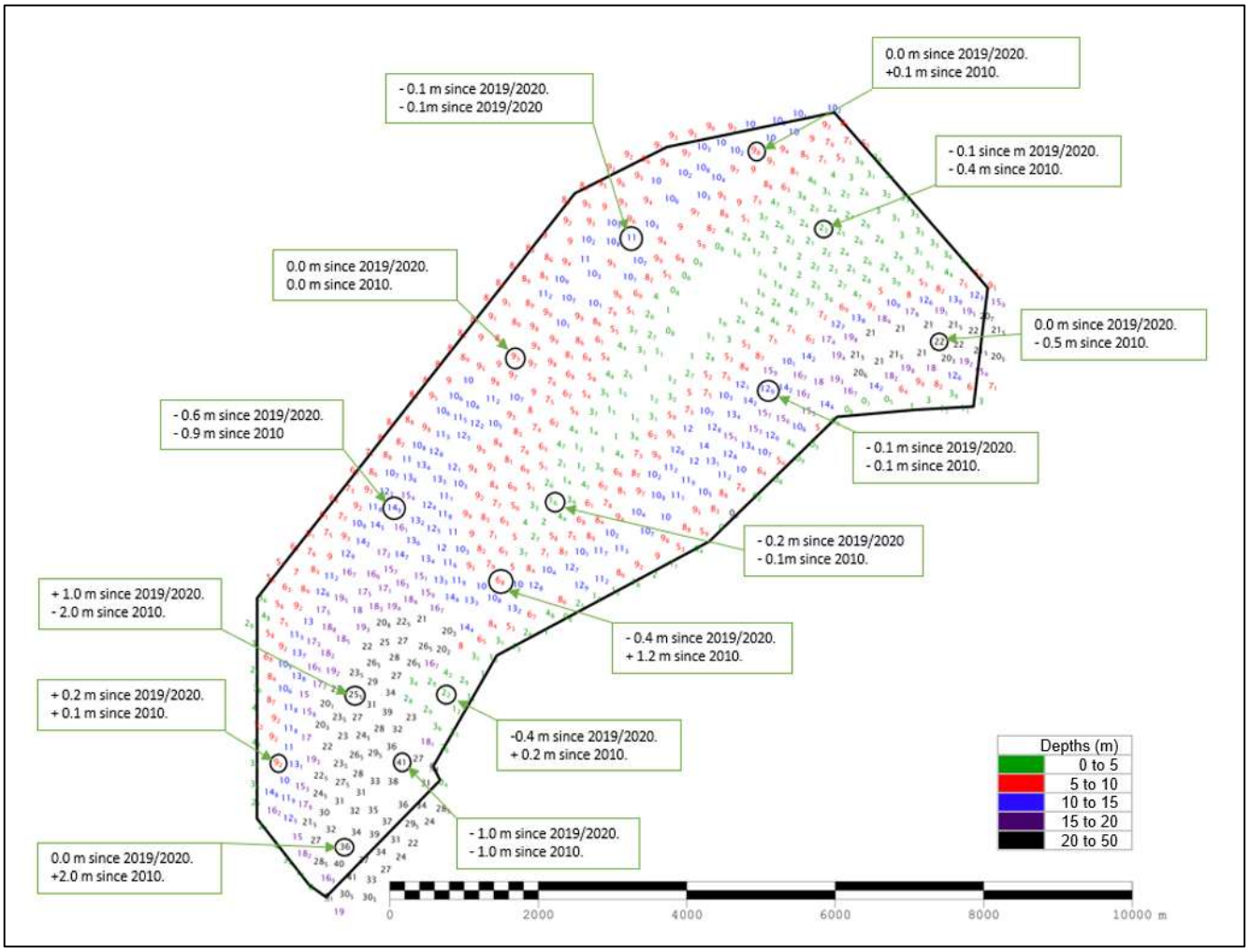


Figure 8: Colour banded depth plot from the 2022 survey with selected depth changes since the 2019/2020 survey and the 2010 survey. Positive values (+) represent deepening. Negative values (-) represent shoaling.

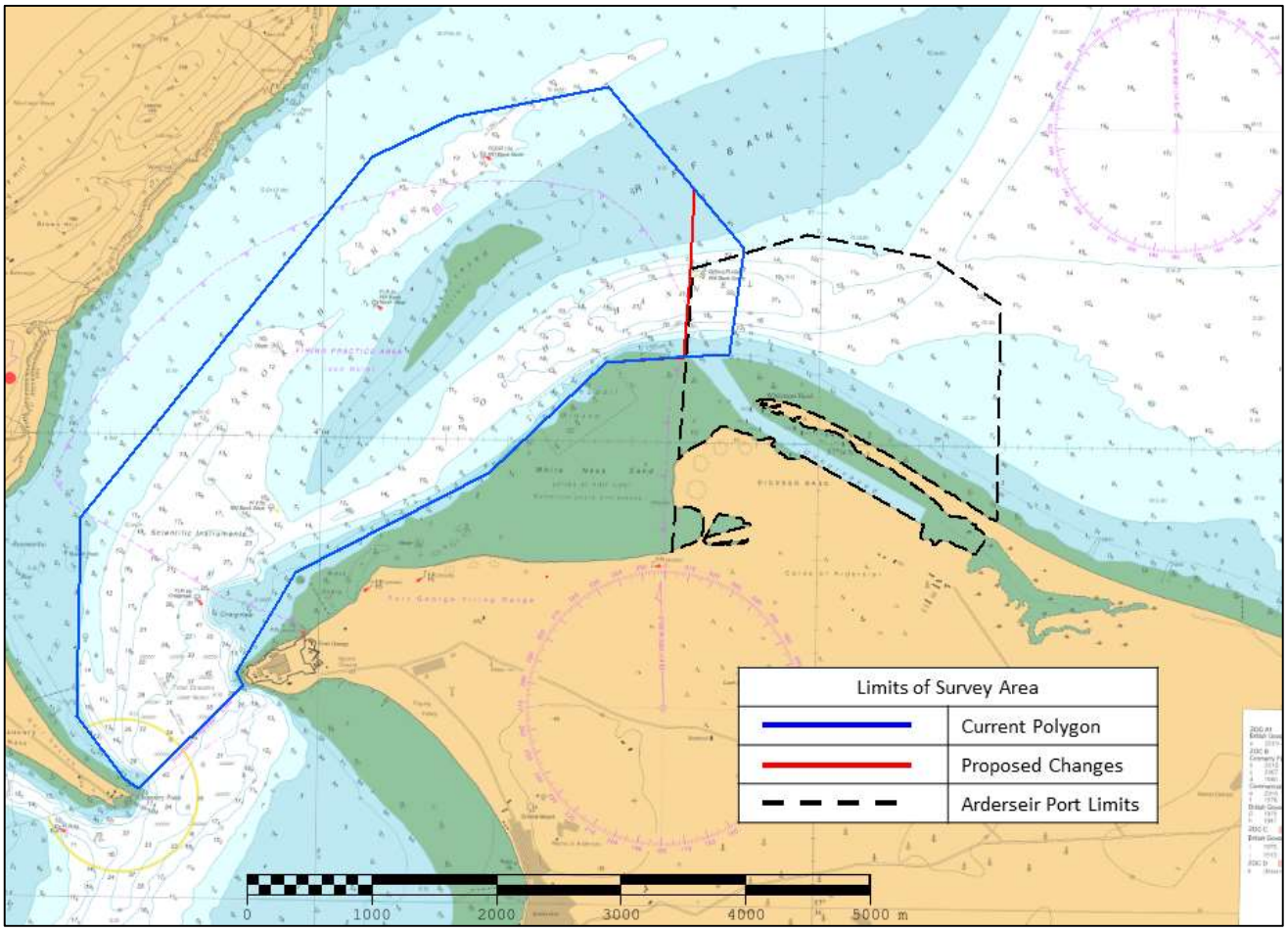
6. RECOMMENDATIONS FOR FUTURE SURVEYS

Survey Interval

6.1 The survey area has experienced relative stability between the 2019/2020 and 2022 surveys and the changes between the 2010 and 2022 survey, however with the new Arderseir Port being built and the potential dredging action associated with it, it is suggested that the current interval be set to 6 years. This will assess possible impacts from the new port and building activity. The interval can then be re-evaluated after the next survey.

Survey Area

6.2 Due to the survey area currently already covering the two main navigation channels and the main southern extent of Riff Bank, it is recommended that the majority of the survey area should remain unchanged. However, due to the new Arderseir Port limits, it is recommended to trim the survey area to the port limits in accordance with typical RRS area practice.



	Latitude	Longitude
1	57 34.470582N	004 05.439222W
2	57 34.515636N	004 05.558586W
3	57 34.776492N	004 05.940390W
4	57 35.636328N	004 05.938932W
5	57 37.213230N	004 03.632580W
6	57 37.393512N	004 02.963958W
7	57 37.528170N	004 01.748166W
8	57 37.093248N	004 01.039236W
9	57 36.746502N	004 01.063656W
10	57 36.368634N	004 01.099992W
11	57 36.342366N	004 01.727796W
12	57 35.856516N	004 02.656542W
13	57 35.412246N	004 04.199208W
14	57 34.979610N	004 04.661250W
15	57 34.925832N	004 04.610874W