Survey Report (Project Code): C5785A

Greater Haig Fras rMCZ 2012 Survey Report

Author: Roger Coggan

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1 Background and Introduction

1.1 *Survey Project Team*

The site evaluation survey at the Greater Haig Fras recommended Marine Conservation Zone (rMCZ) was carried out between the 5th and 12th of July 2012 on the RV *Cefas Endeavour*, cruise code CEND 10/12. The survey team for the duration of the fieldwork included Cefas marine ecologists, a sedimentologist, marine surveyors, a marine habitat mapper and MPA specialists from the JNCC (see below). The vessel worked 24 hours a day with staff divided among two 12-hour shift, as indicated below.

Role / Discipline
Scientist in Charge (SIC). Benthic Ecologist/Senior Seabed Mapper
Day Shift (12:00 – 00:00)
Watch Leader. Benthic Ecologist
Marine Surveyor / Senior Technician
Technical Apprentice
Marine Scientist (Animal Health & Welfare)
Marine Scientist (Plankton Biology)
JNCC Lead Scientist
Student, Exeter University
Night Shift (00:00 – 12:00)
Watch Leader. Senior Sedimentologist
Technician (Marine Instruments & Surveys Team)
Technical Apprentice
Marine Surveyor (NetSurvey Ltd)
Marine Scientist (Shellfish Biology)
Marine Scientist (Ecotoxicology)
JNCC Scientist
Student, Exeter University

1.2 *Site Description*

Haig Fras is a rocky reef, lying about 75 NM (140 Km) west of Lands' End (Figure 1). It is the only substantial area of rocky reef in the Celtic Sea beyond the coastal margin, and consequently is regarded as a feature of conservation importance. Haig Fras was recommended as a candidate Special Area of Conservation (cSAC) to the European Commission for Annex I reef habitat and as a Site of Community Importance (SCI). For a detailed site description see the Haig Fras SAC Selection Assessment Document (JNCC, 2008[1]).

The Greater Haig Fras (GHF) rMCZ was proposed by the Finding Sanctuary project, one of four regional projects tasked with designing Marine Conservation Zones (MCZs) around England. The site is approximately 2,040 km^2 in area, entirely contains the Haig Fras SAC and extends to the local limit of the UK's Exclusive Economic Zone (EEZ). For a detailed description see the relevant parts of the Finding Sanctuary final report (Lieberknecht *et al*., 2011[2]).

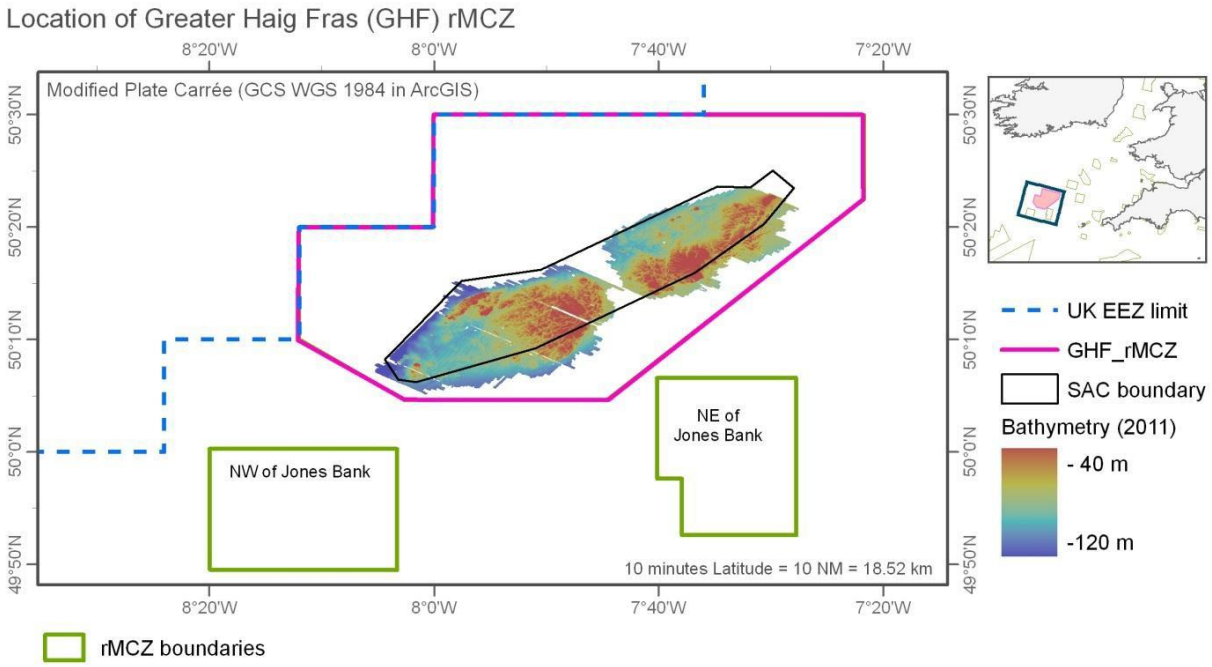

Figure 1. Location of the Greater Haig Fras rMCZ.

[1] JNCC, 2008. Offshore Special Area of Conservation: Haig Fras, SAC Selection Assessment. http://jncc.defra.gov.uk/default.aspx?page=4534#assessments

[2] Lieberknecht *et al*., 2011. *Finding Sanctuary final report and recommendations.* A report submitted by the Finding Sanctuary stakeholder project to Defra, JNCC and Natural England

1.3 *Geological and Biological Context*

Haig Fras is an isolated, fully submarine, granite bedrock outcrop, approximately 45 km long, which emerges from the seabed at ~120 m deep and rises to ~40 m depth. It was discovered and named in 1962 by Smith *et al*. (1965[3]) and was described by Edwards (1984[4]) as the surface expression of a

'batholith', a large igneous intrusion formed from cooled magma in the earth's crust. Jones *et al*. (1988[5]) considered it to be Hercynian intrusion and concurred with Edwards (1984) that it was probably a separate structure to the main S.W. England batholith.

In the 2011 survey that produced the bathymetry in Figure 1, Curtis *et al*. (2012[6]) recorded four physical habitat types, namely high and moderate energy circalittoral rock (A4.1 and A4.2 respectively), deep circalittoral coarse sediment (A5.15) and deep circalittoral sand (A5.27). The only habitats so far protected in the GHF rMCZ area are the rock habitats lying within the current SAC boundary.

The biological communities on the main reef are considered to be of conservation importance. Four distinct faunal biotopes were observed on the main reef by Rees (2000[7]): i) one dominated by jewel anemone *Corynactis viridis* on rock, ii) one dominated by Devonshire cup coral *Caryophyllia smithii* on rock, iii) one characterised by cup sponges and erect branching sponges on rock and iv) a complex community with red encrusting sponge, Devonshire cup coral *Caryophyllia smithii* and featherstars on boulders. He also noted that the bryozoan *Pentapora foliacea*, squat lobster *Munida* sp. and brittlestars were common. Curtis *et al*. (2012) recorded three EUNIS level 5 biotopes on a limited camera survey of the main reef area.

A number of Broad Scale Habitat (BSH) features and one habitat Feature of Conservation Importance (FOCI) have been proposed by the regional project for designation within the Greater Haig Fras rMCZ (Lieberknecht *et al*., 2011) and are listed in Table 1. The Haig Fras rock complex itself is specifically listed as one of the geological and geomorphic features of importance in the Ecological Network Guidance (ENG) (Natural England & JNCC, 2010[8]).

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[3] Smith, A.J., Stride, A.H. and Whittard, W.F. *1965.* The geology of the Western Approaches of the English Channel. IV. A recently discovered Variscan granite west-north-west of the Scilly Isles. *In:* Whittard, W.F. and Bradshaw, R. (eds) Submarine geology and geophysics. *Proceedings Colston Research Society, 17, 287-301.*

[4] Edwards, J.W.F. 1984. Interpretation of seismic and gravity surveys over the eastern part of the Cornubian platform. In: Hutton, D.H.W. and Sanderson, D.J. (eds) Variscan tectonics of the North Atlantic Region. *Special Publication of the Geological Society, London, 14, 119-124*

[5] Jones, D.G.; Miller J.M. & Roberts P.D. (1988). "A seabed radiometric survey of Haig Fras, S. Celtic Sea, U.K.". *Proceedings of the Geologists' Association* **99** (3): 193–203.

[6] Curtis, M., Diesing, M. and Stephens, D. 2012. Haig Fras SAC Mapping. Cefas Project Report C5596.

[7] Rees, E.I.S. 2000. Preliminary observations on benthic biotopes at Haig Fras: an isolated submerged rock in the Celtic Sea. Southampton: OSPAR/ICES/EEA Second Workshop on Habitat Classification, 18-22 September 2000.

[8] Natural England and the Joint Nature Conservation Committee, 2010. *The Marine Conservation Zone Project: Ecological Network Guidance.* Sheffield and Peterborough, UK.

Table 1. Features proposed for designation within the Greater Haig Fras rMCZ.

Feature Type	Feature Name
Broad Scale Habitat (BSH)	A4.2 Moderate energy circalittoral rock
	A5.1 Subtidal coarse sediment
	A5.2 Subtidal sand
	A5.3 Subtidal mud
	A5.4 Subtidal mixed sediments
Habitat FOCI	Subtidal sands and gravels*
	Fragile sponge and anthozoan communities on subtidal rocky habitats**
Geological and geomorphic features	Haig Fras rock complex

**Subtidal sands and gravels are considered to be adequately protected by its component habitat features subtidal sand and/or subtidal coarse sediment, and is no longer included within MCZ designations*
***The presence of this feature outside the SAC boundary was assumed and needed to be confirmed*

1.4 *Existing data and information utilised to inform survey planning*

The information provided by the prior surveys and the Site Assessment Document (SAD) were used by the JNCC to inform the survey plan for the GHF rMCZ. While the prior surveys had targeted the main reef system, the SAD habitat map covered the entire rMCZ area, being based on the UK SeaMap 2010 predictive model (version 7) as illustrated in Figure 2. Further modelled topography data were available from the Defra digital elevation model (DEM), but the resolution of the underlying data in this area of the continental shelf is poor, so the DEM did not contribute any significant information.

It is notable that the UK SeaMap 2010 model predicts an extensive area of circalittoral rock (A4) to the northwest of the main reef area that was surveyed in 2011. There was great interest to see if this prediction would be validated by survey data, so the JNCC prioritised this part of the rMCZ for new survey, assigning a lower priority to the remaining area, southeast of the main reef.

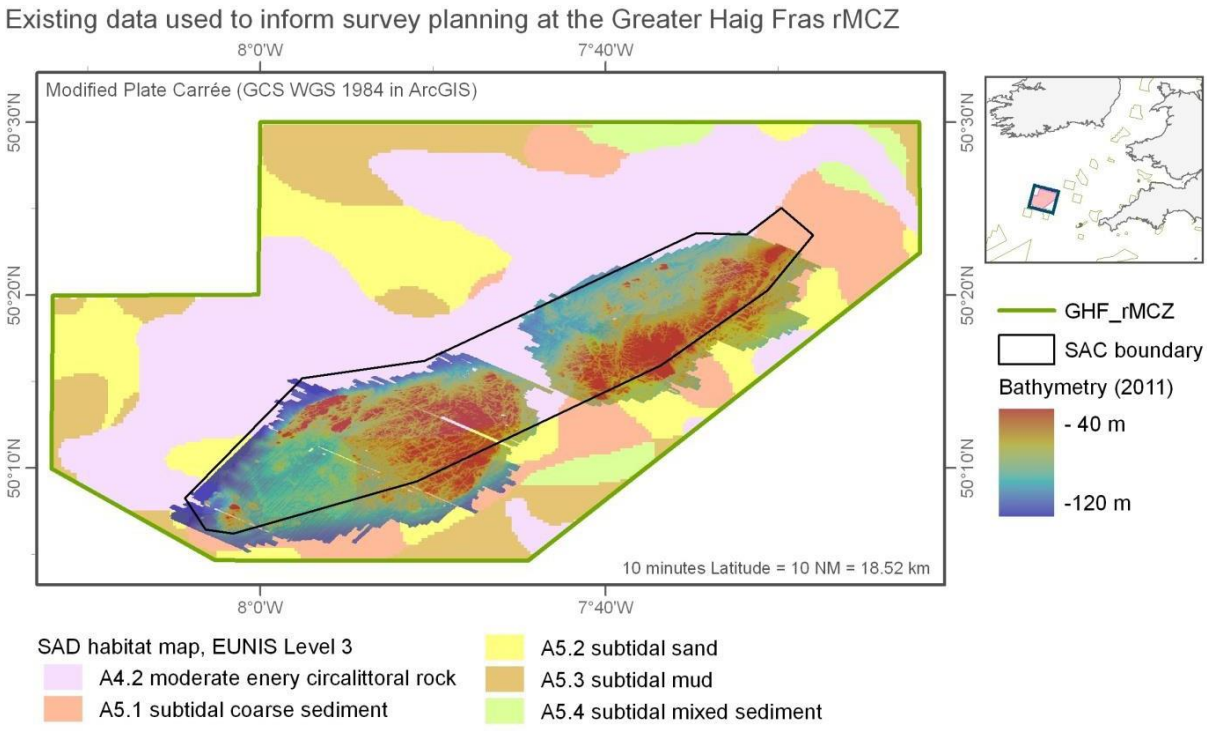


Figure 2. Existing data sources relevant to informing the survey design at the Greater Haig Fras rMCZ.

2 Survey Design and Methods

2.1 *Survey planning and design*

The survey design included complementary elements of acoustic survey and ground truth sampling. The area was far too large to complete a full coverage acoustic survey in the time available, so it was decided to use the time available for acoustic survey to run 'corridors' (in effect single survey lines) that aligned with ground truth stations laid out in a triangular 5 km grid, as per the illustration in Figure 3. This initial plan was amended following discussions between the SIC, the JNCC lead scientist and the JNCC's Offshore Survey Manager, re-orienting the run-lines onto an (approximate) WSW – ENE axis which provided fewer, longer lines, so minimising the unproductive time spent in manoeuvring between the survey lines (Figure 4). The amended survey was limited to the high priority area, due to time constraints (seven days allocated ship time). For convenience, the original array of ground truth stations was kept and assigned Station Codes in the range GHF_01 to GHF_80 (Figure 5). These codes are merely labels to identify the sampling stations and do not reflect the order in which they were occupied.

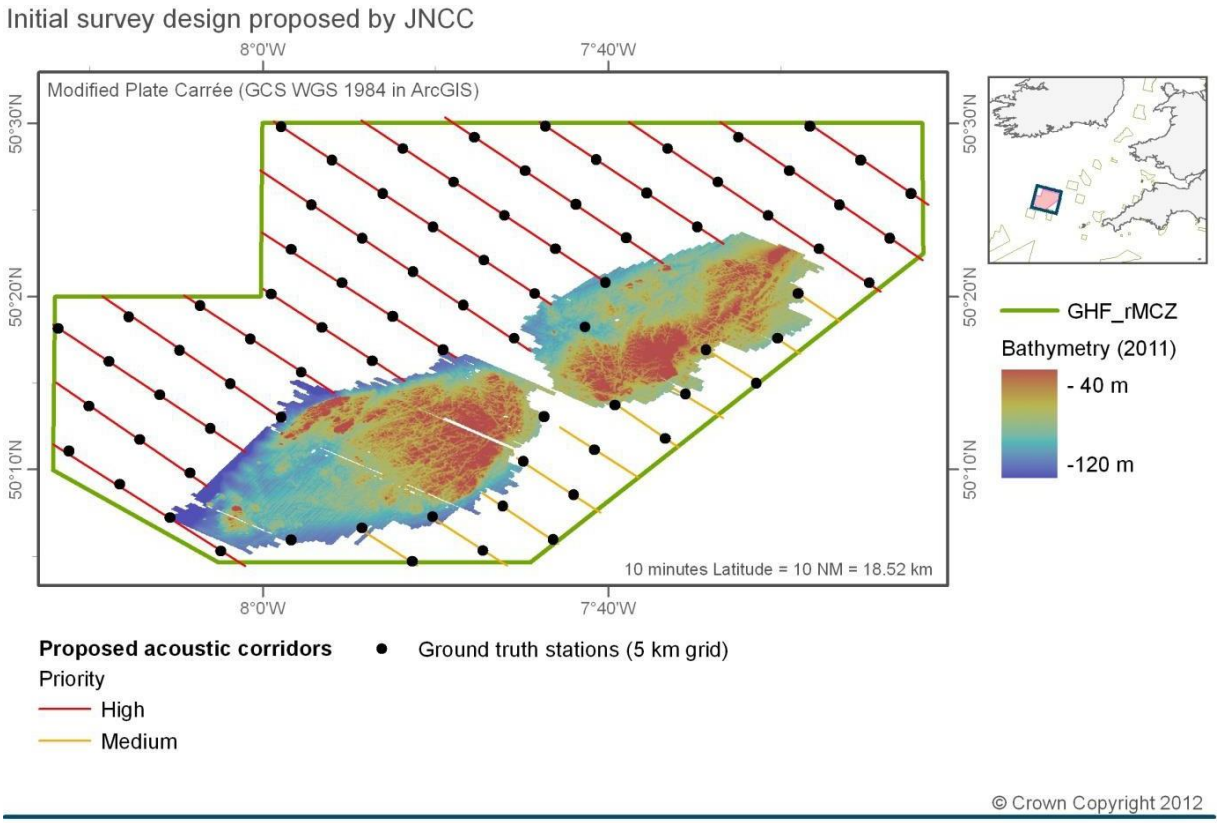


Figure 3. Initial survey design proposed by JNCC.

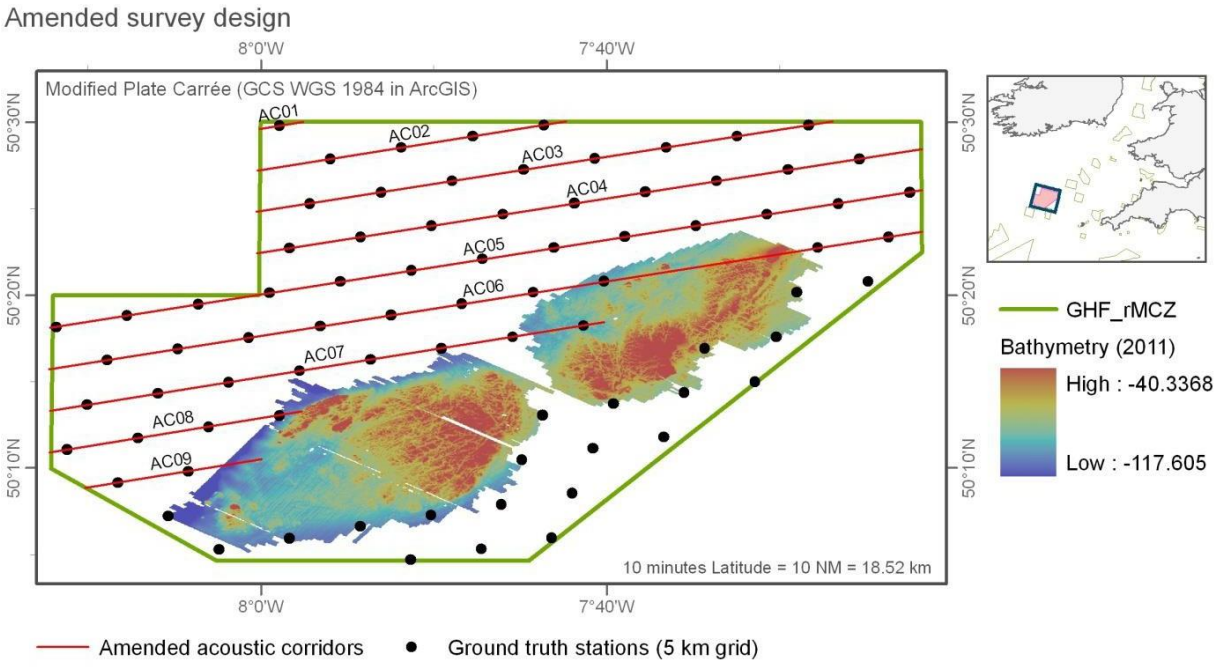


Figure 4. The amended survey design showing re-orientation of acoustic run-lines and assigned line names.

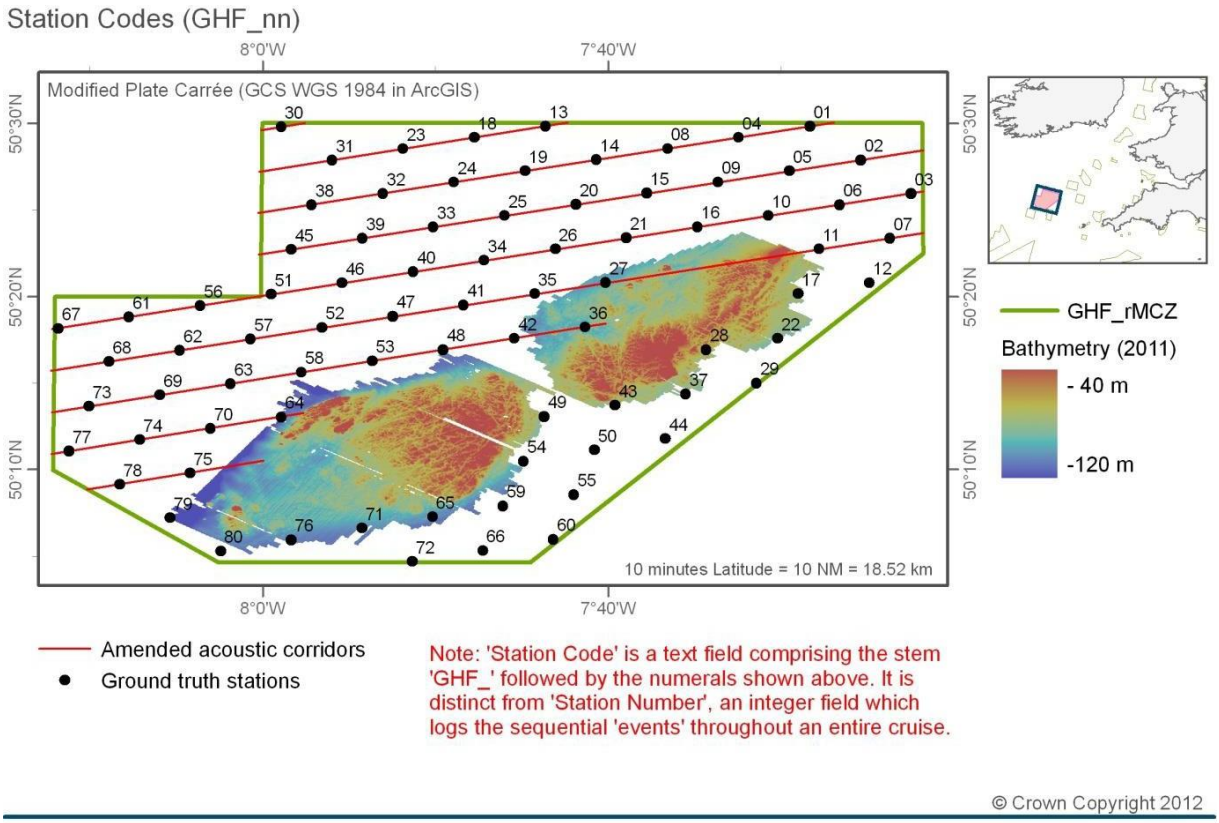


Figure 5. Ground truth stations with their assigned Station Codes.

The general plan was to complete the acoustic survey first, with multibeam and sidescan sonar, and to use the remaining time to collect ground-truth samples from as many stations as possible. Grab sampling was to be attempted at all stations occupied; if the first grab failed to collect a valid sample (> 5 litres volume) a maximum of three attempts would be made before abandonment.

Video and stills images of the seabed were to be collected at selected stations, with the objective of sampling five stations for each of the acoustic facies that were evident on the multibeam backscatter record.

During the ground truth sampling, multibeam data was to be collected opportunistically on transit between stations, ensuring the vessel passed over the target station before switching off the multibeam and returning to occupy the station. This protocol is illustrated in Figure 6. Grab samples were considered valid if taken within 100 metres of the station location. Video samples would ideally remain within the 200 m diameter bullring centred on the station. The size of the bullring was appropriate for the anticipated swath width of the multibeam, which was estimated to be in the region of 300 metres as the water depth over the priority area of the GHF rMCZ was around 100 metres.

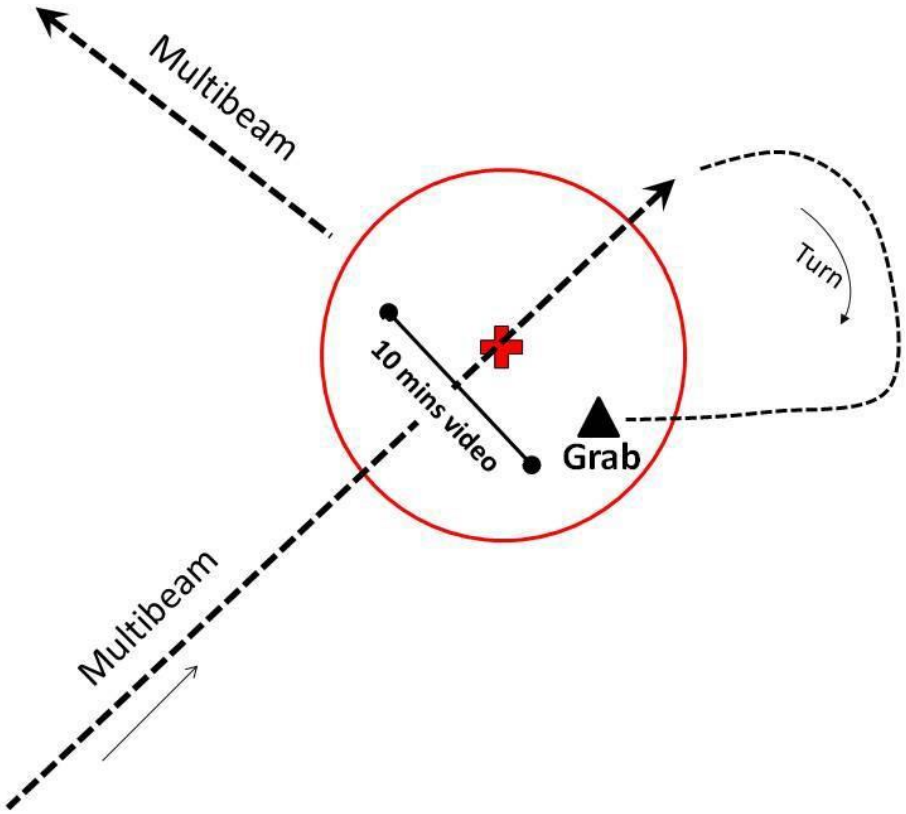


Figure 6. Schematic illustrating sequence of events for multibeam, grab and video sampling at ground truth stations. Multibeam was run opportunistically on transit between stations.

In addition to this pre planned survey there was also a requirement to undertake some further

ad-hoc multibeam survey to provide full coverage over smaller patches of ground, nested within the main survey area. These patches were required to assist in the interpretation of the backscatter from the main acoustic survey, as the limited swath width of single acoustic lines makes them difficult to use for broadscale interpretation. Patches of broader coverage of about 1 km width would help inform such interpretation. One of the nested patches was also to be used in a comparative tests of survey capability between the *Cefas Endeavour*

and the National Oceanographic Centre's (NOC) Autosub, a long range, deep diving, autonomous underwater vehicle (AUV) that can conduct acoustic and photographic surveys of the seabed. The area selected for this test was to be surveyed with multibeam an sidescan sonar, as well as being groundtruthed by grabs and video, and was required to be relatively flat (i.e. not part of the main reef feature) and to contain heterogeneous seabed. This particular part of the survey was referred to as GHFAST (Greater Haig Fras AutoSub Test).

2.2 ***Survey Equipment and sample processing***

2.2.1 *Multibeam bathymetry and backscatter*

Multibeam bathymetry and backscatter data were acquired using the Kongsberg EM2040 system operated at 300 kHz and deployed on the drop keel of RV *Cefas Endeavour*, which was lowered to its full extent to minimise the effect of bad weather on the acoustic signal. Variations of sound velocity with water depth were recorded using a CTD (conductivity temperature depth) probe and applied during multibeam data acquisition. Details of the multibeam equipment are provided in Annex 5.4 and a calibration report in Annex 5.5.

The raw multibeam bathymetry data was processed using CARIS HIPS. Tidal information was gathered using a CNAV 3050 DGPS receiver. Tide height data was smoothed and extracted to reduce the tide on the bathymetry. The soundings were cleaned and smoothed using CARIS to IHO order 1. Multibeam backscatter data were processed with Fledermaus Geocoder Toolbox (GT) to produce standard and floating point (FP) geotiffs. Separate processing reports are provided to satisfy quality assurance (QA) requirements.

2.2.2 *Sidescan sonar*

Sidescan sonar was collected with an Edgetech FS4200 system, processed with Triton ISIS and mosaiced using Triton Delphmap. Again, standard and floating point (FP) geotiffs images were produced. A separate processing report is provided to satisfy quality assurance (QA) requirements.

2.2.3 *Ground-truth sampling*

Ground-truth sampling was achieved using grabs and underwater video cameras, as described below.

2.2.3.1 Grabs

The grab system comprised a 0.1 m^2 mini Hamon grab fitted with a video camera (Figure 7), the combined gear being known as a HamCam. This allowed an image of the undisturbed seabed surface to be obtained for each grab sample. Samples were collected from anywhere within a 100 m radius bullring centred on the target location. On recovery, the grab was emptied into a large plastic bin and a representative sub-sample of sediment (approx. 0.5 litres) taken for Particle Size Analysis (PSA). The sample was stored in a labelled plastic container and frozen ready for transfer to a laboratory ashore. The remaining sample was photographed and the volume of sediment measured and recorded. Benthic fauna were collected by washing the sample with sea-water over a 1 mm sieve. The retained >1 mm fraction was transferred to a labelled container and preserved in 4% buffered formaldehyde for later analysis ashore. A visual assessment was made of the sediment type sampled by the grab and noted on the field records, assigning the sample to a Folk class and its equivalent EUNIS and Broad Scale Habitat (BSH) sediment classes.

Figure 7. Mini Hamon grab with video camera (HamCam).

2.2.3.2 Cameras

Two camera systems were used, one mounted on a towed sledge and the other in a drop-frame. The camera sledge (CS) system comprised a video camera with capability to also capture still images (Figure 8). Illumination was provided by two Cefas high intensity LED striplights and a dedicated flash unit. The camera was oriented to provide a forward oblique view of the seabed and was fitted with a four-spot (red) laser-scaling device which projected the corners of a 17 cm x 17cm square along the axis of the lens onto the seabed. A further (green) horizontal laser helped to visualise the rugosity of the seabed on the moving video image (but was not clearly visible in the still images). Set-up and operation followed the MESH 'Recommended Operating Guidelines (ROG) for underwater video and photographic imaging techniques'. Video was recorded simultaneously to a Sony GV-HD700 DV tape recorder and a computer hard drive. A video overlay was used to provide station metadata, time and position (of the GPS antenna) in the recorded video image.

Camera tows lasted a minimum of 10 minutes, with the sledge being towed at ~ 0.5 knots (~0.25 ms^{-1}) across a 200m diameter 'bullring' centred on the sampling station or between two close but adjacent sampling stations which targeted markedly different backscatter intensities. Still images were captured at regular one-minute intervals and opportunistically if specific features of interest were encountered. The sledge was controlled by a winch operator with sight of the video monitor and note made of the amount of tow cable deployed to allow a 'lay back' to be applied to estimate the position of the sledge.

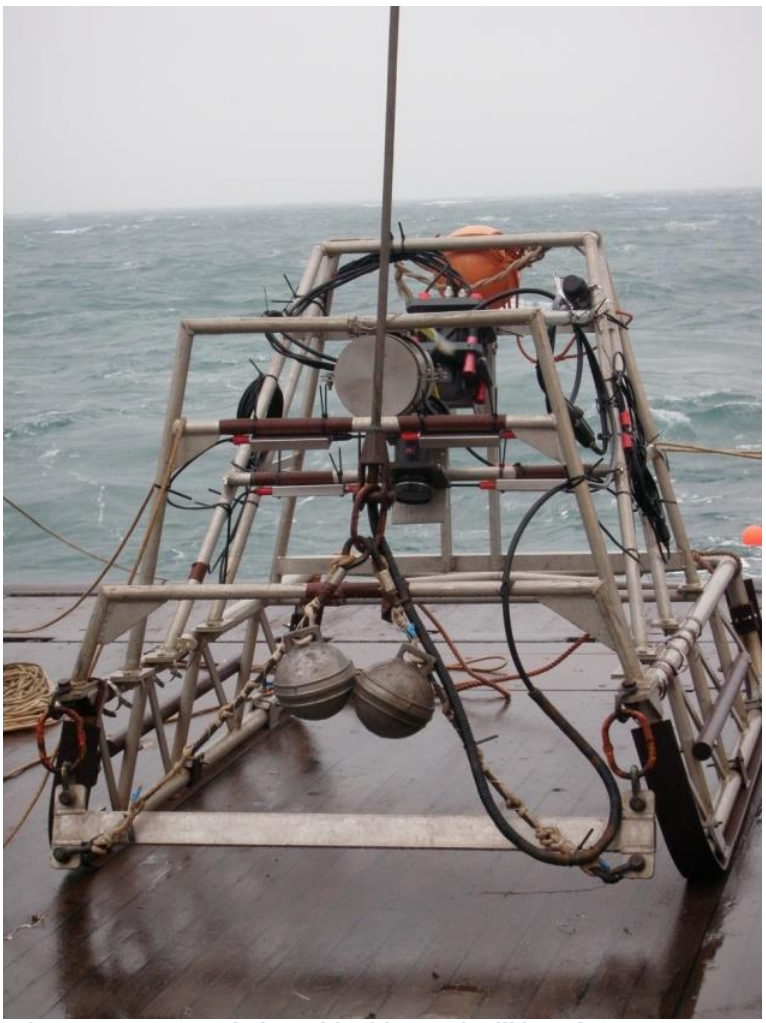


Figure 8. Camera sledge with video and still imaging system.

A drop-camera (DC) system was used at stations where the acoustic backscatter suggested rock would be present. The system specification was similar to that used on the camera sledge, but without the horizontal (green) laser. The camera was mounted in a rectangular drop-frame (Figure 9) and deployed from the side gantry, amidships. Deployments lasted a minimum of 10 minutes, with the vessel executing a controlled drift at ~ 0.3 knots (~0.18 ms^{-1}) across a 200 m diameter 'bullring' centred on the sampling station. Stills images were captured at regular one-minute intervals and opportunistically if specific features of interest were encountered. The height of the camera off the seabed was controlled by a winch operator with sight of the video monitor.

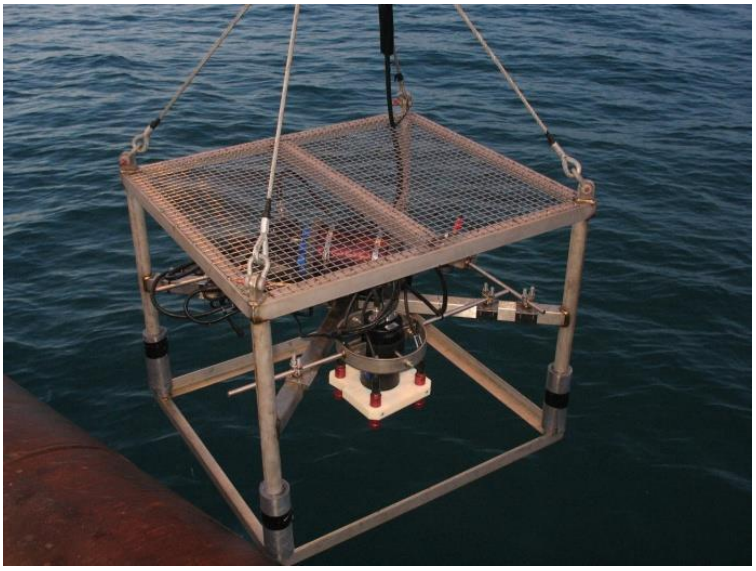


Figure 9. Drop camera frame showing camera and 4-spot laser scaling device

Field notes were made during each camera deployment, noting station and sample metadata, real- time observations of substrate and taxa, and an initial assessment of the range of Broad Scale Habitats (BSH's) that had been seen. A summary pencil sketch depicting the main site characteristics was often included.

2.2.4 *Camera clock synchronisations*

The internal clock of the camera used on the sledge was synchronised with GPS time. This clock creates a timestamp in the EXIF data stored in the digital image. A calibration test was conducted using the camera to photograph a kitchen clock set to GPS time and showed the camera clock lagged GPS time by 1 second (Figure 10). The clock in the camera used on the drop frame was not synchronised with GPS time and similar tests showed that it was in advance of GPS time by 1 minute and 36 seconds.

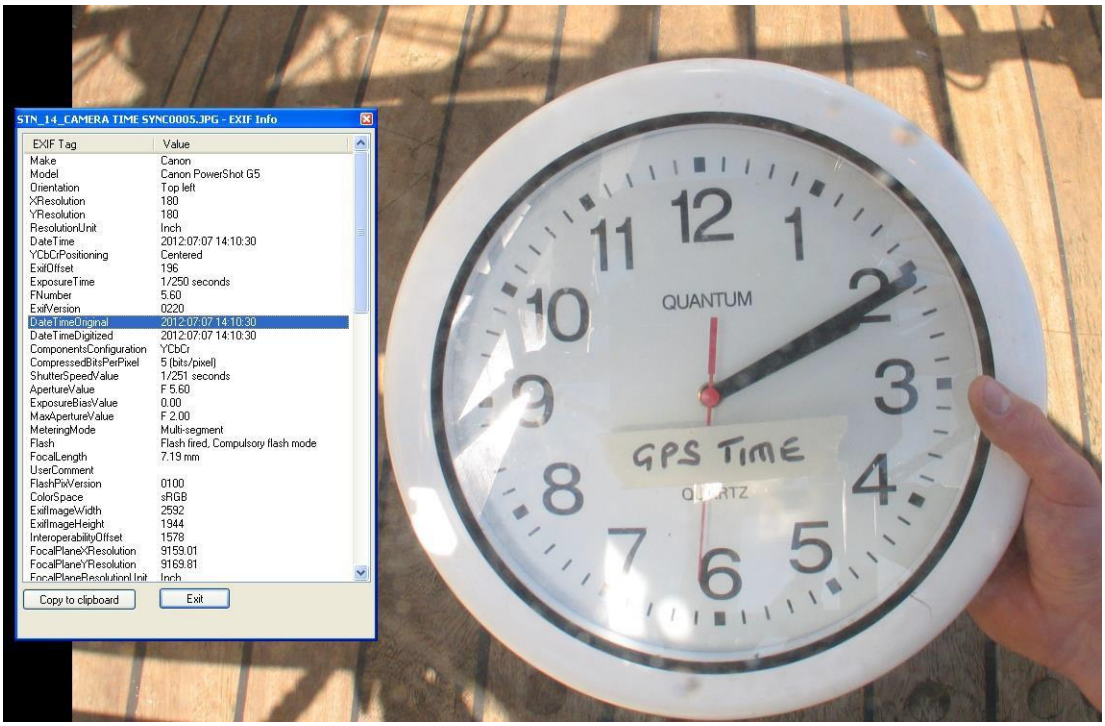


Figure 10. Calibration test synchronisation of the sledge camera's internal clock with GPS time.

2.2.5 *GPS positions and corrections*

GPS fixes were recorded using the Tower Navigation system on RV *CEFAS Endeavour*. This records the Lat/Long position of the gantry from which the sampling equipment is being deployed, automatically compensating for the offset between these gantries and the GPS antenna. Fixes for grab samples were taken at the instant the grab contacted the seabed. The grab was always deployed from the side gantry and the position recorded is taken to be the true position of the grab sample, as the grab typically drops directly down from the gantry. In strong tides an offset of up to about 10 metres may occur but is not accounted for.

Fixes were made for each still image taken by the cameras. The drop camera was always deployed from the side gantry so, as for the grab, the position recorded is taken to be the true position of the image. In contrast, the camera sledge was always deployed over the stern of the vessel, so the fixes record the position of the stern gantry and, because the sledge is towed some distance behind the vessel (generally > 100 m), such fixes are significantly offset from the true position of the camera at the time the images were taken. However, the relative position of each image to its neighbours will be accurate.

Corrected positions for still images taken with the camera sledge have been estimated using a layback calculation developed by Koen Vanstaen (Cefas) during prior work with the JNCC and British Geological Survey in the eastern English Channel (James *et al*., 2007[9]). The calculation requires inputs for position of the vessels GPS antenna, course over ground (COG), the water depth at the sampling location and the amount of cable paid out between the vessel and the sledge ('cable out'); it also uses constant values for the surveyed offsets between the GPS antenna and the stern towing point on the ship.

As the position of the GPS antenna was recorded on the video overlay, the video records were reviewed to extract this position at the instant each still image was taken. This is marked on the video record by a momentary loss of the image as the camera switches from video to still mode, leaving a black screen showing only the video overlay, from which the Lat/Long position can be easily read. The information on water depth and 'cable out' were routinely recorded in the field metadata. COG for each tow was estimated from the uncorrected fix positions for the still images plotted in ArcGIS.

It should be noted that the raw fix data is provided in the metadata records for the survey. The corrected positional data for the still images collected by the camera sledge have been applied in the ArcGIS layers used to plot the positions the still images.

The JNCC requested video tows to be represented in GIS as polyline shapefiles broken up into habitat sections. For the material collected by camera sledge, the position of these lines has been estimated using the corrected position for the associated still images. As stills were taken to mark the start and end of each tow, these corrections have been applied directly. For the transitions between habitat segments along the tow, the position used is that of the nearest still image to the noted transition. All positions should be considered approximate and are estimated to be accurate to within +/- 10 metres.

[9] James *et al*., 2007. Eastern English Channel Marine Habitat Map. *Cefas Scientific Series Technical Report*, No. 139.

3 Survey Narrative

The acoustic corridors were completed between 5th and 7th July, with CTD casts being taken each day. Survey started in the south-west to permit quick access to the Haig Fras 'Infill' survey which was being run concurrently in the area between the two main reef features that had not been covered on the 2011 surveys (see Figure 1 and Coggan, 2012[10]). Line AC01 (Figure 4) was not sampled, because line AC02 was completed at the northeast end and it was not considered an efficient use of time to undertake a relatively long steam (10 NM) to survey this short (1 NM) line in what was proving to be a relatively homogenous area of seabed.

Technical difficulties were experienced with the sidescan from 18:00 hrs on Friday 6th July, requiring two re-terminations of the tow cable, each of which prevented use for 24 hours. Sidescan was acquired for lines AC109, 108, 107, and most of 106, but not for the other main survey lines.

The multibeam bathymetry and backscatter were processed during the survey and the resulting backscatter mosaic image, showing harder surfaces as dark and softer surfaces as light, plotted on A0 paper and used to select the ground-truth sampling sites at which the camera systems would be used.

The ground truth sampling started at 11:30 Sunday 8th July (immediately following that at the Haig Fras Infill site) working through the array of stations from the southwest to the northeast, but in an order that ensured that transits between stations followed a different orientation to the main acoustic survey lines, so maximising the value of the opportunistic multibeam survey (Figure 11). All stations occupied were sampled by grab and a subset also by video. A minor technical problem with the grab winch on 10th July meaning that the down-wire video cable could not be used, so the grab was operated as a plain Hamon grab (gear code HG) for 11 stations. The gears deployed at each station are indicated in Figure 11. Sampling finished at GHF_03, at 13:00 on Wednesday 11th July, a total of 56 stations having been occupied. Stations to the south of the main Haig Fras reef and GHF_30 were not occupied.

Three nested acoustic surveys were completed. Two of these have been referred to as 'Infill' (INF) surveys and lie in the west of the site between GHF_74 and GHF_77 and in the east between GHF_06 and GHF_03. In each case the surveys added two further multibeam lines to the south of the main survey line, providing a full coverage area of approximately 1km x 5 km.

[10] Coggan, R., 2012. Haig Fras 'Infill Survey' Report. Cefas project Report for JNCC, Project ref: C5785A, Report Ref: HF-SAC/xx/AB/07-12

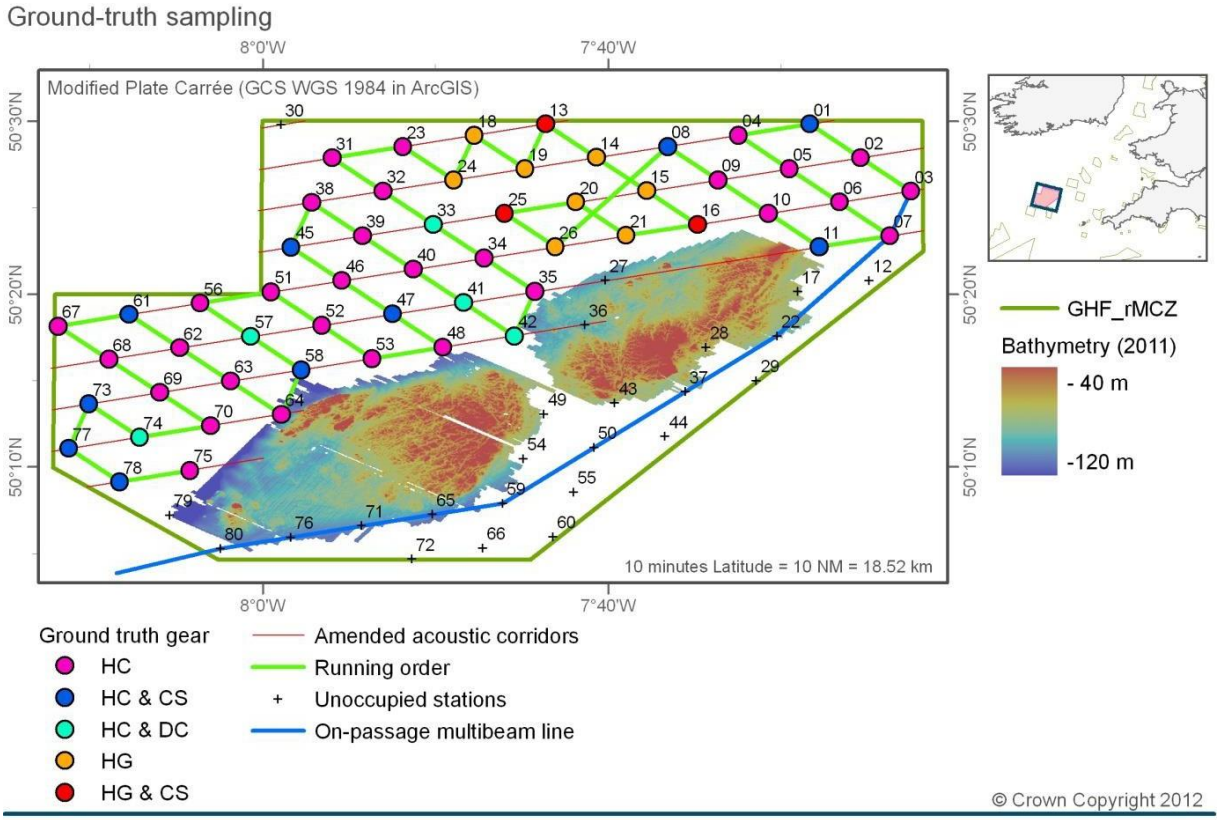


Figure 11. Greater Haig Fras ground truth sampling survey showing station codes, gears used and sequence of occupying stations (running order), starting at GHF_75 in the south-west. Gear code are HC =HamCam, HG = Hamon grab, CS = Camera Sledge, DC = Drop Camera. Also the multibeam line that was run on passage to the next site.

A further full coverage block of the same dimension but in a north-south orientation was selected in the centre of the site, around GHF_26. The seabed here was flat but heterogeneous, so made an

ideal location for the Autosub test (the 'GHFAST' survey referred to in 2.1 above). The acoustic survey (multibeam and sidescan) was competed on the morning of 10th July, and ground truth stations located to target specific features on the sidescan backscatter. Grab and camera sampling was completed in the evening of 10th July. A naming convention was adopted to identify the samples separately to the main GHF survey, as follows: acoustic data and outputs include the text string

'NOC' (for National Oceanographic Centre) in the filenames, while the ground truth stations were coded with a simple 'GT_' prefix. A dataset comprising a geotiff of the bathymetry, an XYZ data file (lat/long & depth) and an ArcGIS shapefile were emailed from RV *Cefas Endeavour* to the Autosub team on RRS *Discovery* on 18th July. The GHF survey was terminated in the afternoon of Wednesday 11th July to allow time to complete other survey works scheduled for this cruise. An opportunistic multibeam survey line was run to the south of the main reef area on-passage to the North West of Jones Bank rMCZ site, targeting locations on the original survey grid (Figure 11).

Preliminary analysis of video and stills material was completed towards the end of the cruise (13th – 15th July) during a period of nearshore acoustic survey for Natural England. Each video record was reviewed, noting time and position of significant changes in substrate type that indicated a transition for one Broad Scale Habitat (BSH) class to another. Changes of less than 2 minutes duration were considered to be incidental patches and not representative of a change in BSH. No notes were made regarding the fauna present.

Each of the still images taken was viewed and assigned to a BSH class according to the dominant substrate seen in the image. Basic notes were also made on features seen in the images, such as the seabed character (e.g. ripples), the sediment type and the presence of epibenthic macrofauna.

Photographs of the sediments collected by grab samples were reviewed by the sedimentologist on board as a quality assurance measure to ensure that they had been assigned to the correct Folk, EUNIS and BSH classes as far as is reasonably possible in the field. It is stressed that these are **preliminary** assignments; as a definitive assignment requires a more comprehensive granulometric analysis.

4 Preliminary Results

All information presented under this section is based on preliminary observations of the acquired data and is subject to change following full analysis of the data in the laboratory.

4.1 *Acoustic Maps*

The multibeam backscatter image was reasonably consistent with the SAD's predicted habitat map shown in Figure 2, in so far as harder substrate extended out from the main reef area and graded into softer substrate towards the perimeters of the rMCZ (Figure 12). The area to the west of a line from GHF_56 to GHF_78 showed relatively uniform low backscatter suggesting soft substrate (Figure 13), but to the east of this line the backscatter was characterised by a high degree of local variance, indicating a complex mosaic of substrates consistent with patchy veneers of sediment over underlying rock. The sediments appear to be formed into rippled bedforms, leading to some exposure of the underlying rock at the seabed surface. Some wider expanses of homogenous high backscatter suggest some coarse substrate is present (Figure 14). The single survey line to the south of the reef shows the same degree of variability in the southeast but becomes more homogenous to the west of GHF_65. See section 46 for a description of the central GHFAST survey area.

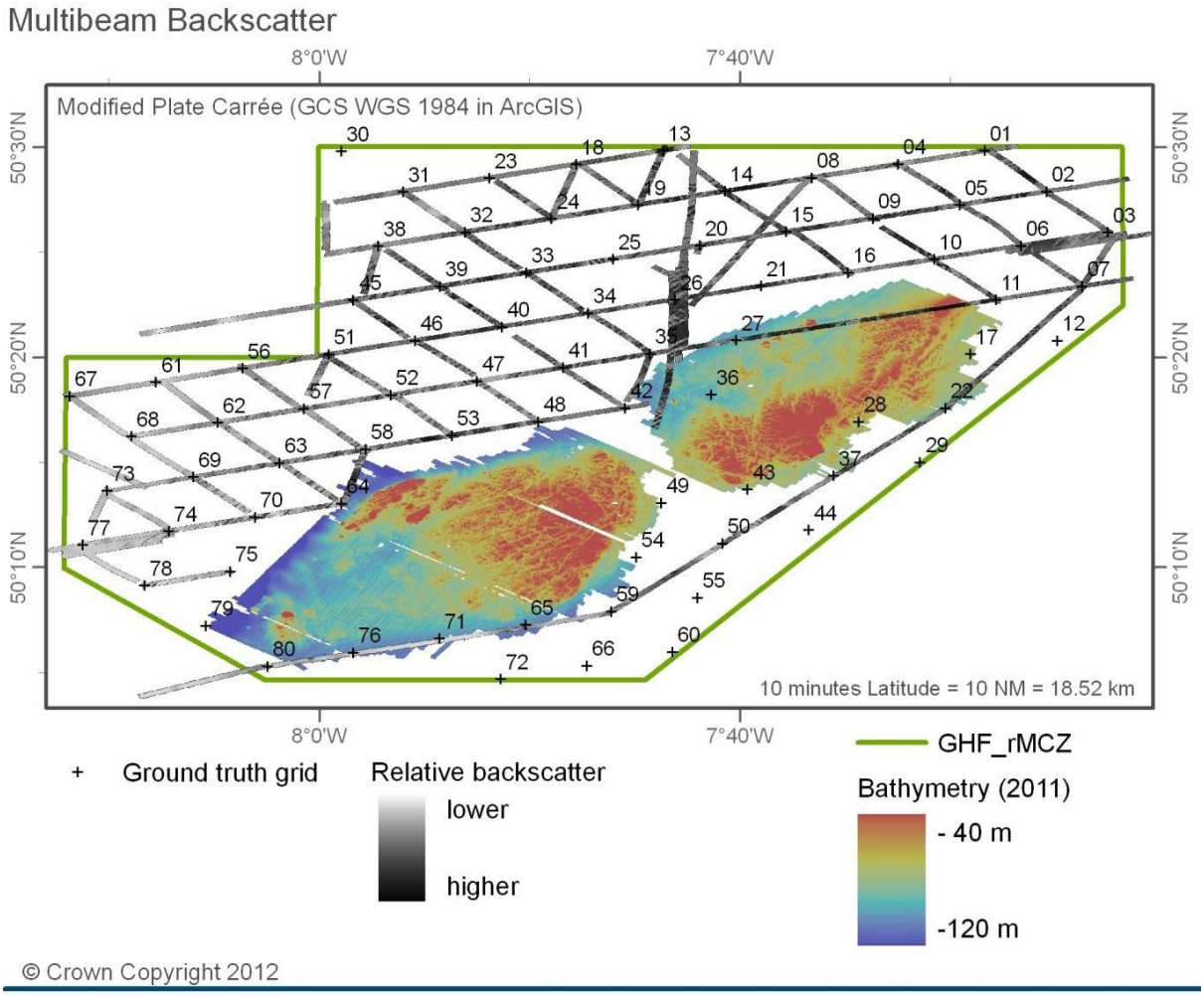


Figure 12. Multibeam backscatter for the Greater Haig Fras rMCZ survey. Note the 2012 data are currently presented as relative backscatter, not absolute.

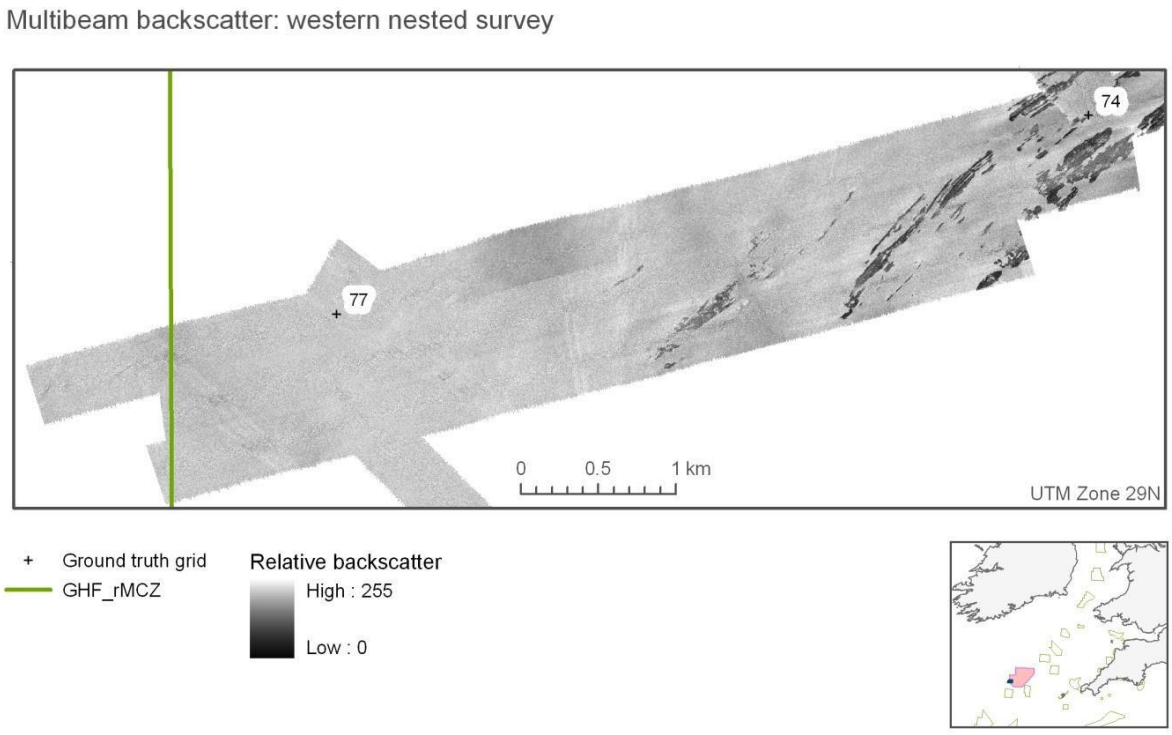


Figure 13. Multibeam backscatter for the nested survey area in the west. Note the trawl marks around GHF_77.

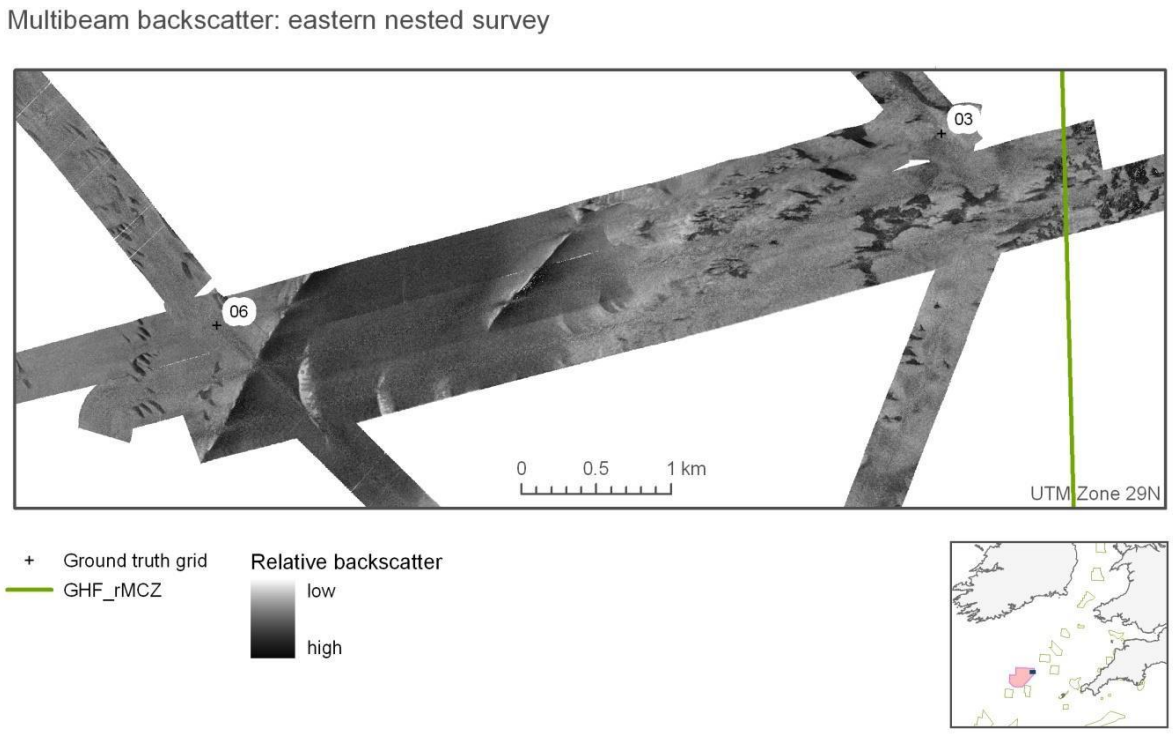


Figure 14. Multibeam backscatter for the nested survey area in the east.

Multibeam bathymetry did not reveal any extensive areas of upstanding reef, as had been seen in the 2011 surveys. Broadly speaking, the site was relatively flat, shallowing from the west to the east (Figure 15). Some minor elevations in the order of 1 to 2 metres above the ambient depth were found and are thought to be associated with low-lying rocky outcrops. The bathymetry ranged from -76 to -146 metres below chart datum (BCD).

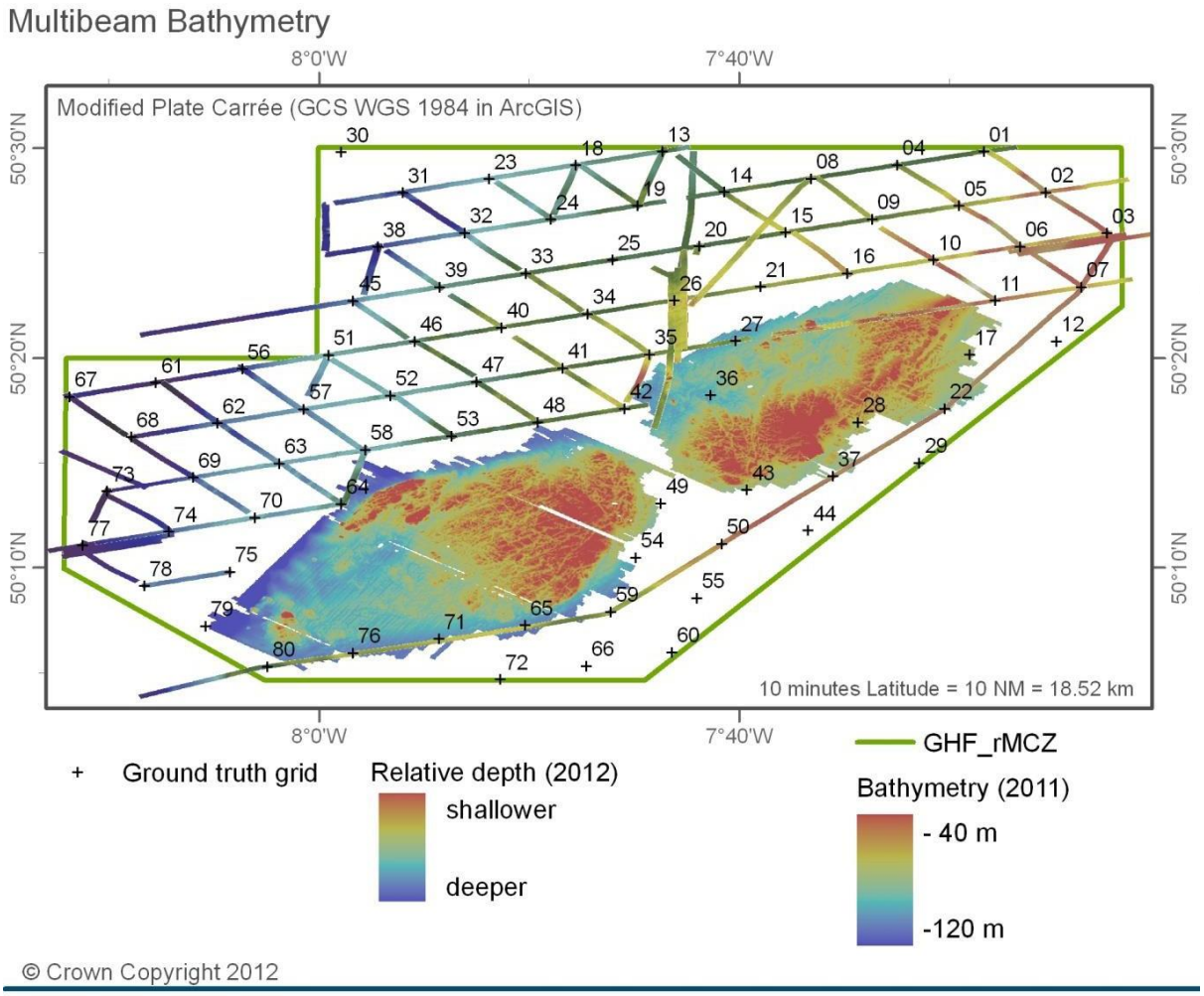


Figure 15. Multibeam bathymetry for the Greater Haig Fras rMCZ survey. Note the 2012 data are currently presented as relative depth, not absolute.

Multibeam and sidescan data were processed following standard Cefas procedures, as detailed in section 2.2. For QA purposes, separate technical survey reports are provided for the multibeam bathymetry processing as MCZ_GHF_2040 Survey report.docx, MCZ_GHf_INF_2040 Survey report.docx and MCZ_GHF_NOC_2040 Survey report.docx. Similarly named technical reports are also provided for the backscatter processing, and a further technical report is provided for the sidescan backscatter processing for the GHFAST survey as MCZ_GHF_NOC_SS processing log.doc. Sidescan data for the GHF survey has not yet been processed.

4.2 *Grab samples and sediment types*

Grab samples were collected at all stations occupied. The distribution over the site of the EUNIS Level 3 sediment types assigned to the samples on the basis of visual inspection in the field is plotted in Figure 16 and the photographs of each grab sample are presented in Figure 17. It should be emphasised that the assignments presented here are only preliminary and definitive assignment must await the results of granulometric analysis. However, it is clear that the area classed by the SAD map as A4.2 moderate energy circalittoral rock is not verified, as grabs successfully sampled sediment over the whole of this area, except for one location in the GHFAST area (see section 4.6).

Mud and mixed sediments would appear to be more widespread than previously thought, and sand less widespread.

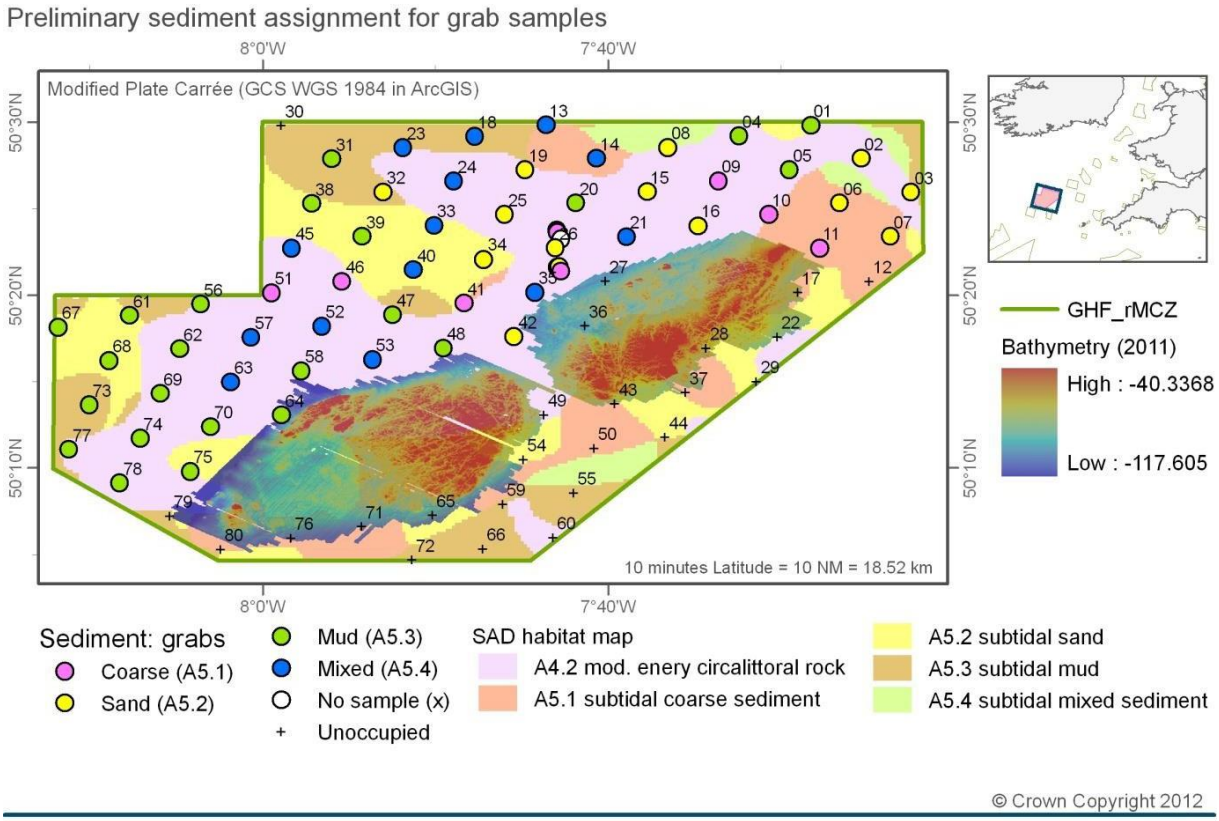


Figure 16. Preliminary sediment assignments for sediments collected in grab samples, plotted over the predicted habitat map from the Site Assessment Document.

Figure 17. Photographs of grab samples and 5mm sieve mesh, arranged by preliminary classification into sediment type.

Continued…

				Mud
GHF26	GHF32	GHF34	GHF42	GHF01
				
				
Sand: Sand	Sand: Muddy sand/sandy mud	Sand: Muddy sand	Sand: Muddy sand	Mud: Slightly shelly mud
GHF04	GHF08	GHF20	GHF31	GHF38
				
				
Mud: Muddy sand/sandy mud	Mud: Muddy sand	Mud: Muddy sand containing shell (Mixed?)	Mud: Shelly mud	Mud: Sandy mud
GHF39	GHF47	GHF48	GHF56	GHF58
				
				
Mud: Sandy mud containing shell	Mud: Sandy mud	Mud: Sandy mud	Mud:Sandy mud	Mud: Mud

Continued…

GHF61	GHF62	GHF64	GHF67	GHF68
No photo				
No photo				
Mud:Sandy mud	Mud: Sandy mud	Mud: Sandy mud	Mud: Sandy mud	Mud: Sandy mud

GHF69	GHF70	GHF73	GHF74	GHF75
				
				
Mud: Mud	Mud: Mud	Mud: Mud	Mud: Mud	Mud: Shelly mud

		Mixed		
GHF77	GHF78	GHF13	GHF14	GHF18
				
				
Mud: Mud	Mud: Mud	Mixed: Muddy (clay?), shelly gravel	Mixed: Muddy gravel	Mixed: Muddy, shelly, sandy gravel/gravelly sand

Continued…

GHF21	GHF23	GHF24	GHF33	GHF35
				
		No >5mm photo		
Mixed: Muddy, shelly, sandy gravel/gravelly sand	Mixed : Shelly muddy sand/sandy mud	Mixed: Shelly mud	Mixed: Sandy muddy gravel	Mixed: Gravelly muddy sand

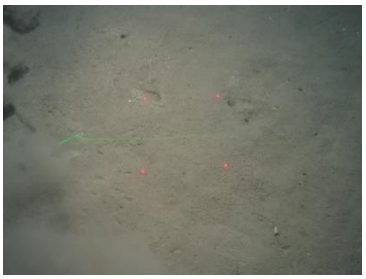
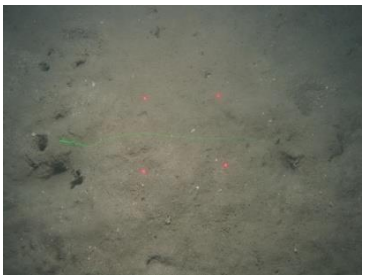
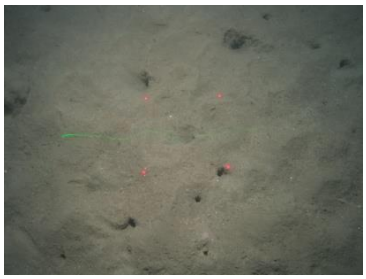
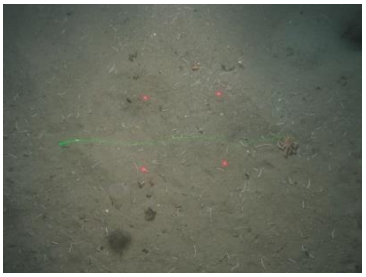
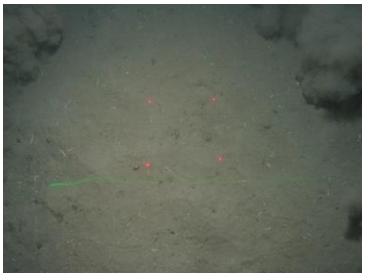
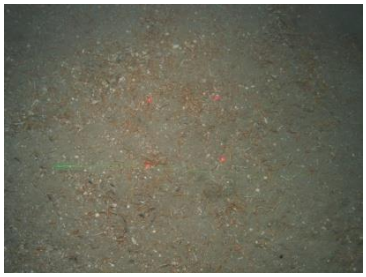
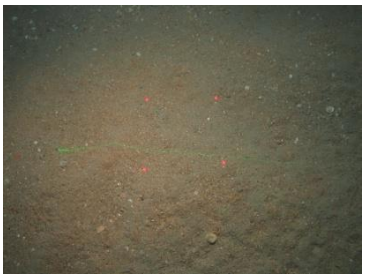
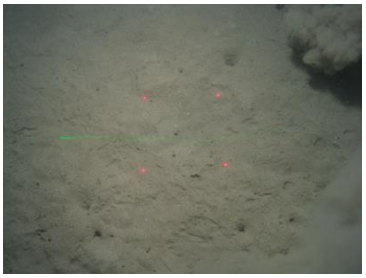
GHF40	GHF52	GHF53	GHF57	GHF45
				
	No >5mm photo			
Mixed: Gravelly sand containing shell and mud(clay?)	Mixed: Muddy, shelly gravelly sand	Mixed: Gravelly shelly sandy mud/ muddy sand.	Mixed: Shelly, gravelly mud	Mixed: Muddy sand/sandy mud containing shell

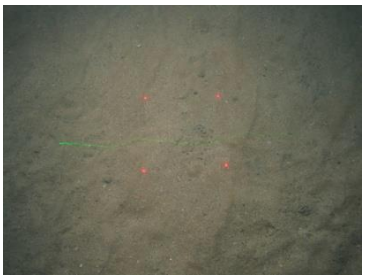
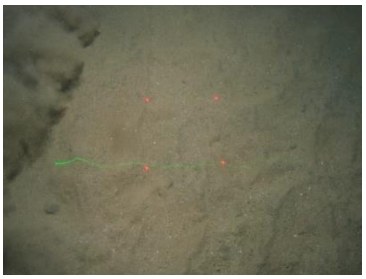
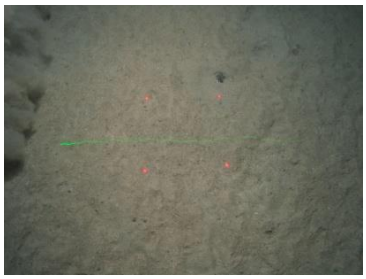
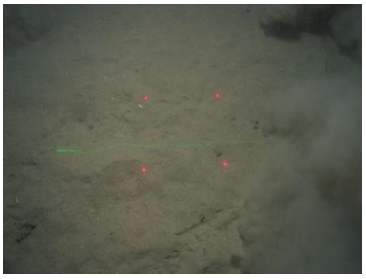
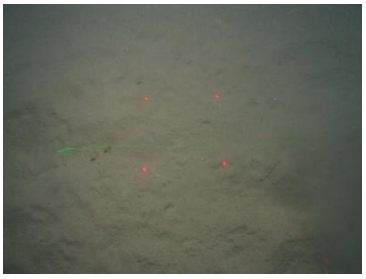
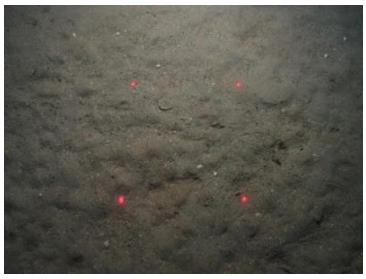
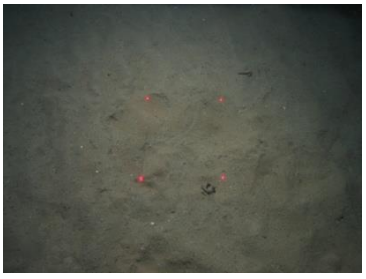
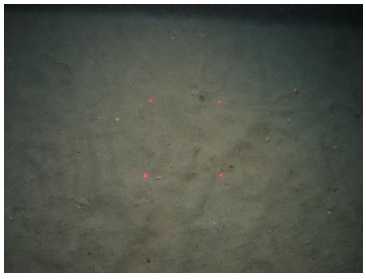
GHF63	GT02	GT09	GT01	GT07
				
				
Mixed: Slightly shelly, sandy mud	Coarse: Gravelly sand	Coarse (Mixed?): Slightly muddy, shelly sandy gravel	Sand: Muddy sand	Sand: Muddy sand

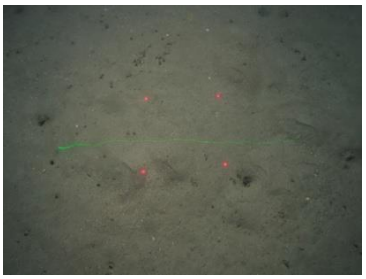
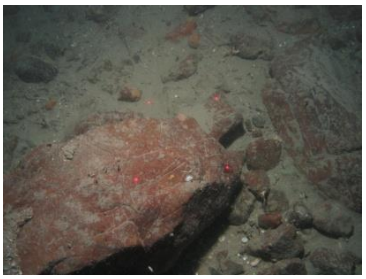
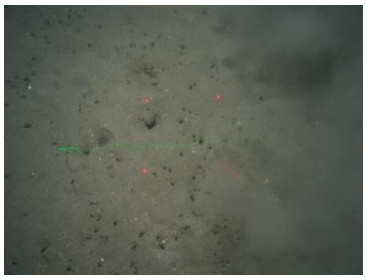
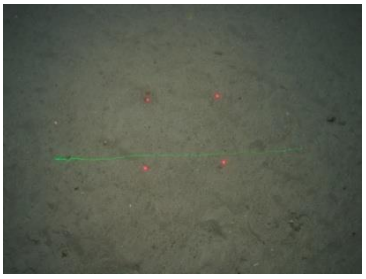
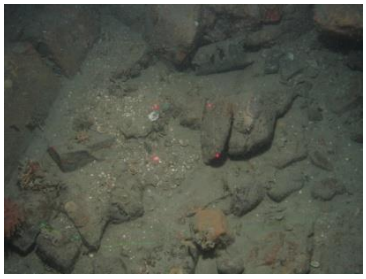
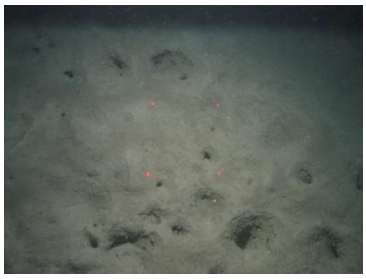
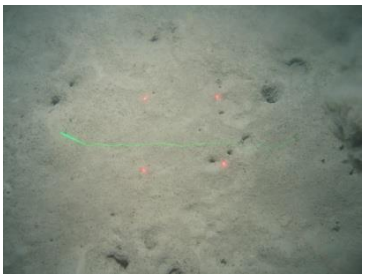
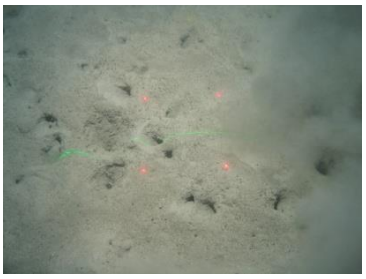
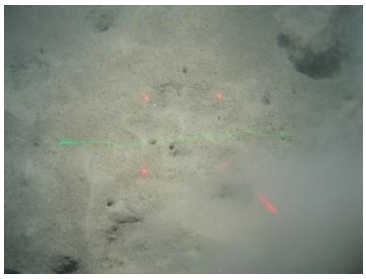
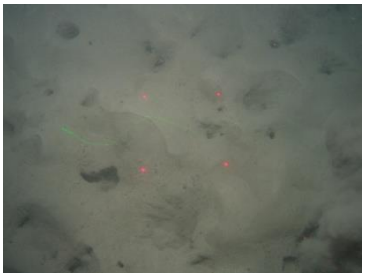
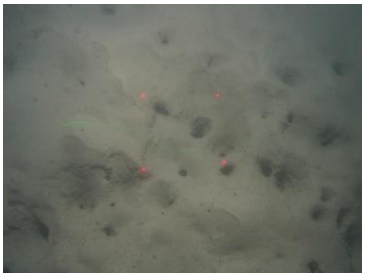
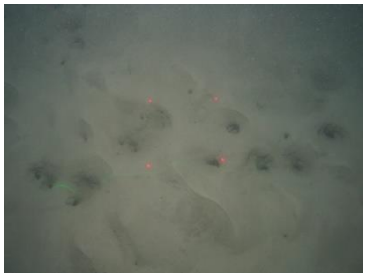
4.3 *Seabed Imagery*

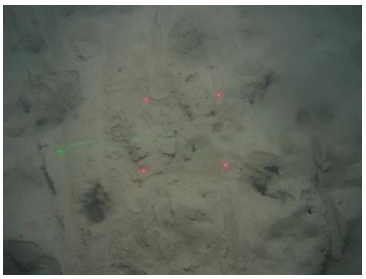
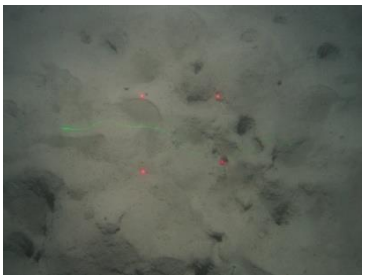
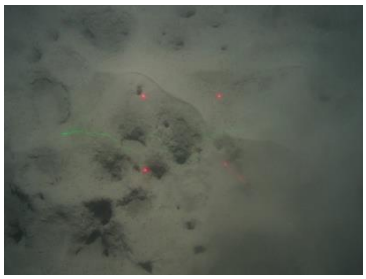
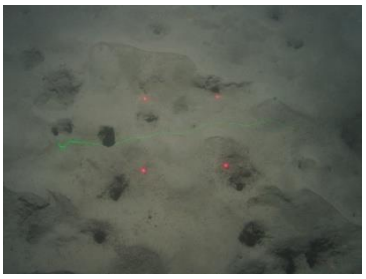
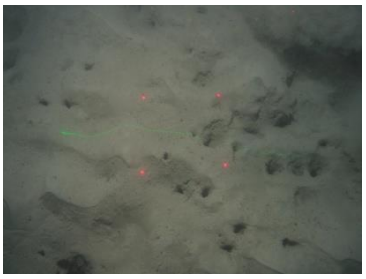
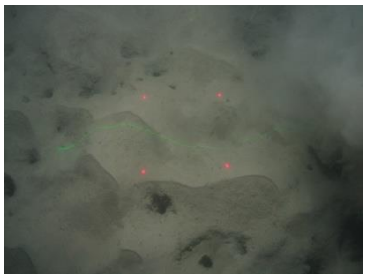
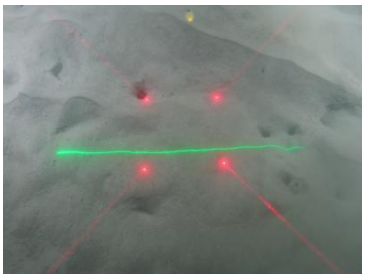
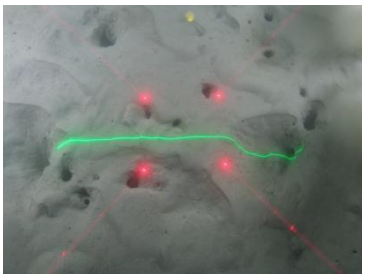
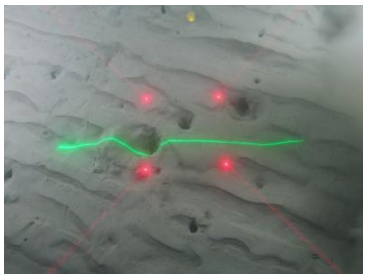
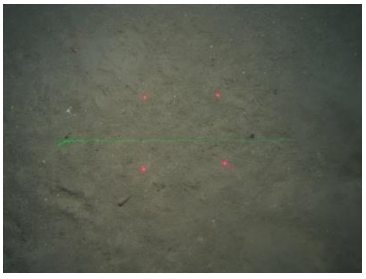
A selection of images from each of the video camera deployments is presented in Table 2 to illustrate the variety of substrates observed on each tow.

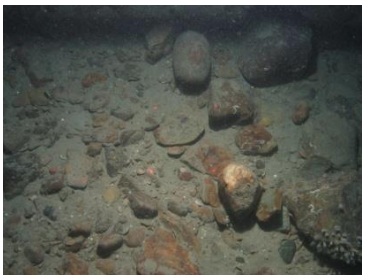
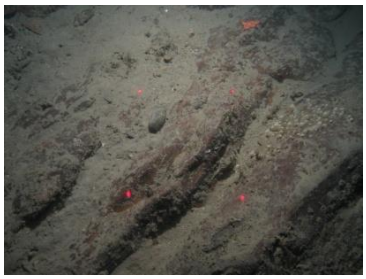
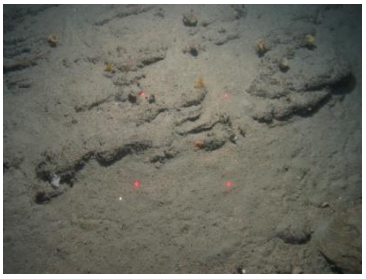
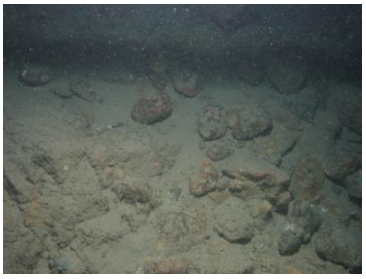
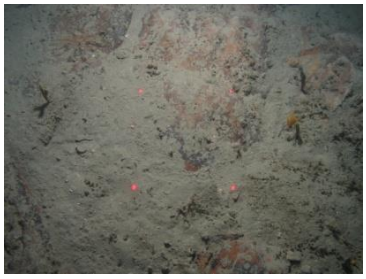
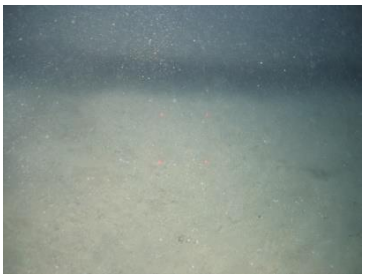
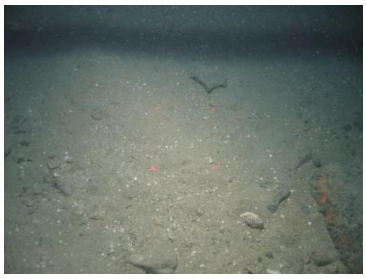
Table 2. Selection of seabed images for each camera deployment, with preliminary assignments to substrate type.

StnCode	Beginning	Middle	End
GHF_01	 Mud	 Mud	 Mud
GHF_08	 Mud	 Mud	 Sand
GHF_11	 Mixed	 Sand	 Sand
GHF_13	 Mixed	 Mud	 Coarse

StnCode	Beginning	Middle	End
GHF_16	 Sand	 Sand	 Mud
GHF_25	 Sand	 Mud	 Mixed
GHF_33	 Coarse	 Coarse	 Sand
GHF_41	 Sand	 Rock	 Sand
GHF_42	 Sand	 Sand	 Sand

StnCode	Beginning	Middle	End
GHF_45	 Mud	 Rock	 Mud
GHF_47	 Sand	 Rock	 Rock
GHF_57	 Rock	 Rock	 Mud
GHF_58	 Mud	 Mud	 Mud
GHF_61	 Mud	 Mud	 Mud

StnCode	Beginning	Middle	End
GHF_73	 Mud	 Mud	 Mud
GHF_74	 Mud	 Mud	 Mud
GHF_77	 Mud	 Mud	 Mud
GHF_78	 Mud	 Mud	 Mud
GHFAST GT_01 to GT_02	 Sand	 Mixed	 Mixed

StnCode	Beginning	Middle	End
GT_03 to GT_04	 Rock	 Rock	 Rock
GT_05 to GT_06	 Rock	 Rock	 Rock
GT_07 to GT_08	 Sand	 Rock	 Mixed
GT_09	 Sand	 Coarse	 Coarse

Results of the preliminary analysis of video and stills images are presented in Figure 18 to Figure 40, overlain on the backscatter acquired by this survey. The plots are from GIS shape files which incorporate a lay-back correction for the position of samples taken using the camera sledge which was deployed over the stern of the vessel (see section 2.2.5 above). The position used to plot samples taken with drop camera are the actual GPS fixes, which record the position of the side gantry from which the drop camera frame was deployed.

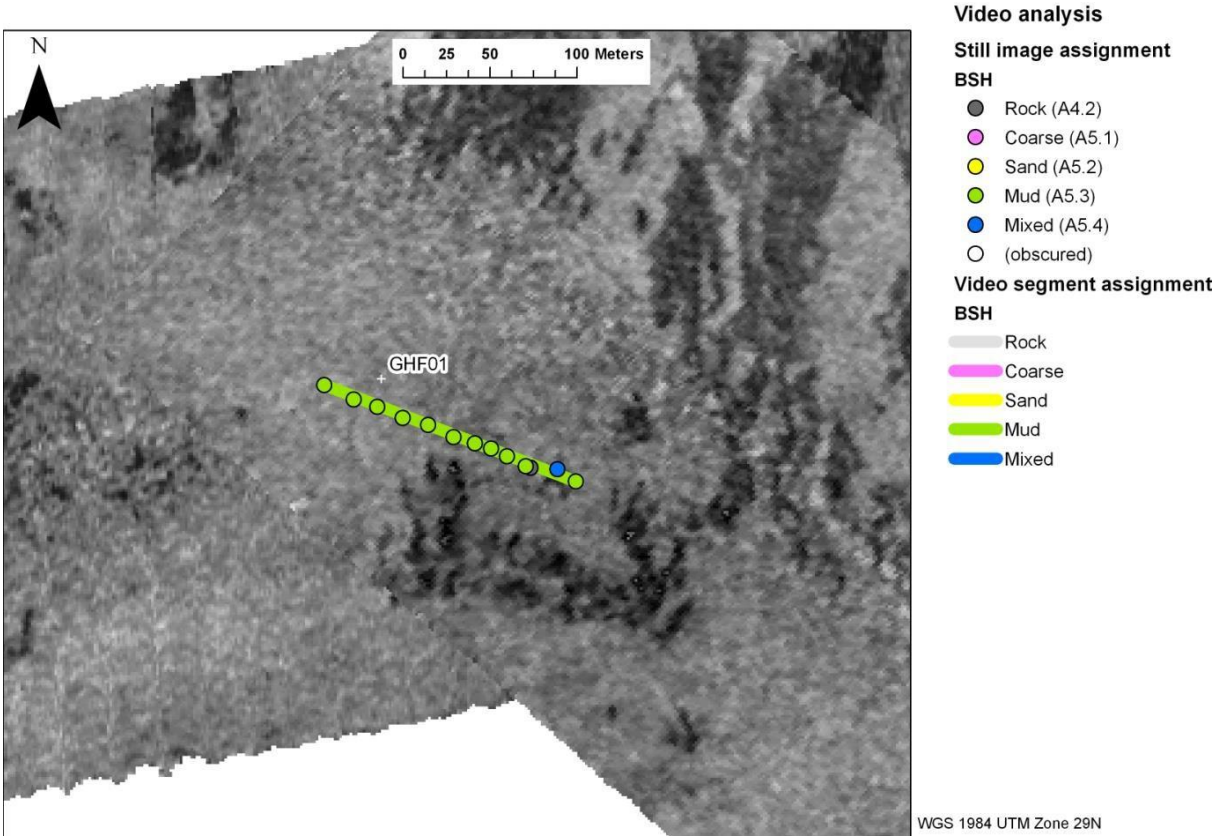


Figure 18. Substrate types assigned in the preliminary analysis of video and stills for GHF_01.

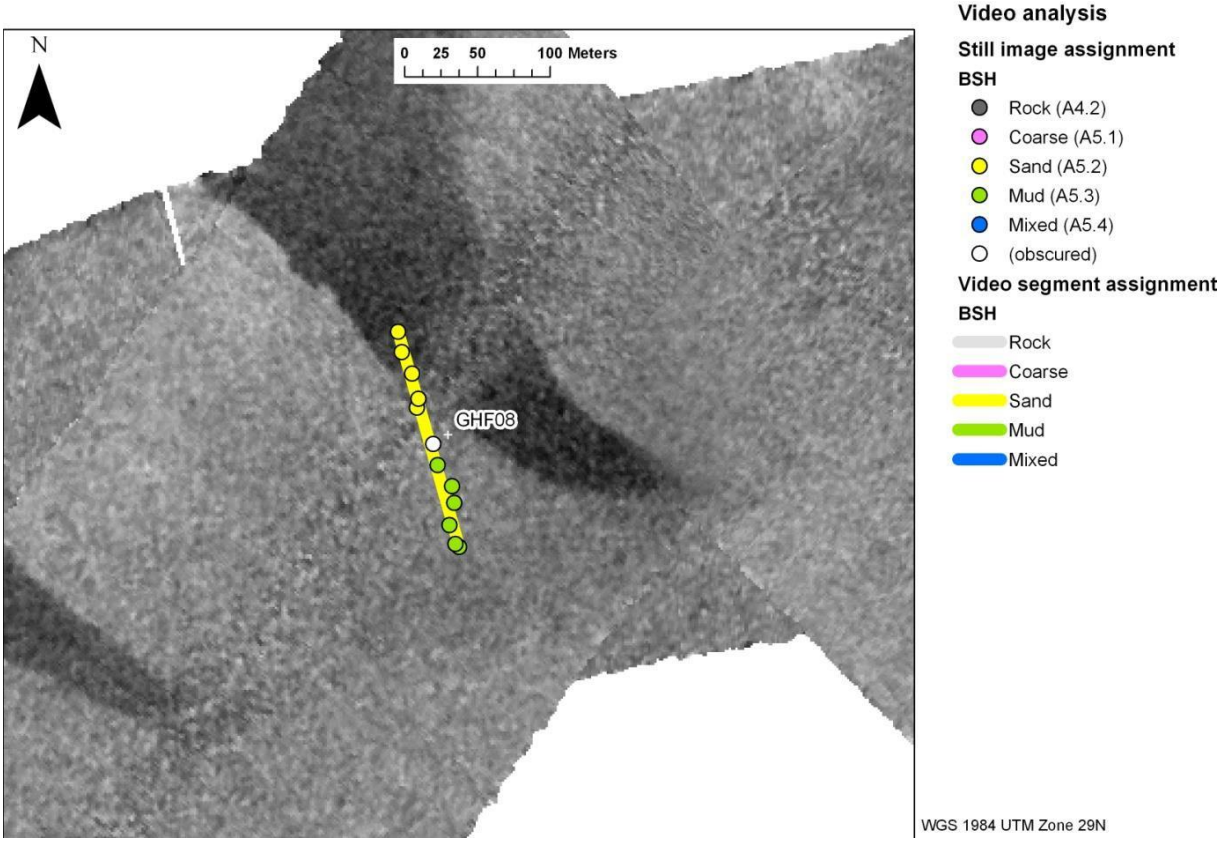


Figure 19. Substrate types assigned in the preliminary analysis of video and stills for GHF_08.

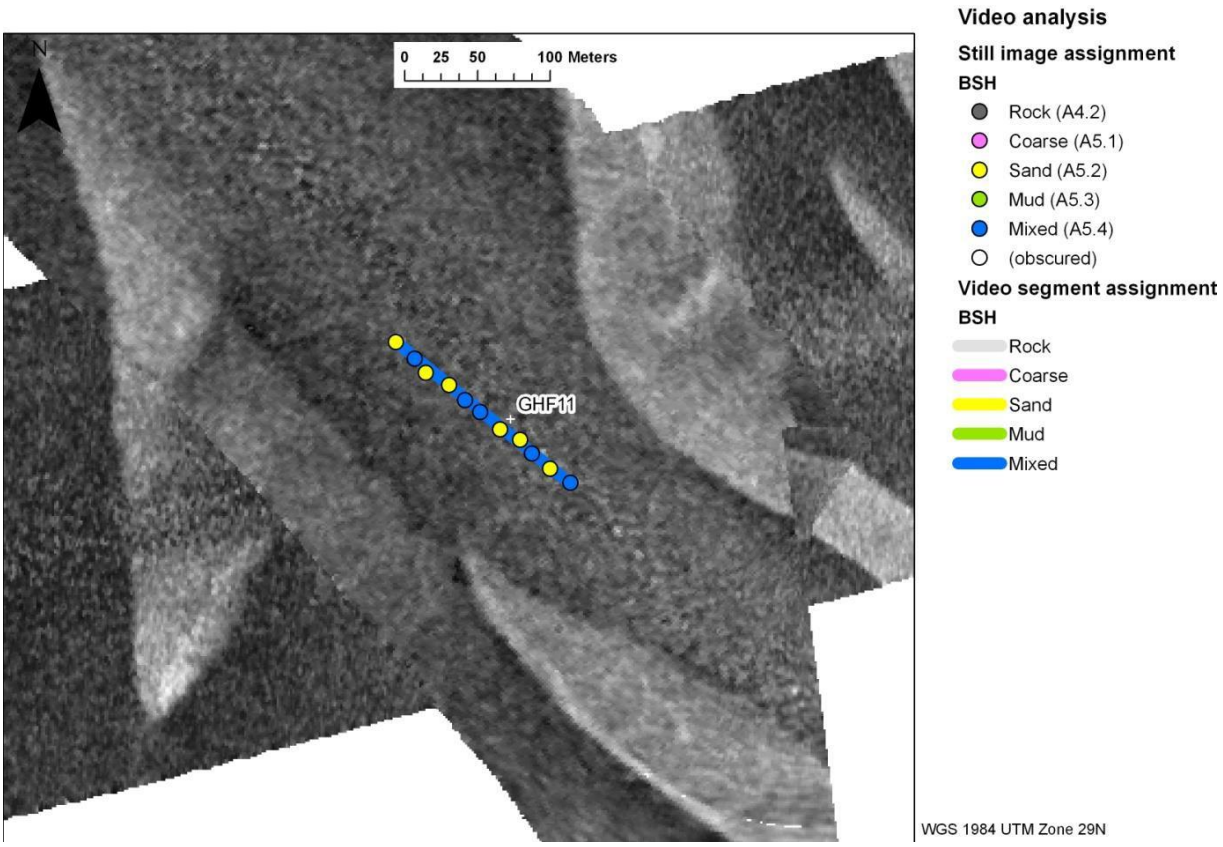


Figure 20. Substrate types assigned in the preliminary analysis of video and stills for GHF_11.

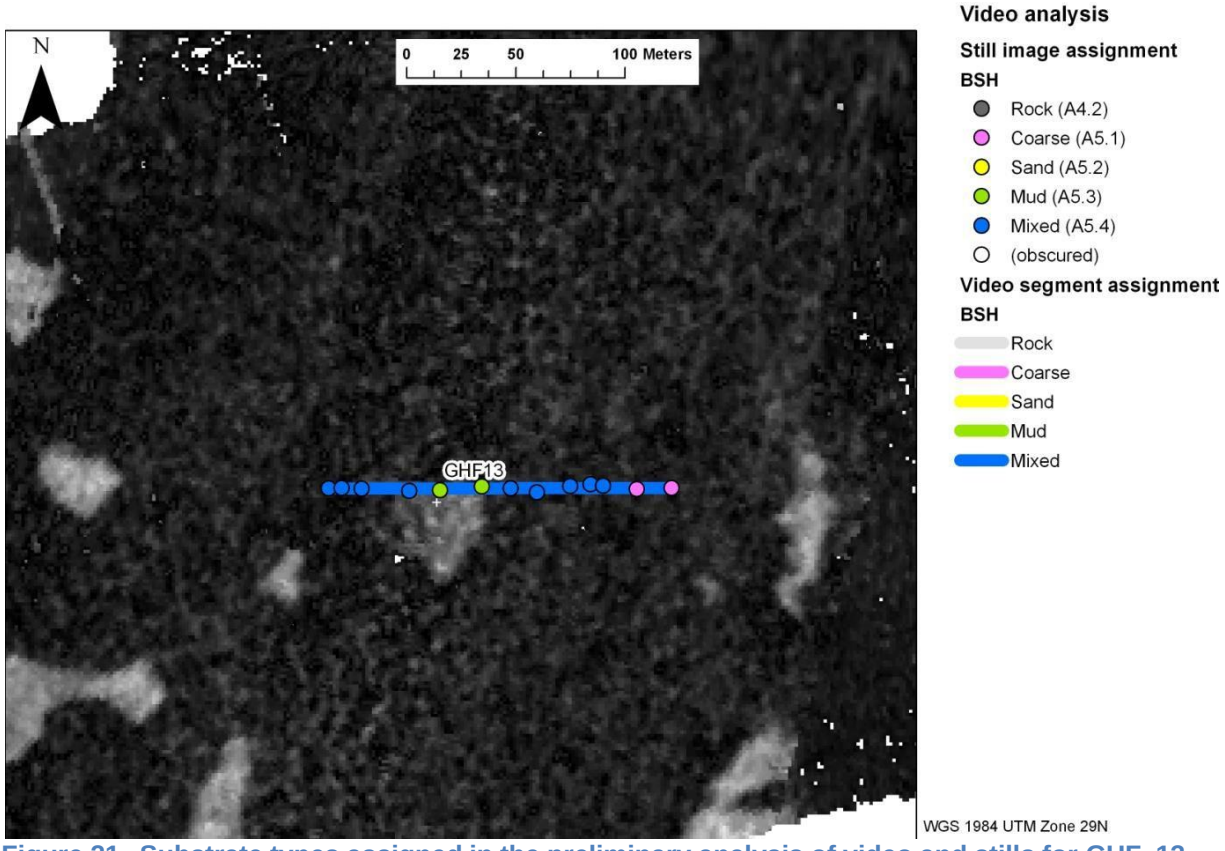


Figure 21. Substrate types assigned in the preliminary analysis of video and stills for GHF_13.

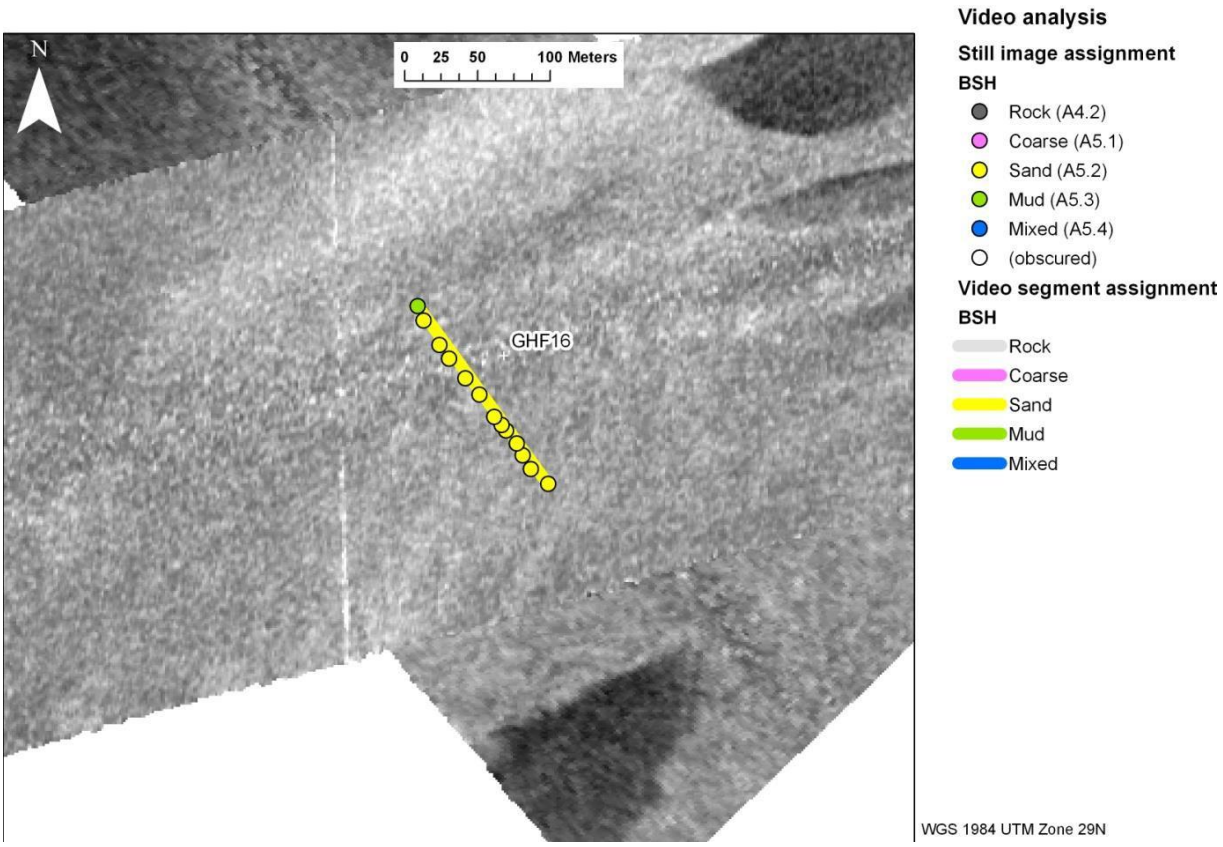


Figure 22. Substrate types assigned in the preliminary analysis of video and stills for GHF_16.

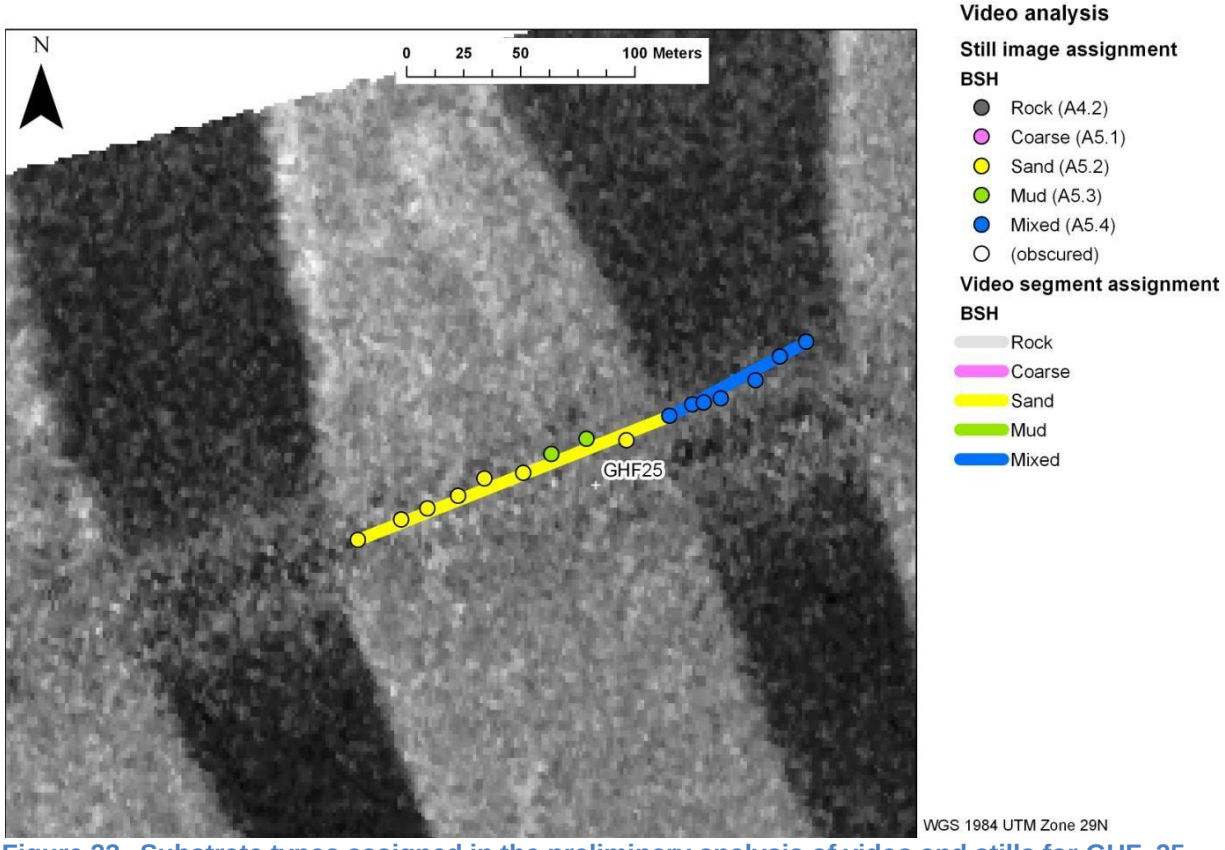


Figure 23. Substrate types assigned in the preliminary analysis of video and stills for GHF_25.

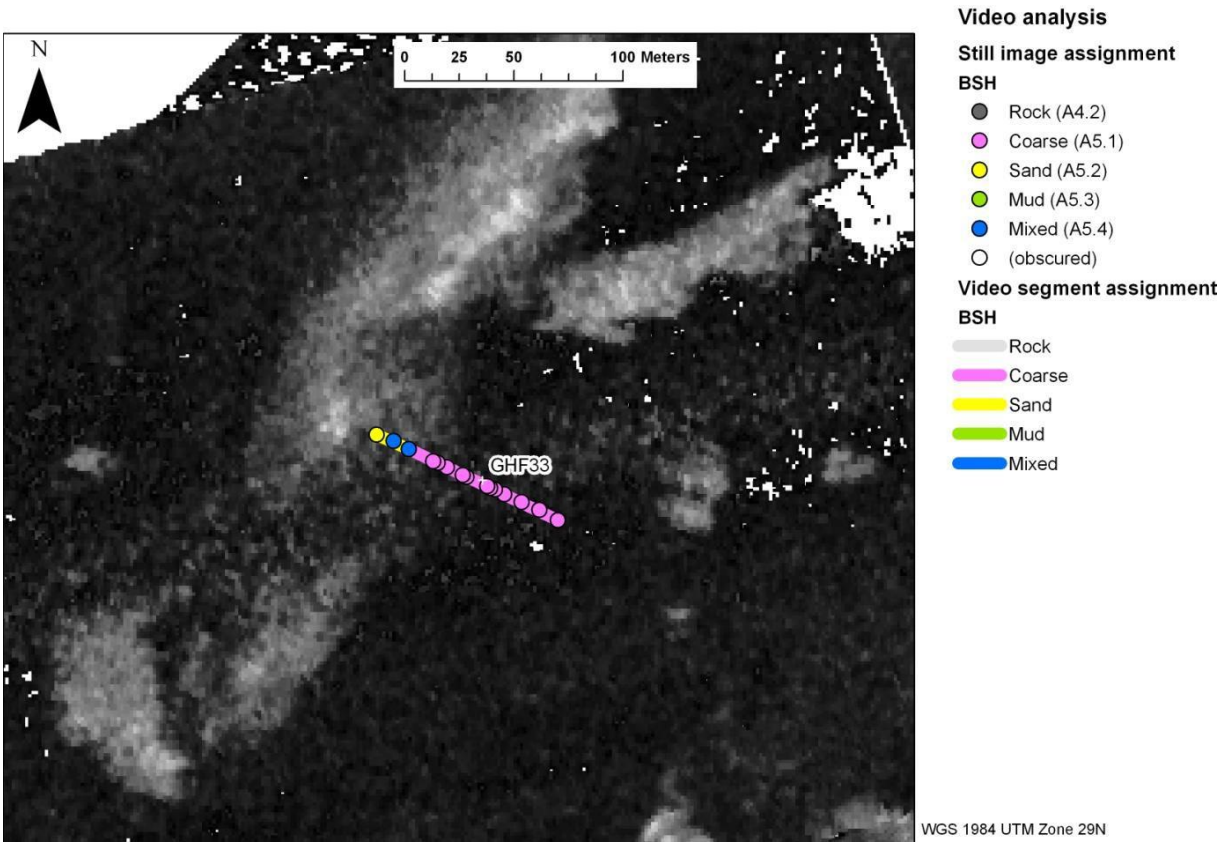


Figure 24. Substrate types assigned in the preliminary analysis of video and stills for GHF_33.

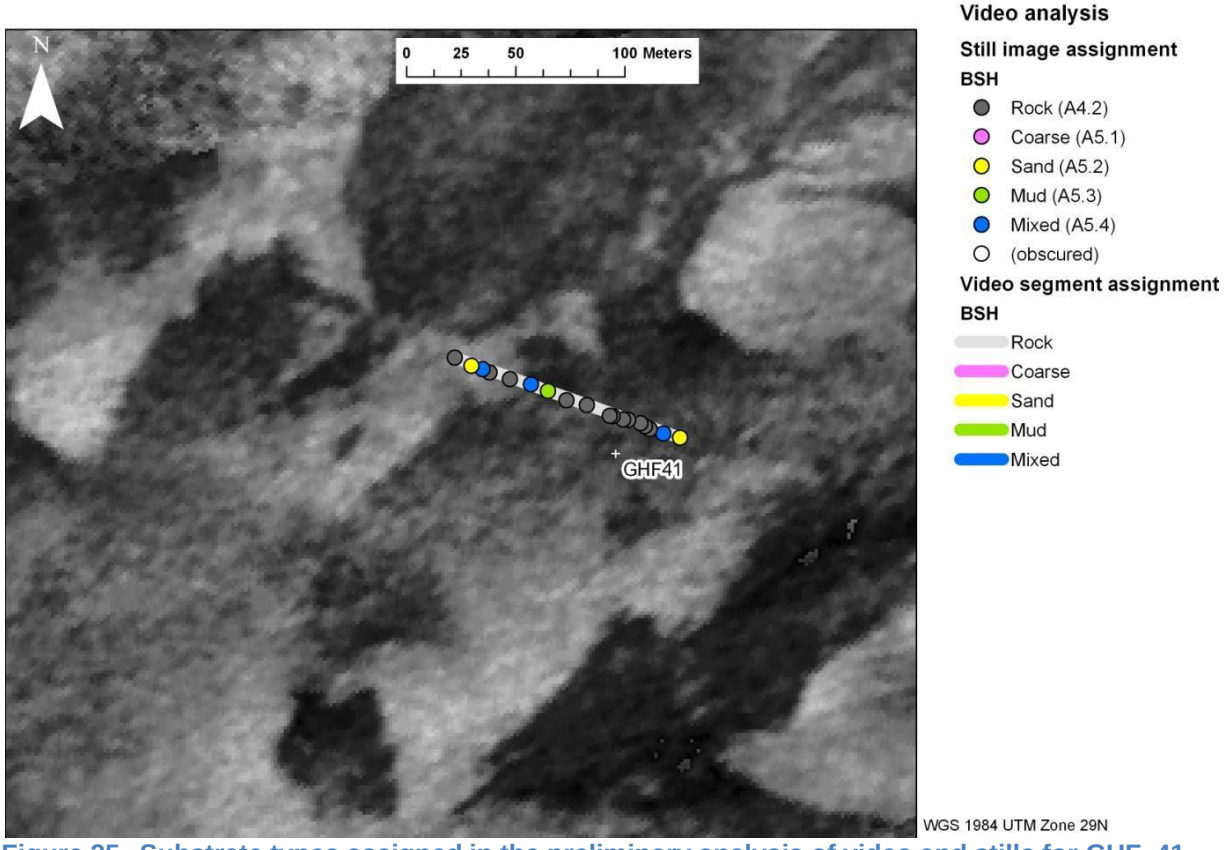


Figure 25. Substrate types assigned in the preliminary analysis of video and stills for GHF_41.

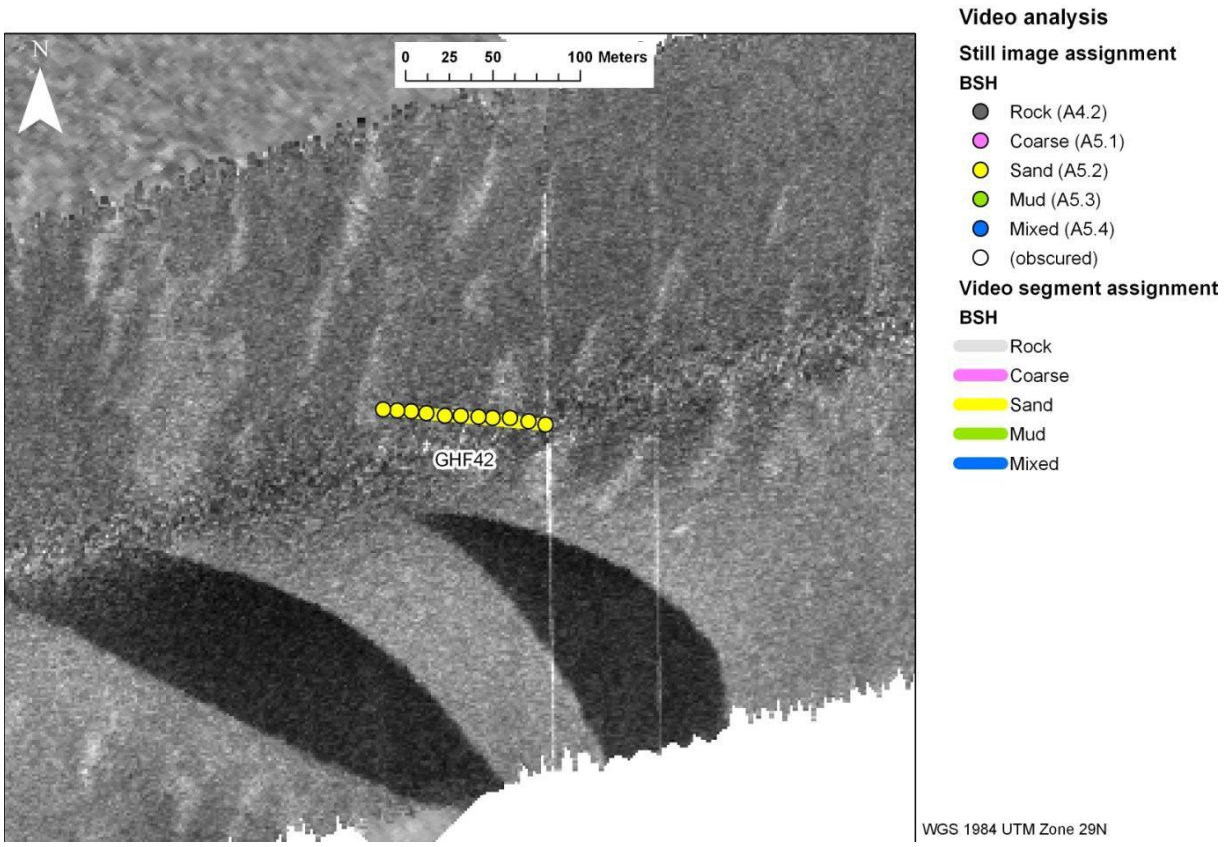


Figure 26. Substrate types assigned in the preliminary analysis of video and stills for GHF_42.

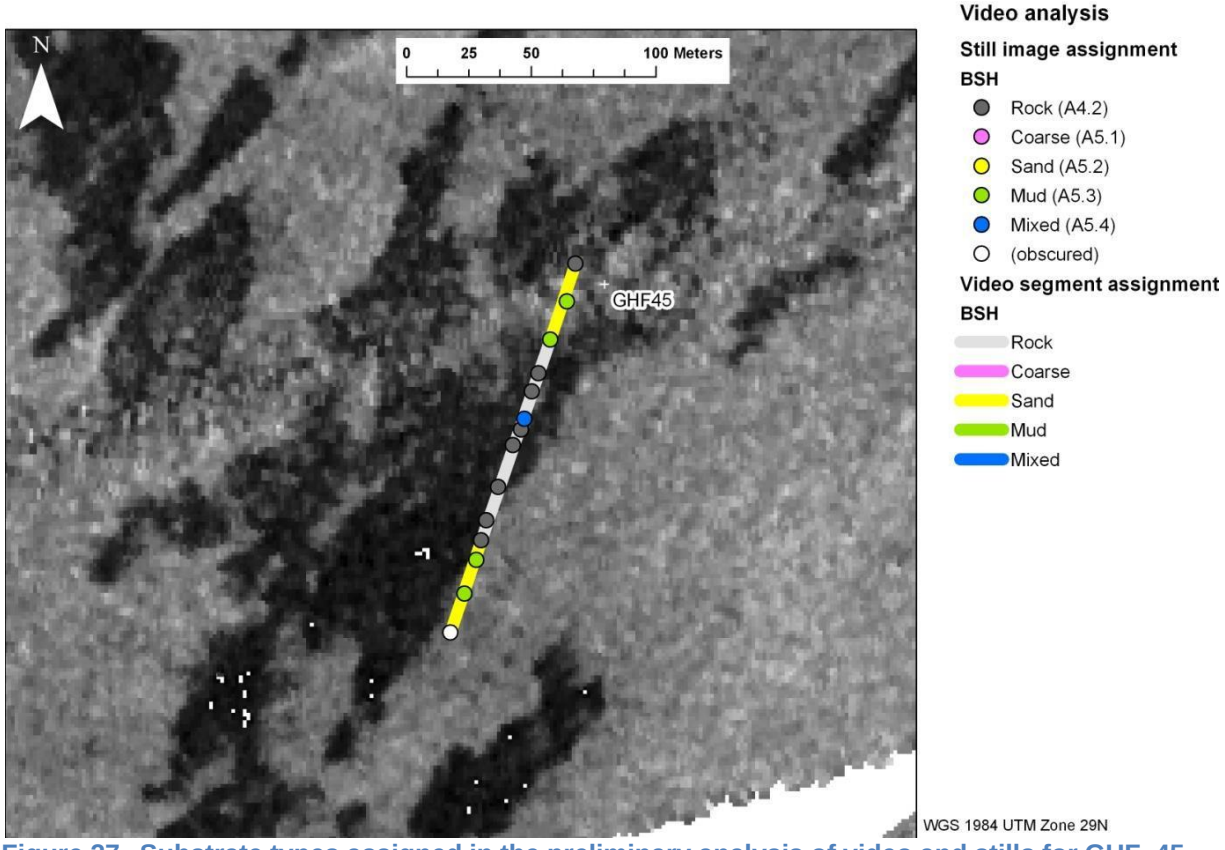


Figure 27. Substrate types assigned in the preliminary analysis of video and stills for GHF_45

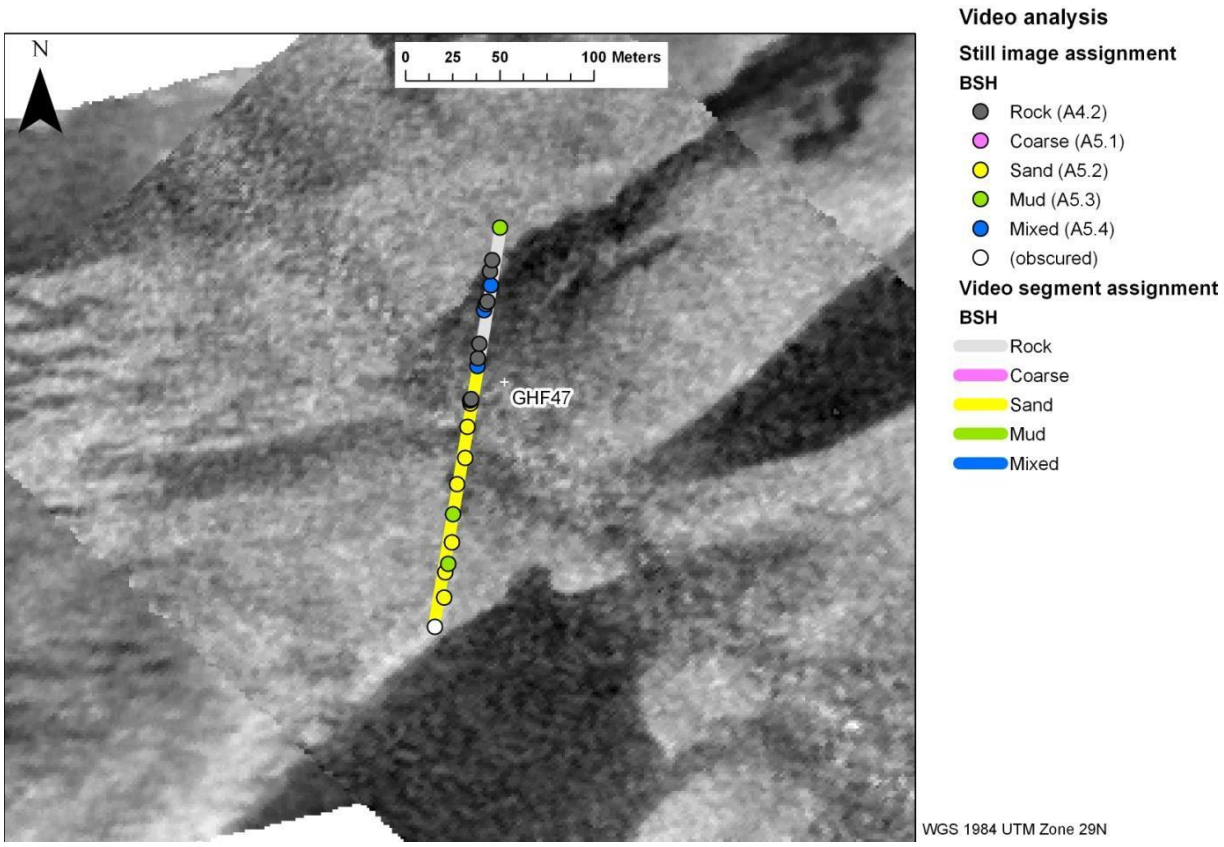


Figure 28. Substrate types assigned in the preliminary analysis of video and stills for GHF_47

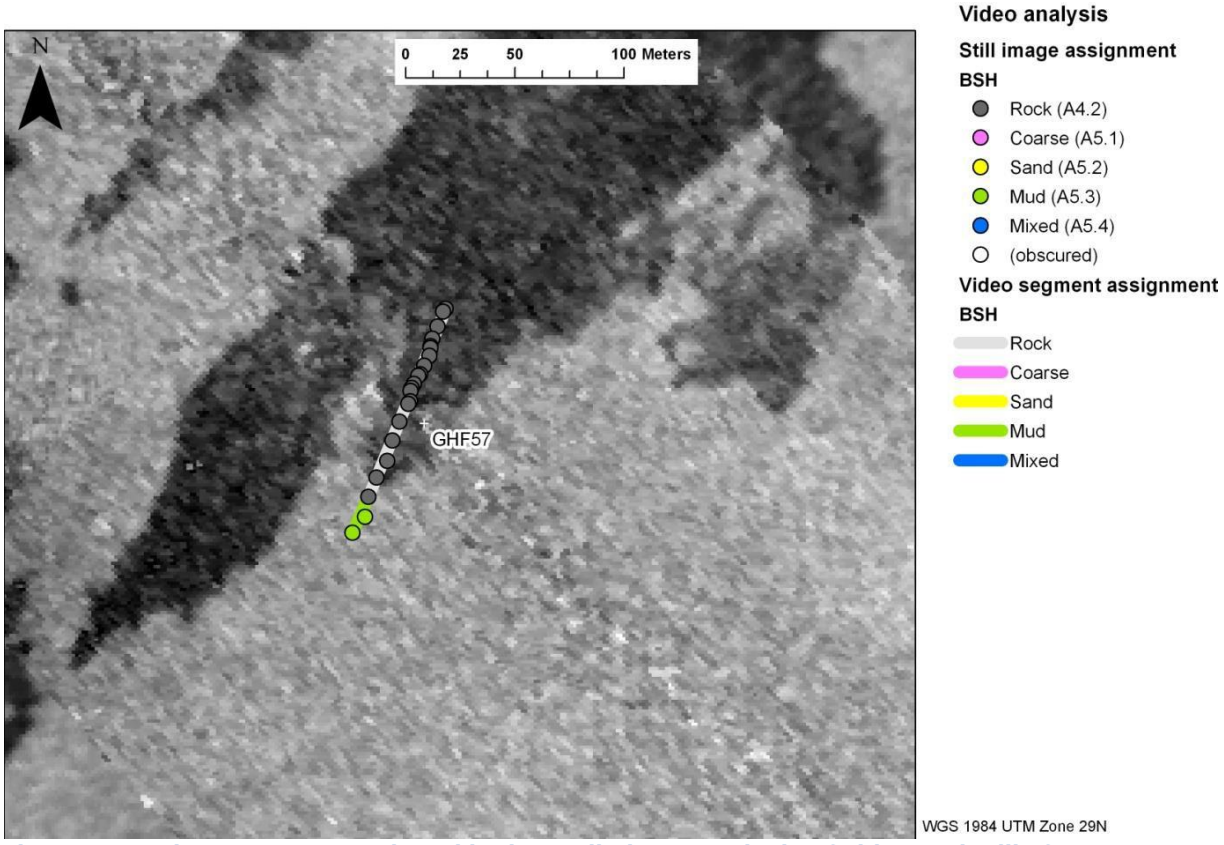


Figure 29. Substrate types assigned in the preliminary analysis of video and stills for GHF_57

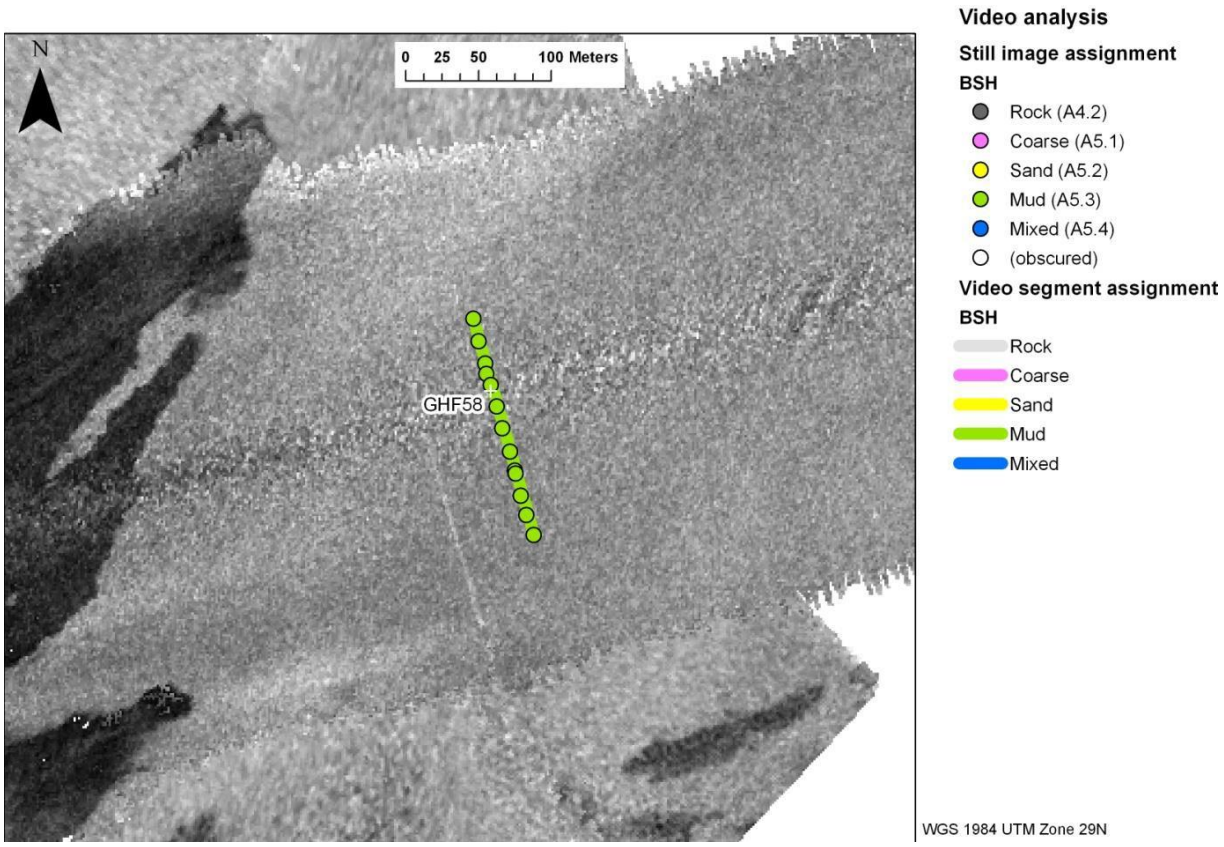


Figure 30. Substrate types assigned in the preliminary analysis of video and stills for GHF_58

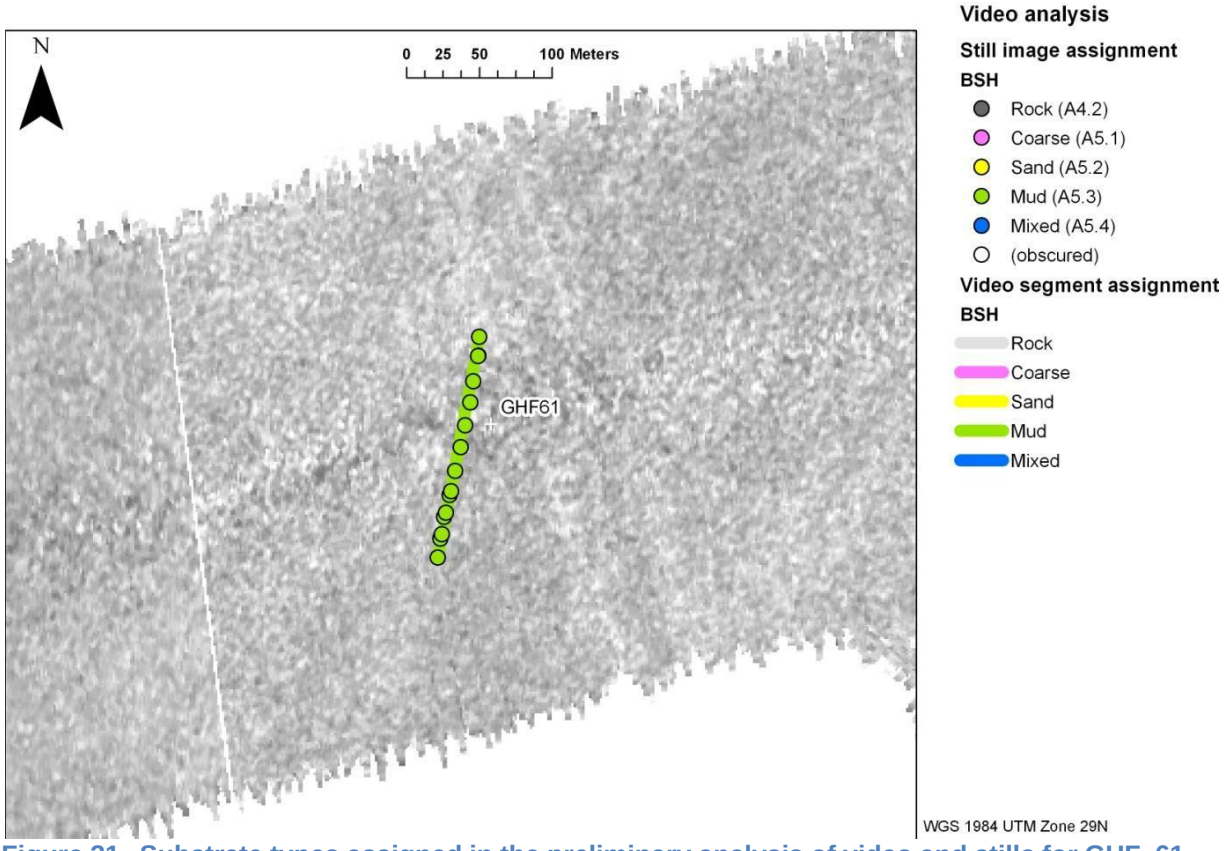


Figure 31. Substrate types assigned in the preliminary analysis of video and stills for GHF_61

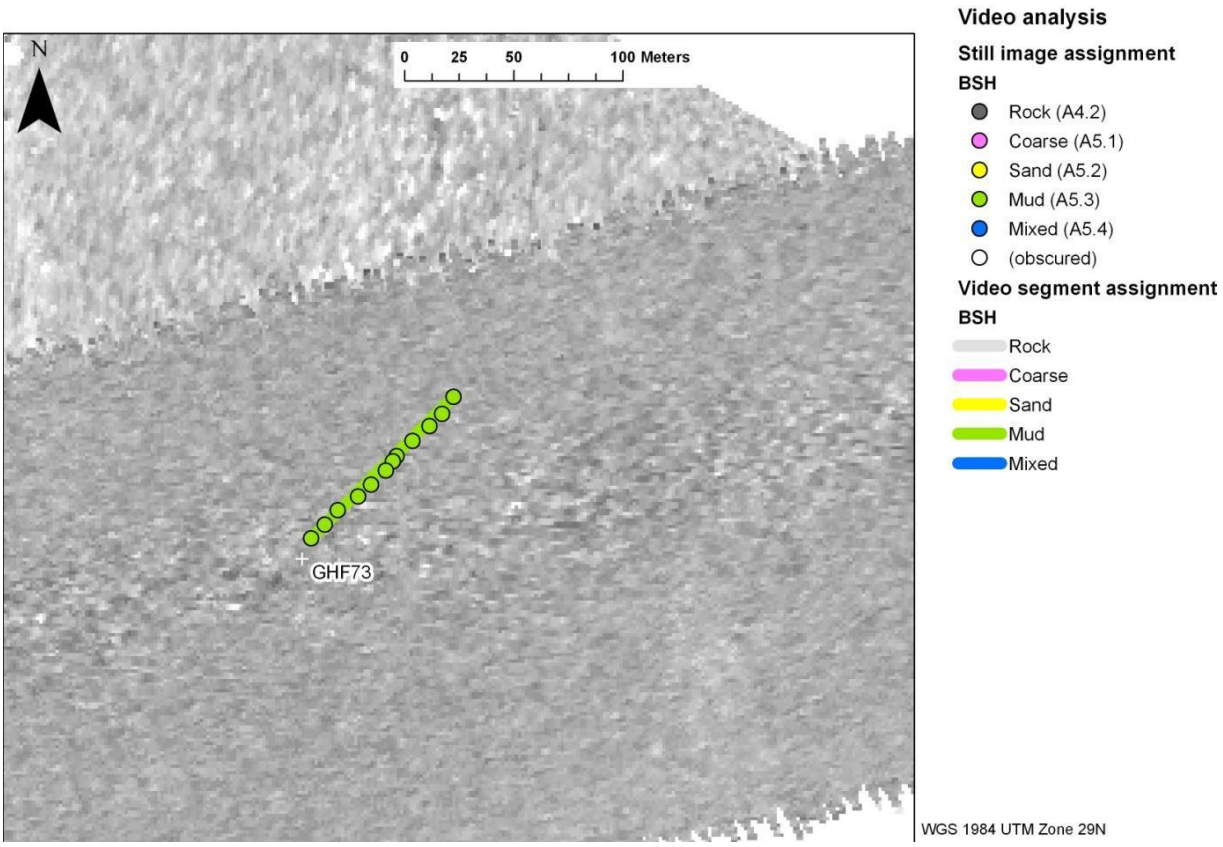


Figure 32. Substrate types assigned in the preliminary analysis of video and stills for GHF_73.

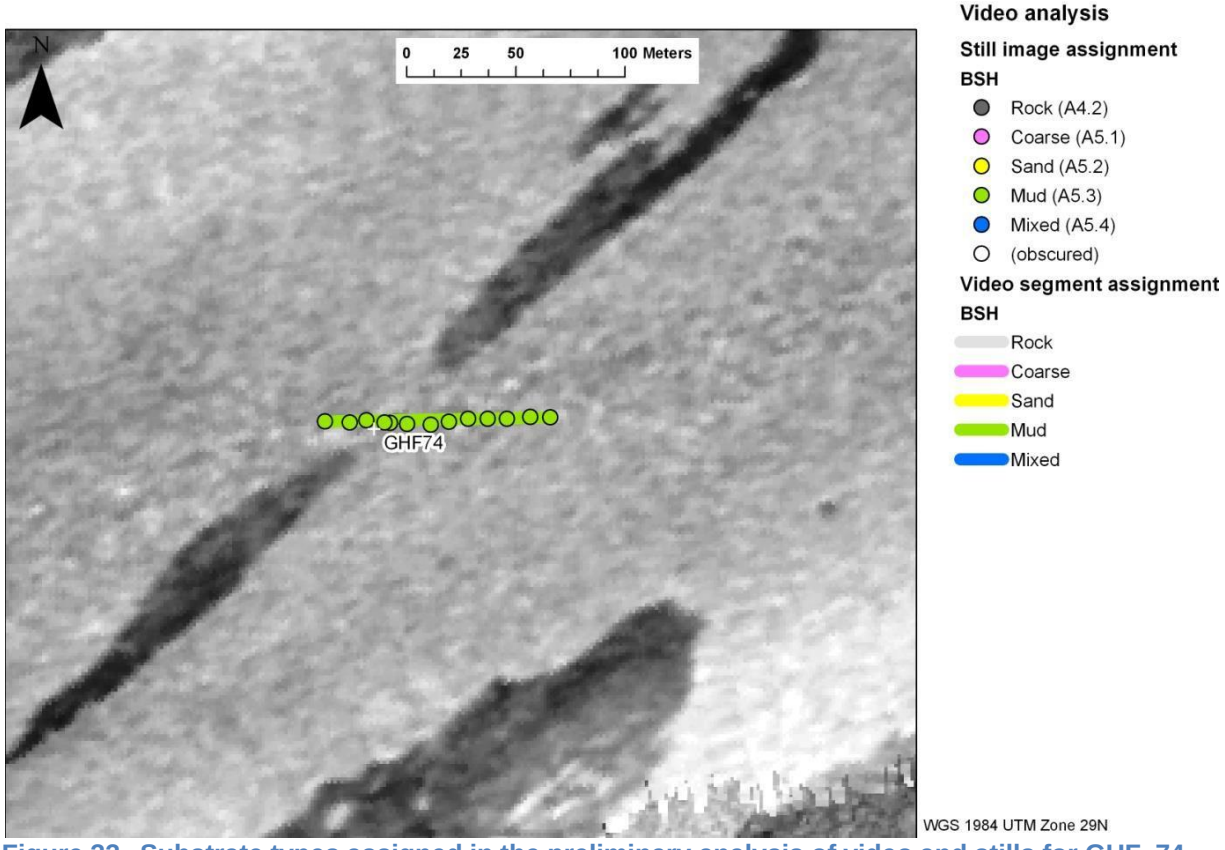


Figure 33. Substrate types assigned in the preliminary analysis of video and stills for GHF_74.

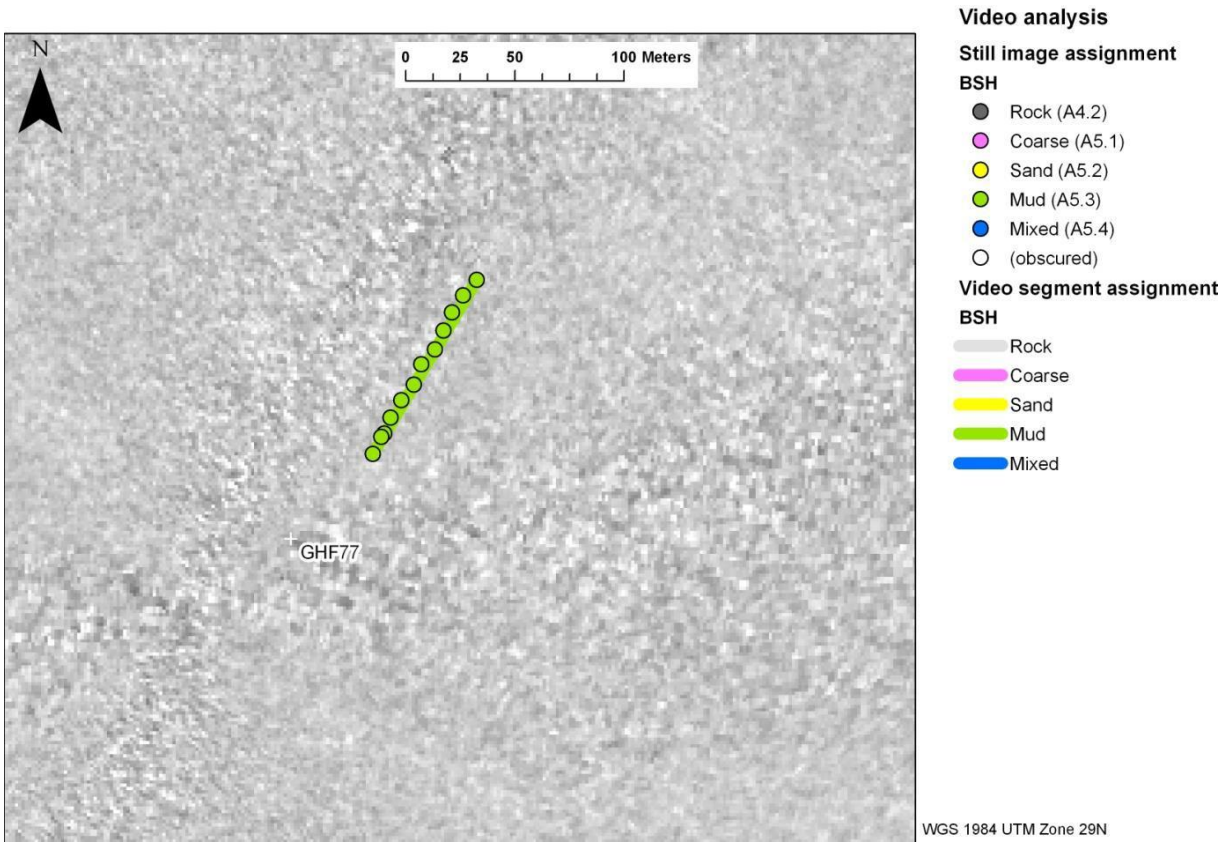


Figure 34. Substrate types assigned in the preliminary analysis of video and stills for GHF_77

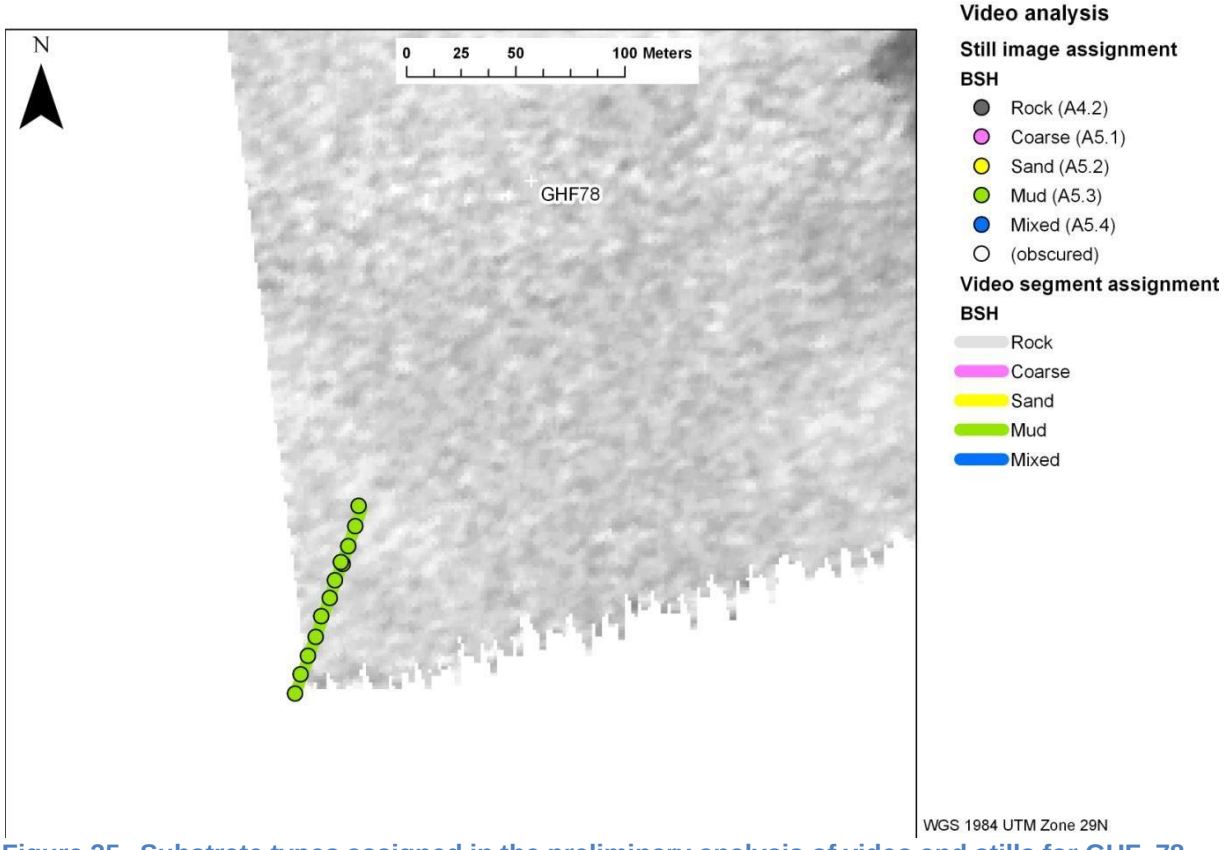


Figure 35. Substrate types assigned in the preliminary analysis of video and stills for GHF_78

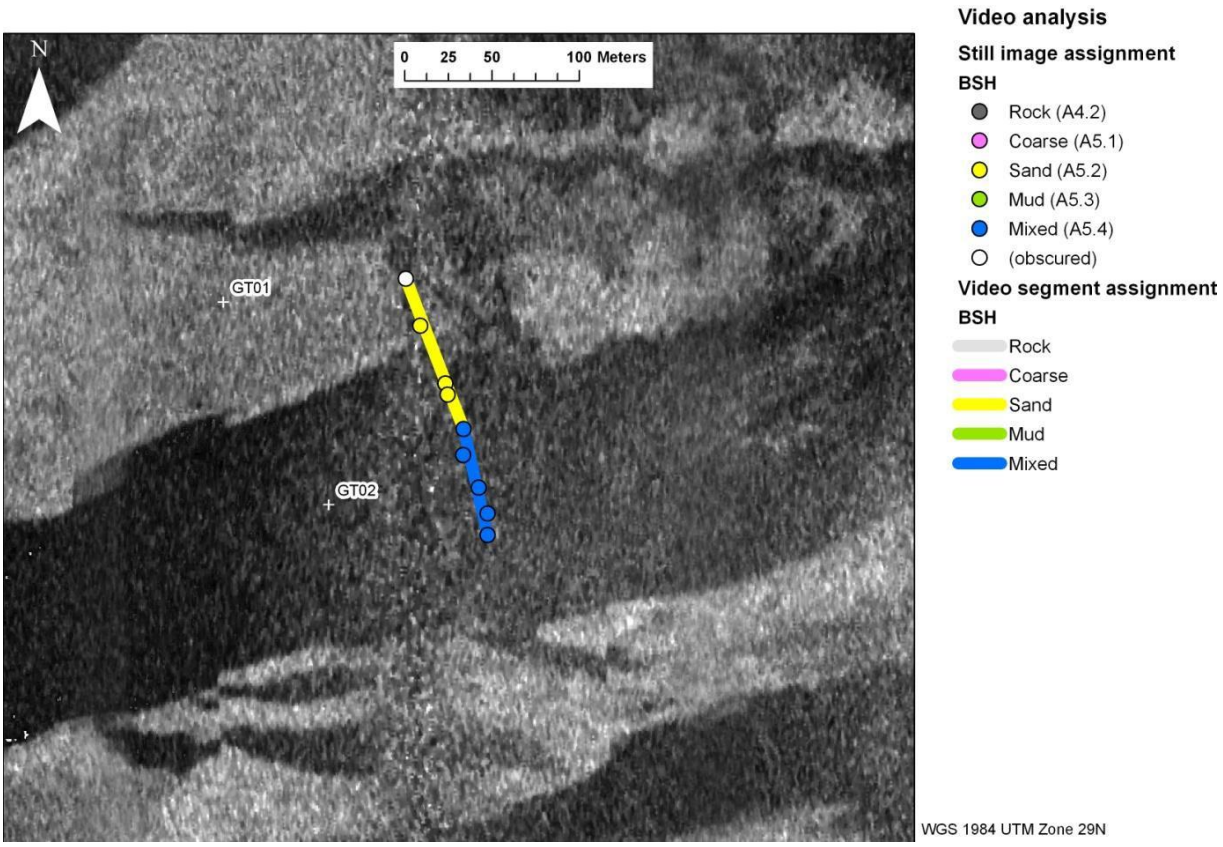


Figure 36. Substrate types assigned in the preliminary analysis of video and stills for GHFAST GT_01-02.

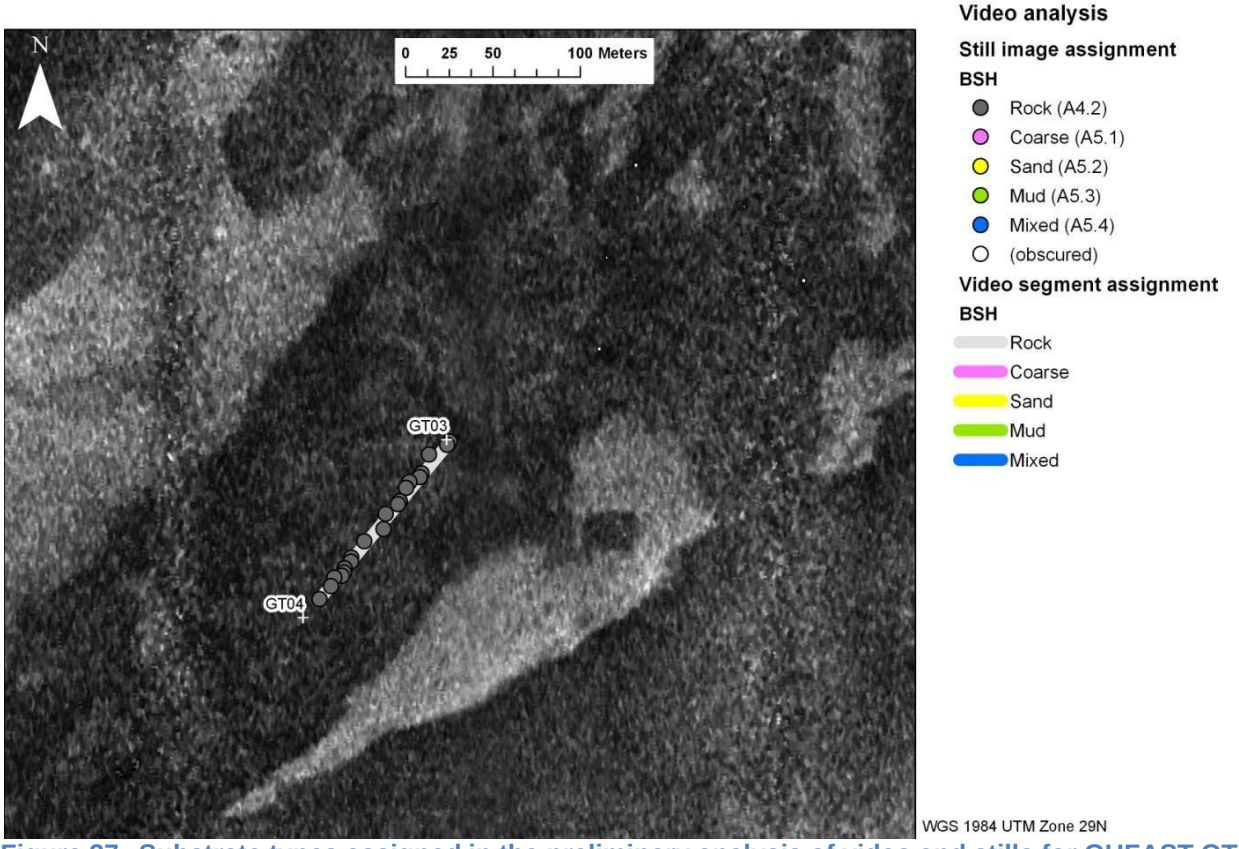


Figure 37. Substrate types assigned in the preliminary analysis of video and stills for GHFAST GT_03-04.

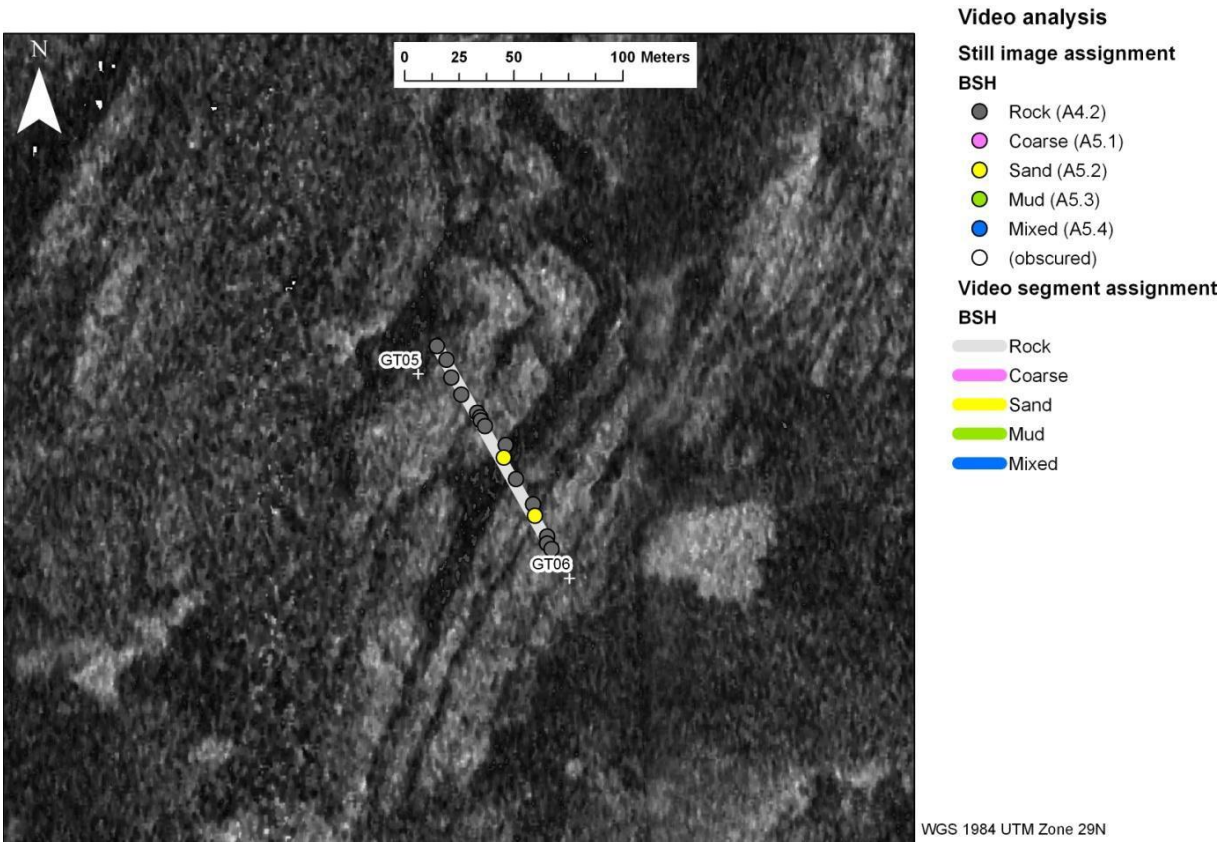


Figure 38. Substrate types assigned in the preliminary analysis of video and stills for GHFAST GT_05-06.

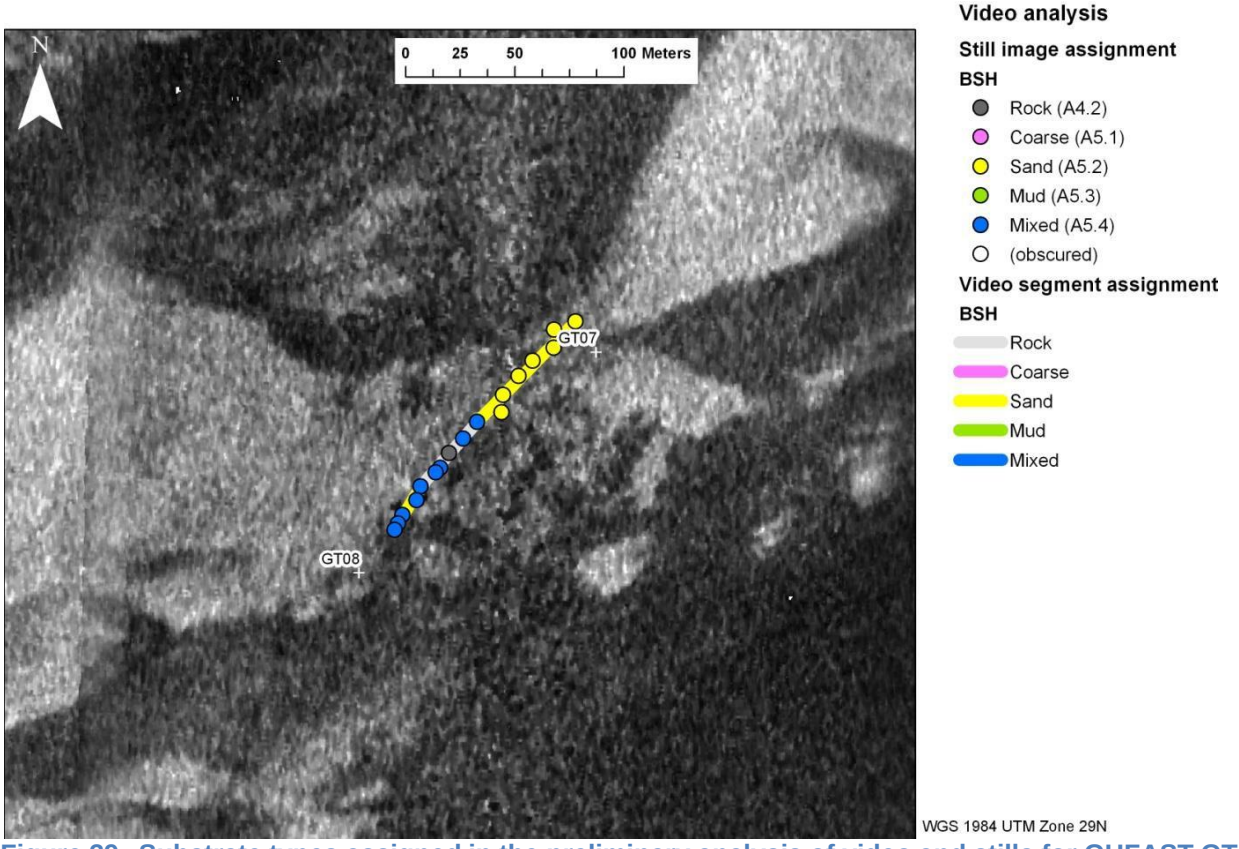


Figure 39. Substrate types assigned in the preliminary analysis of video and stills for GHFAST GT_07-08.

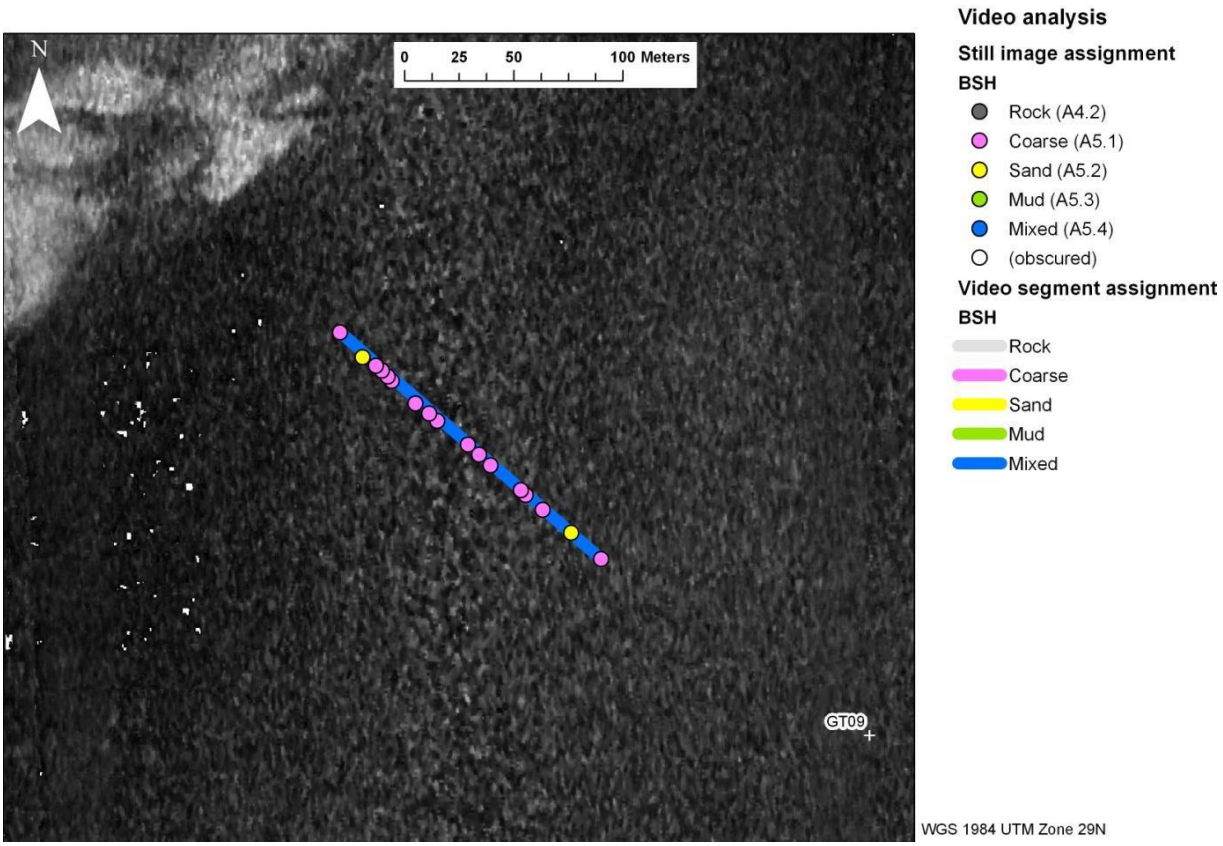


Figure 40. Substrate types assigned in the preliminary analysis of video and stills for GHFAST GT_09.

4.4 *Features of Conservation Importance (FOCI)*

Analysis of the preliminary results of the surveys suggest that the rocky reef feature already known at Haig Fras extends weakly into the central part of the Greater Haig Fras survey area, where some minor exposures of bedrock of low elevation (up to about 2 m) were seen. Circalittoral rock habitat is not as continuous as suggested by the modelled habitat map from the Site Assessment Document, but exposed bedrock does extend in patches over much of the central area of the rMCZ. However, the underlying bedrock appears to be mostly covered by a thin layer of sediment. Some sponges were seen among the exposed bedrock and associated cobbles and boulders, but were not present

in sufficient density to be considered as ‘deep-sea sponge aggregations’ or ‘fragile sponge and anthozoan communities’.

Sediment deposits appear to be thicker towards the perimeter of the rMCZ, with the west and northwest being characterised by cohesive mud with burrowing megafauna, although no sea-pens were observed. The mixed sediment that characterised surficial sediments in the central area appeared to have relatively high mud content. Grab and video sampling suggests that sediments across some of the area may be consistent with the ‘subtidal sands and gravels’ habitat FOCI; in places the sediment was formed into waves and ridges up to about 50 cm high.

No species FOCI were noted. However, several ‘charismatic’ taxa were noted including *Nephrops*, *Munida*, squat lobsters, crinoids, Ross coral and sponges.

4.5 *Evidence of anthropogenic impacts*

Throughout the acoustic survey, a record was kept of any apparent trawl marks that were observed on the acoustic backscatter. Twelve instances were noted, seven appearing as single lines and five as double lines. Their distribution is shown in Figure 41.

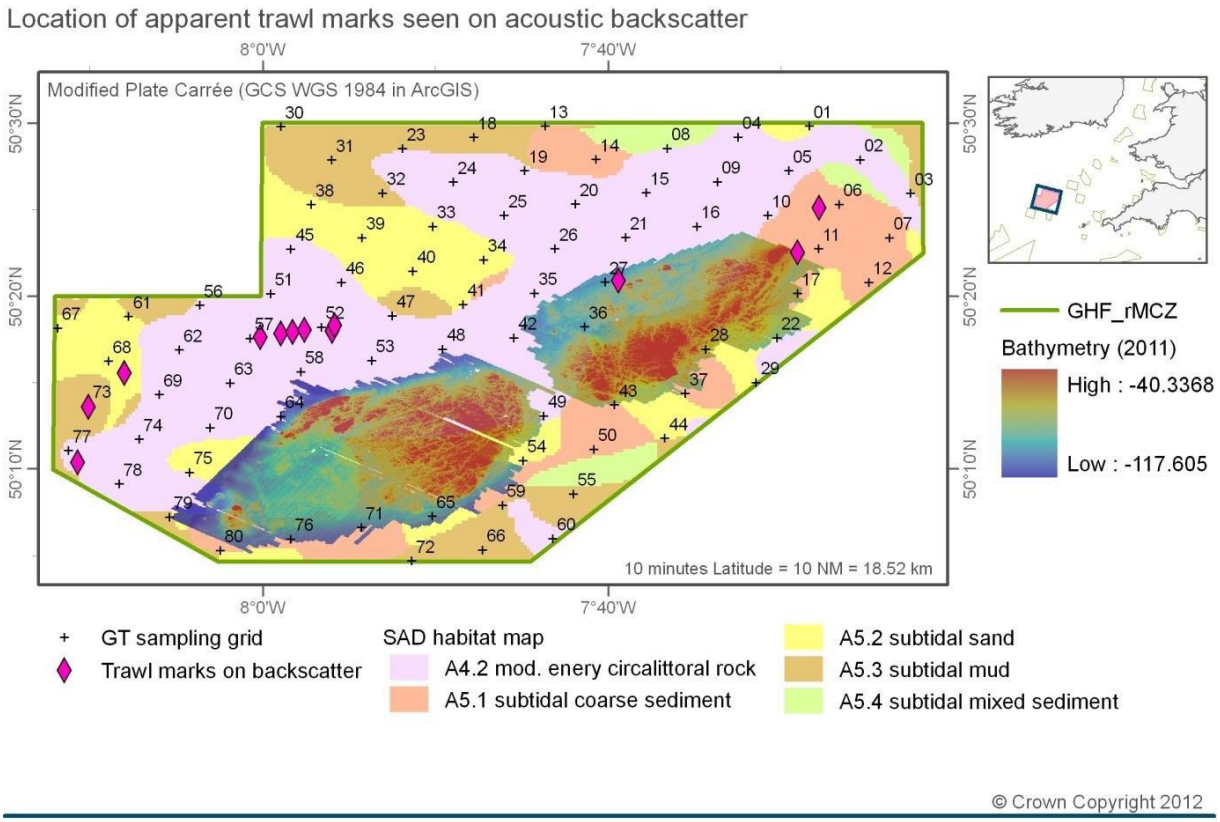


Figure 41. Location of linear 'trawl' marks on the seabed observed during the acoustic survey.

4.6 *Greater Haig Fras Autosub Test (GHFAST) survey*

On Tuesday 10th July a 1 x 6 km area seabed was surveyed as part of a test to compare outputs from ship-based and AUV-based surveys. The area selected was relatively flat but heterogeneous and approximately centred on station GHF_26 of the main survey grid.

Acoustic survey was completed in the morning, and the backscatter processed to inform placement of ground-truth sampling stations (Figure 42), which were occupied in the evening.

Stations GT01 and GT02 targeted sharp transition between light and dark backscatter, with grabs taken at each and the camera sledge towed between them. Results showed muddy sand with burrows at GT01 changing abruptly to coarse mixed sediment with shell-hash on approaching GT02.

Stations GT03 and GT04 targeted a dark heterogeneous area of backscatter. The grab was unsuccessful at GT03 and the drop camera tow between the points revealed cobbles boulders and exposed (flat) bedrock generally dusted with silt and supporting a sparse sponge community. Consequently, a grab was not attempted at GT04.

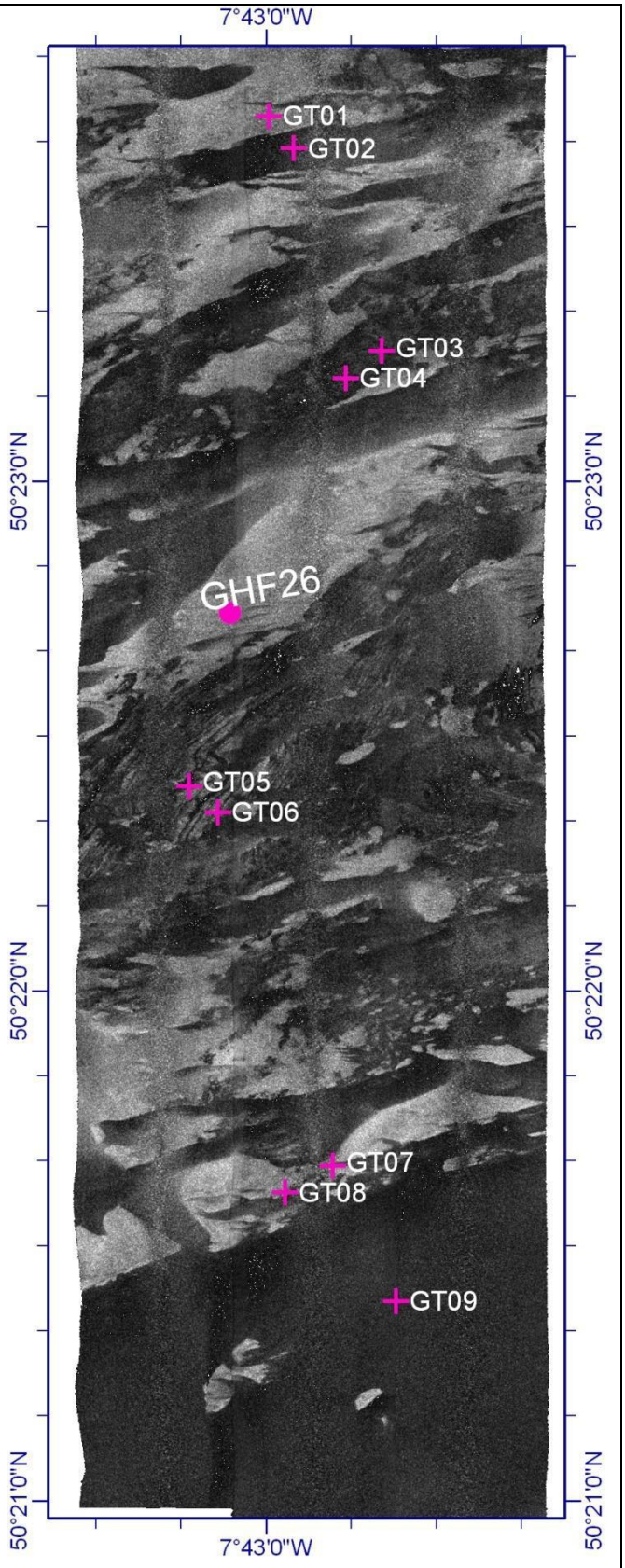


Figure 42. Multibeam backscatter and location of ground truth sampling sites for the GHFAST survey

A grab sample was obtained at GHF26 showing the substrate here to be sand. The drop-camera was used to transit from GT05 to GT06 across an area characterised by alternating light and dark linear features in the backscatter. The images revealed low lying rock ledges with a veneer of silt supporting a sparse sponge community. Consequently, grabs were not attempted here.

Stations GT07 and GT08 targeted an apparent ridge of light backscatter. At both sites grabs returned muddy sand. The video also showed muddy sand and a limited patch of exposed flat bedrock with some boulders.

Station GT09 targeted an area of homogeneous dark backscatter. The grab returned coarse muddy sand and gravel, while the video sledge revealed ripples of mobile, muddy, coarse sand overlying muddy, shelly, coarse, mixed sediment.

The bathymetry of the area ranged from -102 m to -109 m BCD, the shallower regions being over exposed bedrock outcrops (Figure 43).

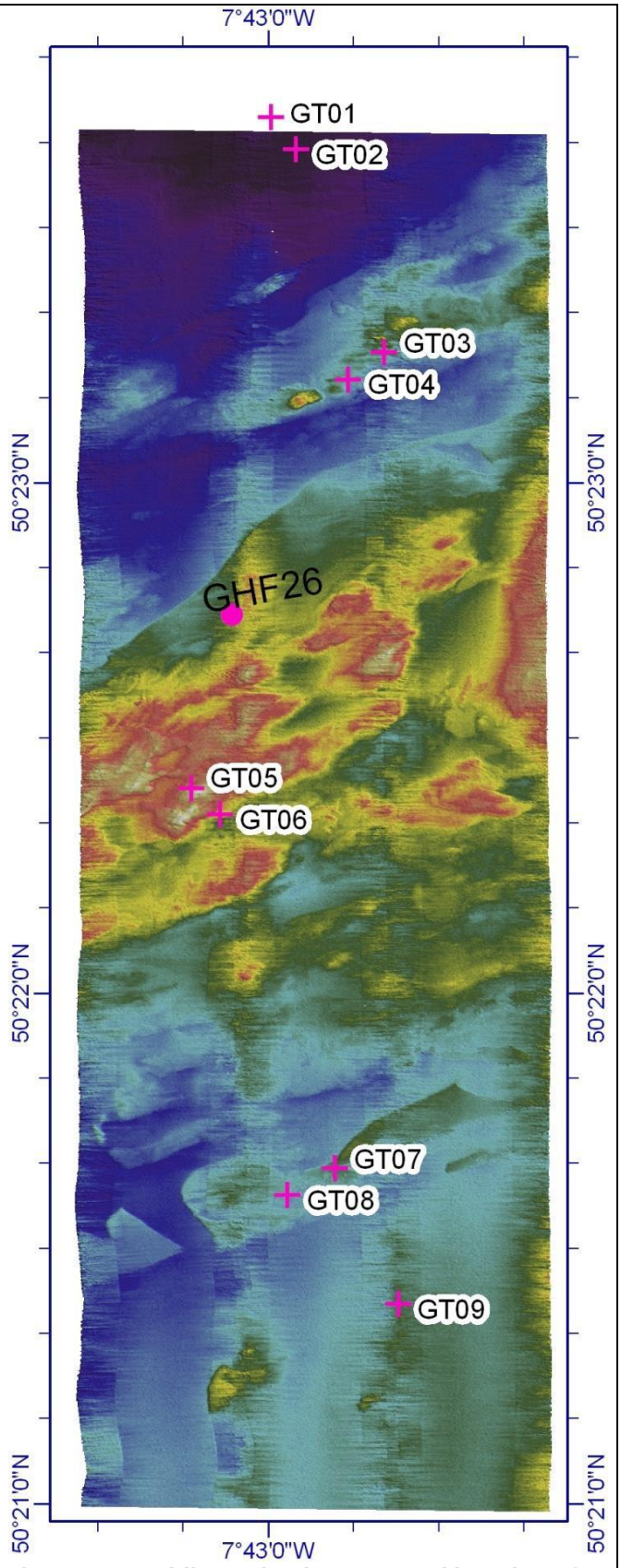


Figure 43. Multibeam backscatter and location of ground truth sampling sites for the GHFAST survey

5 Annexes

5.1 *RV Cefas Endeavour*

Port of registry	Lowestoft
Length OA	73.00 m (excluding stern roller)
Length extreme	73.916 m
Breadth (MLD)	15.80 m
Depth (MLD)	8.20 m
Design draft	5.00 m
Deep draught	5.50 m
LBP	66.50 m
Gross tonnage	2983 tonnes
Net register tonnage	894 tonnes
Net lightship	2436 tonnes
Deadweight @ 5.00 m	784 tonnes
Deadweight @ 5.50 m	1244 tonnes
Displacement @ 5.00 m	3210 tonnes
Displacement @ 5.50 m	3680 tonnes
Builder	Ferguson Shipbuilders Limited, Port Glasgow
Commissioned	2003
Communications	In port BT Tel. Cellphone Voice/Fax/Data Radio TELEX Inmarsat C Fleet 77 (Inmarsat F) and VSAT (eutelsat) internet access
Endurance	42 days
Complement	En-suite accommodation for 16 crew and 19 scientists with dedicated hospital facility
Propulsion System	AC/DC Diesel Electric 3 x diesel electric AC generators, individually raft mounted 2 x tandem electric DC motors Single screw
Power generation	3240 Kw
Power propulsion	2230 Kw
Thrusters	Bow thruster (flush mounted azimuthing) Stern thruster (tunnel)
Trial speed	14.4 knots
Bollard pull	29 tonnes
Call sign	VQHF3
Official number	906938
MMSI	235005270
Lloyds/IMO number	9251107

Side Gantry	7.5 tonne articulated side A-frame
Stern Gantry	25 tonne stern A-frame
Winches	3 x cranes 35 tM, heave compensated 2 x trawl winches 2 x drum winches, (1 double) Double barrel survey winch with motion compensation and slip rings Double barrel survey winch with slip rings Double barrel towing winch with slip rings Side-scan sonar winch with slip rings 3 x Gilson winches (one fitted to stern A-frame)
Transducers/Sea tube	Drop keel to deploy transducers outside the hull boundary layer in addition to hull mounted transducers 1.2 m diameter sea tube/moon-pool
Acoustic equipment	Kongsberg Simrad: HiPAP 500 positioning sonar EK60, 38/120 kHz scientific sounder EA 600, 50/200 kHz scientific sounder Scanmar net mensuration system SH80 high frequency omni-directional sonar EM3002D & EM2040 swathe bathymetry sounders Hull mounted Scanmar fishing computer transducers
Boats	2 x 8m rigid work and rescue boats with suite of navigational equipment deployed on heave-compensated davits
Laboratories	8 networked laboratories designed for optimum flexibility of purpose 4 serviced deck locations for containerised laboratories
Special features	Dynamic positioning system Intering anti-roll system Local Area Network with scientific data management system Ship-wide general information system CCTV
Class	LRS 100A1+LMC UMS SCM CCS ICC IP ES(2) DP(CM) ICE class 2

5.2 ***Camera Sledge***

Kongsberg Underwater Digital Stills Camera, model OE 14-208. Video and stills (5 Mega pixels) Dedicated flash unit, model OE11-242.

Underwater lights – Cefas high power LED strip lights

Camera settings variable depending on underwater visibility and ambient light levels.

5.3 ***Position Logging Software – Tower Navigation***

Vessel offsets are defined from the pitch roll centre of the vessel – the Common Reference Point (CRP) used by the Tower CEMAP software to calculate offsets.

5.4 *Multibeam Acoustic systems*

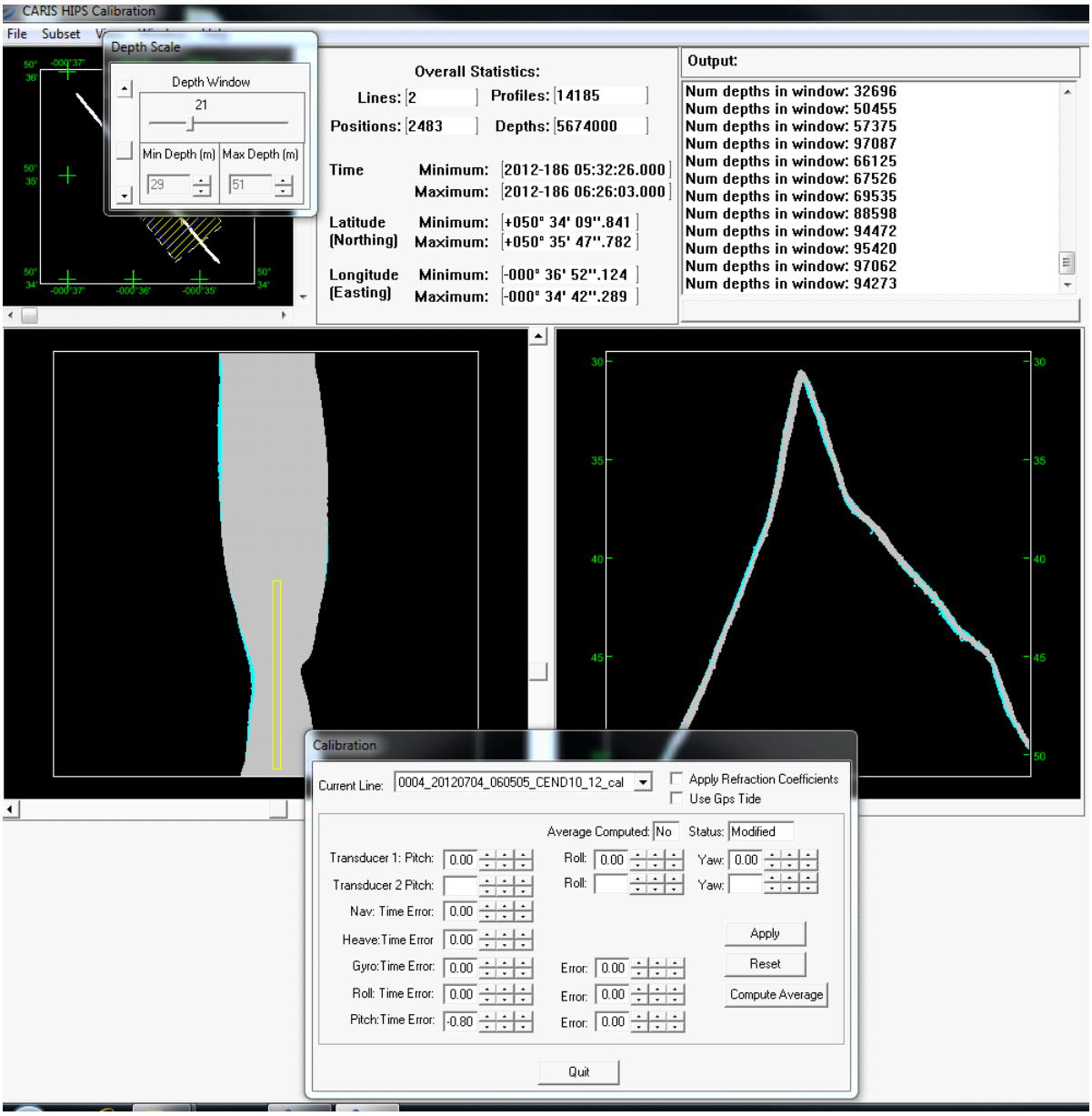
Model: Simrad EM2040 operated at 300 kHz. Calibrated by patch test on 4th July 2012 (see calibration report below).

Hardware On-line	**Remarks**
Kongsberg EM2040	Head serial 220
Seapath 330 plus MRU-5	Serial MRU-5 2043 Serial Seapath S/N10580
C-Nav 3050 GPS	C-NAVC2 (GPS + GLONASS)
Thales 3011 GPS	Fugro Seastar differential corrections
MAHRS Gyro	SN 040644
SAIV SD204	CTD casts SN 718
Reson SVP24	Mounted on blade next to sonar heads
Druck PTX 1830	Vessel draft sensor
Software (including version)	**Remarks**
Kongsberg SIS V3.83	
Caris HIPS V7.1 SP2 Hotfix 1-5	
IVS3D Fledermaus GT v7.3.2a	

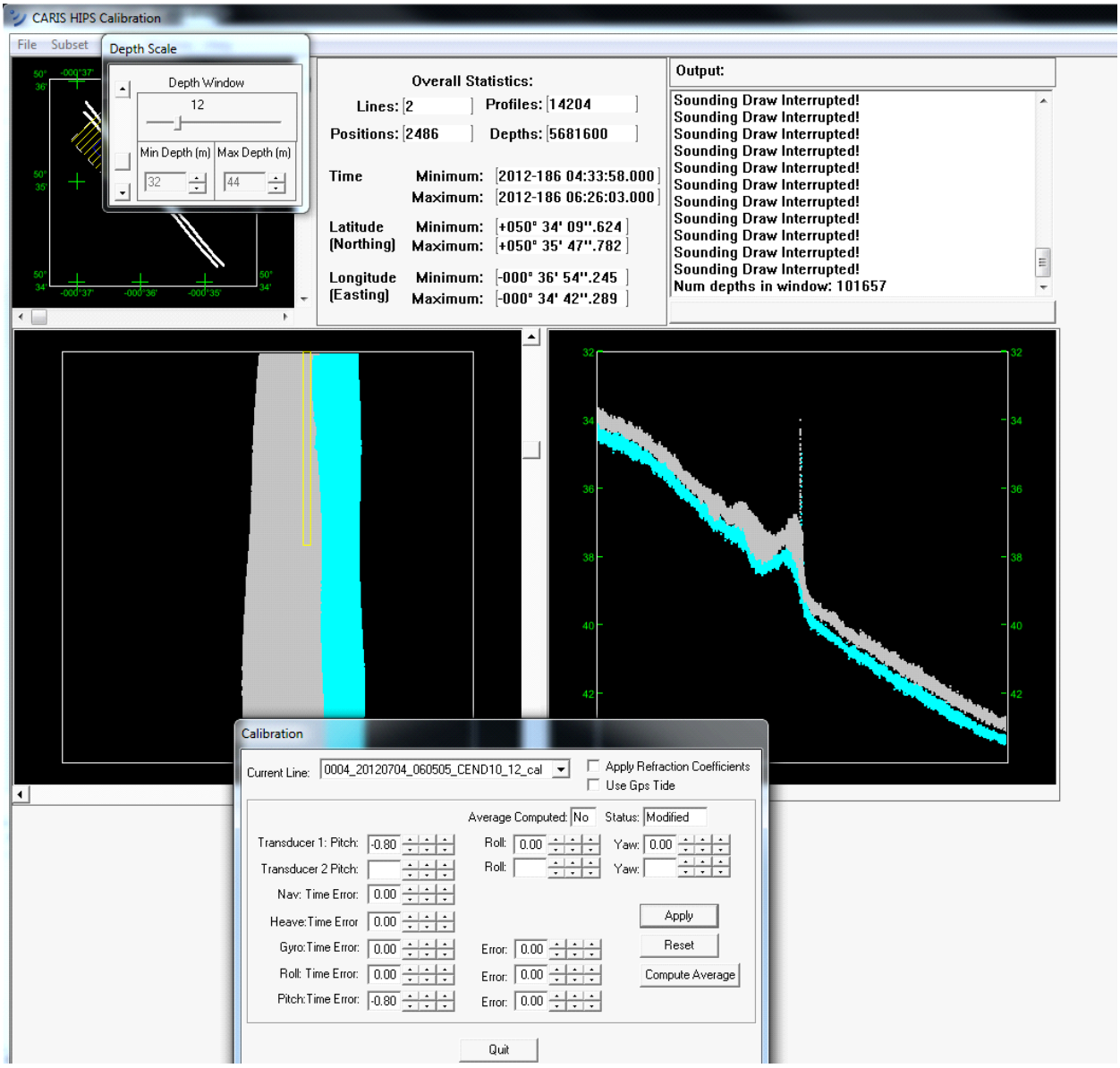
5.5 *Calibration report, Kongsberg EM2040 multibeam*

The calibration was done to the south-east of the Isle of Wight on 4th of July. Five lines were run. Lines were not run for latency as 1 PPS was used. No offsets were changed in SIS. The changes were applied in the HVF (Endeavour_em2040_20120531.hvf) in Caris. The EM3002D was not calibrated and data only used for backscatter purposes. The lines run were over of a steep slope which turned on a flat area with a wreck. Caris was used for the calibration.

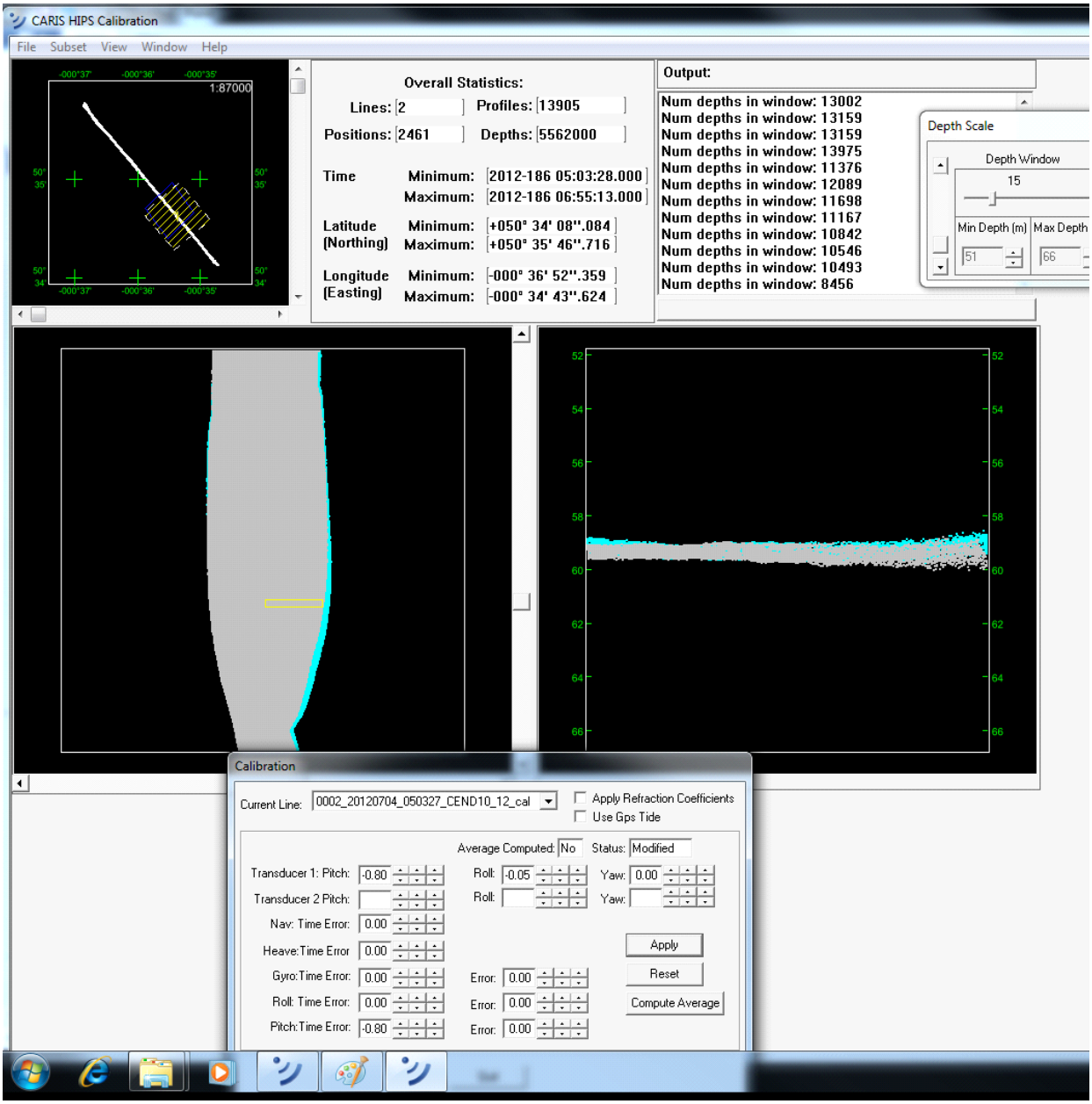
Pitch: -0.8



Yaw: 0.00


CARIS HIPS Calibration
File Subset
Depth Scale
Depth Window
12
Min Depth (m)
Max Depth (m)
32
44
Overall Statistics:
Lines: 2
Profiles: 14204
Positions: 2486
Depths: 5681600
Time
Minimum: 2012-186 04:33:58.000
Maximum: 2012-186 06:26:03.000
Latitude (Northing)
Minimum: +050° 34' 09".624
Maximum: +050° 35' 47".782
Longitude (Easting)
Minimum: -000° 36' 54".245
Maximum: -000° 34' 42".289
Output:
Sounding Draw Interrupted!
Num depths in window: 101657
Calibration
Current Line: 0004_20120704_060505_CEND10_12_cal
Apply Refraction Coefficients
Use Gps Tide
Average Computed: No
Status: Modified
Transducer 1: Pitch: -0.80
Roll: 0.00
Yaw: 0.00
Transducer 2 Pitch:
Nav: Time Error: 0.00
Heave:Time Error 0.00
Gyro:Time Error: 0.00
Roll: Time Error: 0.00
Pitch:Time Error: -0.80
Error: 0.00
Apply
Reset
Compute Average
Quit

Roll: -0.05



5.6 *Sidescan Acoustic system*

The sidescan system used on this survey was the Edgetech FS4200, operated at 300/600 kHz dual frequency. The same navigational equipment was used as described for the multibeam system (above). Data were processed with Triton ISIS and mosaiced using Triton Delphmap.

5.7 *Station metadata*

Station metadata for the Greater Haig Fras survey is provided below. All stations were sampled on Cruise CEND10/12. Station Code is used to identify the location of the sampling station. Station Number is a sequential event number for the cruise, so changes each time a new gear is used, or a new location is sampled. MB=Multibeam, HC=HamCam, CS=Camera Sledge, DC=Drop Camera, Replicate 'X' indicates no sample, SOL = Start Of Line, EOL = End Of Line. All positions in decimal degrees, Lat/Long WGS84.

Date	Time	Stn Code	Gear	Stn No	Replicate	Latitude	Longitude
04/07/2012	02:00	CTD	CTD	1	A	50.56800	-0.57800
04/07/2012	02:28	MB Calibration	MB2	2	A-SOL	50.56810	-0.57878
04/07/2012	02:48	MB Calibration	MB2	2	A-EOL	50.59606	-0.61572
04/07/2012	04:34	MB Calibration	MB2	2	B-SOL	50.59430	-0.61370
04/07/2012	04:55	MB Calibration	MB2	2	B-EOL	50.56814	-0.57838
04/07/2012	05:04	MB Calibration	MB2	2	C-SOL	50.56932	-0.58038
04/07/2012	05:24	MB Calibration	MB2	2	C-EOL	50.59600	-0.61540
04/07/2012	05:32	MB Calibration	MB2	2	D-SOL	50.59550	-0.61307
04/07/2012	05:52	MB Calibration	MB2	2	D-EOL	50.56950	-0.57860
04/07/2012	06:05	MB Calibration	MB2	2	E-SOL	50.56980	-0.57900
04/07/2012	06:26	MB Calibration	MB2	2	E-EOL	50.59690	-0.61520
04/07/2012	06:34	MB Calibration	MB2	2	F-SOL	50.59620	-0.61400
04/07/2012	06:55	MB Calibration	MB2	2	F-EOL	50.56850	-0.57770
05/07/2012	23:00	CTD	CTD	6	A	50.29600	-7.73900
05/07/2012	23:17	AC107	MB2	7	A-SOL	50.29600	-7.73887
05/07/2012	23:17	AC107	SS7	7	A-SOL	50.29600	-7.73887
06/07/2012	03:32	AC107	MB2	7	A-EOL	50.22771	-8.17700
06/07/2012	03:32	AC107	SS7	7	A-EOL	50.22771	-8.17700
06/07/2012	04:45	CTD	CTD	8	A	50.18400	-8.18700
06/07/2012	05:15	AC108	MB2	9	A-SOL	50.18422	-8.18696
06/07/2012	05:15	AC108	SS7	9	A-SOL	50.18422	-8.18696
06/07/2012	07:06	AC108	MB2	9	A-EOL	50.21766	-8.12996
06/07/2012	07:06	AC108	SS7	9	A-EOL	50.21766	-8.12996
06/07/2012	08:10	AC109	MB2	10	A-SOL	50.16344	-8.06956
06/07/2012	08:49	AC109	MB2	10	A-EOL	50.15189	-8.14073
06/07/2012	09:35	AC108	SS7	11	A-SOL	50.18474	-8.18423
06/07/2012	10:16	AC108	SS7	11	A-EOL	50.19574	-8.11578
06/07/2012	10:47	AC108_Transit	MB2	12	A-SOL	50.23038	-8.13841
06/07/2012	11:03	AC108_Transit	MB2	12	A-EOL	50.26163	-8.20441
06/07/2012	11:36	AC106	MB2	13	A-SOL	50.27077	-8.14595
06/07/2012	17:58	AC106	MB2	13	A-EOL	50.38988	-7.35435
06/07/2012	18:00	AC106	MB2	13	B-SOL	50.39008	-7.42388
06/07/2012	18:17	AC106	MB2	13	B-EOL	50.39575	-7.35435
06/07/2012	20:06	AC105	MB2	14	A-SOL	50.43247	-7.37107
07/07/2012	02:43	AC105	MB2	14	A-EOL	50.30168	-8.20285
07/07/2012	03:00	AC104	CTD	15	A	50.35100	-8.13900
07/07/2012	03:32	AC104	MB2	16	A-SOL	50.35140	-8.13926
07/07/2012	08:43	AC104	MB2	16	A-EOL	50.47471	-7.35884
07/07/2012	09:18	AC103	MB2	17	A-SOL	50.50071	-7.44688
07/07/2012	12:43	AC103	MB2	17	A-EOL	50.41497	-7.99547

Date	Time	Stn Code	Gear	Stn No	Replicate	Latitude	Longitude
07/07/2012	12:46	AC103	MB2	17	B-SOL	50.41803	-7.99496
07/07/2012	13:08	AC103	MB2	17	B-EOL	50.45550	-7.99386
07/07/2012	13:11	AC102	MB2	18	A-SOL	50.45621	-7.98733
07/07/2012	15:00	AC102	MB2	18	A-EOL	50.50073	-7.70589
07/07/2012	15:03	AC102	MB2	18	B-SOL	50.49728	-7.70271
07/07/2012	17:23	AC102	MB2	18	B-EOL	50.27684	-7.73449
08/07/2012	11:30	CTD	CTD	40	A	50.16100	-8.07000
08/07/2012	11:35	GHF75	HC	41	X	50.16149	-8.06985
08/07/2012	11:44	GHF75	HC	41	B	50.16320	-8.06987
08/07/2012	12:24	GHF78	HC	42	A	50.15215	-8.13819
08/07/2012	12:49	GHF78	CS	43	A-SOL	50.15081	-8.13921
08/07/2012	12:59	GHF78	CS	43	A-EOL	50.15158	-8.13881
08/07/2012	13:13	GHF78_T_77	MB2	44	A-SOL	50.15550	-8.14420
08/07/2012	13:36	GHF78_T_77	MB2	44	A-EOL	50.18110	-8.18890
08/07/2012	13:38	GHF77-T	MB2	45	A-SOL	50.18260	-8.18880
08/07/2012	13:43	GHF77-T	MB2	45	A-EOL	50.18700	-8.18430
08/07/2012	15:37	GHF77-T-AC108	MB2	46	A-SOL	50.18598	-8.17789
08/07/2012	15:51	GHF77-T-AC108	MB2	46	A-EOL	50.17985	-8.21467
08/07/2012	16:02	AC108-350	MB2	47	A-SOL	50.17852	-8.20272
08/07/2012	16:36	AC108-350	MB2	47	A-EOL	50.19277	-8.11436
08/07/2012	17:00	AC108-700	MB2	48	A-SOL	50.18783	-8.12522
08/07/2012	17:32	AC108-700	MB2	48	A-EOL	50.17507	-8.20398
08/07/2012	17:54	GHF77	HC	49	A	50.18447	-8.18689
08/07/2012	18:21	GHF77	CS	50	A-SOL	50.18470	-8.18652
08/07/2012	18:31	GHF77	CS	50	A-EOL	50.18399	-8.18720
08/07/2012	18:53	GHF77-T-73	MB2	51	A-SOL	50.20375	-8.17915
08/07/2012	19:03	GHF77-T-73	MB2	51	A-EOL	50.23024	-8.16557
08/07/2012	19:16	GHF73	HC	52	A	50.22773	-8.16734
08/07/2012	19:45	GHF73	CS	53	A-SOL	50.22749	-8.16763
08/07/2012	19:55	GHF73	CS	53	A-EOL	50.22692	-8.16856
08/07/2012	20:10	GHF73-T-74	MB2	54	A-SOL	50.22402	-8.16732
08/07/2012	20:26	GHF73-T-74	MB2	54	A-EOL	50.19470	-8.11742
08/07/2012	20:42	GHF74	HC	55	A	50.19527	-8.11824
08/07/2012	21:07	GHF74	DC	56	A-SOL	50.19536	-8.11763
08/07/2012	21:18	GHF74	DC	56	A-EOL	50.19535	-8.11907
08/07/2012	21:56	GHF70	HC	57	A	50.20646	-8.05012
08/07/2012	22:08	GHF70-T-69	MB2	58	A-SOL	50.21005	-8.05539
08/07/2012	22:24	GHF70-T-69	MB2	58	A-EOL	50.23990	-8.10210
08/07/2012	22:40	GHF69	HC	59	A	50.23822	-8.09864
08/07/2012	22:58	GHF69-T-68	MB2	60	A-SOL	50.23943	-8.10098
08/07/2012	23:30	GHF69-T-68	MB2	60	A-EOL	50.27152	-8.14940
08/07/2012	23:32	GHF68	HC	61	A	50.27038	-8.14841
08/07/2012	23:42	GHF68_T_67	MB2	62	A-SOL	50.27169	-8.15270
09/07/2012	00:01	GHF68_T_67	MB2	62	A-EOL	50.30507	-8.20102
09/07/2012	00:13	GHF67	HC	63	A	50.30251	-8.19745
09/07/2012	00:44	GHF61	HC	64	A	50.31347	-8.12881
09/07/2012	01:11	GHF61	CS	65	A-SOL	50.31367	-8.12895
09/07/2012	01:21	GHF61	CS	65	A-EOL	50.31503	-8.12854
09/07/2012	01:35	GHF61-T-62	MB2	66	A-SOL	50.31334	-8.12322
09/07/2012	01:53	GHF61-T-62	MB2	66	A-EOL	50.27984	-8.07740
09/07/2012	02:09	GHF62	HC	67	A	50.28150	-8.07986
09/07/2012	02:14	GHF62-T-63	MB2	68	A-SOL	50.28022	-8.07633

Date	Time	Stn Code	Gear	Stn No	Replicate	Latitude	Longitude
09/07/2012	02:32	GHF62-T-63	MB2	68	A-EOL	50.24776	-8.02890
09/07/2012	02:45	GHF63	HC	69	A	50.24927	-8.03090
09/07/2012	03:23	GHF63-T-64	MB2	70	A-SOL	50.24912	-8.02852
09/07/2012	03:45	GHF63-T-64	MB2	70	A-EOL	50.21521	-7.97926
09/07/2012	04:11	GHF64	HC	71	A	50.21741	-7.98217
09/07/2012	04:19	GHF 64-T-58	MB2	72	A-SOL	50.21853	-7.97978
09/07/2012	04:40	GHF 64-T-58	MB2	72	A-EOL	50.26263	-7.96114
09/07/2012	04:50	GHF58	HC	73	A	50.26039	-7.96250
09/07/2012	05:20	GHF58	CS	74	A-SOL	50.26007	-7.96260
09/07/2012	05:30	GHF58	CS	74	A-EOL	50.25879	-7.96206
09/07/2012	05:43	GHF 58-T-57	MB2	75	A-SOL	50.25731	-7.96128
09/07/2012	06:05	GHF 58-T-57	MB2	75	A-EOL	50.29494	-8.01359
09/07/2012	06:16	GHF57	HC	76	A	50.29239	-8.01123
09/07/2012	06:25	GHF57 to GHF56	MB2	77	A-SOL	50.29238	-8.01432
09/07/2012	06:45	GHF57 to GHF56	MB2	77	A-EOL	50.32609	-8.06399
09/07/2012	06:58	GHF56	HC	78	A	50.32445	-8.05983
09/07/2012	07:56	GHF57	CS	79	A-SOL	50.29278	-8.01195
09/07/2012	08:03	GHF57	CS	79	A-EOL	50.29291	-8.01270
09/07/2012	08:37	GHF57	DC	80	A-SOL	50.29293	-8.01135
09/07/2012	08:48	GHF57	DC	80	A-EOL	50.29202	-8.01197
09/07/2012	09:03	GHF56-GHF51	MB2	81	A-SOL	50.30344	-8.00818
09/07/2012	09:21	GHF56-GHF51	MB2	81	A-EOL	50.33560	-7.99169
09/07/2012	09:27	GHF51	HC	82	A	50.33573	-7.99163
09/07/2012	09:37	GHF51 to GHF52	MB2	83	A-SOL	50.33173	-7.98889
09/07/2012	09:55	GHF51 to GHF52	MB2	83	A-EOL	50.30138	-7.93800
09/07/2012	10:08	GHF52	HC	84	A	50.30354	-7.94313
09/07/2012	10:16	GHF52 to GHF53	MB2	85	A-SOL	50.30314	-7.93942
09/07/2012	10:35	GHF52 to GHF53	MB2	85	A-EOL	50.26882	-7.89114
09/07/2012	10:46	GHF53	HC	86	A	50.27124	-7.89373
09/07/2012	11:35	GHF48	HC	87	A	50.28207	-7.82582
09/07/2012	11:42	GHF48 to GHF47	MB2	88	A-SOL	50.28370	-7.82836
09/07/2012	12:03	GHF48 to GHF47	MB2	88	A-EOL	50.31540	-7.87712
09/07/2012	12:23	GHF47	HC	89	A	50.31433	-7.87471
09/07/2012	12:44	GHF047	CS	90	A-SOL	50.31386	-7.87487
09/07/2012	12:58	GHF047	CS	90	A-EOL	50.31577	-7.87435
09/07/2012	13:10	GHF47 to GHF46	MB2	91	A-SOL	50.31807	-7.87672
09/07/2012	13:30	GHF47 to GHF46	MB2	91	A-EOL	50.34785	-7.92618
09/07/2012	13:40	GHF46	HC	92	A	50.34652	-7.92365
09/07/2012	13:49	GHF46 to GHF45	MB2	93	A-SOL	50.34861	-7.92982
09/07/2012	14:08	GHF46 to GHF45	MB2	93	A-EOL	50.37985	-7.47403
09/07/2012	14:21	GHF45	HC	94	A	50.37856	-7.97225
09/07/2012	14:44	GHF45	CS	95	A-SOL	50.37810	-7.97258
09/07/2012	14:54	GHF45	CS	95	A-EOL	50.37942	-7.97187
09/07/2012	15:08	GHF45	CTD	96	A	50.37947	-7.96438
09/07/2012	15:26	GHF45 to GHF38	MB2	97	A-SOL	50.38334	-7.96419
09/07/2012	15:43	GHF45 to GHF38	MB2	97	A-EOL	50.42417	-7.95232
09/07/2012	15:52	GHF38	HC	98	A	50.42157	-7.95281
09/07/2012	15:59	GHF38 to GHF39	MB2	99	A-SOL	50.41811	-7.94582
09/07/2012	16:18	GHF38 to GHF39	MB2	99	A-EOL	50.38482	-7.89959
09/07/2012	16:34	GHF39	HC	100	A	50.38985	-7.90425
09/07/2012	16:41	GHF39 to GHF40	MB2	101	A-SOL	50.38489	-7.89834
09/07/2012	16:43	GHF39 to GHF40	MB2	101	A-EOL	50.38455	-7.89811

Date	Time	Stn Code	Gear	Stn No	Replicate	Latitude	Longitude
09/07/2012	16:43	GHF39 to GHF40	MB2	101	B-SOL	50.38353	-7.89648
09/07/2012	16:57	GHF39 to GHF40	MB2	101	B-EOL	50.35558	-7.85223
09/07/2012	17:06	GHF40	HC	102	A	50.35775	-7.85466
09/07/2012	17:15	GHF40 to GHF41	MB2	103	A-SOL	50.34973	-7.84400
09/07/2012	17:30	GHF40 to GHF41	MB2	103	A-EOL	50.32326	-7.80326
09/07/2012	17:40	GHF41	HC	104	X	50.32552	-7.80596
09/07/2012	17:47	GHF41	HC	104	B	50.32549	-7.80596
09/07/2012	18:12	GHF41	DC	105	A-SOL	50.32524	-7.80573
09/07/2012	18:24	GHF41	DC	105	A-EOL	50.32558	-7.80717
09/07/2012	18:33	GHF41 to GHF42	MB2	106	A-SOL	50.32288	-7.80437
09/07/2012	18:49	GHF41 to GHF42	MB2	106	A-EOL	50.29180	-7.75513
09/07/2012	19:04	GHF42	DC	107	A-SOL	50.29307	-7.75645
09/07/2012	19:14	GHF42	DC	107	A-EOL	50.29317	-7.75776
09/07/2012	19:33	GHF42	HC	108	A	50.29316	-7.75776
09/07/2012	19:41	GHF42 to GHF35	MB2	109	A-SOL	50.29795	-7.75644
09/07/2012	19:59	GHF42 to GHF35	MB2	109	A-EOL	50.33829	-7.36700
09/07/2012	20:10	GHF35	HC	110	A	50.33622	-7.73727
09/07/2012	20:17	GHF35 to GHF34	MB2	111	A-SOL	50.33710	-7.73872
09/07/2012	20:39	GHF35 to GHF34	MB2	111	A-EOL	50.36993	-7.78949
09/07/2012	20:52	GHF34	HC	112	A	50.36776	-7.78679
09/07/2012	21:01	GHF34_T_GHF33	MB2	113	A-SOL	50.36998	-7.79091
09/07/2012	21:21	GHF34_T_GHF33	MB2	113	A-EOL	50.40190	-7.83777
09/07/2012	21:34	GHF33	HC	114	A	50.40014	-7.83461
09/07/2012	21:56	GHF33	DC	115	A-SOL	50.40022	-7.83478
09/07/2012	22:06	GHF33	DC	115	A-EOL	50.40059	-7.83593
09/07/2012	22:14	GHF33 - GHF32	MB2	116	A-SOL	50.40292	-7.84036
09/07/2012	22:34	GHF33 - GHF32	MB2	116	A-EOL	50.43432	-7.88690
09/07/2012	22:46	GHF32	HC	117	A	50.43237	-7.88377
09/07/2012	22:53	GHF32 - GHF31	MB2	118	A-SOL	50.43250	-7.88415
09/07/2012	23:16	GHF32 - GHF31	MB2	118	A-EOL	50.46544	-7.93486
09/07/2012	23:30	GHF31	HC	119	A	50.46459	-7.93339
10/07/2012	00:08	GHF23	HC	120	A	50.47565	-7.86445
10/07/2012	00:19	GHF23 - GHF24	MB2	121	A-SOL	50.47233	-7.85815
10/07/2012	00:37	GHF23 - GHF24	MB2	121	A-EOL	50.44144	-7.81207
10/07/2012	01:16	GHF24	HG	122	A	50.44332	-7.81547
10/07/2012	01:23	GHF24 - GHF18	MB2	123	A-SOL	50.44697	-7.81407
10/07/2012	01:45	GHF24 - GHF18	MB2	123	A-EOL	50.48846	-7.79489
10/07/2012	01:58	GHF18	HG	124	A	50.48656	-7.79560
10/07/2012	02:08	GHF18 - GHF19	MB2	125	A-SOL	50.48544	-7.79131
10/07/2012	02:26	GHF18 - GHF19	MB2	125	A-EOL	50.45242	-7.71404
10/07/2012	02:40	GHF19	HG	126	A	50.45429	-7.74680
10/07/2012	02:49	GHF19 - GHF13	MB2	127	A-SOL	50.45600	-7.74588
10/07/2012	03:11	GHF19 - GHF13	MB2	127	A-EOL	50.50010	-7.72781
10/07/2012	03:36	GHF13	HG	128	X	50.49714	-7.72712
10/07/2012	04:30	GHF13	HG	128	X	50.49767	-7.72654
10/07/2012	04:35	GHF13	HG	128	C	50.49722	-7.72654
10/07/2012	05:05	GHF13	CS	129	A-SOL	50.49726	-7.72680
10/07/2012	05:16	GHF13	CS	129	A-EOL	50.49723	-7.72468
10/07/2012	05:27	GHF13 - GHF14	MB2	130	A-SOL	50.49391	-7.71511
10/07/2012	05:43	GHF13 - GHF14	MB2	130	A-EOL	50.46267	-7.67594
10/07/2012	05:53	GHF14	HG	131	A	50.46531	-7.67788
10/07/2012	06:00	GHF14 - GHF15	MB2	132	A-SOL	50.46380	-7.67721

Date	Time	Stn Code	Gear	Stn No	Replicate	Latitude	Longitude
10/07/2012	06:18	GHF14 - GHF15	MB2	132	A-EOL	50.43086	-7.62668
10/07/2012	06:59	GHF15	HG	133	A	50.43297	-7.62895
10/07/2012	07:10	GHF15 - GHF16	MB2	134	A-SOL	50.43259	-7.62331
10/07/2012	07:28	GHF15 - GHF16	MB2	134	A-EOL	50.39806	-7.57716
10/07/2012	07:40	GHF16	HG	135	A	50.39977	-7.58014
10/07/2012	08:05	GHF16	CS	136	A-SOL	50.40065	-7.58090
10/07/2012	08:15	GHF16	CS	136	A-EOL	50.40176	-7.58213
10/07/2012	09:03	GHF21	HG	137	x	50.38957	-7.64898
10/07/2012	09:11	GHF21	HG	137	B	50.38957	-7.64897
10/07/2012	09:22	GHF21	HG	137	x	50.38967	-7.64904
10/07/2012	10:31	AS	MB2	138	AS1-SOL	50.34977	-7.72001
10/07/2012	10:31	AS	SS7	138	AS1-SOL	50.34977	-7.72001
10/07/2012	11:01	AS	MB2	138	AS1-EOL	50.40190	-7.27008
10/07/2012	11:01	AS	SS7	138	AS1-EOL	50.40190	-7.27008
10/07/2012	11:10	AS	MB2	138	AS2 350-SOL	50.40028	-7.71515
10/07/2012	11:10	AS	SS7	138	AS2 350-SOL	50.40028	-7.71515
10/07/2012	11:51	AS	MB2	138	AS2 350-EOL	50.32900	-7.71400
10/07/2012	11:51	AS	SS7	138	AS2 350-EOL	50.32900	-7.71400
10/07/2012	12:00	AS	MB2	138	AS2 700-SOL	50.34000	-7.71000
10/07/2012	12:00	AS	SS7	138	AS2 700-SOL	50.34000	-7.71000
10/07/2012	12:37	AS	MB2	138	AS2 700-EOL	50.21140	-7.42600
10/07/2012	12:37	AS	SS7	138	AS2 700-EOL	50.21140	-7.42600
10/07/2012	12:58	AS	MB2	138	AS2 700X-SOL	50.40050	-7.71500
10/07/2012	12:58	AS	SS7	138	AS2 700X-SOL	50.40050	-7.71500
10/07/2012	13:22	AS	MB2	138	AS2 700X-EOL	50.36400	-7.71500
10/07/2012	13:22	AS	SS7	138	AS2 700X-EOL	50.36400	-7.71500
10/07/2012	14:37	GFF26-T-GHF20	MB2	9138	A-SOL	50.14600	-7.70000
10/07/2012	14:42	GFF26-T-GHF20	MB2	9138	A-EOL	50.42447	-7.69750
10/07/2012	14:52	GHF20	HG	139	A	50.42202	-7.69804
10/07/2012	15:27	GHF25	HG	140	A	50.41119	-7.76643
10/07/2012	16:57	GHF25	CS	141	A-SOL	50.41120	-7.76724
10/07/2012	17:11	GHF25	CS	141	A-EOL	50.41196	-7.76446
10/07/2012	17:42	GHF25	CTD	142	A	50.41188	-7.75706
10/07/2012	17:56	GHF25 - GT01	MB2	143	A-SOL	50.40490	-7.73460
10/07/2012	18:03	GHF25 - GT01	MB2	143	A-EOL	50.39504	-7.71531
10/07/2012	18:16	GT01	HG	144	A	50.39577	-7.71625
10/07/2012	18:34	GT02	HG	145	A	50.39407	-7.71560
10/07/2012	19:10	GT01-02	CS	146	A-SOL	50.39489	-7.71606
10/07/2012	19:20	GT01-02	CS	146	A-EOL	50.39354	-7.71543
10/07/2012	19:44	GT03	HG	147	X	50.38769	-7.71241
10/07/2012	19:53	GT03	HG	147	X	50.38749	-7.71254
10/07/2012	20:19	GT03-04	DC	148	A-SOL	50.38760	-7.71283
10/07/2012	20:32	GT03-04	DC	148	A-EOL	50.38680	-7.71390
10/07/2012	20:54	GHF26	HG	149	A	50.37897	-7.71741
10/07/2012	20:56	GHF26-T-GT05	MB2	9150	A	50.34550	-7.71740
10/07/2012	21:18	GHF26-T-GT05	MB2	9150	A	50.37250	-7.71830
10/07/2012	21:19	GT05-06	DC	150	A-SOL	50.37346	-7.71904
10/07/2012	21:32	GT05-06	DC	150	A-EOL	50.37262	-7.71832
10/07/2012	21:57	GT07-08	DC	151	A-SOL	50.36108	-7.71459
10/07/2012	22:11	GT07-08	DC	151	A-EOL	50.36023	-7.71578
10/07/2012	22:38	GT08	HG	152	X	50.36020	-7.71588
10/07/2012	22:39	GT08	HG	152	A	50.36034	-7.71570

Date	Time	Stn Code	Gear	Stn No	Replicate	Latitude	Longitude
10/07/2012	22:56	GT07	HG	153	x	50.36065	-7.71455
10/07/2012	23:16	GT07	HG	153	A	50.36090	-7.71435
10/07/2012	23:39	GT09	HG	154	A	50.35653	-7.71243
11/07/2012	00:01	GT09	CS	155	A-SOL	50.35783	-7.71495
11/07/2012	00:11	GT09	CS	155	A-EOL	50.35877	-7.71661
11/07/2012	00:32	GT09 - GHF08	MB2	156	A-SOL	50.37414	-7.70528
11/07/2012	01:30	GT09 - GHF08	MB2	156	A-EOL	50.47766	-7.60746
11/07/2012	01:41	GHF08	HC	157	A	50.47583	-7.60945
11/07/2012	02:30	GHF_08	CS	158	A-SOL	50.47564	-7.60946
11/07/2012	02:40	GHF_08	CS	158	A-EOL	50.47697	-7.61000
11/07/2012	02:53	GHF08 - GHF09	MB2	159	A-SOL	50.47717	-7.60595
11/07/2012	03:13	GHF08 - GHF09	MB2	159	A-EOL	50.44100	-7.55838
11/07/2012	03:20	GHF09	HC	160	x	50.44327	-7.56018
11/07/2012	03:30	GHF09	HC	160	B	50.44323	-7.56034
11/07/2012	03:41	GHF09 - GHF10	MB2	161	A-SOL	50.43667	-7.55398
11/07/2012	03:58	GHF09 - GHF10	MB2	161	A-EOL	50.40969	-7.50869
11/07/2012	04:07	GHF10	HC	162	x	50.41136	-7.51169
11/07/2012	04:12	GHF10	HC	162	X	50.41136	-7.51167
11/07/2012	04:19	GHF10	HC	162	A	50.41141	-7.51181
11/07/2012	04:27	GHF10 - GHF11	MB2	163	A-SOL	50.40792	-7.50918
11/07/2012	04:45	GHF10 - GHF11	MB2	163	A-EOL	50.37718	-7.46022
11/07/2012	04:54	GHF11	HC	164	x	50.37852	-7.46252
11/07/2012	05:00	GHF11	HC	164	A	50.37848	-7.46246
11/07/2012	05:23	GHF11	CS	165	A-SOL	50.37899	-7.46351
11/07/2012	05:33	GHF11	CS	165	A-EOL	50.37988	-7.46517
11/07/2012	06:12	GHF07	HC	166	A	50.38986	-7.39440
11/07/2012	06:19	GHF07 - GHF06	MB2	167	A-SOL	50.39030	-7.39604
11/07/2012	06:43	GHF07 - GHF06	MB2	167	A-EOL	50.42372	-7.44573
11/07/2012	07:00	GHF06	HC	168	A	50.42211	-7.44333
11/07/2012	07:07	GHF06_T_GHF05	MB2	169	A-SOL	50.42564	-7.44545
11/07/2012	07:31	GHF06_T_GHF05	MB2	169	A-EOL	50.45575	-7.49481
11/07/2012	07:45	GHF_05	HC	170	A	50.45430	-7.49184
11/07/2012	07:50	GHF05_T_GHF04	MB2	171	A-SOL	50.45523	-7.49249
11/07/2012	08:18	GHF05_T_GHF04	MB2	171	A-EOL	50.48824	-7.54315
11/07/2012	08:30	GHF04	HC	172	A	50.48676	-7.54052
11/07/2012	09:07	GHF01	HC	173	A	50.49709	-7.47120
11/07/2012	09:30	GHF01	CS	174	A-SOL	50.49704	-7.47153
11/07/2012	09:40	GHF01	CS	174	A-EOL	50.49755	-7.47355
11/07/2012	09:56	GHF01_T_GHF02	MB2	175	A-SOL	50.49859	-7.47209
11/07/2012	10:15	GHF01_T_GHF02	MB2	175	A-EOL	50.46274	-7.42022
11/07/2012	10:26	GHF02	HC	176	A	50.46510	-7.42251
11/07/2012	10:34	GHF02_T_GHF03	MB2	177	A-SOL	50.46187	-7.41976
11/07/2012	10:51	GHF02_T_GHF03	MB2	177	A-EOL	50.43100	-7.37243
11/07/2012	11:16	BLOCK3	MB2	178	A-SOL	50.43130	-7.36110
11/07/2012	11:48	BLOCK3	MB2	178	A-EOL	50.41530	-7.45410
11/07/2012	11:52	BLOCK3	MB2	178	B-SOL	50.41510	-7.44560
11/07/2012	12:20	BLOCK3	MB2	178	B-EOL	50.43330	-7.32770
11/07/2012	12:48	GHF03	HC	179	A	50.43254	-7.37452
11/07/2012	13:09	CTD	CTD	180	A	50.42570	-7.37175
11/07/2012	13:09	HFS	MB2	181	A-SOL	50.42570	-7.37175
11/07/2012	17:06	HFS	MB2	181	A-EOL	50.06380	-8.14347

5.8 ***Daily Progress Reports***

The JNCC Daily Progress Reports covering the days which had activities relating to the Greater Haig Fras survey are reproduced below. The reports were compiled by [redacted] (JNCC).

DAILY LOG
STATUS REPORT
Name of Area Survey
Rv Cefas Endeavour – JNCC – DPR No. 3 – 05/07/12

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 10/12 Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No. 3	Location at 24:00: 50°18.03N, 7°42.53W
Date: 05/07/12	

To Company:	Person:	E-mail:	
Cefas	[redacted]		
JNCC			
JNCC			
JNCC			
Cefas			
JNCC			
Cefas			

Safety

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	3
Additional comments:		

Summary of operations 0000-2400

Time UTC	Type	Comments
00:00-7:40	Transit	Transit to Haig Fras infill
07:40-07:49	Offshore calibration	CTD cast
7:49-8:45	Transit	Continue transit to Haig Fras infill site
8:45-16:37	TOSu	Dual multibeam (EM3002 & EM2040) to gather additional information in the area between reef in Haig Fras SCI. Multibeam suspended due to tripped circuit breaker
16:37-17:40	Ship downtime	Switchboard fault, multibeam suspended for 1 hr
17:40-21:23	TOSu	Dual multibeam resumed in Haig Fras gap fill
21:23-21:39	Offshore calibration	CTD cast
21:39-21:55	Transit	Leaving Haig Fras gap fill to transit to Greater Haig Fras sampling pt GHF42
21:55-00:00	TOSu	sampling with multibeam (EM2040) & side scan (Edgetech @300 & 600 kHz) begins along acoustic line AC107, starting at GHF42

Weather

Weather/sea state conditions	0000-0600	0600-1200	1200-1800	1800-2400	Remarks
	Swell 3m, sea smooth – very smooth, winds SW veering NW, gentle breeze to light air, 1015mb, vis good, c/r	Winds NW turning to light air, swell 3-2m, 1017mb, vis good,vis good, cloudy, sea v smooth	cloudy, vis good, sea v smooth Winds light & variable, , 1019mb, 2m swell	Light & variable winds, 2-1m swell, sea v smooth, vis good-v good, 1021mb,sky partly clouded	

DAILY LOG
STATUS REPORT

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)		Remarks
Mob/Demob	0	9		
Offshore Calibrations	0:25	4:07		
Total Operation Survey (TOSu)	13:40	13:40		
Total Operation Sampling (TOSa)	0	0		
Equipment/Downtime	0	0		
Ship/Plant Downtime	1:03	2:33		Circuit breaker fault, multibeam suspended for about 1 hr
Waiting On Weather	0	0		
Transit	8:52	39:50		
Standby Port	0	0		
Others	0	2:50		
Total:	**24**	**72**		

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current est. total (Lkm)	Remarks
Acoustic: Multibeam				
EM3002	100.5	100.5		
EM2040	100.5	100.5		
Acoustic: Sidescan Sonar				
Edgetech	7.8	7.8		V rough approximation based on cross ref with multibeam logging times

Overall Progress Groundtruthing Samples

Action	Today (# samples/tows)	Accum (# samples/tows)			Remarks
Hamon grab (0.1m2)	0	0			
Drop camera	0	0			
Camera sledge	0	0			

Weather forecast for the next 24 hours

Variable 4, becoming W/NW 5 or 6 later. Moderate, becoming rough later in west. Rain or showers. Moderate or good, occasionally poor later

Planned operation for the next 24 hours (00:00 to 24:00 on 06/07/12)

Continue multibeam and side scan acoustic lines logging over 5km triangular grid in GHF

Agreed Changes to Scope/Survey operation priorities

Not picking up GHF36 in acoustic sampling at this point because it is dark & the area is being actively fished with set gear – presenting snagging risk to side scan. Acoustic line AC07 starts logging at GHF42.

CEFAS/JNCC Comments

Both EM2040 & EM3002 multibeam data was collected through the HF gap infill. EM3002 to be processed first, with EM2040 data processed later. Survey in the HF gap infill is to be designed to fit the needs of the EM3002 coverage and use EM2040 data for the rest of the survey of GHF & other sites where backscatter doesn't need to be integrated with existing earlier data. EM3002 has not been calibrated for this survey. Need to note in cruise report when it was last calibrated. For the rest of the survey we are switching to EM2040.

CEFAS SIC..... [redacted] ..... JNCC Rep: [redacted]

DAILY LOG
STATUS REPORT
Name of Area Survey
Rv Cefas Endeavour – JNCC – DPR No. 4 – 06/07/12

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 10/12 Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No. 4 Date: 06/07/12	Location at 24:00: 50°23.58N, 7°37.72W

To Company:	Person:	E-mail:
Cefas	[redacted]	
JNCC		
JNCC		
JNCC		
Cefas		
JNCC		
Cefas		

Safety

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	3
Additional comments:		

Summary of operations 0000-2400

Time UTC	Type	Comments
00:00-4:33	TOSu	Multibeam and side scan transects in Greater Haig Fras along acoustic line AC107 mapped in 5km triangular grid
4:33-4:43	Offshore calibration	CTD cast
4:43-18:48	TOSu	Resume multibeaming & side scan of acoustic lines AC107, AC108, AC109, AC106 & AC105
18:48-19:30	Ship downtime	Circuit breaker fault- acoustic surveying suspended
19:30-21:19	TOSu	Multibeaming and side scanning resumed along AC105
21:19-21:45	Equipment downtime	Lost comms with Edgetech side scan – retrieved to investigate, multibeam suspended shortly after.
21:45-22:15	Transit	Transit back onto AC105 to resume multibeaming without side scan
22:15-00:00	TOSu	Continue multibeaming only along AC105

Weather

Weather/sea state conditions	0000-0600	0600-1200	1200-1800	1800-2400	Remarks
	Light air, sea calm, swell 1m, 1021 mb, vis good, partly cloudy	Vis v good, wind N/NW, light to gentle breeze, sea v smooth, swell 1m, 1021, cloudy	NW/W, light to gentle breeze, vis good, cloudy, swell 1m, sea v smooth, 1020mb,	W, gentle to mod gale, vis good, sea smooth, swell 2m1018, overcast	

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)		Remarks
Mob/Demob	0	9		

DAILY LOG
STATUS REPORT

Offshore Calibrations	0:10	4:17		CTD deployed
Total Operation Survey (TOSu)	22:12	35:52		
Total Operation Sampling (TOSa)	0	0		
Equipment/Downtime	00:26	00:26		
Ship/Plant Downtime	00:42	3:15		
Waiting On Weather	0	0		
Transit	00:30	40:20		
Standby Port	0	0		
Others	0	2:50		
Total:	**24**	96		

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
EM2040	143.5	244		
EM3002	0	100.5		
Acoustic: Sidescan Sonar				
Edgetech	120	127.8		V rough approximation based on cross ref with multibeam logging times

Overall Progress Groundtruthing Samples

Action	Today (# samples/tows)	Accum (# samples/tows)			Remarks
Hamon grab (0.1m2)	0	0			
Drop camera	0	0			
Camera sledge	0	0			

Weather forecast for the next 24 hours

S/SW becoming cyclonic 6-8, becoming NW 4/5 later, mod-rough, rain then thundery showers, good to occasionally poor vis.

Planned operation for the next 24 hours (00:00 to 24:00 on 07/07/12)

Transit to Haig Fras gap infill between surveyed reef outcrops to ground truth acoustic data with grabs and camera drops/tows

Agreed Changes to Scope/Survey operation priorities

CEFAS/JNCC Comments

CEFAS SIC… [redacted] ……. JNCC Rep [redacted]

DAILY LOG
STATUS REPORT
Name of Area Survey
Rv Cefas Endeavour – JNCC – DPR No. 5 – 07/07/12

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 10/12 Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No. 5	Location at 24:00: 50°14.70N, 7°44.34W
Date: 07/07/12	

To Company:	Person:	E-mail:
Cefas	[redacted]	
JNCC		
JNCC		
JNCC		
Cefas		
JNCC		
Cefas		

Safety

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	3
Additional comments:		

Summary of operations 0000-2400

Time UTC	Type	Comments
00:00-2:50	TOSu	Continued collecting multibeam data along acoustic line AC105
2:50:3:03	Offshore calibration	CTD cast
3:03-15:03	TOSu	Continued collecting multibeam data along remaining acoustic lines, AC104, AC103 & AC102.
15:03-17:40	Transit	Transit from the end of acoustic line AC102 back to the gap between Haig Fras reef outcrops to ground truth acoustic data collected on 5th & 6th July
17:40-21:00	TOSa	Ground truthing with Hamon grab and drop/sledge camera in sites HF101, HF102, HF103
21:00-21:10	Ship downtime	Circuit breaker trip fault – surveying/sampling suspended
21:10-00:00	TOSa	Ground truthing with Hamon grab & drop/sledge camera resumed. Collecting imagery/samples from HF103 & HF104

Weather

Weather/sea state conditions	0000-0600	0600-1200	1200-1800	1800-2400	Remarks
	Wind NW strong to mod, sea – smooth-slight, 1015mb, vis good, rain, cloudy, swell 3-3.5m	Wind NNW strong, sea – slight, 1015mb, 3-4m swell, vis good, overcast-partly cloudy	Wind N/NW fresh to moderate breeze, sea slight to smooth, swell 4m, 1018mb, partly cloudy, vis v good	Wind N/NW, sea v smooth, swell 4 down to 2m, 1019mb, partly cloudy, vis v good	

DAILY LOG
STATUS REPORT

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)		Remarks
Mob/Demob	0	9		
Offshore Calibrations	0:13	4:30		CTD deployed
Total Operation Survey (TOSu)	14:50	50:42		
Total Operation Sampling (TOSa)	6:10	6:10		
Equipment/Downtime	0:00	0:26		
Ship/Plant Downtime	0:10	3:25		
Waiting On Weather	0	0		
Transit	2:3	42:57		
Standby Port	0	0		
Others	0	2:50		
Total:	**24**	**120**		

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
EM2040	174	318		
EM3002	0	100.5		
Acoustic: Sidescan Sonar				
Edgetech	0	127.8		

Overall Progress Groundtruthing Samples

Action	Today (# samples/tows)	Accum (# samples/tows)			Remarks
Hamon grab (0.1m2)	2	2			
Drop camera	3	3			
Camera sledge	1	1			

Weather forecast for the next 24 hours

Westerly or northwesterly 4 or 5 occasionally 6 at first. Rough at 1st in west, otherwise moderate, rain/showers, mod to good vis.

Planned operation for the next 24 hours (00:00 to 24:00 on 08/07/12)

To continue ground-truthing acoustic data in Haig Fras gap infill using Hamon grab & drop/sledge cameras (as appropriate). Then transit into Greater Haig Fras towards GHF75 to begin ground-truthing acoustic data collected on 5th & 6th July. This is to be combined with multibeam survey across the acoustic lines previously collected.

Agreed Changes to Scope/Survey operation priorities

CEFAS/JNCC Comments

CEFAS SIC… [redacted] ……. JNCC Rep: [redacted]

DAILY LOG
STATUS REPORT
Name of Area Survey
Rv Cefas Endeavour – JNCC – DPR No. 6 – 08/07/12

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 10/12 Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No.6	Location at 24:00: 50°14.43N, 008°06.17W
Date: 08/07/12	

To Company:	Person:	E-mail:
Cefas	[redacted]	
JNCC		
JNCC		
JNCC		
Cefas		
JNCC		
Cefas		

Safety

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	3
Additional comments:		

Summary of operations 0000-2400

Time UTC	Type	Comments
00:00-2:37	TOSa	Drop cameras in Haig Fras infill sites, HFI05, HFI06, HF_07 & HF_08
2:37-4:09	TOSa	Hamon grabs in Haig Fras infill sites, HFI09 & HFI10
4:09-4:21	TOSa	Camera sledge from HFI09 to HFI10
4:21-5:16	TOSa	Hamon grabs in Haig Fras infill sites, HFI11 & HFI12
5:16-5:51	TOSa	Sledge camera tow from HFI11 to HFI12
5:51-9:16	TOSa	Hamon grabs at sites, HFI03, HFI04, HFI05, HFI06, HFI07 & HFIO8
9:16-10:55	Transit	Transit to GHF 75
10:55-11:10	Offshore calibration	CTD cast
11:10-12:59	TOSa	Hamon grabs at sites GHF75 & GHF78 and camera sledge towed between
13:13-13:58	TOSu	Multibeam collected on transit between GHF78 & GHF77
13:58-15:20	Ship downtime	Propulsion motor tripped- multibeam suspended
15:20-17:32	TOSu	Survey resumed - opportunistic nested block of 3 multibeam lines collected parallel to acoustic line collected previously between GHF78-GHF77 (ship at half power)
17:32-18:53	TOSa	Hamon grab & camera sledge at GHF77 (ship now on full power)
18:53-19:16	TOSu	Multibeam collected on transit between GHF77 & GHF73
19:16-20:10	TOSa	Hamon grab & camera sledge at GHF73
20:10-20:42	TOSu	Multibeam collected on transit between GHF73 & GHF74
20:42-22:08	TOSa	Hamon grab & drop camera at GHF74 & Hamon grab at GHF70
22:08-22:24	TOSu	Multibeam collected on transit between GHF70 & GHF69
22:24-22:58	TOSa	Hamon grab at GHF69
22:58-23:32	TOSu	Multibeam collected on transit between GHF69 & GHF68
22:32-22:42	TOSa	Hamon grab at GHF68
22:4-00:00	TOSu	Multibeam collected on transit between GHF68 & GHF67

DAILY LOG
STATUS REPORT

Weather

Weather/sea state conditions	0000-0600	0600-1200	1200-1800	1800-2400	Remarks
	Light airs, sea v smooth, swell 2m, 1020mb, sky partly cloudy, vis v good	Light airs, sea v smooth, swell 201 m, 1020mb, sky partly cloudy becoming overcast, vis v good-good	Light airs, sea v smooth, swell 1-2m, 1023, overcast, vis good	NW light, sea v smooth, swell 1m, 1023, overcast, vis good	

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)		Remarks
Mob/Demob	0	9:00		
Offshore Calibrations	0:15	4:45		
Total Operation Survey (TOSu)	6:36	57:18		
Total Operation Sampling (TOSa)	15:30	21:40		
Equipment/Downtime	0	0:26		
Ship/Plant Downtime	1:22	4:47		
Waiting On Weather	0	0		
Transit	1:39	44:36		
Standby Port	0	0		
Others	0	2:50		
Total:	**24**	**144**		

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
EM2040	37	355		
EM3002	0	100.5		
Acoustic: Sidescan Sonar				
Edgetech	0	127.8		

Overall Progress Groundtruthing Samples

Action	Today (# samples/tows)	Accum (# samples/tows)			Remarks
Hamon grab (0.1m2)	18	20			
Drop camera	4	7			
Camera sledge	5	6			

DAILY LOG
STATUS REPORT

Weather forecast for the next 24 hours

W or NW, 4/5 decreasing 3 at times, slight or moderate seas, occasional rain, moderate or good vis

Planned operation for the next 24 hours (00:00 to 24:00 on 09/07/12)

Continue ground truthing sites in Greater Haig Fras and multibeaming on transit between sites.

Agreed Changes to Scope/Survey operation priorities

CEFAS/JNCC Comments

One of the propulsion motors tripped, so the vessel was down to half speed. We decided to make best use of the time by undertaking an opportunistic nested block of the area (100% multibeam) we were in at the time (GHF77/GHF74) before resuming the rest of the survey in wider Greater Haig Fras once the motor was up to full power again.

CEFAS SIC.. [redacted] ..... JNCC Rep: [redacted]

DAILY LOG
STATUS REPORT
Name of Area Survey
Rv Cefas Endeavour – JNCC – DPR No. 7 – 09/07/12

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 10/12 Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No.7 Date: 09/07/12	Location at 24:00: 50°26.38N, 007°53.74W

To Company:	Person:	E-mail:
Cefas	[redacted]	
JNCC		
JNCC		
JNCC		
Cefas		
JNCC		
Cefas		

Safety

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	3
Additional comments:		

Summary of operations 0000-2400

Time UTC	Type	Comments
00:00-01:35	TOSa	Hamon grab at GHF67 & GHF61, with camera sledge towed between
01:35-2:09	TOSu	Multibeam collected on transit between GHF61 & GHF62
2:09-2:14	TOSa	Hamon grab at GHF62
2:14-2:33	TOSu	Multibeam collected on transit between GHF62 & GHF63
2:33-3:23	TOSa	Hamon grab at GHF63
3:23-4:11	TOSu	Multibeam collected on transit between GHF63 & GHF64
4:11-4:19	TOSa	Hamon grab at GHF64
4:19-4:40	TOSu	Multibeam collected on transit between GHF64 & GHF58
4:40-5:43	TOSa	Hamon grab & towed camera sledge at GHF58
5:43-6:16	TOSu	Multibeam collected on transit between GHF58 & GHF57
6:16-6:25	TOSa	Hamon grab at GHF57
6:25-6:58	TOSu	Multibeam collected on transit between GHF57 & GHF56
6:58-7:56	TOSa	Hamon grab at GHF56
7:56-09:03	TOSa	Camera sledge & drop camera on GHF57
9:03-9:27	TOSu	Multibeam collected on transit between GHF57 & GHF51
9:27-9:37	TOSa	Hamon grab at GHF51
9:37-10:08	TOSu	Multibeam collected on transit between GHF51 & GHF52
10:08-10:16	TOSa	Hamon grab at GHF52
10:16-10:46	TOSu	Multibeam collected on transit between GHF52 & GHF53
10:46-11:50	TOSa	Hamon grab at GHF53 & GHF48
11:50-13:40	TOSu	Multibeam collected on transit between GHF48 & GHF47
13:40-13:49	TOSa	Hamon grab at GHF 47 & GHF46 & towed camera sledge at GHF47
13:49-14:08	TOSu	Multibeam collected on transit between GHF46 & GHF45
14:08-15:08	TOSa	Hamon grab & towed camera sledge at GHF45
15:08-15:26	Offshore calibrations	CTD cast
15:26-15:43	TOSu	Multibeam collected on transit between GHF45 & GHF38
15:43-15:59	TOSa	Hamon grab at GHF38
15:59-16:34	TOSu	Multibeam collected on transit between GHF38 & GHF39

DAILY LOG
STATUS REPORT

16:34-16:41	TOSa	Hamon grab at GHF39
16:41-17:06	TOSu	Multibeam collected on transit between GHF39 & GHF40
17:06-17:15	TOSa	Hamon grab at GHF40
17:15-17:40	TOSu	Multibeam collected on transit between GHF40 & GHF41
17:40-18:33	TOSa	Hamon grab at GHF41
18:33-19:04	TOSu	Multibeam collected on transit between GHF41 & GHF42
19:04-19:41	TOSa	Hamon grab at GHF42
19:41-20:10	TOSu	Multibeam collected on transit between GHF42 & GHF35
20:10-20:17	TOSa	Hamon grab at GHF35
20:17-20:52	TOSu	Multibeam collected on transit between GHF35 & GHF34
20:52-21:01	TOSa	Hamon grab at GHF34
21:01-21:34	TOSu	Multibeam collected on transit between GHF34 & GHF33
21:34-22:14	TOSa	Hamon grab & drop camera at GHF33
22:14-22:46	TOSu	Multibeam collected on transit between GHF33 & GHF32
22:46-22:53	TOSa	Hamon grab at GHF32
22:53-23:30	TOSu	Multibeam collected on transit between GHF32 & GHF31
23:30-00:00	TOSa	Hamon grab at GHF31

Weather

Weather/sea state conditions	0000-0600	0600-1200	1200-1800	1800-2400	Remarks
	NW moderate breeze, sea v smooth, 1-2m swell, 1023mb,vis good, overcast, rain later	NW moderate breeze, sea v smooth, 1m swell, 1022mb, overcast, vis good	N/NW moderate breeze, 1m swell, sea v smooth, 1025mb, overcast becoming cloudy, vis v good	NW moderate breeze, 1m swell, 2m swell, 1024mb, sky partly cloudy, vis v good	

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)		Remarks
Mob/Demob	0	9:00		
Offshore Calibrations	0:18	5:03		
Total Operation Survey (TOSu)	11:41	68:59		
Total Operation Sampling (TOSa)	12:01	33:41		
Equipment/Downtime	0	0:26		
Ship/Plant Downtime	0	3:25		
Waiting On Weather	0	0		
Transit	0	44:36		
Standby Port	0	0		
Others	0	2:50		
Total:	**24**	**168**		

DAILY LOG
STATUS REPORT

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
EM2040	107	462		
EM3002	0	100.5		
Acoustic: Sidescan Sonar				
Edgetech	0	127.8		

Overall Progress Groundtruthing Samples

Action	Today (# samples/tows)	Accum (# samples/tows)			Remarks
Hamon grab (0.1m2)	25	45			
Drop camera	2	9			
Camera sledge	4	10			

Weather forecast for the next 24 hours

NW 4/5, occasionally 6 later, moderate, showers, rain later in the west, vis good

Planned operation for the next 24 hours (00:00 to 24:00 on 10/07/12)

Continue running multibeam lines transversely to acoustic lines collected in Greater Haig Fras on 5th & 6th July & ground truthing with Hamon grab, drop/sledge cameras at sample points on 5km triangular grid. When reach sites GHF 20 & 26 undertake a nested block for NOC (at least 6km^2) with 100% side scan & multibeam which is to be ground truthed immediately after post processing. When nested block is complete continue to collect multibeam transversely & ground truth sample pts on grid in GHF as before.

Agreed Changes to Scope/Survey operation priorities

CEFAS/JNCC Comments

CEFAS SIC.. [redacted] ..... JNCC Rep: [redacted]

DAILY LOG
STATUS REPORT
Name of Area Survey
Rv Cefas Endeavour – JNCC – DPR No. 8 – 10/07/12

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 10/12 Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No.8	Location at 24:00: 50°26.38N, 007°53.74W
Date: 10/07/12	

To Company:	Person:	E-mail:
Cefas	[redacted]	
JNCC		
JNCC		
JNCC		
Cefas		
JNCC		
Cefas		

Safety

	Today	To Date
Accidents/Incidents	0	0
Near Misses	1	1
Safety Drills/Induction	0	3
Additional comments:	Brake on the Hamon grab winch drum B slipped. The grab was being retrieved at the time and banged into the side of the vessel. Crew & scientists were informed and kept away from the area until the grab was safely retrieved on deck. Grab transferred to drum A while drum B was fixed	

Summary of operations 0000-2400

Time UTC	Type	Comments
00:00-00:19	TOSa	Hamon grab at GHF23
00:19-1:00	TOSu	Multibeam collected between GHF23 & GHF24
1:00-1:16	Equipment downtime	Winch problem, brakes not operating properly, small delay in grabbing to change over to barrel A
1:16-1:23	TOSa	Hamon grab at GHF24
1:23-1:58	TOSu	Multibeam collected between GHF24 & GHF18
1:58-2:08	TOSa	Hamon grab at GHF18
2:08-2:40	TOSu	Multibeam collected between GHF18 & GHF19
2:40-2:49	TOSa	Hamon grab at GHF19
2:49-3:36	TOSu	Multibeam collected between GHF19 & GHF13
3:36-5:05	TOSa	Hamon grab at GHF13
5:05-5:53	TOSu	Sledge camera towed through GHF13 & multibeam collected between GHF13 & GHF14
5:53-6:00	TOSa	Hamon grab at GHF14
6:00-6:59	TOSu	Multibeam collected between GHF14 & GHF15
6:59-7:10	TOSa	Hamon grab at GHF15
7:10-7:28	TOSu	Multibeam collected between GHF15 & GHF16
7:28-7:40	TOSa	Hamon grab at GHF16
7:40-8:05	Ship downtime	Circuit breaker trip fault–survey suspended
8:05-10:10	TOSa	Camera sledge tow at GHF16 & Hamon grab at GHF21
10:10-13:42	TOSu	3 multibeam & side scan lines collected for Autosub nested test block around GHF 26, offset by 350 and 700m from site
13:42-14:12	Ship downtime	Circuit breaker trip fault–survey suspended
14:12-14:52	TOSu	Transit between GHF26 & GHF20 collecting multibeam only
14:52-15:40	TOSa	Hamon grabs at GHF20 & 25

DAILY LOG
STATUS REPORT

15:40-16:40	Ship downtime	Survey suspended – hydraulic fluid leak on aft deck
16:40-17:15	TOSu	Sledge camera at GHF25
17:15-17:42	Equipment downtime	Winch breke test
17:42-18:16	Offshore calibration	CTD cast
18:16-00:00	TOSa	Hamon grabbing at sites GT01, GT03, GHF26, GT08, GT07, GT09, GHF08, GHF09, GHF10 within the Autosub test area. Camera sledge used between sites GT01-02 & at GT09. Drop camera deployed between sites GT03-04, GT05-06, GT07-08.

Weather

Weather/sea state conditions	0000-0600	0600-1200	1200-1800	1800-2400	Remarks
	Winds NW, fresh breeze, sea v. smooth becoming smooth, swell 2m, 1025mb, blue sky, vis v. good	Winds NW fresh breeze becoming strong, sea smooth, 2-4m swell, 1025mb, blue sky, cloudy vis v. good	Winds NW strong to fresh breeze, sea smooth, 2m swell, 1027mb, cloudy, vis v. good	Winds NW, strong breeze to moderate gale, sea smooth, swell 3-3.5m, 1027mb,cloudy, vis v good	

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)		Remarks
Mob/Demob	0	9:00		
Offshore Calibrations	00:34	05:37		
Total Operation Survey (TOSu)	9:27	78:26		
Total Operation Sampling (TOSa)	11:21	45:02		
Equipment/Downtime	0:43	1:09		
Ship/Plant Downtime	1:55	5:20		
Waiting On Weather	0	0		
Transit	0	44:36		
Standby Port	0	0		
Others	0	2:50		
Total:	**24**	**192**		

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
EM2040	64	526		
EM3002	0	100.5		
Acoustic: Sidescan Sonar				
Edgetech	2	130		Rough approximation

DAILY LOG
STATUS REPORT

Overall Progress Groundtruthing Samples

Action	Today (# samples/tows)	Accum (# samples/tows)			Remarks
Hamon grab (0.1m2)	20	65			
Drop camera	3	12			
Camera sledge	5	15			

Weather forecast for the next 24 hours

SW5-7, seas moderate to rough

Planned operation for the next 24 hours (00:00 to 24:00 on 11/07/12)

Complete ground truthing of the remaining sites in Greater Haig Fras, multibeaming between sites transverse to existing acoustic lines collected on 5th & 6th July. Aiming to begin steam down to NW Jones Bank by noon from GHF03. We will collect multibeam while transiting through sites GHF03, GHF07, GHF22, GHF37, GHF50, GHF59& GHF80 on the way to NW Jones Bank. Once at NW Jones Bank, undertake further ground truthing of existing data collected by Gardline & collect multibeam data between stations.

Agreed Changes to Scope/Survey operation priorities

CEFAS/JNCC Comments

CEFAS SIC… [redacted] ..... JNCC Rep: [redacted]

DAILY LOG
STATUS REPORT
Name of Area Survey
Rv Cefas Endeavour – JNCC – DPR No. 9 – 11/07/12

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 10/12 Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No.9	Location at 24:00: 49°50.34N, 008°17.76W
Date: 11/07/12	

To Company:	Person:	E-mail:
Cefas	[redacted]	
JNCC		
JNCC		
JNCC		
Cefas		
JNCC		
Cefas		

Safety

	Today	To Date
Accidents/Incidents	0	0
Near Misses	1	1
Safety Drills/Induction	0	3
Additional comments:		

Summary of operations 0000-2400

Time UTC	Type	Comments
0:00-00:32	TOSa	Camera sledge at GT09
00:32-01:41	TOSu	Multibeam collected between GT09 & GHF08
01:41-2:53	TOSa	Hamon grab & camera sledge at GHF08
2:53-3:24	TOSu	Multibeam collected between GHF08 & GHF09
3:24-3:41	TOSa	Hamon grab at GHF09
3:41-4:07	TOSu	Multibeam collected between GHF09 & GHF10
4:07-4:27	TOSa	Hamon grab at GHF10
4:27-4:54	TOSu	Multibeam collected between GHF10 & GHF11
4:54-6:19	TOSa	Hamon grab at GHF11 & GHF07 with camera sledge at GHF11
6:19-7:00	TOSu	Multibeam collected between GHF07 & GHF06
7:00-7:07	TOSa	Hamon grab at GHF06
7:07-7:44	TOSu	Multibeam collected between GHF06 & GHF05
7:44-7:50	TOSa	Hamon grab at GHF05
7:50-8:30	TOSu	Multibeam collected between GHF05 & GHF04
8:30-9:56	TOSa	Hamon grabs at GHF04 & GHF01, with camera sledge through GHF01
9:56-10:26	TOSu	Multibeam collected between GHF01 & GHF02
10:26-10:43	TOSa	Hamon grab at GHF02
10:34-11:16	TOSu	Multibeam collected between GHF02 & GHF03
11:16-12:48	TOSu	Multibeam collected at AC105B (2 lines at 350m & 700m separation)
12:48-12:58	TOSa	Hamon grab at GHF03
12:58-13:09	Offshore calibration	CTD cast
13:09-17:06	TOSu	Multibeam collected between GHF03 & GHF80
17:06-18:10	Transit	Transit from GHF80 to North West Jones Bank
18:10-19:08	TOSa	Hamon grab & camera sledge at NWJB05
19:08-19:34	TOSu	Multibeam collected between NWJB05 & NWJB01
19:34-19:43	TOSa	Hamon grab at NWJB01
19:43-20:21	TOSu	Multibeam collected between NWJB01 & NWJB06
20:21-21:24	TOSa	Hamon grab & camera sledge at NWJB06

DAILY LOG
STATUS REPORT

21:24-22:11	TOSu	Multibeam collected between NWJB06 & NWJB03
22:11-22:19	TOSa	Hamon grab at NWJB03
22:19-22:50	TOSu	Multibeam collected between NWJB03 & NWJB02
22:50-23:27	TOSa	Hamon grab at NWJB02 & NWJB04
23:27-00:00	TOSu	Multibeam collected between NWJB04 & NWJB07

Weather

Weather/sea state conditions	0000-0600	0600-1200	1200-1800	1800-2400	Remarks
	Winds NW, strong to fresh breeze, seas smooth, swell 4-3m, 1026mb, sky partly cloudy, vis good	Winds NW, fresh to strong breeze, seas smooth, swell 3m, 102 7mb, cloudy occasional rain, vis good	Winds NW moderate gale, seas smooth, swell 3-4m, 1026, cloudy-overcast, vis good	Winds SW, strong breeze becoming gentle, slight seas becoming smooth, swell 4-3m, 1027mb, cloudy, vis good	

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)		Remarks
Mob/Demob	0	9:00		
Offshore Calibrations	00:11	5:48		
Total Operation Survey (TOSu)	08:47	87:13		
Total Operation Sampling (TOSa)	13:58	59:00		
Equipment/Downtime	0	01:09		
Ship/Plant Downtime	0	05:20		
Waiting On Weather	0	0		
Transit	1:04	45:40		
Standby Port	0	0		
Others	0	2:50		
Total:	**24**	**216**		

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
EM2040	403	929		
EM3002	0	100.5		
Acoustic: Sidescan Sonar				
Edgetech	0	130		

DAILY LOG
STATUS REPORT

Overall Progress Groundtruthing Samples

Action	Today (# samples/tows)	Accum (# samples/tows)			Remarks
Hamon grab (0.1m2)	17	82			
Drop camera	0	12			
Camera sledge	6	21			

Weather forecast for the next 24 hours

SW 5-7, veering westerly 4 or 5, moderate or rough seas, rain or drizzle, moderate or poor vis, occasionally good.

Planned operation for the next 24 hours (00:00 to 24:00 on 12/07/12)

Continue infill multibeam & ground truthing of North-West of Jones Bank before transiting to Start Point to begin the Natural England portion of the survey.

Agreed Changes to Scope/Survey operation priorities

According to the PoA, samples sites in Greater Haig Fras, north-west of Haig Fras reef were of higher priority than those to the south-west of the reef. It was agreed that it was more important to complete the ground truthing here and forsake ground truthing of sample sites south-west of Haig Fras should time become limited.

CEFAS/JNCC Comments

CEFAS SIC. [redacted] ..... JNCC Rep: [redacted]

5.9 *Fisheries Liaison Officer (FLO) Report*

No fisheries Liaison Officer was on board but the bridge officers kept a log of fishing vessels working in the vicinity. Only vessels broadcasting AIS data were recorded.

Table 3. Vessels observed fishing in the area.

Date	MCZ Name	Vessel Name	Callsign
05.07.2012	HAIG FRAS	F\V MEREN	FHZV
05.07.2012	HAIG FRAS	F\V CU NA MARA	EI5777
05.07.2012	HAIG FRAS	F\V ARKH ANGELL	EILL3
06.07.2012	HAIG FRAS	F\V AR ZANTEZ	FHIH
06.07.2012	HAIG FRAS	F\V LE BALBUZARDZ	FINH
06.07.2012	HAIG FRAS	F\V CU NA MARA	EI5777
06.07.2012	NORTHWEST of JONES BANK	F\V MIREN	FHZV
06.07.2012	NORTHWEST of JONES BANK	F\V AR LAERES	FMIM
06.07.2012	NORTHWEST of JONES BANK	F\V SALTEES TERN	EI6768
07.07.2012	NORTHWEST of JONES BANK	F\V BOUGAINVILLE	FMAS
07.07.2012	NORTHWEST of JONES BANK	F\V ALPHAVER	FVXS
07.07.2012	NORTHWEST of JONES BANK	HUNURE GOUET	FVXU
07.07.2012	NORTHWEST of JONES BANK	CONNEMARA	FGSR
07.07.2012	NORTHWEST of JONES BANK	LE MUREX	FGRH
07.07.2012	NORTHWEST of JONES BANK	AR LAERES	FMIM
07.07.2012	NORTHWEST of JONES BANK	CONNEMARA	FGSR
08.07.2012	HAIG FRAS	ELLIE AOHAMH	EI7536
08.07.2012	HAIG FRAS	AR ZANTEZ	FHIH
08.07.2012	HAIG FRAS	AR VOALEDEN	FIMJ

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