Report Ref: JB(NW)/06/AB/07-12 Project Code: C5785A

North West of Jones Bank rMCZ

2012 Survey Report

Author: Roger Coggan

Issue date: January 2016
Published date: January 2023

Report Ref: JB(NW)/06/AB/07-12 / Project Code: C5785A

North West of Jones Bank rMCZ 2012 Survey Report

Author: Roger Coggan

Issue date: January 2016
(Published January 2023)

This report should be cited:
Coggan, R. 2023. North West of Jones Bank rMCZ 2012 Survey Report. [Contracted] Report by Cefas for Defra and JNCC (Project Code: C5785A).

Head office

Centre for Environment, Fisheries & Aquaculture Science

Pakefield Road, Lowestoft, Suffolk NR33 0HT, UK

Tel +44 (0) 1502 56 2244 Fax +44 (0) 1502 51 3865

www.cefas.defra.gov.uk

Table of contents

1 Background and Introduction

1.1 Survey Project Team

The initial site evaluation survey at the North West of Jones Bank recommended Marine Conservation Zone (rMCZ) was carried out in March 2012 by Gardline (Job# 9060) as part of the ITT (Lot Number 6) using the vessel MV *Tridens 1*, but the benthic sampling work was not completed. Hence the area was visited again in July 2012 during the RV *Cefas Endeavour* cruise CEND10/12 which also targeted the neighbouring Greater Haig Fras rMCZ. 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 shifts, 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

The North West of Jones Bank (NWJB) 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 a square block, approximately 400 km^2 in area and is adjacent to the Greater Haig Fras and East of Jones bank rMCZs (Figure 1). The Selection Assessment Document (SAD) reports that "*The site comprises an area of continental shelf sea where the seafloor habitat* [is] *dominated by subtidal mud. The eastern site boundary is*

approximately 165 km west of Land's End. The area is included in the network in order to meet ENG[1] broad-scale habitat targets". For a detailed description see section 11.3.4 (pages 235-246) in the Finding Sanctuary final report (Lieberknecht et al., 2011[2]).

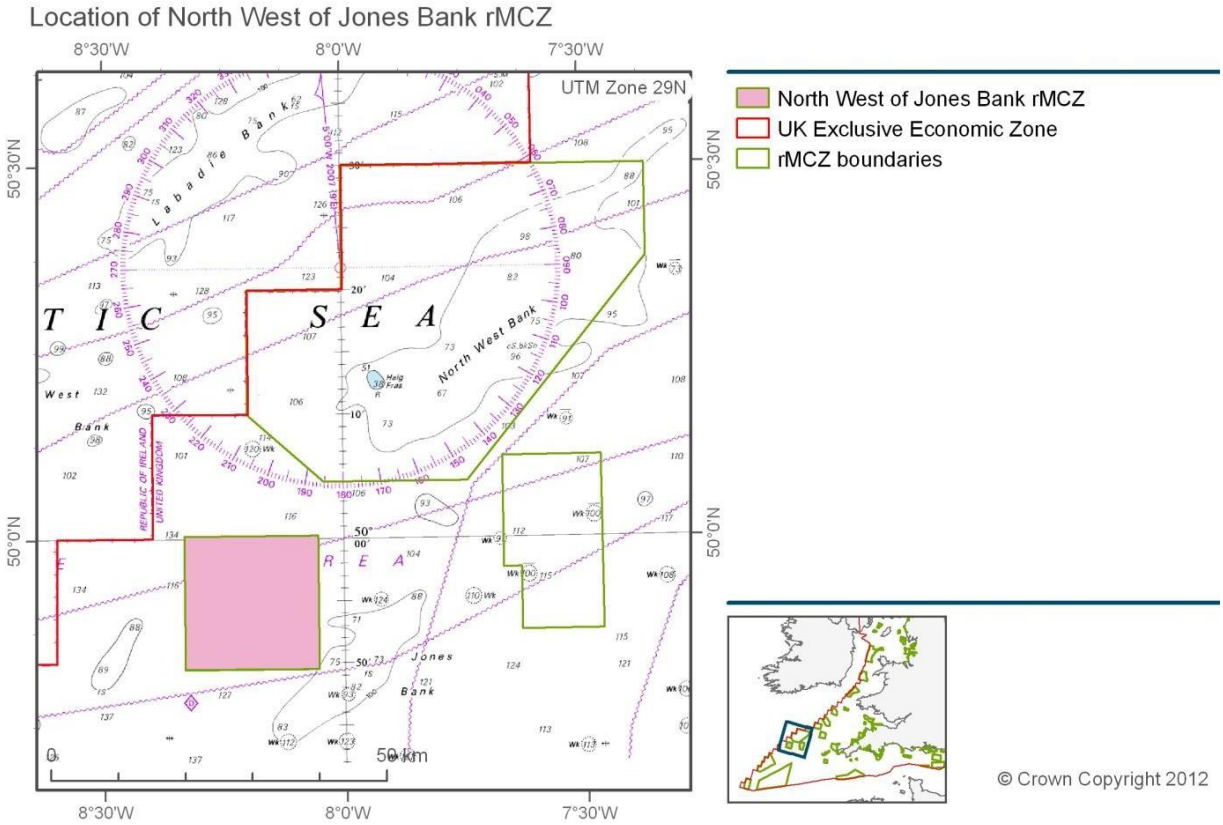


Figure 1. Location of the North West of Jones Bank rMCZ.

1.3 Geological and Biological Context

Jones Bank itself is a linear tidal sand ridge (LTSR), one of about 25 such ridges that characterise the central and outer parts of the Celtic Sea. The LTSR field covers an area of c. 65,000 km^2 extending from the shelf break at 200 m depth to approximately the 130 m depth contour to the southwest of the Isles of Scilly (Scourse et al., 2009[3]). The ridges were formed between 10 and 20 thousand years ago and are the largest features of their kind yet discovered. They are discrete sandy sedimentary bodies, up to 200 km in length, 55 m high and 15 km wide with a ridge-to-ridge wavelength of c. 20 km; their crests are generally aligned in a SW-NE direction. Jones Bank lies at northeast extremity of the LTSR field and is some 30 km long, shallowing to a depth of c. 70 m and is just inside the area of seabed that is considered to have been physically contacted by the Irish Sea Ice Stream during the Last Glacial Maximum. The inter-ridge areas comprise 'muddy' sediments (Hamilton et al., 19804), being silty-clay (with dropstones) and/or subglacial till (diamicton) (Scourse et al., 2009). In terms of benthic biology, no studies have been found relating to this specific rMCZ site, though with a soft muddy substrate it is likely to support burrowing megafaunal communities including commercial species such as Nephrops norvegicus.

Three Broad Scale Habitats (BSH) were listed in the proposal for designating the North West of Jones Bank site as an MCZ by the regional project (Lieberknecht et al., 2011), as listed in Table 1.

[1] Natural England and the Joint Nature Conservation Committee, 2010. *The Marine Conservation Zone Project: Ecological Network Guidance.* Sheffield and Peterborough, UK.
[2] Lieberknecht et al., 2011. *Finding Sanctuary final report and recommendations.* A report submitted by the Finding Sanctuary stakeholder project to Defra, the Joint Nature Conservation Committee, and Natural England

Table 1. Features proposed for designation within the North West of Jones Bank rMCZ.

Feature Type	Feature Name
Broad Scale Habitat (BSH)	A5.1 Subtidal coarse sediment
	A5.2 Subtidal sand
	A5.3 Subtidal mud

Additional habitat FOCI have been identified by the regional project as being present in the proposed site but were not included in the recommendations for designation. No species FOCI have been listed (Table 2).

Table 2. Features present but not proposed for designation within the North West of Jones Bank rMCZ.

Feature Type	Feature Name
Habitat FOCI	Subtidal sands and gravels*
Species FOCI	None listed

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.

1.4 Existing data and information utilised to inform survey planning

The information provided by the prior surveys and the Selection Assessment Document (SAD) were used by the JNCC to inform the survey plan for the NWJB rMCZ. Some background is given here to provide context for the sampling requested by the JNCC for the CEND10/12 cruise.

At the 'Invitation To Tender' (ITT) stage of the MCZ Site Evaluation Project, a survey design was provided as part of the tender specification, as illustrated in Figure 2. The plan included an acoustic survey of the whole site but prioritised the eastern part over the western part (areas 1 and 2 in Figure 2). There was also an array of ground-truth sampling stations arranged in triangular grids, with the density of stations being increased for the two BSH's predicted to be of limited extent by the modelled habitat map presented in the SAD.

[3] Scourse *et al.* 2009. Celtic Sea linear tidal sand ridges, the Irish Sea Ice Stream and the Fleuve Manche: Palaeotidal modelling of a transitional passive margin depositional system. Marine Geology, 259, 102-111.

[4] Hamilton *et al.* 1980. Bottom currents and shelf sediments, southwest of Britain. Sedimentary Geology, 26, 115-138.

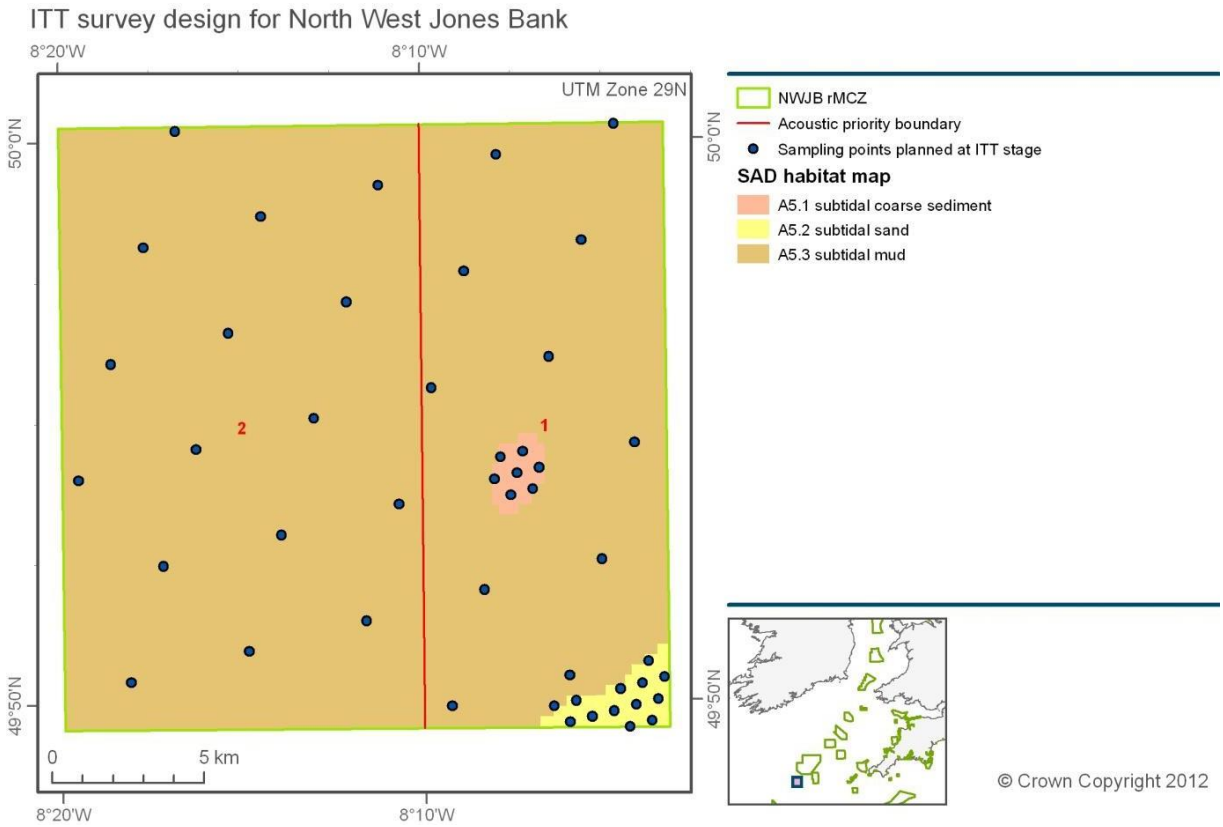


Figure 2. Original survey plan for the NWJB rMCZ at the ITT stage, showing prioritised areas for acoustic survey (1 & 2) and an array of ground-truth stations designed to sample the BSH classes identified in the Selection Assessment Document (SAD).

The majority of the intended sampling was completed by the Gardline survey in March 2012, as illustrated in Figure 3, but note that due to some errors in the positional data submitted in the pro-forma grabs logsheets, targeted sampling locations were used in this figure and not the positions reported *in the logsheet*. Accurate positional data was recorded in Eastings and Northings (UTM 29N) at the time of sampling, and is listed correctly in the Gardline report, but errors have arisen for some points when these were converted to the Lat / Long WGS84 format required in the pro-forma spreadsheet. Some of the Lat/Long positions plot up to 1.2 km off target, and two of them plot 1 degree of latitude to the south of the target (110 km off target), hence the target positions have been used in Figure 3. These errors were potentially unrecognised at the time the JNCC considered what further sampling they would like undertaken at the site in 2012 (see section 2.1).

Figure 3 also shows the numbers that Gardline assigned to the stations; in their reports these are prefixed with the letters 'ENV' (for 'Environmental sample'), creating Station Codes that run from ENV01 to ENV56. Not all of the stations planned at the ITT stage were occupied. Some low priority stations were dropped (e.g. ENV04 & ENV05) and some ad-hoc stations added during the fieldwork. The multibeam acoustic survey completed by Gardline collected both bathymetry and backscatter data and has provided full coverage over the 'priority 1' area in the east and 50% coverage over the 'priority 2' area in the west, showing depths across the site ranging (approximately) between 100 and 135 m. The Gardline survey occupied 38 ground-truth stations, 27 of which were sampled by grab only, two by video only and nine by both grab and video. Further details are available in Gardline's survey report (Gardline Geosurvey Ltd. March 2012. Defra MCZ programme 2012, Lot 6 - Northwest Jones Bank, Acquisition Report. Compiled by L. Januszewski & J Gallyot. Commercial project report for Cefas, Gardline project reference 9060, 262 pp.).

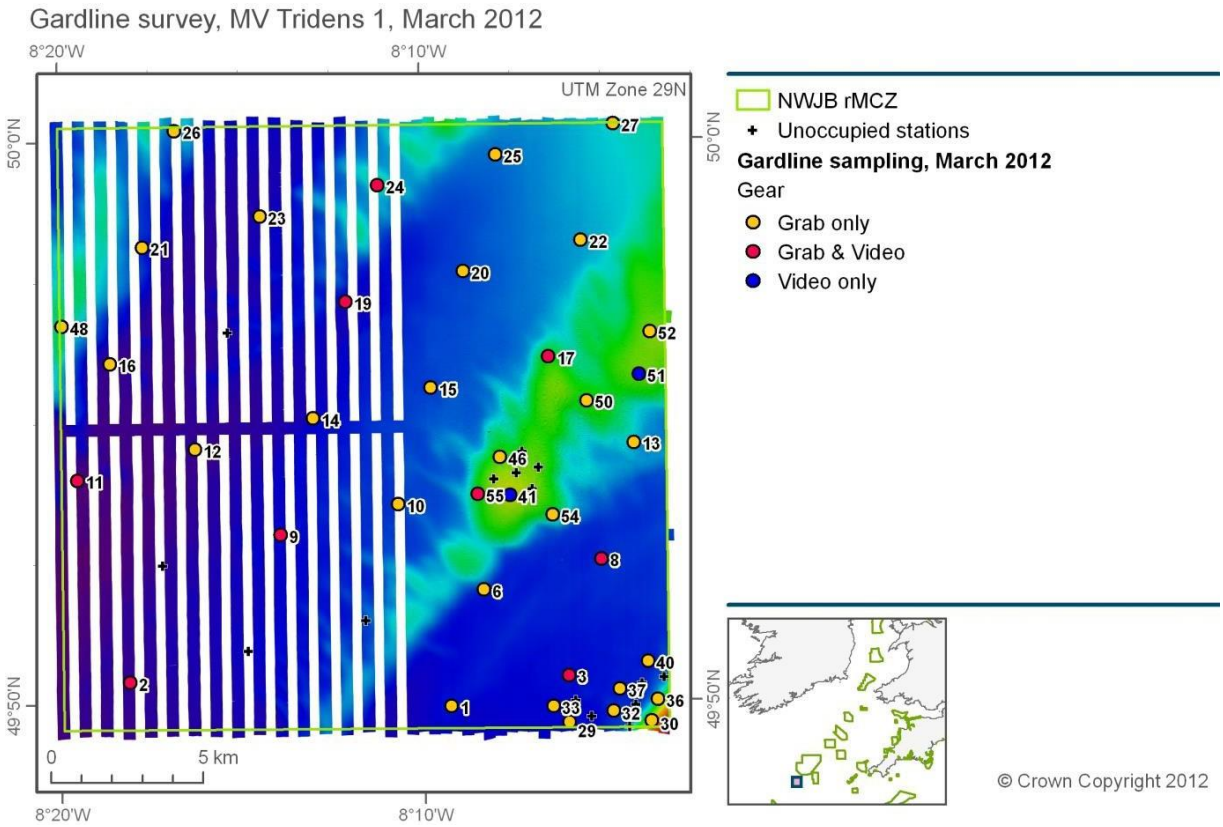


Figure 3. Sampling achieved by the Gardline survey on MV *Tridens 1* in March 2012.

2 Survey Design and Methods

2.1 *Survey planning and design*

The survey reported here was designed by the JNCC with the intention of filling some of the gaps in the available ground-truth data. The survey targeted 12 locations in the rMCZ area, six of which were to be sampled by grab only, four by video only and two by both grab and video. The target locations and the Station Codes assigned to these (by Cefas) are shown in Figure 4. Grabs were assigned codes NWJB01 to 08, and as all video tows could be completed by camera sledge these were assigned names NWJB_CS01 to 06.

Comparing these new locations with the prior Gardline survey it is noted that station NWJB01 is very close to the target location for ENV26 but lies within the swath of the multibeam coverage, whereas ENV26 did not. ENV26 was sampled by Gardline, but its position was misreported as 1 degree to the south of the actual position, so may not have been evident to the JNCC at the planning stage. The same reporting error applies to NWJB08 and ENV27.

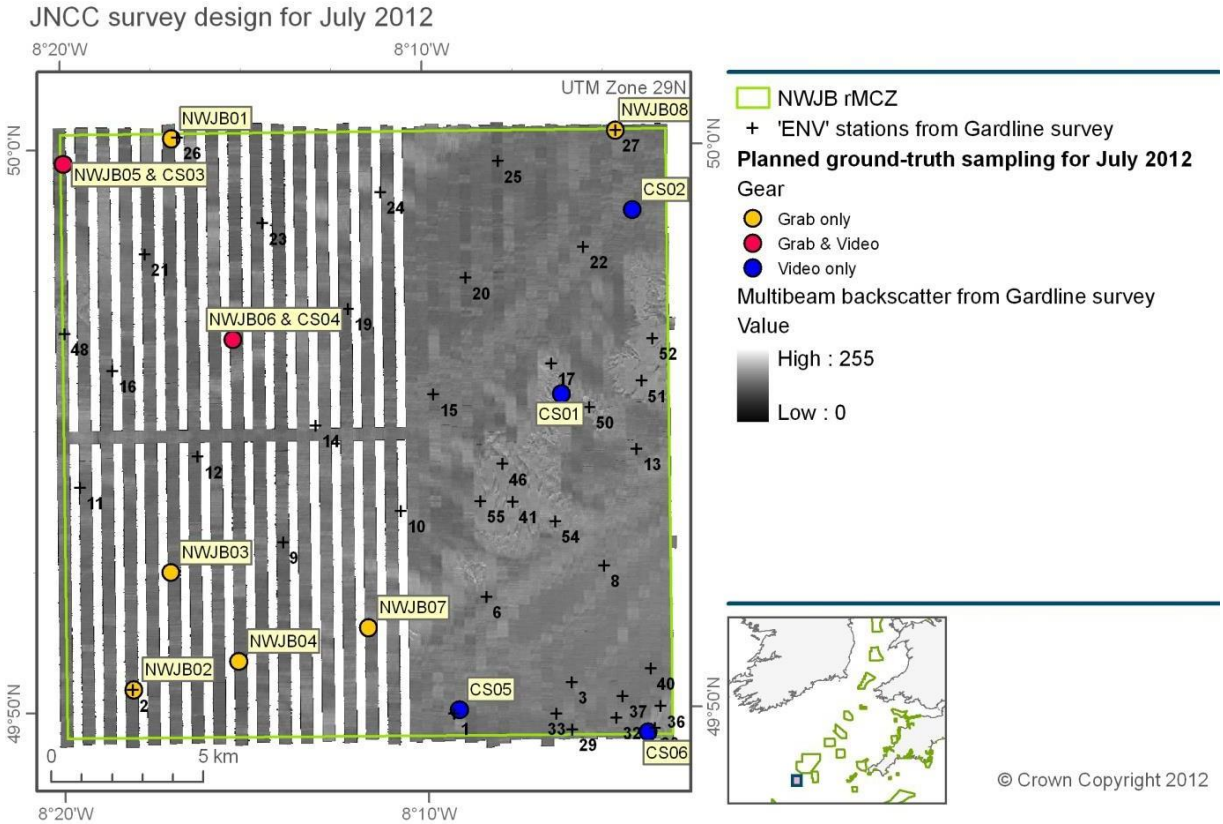


Figure 4. JNCC's survey design for the sampling opportunity in July 2012, in relation to the backscatter and targeted ground truth stations from the prior Gardline survey.

It is also evident that NWJB02 is at the same target location as ENV02; again, the position of the sample acquired by Gardline at ENV02 was misreported and plots c. 1.2 km west of its actual position, which was on target.

The locations of the grabs at NWJB03, 04, 05, 06 and 07 have not previously been sampled by any gear and have been placed to lie on the available multibeam backscatter. Likewise, CS01, 02, 03, 04 and 05 are also at locations that have not previously been sampled, With the exception of CS01, the backscatter at each of these video stations is fairy homogenous. CS06 is at the same location as ENV30, but this was not previously sampled by video. The transect selected here passes over a single anomalous backscatter feature.

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 general protocol is illustrated in Figure 5, but for this site video samples were taken along specific transects identified by the JNCC. Grab samples were considered valid if taken within 100 metres of the target location.

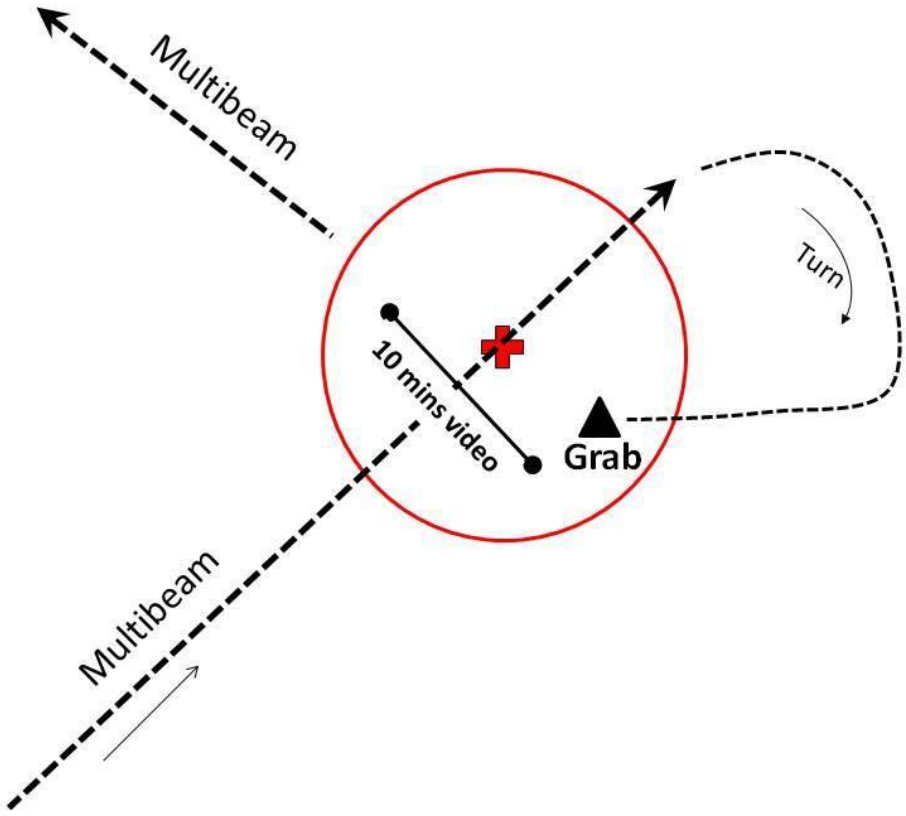


Figure 5. Schematic diagram illustrating the sequence of events for multibeam, grab and video sampling at ground truth stations. Multibeam was run opportunistically on transit between stations.

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 determined 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 *Ground-truth sampling*

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

2.2.2.1 Grabs

The grab system comprised a 0.1 m^2 mini Hamon grab fitted with a video camera (Figure 6), 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 6. Mini Hamon grab with video camera (HamCam).

2.2.2.2 Cameras

Video observations were made with a camera sledge (CS) system (Figure 7), having a video camera with capability to also capture still images. 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 projecting the corners of a 17 cm x 17 cm 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 always 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}) along the desired transect line. Stills 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.

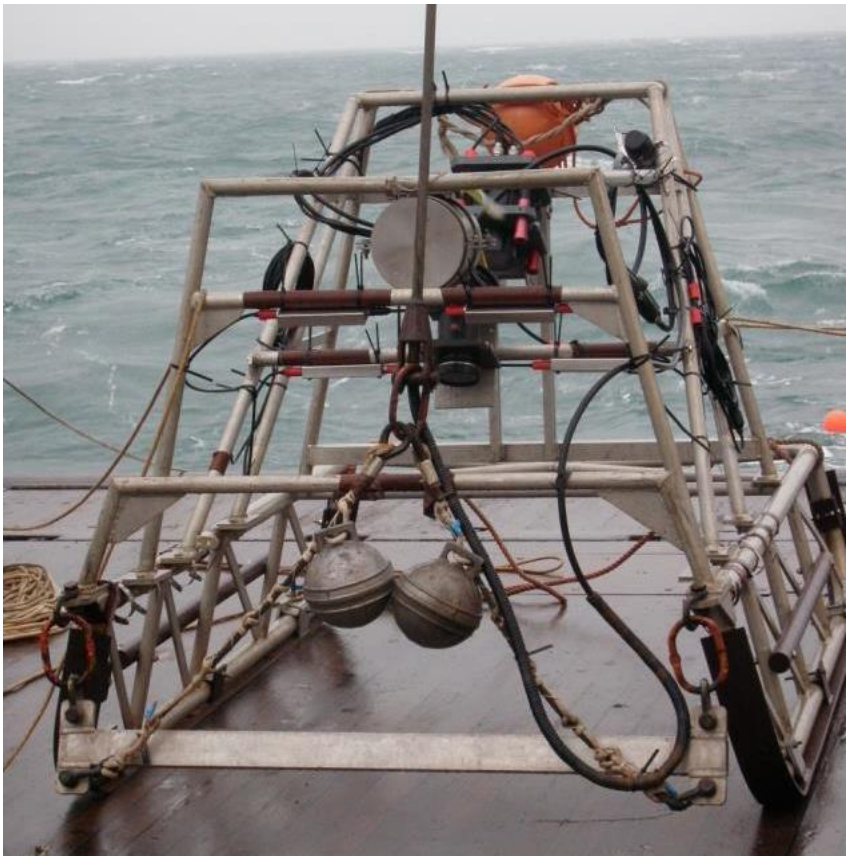


Figure 7. Camera sledge with video and still imaging system.

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.

2.2.3 *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 8).

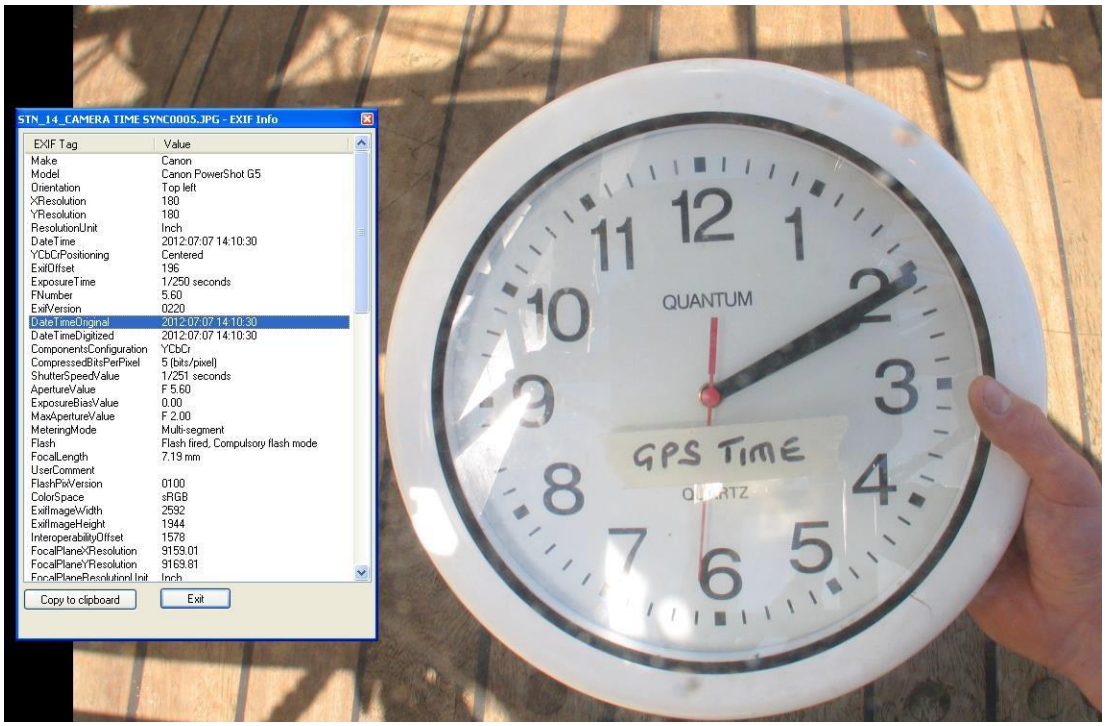


Figure 8. Calibration test synchronisation the sledge camera's internal clock with GPS time.

2.2.4 *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 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[5]). 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 of 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 sections 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.

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

3 Survey Narrative

The survey was completed between 18:00 hrs on Wednesday 11th July and 06:30 hrs on Thursday 12th July, starting in the northwest and finishing in the northeast (Figure 9). All stations were occupied, and all sampling attempts were successful.

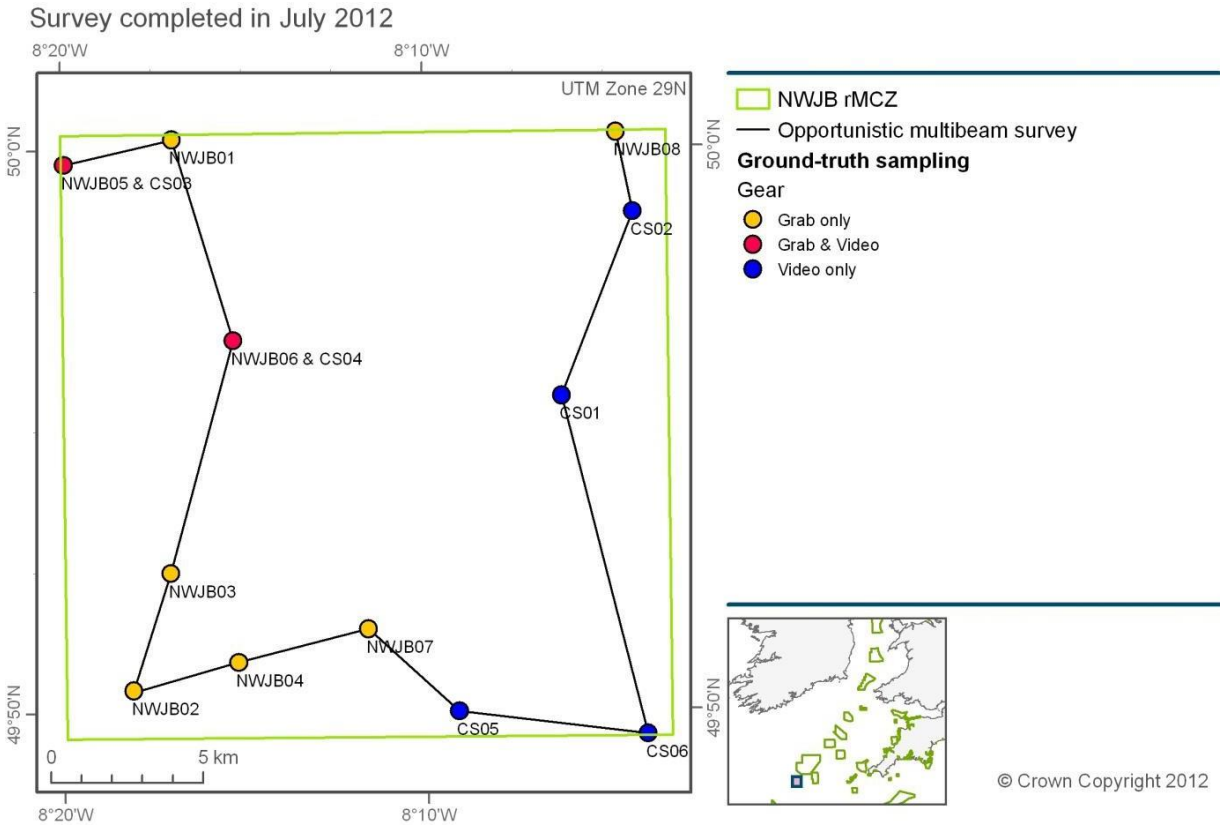


Figure 9. North West of Jones Bank ground-truth sampling survey showing station codes, gears used and sequence of occupying stations (running order), starting at NWJB05 in the northwest, overlain on the SAD habitat map . Gear code are HC =HamCam, CS = Camera Sledge.

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

4.1 *Acoustic Maps*

The multibeam backscatter image was reasonably consistent with the SAD's predicted habitat map in so far as the relatively uniform low backscatter suggests soft substrate across the majority of the site, with patches of very high backscatter around CS01 suggesting harder substrate in the region close to what the SAD map shows as coarse sediment (Figure 10). There is some local variability in backscatter around NWJB01, NWJB06 and NWJB07 with a pattern that suggests some bedforms may be present. At higher magnification, the backscatter contains many linear features that are consistent with trawl marks on the seabed (Figure 11).

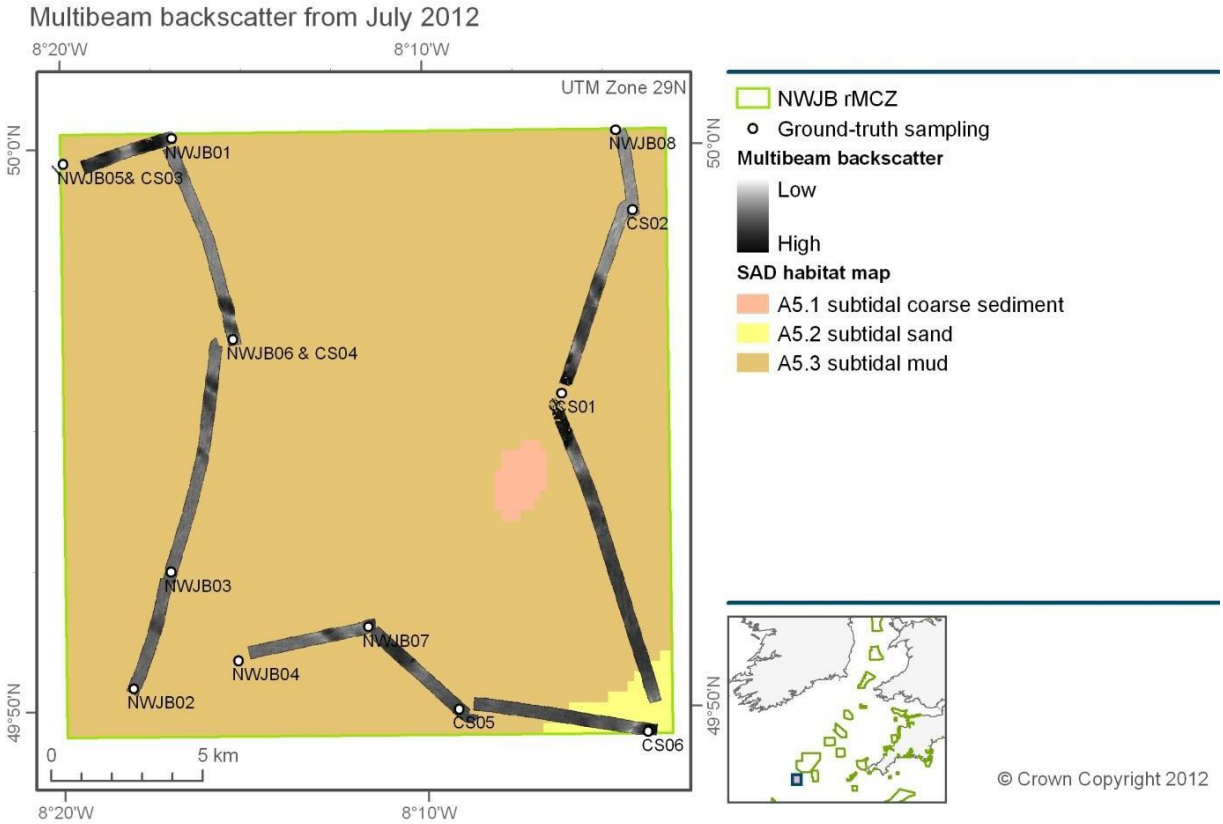


Figure 10. Multibeam backscatter for the North West of Jones Bank rMCZ survey. Note the 2012 data are currently presented as relative backscatter, not absolute.

Multibeam bathymetry showed the area to be relatively flat, but to shoal in the southeast corner (S06) and around CS01 (Figure 12), areas that are consistent with northwest edge of the Jones Bank LTSR (Figure 1). The bathymetry along the survey lines ranged from c. 90 to c. 128 metres below chart datum (BCD). Multibeam data was processed following standard Cefas procedures, as detailed in section 2.2. For QA purposes, separate technical reports are provided for the multibeam bathymetry processing (MCZ_NWJB_2040 Survey report.docx) and backscatter processing (MCZ_NWJB Backscatter processing report).

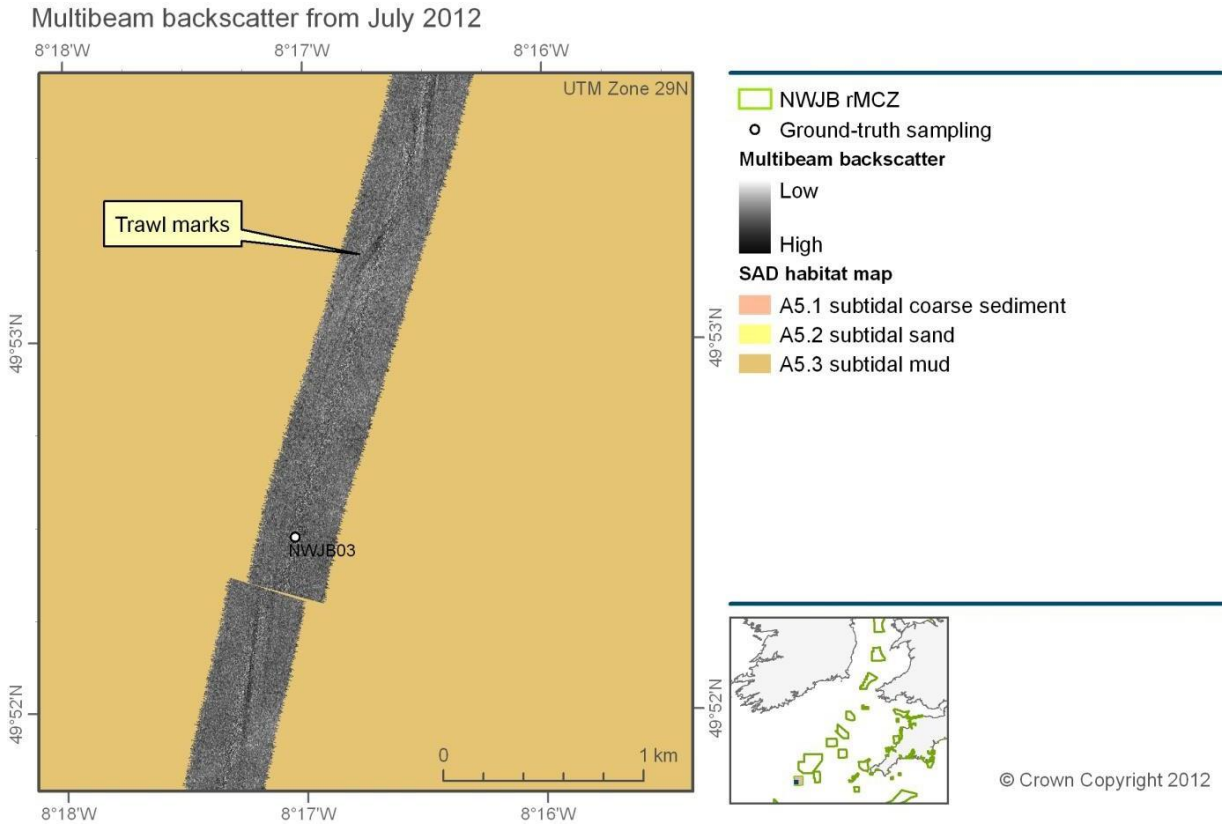


Figure 11. Linear striations in multibeam backscatter, consistent with trawl disturbance to the seabed.

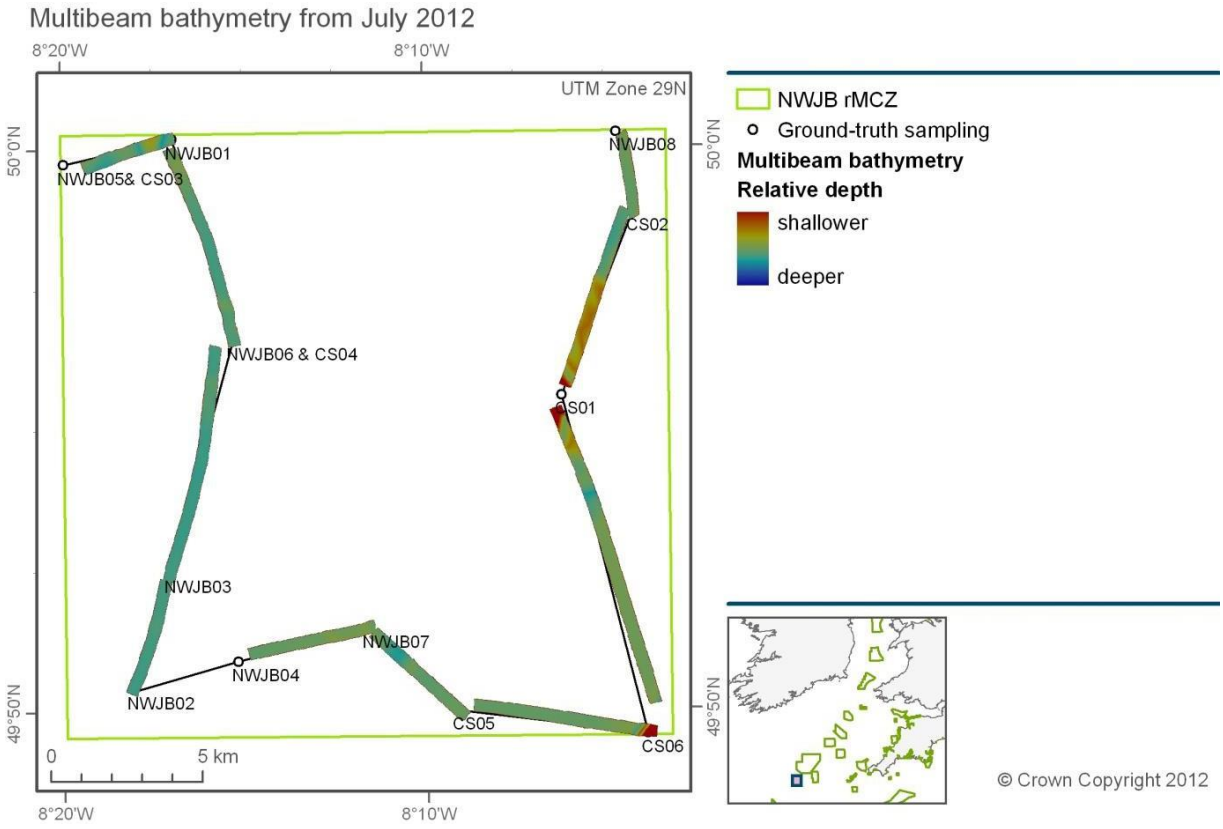


Figure 12. Multibeam bathymetry for the North West of Jones Bank rMCZ survey.

4.2 *Grab samples and sediment types*

Grab samples were collected at eight stations. Figure 13 shows the EUNIS Level 3 sediment types assigned to the samples on the basis of visual inspection in the field, and the photographs of each grab sample are presented in Figure 14. It should be emphasised that the assignments presented here are only preliminary and definitive assignment must await the results of granulometric analysis.

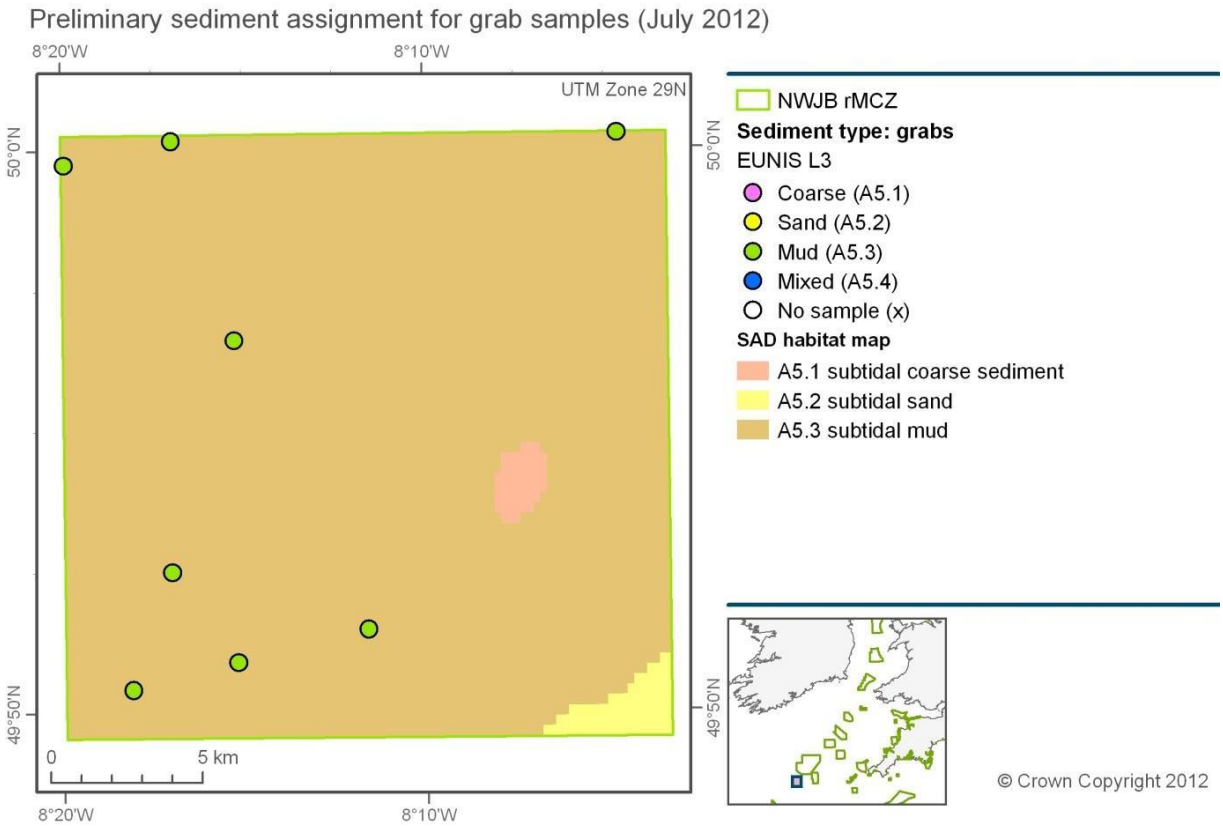


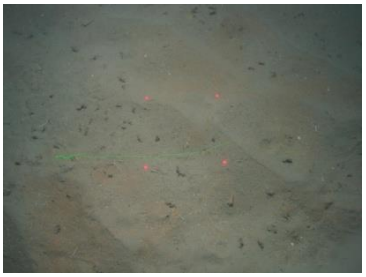
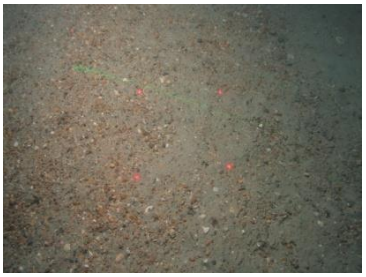
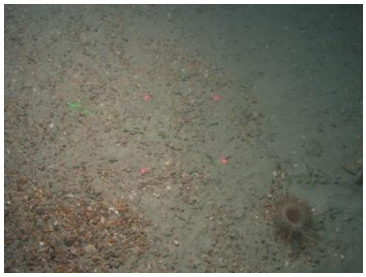
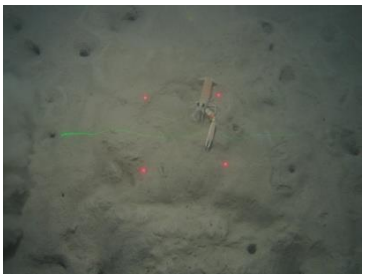
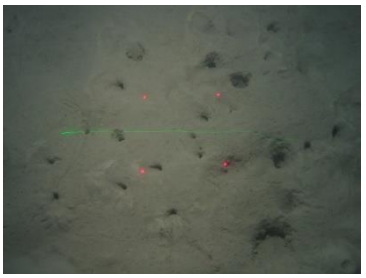
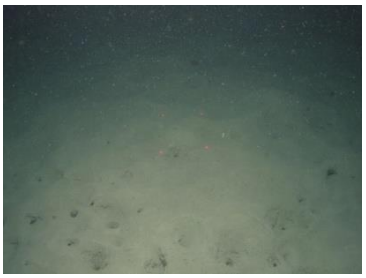
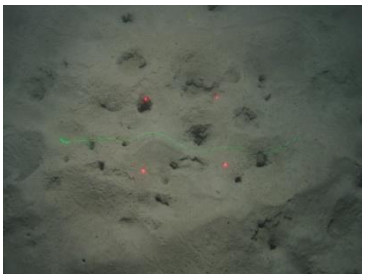
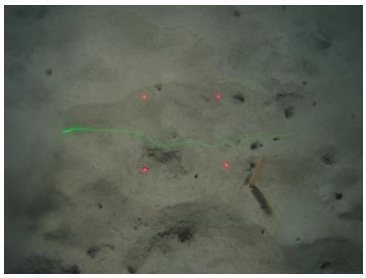
Figure 13. Preliminary sediment assignments for sediments collected in grab samples, plotted over the predicted habitat map from the Selection Assessment Document.

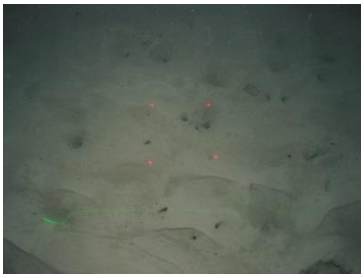
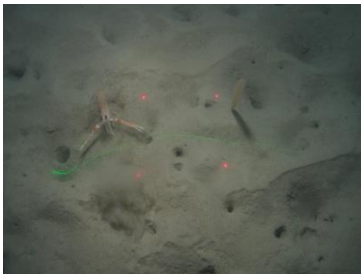
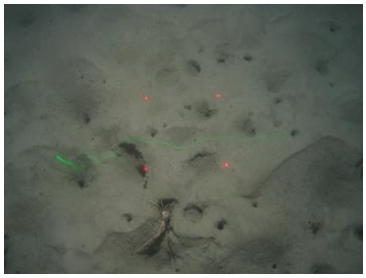
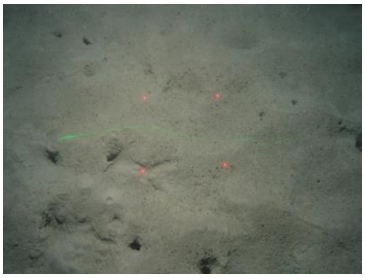
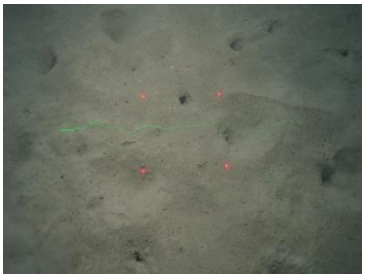
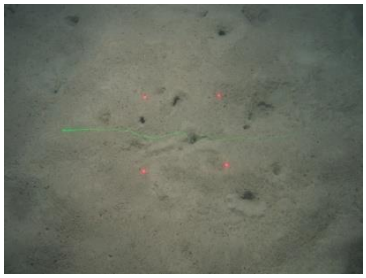
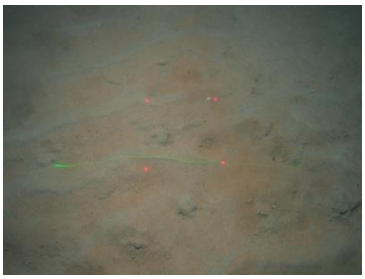
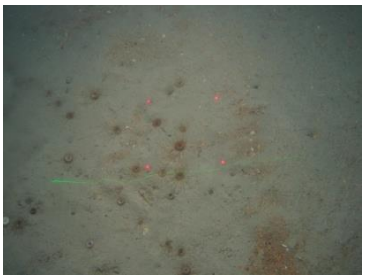
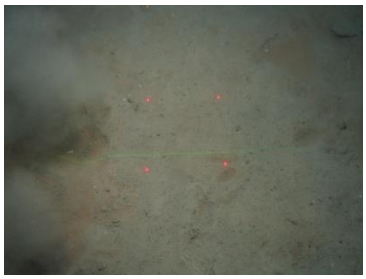
Figure 14. Photographs of grab samples and 5mm sieve mesh, showing preliminary classification of sediment type.

4.3 *Seabed Imagery*

A selection of three still images from each of the camera sledge deployments is presented in Table 3 to illustrate what was observed on the video. Most of the images show a thick, cohesive mud sediment pitted with burrow holes. The crustacean *Nephrops norvegicus* was observed on the seabed surface and emerging from burrows. The sea pen *Virgularia* sp. and a number of burrowing anemones were also observed. Patches of coarser substrate (mixed sediment) were evident at CS01 whilst at CS06 the sediment was considered to be predominantly sand, with a fine smothering of silt. Both of these stations seem to be associated with the northwest limits of the Jones Bank LTSR. Seabed images also recorded some areas of anthropogenically disturbed seabed (see Section 4.5).

Table 3. Selection of seabed images for each camera deployment, with preliminary assignments to substrate type.

StnCode	Beginning	Middle	End
CS01	 Sand	 Mixed	 Mixed
CS02	 Mud	 Mud	 Sand
CS03 = NWJB05	 Mixed	 Sand	 Sand

StnCode	Beginning	Middle	End
CS04 = NWJB06	 Mixed	 Mud	 Coarse
CS05	 Sand	 Sand	 Mud
CS06	 Sand	 Sand	 Sand

Results of the preliminary analysis of video and stills images are presented in Figure 15 to Figure 20, overlain on the Gardline multibeam backscatter, which shows harder substrate in lighter tones and softer substrate in darker tones. The backscatter from the Cefas survey is not shown as the initial processing produced a poor-quality output. The video/stills plots are from GIS shape files which incorporate a lay-back correction for the position of the sledge which was deployed over the stern of the vessel (see section 2.2.4 above).

The tow at CS01 revealed a clear alternation in BSH consistent with what was anticipated from the backscatter. While the preliminary interpretation of video and stills is consistent for the mixed sediment BSH, there is a discrepancy for the softer sediment, with the video being assigned to mud while the stills were assigned to sand. The latter would appear to be more appropriate as the still images show a light smothering of silt over sand, the resuspension of which would have given an overriding impression of a mud substrate in the video. A similar situation occurs at CS06.

The tow at CS02 showed homogenous mud substrate; the backscatter has some linear marks indicating that the area may have been disturbed by trawling (see also Section 4.5).

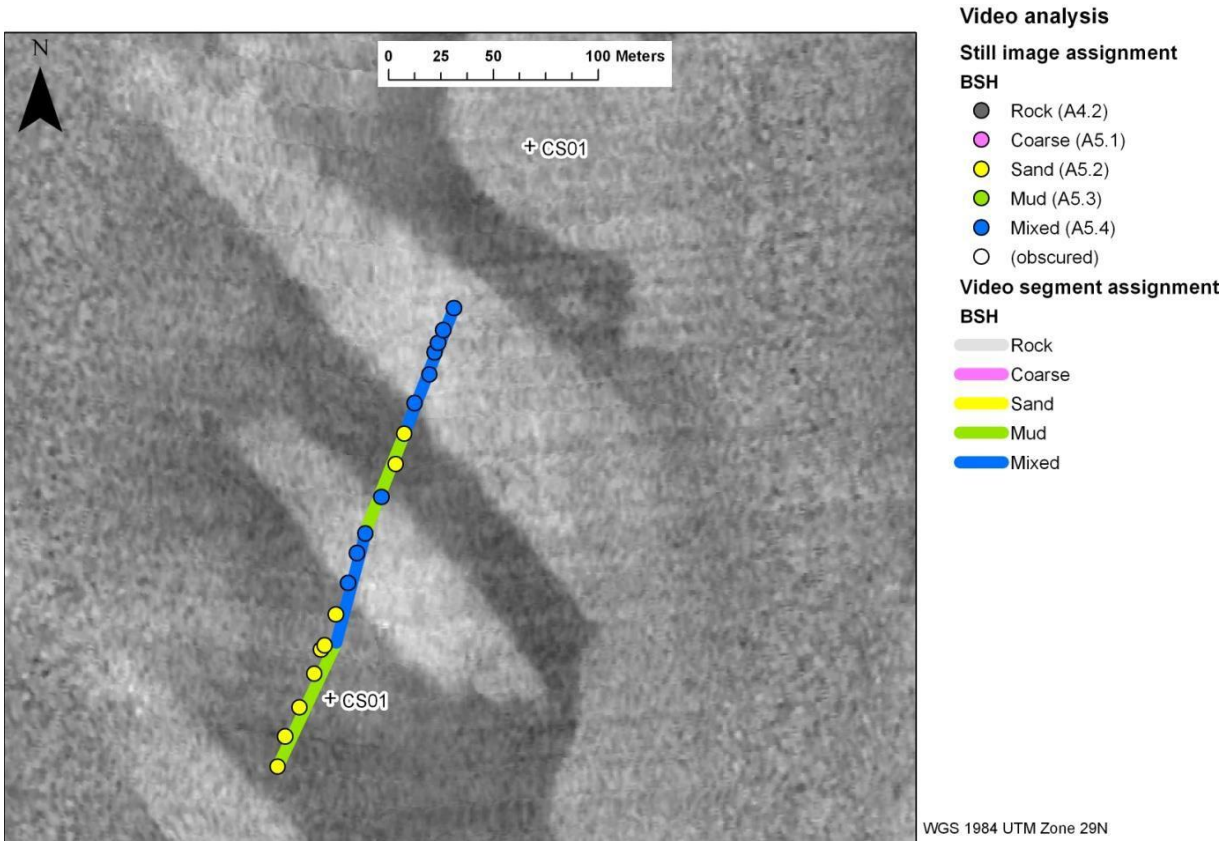


Figure 15. Substrate types assigned in the preliminary analysis of video and stills for CS01.

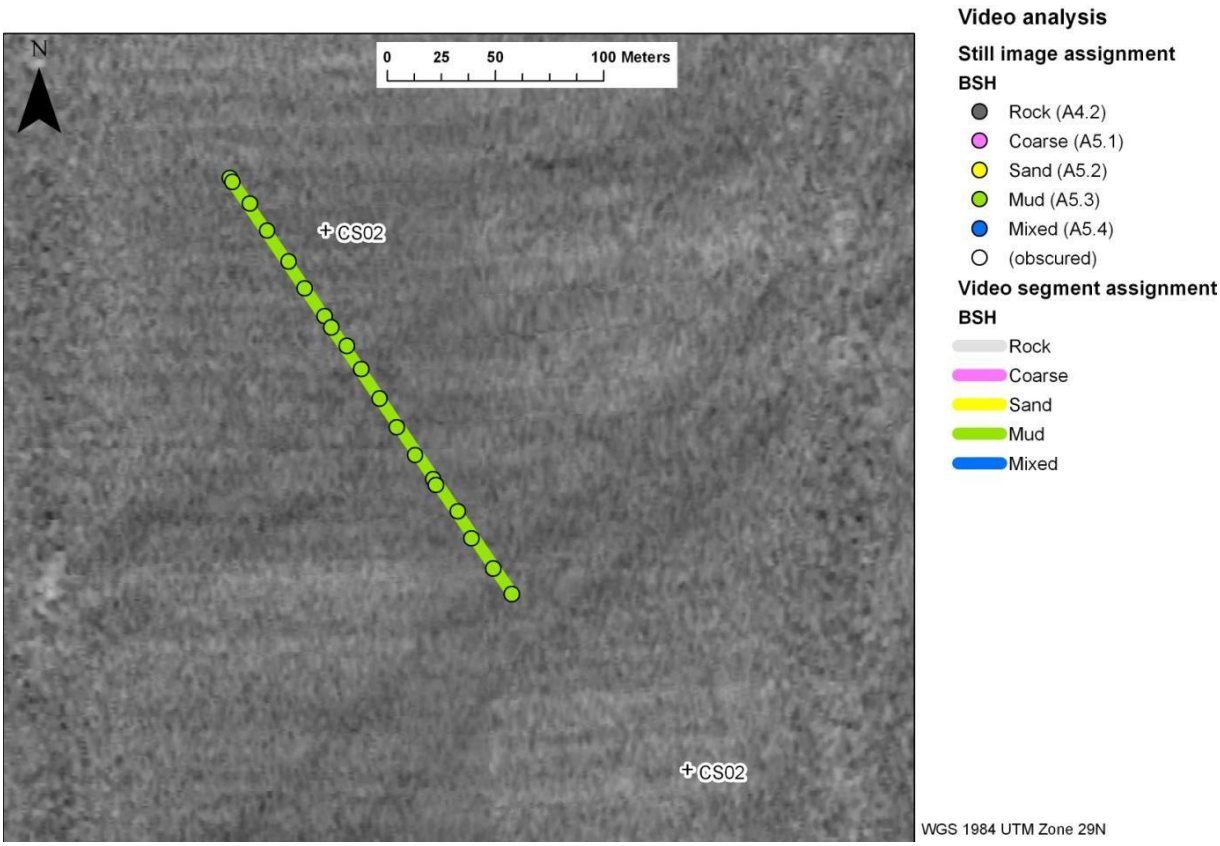


Figure 16. Substrate types assigned in the preliminary analysis of video and stills for CS02.

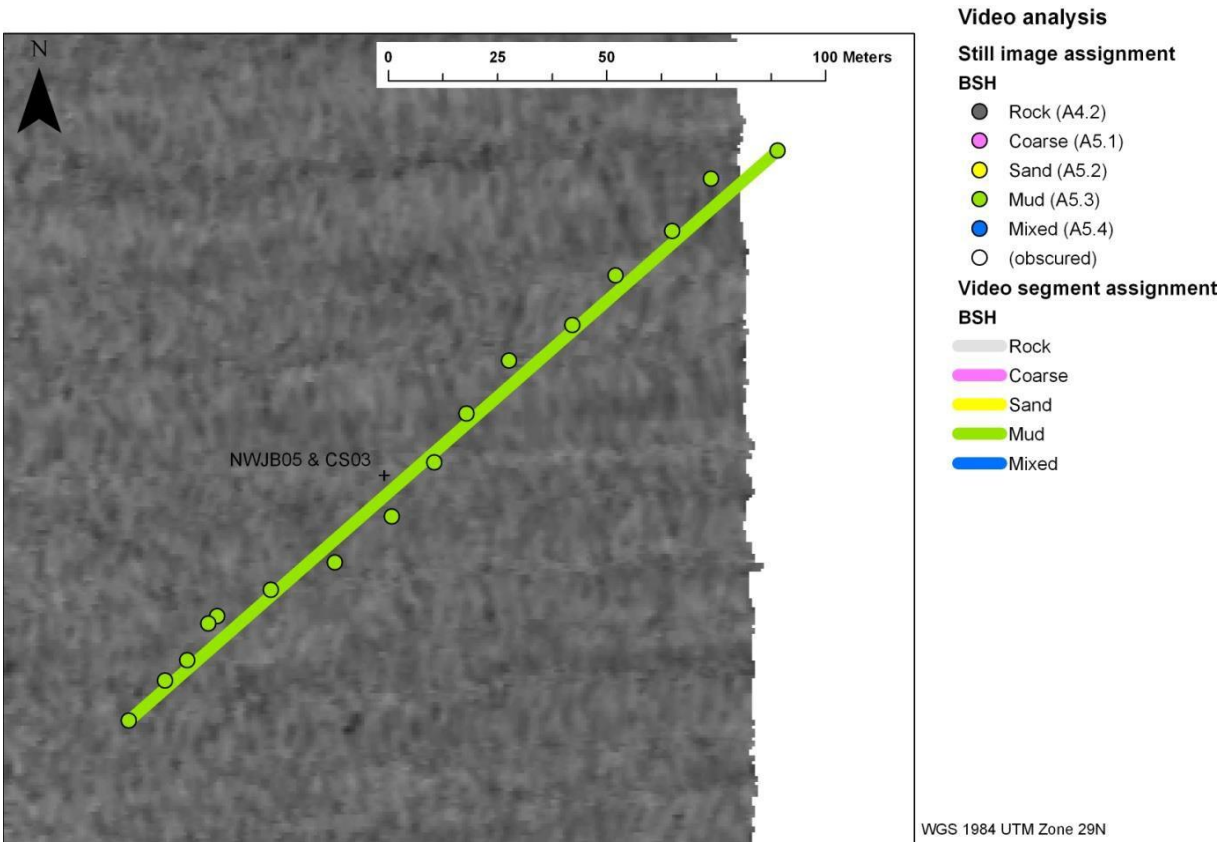


Figure 17. Substrate types assigned in the preliminary analysis of video and stills for CS03 (= NWJB05).

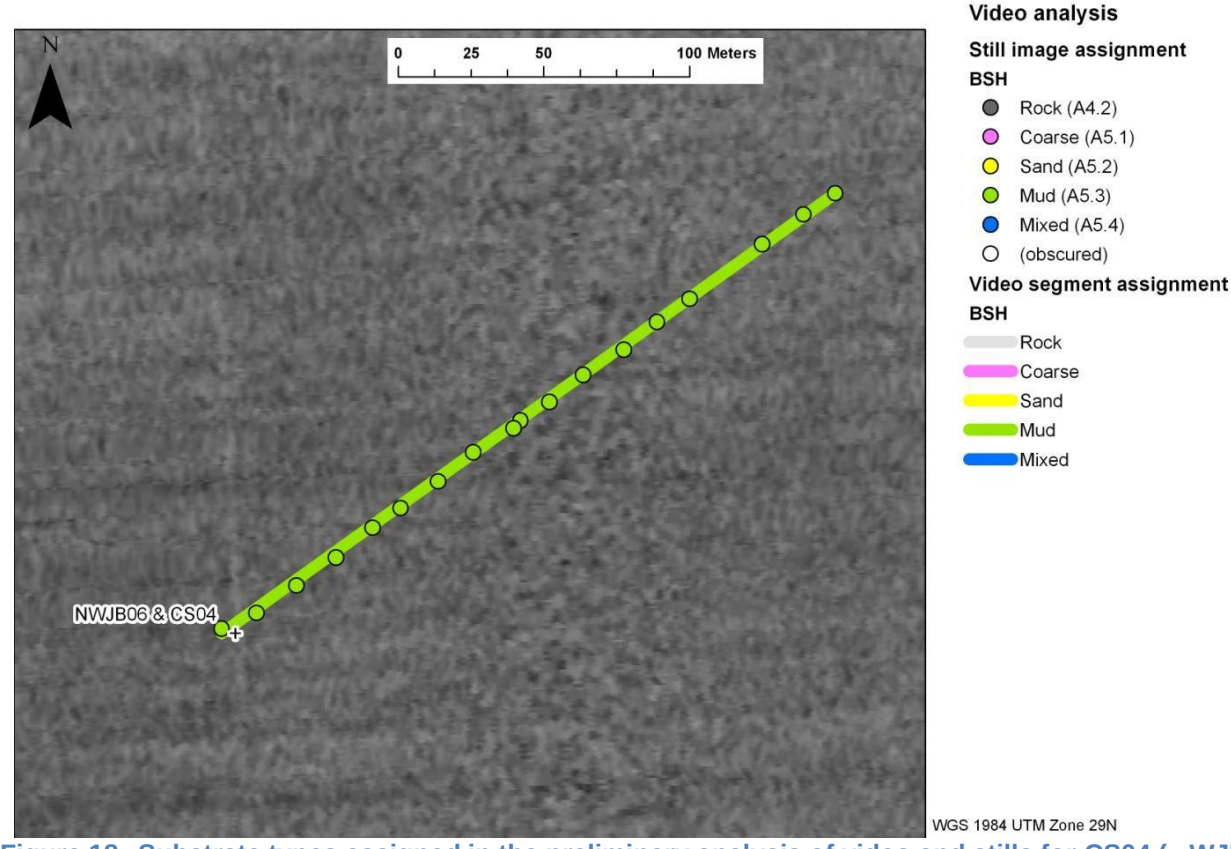


Figure 18. Substrate types assigned in the preliminary analysis of video and stills for CS04 (= WJB06).

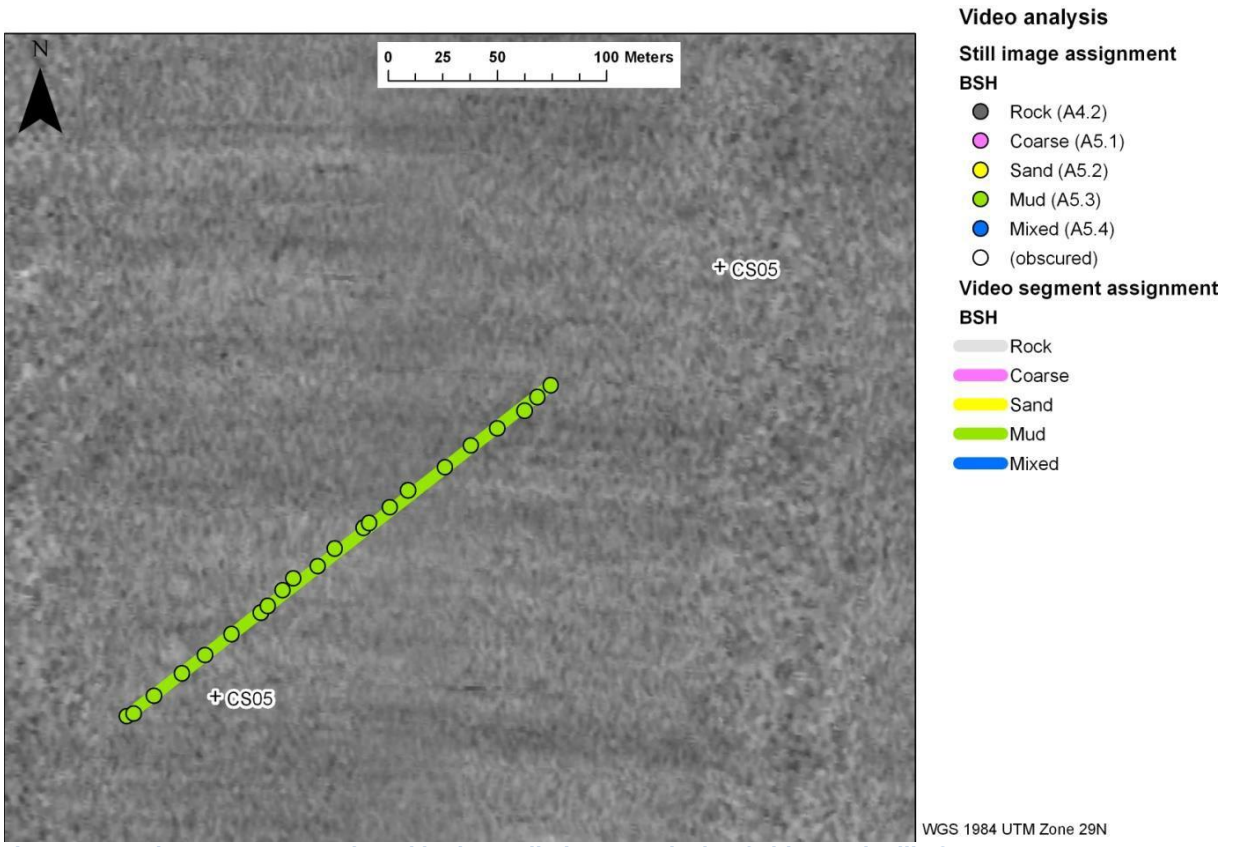


Figure 19. Substrate types assigned in the preliminary analysis of video and stills for CS05.

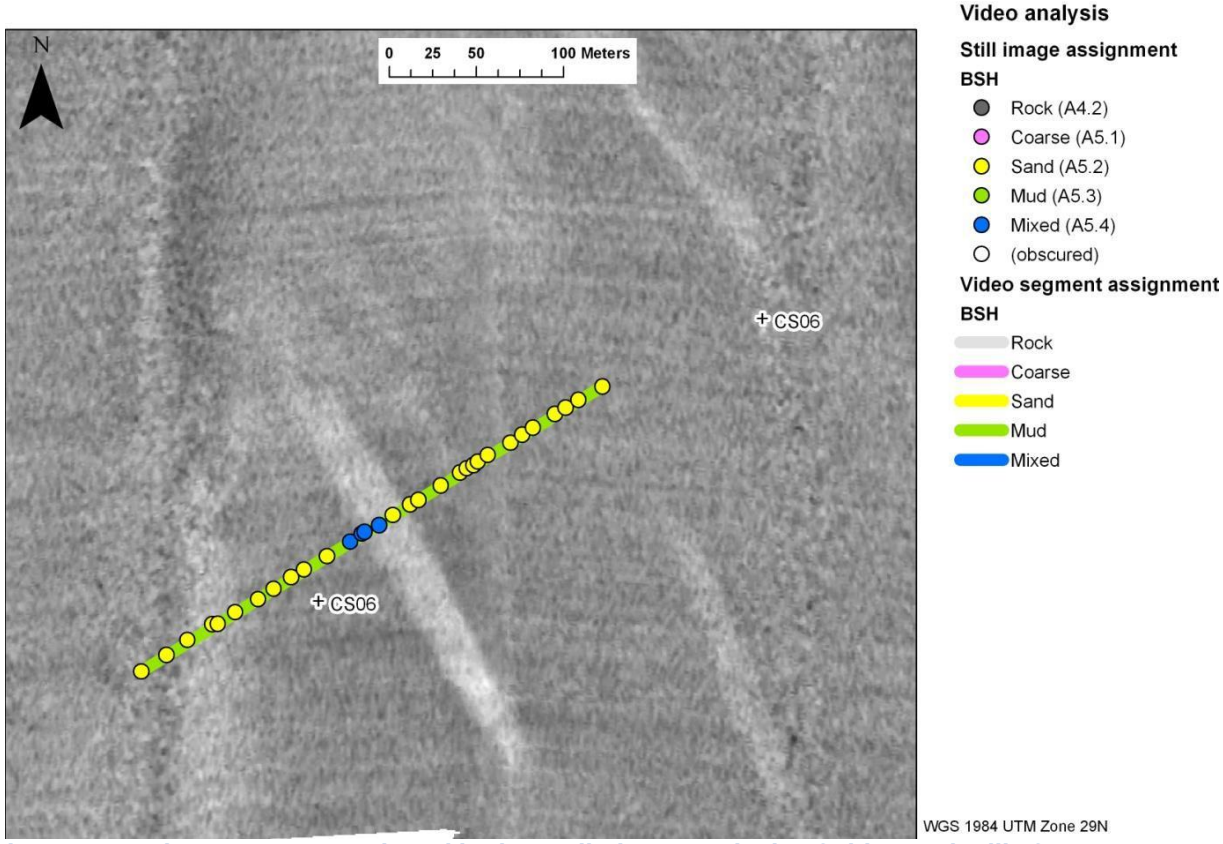


Figure 20. Substrate types assigned in the preliminary analysis of video and stills for CS06.

4.4 *Features of Conservation Importance (FOCI)*

Analysis of the preliminary results of the survey suggests that much of the NWJB rMCZ is consistent with that Habitat FOCI 'Sea Pen and Burrowing Megafauna Communities', but the 'Subtidal Sands and Gravels' mentioned in the SAD appeared to be limited in extent. No species FOCI were noted.

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 (Figure 21). Only two points were noted during acquisition, in the northwest corner of the rMCZ; these are 'across-track' marks (cutting across the survey line) and are more noticeable in the small 'waterfall' display available at the time of acquisitions than along-track marks. The latter become clear on the larger areas viewable once the data have been processed and much of this show marks consistent with trawling, generally oriented in a N-S direction.

Patches of disturbed seabed were also recorded on the video and stills images, especially at CS02, where some stills showed a recently tilled surface and others have linear marks consistent with the rollers on the ground-rope of demersal trawls (Figure 22). Several vessels were actively fishing the area during the survey work at Greater Haig Fras and North West of Jones Bank (see section 5.8).

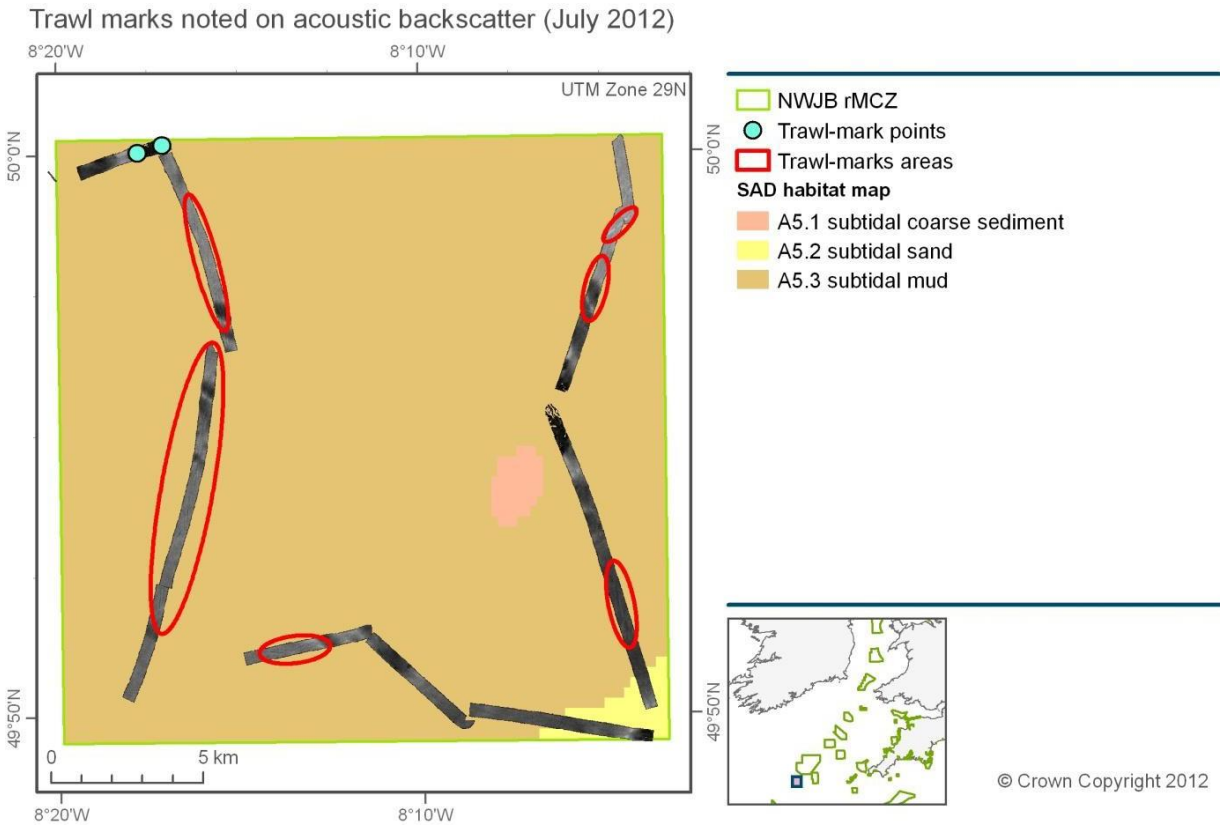


Figure 21. Location of linear 'trawl' marks on the seabed observed during the acoustic survey.

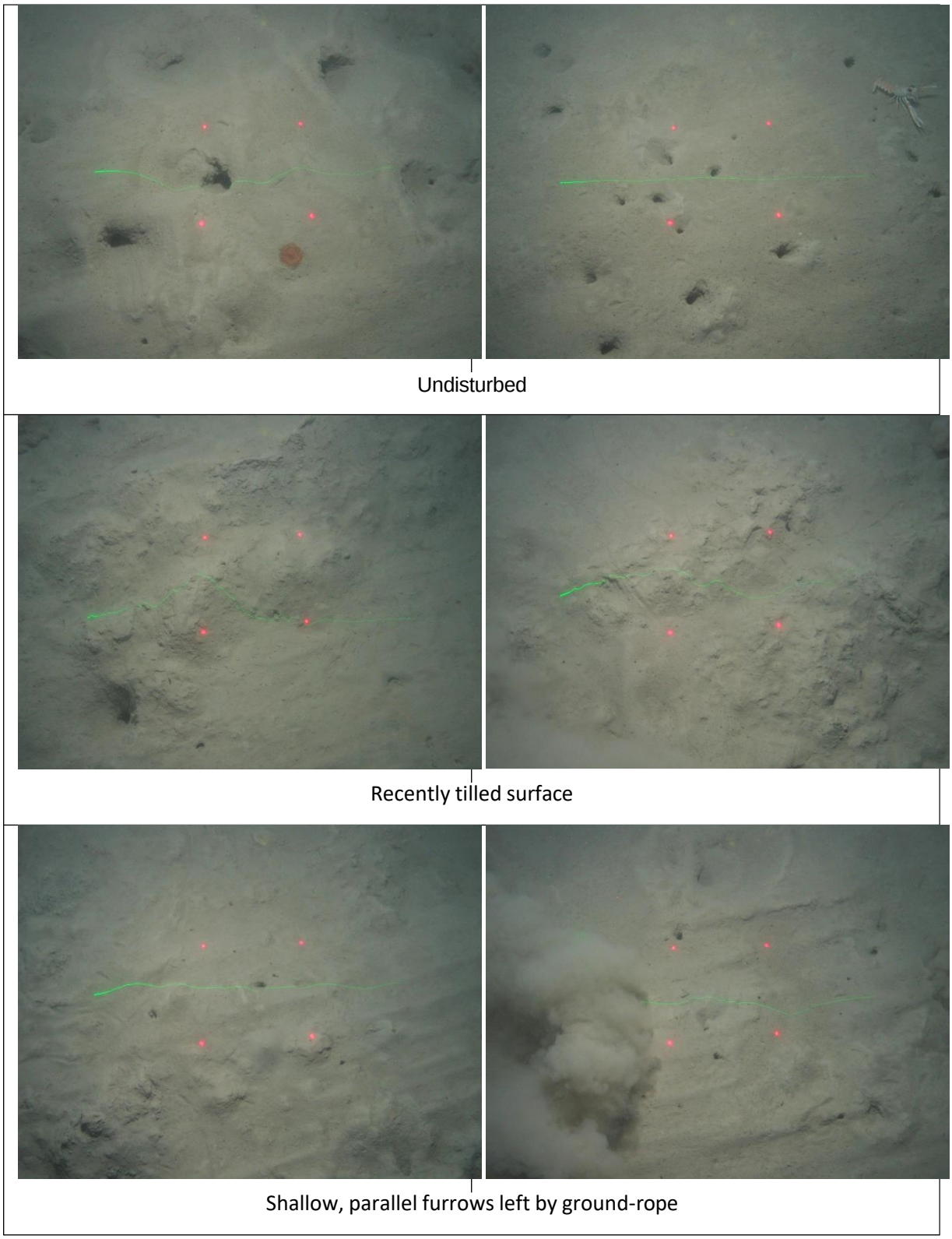


Figure 22. Seabed images from CS02 comparing undisturbed and disturbed seabed.

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*

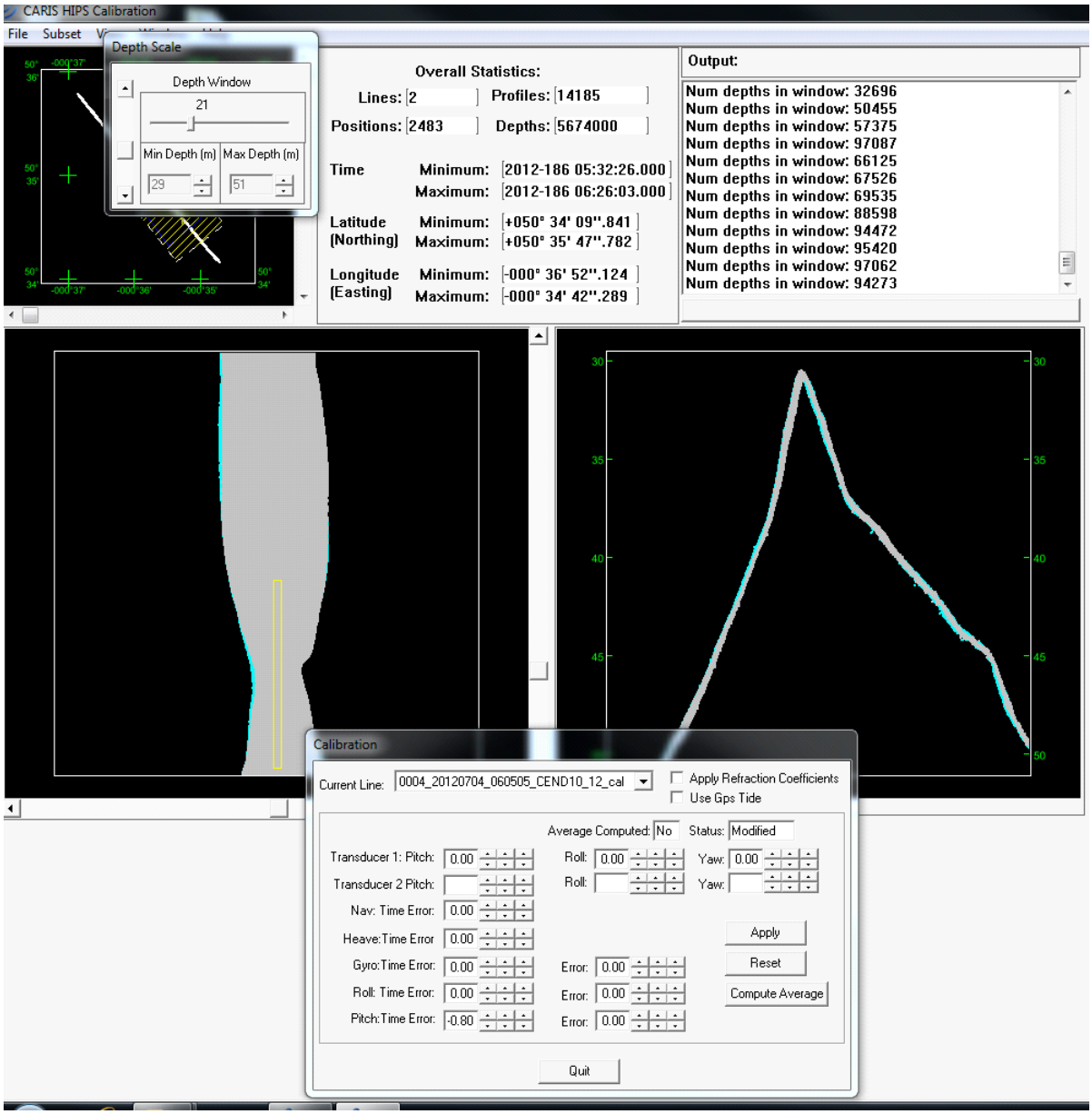
Model: Simrad EM2040 operated at 300 kHz. Calibrated by patch test on 4th July 2012 (see calibration report below).

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	

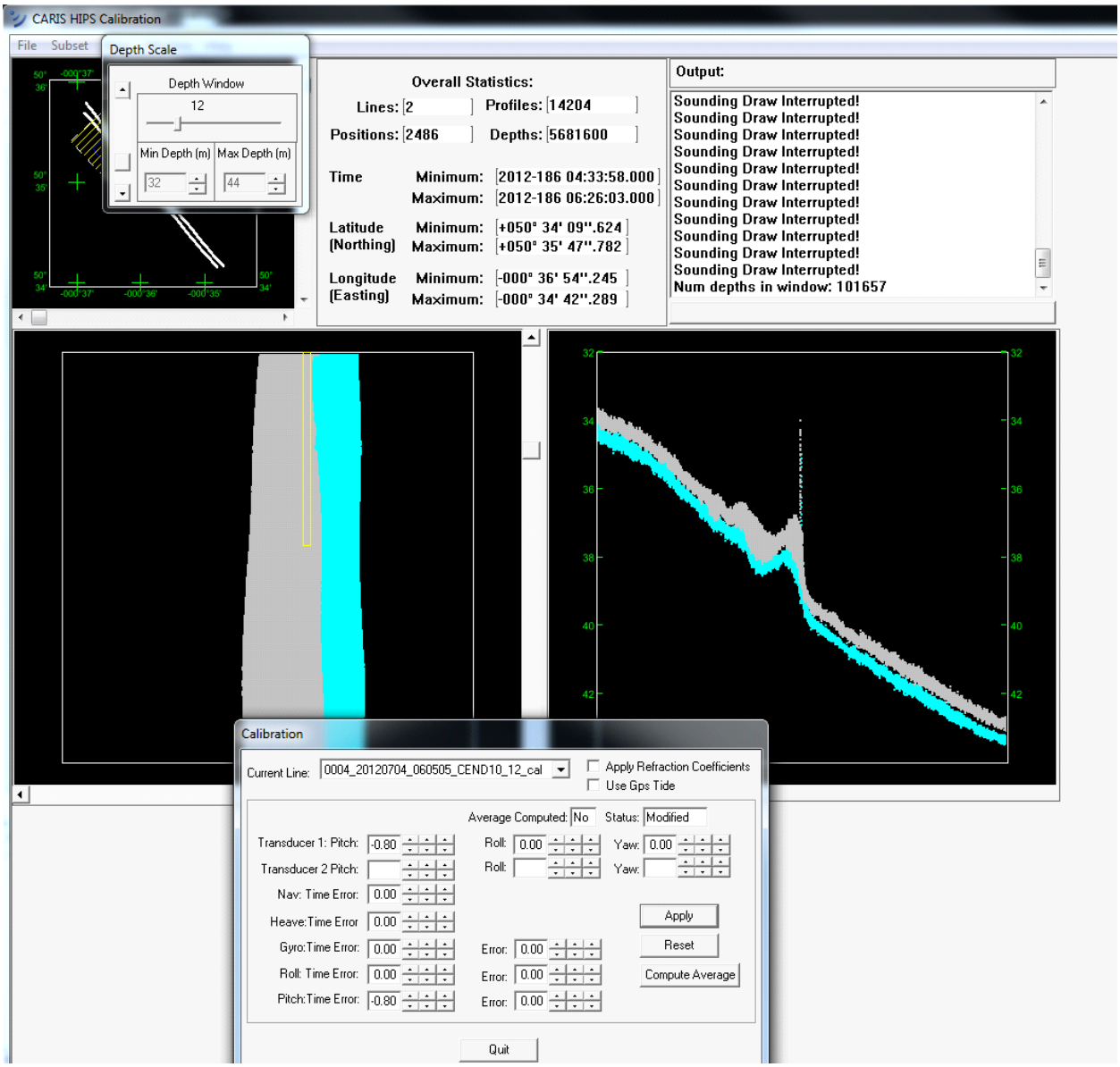
5.5 *Calibration report, Kongsberg EM2040 multibeam*

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 lines run were over of a steep slope which turned on a flat area with a wreck. Caris was used for the calibration.

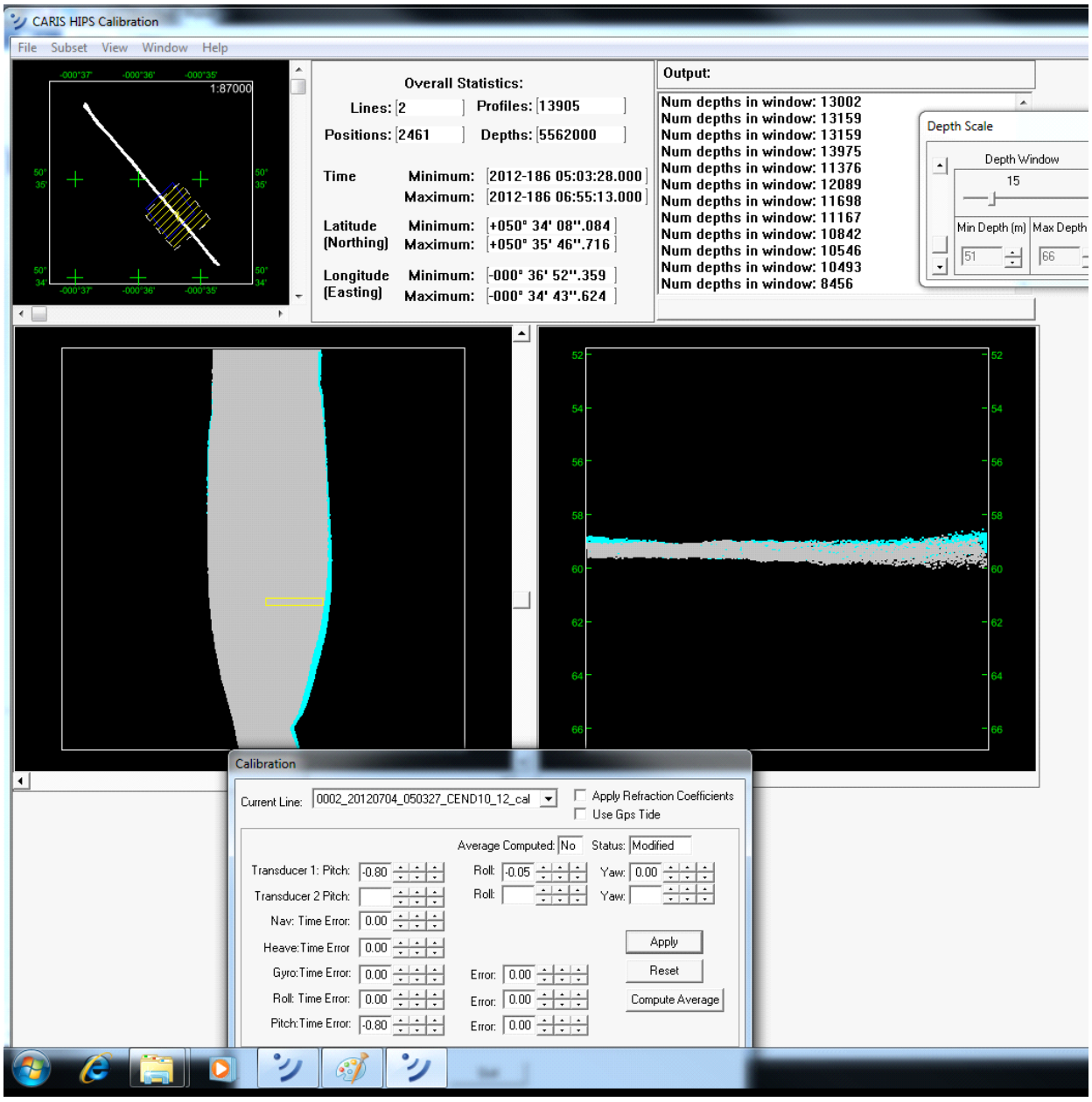
Pitch: -0.8



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:
Roll:
Yaw:
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
Error: 0.00
Error: 0.00
Apply
Reset
Compute Average
Quit

Roll: -0.0


CARIS HIPS Calibration
File Subset View Window Help
1:87000
Overall Statistics:
Lines: 2
Profiles: 13905
Positions: 2461
Depths: 5562000
Time Minimum: 2012-186 05:03:28.000
Maximum: 2012-186 06:55:13.000
Latitude (Northing) Minimum: +050° 34' 08".084
Maximum: +050° 35' 46".716
Longitude (Easting) Minimum: -000° 36' 52".359
Maximum: -000° 34' 43".624
Output:
Num depths in window: 13002
Num depths in window: 13159
Num depths in window: 13159
Num depths in window: 13975
Num depths in window: 11376
Num depths in window: 12089
Num depths in window: 11698
Num depths in window: 11167
Num depths in window: 10842
Num depths in window: 10546
Num depths in window: 10493
Num depths in window: 8456
Depth Scale
Depth Window
15
Min Depth (m)
Max Depth
Calibration
Current Line: 0002_20120704_050327_CEND10_12_cal
Apply Refraction Coefficients
Use Gps Tide
Average Computed: No
Status: Modified
Transducer 1: Pitch: -0.80
Roll: -0.05
Yaw: 0.00
Transducer 2 Pitch:
Roll:
Yaw:
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
Error: 0.00
Error: 0.00
Apply
Reset
Compute Average

5.6 *Station metadata*

Station metadata for the North West of Jones Bank 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. MB2= Kongsberg EM2040 Multibeam, HC=HamCam, CS=Camera Sledge, SOL = Start Of Line, EOL = End Of Line. All positions in decimal degrees, Lat/Long WGS84.

Date	Time	Station Code	Gear	Station Number	Replicate	Latitude	Longitude
11/07/2012	18:10	NWJB05	HC	182	A	49.99577	-8.33203
11/07/2012	18:38	NWJB05	CS	183	A-SOL	49.99630	-8.33117
11/07/2012	18:51	NWJB05	CS	183	A-EOL	49.94357	-8.25406
11/07/2012	19:08	NWJB05_T_NWJB01	MB2	184	A-SOL	49.99469	-8.32254
11/07/2012	19:19	NWJB05_T_NWJB01	MB2	184	A-EOL	50.00357	-8.27921
11/07/2012	19:34	NWJB01	HC	185	A	50.00291	-8.28246
11/07/2012	19:43	NWJB01_T_NWJB06	MB2	186	A-SOL	50.00024	-8.28301
11/07/2012	20:09	NWJB01_T_NWJB06	MB2	186	A-EOL	49.94118	-8.25341
11/07/2012	20:21	NWJB06	HC	187	A	49.94357	-8.25406
11/07/2012	20:57	NWJB06	CS	188	A-SOL	49.94397	-8.25290
11/07/2012	21:14	NWJB06	CS	188	A-EOL	49.94261	-8.25588
11/07/2012	21:24	NWJB06_T_NWJB03	MB2	189	A-SOL	49.94230	-8.26154
11/07/2012	21:58	NWJB06_T_NWJB03	MB2	189	A-EOL	49.87180	-8.28505
11/07/2012	22:11	NWJB03	HC	190	A	49.87491	-8.28340
11/07/2012	22:19	NWJB03_T_NWJB02	MB2	191	A-SOL	49.87726	-8.28623
11/07/2012	22:36	NWJB03_T_NWJB02	MB2	191	A-EOL	49.83828	-8.30266
11/07/2012	22:50	NWJB02	HC	192	A	49.84015	-8.30154
11/07/2012	23:27	NWJB04	HC	193	A	49.84802	-8.25340
11/07/2012	23:37	NWJBCS04_T_NWJBCS07	MB2	194	A-SOL	49.85029	-8.24755
11/07/2012	23:53	NWJBCS04_T_NWJBCS07	MB2	194	A-EOL	49.85814	-8.18968
12/07/2012	00:03	NWJB07	HC	195	A	49.85772	-8.19338
12/07/2012	00:12	NWJBCS04_T_NWJBCS05	MB2	196	A-SOL	49.85622	-8.19119
12/07/2012	00:27	NWJBCS04_T_NWJBCS05	MB2	196	A-EOL	49.83071	-8.14833
12/07/2012	01:11	NWJB_CS05	CS	197	A-SOL	49.83176	-8.15489
12/07/2012	01:27	NWJB_CS05	CS	197	A-EOL	49.83310	-8.15217
12/07/2012	01:41	NWJBCS05_T_NWJBCS06	MB2	198	A-SOL	49.83433	-8.14410
12/07/2012	02:04	NWJBCS05_T_NWJBCS06	MB2	198	A-EOL	49.82530	-8.06043
12/07/2012	02:31	NWJB_CS06	CS	199	A-SOL	49.82578	-8.06577
12/07/2012	02:51	NWJB_CS06	CS	199	A-EOL	49.82720	-8.06208
12/07/2012	03:06	NWJBCS06_T_NWJBCS01	MB2	200	A-SOL	49.83500	-8.06248
12/07/2012	03:52	NWJBCS06_T_NWJBCS01	MB2	200	A-EOL	49.92400	-8.10528
12/07/2012	04:17	NWJB_CS01	CS	201	A-SOL	49.92454	-8.10483
12/07/2012	04:32	NWJB_CS01	CS	201	A-EOL	49.92650	-8.10363
12/07/2012	04:41	NWJBCS01_T_NWJBCS02	MB2	202	A-SOL	49.92894	-8.10206
12/07/2012	05:11	NWJBCS01_T_NWJBCS02	MB2	202	A-EOL	49.98138	-8.07000
12/07/2012	05:29	NWJB_CS02	CS	203	A-SOL	49.98017	-8.06957
12/07/2012	05:45	NWJB_CS02	CS	203	A-EOL	49.97843	-8.06779
12/07/2012	05:57	NWJBCS02_T_NWJBCS08	MB2	204	A-SOL	49.97874	-8.06927
12/07/2012	06:09	NWJBCS02_T_NWJBCS08	MB2	204	A-EOL	50.00382	-8.07512
12/07/2012	06:16	NWJB08	HC	205	A	50.00451	-8.07729

5.7 *Daily Progress Reports*

The JNCC Daily Progress Reports covering the days which had activities relating to the North West of Jones Bank survey are reproduced below. The reports were compiled by a JNCC staff member.

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]	[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, Issue 9 11.07.2012 Page 1 of 3

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]

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

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.10 Date: 12/07/12	Location at 24:00: 50°04.9N, 003°47.293W

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

Safety

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

Summary of operations 0000-2400

Time UTC	Type	Comments
00:00-00:12	TOSa	Hamon grab at NWJB07
00:12-01:11	TOSu	Multibeam data collected between NWJB07 & NWJB05
01:11-01:41	TOSa	Camera sledge deployed at NWJB_CS05
01:41-02:31	TOSu	Multibeam data collected between NWJB_CS05 & NWJB_CS06
02:31-03:06	TOSa	Camera sledge deployed at NWJB_CS06
03:06-04:17	TOSu	Multibeam data collected between NWJB_CS06 & NWJB_CS01
04:17-04:41	TOSa	Camera sledge deployed at NWJB_CS01
04:41-05:29	TOSu	Multibeam data collected between NWJB_CS01 & NWJB_CS02
05:29-05:57	TOSa	Camera sledge deployed at NWJB_CS02
05:57-06:09	TOSu	Multibeam data collected between NWJB_CS02 & NWJB_CS08
06:09-06:30	TOSa	Hamon grab at NWJB08
06:30-13:30	Transit	Transit to South of the Isles of Scilly rMCZ.
13:30-14:24	TOSu	Multibeam collected at South of the Isles of Scilly, line running SW to NE through the site (line called SSC-MB07)
14:24-16:06	Transit	Transit between end of SW to NE line (SSC-MB07) & start of NW-SE line (SSC-MB03)
16:06-16:45	TOSu	Multibeam collected at South of the Isles of Scilly, running NW to SE through the site (SSC-MB03)
		End of offshore MCZ survey. Transit to Start Point area for NE acoustic survey

DAILY LOG
STATUS REPORT

Weather

Weather/sea state conditions	0000-0600	0600-1200	1200-1800	1800-2400	Remarks
	Winds W/SW, gentle to mod breeze, swell 2-3m, 1026mb, overcast-cloudy, vis good-v goo, sea v smooth	Winds SW, fresh breeze – mod gale, smooth to slight sea, swell 3-4m, 1022mb, overcast, raining, mod vis	Winds SW, mod gale- strong breeze, swell 4m, 1021mb, overcast, raining, poor – mod vis	Winds SW/W, strong to moderate breeze, sea slight, 1019, overcast drizzle, vis moderate	

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)		Remarks
Mob/Demob	0	9		
Offshore Calibrations	0	5:48		
Total Operation Survey (TOSu)	5:33	92:46		
Total Operation Sampling (TOSa)	2:30	61:30		
Equipment/Downtime	0	1:09		
Ship/Plant Downtime	0	5:20		
Waiting On Weather	0	0		
Transit	8:42	54:22		
Standby Port	0	0		
Others	0	2:50		
Total:	**16:45**	**232:45**		

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
EM2040	27	956		
EM3002	0	100.5		
Acoustic: Sidescan Sonar				
Edgetech	0	130		

Overall Progress Groundtruthing Samples

Action	Today (# samples/tows)	Accum (# samples/tows)			Remarks
Hamon grab (0.1m2)	2	84			
Drop camera	0	12			
Camera sledge	4	25			

DAILY LOG
STATUS REPORT

Weather forecast for the next 24 hours

Winds westerly veering south-westerly,3/4 becoming 5/6. Blue sky becoming cloudy overcast moderate/good vis

Planned operation for the next 24 hours (00:00 to 24:00 on 13/07/12)

Survey of JNCC MCZ sites is complete, Start Pt survey begins.

Agreed Changes to Scope/Survey operation priorities

CEFAS/JNCC Comments

Three multibeam lines were attempted at South of the Isles of Scilly, two were successful; running from NW to SE & SW to NE. One line running NE to SW was abandoned due to rough sea state

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

5.8 *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 during the CEND10/12 cruise. Only vessels broadcasting AIS data were recorded.

Table 4. 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

About us

Cefas is a multi-disciplinary scientific research and consultancy centre providing a comprehensive range of services in fisheries management, environmental monitoring and assessment, and aquaculture to a large number of clients worldwide.

We have more than 500 staff based in 2 laboratories, our own ocean-going research vessel, and over 100 years of fisheries experience.

We have a long and successful track record in delivering high-quality services to clients in a confidential and impartial manner.
(www.cefas.defra.gov.uk)

Cefas Technology Limited (CTL) is a wholly owned subsidiary of Cefas specialising in the application of Cefas technology to specific customer needs in a cost-effective and focussed manner.

CTL systems and services are developed by teams that are experienced in fisheries, environmental management and aquaculture, and in working closely with clients to ensure that their needs are fully met.
(www.cefastechnology.co.uk)

.

Customer focus

With our unique facilities and our breadth of expertise in environmental and fisheries management, we can rapidly put together a multi-disciplinary team of experienced specialists, fully supported by our comprehensive in-house resources.

Our existing customers are drawn from a broad spectrum with wide ranging interests. Clients include:

- international and UK government departments
- the European Commission
- the World Bank
- Food and Agriculture Organisation of the United Nations (FAO)
- oil, water, chemical, pharmaceutical, agro-chemical, aggregate and marine industries
- non-governmental and environmental organisations
- regulators and enforcement agencies
- local authorities and other public bodies

We also work successfully in partnership with other organisations, operate in international consortia and have several joint ventures commercialising our intellectual property

Head office
Centre for Environment, Fisheries & Aquaculture Science
Pakefield Road, Lowestoft,
Suffolk NR33 0HT UK

Tel +44 (0) 1502 56 2244
Fax +44 (0) 1502 51 3865

Web www.cefas.defra.gov.uk

Centre for Environment, Fisheries & Aquaculture Science
Barrack Road, The Nothe
Weymouth, DT4 8UB

Tel +44 (0) 1305 206600
Fax +44 (0) 1305 206601

printed on paper made from
a minimum 75% de-inked