JNCC/Cefas Partnership Report Series

Report No. 10

CEND23/15 Cruise Report: Monitoring Survey of Croker Carbonate Slabs cSAC/SCI

Wood, D., Jenkins, C., Eggett, A., Judd, A. & Golding, N.

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This report is compliant with the JNCC Evidence Quality Assurance Policy http://jncc.Defra.gov.uk/default.aspx?page=6675. This report was reviewed by Cefas and JNCC, with comments and input from an external contractor who was employed by JNCC for the purposes of this project.

Summary

The monitoring survey of the Croker Carbonate Slabs candidate Special Area of Conservation (cSAC) and Site of Community Importance (SCI) was carried out from 24 October – 06 November 2015.

There were four key aims of the survey:

1. Revisit sample stations where MDAC has been previously subject to $\delta^{13}C$ isotope analysis or stations where its presence was suggested from seabed imagery (potential MDAC) within the site boundary.
2. Improve our knowledge of the distribution and spatial extent of MDAC within the site.
3. Improve our knowledge of areas adjacent to site; confirm the presence of MDAC, map the finer spatial extent and gather more detailed information on biological communities.
4. Characterise the wider sediment areas found within the site.

A variety of data types were collected during the two-week survey including multibeam echosounder bathymetry and backscatter, sidescan sonar, EK60 echosounder, deep-tow boomer, high resolution video and stills, benthic samples and water samples. In addition, a pumped METS methane sensor was fitted to the camera drop-frame.

Weather conditions were predominantly good throughout the survey period, though some operations were affected by strong winds combined with extremely strong tides. While no major changes were made to the survey plan, minor modifications such as reorientation of survey lines (to maximise time efficiencies while working with the prevailing conditions) were made. Work in some areas was also limited by the presence of static fishing gear. Due to the good weather, the vessel was able to remain on site and work continuously, with no need to make use of the weather contingency sites. That being the case, the majority of the survey objectives were completed, with only a small amount of sidescan sonar and ground-truthing outstanding.

Indicators of the presence of methane, including active gas seabed seepage, and extensive formations with the appearance of MDAC were identified. Samples of this potential MDAC were collected using a mini-Hamon grab from a number of stations across the site, and will be subject to further detailed analysis in the near future.

Contents

1 Background and Introduction

1.1 Survey Project Team

The monitoring survey at Croker Carbonate Slabs candidate Special Area of Conservation (cSAC) and Site of Community Importance (SCI) was carried out from 24 October – 06 November 2015, aboard the RV *Cefas Endeavour*. The survey team for the duration of the fieldwork included Cefas marine scientists, four marine scientists from JNCC, an MDAC specialist, two seismic technicians and a representative from the British Virgin Islands (BVI).

1.2 Site description - Croker Carbonate Slabs cSAC/SCI

The Annex I habitat (Submarine structures made by leaking gases) within the Croker Carbonate Slabs (CCS) site was first identified during the Strategic Environmental Assessment (SEA) 6 survey of the Irish Sea in 2004; two areas, Texel 10 and Texel 11, were surveyed using multibeam echo-sounder, sidescan sonar, sub-bottom profiling, video and stills imagery and grab sampling. Analysis of this data showed that carbonate structures were present on the seabed within the Texel 11 survey area, and that these were formed by Methane-Derived Authigenic Carbonate (MDAC) (Judd 2005). These MDAC blocks and slabs form when methane rising from deep below the seabed is consumed by microbes in the seabed sediment; the carbonate is precipitated as a by-product of the anaerobic oxidation of methane undertaken by these microbial communities at the sulphate-methane interface that normally lies close beneath the seabed. The carbonate acts as cement, ‘gluing’ sediment particles together to form a type of rock.

Within the CCS site, the seabed habitats created by these MDAC structures support a diverse range of marine species that are absent from the surrounding seabed, which is characterised by coarse sediment. Large carbonate blocks support a diverse range of soft corals, erect filter feeders, sponges, tube worms and anemones, whereas the flatter, pavement-like MDAC structures are colonised with scour-resistant animals such as hydroids and bryozoans.

The site is underlain by potential methane source-rocks: coal-bearing rocks of the Westphalian (Upper Carboniferous) Coal Measures, and/or the Dinantian/Namurian (Middle to Lower Carboniferous) Holywell Shale. These Carboniferous rocks sub-crop beneath late-Pleistocene glacio-marine sediments (the Prograded Facies of the Western Irish Sea Formation; described by Jackson *et al* 1995). The presence, on high-resolution sub-bottom (pinger and boomer) profiles, of indicators of gas within these late-Pleistocene sediments suggests that gas is able to migrate upwards towards the seabed. High methane concentrations in sediment pore waters and near-seabed waters support this suggestion (Judd 2005).

Croker Carbonate Slabs was designated under the EU Habitats Directive as a Site of Community Importance (SCI) in November 2012. The site is located in the mid-Irish Sea, approximately 30km to the west of Anglesey, covering an area of ~66km^2 (Figure 1) and is designated for the Annex I habitat ‘*1180 Submarine structures made by leaking gases*’ (Figure 2).

Submarine structures made by leaking gases, specifically Methane-Derived Authigenic Carbonate (MDAC), was first identified within the site in 2004 during the Strategic Environmental Assessment 6 (SEA6) surveys. The site was further surveyed in 2008 as part of CEND 11/08.

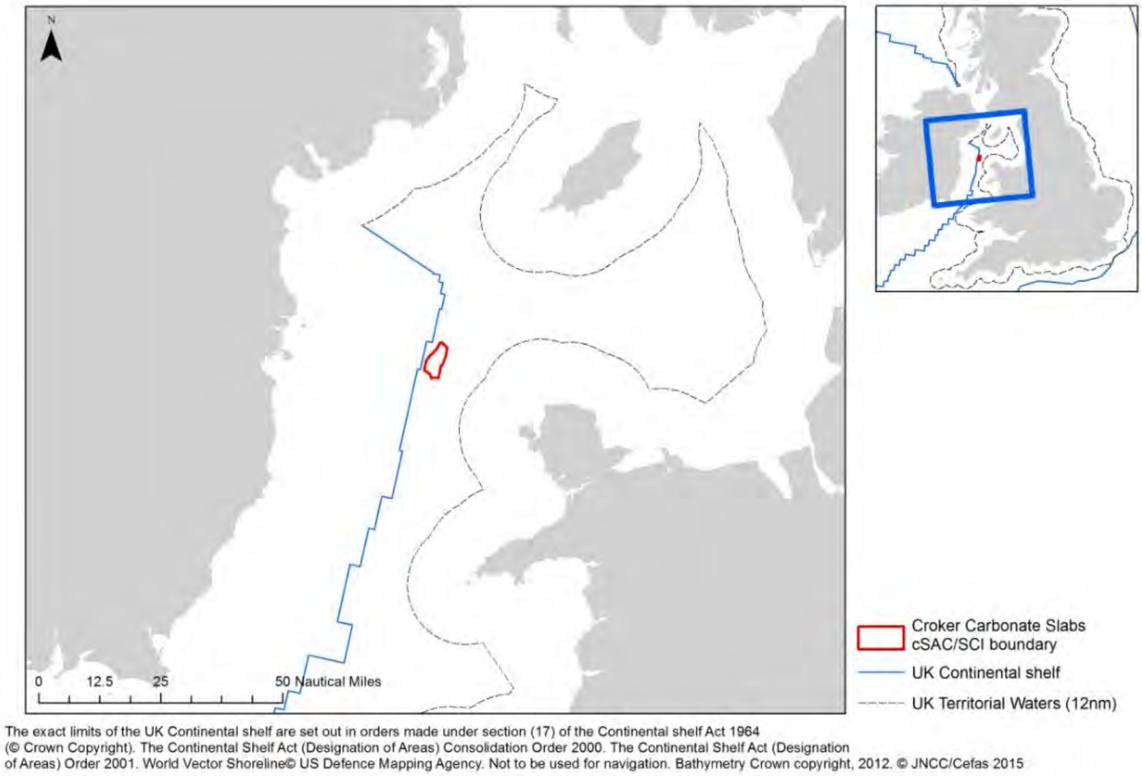

Figure 1. Location of Croker Carbonate Slabs cSAC/SCI.

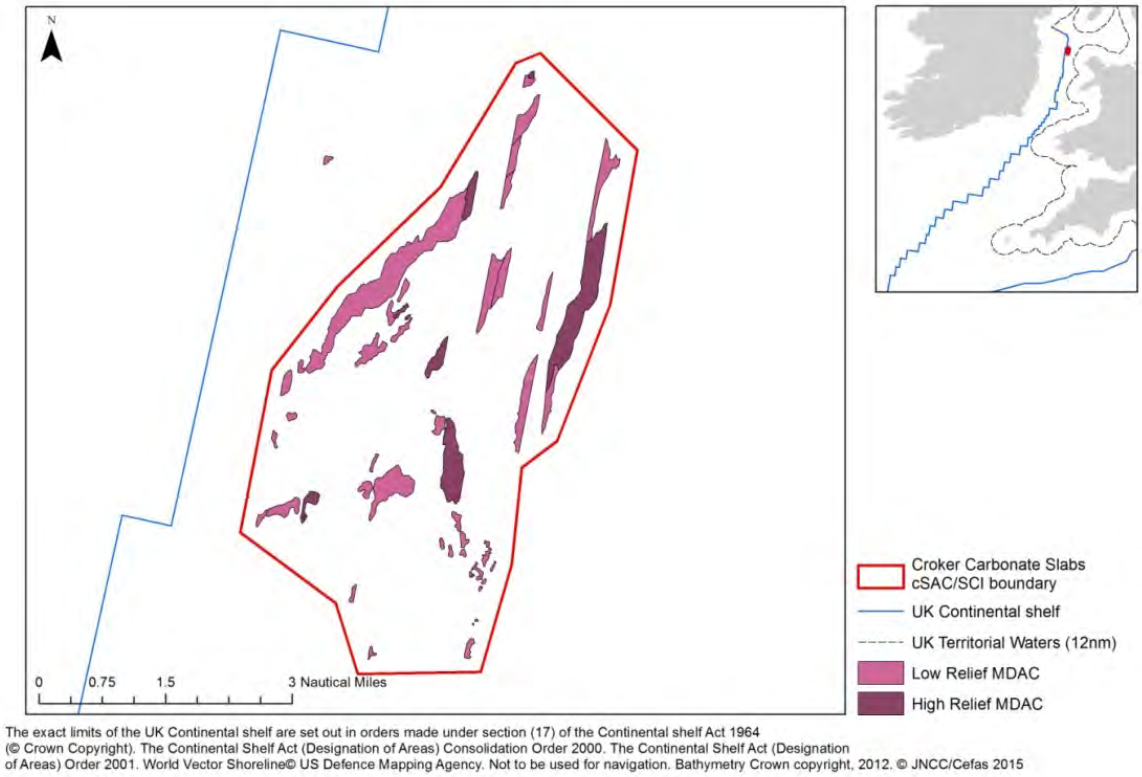

Figure 2. The pre-2015 survey understanding of the distribution of Annex I habitat “Submarine structures made by leaking gases” within, and surrounding, the cSAC/SCI boundary.

The site is contained completely within the North St George's Channel recommended Marine Conservation Zone (rMCZ).

The conservation objective[1] for the protected features of the Croker Carbonate Slabs cSAC/SCI is (JNCC 2012a):

Subject to natural change, **maintain** the **submarine structures made by leaking gases** in **favourable condition**, such that:

- the natural environmental quality is maintained;
- the natural environmental processes are maintained; and
- the extent, physical structure, diversity, community structure and typical species representative of submarine structures made by leaking gases in the Irish Sea are maintained.

1.3 Existing data

A preliminary survey of the region, that would later become the Croker Carbonate Slabs cSAC/SCI, was undertaken as part of the Department of Trade and Industry (DTI) SEA6 survey. In this survey, multibeam echosounder (MBES), grab samples and video data were collected from sites referred to as Texel 10 and Texel 11 (Judd 2005).

In 2008, JNCC undertook additional survey work and established the presence of MDAC over a wider area. The feature was mapped using high resolution acoustics (multibeam echo-sounder and sidescan sonar) and validated using seabed imagery, grab samples and carbon isotope analysis. Within the site, the MDAC structures took two key forms, extensive MDAC 'pavement' or 'slabs' up to 20mm thick (termed 'low relief ' MDAC) and larger structures over 20mm thick and up to 2m high (termed 'high relief' MDAC). The exposed MDAC was observed forming two longitudinal features with a SSW-NNE orientation.

Further sampling has taken place within and adjacent to the site as part of the Defra-funded MB0120 MCZ site verification surveys of North St George's Channel rMCZ in 2012 and 2013, which overlaps the entire Croker Carbonate Slabs cSAC/SCI. A full coverage multibeam survey was carried out by Osiris Projects on board the RV *Prince Madog* and *Bibby Tethra* in 2012, with ground truthing and sidescan data being collected on surveys in 2012 and 2013 (CEND03/12 & CEND05/13), which included sampling from within the Croker site boundary. The latter has been processed specifically to inform the planning of this survey. These data, combined with previous survey data are shown in Figure 3.

The backscatter and bathymetry data collected from the MB0120 MBES survey of this site indicated the presence of hard substrate within and adjacent to the Croker Carbonate Slabs boundary (Figure 4). Within the site boundary the predicted hard substrate coincides with areas of known MDAC from the SEA6 and 2008 surveys (Figure 5).

[1] Conservation objectives set out the desired state for the protected features of a Marine Protected Area (MPA).

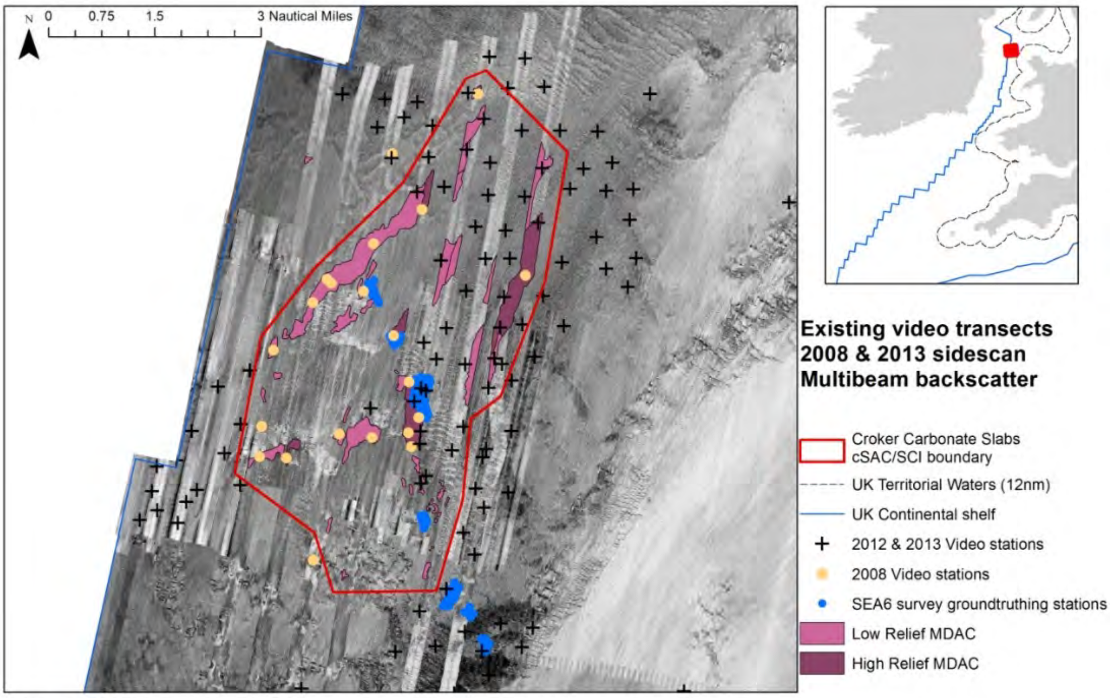

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Figure 3. Existing drop frame/video sledge locations collected between 2004 and 2013, together with the High and Low relief MDAC identified from sidescan sonar imagery collected in 2008 and backscatter and sidescan sonar data collected during 2012 and 2013.

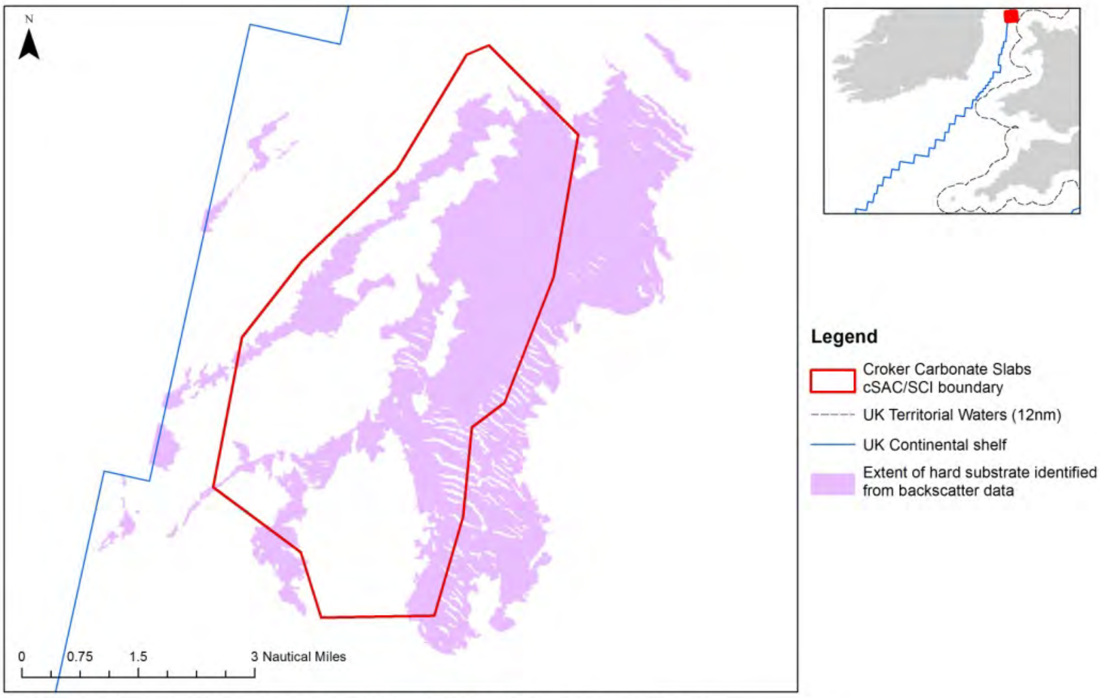

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Figure 4. Distribution and spatial extent of hard substrate identified in bathymetry and backscatter data collected as part of the North St George's Channel rMCZ site verification survey, 2012.

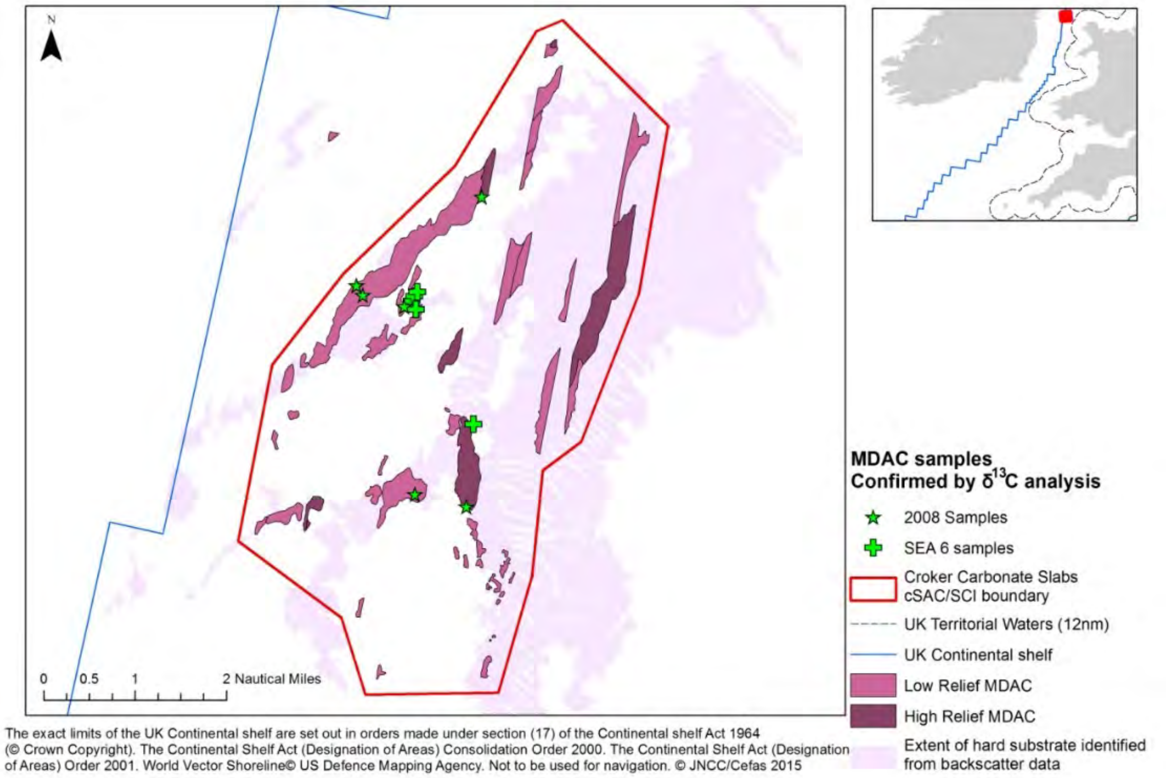

Figure 5. Locations of samples collected in 2004 and 2008 which were confirmed as MDAC by $\delta^{13}C$ analysis.

2 Aims & Objectives

2.1 Aim

The aim of the CEND 23/15 survey was to contribute to the development of a monitoring time-series for Croker Carbonate Slabs cSAC/SCI, from which the rate and direction of change in the condition of the site feature can be inferred in the long term.

2.2 Objectives and Priorities

1) Revisit sample stations where Methane-Derived Authigenic Carbonate has been previously subject to $\delta^{13}C$ isotope analysis or stations where its presence was suggested from seabed imagery (potential MDAC) within the site boundary.

   Conduct camera transects over areas previously identified (CEND11/08 & SEA6) as MDAC and areas of ‘potential MDAC’ (CEND 03/12 & 05/13) to assist in detecting change over a time series. This included:

   (a) camera transects to investigate whether a difference in community composition exists between the MDAC areas exhibiting high and low relief, and;
   (b) collecting grab samples of carbonate at ‘potential MDAC’ stations to confirm presence.

2) Improve our knowledge of the distribution and spatial extent of MDAC within the site.

   (a) Conduct camera transects over areas mapped as ‘potential MDAC’ from acoustic data collected by previous surveys.
   (b) Collect benthic samples for infaunal and/or $\delta^{13}C$ isotope analysis and carbon-14 or uranium-thorium dating to confirm the presence of MDAC over areas mapped as ‘potential MDAC’ from acoustic data collected by previous surveys.
   (c) Conduct sidescan sonar and boomer surveys. Sidescan sonar lines were planned to infill gaps in existing sidescan data coverage, and to improve our knowledge of the spatial extent of MDAC across the site. Sub-bottom (boomer) data should indicate underlying strata, areas of gas blanking and paths of fluid transport.
   (d) Investigate a suspected gas release site (one location inside the site) as identified by CEND 05/13 sidescan data.

3) Improve our knowledge of areas adjacent to the site; confirm the presence of MDAC, map the finer spatial extent and gather more detailed information on biological communities.

   (a) Conduct camera transects based on a 1,000m grid over areas of ‘potential’ MDAC/hard substrate mapped from acoustic data collected from a number of surveys. In addition, repeat specific camera tows from CEND 05/13 that previously identified areas of ‘potential MDAC’.
   (b) Collect benthic samples for infaunal and/or $\delta^{13}C$ isotope analysis and carbon-14 or uranium-thorium dating to confirm presence of MDAC.
   (c) Conduct boomer and sidescan sonar survey lines.

(d) Investigate suspected gas release sites (four locations outside the site) as identified by CEND 05/13 sidescan data.

4) Characterise the wider sediment areas found within the site.

   (a) Conduct video transects and PSA sampling with a mini-Hamon grab in these areas to assist with characterisation.

3 Survey plan and protocols

The survey was undertaken aboard the RV *Cefas Endeavour*. Details of the vessel and the equipment used are provided in Appendix 1; details of equipment calibration are presented in Appendix 2. The planned survey operations (summarised in Figure 6) and the equipment operation protocols are described below. GIS shapefiles of planned sampling operations were provided by JNCC.

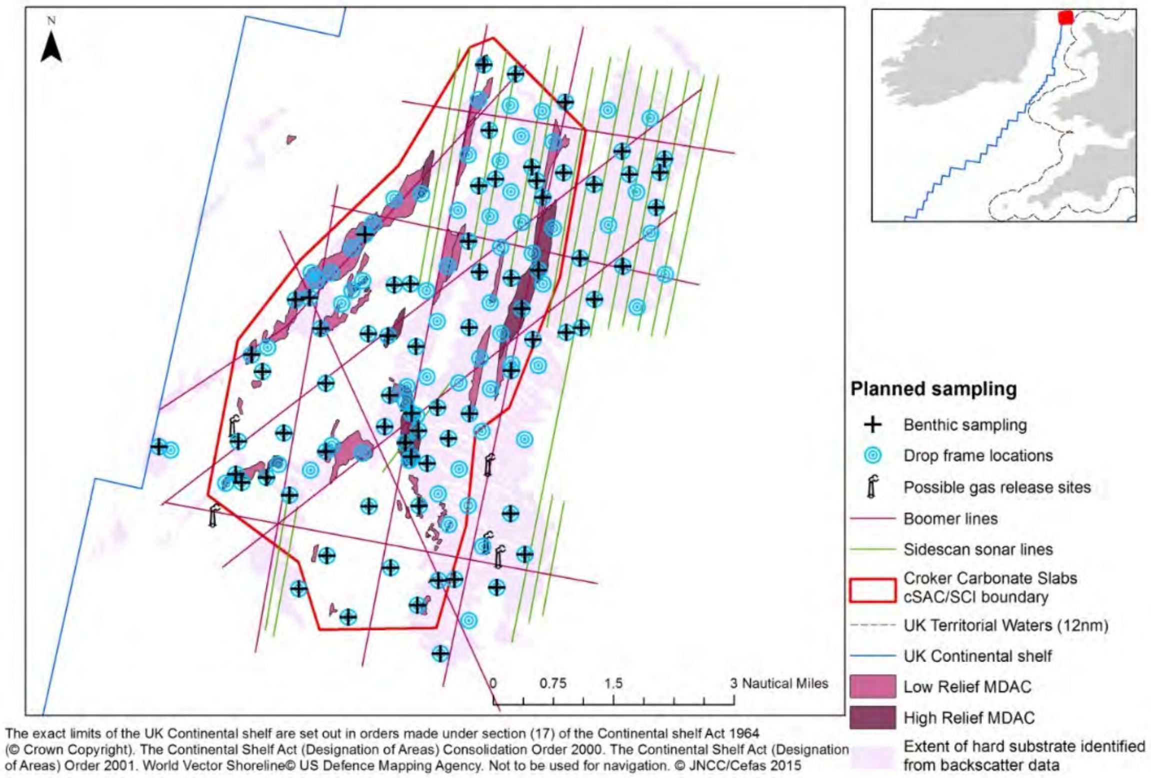

Figure 6. Proposed survey operations to be undertaken in and surrounding Croker Carbonate Slabs cSAC/SCI on CEND 23/15.

3.1 Acoustic data collection

The following acoustic systems[2] were planned for use:

- EK60 scientific echosounder.
- Multibeam echosounder (MBES).
- Sidescan sonar.
- Boomer (Geoforce deep-towed boomer).

The EK60 and MBES were monitored continuously throughout the survey operations: including during Boomer and sidescan sonar deployments. The proposed acoustic survey lines are indicated in Figure 7. The sidescan sonar lines were planned to infill gaps in existing data to aid with assessing the spatial extent of MDAC. Boomer lines were planned

[2] Details of the acoustic systems are presented in Appendix 1.

to cover known and 'potential MDAC' features on the seabed, to better understand the geology of the site and to examine potential fluid transport pathways. The lines were orientated to follow geological features, but were subject to change depending on weather conditions during the survey.

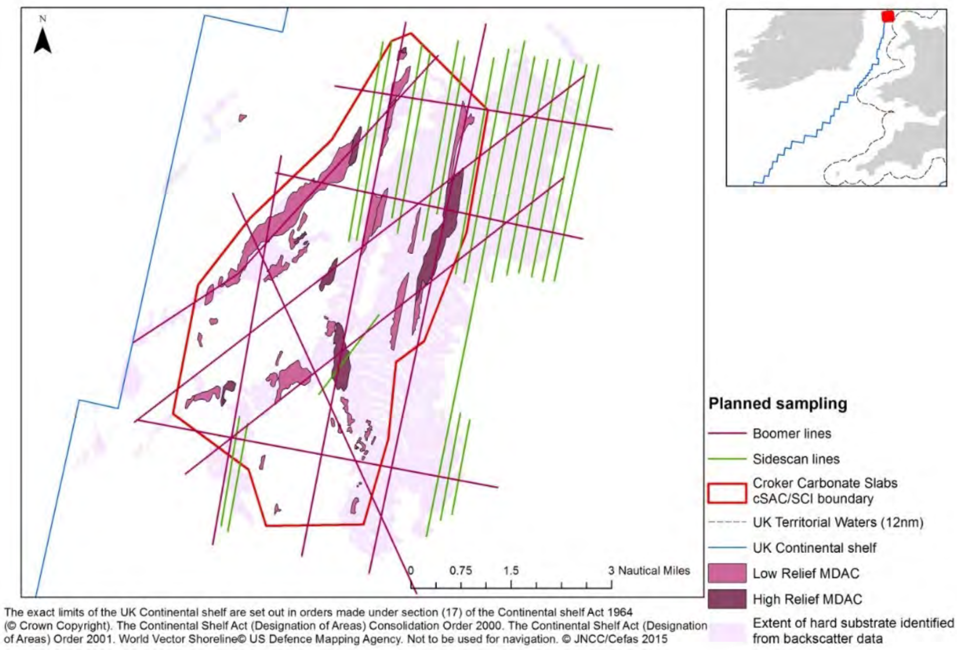

Figure 7. Planned sub-bottom profiler and sidescan sonar lines.

3.1.1 EK60 Scientific echosounder

The single beam echosounder was used to provide basic information about water depth, and also to identify water column targets that may be attributable to gas seepage plumes. It was run continuously throughout the acoustic and ground truthing survey operations, with data being stored where gas seepage was suspected.

3.1.2 Multibeam echosounder (MBES)

MBES data (Bathymetry and backscatter) were acquired continuously throughout survey operations in order to provide information about seabed depth, type and distribution of hard substrates. Water column data were also viewed and retained where the water column display indicated possible targets attributable to gas seepage plumes.

3.1.3 Sidescan sonar

Sidescan sonar was used to assess the texture and dimensions of hard substrates in areas of high backscatter intensity that were not previously subjected to this technique. The system was also used to investigate areas of gas seepage, with gas bubbles visible on the water column section of the sidescan trace. Acquired data were processed on board to inform additional sampling if time allowed.

3.1.4 Boomer

Sub-bottom profiling was undertaken primarily to determine the distribution of gas within the near-seabed sediments, to provide data about the geological make-up of the site, and to aid in the selection of video and sampling sites.

As with all seismic systems, penetration and vertical resolution are dependent upon signal strength and frequency, and the nature of the seabed. Penetration is reduced by relatively hard seabed, such as the sandy and shelly seabed encountered in this area; penetration is likely further reduced where MDAC is present as it reflects a higher proportion of incident energy. For this reason the boomer system was chosen in preference to lower strength, higher frequency systems such as chirp and pinger.

A deep-tow system was chosen rather than a surface-tow system in order to maximise record quality; a surface tow system would have had a more restricted operating window in the sea conditions likely to be encountered in the Irish Sea at this time of year.

Sub-bottom profiling was undertaken by Exploration Electronics Ltd using a Geoforce Deep-towed Boomer.

Figure 8. The Geoforce deep-towed boomer towfish being deployed from the RV *Cefas Endeavour*. The hydrophone streamer can be seen hanging from the rear of the towfish (Photo: Alan Judd, 2015).

The boomer was operated by two technicians to allow 24hr operations and interpretation. JNCC guidelines for seismic surveys were used during the survey with respect to the sub-bottom profiler[3]; these require that deployments of the sub-bottom system are 'logged' in a noise register. Pre-shoot watches of 30 minutes were undertaken, by a trained Marine

[3] http://jncc.defra.gov.uk/pdf/JNCC_Guidelines_Seismic%20Guidelines_Aug%202010.pdf

Mammal Observer, in daylight hours prior to the system being activated. Because it was not possible to ‘soft-start’ the boomer system, survey operations were delayed if marine mammals were detected within 500m of the vessel during the ’30 minute’ ‘observation’ period prior to firing the seismic source. Boomer lines were planned in order to make most efficient use of the system in understanding the extent of the MDAC features, as listed in Objective 2 (Section 2.2), together with gaining a greater understanding of the geology of the region.

3.1.5 Acoustic data formats

The formats in which the various types of acoustic data were stored are shown in Table 1.

Table 1. Acoustic data formats

Kit	Data format(s)
EK60 Echosounder	.raw
Sidescan Sonar	.JSF .XTF
Multibeam	.all .gsf .xyz .sd .wcd .TIF .tid
Boomer	.segy .jpg summary images

3.2 Ground truthing stations

3.2.1 Visual ground truthing

Visual ground truthing was carried out using a drop frame equipped with laser scale, digital stills and video cameras. Video and stills acquisition were conducted following the MESH ROG[4].

Drop frame visualisation was planned to follow the priorities outlined in Figure 9. Sampling positions for each priority were assigned using the following methodology:

a) Priority 1 stations were positioned to match locations that had been previously surveyed within the site, where MDAC has been confirmed or was suspected. Camera transects were planned to run over the same ground (same length or longer if required – extended to 200m) as the original camera tow on which they were based.

   These stations were subdivided into 13 primary (priority 1) and 13 secondary (priority 1.5) locations. The primary locations included stations of known MDAC verified by $\delta^{13}C$ isotope analysis, along with additional selected stations from SEA6, CEND 11/08 and 05/13, that ensured good geographical coverage across the site and included key features, e.g. the cliff in the centre of the site.

[4] http://www.searchmesh.net/PDF/GMHM3_Video_ROG.pdf

b) Priority 2 stations were allocated based on a 750m triangular grid within the site, and within the predicted extent of hard substrate, within the cSAC/SCI boundary. Sixty-two stations were assigned using this grid.

c) Priority 3 stations were either matched to locations visited previously (where 'potential' MDAC was suspected adjacent to the cSAC/SCI boundary), or allocated based on a 1,000m triangular grid within the predicted extent of hard substrate identified from multibeam backscatter data.

d) Priority 4 stations were assigned using a 1,500m triangular grid in sediment areas within the cSAC/SCI boundary.

The numbers of transects assigned to each priority are detailed in Table 2.

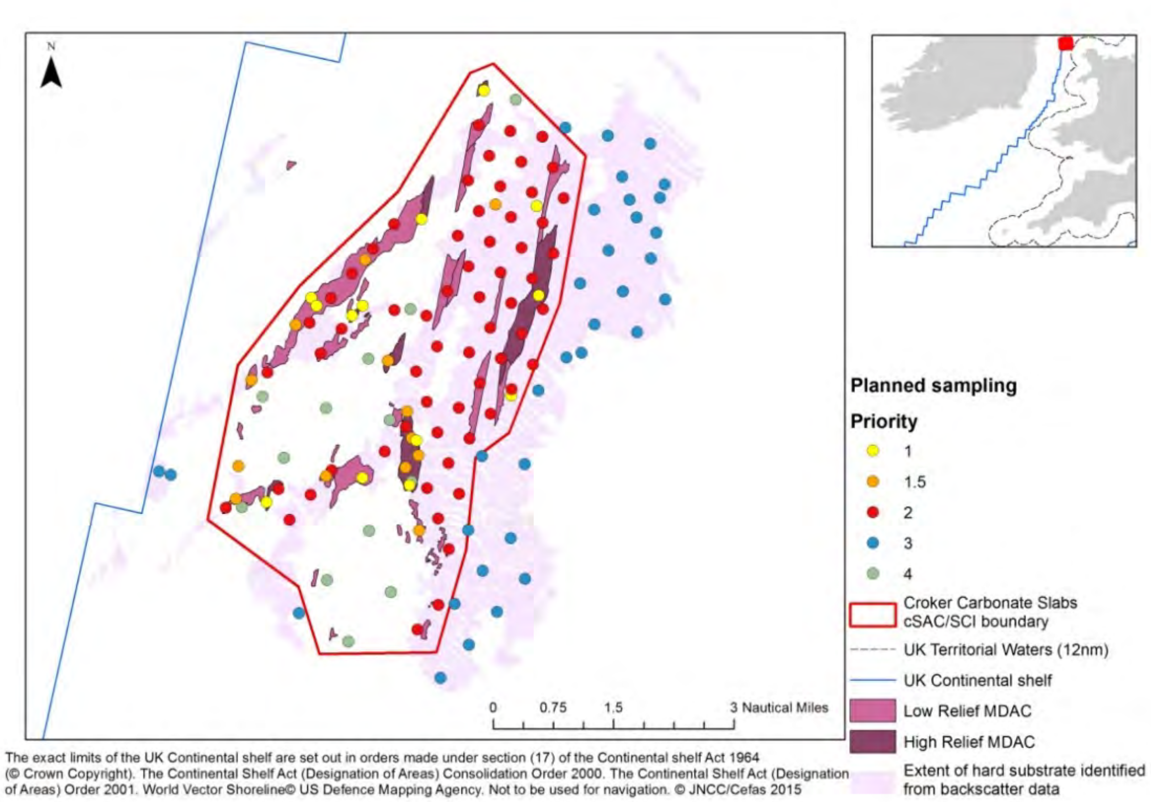

Figure 9. Location of planned drop frame operations on CEND 23/15.

Priority no.	Number of stations
1	13
1.5	13
2	61
3	33
4	13

Table 2. Drop frame transects by priority number.

At each drop frame station a camera transect was undertaken to investigate the features and makeup of the seabed present. The target tow speed was 0.3kts. Where repeat tows were being undertaken the tow length was planned to match the original tow. Where a new station was being surveyed the target tow length was 200m. Video footage with overlay of ship's position and methane concentration from a pumped METS methane sensor were recorded during the tow, once the drop frame has reached the seabed. Still images were taken at 60 second intervals from a dedicated stills camera, together with opportunistic stills that would assist in completing the survey objectives. The drop frame was deployed from the side gantry and the Tower logging system was set up to record USBL position at five second intervals.

3.2.2 Benthic sampling

Benthic sampling was carried out using a 0.1m^2 mini-Hamon grab equipped with USBL transponder for positioning. A Shipek grab was carried as backup, and a rock dredge was available in case the other grabs failed to acquire a sample of hard substrate. Proposed grab locations are shown in Figure 10.

The sample stations were based on the locations identified for drop frame visualisations as outlined in section 3.2.1. The numbers of samples to be collected in each priority are shown in Table 3.

Priority 1 benthic samples were positioned to obtain samples from locations within the site where 'potential MDAC' had been previously observed from video transects on surveys CEND 11/08, 03/12 & 05/13. Sampling stations within 450m of where the presence of MDAC had already been confirmed by δ^{13}C isotope analysis were not sampled.

As with the drop frame transects, these grab stations were further subdivided into five primary (Priority 1) and 12 secondary (Priority 1.5) stations.

Priority 2 benthic samples, again from within the site, were assigned using the same 750m grid used for the drop frame station planning. A subset of 23 stations were randomly selected from the grid to be sampled. Where necessary, planned sample locations within 450m of an existing δ^{13}C isotope analysed sample, were moved to the next 'nearest neighbour'.

Priority 3 benthic samples were positioned over the five stations where 'potential MDAC' was observed on video transects on previous CEND 03/12 & 05/13 surveys adjacent to the site boundary. In addition to this there were 14 samples assigned randomly to the same 1,000m triangular grid used to plan the priority 3 camera transects.

Priority 4 benthic samples were located within the sediment-covered area of the site. These grabs were to be collected from the same locations as the 13 planned camera transects (see section 3.2.1)

Successfully collected samples of 'potential MDAC' were taken from the grab, described and photographed and fauna removed after immersion for two hours in seawater to allow any fauna to emerge, prior to being washed in freshwater and stored. A small surface area was cleaned for testing (in a fume cupboard) with a 10% hydrochloric acid (HCl) to assess whether or not the sample was carbonate (fizzing, caused by carbon dioxide production, indicates the presence of carbonate). Samples were then dried, labelled and stored for further analysis (δ^{13}C isotopes, scanning electron microscopy etc.) by an onshore laboratory.

Where sediment samples were collected, a Particle Size Analysis (PSA) sample was taken for analysis.

Table 3. Number of benthic samples to be collected by priority.

Priority no.	Number of stations
1	5
1.5	12
2	23
3	19
4	13

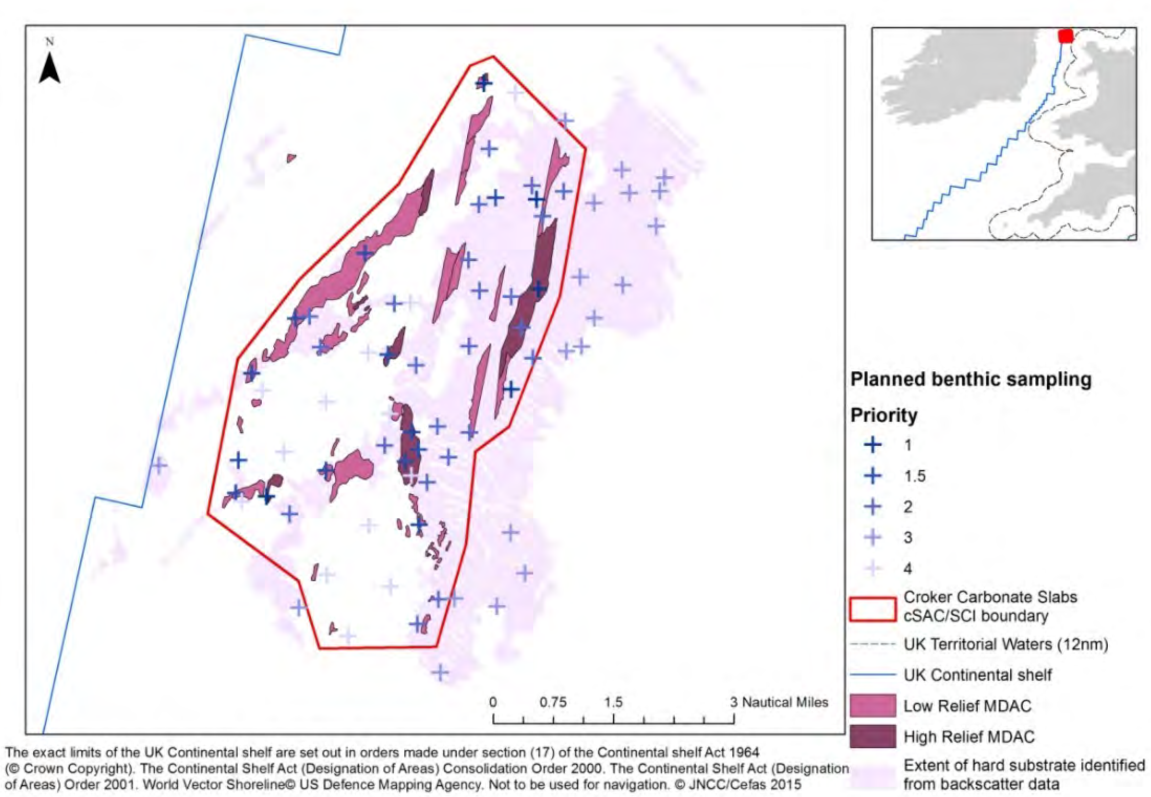

Figure 10. Location of planned benthic samples on CEND 23/15.

3.2.3 Methane concentration

A pumped METS methane detector system was used to indicate variations in methane concentrations in the water, close to the seabed, during drop frame operations (see section 3.2.1). The METS sensor was operated continuously during these operations. It was attached to the drop frame, so that continuous measurements could be made throughout each video transect, and whilst the frame was being lowered to, and raised from, the seabed. Between stations the sensor was left running while immersed in seawater.

Water sampling was undertaken to provide validation of the METS sensor readings.

Water samples were taken with a 10L Niskin bottle attached to a hydrographic wire and triggered via a messenger sent down the cable. When possible, sampling took place at slack water to achieve the best possible accuracy over the target. At each sampling location, three water samples were taken; one just above the seabed, one mid-water and one just below the sea surface. Samples were fixed with mercuric chloride for sample preservation and the prevention of bacterial oxidation of any methane, prior to refrigeration and analysis by an onshore laboratory.

Niskin bottle sampling was undertaken:

1) In areas where gas seepage was suspected.
2) At control sites outside the Croker Carbonate Slabs survey area. These were chosen with the following consideration:

- the sample station was well beyond the survey area;
- the sample station East of the survey area was not influenced by water that had crossed the site (because the tidal currents flow North-South / South-North across the site) and is not affected by wind-driven flow; and
- the underlying geology at the sample station, where there is no evidence of gas beneath the seabed from previous surveys, is fundamentally different from that underlying the survey site.

3.2.4 Ground truth data formats

The formats in which the various types of ground truth data were stored are shown in Table 4. Details of offsets are presented in Appendix 3.

Table 4. Ground truth data formats.

Kit	Data format(s)
Mini-Hamon grab	.mdb Digilog MS Access database .jpg photographs of samples .docx MS Word summary sheet
Day grab	.mdb Digilog MS Access database .jpg photographs of samples .docx MS Word summary sheet
Video	.mdb Digilog MS Access database .jpg photographs stills .mp4 video .docx MS Word summary sheet
METS methane sensor	.csv output via Tower Navigation software.

3.3 Leaking Gases Protocol

It has yet to be established whether MDAC continues to form within the Croker Carbonate Slabs site. Active methane seepage from the seabed would be an important indicator.

To establish whether active seepage is occurring, the displays from the scientific echosounder (EK60) and MBES water column display were monitored and recorded during survey operations around the site.

Where evidence pointed toward the presence of a possible gas seep the following protocol was followed:

- Recording of multibeam and EK60 Scientific Echosounder water column data.

- Drop frame transect to establish visual ID of the seep and/or related seabed features (fitted with pumped METS methane sensor to record methane levels)
- Water sample collection using a Niskin bottle at locations where visual ID was established – ideally this was conducted at slack water

Analysis of the sidescan sonar data collected as part of the CEND 03/15 survey identified five targets inside and outside of the site. See Figure 11.

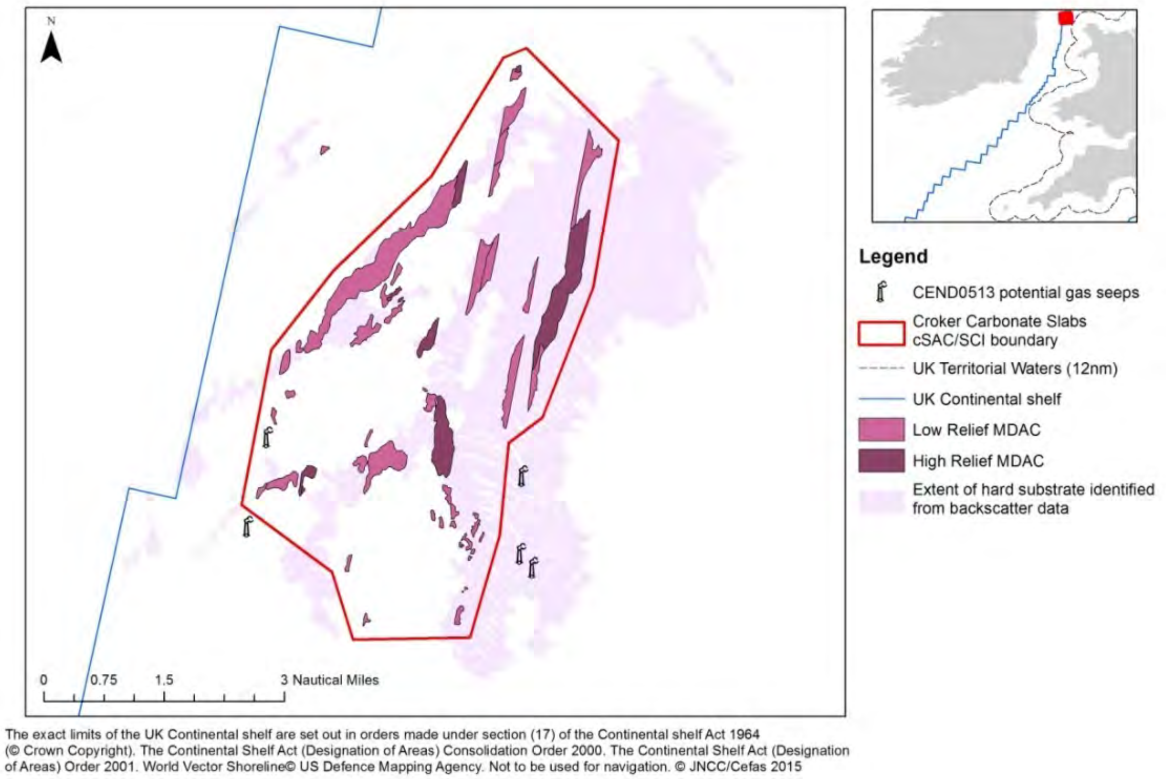

Figure 11. Location of possible gas release site identified from CEND03/15 sidescan sonar data.

3.4 Positioning

GPS fixes were recorded using the Tower Navigation system on RV *Cefas Endeavour*. This records the positional coordinates of the gantry from which the sampling equipment is being deployed, automatically compensating for the offset between these gantries and the GPS antenna, as well as the corrected position provided by the HiPAP beacon, if used; details of offsets are presented in Appendix 3. Fixes for grab samples were taken at the instant the grab contacted the seabed. The grabs were always deployed from the side gantry. The mini-Hamon grab position is recorded is taken from the HiPAP, with the side gantry position recorded for backup. The day grab position was recorded from the side gantry position.

Positional fixes were made for the camera tows at five second intervals during the transect. This allowed accurate positional fixing of each still image to be applied retrospectively by time matching the still image to the nearest positional fix. The drop camera was always deployed from the side gantry of the vessel, so the fixes record the position of the side gantry. Improved accuracy of the positions assigned to the video footage and still images taken with the drop camera was achieved through use of the positional data generated using the HiPAP system.

Still images were time matched against fix records taken every five seconds using the HiPAP. Fix positions for the HIPAP were quality assured using GIS visualisation and removing erroneous fix positions. The information on water depth and ‘cable out’ were routinely recorded in the field metadata. Course over Ground for each tow was estimated from the uncorrected fix positions for the still images plotted in ArcGIS.

4 Cruise Narrative

Survey equipment was mobilised to RV *Cefas Endeavour* on the 22 October in Swansea, with Cefas and JNCC scientists and Exploration Electronics technicians joining the vessel on the 23 October. The hire of a sub-bottom profile boomer required that the vessel mount one of the contractor's winches on the deck. This was strain tested by P&O on-board operatives to a load of two tonnes prior to sailing. The vessel sailed for site on 24 October at 13:00 and commenced operations at 07:30 on 25 October. The hull mounted MBES was calibrated over a known wreck during the transit to site in preparation for survey operations. Due to the novel nature of the boomer deployment on-board it was decided that a practice deployment also be attempted during transit to site. Crew and scientists were able to present a suitable standard operating procedure (SoP) which was wet tested and deemed safe and effective for continued operations.

Remote data collection from sidescan sonar and boomer had been prioritised and were deployed to commence operations upon arrival at site. However, due to potential positional inaccuracies with the sub-bottom profiler it was determined that priority sidescan lines be run in the interim, whilst positioning of the boomer could be corrected. Initial deployment of the sidescan was halted, due to failure of the termination at the water end of the winch-to-fish connection. Video and still photograph acquisition commenced at 16:00 on 25 October due to further initial delays caused by laser visibility and camera stability.

Weather conditions were predominantly good throughout the survey period though some operations were affected by strong winds combined with extremely strong tides. Survey operations were carried out much as is described within the pre-survey planning. Some changes were made during the survey to maximise efficiencies and to ensure that the best available evidence was collected *in situ*. The boomer lines were re-orientated to be coincident with known seabed features, but were also limited by static fishing gear reported by a local fisherman. Ground truthing stations for mini-Hamon grab, water sampling and meiofaunal sampling were re-targeted based on video observations as well as real time investigations of acoustic (sidescan sonar, MBES, EK60) and seismic (boomer) data. Boomer lines were acquired at high (240j) and low (135j) power to provide higher resolution, but with poorer penetration (low power), and with lower resolution data but with a greater depth of penetration (high power). Seismic data was a key component in targeting several groundtruthing stations, alongside the EK60 water column data and acoustic data from sidescan and multibeam echosounder.

Marine mammal observations were undertaken prior to any boomer operations as per the JNCC marine mammal guidance for offshore surveys. These watches were carried out by trained marine mammal observers 30 minutes, as a minimum, prior to the boomer being turned on. Where mammals were observed within 500 metres of the vessel and in the 30 minute pre-shoot window, boomer operations were delayed until 20 minutes after the mammals had left the survey area.

Survey operations were concluded, and the transit back to Swansea was commenced, on 5 November at 17:30. RV *Cefas Endeavour* was alongside in Swansea at 13:00 on 6 November with scientists and contractors demobilising that same day.

The vessel was able to work continuously at the priority site with no need to make use of the weather contingency sites. Consequently it was almost possible to complete all the tasks identified in the survey plan, with only a small amount of sidescan sonar and ground truthing outstanding.

A breakdown of survey operation time is presented in Appendix 4; Appendix 5 contains copies of Daily Progress Reports.

5 Results

A full record of all the survey line and sample metadata is provided in Appendix 6.

5.1 Acoustic line summaries

Boomer lines were run to explore the sub-surface geology, the presence of gas beneath the seabed, and potential areas of active gas escape for subsequent ground-truthing across the area (Figure 12). Sidescan sonar lines with MBES and EK60 echosounder were run simultaneously with the boomer. Additional lines were run using the sidescan sonar, multibeam and EK60 echosounder (Figure 13). One boomer line and several sidescan sonar lines had to be interrupted to avoid static fishing gear. In total 180km of boomer lines were run (at a combination of low power (135J) and high power (240J)). Three hundred and twenty km of sidescan sonar lines were run.

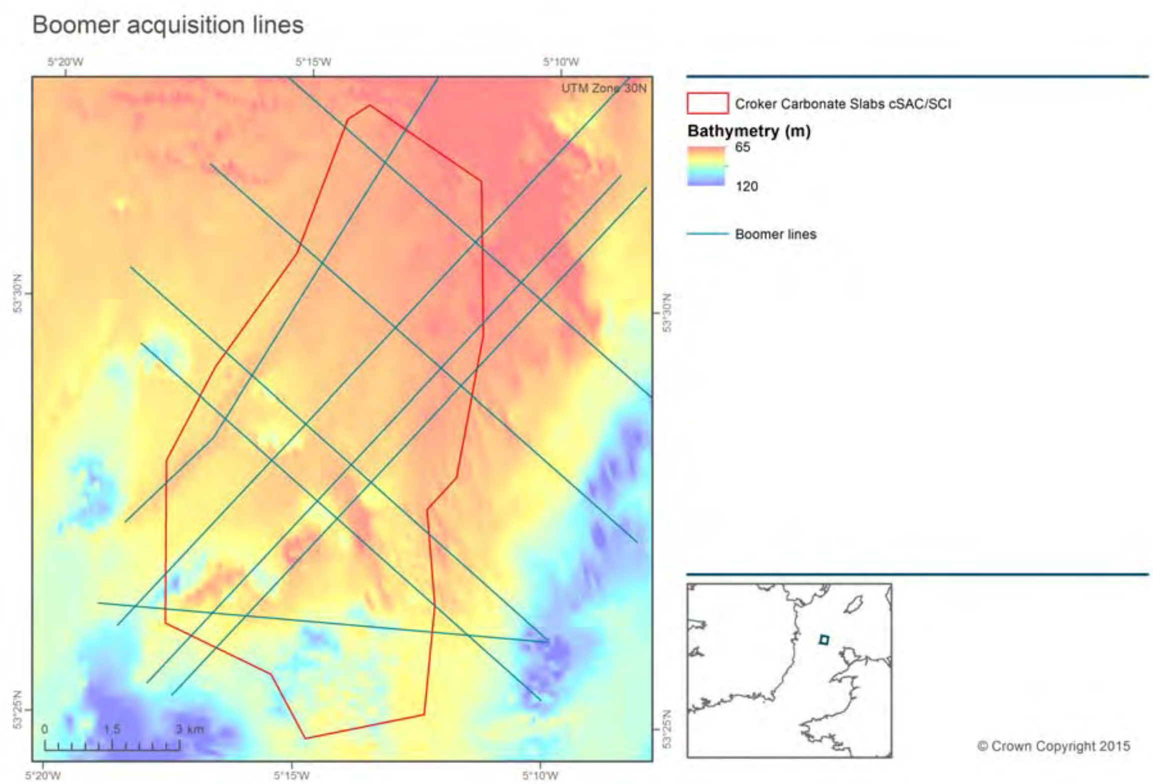

Figure 12. Boomer (sub-bottom profiler) lines completed on survey CEND23/15.

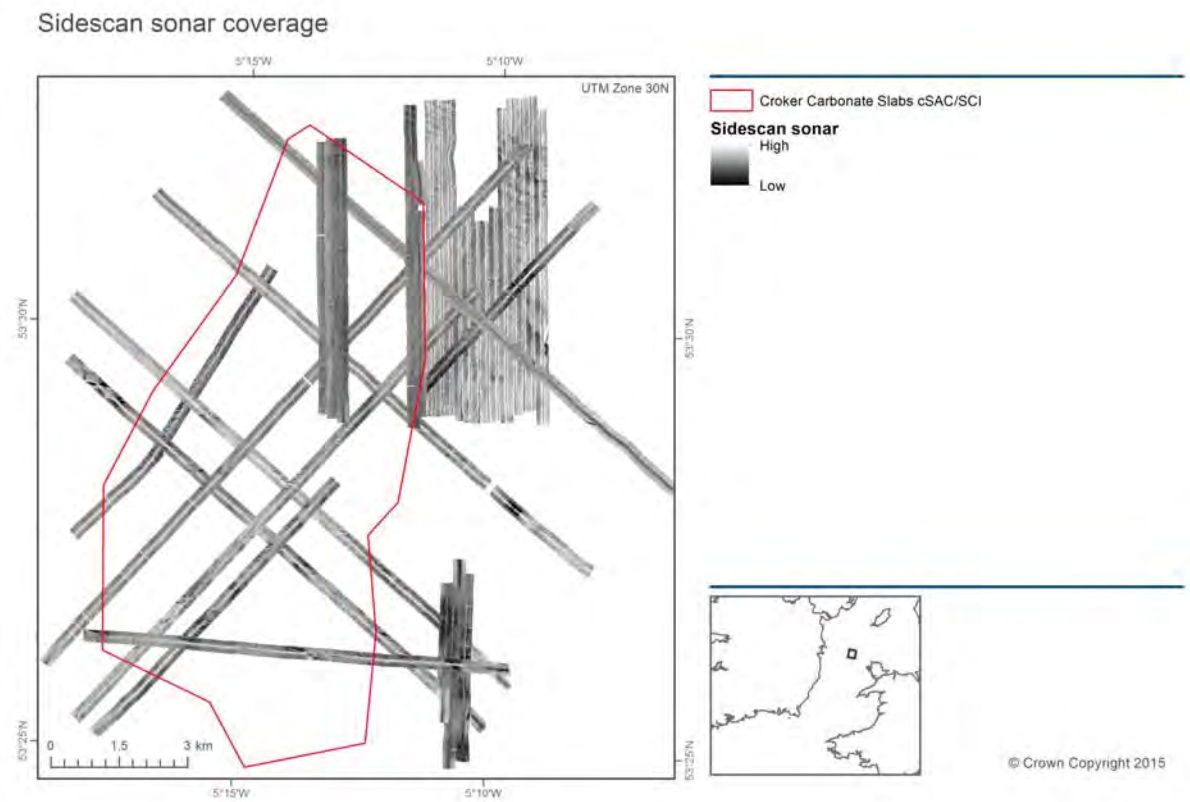

Figure 13. Sidescan sonar lines run on survey CEND23/15.

5.1.1 Sub-bottom profiler (boomer) interpretation

On the profiles the x-axis shows trace numbers (which can be cross-referenced to geographical locations along the profile) and the y-axis shows two-way travel time in milliseconds (msec). For ease of interpretation the profile images have a marked vertical exaggeration.

Profiles were interpreted assuming an acoustic velocity of in seawater 1,500m sec^{-1}, and 1,650m sec^{-1} in near-seabed sediments. The low power (135 joules) profiles provided greater resolution than the higher power (240 J) setting (~45cm compared to ~70cm); also the higher power profiles producing more 'ringing' of the seabed reflection (i.e. more reflections close beneath the seabed were obscured). Sub-seabed penetration of up to 30m was achieved with at low power, deeper penetration being prevented by the first seabed multiple. Theoretically the higher power profiles should achieve greater penetration, however, in practice this was not possible. Because of the range of water depths likely to be encountered along individual survey lines, it was decided to keep the towfish at a constant depth; this depth was not changed between low power and high power lines, so the first seabed multiple affected both sets of profiles at the same sub-seabed depth.

The reflections evident on the profiles are obscured in places by acoustic turbidity, which is commonly attributed to the presence of gas within the sediments; Wingfield *et al* (1990) refers to this as "gas blanking". The presence of gas is further indicated by the lateral variability in the amplitude of some individual reflections; this is referred to as "gas brightening" and suggests an increased concentration of gas within the sediments. Together these features hinder the identification of individual reflections across the profiles.

During interpretation, reference was made to the relevant BGS publications (Wingfield *et al* 1990; Jackson *et al* 1995) in order to place the sediments of this area into an accepted chronostratigraphy. An interpreted section (“Section 1”) through the Quaternary deposits of this study area was included on the British Geological Survey Quaternary Geology map (Wingfield *et al* 1990). Profile SBP009 was run specifically for comparison with this section.

The boomer profiles showed that the area is underlain by multi-layered sediments to a depth of at least 30m (see Figure 14). Comparison with Wingfield *et al.* (1990) suggests that these are from Wave and Bank Facies of the Surface Sands Formation (Holocene) and the Prograded Facies of the Western Irish Sea Formation (Weichselian to Holocene). These are both described as comprising mainly sands. The truncation of reflections along steep seabed slopes demonstrates that the topographic hollows are erosive features.

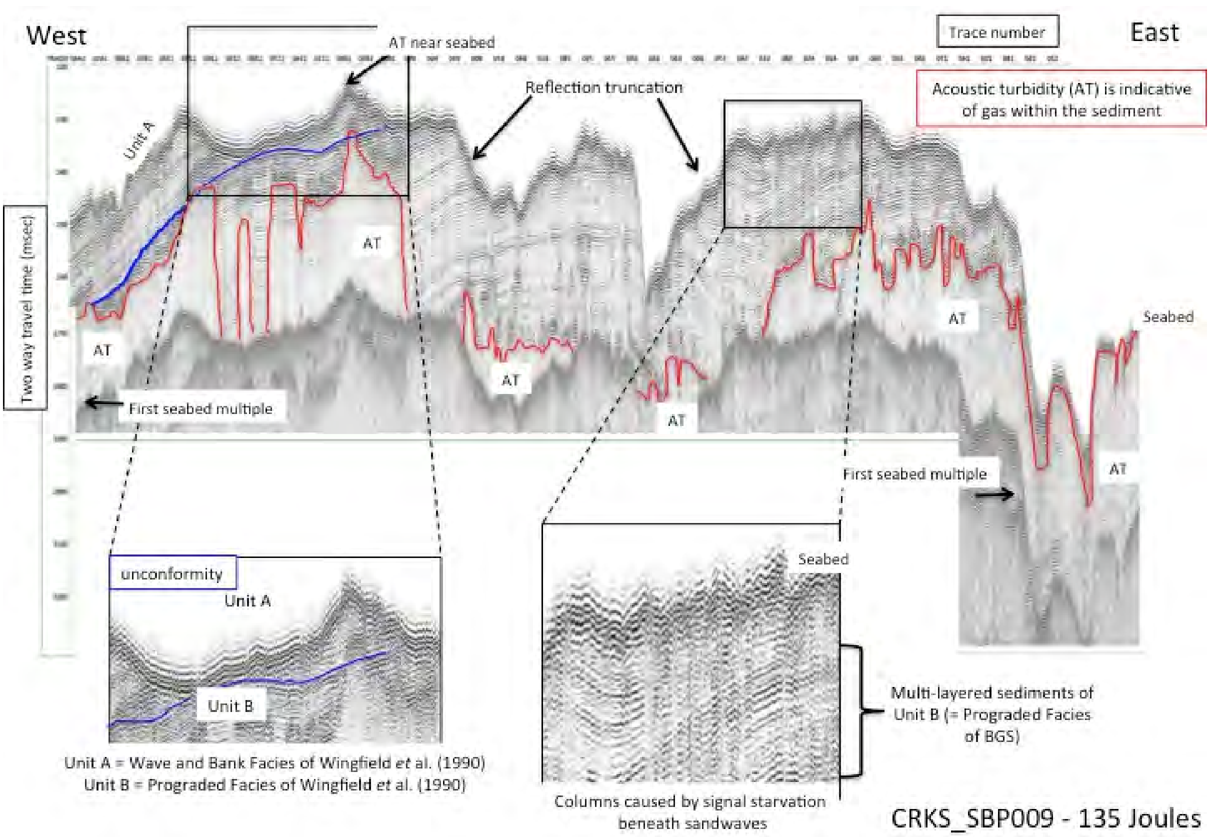

Figure 14. Preliminary interpretation of Boomer Line CRKS_SBP009.

5.2 Drop frame camera transect summaries

Drop frame camera transects were successfully recorded at 128 stations (Figure 15). Note that transect GT133 was recorded twice, once as a 200 m bullring tow and then again following a pre-planned transect line. On four occasions, camera tows had to be abandoned due to adverse weather conditions; conflicting strong winds and currents. These conditions led to poor data quality and some tows were subsequently not completed. The following camera tows (for stations GT012, GT070 and twice for GT122) were re-run once conditions improved. A wide range of broad-scale habitats were identified from real time observations. These varied from sand, coarse or mixed sediments through to moderate energy rock. Representative images of the various habitat types are presented in Appendix 7.

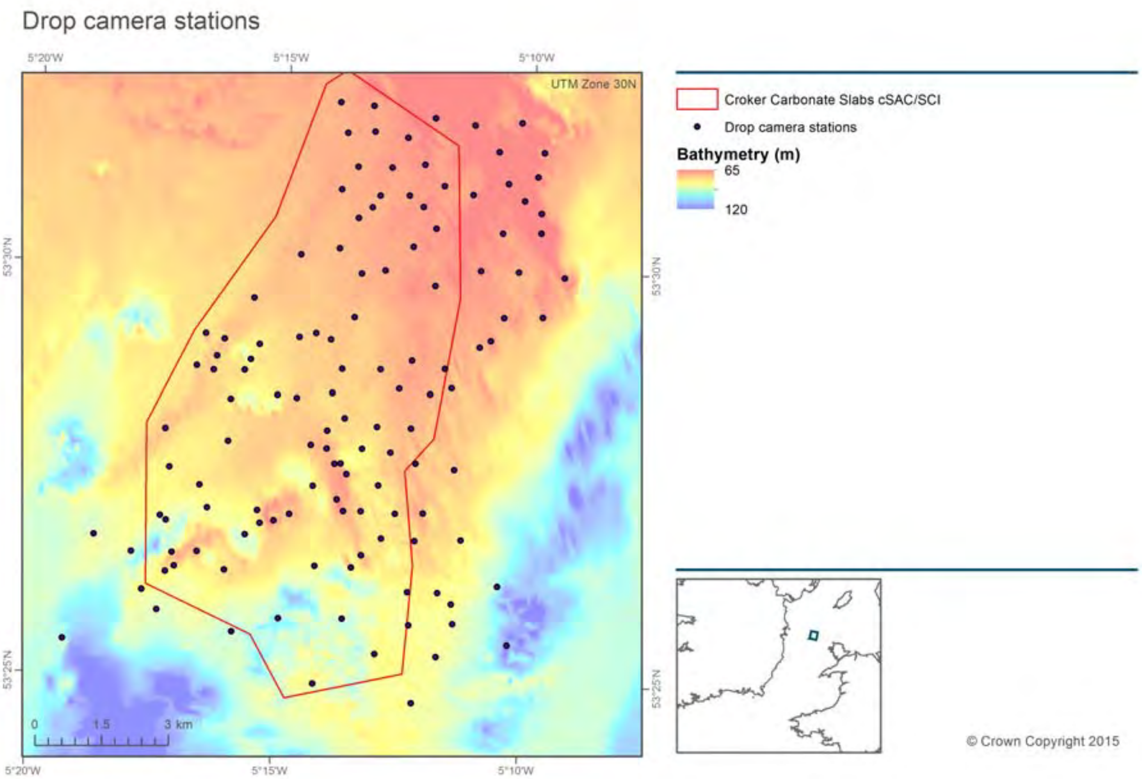

Figure 15. Successful drop camera stations completed on CEND 23/15 in and around Croker Carbonate Slabs cSAC/SCI.

5.3 Habitat descriptions/Initial indication of presence of EUNIS/FOCI

Initial observations of the video data suggested that the EUNIS habitat types listed in Table 5 were present:

Table 5. EUNIS habitat types observed after initial observations.

EUNIS **Habitat Type**	**EUNIS Level 3 Code**
High Energy Circalittoral Rock**	A4.1
Moderate Energy Circalittoral Rock**	A4.2
Low Energy Circalittoral Rock**	A4.3
Subtidal Coarse Sediment	A5.1
Subtidal Sand	A5.2
Subtidal Mud	A5.3
Subtidal Mixed Sediment	A5.4

A possible reef structure was seen at station GT150. Large areas of potential Methane-Derived Authigenic Carbonate (MDAC) were seen at many of the ground truth stations. At two stations, bubbles were seen seeping from the seabed.

5.4 Grab sample summaries

Mini-Hamon grab samples were taken at 56 stations across the site (Figure 16). They were classified as mud, sand, coarse or mixed sediment based on preliminary observations. Day grab samples were taken at three stations. Meiofaunal samples were taken from these three Day grab stations and were provisionally classified as sand or mixed sediment. Representative images are provided in Appendix 8.

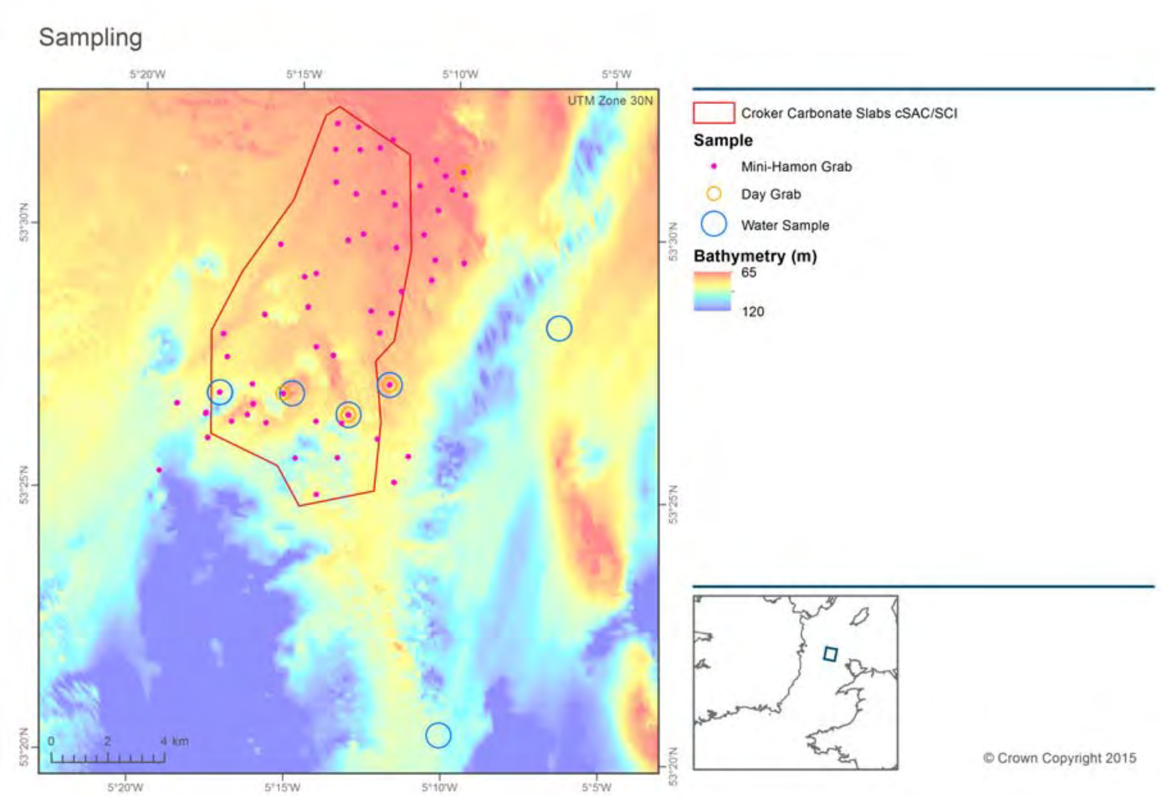

Figure 16. Location of successful mini-Hamon grab, Day grab and water sampling stations completed on CEND 23/15, in and around the Croker Carbonate Slabs cSAC/SCI.

5.5 Methane concentration in the water

5.5.1 METS measurements

The concentration of methane in near-seabed water was measured at 125 of the camera tow stations using a pumped METS methane sensor (Figure 17). Stations with apparent high methane concentrations were selected for water sampling. METS methane sensor output voltages were converted to methane concentrations, and stored prior to plotting as graphs. Basic statistics (range, arithmetic mean and standard deviation) were calculated for each station.

Typically the calculated methane concentrations increased monotonically during individual video transects, suggesting that the instrument was stabilising very slowly. However, values did reduce on some transects, and there was a distinct fall whenever the instrument was returned to deck. When plotted over time there were clear differences in apparent methane concentration between transects, although further analysis is required to assess whether or not these are influenced by, for example, tidal variations (Figure 18 and Figure 19).

Data were recorded at GT028 but rejected. The methane sensor was tested with a butane cigarette lighter mid-survey. The levels of methane were notably higher at GT028 than for all other recordings. Therefore, it was deemed that the METS methane sensor was still being affected by the butane lighter test. The METS methane sensor did not appear to be produce accurate readings until approximately 30 minutes after this test. Data were recorded at GT076, however the pump was not connected due to an error during deployment. Data were also recorded at GT139, however a sand eel became stuck in the orifice of the pump at an unknown point during the tow, potentially preventing water entering the methane sensor. Therefore, the METS sensor data from GT028, GT076 and GT139 should be treated with caution when viewing/interpreting. Data were not recorded at GT136 and GT009 due to a software error.

5.5.2 Water sampling by Niskin bottle

Water samples were collected using a Niskin bottle at three stations within Croker Carbonate Slabs cSAC/SCI, together with one adjacent to this area, to provide a control for the METS methane measurements. Two additional samples were collected from control sites located outside the survey area (Figure 16).

Water samples were collected at the bottom, middle and top of the water column at each station and retained for later analysis onshore.

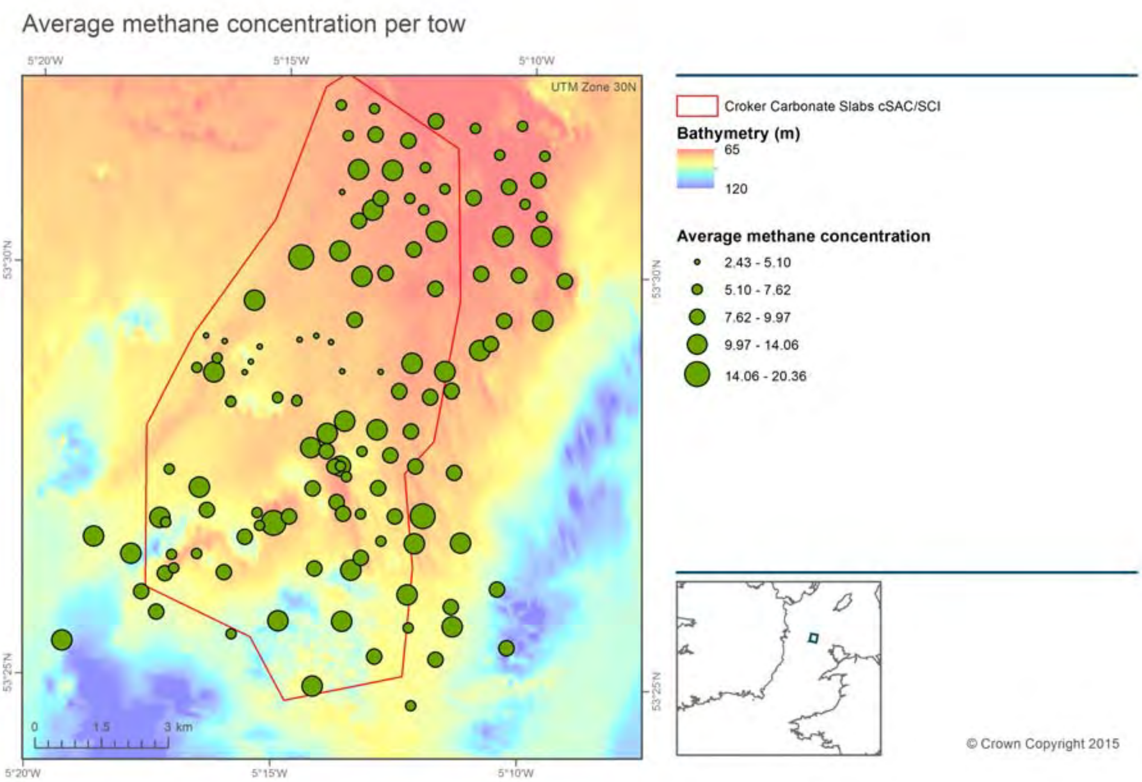

Figure 17. Average methane concentration (nmol/l) recorded from camera transects on CEND 23/15.

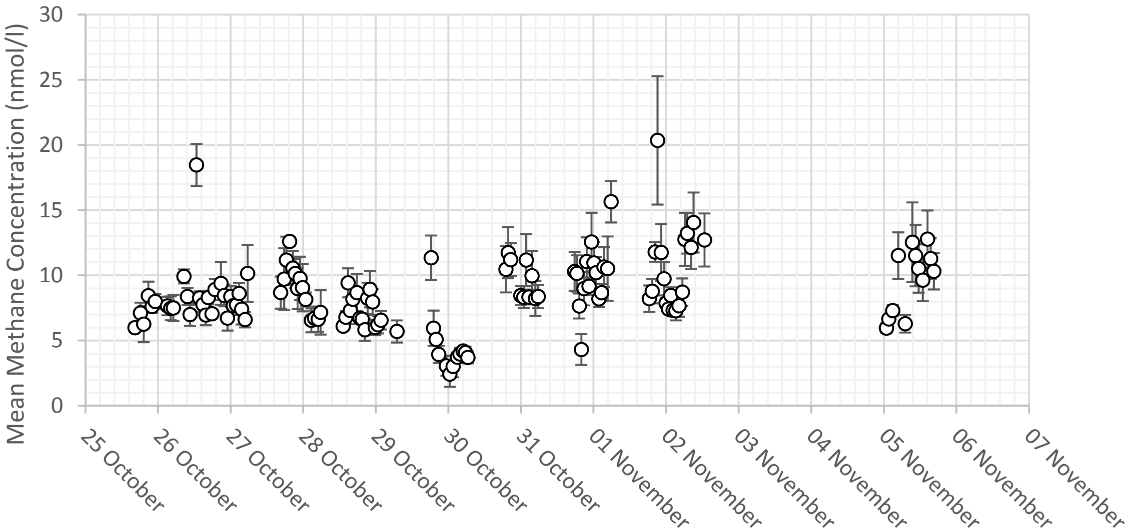

Figure 18. Mean methane concentration against time. Error bars show standard deviation.

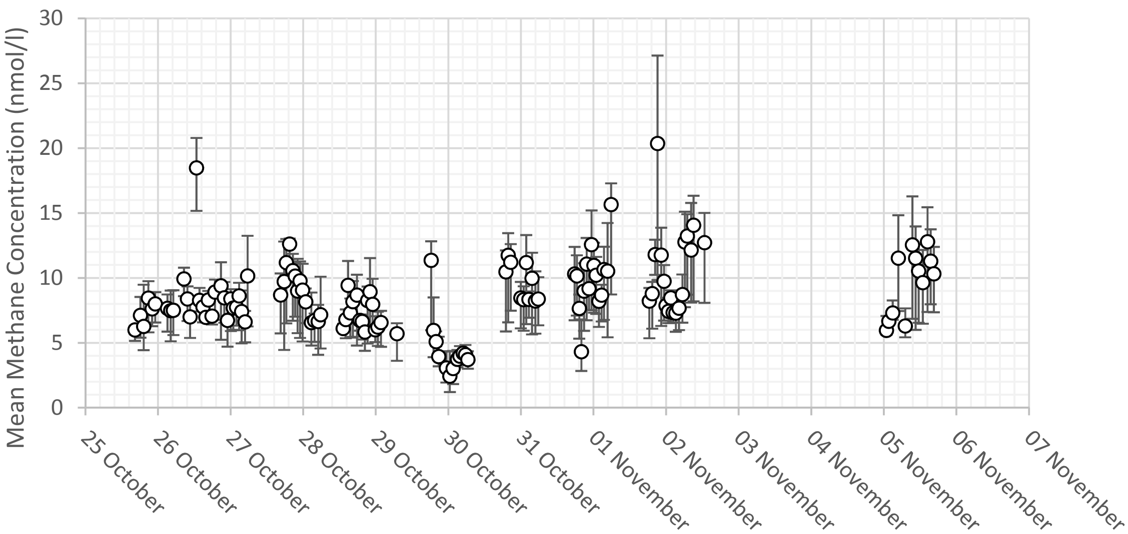

Figure 19. Mean methane concentration against time. Error bars show minimum and maximum values.

5.6 Marine Mammal Observations

Three fully trained members of the survey team (Simeon Archer, James Albrecht and Chris Jenkins) undertook marine mammal observations, as per the JNCC guidance (JNCC 2010), prior to commencement of Boomer firing. Seismic work was only undertaken during day light hours due to static fishing gear within the site.

During the pre-shooting watch on the 27 October a pod of approximately 25 common dolphins were spotted by the marine mammal observer travelling towards the vessel. As the boomer had not commenced firing, the line was postponed and the source remained switched off. The dolphins stayed within the mitigation zone for approximately 1 hour and 20 minutes. Once the dolphins left the mitigation zone a pre-shooting watch of an additional 20 minutes was carried out before beginning operations.

During operations on the 29 October two dolphins were spotted at a distance of 1,500m from the seismic source. As the source was already firing no mitigating action was taken.

The Marine Mammal Observations Report can be found in Appendix 9.

6 Preliminary indications of Methane-Derived Authigenic Carbonate (MDAC) distribution and condition

It is not possible to make a definite identification of methane-derived authigenic carbonate without undertaking laboratory analyses (most importantly carbon isotope analysis) of collected samples. As this was beyond the scope and capabilities of this survey, only preliminary identifications were possible. However, in the light of previous experience at this site and elsewhere, indicators of possible MDAC sites could be distinguished, and individual formations and samples could be identified as 'potential MDAC'.

'Indicators' which provide evidence of the conditions under which MDAC forms include: the presence of shallow gas beneath the seabed, seabed gas seeps (gas bubbles, sulphidic sediments and bacterial mats), and increased methane concentrations in the water column. All of these indicators were seen in at least one location during the survey.

6.1 Acoustic data

Preliminary interpretations of acoustic (echo sounder, MBES, sidescan sonar and boomer) data were undertaken during the survey in order to guide the ground truthing operations by identifying locations in which MDAC was likely to be present. The main indicators that were observed are:

- Acoustic turbidity (an indicator of shallow gas) is visible on boomer records almost throughout the survey area; however, the depth below seabed ranges between ~30m and <2m (see Figure 14). Places where the gas approaches the seabed are likely locations of MDAC formation.
- The nature of the seabed affects the clarity of boomer records. The hardness of MDAC inhibits penetration causing signal starvation in the underlying record, so this can provide evidence of the possible presence of MDAC. However, shell beds and steep sand waves scatter the incident acoustic energy producing similar effects.
- Both low-relief MDAC and high-relief MDAC have characteristic appearances on MBES and sidescan sonar data; these are attributable to the hard substrate of MDAC compared to the seabed sediment types found in this part of the Irish Sea, and the resultant contrast in back-scatter. Although interpretation is somewhat subjective, a combination of MBES and sidescan sonar data was used to identify sites worthy of investigating by ground truthing.
- Gas bubbles rising from seabed seeps present vertically-extended water column targets on acoustic records, most notably echo sounder and sidescan sonar records. Locations at which such targets were identified were prioritised for ground truthing.

6.2 Visual inspection

As well as the extensive occurrences of formations with the appearance of both high-relief and low-relief MDAC identified during the visual surveys (see Appendix 7), other indicators of the presence of methane were (at least provisionally) identified, however they are difficult to identify as the drop frame transits across the seabed:

- Bacterial mats, such as those of the thiotrophic bacterium *Beggiatoa*, appear as white fluffy masses on the seabed. White patches observed on Images taken at Station GT135 have the appearance of bacterial mats.

- A patch of black, possibly sulphidic, sediment was observed at station GT116.
- Gas bubbles rising from the seabed were recorded on video at three locations (GT116, GT135 and GT147).

The above indicators were used to identify grab and water sampling sites.

6.3 Methane concentrations in the water

A considerable range of methane concentrations was recorded across the survey area (Figure 17, Figure 18 and Figure 19). This may be indicative of variable amounts of methane passing through the seabed, inhomogeneity in the water carried across the site by tidal currents, or instrument imprecision. Confirmation (or denial) that absolute methane concentrations were high over the site relative to the control sites awaits analyses of the water samples.

The sites at which the two highest methane concentrations (20.8 nmol/l at GT135 and 27.1 nmol/l at GT147) were recorded by the METS sensor were both locations at which gas bubbles were seen on the video. Station CRKS_GT135 recorded a mean value of 18.48 nmol/l and station CRKS_GT147 recorded a mean value of 20.36 nmol/l (Figure 18 and Figure 19).

6.4 ‘Potential MDAC’ sampling

During mini-Hamon grab operations, samples containing ‘potential MDAC’ were collected from more than 30 stations within and beyond the present cSAC/SCI boundary (Figure 20). The presence of carbonate was demonstrated using HCl (see Section 3.2.2), but verification of the presence of MDAC awaits the results of onshore analyses.

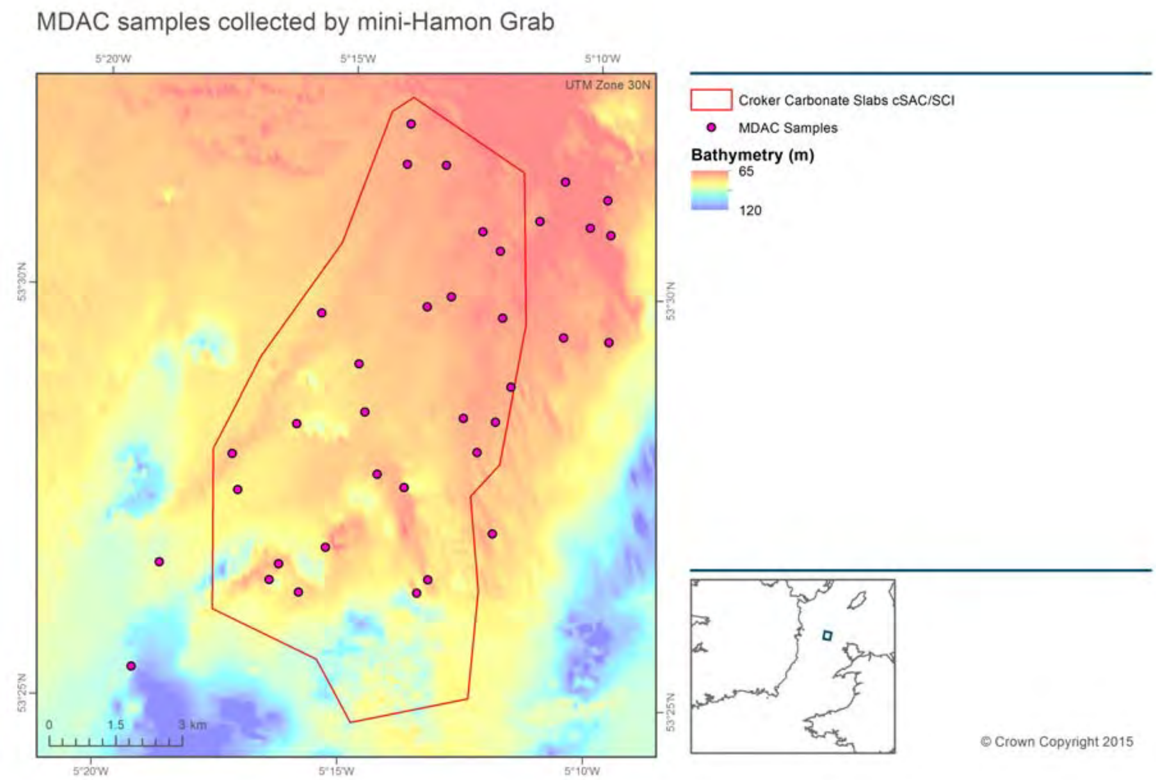

Figure 20. Location of grab samples targeting ‘potential MDAC’ collected on CEND 23/15.

7 Quality Control (QC)

7.1 Bathymetry

For the MBES a patch test and calibration were carried out during the transit to the survey site. For details of the calibration see Appendix 1. Following the calibration, all offsets were applied to the data and the resulting data showed all data from the different lines to be perfectly aligned. Further checks were undertaken during the remainder of the survey where perpendicular survey lines were situated over seabed features. Good alignment was observed in all cases.

7.2 Sidescan sonar

To ensure the highest quality data, the sidescan sonar data collection was started approximately 1km before the start of line. The pitch and roll were monitored throughout the line. The gain was adjusted before the start of each line. At the outset of the survey cable out changes were entered manually into the SiS software. However, from the 1 November cable out changes were automatically detected and appended to the data for layback calculations. This latter method is preferable as it is instantaneous and continuous rather than manual changes that are often made in large steps in cable lengths.

7.3 Sub-bottom profiling

The boomer was most affected by the speed over ground and metocean conditions. The outputs from the boomer were monitored as soon as the boomer started firing before the start of each line. Vessel speed was adjusted to ensure high quality output. Typically this was at 4-5 kts. Vessel speed at the site was notably influenced by the high current speed. To counter this, lines were run in the appropriate direction to ensure the correct speed over ground could be maintained. Boomer lines were run at high and low power to maximise the chance of comprehensive penetration of the sub-bottom (see section 3.1.4 for detail).

7.4 Seabed imagery

Camera stills were examined after each tow. Occasionally photographs were too dark. This was typically because either the drop frame had lifted off the seabed at the moment the photograph was taken, or the flash had not recharged since the previous photograph. Other photographs were occasionally too blurry. This was typically because either the drop frame moved at the moment the photograph was taken, or the concentration of suspended matter in the water column was too high. Photographs that were either too dark or blurry were deleted. Video files were viewed directly after each tow to confirm video data were recorded.

7.5 Benthic sampling

The video footage for each station thought likely to contain MDAC were reviewed on board. The exact location of possible MDAC that looked like it could be sampled with the mini-Hamon grab was noted. The position was then set as a grab target with a 25m bullring in Tower. The mini-Hamon grab was lowered to 10m above the seabed. The vessel was manoeuvred, so that the HiPAP on the mini-Hamon grab showed that the grab was directly above the centre of the bullring. Once in position, the grab was dropped the final 10m to the seabed and the sample recovered. On occasion when the grab was unsuccessful the vessel moved 5m within the bullring and another attempt was made.

7.6 Methane concentrations in the water

In order to validate the data derived from the METS sensor water samples collected by Niskin bottle will be analysed after the survey. The METS sensor was calibrated before the survey, and should not, according to the manufacturer's documentation, require re-calibration for a period of 6 to 12 months.

A sensor test, using a butane cigarette lighter (as recommended by the manufacturer) was undertaken during the survey.

8 Human activity

Initial analysis of the sidescan sonar data revealed two areas of human activity (Figure 21). Site A showed signs of scallop dredging. Site B showed a ship wreck. The drop camera tows also showed occasional signs of marine litter, including ropes and, at one location, an adjustable spanner.

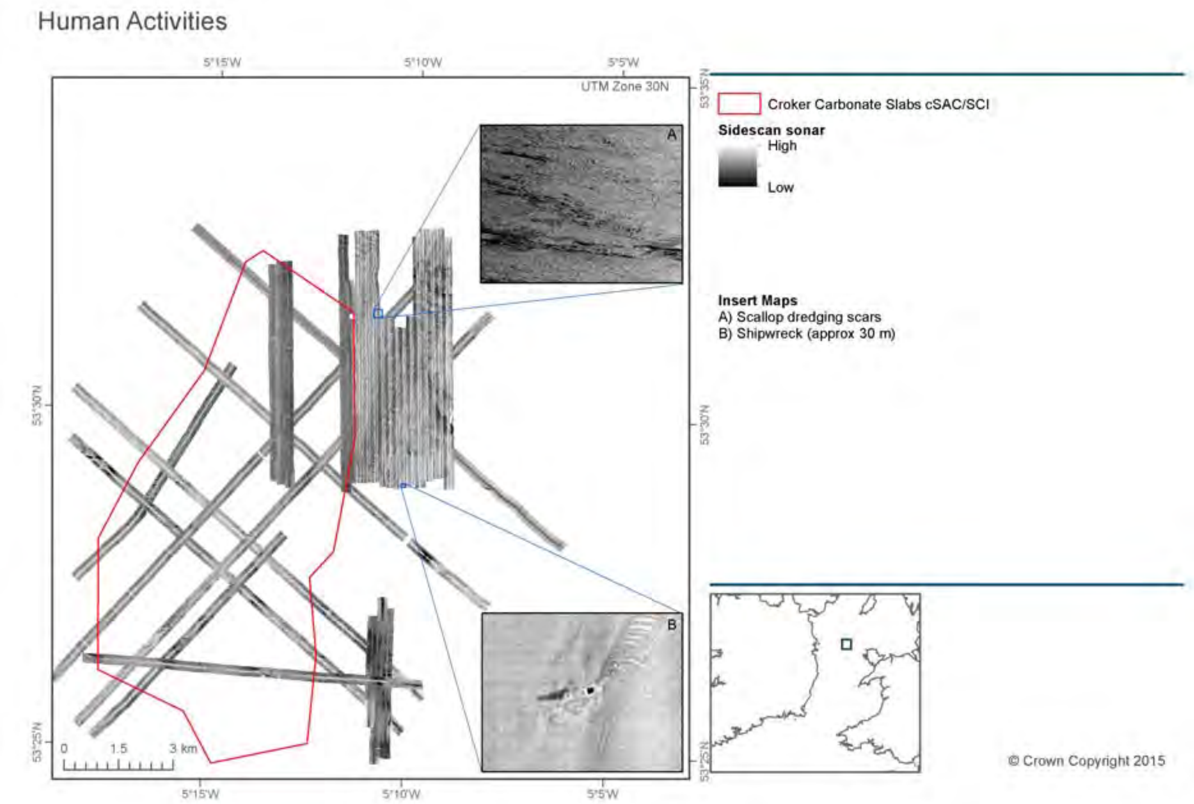

Figure 21. Sidescan sonar evidence of human activities.

Upon liaising with local fisherman we were informed of five pot strings, roughly 500m in length, within and around the site. These pots were set in a west to east orientation to the east and north-east of the survey area. Due to the strong currents within the area, leading to some uncertainty in where the pots lay at the seabed, a 500m exclusion zone was set around the strings. These pots remained for the majority of the survey, but were moved northwards towards the end of the cruise.

9 H&S events

A safety induction to the vessel for scientific staff was carried out at 07:30 on 24 October 2015. A toolbox talk was held at 09:00 followed by a muster station drill at 09:30. During the drill all staff were familiarised with lifeboat deployment and relevant safety equipment. The vessel then left Swansea port at 12:00.

A fire in the galley drill was conducted at 11:00 on 2 November 2015. The drill included deployment and operation of the fire hoses.

There were no health and safety incidents during the survey.

10 References

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Appendix 1. Vessel and equipment used

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 EM3002 swathe bathymetry sounder 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

STR SeaSpyder "Telemetry" Drop Camera System

Telemetry Operation over coaxial cable
18 Mega Pixels Underwater Digital Stills Camera
High Power Camera Flash
20W High Intensity LED Lights x 4
Dual Scaling Subsea Lasers x 4 (Spaced at 17cm)
250 kHz Precision Altimeter
Combined Compass & Depth
STR in-house software

Positioning Software-Tower

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.

Mini-Hamon Grab

The grab system comprised a 0.1 m^2 mini-Hamon grab (Figure 22). On recovery, the grab was emptied into a large plastic tray 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 1mm sieve. The retained >1mm fraction was transferred to a labelled container and preserved in buffered 4% 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 Level 3 and Broadscale Habitat (BSH) sediment class.

Figure 22. Mini-Hamon grab.

Day grab

The grab system comprised a 0.1m^2 Day grab (Figure 23 23).

Figure 23. 0.1m^2 Day grab.

Samples were collected from the planned ground truth stations. Day grabs were only attempted at stations where the drop camera video showed suitable seabed. On recovery, the grab sample surface was photographed and sample depth recorded after which a sub-sample of sediment was taken from the full depth of the sample using a 3cm diameter core. The PSA sub-sample was picked for macrofauna and then stored in a labelled plastic container and frozen ready for transfer to a laboratory ashore. The grab contents were then decanted into a large plastic bin. Benthic fauna were collected by washing the sample with sea-water over a 1mm sieve. The retained >1mm 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 Level 3 and Broadscale Habitat (BSH) sediment class.

Meiofaunal samples were taken using a 3cm diameter core to a depth of 5cm. These samples were placed in a plastic tub and preserved in a solution of 4% formaldehyde without sieving.

Niskin water bottle

A 10 litre Niskin water bottle was used to collect the water samples. Water was transferred to a 0.125l bottle. Water samples were fixed with mercuric chloride and stoppered for storage. Care was taken not to allow air bubbles to form in the liquid, as this would have allowed any methane stored within the liquid to escape prior to analysis.

Sidescan sonar

An Edgetech model 4800MP 300/600 kHz dual frequency digital sidescan was used withTriton ISIS SS-Logger version 7.5 (2012) software.

Simard EK60 Echosounder
Simrad ER60 Scientific Echosounder software version 2.4.0 was used.

Multibeam echosounder (Bathymetry and backscatter)
A Simrad EM2040 operated at 300 kHz was used.

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 V4.1.3	-
Caris HIPS V7.1 SP2 Hotfix 1-5	-
IVS3D Fledermaus GT v7.3.2a	-

Sub-bottom profiler (Boomer)
A Geoforce deep-towed boomer (DTB) was used. This is a towfish-mounted seismic sub-bottom profiler system providing an acoustic signal over the frequency range 0.5 to 8 kHz with a source energy of up to 540 joules powered by a dedicated power system. The towfish is deployed using a dedicated hydraulic winch with a 600m cable, is rated to 300m water depth, and is typically towed at about 4 knots.

In addition to the internal receiver system, there is a separate 10 element, 4.6 m long hydrophone streamer. The received signal is processed and stored in industry-standard (SEGY) format. Screen shots (in JPEG format) can be provided for real-time interpretation. Operating parameters used during this cruise were:

- Source depth: 25m
- Source energy:
  - low power lines: 3 kV (135 joules)
  - high power lines: 4 kV (240 joules)
- Source frequency: 0.5-1.5kHz
- Shot interval: 250 milliseconds
- Survey speed: ~4 knots

METS methane sensor
A METS methane sensor (Franatech GMBH, Germany) was used. This is an underwater methane detector, which uses a gas-permeable membrane, and a tin oxide semiconductor detector. Seawater from online flow is continuously pumped over the detector at a constant rate.

The METS methane sensor provides continuous measurements output as a voltage which is subsequently recalculated as a methane concentration. The manufacturer’s specification states that the equipment is suitable in methane concentrations in the range 1 to 500 nmol per litre, with a reaction time of a 10 seconds. Anticipated background methane concentrations in the Irish Sea are in the range 2-3 nmol per litre.

Figure 24. METS methane sensor (Franatech GMBH, Germany) Underwater methane sensor.

Appendix 2. Equipment calibration

GPS positions and corrections

GPS fixes were recorded using the Tower Navigation system on RV *Cefas Endeavour*. This records the latitude/longitude position of the side gantry from which the sampling equipment was 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 mini-Hamon grab and drop camera systems were always deployed from the side gantry and appended with a beacon for HiPAP. This data is data is checked post deployment for inconsistencies. Where large errors are recorded the ships side gantry position is used preferentially, though an offset of up to 10m can be observed in strong tides. The side gantry position was used for recording day grab positions. In the case of the drop camera, this could be accounted for by comparing the logged position of the side gantry steer point with position calculated by the ships High Precision Acoustic Positioning (HiPAP) system. Where large differences were observed between the position logged using the side gantry steer point and the HiPAP position, the HiPAP position was considered to be most accurate.

GPS positional fixes were taken, for both the side gantry steer point and the position derived from HiPAP, continuously at five second intervals throughout the tow. This allowed the position of the camera system above the seabed to be cross referenced with the time at which the still image was captured to accurately determine the position of each still image acquired during the drop camera transect.

Calibration patch test report, Kongsberg EM2040 multibeam

A patch test took place on the evening of Saturday 24 October 2015 during off southwest Wales, during transit from Swansea to the main survey site. A charted wreck close to the planned transit plan was chosen. The wreck was standing proud almost 10 metres from the surrounding flat seabed, making it a suitable multibeam patch test site. The blade was deployed to 3.2m. Three parallel lines were surveyed at constant speed, in each direction. This provided sufficient data to calibrate pitch, roll and yaw offsets. Lines were not run for latency as 1PPS (Pulse Per Second) is being used.

On completion of data collection, all survey data were loaded in Caris HIPS. The Caris HIPS calibration tool was used to determine offsets and were applied to in the Caris vessel configuration file (Endeavour_EM2040.hvf).

The following correction factors were obtained from the patch test:
Pitch correction: -0.46 degrees
Roll Correction: 0.0 degrees
Yaw: 0.28 degrees

Following the calibration, all offsets were applied to the data and the resulting data showed all data from the different lines to be perfectly aligned. Further checks were undertaken during the remainder of the survey where perpendicular survey lines were situated over seabed features. Good alignment was observed in all cases.

Simrad EK60 Echosounder

The EK60 was calibrated at the start of each day of acoustical surveying. A CTD (Conductivity, Temperature, and Depth) profile was recorded each day of acoustical surveying using a CTD micrologger. The CTD drop was made before acoustical surveying began. Wherever possible the CTD drop was made at the deepest point near to the start of the first line of the day. The CTD data was used to update the EK60 software with temperature, salinity and speed of sound.

METS

The methane sensor was calibrated by the manufacturers Franatech prior to delivery. The calibration was performed by diluting a known concentration and of methane into a known volume of water to provide a test solution at a defined temperature. This gives the coefficients which are applied in the conversion formula to transform sensor volts into nanomoles per litre.

During the deployment the sensor volts were logged along with water temperature and location/time on the boat to allow later processing into absolute values. The METS methane sensor used the following formula:

Formula
Type: Methane Sensor METS
Serial number: 1594

$$\mathrm{c} = \exp\left[1.618 * ln\left\{\left(0.106 + 0.330 * exp\frac{-V_t}{0.510}\right) * \left(\frac{1}{V_{CH4}} - \frac{1}{-1.217 + 7.005 * exp\frac{-V_t}{1.148}}\right)\right\}\right]$$

$$t = (V_t * 22.15) - 5.35$$

c = methane concentration [nmol/l]
t = gas temperature [°C]
V_{CH4} = methane voltage [V]
V_t = temperature voltage [V]

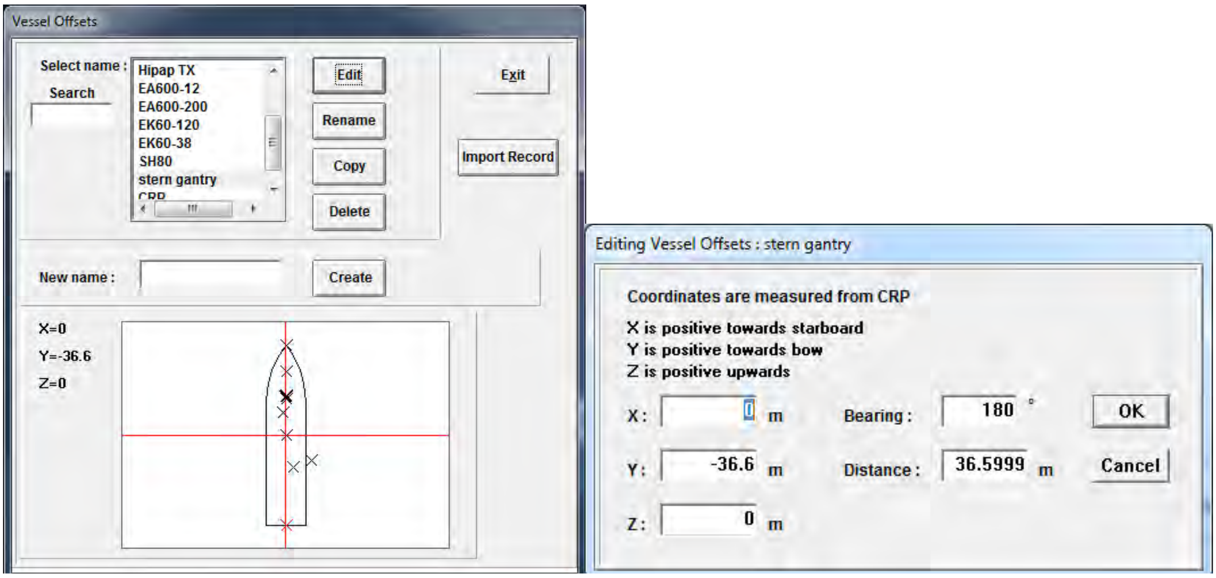
Methane range: 1 nmol/l - 500 nmol/l
Temperature range: +2°C to +20 °C

Calibrator: J.G. Date: 14 October 2015

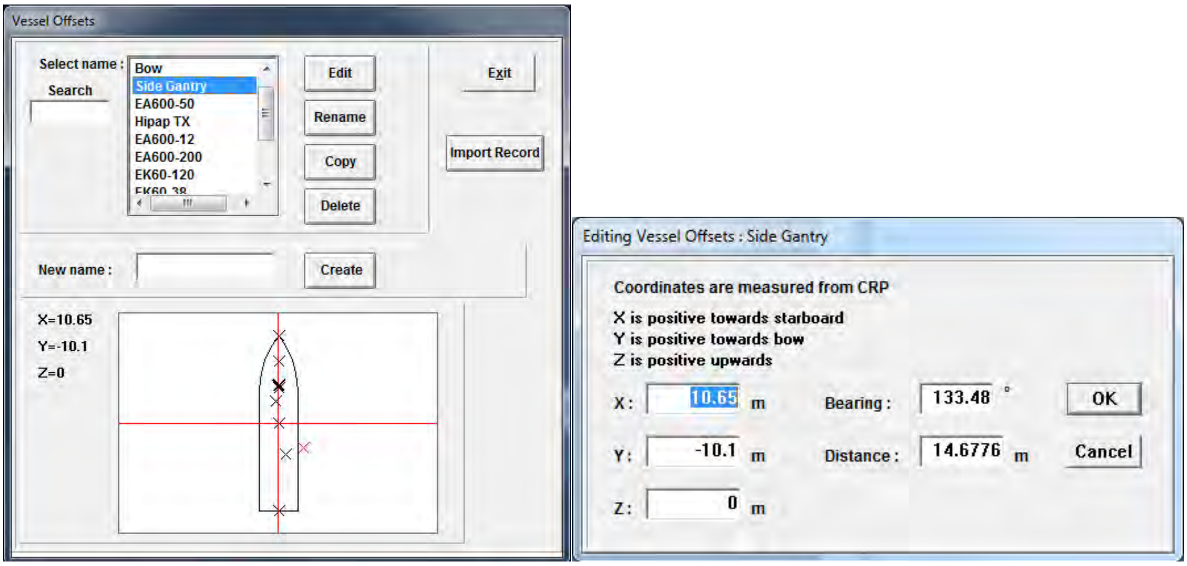
Appendix 3. Offsets

The following vessel offsets were used to calculate the true positions of equipment deployed from the RV *Cefas Endeavour*.

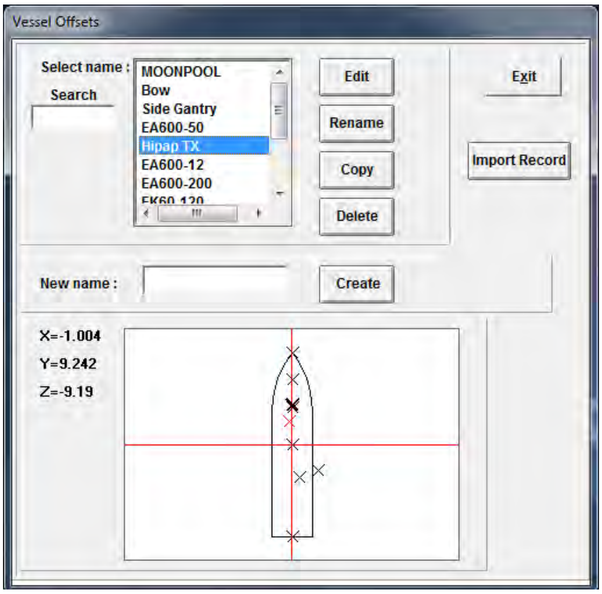
Stern Gantry

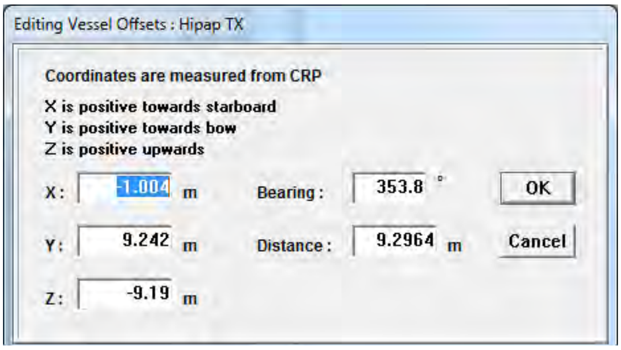


Side Gantry



HiPAP


Vessel Offsets
Select name :
Search
MOONPOOL
Bow
Side Gantry
EA600-50
Hipap TX
EA600-12
EA600-200
Edit
Rename
Copy
Delete
Exit
Import Record
New name :
Create
X=-1.004
Y=9.242
Z=-9.19


Editing Vessel Offsets : Hipap TX
Coordinates are measured from CRP
X is positive towards starboard
Y is positive towards bow
Z is positive upwards
X : -1.004 m
Y : 9.242 m
Z : -9.19 m
Bearing : 353.8 °
Distance : 9.2964 m
OK
Cancel

Appendix 4. Breakdown of survey operation time

Table 6. Breakdown of survey operations.

Action	Total	Remark
SeaSpyder Drop Camera transects	128	No. of camera transects
Sidescan Edgetech 300/600kHz	320	No. of line kilometres
Deep-tow Huntec Boomer	180	No of line kilometres (combination of low power (135J) and high power (240J))
Mini-Hamon grab ($0.1m^2$)	56	No. of samples
Day grab ($0.1m^2$)	10	No. of samples
Water sample (Niskin bottle & data logger)	18	Water sample taken at seabed, mid water column and just below sea surface

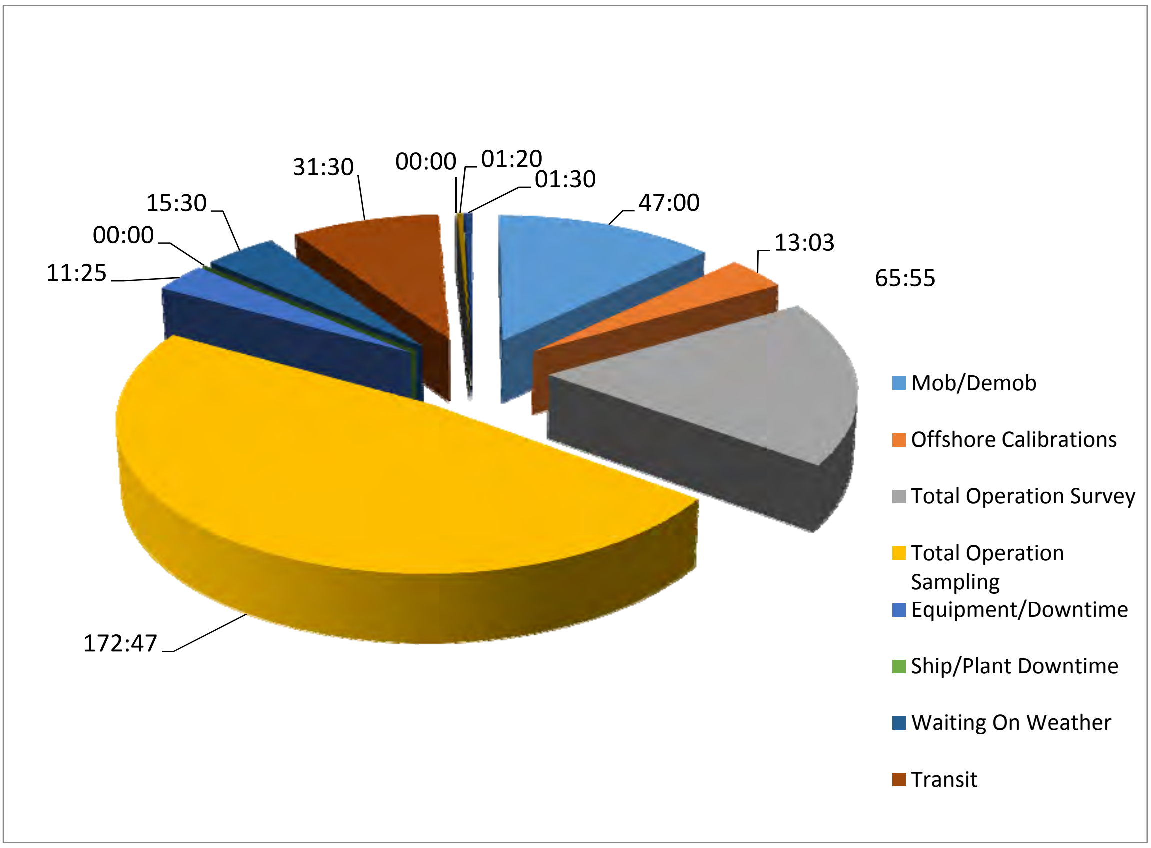


Figure 25. Summary of operations on CEND23/15. Labels show time in hours.

Appendix 5. Copy of daily progress reports

Original content was created pre-GDPR and has been removed as it contained personal information. No scientific or technical content has been removed.

Appendix 6. Survey metadata

Table 7. Survey metadata output from Digilog database for survey CEND23/15. Station No is a sequential event number for the survey, so changes each time a new gear is used or a new location is sampled. Station Code is used to identify the location of the sampling station. CTD = CTD Micrologger, MB2 = Simrad EM2040 multibeam, DC = Drop Camera, EK60 = Echosounder, HG = mini-Hamon Grab, DG = Day Grab, SBP = Sub-bottom Profiler, NWB = Niskin Water Bottle, SS7 = EdgeTech 4200FS Sidescan Sonar, SOL = Start of Line, EOL = End of Line, NS = No Sample. Latitude and longitude for HG, DG and DC were taken from HiPAP; CTD and NWB were taken from side gantry; whilst SSS, MBES, EK60 and SBP were recorded from the central reference point.

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
24/10/2015	1	CAL_SVP	CTD	54	A1	18:46	51.47438	-4.95098	
24/10/2015	2	MBES_CAL	MB2		MBES_CAL1	20:07	51.47438	-4.93490	SOL
24/10/2015	2	MBES_CAL	MB2		MBES_CAL1	20:09	51.47438	-4.94001	EOL
24/10/2015	2	MBES_CAL	MB2		MBES_CAL2	19:27	51.47438	-4.93491	SOL
24/10/2015	2	MBES_CAL	MB2		MBES_CAL2	19:30	51.47438	-4.93950	EOL
24/10/2015	2	MBES_CAL	MB2		MBES_CAL2	19:38	51.47438	-4.94016	SOL
24/10/2015	2	MBES_CAL	MB2		MBES_CAL2	19:40	51.47438	-4.93505	EOL
24/10/2015	2	MBES_CAL	MB2		MBES_CAL1	19:48	51.47438	-4.93587	SOL
24/10/2015	2	MBES_CAL	MB2		MBES_CAL1	19:50	51.47438	-4.93919	EOL
24/10/2015	2	MBES_CAL	MB2		MBES_CAL3	19:57	51.47438	-4.93920	SOL
24/10/2015	2	MBES_CAL	MB2		MBES_CAL3	19:59	51.47438	-4.93523	EOL
25/10/2015	3	CTD001	CTD	80	A1	07:17	51.47438	-5.30709	
25/10/2015	5	CRKS_GT008	DC	75	A1	16:12	51.47438	-5.27679	SOL
25/10/2015	5	CRKS_GT008	DC	75	A1	16:42	51.47438	-5.27316	EOL
25/10/2015	6	CRKS_GT075	DC	79	A1	18:01	51.47438	-5.28437	SOL
25/10/2015	6	CRKS_GT075	DC	79	A1	18:21	51.47438	-5.28167	EOL
25/10/2015	7	CRKS_GT125	DC	82	A1	19:02	51.47438	-5.28525	SOL
25/10/2015	7	CRKS_GT125	DC	82	A1	19:27	51.47438	-5.28553	EOL
25/10/2015	8	CRKS_GT010	DC	89	A1	20:37	51.47438	-5.28735	SOL
25/10/2015	8	CRKS_GT010	DC	89	A1	20:58	51.47438	-5.28968	EOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
25/10/2015	9	CRKS_GT124	DC	103	A1	21:52	51.47438	-5.28757	SOL
25/10/2015	9	CRKS_GT124	DC	103	A1	22:12	51.47438	-5.28702	EOL
25/10/2015	10	CRKS_GT077	DC	89	A1	22:54	51.47438	-5.27381	SOL
25/10/2015	10	CRKS_GT077	DC	89	A1	23:14	51.47438	-5.27131	EOL
25/10/2015	11	CRKS_GT012	DC	76	A1				NS
26/10/2015	12	CRKS_GT082	DC	85	A1	02:58	53.43954	-5.23685	SOL
26/10/2015	12	CRKS_GT082	DC	85	A1	03:16	53.44038	-5.23888	EOL
26/10/2015	13	CRKS_GT126	DC	88	A1	03:57	53.44794	-5.25583	SOL
26/10/2015	13	CRKS_GT126	DC	88	A1	04:24	53.44986	-5.25776	EOL
26/10/2015	14	CRKS_GT012	DC	71	A1	04:57	53.44393	-5.27151	SOL
26/10/2015	14	CRKS_GT012	DC	71	A1	05:09	53.44505	-5.27225	EOL
26/10/2015	15	CRKS_GT014	DC	85	A1	08:24	53.43826	-5.26736	SOL
26/10/2015	15	CRKS_GT014	DC	85	A1	08:42	53.43865	-5.26443	EOL
26/10/2015	16	CRKS_GT017	DC	102	A1	09:32	53.44551	-5.26073	SOL
26/10/2015	16	CRKS_GT017	DC	102	A1	09:53	53.44353	-5.26041	EOL
26/10/2015	17	CRKS_GT020	DC	72	A1	10:25	53.45050	-5.25681	SOL
26/10/2015	17	CRKS_GT020	DC	72	A1	10:45	53.45034	-5.25368	EOL
26/10/2015	18	CRKS_GT135	DC	70	A1	12:28	53.44851	-5.25115	SOL
26/10/2015	18	CRKS_GT135	DC	70	A1	12:49	53.44827	-5.25406	EOL
26/10/2015	19	CRKS_GT023	DC	77	A1	13:27	53.44991	-5.24599	SOL
26/10/2015	19	CRKS_GT023	DC	77	A1	13:57	53.45074	-5.24203	EOL
26/10/2015	20	CRKS_GT116	DC	75	A1	14:39	53.44199	-5.22118	SOL
26/10/2015	20	CRKS_GT116	DC	75	A1	14:58	53.44318	-5.21919	EOL
26/10/2015	21	CRKS_GT043	DC	82	A1	15:38	53.44548	-5.21462	SOL
26/10/2015	21	CRKS_GT043	DC	82	A1	15:58	53.44612	-5.21859	EOL
26/10/2015	22	CRKS_GT053	DC	80	A1	16:26	53.45060	-5.21014	SOL
26/10/2015	22	CRKS_GT053	DC	80	A1	16:46	53.45227	-5.21020	EOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
26/10/2015	23	CRKS_GT037	DC	84	A1	17:40	53.45086	-5.22175	SOL
26/10/2015	23	CRKS_GT037	DC	84	A1	18:00	53.45207	-5.21978	EOL
26/10/2015	24	CRKS_GT132	DC	70	A1	18:39	53.45081	-5.22767	SOL
26/10/2015	24	CRKS_GT132	DC	70	A1	18:59	53.45357	-5.22755	EOL
26/10/2015	25	CRKS_GT006	DC	73	A1	20:31	53.45315	-5.23003	SOL
26/10/2015	25	CRKS_GT006	DC	73	A1	21:05	53.45589	-5.23104	EOL
26/10/2015	26	CRKS_GT026	DC	87	A1	21:44	53.45574	-5.23825	SOL
26/10/2015	26	CRKS_GT026	DC	87	A1	22:05	53.45733	-5.23873	EOL
26/10/2015	27	CRKS_GT030	DC	76	A1	22:42	53.45834	-5.22699	SOL
26/10/2015	27	CRKS_GT030	DC	76	A1	23:12	53.45607	-5.22643	EOL
26/10/2015	28	CRKS_GT044	DC	82	A1	23:53	53.45623	-5.21614	SOL
26/10/2015	28	CRKS_GT044	DC	82	A1	00:13	53.45789	-5.21578	EOL
27/10/2015	29	CRKS_GT093	DC	77	A1	00:41	53.46085	-5.20369	SOL
27/10/2015	29	CRKS_GT093	DC	77	A1	01:03	53.45953	-5.20569	EOL
27/10/2015	30	CRKS_GT099	DC	80	A1	01:45	53.45980	-5.19059	SOL
27/10/2015	30	CRKS_GT099	DC	80	A1	02:07	53.46109	-5.18849	EOL
27/10/2015	31	CRKS_GT054	DC	75	A1	02:37	53.46291	-5.21226	SOL
27/10/2015	31	CRKS_GT054	DC	75	A1	02:58	53.46294	-5.20925	EOL
27/10/2015	32	CRKS_GT038	DC	84	A1	03:26	53.46356	-5.22199	SOL
27/10/2015	32	CRKS_GT038	DC	84	A1	03:48	53.46176	-5.22208	EOL
27/10/2015	33	CRKS_GT133	DC	80	A1	04:39	53.46045	-5.22903	SOL
27/10/2015	33	CRKS_GT133	DC	80	A1	04:53	53.45971	-5.22757	EOL
27/10/2015	34	CRKS_GT133	DC	73	A1	05:12	53.46253	-5.23108	SOL
27/10/2015	34	CRKS_GT133	DC	73	A1	06:00	53.45825	-5.22636	EOL
27/10/2015	35	CTD002	CTD	125	A1	07:18	53.42809	-5.16242	
27/10/2015	36	CRKS_SSN08	EK60		CRKS_SSN08	11:32	53.45721	-5.18142	EOL
27/10/2015	36	CRKS_SSN08	MB2		CRKS_SSN08	11:04	53.41596	-5.18092	SOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
27/10/2015	36	CRKS_SSN08	SS7		CRKS_SSN08	11:32	53.41596	-5.18092	EOL
27/10/2015	36	CRKS_SSN08	MB2		CRKS_SSN08	11:32	53.45721	-5.18142	EOL
27/10/2015	36	CRKS_SSN08	SS7		CRKS_SSN08	11:04	53.45721	-5.18142	SOL
27/10/2015	36	CRKS_SSN08	EK60		CRKS_SSN08	11:04	53.41596	-5.18092	SOL
27/10/2015	37	CRKS_SSN_TRANSIT	MB2		TRANSIT	11:36	53.45938	-5.18298	SOL
27/10/2015	37	CRKS_SSN_TRANSIT	SS7		TRANSIT	11:36	53.45938	-5.18298	SOL
27/10/2015	37	CRKS_SSN_TRANSIT	SS7		TRANSIT	11:50	53.47916	-5.19316	EOL
27/10/2015	37	CRKS_SSN_TRANSIT	MB2		TRANSIT	11:50	53.47916	-5.19316	EOL
27/10/2015	37	CRKS_SSN_TRANSIT	EK60		TRANSIT	11:36	53.45938	-5.18298	SOL
27/10/2015	37	CRKS_SSN_TRANSIT	EK60		TRANSIT	11:50	53.47916	-5.19316	EOL
27/10/2015	38	CRKS_SSN04	SS7		CRKS_SSN04	11:50	53.48305	-5.19349	SOL
27/10/2015	38	CRKS_SSN04	MB2		CRKS_SSN04	12:42	53.48305	-5.19349	EOL
27/10/2015	38	CRKS_SSN04	SS7		CRKS_SSN04	12:42	53.55116	-5.19839	EOL
27/10/2015	38	CRKS_SSN04	MB2		CRKS_SSN04	11:50	53.55116	-5.19839	SOL
27/10/2015	38	CRKS_SSN04	EK60		CRKS_SSN04	11:50	53.48305	-5.19349	SOL
27/10/2015	38	CRKS_SSN04	EK60		CRKS_SSN04	12:42	53.55116	-5.19839	EOL
27/10/2015	39	CRKS_SSN04	SS7		CRKS_SSN04_-150	14:32	53.53200	-5.19471	SOL
27/10/2015	39	CRKS_SSN04	MB2		CRKS_SSN04_-150	14:32	53.53200	-5.19471	SOL
27/10/2015	39	CRKS_SSN04	MB2		CRKS_SSN04_-150	15:00	53.48187	-5.19110	EOL
27/10/2015	39	CRKS_SSN04	SS7		CRKS_SSN04_-150	15:00	53.48187	-5.19110	EOL
27/10/2015	39	CRKS_SSN04	EK60		CRKS_SSN04_-150	15:00	53.53200	-5.19471	EOL
27/10/2015	39	CRKS_SSN04	EK60		CRKS_SSN04_-150	14:32	53.48187	-5.19110	SOL
27/10/2015	40	CRKS_GT005	DC	71	A1	16:21	53.46034	-5.23109	SOL
27/10/2015	40	CRKS_GT005	DC	71	A1	16:42	53.46093	-5.22828	EOL
27/10/2015	41	CRKS_GT027	DC	75	A1	17:32	53.46339	-5.23390	SOL
27/10/2015	41	CRKS_GT027	DC	75	A1	17:52	53.46186	-5.23273	EOL
27/10/2015	42	CRKS_GT083	DC	76	A1	18:13	53.46399	-5.23932	SOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
27/10/2015	42	CRKS_GT083	DC	76	A1	18:36	53.46205	-5.23909	EOL
27/10/2015	43	CRKS_GT131	DC	74	A1	19:00	53.46695	-5.23396	SOL
27/10/2015	43	CRKS_GT131	DC	74	A1	19:51	53.46368	-5.23378	EOL
27/10/2015	44	CRKS_GT031	DC	81	A1	20:23	53.46957	-5.22812	SOL
27/10/2015	44	CRKS_GT031	DC	81	A1	20:44	53.46785	-5.22817	EOL
27/10/2015	45	CRKS_GT045	DC	82	A1	21:10	53.46801	-5.21711	SOL
27/10/2015	45	CRKS_GT045	DC	82	A1	21:31	53.46969	-5.21696	EOL
27/10/2015	46	CRKS_GT060	DC	77	A1	21:55	53.46791	-5.20554	SOL
27/10/2015	46	CRKS_GT060	DC	77	A1	22:20	53.46993	-5.20517	EOL
27/10/2015	47	CRKS_GT100	DC	80	A1	22:43	53.47623	-5.19220	SOL
27/10/2015	47	CRKS_GT100	DC	80	A1	23:09	53.47518	-5.18943	EOL
27/10/2015	48	CRKS_GT066	DC	76	A1	23:34	53.47485	-5.19943	SOL
27/10/2015	48	CRKS_GT066	DC	76	A1	23:58	53.47290	-5.19957	EOL
28/10/2015	49	CRKS_GT055	DC	75	A1	00:35	53.47588	-5.20995	SOL
28/10/2015	49	CRKS_GT055	DC	75	A1	01:03	53.47388	-5.21203	EOL
28/10/2015	50	CRKS_GT028	DC	81	A1	01:30	53.47462	-5.23255	SOL
28/10/2015	50	CRKS_GT028	DC	81	A1	01:50	53.47385	-5.23504	EOL
28/10/2015	51	CRKS_GT024	DC	78	A1	02:21	53.47337	-5.24453	SOL
28/10/2015	51	CRKS_GT024	DC	78	A1	03:02	53.47688	-5.24394	EOL
28/10/2015	52	CRKS_GT080	DC	82	A1	03:35	53.47385	-5.25104	SOL
28/10/2015	52	CRKS_GT080	DC	82	A1	03:54	53.47546	-5.25127	EOL
28/10/2015	53	CRKS_GT015	DC	79	A1	04:46	53.47279	-5.26691	SOL
28/10/2015	53	CRKS_GT015	DC	79	A1	05:07	53.47418	-5.26866	EOL
28/10/2015	54	CRKS_GT127	DC	78	A1	05:33	53.47936	-5.27877	SOL
28/10/2015	54	CRKS_GT127	DC	78	A1	05:56	53.47748	-5.27793	EOL
28/10/2015	55	CTD003	CTD	100	A1	07:01	53.42557	-5.16422	
28/10/2015	56	CRKS_SSN08	MB2		CRKS_SSN08-150	08:50	53.41547	-5.17824	EOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
28/10/2015	56	CRKS_SSN08	MB2		CRKS_SSN08-150	08:31	53.45156	-5.17841	SOL
28/10/2015	56	CRKS_SSN08	MB2		CRKS_SSN08-300	10:09	53.45232	-5.17655	EOL
28/10/2015	56	CRKS_SSN08	MB2		CRKS_SSN08-300	09:36	53.41221	-5.17603	SOL
28/10/2015	56	CRKS_SSN08	MB2		CRKS_SSN08-450	10:57	53.41738	-5.17379	EOL
28/10/2015	56	CRKS_SSN08	MB2		CRKS_SSN08-450	10:31	53.45473	-5.17406	SOL
28/10/2015	56	CRKS_SSN08	SS7		CRKS_SSN08-150	08:31	53.41547	-5.17824	SOL
28/10/2015	56	CRKS_SSN08	EK60		CRKS_SSN08-150	08:31	53.41547	-5.17824	SOL
28/10/2015	56	CRKS_SSN08	SS7		CRKS_SSN08-150	08:50	53.45156	-5.17841	EOL
28/10/2015	56	CRKS_SSN08	SS7		CRKS_SSN08-300	09:36	53.45232	-5.17655	SOL
28/10/2015	56	CRKS_SSN08	EK60		CRKS_SSN08-150	08:50	53.45156	-5.17841	EOL
28/10/2015	56	CRKS_SSN08	SS7		CRKS_SSN08-300	10:09	53.41221	-5.17603	EOL
28/10/2015	56	CRKS_SSN08	EK60		CRKS_SSN08-300	09:36	53.45232	-5.17655	SOL
28/10/2015	56	CRKS_SSN08	SS7		CRKS_SSN08-450	10:31	53.41738	-5.17379	SOL
28/10/2015	56	CRKS_SSN08	EK60		CRKS_SSN08-300	10:09	53.41221	-5.17603	EOL
28/10/2015	56	CRKS_SSN08	EK60		CRKS_SSN08-450	10:31	53.41738	-5.17379	SOL
28/10/2015	56	CRKS_SSN08	SS7		CRKS_SSN08-450	10:57	53.45473	-5.17406	EOL
28/10/2015	56	CRKS_SSN08	EK60		CRKS_SSN08-450	10:57	53.45473	-5.17406	EOL
28/10/2015	57	CRKS_SSN02	MB2		CRKS_SSN02_-450	12:10	53.48320	-5.21684	EOL
28/10/2015	57	CRKS_SSN02	MB2		CRKS_SSN02_-450	11:28	53.54061	-5.22086	SOL
28/10/2015	57	CRKS_SSN02	SS7		CRKS_SSN02_-450	11:28	53.48320	-5.21684	SOL
28/10/2015	57	CRKS_SSN02	EK60		CRKS_SSN02_-450	11:28	53.48320	-5.21684	SOL
28/10/2015	57	CRKS_SSN02	SS7		CRKS_SSN02_-450	12:10	53.54061	-5.22086	EOL
28/10/2015	57	CRKS_SSN02	EK60		CRKS_SSN02_-450	12:10	53.54061	-5.22086	EOL
28/10/2015	58	CRKS_GT007	DC	74	A1	13:02	53.53336	-5.23255	SOL
28/10/2015	58	CRKS_GT007	DC	74	A1	13:22	53.53471	-5.23106	EOL
28/10/2015	59	CRKS_GT036	DC	74	A1	13:55	53.52723	-5.22994	SOL
28/10/2015	59	CRKS_GT036	DC	74	A1	14:16	53.52621	-5.23235	EOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
28/10/2015	60	CRKS_GT050	DC	72	A1	14:39	53.52764	-5.22065	SOL
28/10/2015	60	CRKS_GT050	DC	72	A1	14:59	53.52645	-5.21868	EOL
28/10/2015	61	CRKS_GT087	DC	70	A1	15:23	53.53282	-5.22137	SOL
28/10/2015	61	CRKS_GT087	DC	70	A1	15:46	53.53424	-5.21932	EOL
28/10/2015	62	CRKS_GT065	DC	68	A1	16:13	53.52658	-5.20946	SOL
28/10/2015	62	CRKS_GT065	DC	68	A1	16:36	53.52777	-5.20719	EOL
28/10/2015	63	CRKS_GT096	DC	68	A1	17:33	53.53072	-5.20032	SOL
28/10/2015	63	CRKS_GT096	DC	68	A1	17:57	53.52935	-5.20244	EOL
28/10/2015	64	CRKS_GT108	DC	65	A1	18:31	53.52423	-5.17838	SOL
28/10/2015	64	CRKS_GT108	DC	65	A1	18:54	53.52204	-5.17808	EOL
28/10/2015	65	CRKS_GT111	DC	68	A1	19:20	53.53022	-5.17092	SOL
28/10/2015	65	CRKS_GT111	DC	68	A1	19:41	53.53219	-5.17084	EOL
28/10/2015	66	CRKS_GT114	DC	69	A1	20:13	53.52426	-5.16306	SOL
28/10/2015	66	CRKS_GT114	DC	69	A1	20:34	53.52226	-5.16309	EOL
28/10/2015	67	CRKS_GT120	DC	69	A1	21:06	53.51937	-5.16496	SOL
28/10/2015	67	CRKS_GT120	DC	69	A1	21:27	53.52061	-5.16244	EOL
28/10/2015	68	CRKS_GT119	DC	71	A1	21:54	53.51783	-5.17493	SOL
28/10/2015	68	CRKS_GT119	DC	71	A1	22:15	53.51911	-5.17240	EOL
28/10/2015	69	CRKS_GT104	DC	73	A1	22:45	53.51540	-5.18678	SOL
28/10/2015	69	CRKS_GT104	DC	73	A1	23:08	53.51413	-5.18396	EOL
28/10/2015	70	CRKS_GT074	DC	75	A1	23:38	53.51705	-5.19659	SOL
28/10/2015	70	CRKS_GT074	DC	75	A1	23:59	53.51511	-5.19649	EOL
29/10/2015	71	CRKS_GT117	DC	72	A1	00:29	53.51270	-5.20359	SOL
29/10/2015	71	CRKS_GT117	DC	72	A1	00:52	53.51327	-5.20673	EOL
29/10/2015	72	CRKS_GT064	DC	70	A1	01:33	53.51490	-5.20844	SOL
29/10/2015	72	CRKS_GT064	DC	70	A1	01:52	53.51620	-5.20695	EOL
29/10/2015	73	CRKS_GT070	DC	67	A1	06:10	53.52122	-5.20344	SOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
29/10/2015	73	CRKS_GT070	DC	67	A1	06:15	53.52151	-5.20254	EOL
29/10/2015	73	CRKS_GT070	DC	67	A2	06:49	53.52087	-5.20305	SOL
29/10/2015	73	CRKS_GT070	DC	67	A2	07:10	53.52230	-5.20167	EOL
29/10/2015	74	CTD004	CTD	69	A1	07:20	53.52267	-5.20125	
29/10/2015	75	CRKS_SSN02	MB2		CRKS_SSN02_-250	09:19	53.53494	-5.22318	EOL
29/10/2015	75	CRKS_SSN02	MB2		CRKS_SSN02_-250	08:31	53.47945	-5.21954	SOL
29/10/2015	75	CRKS_SSN02	MB2		CRKS_SSN02_-50	10:53	53.48330	-5.22279	EOL
29/10/2015	75	CRKS_SSN02	MB2		CRKS_SSN02_-50	10:24	53.53795	-5.22635	SOL
29/10/2015	75	CRKS_SSN02	SS7		CRKS_SSN02_-250	08:31	53.53494	-5.22318	SOL
29/10/2015	75	CRKS_SSN02	SS7		CRKS_SSN02_-250	09:19	53.47945	-5.21954	EOL
29/10/2015	75	CRKS_SSN02	SS7		CRKS_SSN02_-50	10:24	53.48330	-5.22279	SOL
29/10/2015	75	CRKS_SSN02	EK60		CRKS_SSN02_-250	08:31	53.53494	-5.22318	SOL
29/10/2015	75	CRKS_SSN02	EK60		CRKS_SSN02_-250	09:19	53.47945	-5.21954	EOL
29/10/2015	75	CRKS_SSN02	SS7		CRKS_SSN02_-50	10:53	53.53795	-5.22635	EOL
29/10/2015	75	CRKS_SSN02	EK60		CRKS_SSN02_-50	10:24	53.48330	-5.22279	SOL
29/10/2015	75	CRKS_SSN02	EK60		CRKS_SSN02_-50	10:53	53.53795	-5.22635	EOL
29/10/2015	76	CRKS_SBP	MB2		CRKS_SBP001	11:20	53.55063	-5.20328	SOL
29/10/2015	76	CRKS_SBP	MB2		CRKS_SBP001	11:20	53.47169	-5.28071	SOL
29/10/2015	76	CRKS_SBP	SS7		CRKS_SBP001	11:20	53.55063	-5.20328	SOL
29/10/2015	76	CRKS_SBP	SS7		CRKS_SBP001	12:22	53.47169	-5.28071	EOL
29/10/2015	76	CRKS_SBP	EK60		CRKS_SBP001	11:20	53.55063	-5.20328	SOL
29/10/2015	76	CRKS_SBP	EK60		CRKS_SBP001	12:22	53.47169	-5.28071	EOL
29/10/2015	76	CRKS_SBP	SBP		CRKS_SBP001	11:20	53.55063	-5.20328	SOL
29/10/2015	76	CRKS_SBP	SBP		CRKS_SBP001	12:22	53.47169	-5.28071	EOL
29/10/2015	77	CRKS_SBP	MB2		CRKS_SBP002	15:51	53.43375	-5.31017	EOL
29/10/2015	77	CRKS_SBP	MB2		CRKS_SBP002	15:51	53.53810	-5.15707	EOL
29/10/2015	77	CRKS_SBP	SS7		CRKS_SBP002	13:18	53.43375	-5.31017	SOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
29/10/2015	77	CRKS_SBP	SS7		CRKS_SBP002	15:51	53.53810	-5.15707	EOL
29/10/2015	77	CRKS_SBP	EK60		CRKS_SBP002	13:18	53.43375	-5.31017	SOL
29/10/2015	77	CRKS_SBP	EK60		CRKS_SBP002	15:51	53.53810	-5.15707	EOL
29/10/2015	77	CRKS_SBP	SBP		CRKS_SBP002	13:18	53.43375	-5.31017	SOL
29/10/2015	77	CRKS_SBP	SBP		CRKS_SBP002	15:51	53.53810	-5.15707	EOL
29/10/2015	78	CRKS_SBP	MB2		CRKS_SBP004	16:30	53.52520	-5.13614	SOL
29/10/2015	78	CRKS_SBP	MB2		CRKS_SBP004	17:04	53.48709	-5.19288	EOL
29/10/2015	78	CRKS_SBP	SS7		CRKS_SBP004	16:30	53.52520	-5.13614	SOL
29/10/2015	78	CRKS_SBP	SS7		CRKS_SBP004	17:04	53.48709	-5.19288	EOL
29/10/2015	78	CRKS_SBP	EK60		CRKS_SBP004	16:30	53.52520	-5.13614	SOL
29/10/2015	78	CRKS_SBP	EK60		CRKS_SBP004	17:04	53.48709	-5.19288	EOL
29/10/2015	78	CRKS_SBP	SBP		CRKS_SBP004	16:30	53.52520	-5.13614	SOL
29/10/2015	78	CRKS_SBP	SBP		CRKS_SBP004	17:04	53.48709	-5.19288	EOL
29/10/2015	79	CRKS_GT013	DC	77	A1	18:06	53.47856	-5.27291	SOL
29/10/2015	79	CRKS_GT013	DC	77	A1	18:30	53.48024	-5.27461	EOL
29/10/2015	80	CRKS_GT130	DC	75	A1	18:46	53.48140	-5.27191	SOL
29/10/2015	80	CRKS_GT130	DC	75	A1	19:24	53.48442	-5.27332	EOL
29/10/2015	81	CRKS_GT002	DC	82	A1	19:40	53.48589	-5.27593	SOL
29/10/2015	81	CRKS_GT002	DC	82	A1	20:12	53.48331	-5.27450	EOL
29/10/2015	82	CRKS_GT016	DC	77	A1	20:36	53.48489	-5.26956	SOL
29/10/2015	82	CRKS_GT016	DC	77	A1	20:59	53.48620	-5.26730	EOL
29/10/2015	83	CRKS_GT018	DC	82	A2	23:08	53.47868	-5.26249	SOL
29/10/2015	83	CRKS_GT018	DC	82	A2	23:30	53.48046	-5.26243	EOL
29/10/2015	83	CRKS_GT018	DC	82	A1	21:24	53.47879	-5.26241	SOL
29/10/2015	83	CRKS_GT018	DC	82	A1	21:34	53.47959	-5.26234	EOL
30/10/2015	84	CRKS_GT001	DC	94	A1	00:10	53.48088	-5.26052	SOL
30/10/2015	84	CRKS_GT001	DC	94	A1	00:47	53.48383	-5.25928	EOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
30/10/2015	85	CRKS_GT134	DC	84	A1	01:19	53.48399	-5.25767	SOL
30/10/2015	85	CRKS_GT134	DC	84	A1	01:47	53.48621	-5.25632	EOL
30/10/2015	86	CRKS_GT025	DC	80	A1	02:47	53.48561	-5.24422	SOL
30/10/2015	86	CRKS_GT025	DC	80	A1	03:10	53.48563	-5.24742	EOL
30/10/2015	87	CRKS_GT084	DC	77	A1	03:37	53.48653	-5.23866	SOL
30/10/2015	87	CRKS_GT084	DC	77	A1	04:00	53.48653	-5.24195	EOL
30/10/2015	88	CRKS_GT029	DC	76	A1	04:41	53.48532	-5.23355	SOL
30/10/2015	88	CRKS_GT029	DC	76	A1	05:04	53.48699	-5.23519	EOL
30/10/2015	89	CRKS_GT032	DC	77	A1	05:27	53.47948	-5.22945	SOL
30/10/2015	89	CRKS_GT032	DC	77	A1	05:50	53.48093	-5.22729	EOL
30/10/2015	90	CRKS_GT046	DC	74	A1	06:15	53.47965	-5.21649	SOL
30/10/2015	90	CRKS_GT046	DC	74	A1	06:37	53.48116	-5.21825	EOL
30/10/2015	91	CTD005	CTD	112	A1	07:18	53.45948	-5.14749	
30/10/2015	92	CRKS_SBP	MB2		CRKS_SBP007	10:13	53.45420	-5.13479	EOL
30/10/2015	92	CRKS_SBP	MB2		CRKS_SBP007	08:52	53.52677	-5.28240	SOL
30/10/2015	92	CRKS_SBP	MB2		CRKS_SBP001A	11:19	53.47240	-5.28032	EOL
30/10/2015	92	CRKS_SBP	MB2		CRKS_SBP001A	11:00	53.45585	-5.30720	SOL
30/10/2015	92	CRKS_SBP	MB2		CRKS_SBP004	11:54	53.42043	-5.29277	SOL
30/10/2015	92	CRKS_SBP	MB2		CRKS_SBP004	12:38	53.47125	-5.21629	EOL
30/10/2015	92	CRKS_SBP	MB2		CRKS_SBP006	15:19	53.43180	-5.16226	EOL
30/10/2015	92	CRKS_SBP	SS7		CRKS_SBP007	08:52	53.45420	-5.13479	SOL
30/10/2015	92	CRKS_SBP	SS7		CRKS_SBP007	10:13	53.52677	-5.28240	EOL
30/10/2015	92	CRKS_SBP	MB2		CRKS_SBP006	13:42	53.50597	-5.30960	SOL
30/10/2015	92	CRKS_SBP	EK60		CRKS_SBP007	08:52	53.45420	-5.13479	SOL
30/10/2015	92	CRKS_SBP	EK60		CRKS_SBP007	10:13	53.52677	-5.28240	EOL
30/10/2015	92	CRKS_SBP	SS7		CRKS_SBP001A	11:00	53.47240	-5.28032	SOL
30/10/2015	92	CRKS_SBP	MB2		CRKS_SBP005	15:58	53.49125	-5.30576	SOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
30/10/2015	92	CRKS_SBP	EK60		CRKS_SBP001A	11:00	53.47240	-5.28032	SOL
30/10/2015	92	CRKS_SBP	MB2		CRKS_SBP005	17:20	53.42033	-5.16414	EOL
30/10/2015	92	CRKS_SBP	SS7		CRKS_SBP001A	11:19	53.45585	-5.30720	EOL
30/10/2015	92	CRKS_SBP	EK60		CRKS_SBP001A	11:19	53.45585	-5.30720	EOL
30/10/2015	92	CRKS_SBP	SS7		CRKS_SBP004	11:54	53.42043	-5.29277	SOL
30/10/2015	92	CRKS_SBP	SS7		CRKS_SBP004	12:38	53.47125	-5.21629	EOL
30/10/2015	92	CRKS_SBP	EK60		CRKS_SBP004	11:54	53.42043	-5.29277	SOL
30/10/2015	92	CRKS_SBP	EK60		CRKS_SBP004	12:38	53.47125	-5.21629	EOL
30/10/2015	92	CRKS_SBP	SS7		CRKS_SBP006	13:42	53.43180	-5.16226	SOL
30/10/2015	92	CRKS_SBP	EK60		CRKS_SBP006	13:42	53.43180	-5.16226	SOL
30/10/2015	92	CRKS_SBP	SS7		CRKS_SBP006	15:19	53.50597	-5.30960	EOL
30/10/2015	92	CRKS_SBP	EK60		CRKS_SBP006	15:19	53.50597	-5.30960	EOL
30/10/2015	92	CRKS_SBP	EK60		CRKS_SBP005	15:58	53.49125	-5.30576	SOL
30/10/2015	92	CRKS_SBP	SS7		CRKS_SBP005	15:58	53.49125	-5.30576	SOL
30/10/2015	92	CRKS_SBP	SBP		CRKS_SBP007	08:52	53.45420	-5.13479	SOL
30/10/2015	92	CRKS_SBP	EK60		CRKS_SBP005	17:20	53.42033	-5.16414	EOL
30/10/2015	92	CRKS_SBP	SS7		CRKS_SBP005	17:20	53.42033	-5.16414	EOL
30/10/2015	92	CRKS_SBP	SBP		CRKS_SBP007	10:13	53.52677	-5.28240	EOL
30/10/2015	92	CRKS_SBP	SBP		CRKS_SBP001A	11:00	53.47240	-5.28032	SOL
30/10/2015	92	CRKS_SBP	SBP		CRKS_SBP001A	11:19	53.45585	-5.30720	EOL
30/10/2015	92	CRKS_SBP	SBP		CRKS_SBP004	11:54	53.42043	-5.29277	SOL
30/10/2015	92	CRKS_SBP	SBP		CRKS_SBP004	12:38	53.47125	-5.21629	EOL
30/10/2015	92	CRKS_SBP	SBP		CRKS_SBP006	13:42	53.43180	-5.16226	SOL
30/10/2015	92	CRKS_SBP	SBP		CRKS_SBP006	15:19	53.50597	-5.30960	EOL
30/10/2015	92	CRKS_SBP	SBP		CRKS_SBP005	15:58	53.49125	-5.30576	SOL
30/10/2015	92	CRKS_SBP	SBP		CRKS_SBP005	17:20	53.42033	-5.16414	EOL
30/10/2015	93	CRKS_GT061	DC	70	A1	18:50	53.48157	-5.20592	SOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
30/10/2015	93	CRKS_GT061	DC	70	A1	19:12	53.47979	-5.20579	EOL
30/10/2015	94	CRKS_GT071	DC	72	A1	19:36	53.48006	-5.19467	SOL
30/10/2015	94	CRKS_GT071	DC	72	A1	19:57	53.48188	-5.19465	EOL
30/10/2015	95	CRKS_GT102	DC	75	A1	20:24	53.48460	-5.18317	SOL
30/10/2015	95	CRKS_GT102	DC	75	A1	20:48	53.48278	-5.18478	EOL
30/10/2015	96	CRKS_GT122	DC	72	A2	22:44	53.48595	-5.17941	SOL
30/10/2015	96	CRKS_GT122	DC	72	A3	00:07	53.48490	-5.18035	EOL
30/10/2015	96	CRKS_GT122	DC	72	A3	23:46	53.48605	-5.17815	SOL
30/10/2015	96	CRKS_GT122	DC	72	A1	21:22	53.48601	-5.17817	EOL
30/10/2015	96	CRKS_GT122	DC	72	A1	21:17	53.48562	-5.17887	SOL
30/10/2015	96	CRKS_GT122	DC	72	A2	22:50	53.48609	-5.17842	EOL
31/10/2015	97	CRKS_GT106	DC	76	A1	00:41	53.49068	-5.17516	SOL
31/10/2015	97	CRKS_GT106	DC	76	A1	01:06	53.49215	-5.17757	EOL
31/10/2015	98	CRKS_GT112	DC	73	A1	01:36	53.49098	-5.16202	SOL
31/10/2015	98	CRKS_GT112	DC	73	A1	01:53	53.49253	-5.16104	EOL
31/10/2015	99	CRKS_GT115	DC	72	A1	02:25	53.49911	-5.15497	SOL
31/10/2015	99	CRKS_GT115	DC	72	A1	02:46	53.50059	-5.15383	EOL
31/10/2015	100	CRKS_GT109	DC	75	A1	03:28	53.50001	-5.17066	SOL
31/10/2015	100	CRKS_GT109	DC	75	A1	03:50	53.49895	-5.16810	EOL
31/10/2015	101	CRKS_GT103	DC	69	A1	04:36	53.50007	-5.18348	SOL
31/10/2015	101	CRKS_GT103	DC	69	A1	04:56	53.50138	-5.18184	EOL
31/10/2015	102	CRKS_GT004	DC	70	A1	05:23	53.49676	-5.19878	SOL
31/10/2015	102	CRKS_GT004	DC	70	A1	06:01	53.49378	-5.19704	EOL
31/10/2015	103	CTD006	CTD	85	A1	06:45	53.45467	-5.25153	
31/10/2015	104	CRKS_SBP	MB2		CRKS_SBP003	09:20	53.42199	-5.30114	EOL
31/10/2015	104	CRKS_SBP	MB2		CRKS_SBP003	08:06	53.50942	-5.17230	SOL
31/10/2015	104	CRKS_SBP	MB2		CRKS_SBP008	11:34	53.46947	-5.10428	EOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
31/10/2015	104	CRKS_SBP	MB2		CRKS_SBP008	10:15	53.54630	-5.26087	SOL
31/10/2015	104	CRKS_SBP	MB2		CRKS_SBP009	14:23	53.43373	-5.16314	EOL
31/10/2015	104	CRKS_SBP	MB2		CRKS_SBP009	13:25	53.43793	-5.30328	SOL
31/10/2015	104	CRKS_SBP	MB2		CRKS_SBP010	16:18	53.45464	-5.30886	EOL
31/10/2015	104	CRKS_SBP	MB2		CRKS_SBP010	14:39	53.54910	-5.20472	SOL
31/10/2015	104	CRKS_SBP	SS7		CRKS_SBP003	08:06	53.42199	-5.30114	SOL
31/10/2015	104	CRKS_SBP	EK60		CRKS_SBP003	08:06	53.42199	-5.30114	SOL
31/10/2015	104	CRKS_SBP	SS7		CRKS_SBP003	09:20	53.50942	-5.17230	EOL
31/10/2015	104	CRKS_SBP	SS7		CRKS_SBP008	10:15	53.46947	-5.10428	SOL
31/10/2015	104	CRKS_SBP	EK60		CRKS_SBP003	09:20	53.50942	-5.17230	EOL
31/10/2015	104	CRKS_SBP	SS7		CRKS_SBP008	11:34	53.54630	-5.26087	EOL
31/10/2015	104	CRKS_SBP	EK60		CRKS_SBP008	10:15	53.46947	-5.10428	SOL
31/10/2015	104	CRKS_SBP	SS7		CRKS_SBP009	13:25	53.43373	-5.16314	SOL
31/10/2015	104	CRKS_SBP	EK60		CRKS_SBP008	11:34	53.54630	-5.26087	EOL
31/10/2015	104	CRKS_SBP	SS7		CRKS_SBP009	14:23	53.43793	-5.30328	EOL
31/10/2015	104	CRKS_SBP	EK60		CRKS_SBP009	13:25	53.43373	-5.16314	SOL
31/10/2015	104	CRKS_SBP	EK60		CRKS_SBP009	14:23	53.43793	-5.30328	EOL
31/10/2015	104	CRKS_SBP	SS7		CRKS_SBP010	14:39	53.45464	-5.30886	SOL
31/10/2015	104	CRKS_SBP	EK60		CRKS_SBP010	14:39	53.45464	-5.30886	SOL
31/10/2015	104	CRKS_SBP	SS7		CRKS_SBP010	16:18	53.54910	-5.20472	EOL
31/10/2015	104	CRKS_SBP	SBP		CRKS_SBP003	08:06	53.42199	-5.30114	SOL
31/10/2015	104	CRKS_SBP	SBP		CRKS_SBP003	09:20	53.50942	-5.17230	EOL
31/10/2015	104	CRKS_SBP	EK60		CRKS_SBP010	16:18	53.54910	-5.20472	EOL
31/10/2015	104	CRKS_SBP	SBP		CRKS_SBP008	10:15	53.46947	-5.10428	SOL
31/10/2015	104	CRKS_SBP	SBP		CRKS_SBP008	11:34	53.54630	-5.26087	EOL
31/10/2015	104	CRKS_SBP	SBP		CRKS_SBP009	13:25	53.43373	-5.16314	SOL
31/10/2015	104	CRKS_SBP	SBP		CRKS_SBP009	14:23	53.43793	-5.30328	EOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
31/10/2015	104	CRKS_SBP	SBP		CRKS_SBP010	14:39	53.45464	-5.30886	SOL
31/10/2015	104	CRKS_SBP	SBP		CRKS_SBP010	16:18	53.54910	-5.20472	EOL
31/10/2015	105	CRKS_GT041	DC	72	A1	17:34	53.52045	-5.22610	SOL
31/10/2015	105	CRKS_GT041	DC	72	A1	17:55	53.52175	-5.22415	EOL
31/10/2015	106	CRKS_GT059	DC	70	A1	18:19	53.52047	-5.21452	SOL
31/10/2015	106	CRKS_GT059	DC	70	A1	18:40	53.52201	-5.21318	EOL
31/10/2015	107	CRKS_GT049	DC	72	A1	19:06	53.51472	-5.21829	SOL
31/10/2015	107	CRKS_GT049	DC	72	A1	19:28	53.51615	-5.22003	EOL
31/10/2015	108	CRKS_GT035	DC	73	A1	19:48	53.51577	-5.23137	SOL
31/10/2015	108	CRKS_GT035	DC	73	A1	20:09	53.51455	-5.22943	EOL
31/10/2015	109	CRKS_GT040	DC	73	A1	20:40	53.51009	-5.22543	SOL
31/10/2015	109	CRKS_GT040	DC	73	A1	21:01	53.50866	-5.22381	EOL
31/10/2015	110	CRKS_GT118	DC	74	A1	21:33	53.51228	-5.22078	SOL
31/10/2015	110	CRKS_GT118	DC	74	A1	21:53	53.51121	-5.21860	EOL
31/10/2015	111	CRKS_GT063	DC	72	A1	22:19	53.50460	-5.20652	SOL
31/10/2015	111	CRKS_GT063	DC	72	A1	22:40	53.50338	-5.20868	EOL
31/10/2015	112	CRKS_GT141	DC	73	A1	23:09	53.50840	-5.19903	SOL
31/10/2015	112	CRKS_GT141	DC	73	A1	23:30	53.50959	-5.20117	EOL
31/10/2015	113	CRKS_GT107	DC	73	A1	23:55	53.50777	-5.17641	SOL
31/10/2015	113	CRKS_GT107	DC	73	A1	00:19	53.50610	-5.17825	EOL
01/11/2015	114	CRKS_GT113	DC	70	A1	00:40	53.50799	-5.16336	SOL
01/11/2015	114	CRKS_GT113	DC	70	A1	01:02	53.50673	-5.16116	EOL
01/11/2015	115	CRKS_GT139	DC	73	A1	01:35	53.49962	-5.21581	SOL
01/11/2015	115	CRKS_GT139	DC	73	A1	01:57	53.49835	-5.21364	EOL
01/11/2015	116	CRKS_GT138	DC	78	A1	02:28	53.49000	-5.22577	SOL
01/11/2015	116	CRKS_GT138	DC	78	A1	02:50	53.49102	-5.22833	EOL
01/11/2015	117	CRKS_GT039	DC	76	A1	03:14	53.49884	-5.22383	SOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
01/11/2015	117	CRKS_GT039	DC	76	A1	03:38	53.49686	-5.22381	EOL
01/11/2015	118	CRKS_GT034	DC	75	A1	04:27	53.50381	-5.23149	SOL
01/11/2015	118	CRKS_GT034	DC	75	A1	04:50	53.50309	-5.22857	EOL
01/11/2015	119	CRKS_GT003	DC	75	A1	05:15	53.50235	-5.24454	SOL
01/11/2015	119	CRKS_GT003	DC	75	A1	06:21	53.50740	-5.24254	EOL
01/11/2015	120	CTD007	CTD	35	A1	06:42	53.48962	-5.20793	
01/11/2015	121	CRKS_SBP	MB2		CRKS_SBP007	08:30	53.45375	-5.13554	SOL
01/11/2015	121	CRKS_SBP	MB2		CRKS_SBP007	09:34	53.52768	-5.28463	EOL
01/11/2015	121	CRKS_SBP	MB2		CRKS_SBP004	11:16	53.42002	-5.29232	SOL
01/11/2015	121	CRKS_SBP	MB2		CRKS_SBP004	12:40	53.52527	-5.13690	EOL
01/11/2015	121	CRKS_SBP	MB2		CRKS_SBP005	14:08	53.42158	-5.16674	SOL
01/11/2015	121	CRKS_SBP	MB2		CRKS_SBP005	15:26	53.49061	-5.30497	EOL
01/11/2015	121	CRKS_SBP	MB2		CRKS_SBP006	15:53	53.50628	-5.31001	SOL
01/11/2015	121	CRKS_SBP	EK60		CRKS_SBP007	08:30	53.45375	-5.13554	SOL
01/11/2015	121	CRKS_SBP	SS7		CRKS_SBP007	08:30	53.45375	-5.13554	SOL
01/11/2015	121	CRKS_SBP	SS7		CRKS_SBP007	09:34	53.52768	-5.28463	EOL
01/11/2015	121	CRKS_SBP	EK60		CRKS_SBP007	09:34	53.52768	-5.28463	EOL
01/11/2015	121	CRKS_SBP	SS7		CRKS_SBP004	11:16	53.42002	-5.29232	SOL
01/11/2015	121	CRKS_SBP	MB2		CRKS_SBP006	17:15	53.43302	-5.16354	EOL
01/11/2015	121	CRKS_SBP	EK60		CRKS_SBP004	11:16	53.42002	-5.29232	SOL
01/11/2015	121	CRKS_SBP	EK60		CRKS_SBP004	12:40	53.52527	-5.13690	EOL
01/11/2015	121	CRKS_SBP	SS7		CRKS_SBP004	12:40	53.52527	-5.13690	EOL
01/11/2015	121	CRKS_SBP	SS7		CRKS_SBP005	14:08	53.42158	-5.16674	SOL
01/11/2015	121	CRKS_SBP	SS7		CRKS_SBP005	15:26	53.49061	-5.30497	EOL
01/11/2015	121	CRKS_SBP	SS7		CRKS_SBP006	15:53	53.50628	-5.31001	SOL
01/11/2015	121	CRKS_SBP	EK60		CRKS_SBP005	14:08	53.42158	-5.16674	SOL
01/11/2015	121	CRKS_SBP	EK60		CRKS_SBP005	15:26	53.49061	-5.30497	EOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
01/11/2015	121	CRKS_SBP	EK60		CRKS_SBP006	15:53	53.50628	-5.31001	SOL
01/11/2015	121	CRKS_SBP	SS7		CRKS_SBP006	17:15	53.43302	-5.16354	EOL
01/11/2015	121	CRKS_SBP	EK60		CRKS_SBP006	17:15	53.43302	-5.16354	EOL
01/11/2015	121	CRKS_SBP	SBP		CRKS_SBP007	08:30	53.45375	-5.13554	SOL
01/11/2015	121	CRKS_SBP	SBP		CRKS_SBP007	09:34	53.52768	-5.28463	EOL
01/11/2015	121	CRKS_SBP	SBP		CRKS_SBP004	11:16	53.42002	-5.29232	SOL
01/11/2015	121	CRKS_SBP	SBP		CRKS_SBP004	12:40	53.52527	-5.13690	EOL
01/11/2015	121	CRKS_SBP	SBP		CRKS_SBP005	14:08	53.42158	-5.16674	SOL
01/11/2015	121	CRKS_SBP	SBP		CRKS_SBP005	15:26	53.49061	-5.30497	EOL
01/11/2015	121	CRKS_SBP	SBP		CRKS_SBP006	15:53	53.50628	-5.31001	SOL
01/11/2015	121	CRKS_SBP	SBP		CRKS_SBP006	17:15	53.43302	-5.16354	EOL
01/11/2015	122	CRKS_GT145	DC	108	A1	18:11	53.42461	-5.17099	SOL
01/11/2015	122	CRKS_GT145	DC	108	A1	18:41	53.42290	-5.17309	EOL
01/11/2015	123	CRKS_GT101	DC	98	A1	19:11	53.43643	-5.17480	SOL
01/11/2015	123	CRKS_GT101	DC	98	A1	19:37	53.43493	-5.17221	EOL
01/11/2015	124	CRKS_GT098	DC	82	A1	20:11	53.44561	-5.18766	SOL
01/11/2015	124	CRKS_GT098	DC	82	A1	20:33	53.44403	-5.19008	EOL
01/11/2015	125	CRKS_GT147	DC	71	A1	20:59	53.45082	-5.20071	SOL
01/11/2015	125	CRKS_GT147	DC	71	A1	21:20	53.45242	-5.19866	EOL
01/11/2015	126	CRKS_GT092	DC	77	A1	22:12	53.44520	-5.20326	SOL
01/11/2015	126	CRKS_GT092	DC	77	A1	22:32	53.44353	-5.20491	EOL
01/11/2015	127	CRKS_GT095	DC	83	A1	23:07	53.43483	-5.19500	SOL
01/11/2015	127	CRKS_GT095	DC	83	A1	23:29	53.43659	-5.19400	EOL
01/11/2015	128	CRKS_GT051	DC	86	A1	23:49	53.43262	-5.19029	SOL
01/11/2015	128	CRKS_GT051	DC	86	A1	00:07	53.43393	-5.18903	EOL
02/11/2015	129	CRKS_GT091	DC	89	A1	00:36	53.42813	-5.20442	SOL
02/11/2015	129	CRKS_GT091	DC	89	A1	00:57	53.42947	-5.20253	EOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
02/11/2015	130	CRKS_GT042	DC	89	A1	01:22	53.42210	-5.21565	SOL
02/11/2015	130	CRKS_GT042	DC	89	A1	01:44	53.42190	-5.21263	EOL
02/11/2015	131	CRKS_GT090	DC	92	A1	02:07	53.41238	-5.20282	SOL
02/11/2015	131	CRKS_GT090	DC	92	A1	02:29	53.41418	-5.20258	EOL
02/11/2015	132	CRKS_GT089	DC	100	A1	03:02	53.42582	-5.26425	SOL
02/11/2015	132	CRKS_GT089	DC	100	A1	03:23	53.42416	-5.26407	EOL
02/11/2015	133	CRKS_GT146	DC	95	A1	04:06	53.42983	-5.28986	SOL
02/11/2015	133	CRKS_GT146	DC	95	A1	04:25	53.42826	-5.28988	EOL
02/11/2015	134	CRKS_GT144	DC	80	A1	05:12	53.43384	-5.29518	SOL
02/11/2015	134	CRKS_GT144	DC	80	A1	05:33	53.43266	-5.29729	EOL
02/11/2015	135	CRKS_GT123	DC	94	A1	06:03	53.44472	-5.31184	SOL
02/11/2015	135	CRKS_GT123	DC	94	A1	06:23	53.44324	-5.31317	EOL
02/11/2015	136	CRKS_GT088	DC	100	A1	06:49	53.44148	-5.29900	SOL
02/11/2015	136	CRKS_GT088	DC	100	A1	07:11	53.44153	-5.29591	EOL
02/11/2015	137	CRKS_GT148	DC	94	A1	08:05	53.44892	-5.28968	SOL
02/11/2015	137	CRKS_GT148	DC	94	A1	08:27	53.44704	-5.28966	EOL
02/11/2015	138	CRKS_GT142	DC	82	A1	08:53	53.45528	-5.27655	SOL
02/11/2015	138	CRKS_GT142	DC	82	A1	09:15	53.45659	-5.27868	EOL
02/11/2015	139	CRKS_GT136	DC	80	A1	09:40	53.46431	-5.26737	SOL
02/11/2015	139	CRKS_GT136	DC	80	A1	10:02	53.46351	-5.26464	EOL
02/11/2015	140	CRKS_GT009	DC	78	A1	10:29	53.46649	-5.28870	SOL
02/11/2015	140	CRKS_GT009	DC	78	A1	10:56	53.46431	-5.28964	EOL
02/11/2015	141	CRKS_GT143	DC	98	A1	12:29	53.42346	-5.32142	SOL
02/11/2015	141	CRKS_GT143	DC	98	A1	12:53	53.42167	-5.32015	EOL
02/11/2015	142	CRKS_GT007	HG	73	A1	14:16	53.53447	-5.23140	
02/11/2015	142	CRKS_GT007	HG	73	A2	14:19	53.53445	-5.23143	
02/11/2015	142	CRKS_GT007	HG	73	A2	14:19	53.53445	-5.23143	

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
02/11/2015	142	CRKS_GT007	HG	73	A3	14:29	53.53444	-5.23140	
02/11/2015	143	CRKS_GT036	HG	75	A1	15:08	53.52624	-5.23217	
02/11/2015	143	CRKS_GT036	HG	75	A2	15:14	53.52625	-5.23217	
02/11/2015	143	CRKS_GT036	HG	75	A2	15:14	53.52625	-5.23217	
02/11/2015	144	CRKS_GT050	HG	74	A1	15:42	53.52629	-5.21896	
02/11/2015	144	CRKS_GT050	HG	74	A3	15:56	53.52631	-5.21898	
02/11/2015	144	CRKS_GT050	HG	74	A2	15:49	53.52631	-5.21898	
02/11/2015	144	CRKS_GT050	HG	74	A1	15:42	53.52629	-5.21896	
02/11/2015	145	CRKS_GT087	HG	70	A1	16:19	53.53354	-5.22033	
02/11/2015	146	CRKS_GT065	HG	72	A1	16:40	53.52721	-5.20835	
02/11/2015	146	CRKS_GT065	HG	72	A2	16:49	53.52717	-5.20839	
02/11/2015	146	CRKS_GT065	HG	72	A3	16:52	53.52713	-5.20843	
02/11/2015	147	CRKS_GT096	HG	72	A1	17:36	53.52975	-5.20167	
02/11/2015	147	CRKS_GT096	HG	72	A2	17:44	53.52980	-5.20164	
02/11/2015	147	CRKS_GT096	HG	72	A3	17:53	53.52983	-5.20162	
02/11/2015	148	CRKS_GT108	HG	69	A3	18:33	53.52370	-5.17820	
02/11/2015	148	CRKS_GT108	HG	69	A4	18:41	53.52374	-5.17816	
02/11/2015	148	CRKS_GT108	HG	69	A2	18:26	53.52366	-5.17822	
02/11/2015	148	CRKS_GT108	HG	69	A1	18:23	53.52365	-5.17824	
02/11/2015	149	CRKS_GT119	HG	65	A2	19:10	53.51882	-5.17307	
02/11/2015	149	CRKS_GT119	HG	65	A3	19:16	53.51886	-5.17304	
02/11/2015	149	CRKS_GT119	HG	65	A1	19:03	53.51879	-5.17312	
02/11/2015	150	CRKS_GT120	HG	71	A1	19:36	53.52012	-5.16367	
02/11/2015	150	CRKS_GT120	HG	71	A2	19:43	53.52018	-5.16360	
02/11/2015	151	CRKS_GT107	HG	70	A1	20:12	53.50778	-5.17638	
02/11/2015	151	CRKS_GT107	HG	70	A2	20:18	53.50778	-5.17645	
02/11/2015	151	CRKS_GT107	HG	70	A3	20:25	53.50783	-5.17652	

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
02/11/2015	152	CRKS_GT120DG	DG	69	A1	21:02	53.52028	-5.16358	
02/11/2015	152	CRKS_GT120DG	DG	69	A5	21:37	53.52027	-5.16360	
02/11/2015	152	CRKS_GT120DG	DG	69	A4	21:24	53.52032	-5.16356	
02/11/2015	152	CRKS_GT120DG	DG	69	A2	21:09	53.52029	-5.16352	
02/11/2015	152	CRKS_GT120DG	DG	69	A3	21:15	53.52031	-5.16350	
02/11/2015	153	CRKS_GT104	HG	69	A1	22:02	53.51542	-5.18648	
02/11/2015	153	CRKS_GT104	HG	69	A2	22:10	53.51546	-5.18650	
02/11/2015	153	CRKS_GT104	HG	69	A3	22:18	53.51546	-5.18657	
02/11/2015	153	CRKS_GT104	HG	69	A4	22:22	53.51546	-5.18657	
02/11/2015	154	CRKS_GT141	HG	70	A1	22:40	53.50915	-5.19962	
02/11/2015	154	CRKS_GT141	HG	70	A2	22:50	53.50920	-5.19961	
02/11/2015	155	CRKS_GT139	HG	72	A1	23:18	53.49965	-5.21590	
02/11/2015	155	CRKS_GT139	HG	72	A2	23:26	53.49957	-5.21591	
02/11/2015	155	CRKS_GT139	HG	72	A3	23:34	53.49964	-5.21584	
03/11/2015	156	CRKS_GT039	HG	74	A2	00:14	53.49746	-5.22389	
03/11/2015	156	CRKS_GT039	HG	74	A3	00:34	53.49746	-5.22393	
03/11/2015	156	CRKS_GT039	HG	74	A1	23:55	53.49749	-5.22384	
03/11/2015	157	CRKS_GT035	HG	74	A2	01:40	53.51578	-5.23127	
03/11/2015	157	CRKS_GT035	HG	74	A4	01:56	53.51580	-5.23136	
03/11/2015	157	CRKS_GT035	HG	74	A3	01:52	53.51579	-5.23135	
03/11/2015	157	CRKS_GT035	HG	74	A1	01:28	53.51583	-5.23128	
03/11/2015	158	CRKS_GT118	HG	75	A1	02:20	53.51232	-5.22046	
03/11/2015	158	CRKS_GT118	HG	75	A2	02:28	53.51226	-5.22050	
03/11/2015	158	CRKS_GT118	HG	75	A3	02:32	53.51227	-5.22049	
03/11/2015	158	CRKS_GT118	HG	75	A4	02:43	53.51228	-5.22057	
03/11/2015	159	CRKS_GT117	HG	71	A5	03:26	53.51299	-5.20592	
03/11/2015	159	CRKS_GT117	HG	71	A1	03:05	53.51304	-5.20583	

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
03/11/2015	159	CRKS_GT117	HG	71	A2	03:09	53.51303	-5.20581	
03/11/2015	159	CRKS_GT117	HG	71	A3	03:15	53.51299	-5.20582	
03/11/2015	159	CRKS_GT117	HG	71	A4	03:18	53.51298	-5.20584	
03/11/2015	160	CRKS_GT004	HG	71	A3	04:07	53.49553	-5.19817	
03/11/2015	160	CRKS_GT004	HG	71	A1	03:36	53.49558	-5.19818	
03/11/2015	160	CRKS_GT004	HG	71	A2	04:00	53.49558	-5.19817	
03/11/2015	160	CRKS_GT004	HG	71	A4	04:14	53.49549	-5.19816	
03/11/2015	161	CRKS_GT103	HG	70	A1	04:52	53.49992	-5.18359	
03/11/2015	161	CRKS_GT103	HG	70	A2	04:55	53.49992	-5.18359	
03/11/2015	161	CRKS_GT103	HG	70	A3	05:01	53.49996	-5.18356	
03/11/2015	161	CRKS_GT103	HG	70	A4	05:08	53.49999	-5.18364	
03/11/2015	162	CRKS_GT106	HG	73	A2	05:39	53.49195	-5.17726	
03/11/2015	162	CRKS_GT106	HG	73	A5	06:08	53.49200	-5.17723	
03/11/2015	162	CRKS_GT106	HG	73	A3	05:43	53.49195	-5.17725	
03/11/2015	162	CRKS_GT106	HG	73	A1	05:31	53.49194	-5.17726	
03/11/2015	162	CRKS_GT106	HG	73	A4	06:01	53.49195	-5.17725	
03/11/2015	163	CRKS_GT112	HG	72	A1	06:33	53.49133	-5.16179	
03/11/2015	163	CRKS_GT112	HG	72	A2	06:41	53.49129	-5.16179	
03/11/2015	163	CRKS_GT112	HG	72	A3	06:47	53.49126	-5.16181	
03/11/2015	164	CRKS_GT122	HG	70	A1	07:12	53.48556	-5.17889	
03/11/2015	164	CRKS_GT122	HG	70	A2	07:18	53.48561	-5.17882	
03/11/2015	164	CRKS_GT122	HG	70	A3	07:24	53.48565	-5.17880	
03/11/2015	165	CRKS_GT071	HG	73	A1	08:02	53.48167	-5.19461	
03/11/2015	165	CRKS_GT071	HG	73	A3	08:16	53.48172	-5.19476	
03/11/2015	165	CRKS_GT071	HG	73	A2	08:12	53.48170	-5.19467	
03/11/2015	165	CRKS_GT071	HG	73	A3	08:16	53.48172	-5.19476	
03/11/2015	166	CRKS_GT066	HG	74	A1	08:48	53.47458	-5.19960	

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
03/11/2015	166	CRKS_GT066	HG	74	A3	09:04	53.47461	-5.19973	
03/11/2015	166	CRKS_GT066	HG	74	A3	09:04	53.47461	-5.19973	
03/11/2015	166	CRKS_GT066	HG	74	A2	08:56	53.47459	-5.19966	
03/11/2015	167	CRKS_GT060	HG	73	A1	09:28	53.46828	-5.20541	
03/11/2015	167	CRKS_GT060	HG	73	A2	09:40	53.46830	-5.20549	
03/11/2015	167	CRKS_GT060	HG	73	A3	09:47	53.46830	-5.20556	
03/11/2015	167	CRKS_GT060	HG	73	A3	09:47	53.46830	-5.20556	
03/11/2015	168	CRKS_GT055	HG	73	A2	10:13	53.47516	-5.21051	
03/11/2015	168	CRKS_GT055	HG	73	A2	10:13	53.47516	-5.21051	
03/11/2015	168	CRKS_GT055	HG	73	A1	10:10	53.47516	-5.21051	
03/11/2015	168	CRKS_GT055	HG	73	A3	10:21	53.47520	-5.21050	
03/11/2015	169	CRKS_GT005	HG	73	A2	10:57	53.46068	-5.22985	
03/11/2015	169	CRKS_GT005	HG	73	A3	11:04	53.46064	-5.22986	
03/11/2015	169	CRKS_GT005	HG	73	A1	10:50	53.46073	-5.22985	
03/11/2015	170	CRKS_GT083	HG	79	A1	11:25	53.46328	-5.23920	
03/11/2015	170	CRKS_GT083	HG	79	A2	11:32	53.46324	-5.23922	
03/11/2015	171	CRKS_GT024	HG		A3	12:16	53.47584	-5.24406	
03/11/2015	171	CRKS_GT024	HG		A1	11:56	53.47583	-5.24416	
03/11/2015	171	CRKS_GT024	HG		A2	12:08	53.47586	-5.24410	
03/11/2015	172	CRKS_GT084	HG		A1	12:40	53.48658	-5.24041	
03/11/2015	173	CRKS_GT025	HG	80	A3	13:21	53.48539	-5.24654	
03/11/2015	173	CRKS_GT025	HG	80	A1	13:08	53.48544	-5.24649	
03/11/2015	173	CRKS_GT025	HG	80	A3	13:21	53.48539	-5.24654	
03/11/2015	173	CRKS_GT025	HG	80	A2	13:21	53.48543	-5.24651	
03/11/2015	174	CRKS_GT015	HG	88	A1	13:48	53.47308	-5.26709	
03/11/2015	174	CRKS_GT015	HG	88	A2	13:58	53.47304	-5.26714	
03/11/2015	174	CRKS_GT015	HG	88	A3	14:06	53.47303	-5.26707	

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
03/11/2015	175	CRKS_GT009	HG	79	A1	14:31	53.46658	-5.28865	
03/11/2015	175	CRKS_GT009	HG	79	A1	14:31	53.46658	-5.28865	
03/11/2015	175	CRKS_GT009	HG	79	A2	14:39	53.46653	-5.28868	
03/11/2015	175	CRKS_GT009	HG	79	A3	14:47	53.46655	-5.28874	
03/11/2015	176	CRKS_GT148	NWB	92	B1	16:05	53.44789	-5.28969	
03/11/2015	176	CRKS_GT148	NWB	92	C1	16:20	53.44788	-5.28971	
03/11/2015	176	CRKS_GT148	NWB	92	A1	15:42	53.44788	-5.28961	
03/11/2015	177	CRKS_GT148	HG	95	A2	16:49	53.44793	-5.28972	
03/11/2015	177	CRKS_GT148	HG	95	A3	16:57	53.44789	-5.28977	
03/11/2015	177	CRKS_GT148	HG	95	A1	16:40	53.44797	-5.28966	
03/11/2015	178	CRKS_GT123	HG	92	A1	17:41	53.44403	-5.31225	
03/11/2015	178	CRKS_GT123	HG	92	A2	17:45	53.44403	-5.31225	
03/11/2015	178	CRKS_GT123	HG	92	A3	17:54	53.44408	-5.31226	
03/11/2015	178	CRKS_GT123	HG	92	A4	18:02	53.44412	-5.31222	
03/11/2015	179	CRKS_GT143	HG	95	A1	18:40	53.42277	-5.32068	
03/11/2015	179	CRKS_GT143	HG	95	A1	18:40	53.42277	-5.32068	
03/11/2015	180	CRKS_GT144	HG	80	A1	19:11	53.43362	-5.29537	
03/11/2015	180	CRKS_GT144	HG	80	A3	19:25	53.43354	-5.29540	
03/11/2015	180	CRKS_GT144	HG	80	A2	19:18	53.43358	-5.29539	
03/11/2015	181	CRKS_GT088	HG	98	A1	19:48	53.44135	-5.29682	
03/11/2015	181	CRKS_GT088	HG	98	A2	19:56	53.44130	-5.29684	
03/11/2015	181	CRKS_GT088	HG	98	A3	20:04	53.44127	-5.29685	
03/11/2015	181	CRKS_GT088	HG	98	A4	20:09	53.44127	-5.29687	
03/11/2015	182	CRKS_GT075	HG	83	A1	20:29	53.43894	-5.28302	
03/11/2015	183	CRKS_GT008	HG	80	A1	20:46	53.44122	-5.27472	
03/11/2015	183	CRKS_GT008	HG	80	A1	20:46	53.44122	-5.27472	
03/11/2015	184	CRKS_GT012	HG	72	A1	20:59	53.44450	-5.27172	

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
03/11/2015	184	CRKS_GT012	HG	72	A2	21:07	53.44454	-5.27178	
03/11/2015	184	CRKS_GT012	HG	72	A3	21:13	53.44455	-5.27185	
03/11/2015	185	CRKS_GT077	HG	89	A1	21:29	53.45086	-5.27244	
03/11/2015	186	CRKS_GT126	HG	83	A5	22:22	53.44814	-5.25609	
03/11/2015	186	CRKS_GT126	HG	83	A4	22:15	53.44810	-5.25600	
03/11/2015	186	CRKS_GT126	HG	83	A3	22:08	53.44810	-5.25601	
03/11/2015	186	CRKS_GT126	HG	83	A1	21:56	53.44809	-5.25595	
03/11/2015	186	CRKS_GT126	HG	83	A2	22:04	53.44811	-5.25601	
03/11/2015	187	CRKS_GT126	DG	83	A1	22:37	53.44813	-5.25613	
03/11/2015	187	CRKS_GT126	DG	83	A2	22:49	53.44817	-5.25619	
03/11/2015	187	CRKS_GT126	DG	83	A3	23:00	53.44820	-5.25613	
03/11/2015	187	CRKS_GT126	DG	83	A4	23:05	53.44819	-5.25613	
03/11/2015	188	CRKS_GT014	HG	80	A1	23:30	53.43888	-5.26466	
03/11/2015	188	CRKS_GT014	HG	80	A1	23:30	53.43888	-5.26466	
04/11/2015	189	CRKS_GT135	NWB	69	B1	00:54	53.44820	-5.25130	
04/11/2015	189	CRKS_GT135	NWB	69	A1	00:25	53.44821	-5.25129	
04/11/2015	189	CRKS_GT135	NWB	69	C1	01:03	53.44821	-5.25129	
04/11/2015	190	CRKS_GT082	HG	88	A1	01:37	53.43984	-5.23804	
04/11/2015	191	CRKS_GT116	HG	78	A1	02:01	53.44215	-5.22091	
04/11/2015	191	CRKS_GT116	HG	78	A2	02:07	53.44215	-5.22090	
04/11/2015	191	CRKS_GT116	HG	78	A3	02:13	53.44212	-5.22093	
04/11/2015	191	CRKS_GT116	HG	78	A4	02:21	53.44213	-5.22100	
04/11/2015	192	CRKS_GT116	DG	78	A1	02:33	53.44215	-5.22092	
04/11/2015	192	CRKS_GT116	DG	78	A2	02:46	53.44212	-5.22093	
04/11/2015	192	CRKS_GT116	DG	78	A3	02:50	53.44212	-5.22095	
04/11/2015	192	CRKS_GT116	DG	78	A4	02:57	53.44213	-5.22101	
04/11/2015	193	CRKS_GT116	NWB	78	B1	03:31	53.44208	-5.22088	

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
04/11/2015	193	CRKS_GT116	NWB	78	C1	03:43	53.44208	-5.22090	
04/11/2015	193	CRKS_GT116	NWB	78	A1	03:19	53.44208	-5.22091	
04/11/2015	194	CRKS_GT147	NWB	77	B1	04:52	53.45186	-5.19946	
04/11/2015	194	CRKS_GT147	NWB	77	C1	04:59	53.45186	-5.19946	
04/11/2015	194	CRKS_GT147	NWB	77	A1	04:38	53.45186	-5.19946	
04/11/2015	195	CRKS_GT147	HG	77	A1	05:12	53.45193	-5.19950	
04/11/2015	195	CRKS_GT147	HG	77	A2	05:18	53.45190	-5.19948	
04/11/2015	195	CRKS_GT147	HG	77	A3	05:24	53.45185	-5.19946	
04/11/2015	195	CRKS_GT147	HG	77	A3	05:24	53.45185	-5.19946	
04/11/2015	196	CRKS_GT147	DG	77	A1	05:37	53.45185	-5.19946	
04/11/2015	196	CRKS_GT147	DG	77	A2	05:43	53.45184	-5.19954	
04/11/2015	196	CRKS_GT147	DG	77	A3	05:49	53.45184	-5.19962	
04/11/2015	197	CRKS_GT149	NWB	84	A1	06:52	53.47145	-5.11014	
04/11/2015	197	CRKS_GT149	NWB	84	B1	07:04	53.47145	-5.11019	
04/11/2015	197	CRKS_GT149	NWB	84	C1	07:12	53.47144	-5.11018	
04/11/2015	198	CTD008	CTD	81	A1	08:17	53.46533	-5.17782	
04/11/2015	198	CTD008	CTD	81	A2	09:02	53.45811	-5.18827	
04/11/2015	199	CRKS_SSN08	EK60		CRKS_SSN08-650	09:53	53.45216	5.17100	SOL
04/11/2015	199	CRKS_SSN08	EK60		CRKS_SSN08-650	10:23	53.41550	5.17086	EOL
04/11/2015	199	CRKS_SSN08	MB2		CRKS_SSN08-650	10:23	53.41550	5.17086	EOL
04/11/2015	199	CRKS_SSN08	SS7		CRKS_SSN08-650	09:53	53.41550	5.17086	SOL
04/11/2015	199	CRKS_SSN08	MB2		CRKS_SSN08-650	09:53	53.45216	5.17100	SOL
04/11/2015	199	CRKS_SSN08	SS7		CRKS_SSN08-650	10:23	53.45216	5.17100	EOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-2850	12:07	53.48378	-5.15066	EOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-2850	11:23	53.54595	-5.15470	SOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-2650	13:07	53.54559	-5.15780	EOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-2650	12:22	53.48318	-5.15351	SOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-2850	11:23	53.48378	-5.15066	SOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-2850	12:07	53.54595	-5.15470	EOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-2050	13:33	53.48363	-5.16251	SOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-2650	12:22	53.54559	-5.15780	SOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-2850	11:23	53.48378	-5.15066	SOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-2050	14:16	53.54571	-5.16684	EOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-2450	15:17	53.54482	-5.16071	EOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-2850	12:07	53.54595	-5.15470	EOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-2650	13:07	53.48318	-5.15351	EOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-2450	14:32	53.48285	-5.15657	SOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-2650	12:22	53.54559	-5.15780	SOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-2050	13:33	53.48363	-5.16251	SOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-1850	15:31	53.48404	-5.16549	SOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-2650	13:07	53.48318	-5.15351	EOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-2050	14:16	53.54571	-5.16684	EOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-2050	13:33	53.48363	-5.16251	SOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-1850	16:01	53.52581	-5.16851	EOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-2450	14:32	53.54482	-5.16071	SOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-2050	14:16	53.54571	-5.16684	EOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-2250	16:38	53.54523	-5.16372	SOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-2450	15:17	53.48285	-5.15657	EOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-2450	14:32	53.54482	-5.16071	SOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-2250	17:23	53.48275	-5.15948	EOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-1850	15:31	53.48404	-5.16549	SOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-1650	17:41	53.48370	-5.16867	SOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-1850	16:01	53.52581	-5.16851	EOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-1650	18:09	53.52330	-5.17148	EOL

Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-2450	15:17	53.48285	-5.15657	EOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-2250	16:38	53.54523	-5.16372	SOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-850	18:40	53.54485	-5.18485	SOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-1850	15:31	53.48404	-5.16549	SOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-2250	17:23	53.48275	-5.15948	EOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-850	19:21	53.48226	-5.18068	EOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-1850	16:01	53.52581	-5.16851	EOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-1450	19:35	53.48364	-5.17174	SOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-1450	20:04	53.52368	-5.17433	EOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-1650	17:41	53.48370	-5.16867	SOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-2250	16:38	53.54523	-5.16372	SOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-650	20:34	53.54451	-5.18782	SOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-1650	18:09	53.52330	-5.17148	EOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-2250	17:23	53.48275	-5.15948	EOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-850	18:40	53.54485	-5.18485	SOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-850	19:21	53.48226	-5.18068	EOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-1650	17:41	53.48370	-5.16867	SOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-1450	19:35	53.48364	-5.17174	SOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-1450	20:04	53.52368	-5.17433	EOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-1650	18:09	53.52330	-5.17148	EOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-850	18:40	53.54485	-5.18485	SOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-650	21:12	53.48235	-5.18373	EOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-650	20:34	53.54451	-5.18782	SOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-850	19:21	53.48226	-5.18068	EOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-1250	21:32	53.48381	-5.17473	SOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-650	21:12	53.48235	-5.18373	EOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-1450	19:35	53.48364	-5.17174	SOL

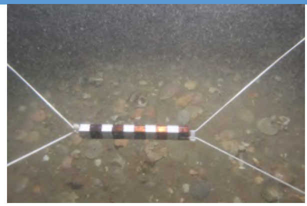
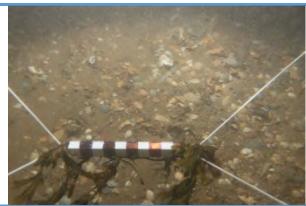
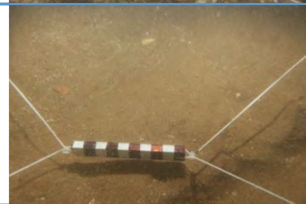
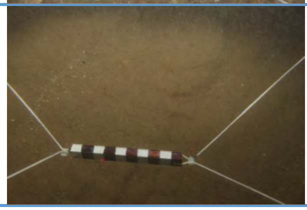
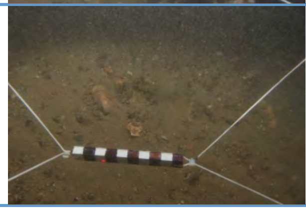
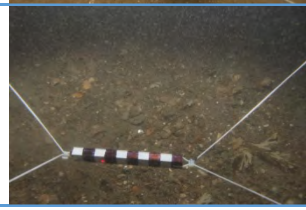
Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-1250	21:32	53.48381	-5.17473	SOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-1250	22:02	53.52497	-5.17755	EOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-450	22:33	53.54452	-5.19093	SOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-1250	22:02	53.52497	-5.17755	EOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-1450	20:04	53.52368	-5.17433	EOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-450	23:15	53.48227	-5.18673	EOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-1050	00:01	53.48346	-5.17752	EOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-650	20:34	53.54451	-5.18782	SOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-450	22:33	53.54452	-5.19093	SOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-650	21:12	53.48235	-5.18373	EOL
04/11/2015	200	CRKS_SSN04	MB2		CRKS_SSN04_-1050	23:29	53.52619	-5.18065	SOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-450	23:15	53.48227	-5.18673	EOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-1250	21:32	53.48381	-5.17473	SOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-1250	22:02	53.52497	-5.17755	EOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-1050	00:01	53.48346	-5.17752	EOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-450	22:33	53.54452	-5.19093	SOL
04/11/2015	200	CRKS_SSN04	SS7		CRKS_SSN04_-1050	23:29	53.52619	-5.18065	SOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-450	23:15	53.48227	-5.18673	EOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-1050	23:29	53.48346	-5.17752	SOL
04/11/2015	200	CRKS_SSN04	EK60		CRKS_SSN04_-1050	00:01	53.52619	-5.18065	EOL
05/11/2015	201	CRKS_GT105	DC	68	A1	00:40	53.52946	-5.18683	SOL
05/11/2015	201	CRKS_GT105	DC	68	A1	01:01	53.53098	-5.18551	EOL
05/11/2015	202	CRKS_GT110	DC	67	A1	01:25	53.51445	-5.16927	SOL
05/11/2015	202	CRKS_GT110	DC	67	A1	01:45	53.51564	-5.17138	EOL
05/11/2015	203	CRKS_GT110	HG	67	A1	02:01	53.51443	-5.16925	
05/11/2015	203	CRKS_GT110	HG	67	A2	02:08	53.51443	-5.16923	
05/11/2015	203	CRKS_GT110	HG	67	A3	02:15	53.51446	-5.16928	

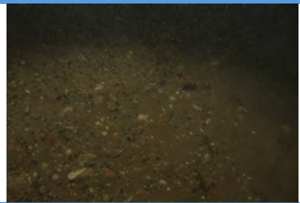
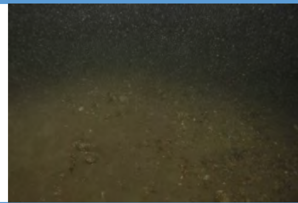
Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
05/11/2015	204	CRKS_GT121	DC	71	A1	02:48	53.51202	-5.16348	SOL
05/11/2015	204	CRKS_GT121	DC	71	A1	03:03	53.51334	-5.16166	EOL
05/11/2015	205	CRKS_GT121	HG	69	A1	03:32	53.51303	-5.16224	
05/11/2015	205	CRKS_GT121	HG	69	A1	03:32	53.51303	-5.16224	
05/11/2015	206	CRKS_GT129	DC	79	A1	04:25	53.49331	-5.25997	SOL
05/11/2015	206	CRKS_GT129	DC	79	A1	05:09	53.49691	-5.25944	EOL
05/11/2015	207	CRKS_GT129	HG	78	A1	05:32	53.49549	-5.25976	
05/11/2015	207	CRKS_GT129	HG	78	A2	05:38	53.49552	-5.25974	
05/11/2015	207	CRKS_GT129	HG	78	A3	05:50	53.49556	-5.25978	
05/11/2015	207	CRKS_GT129	HG	78	A4	05:53	53.49556	-5.25976	
05/11/2015	207	CRKS_GT129	HG	78	A5	05:58	53.49556	-5.25979	
05/11/2015	207	CRKS_GT129	HG	78	A6	06:02	53.49556	-5.25980	
05/11/2015	207	CRKS_GT129	HG	78	A7	06:09	53.49555	-5.25980	
05/11/2015	208	CRKS_GT076	DC	89	A1	06:53	53.45878	-5.28701	SOL
05/11/2015	208	CRKS_GT076	DC	89	A1	07:14	53.46013	-5.28529	EOL
05/11/2015	209	CRKS_GT076	HG	85	A1	08:12	53.45929	-5.28636	
05/11/2015	209	CRKS_GT076	HG	85	A2	08:20	53.45933	-5.28636	
05/11/2015	209	CRKS_GT076	HG	85	A2	08:20	53.45933	-5.28636	
05/11/2015	210	CRKS_GT150	DC	75	A1	09:16	53.43945	-5.22449	SOL
05/11/2015	210	CRKS_GT150	DC	75	A1	09:36	53.44109	-5.22449	EOL
05/11/2015	211	CRKS_GT150	HG	81	A1	09:46	53.43940	-5.22448	
05/11/2015	211	CRKS_GT150	HG	81	A1	09:46	53.43940	-5.22448	
05/11/2015	212	CRKS_GT052	DC	86	A1	10:19	53.43480	-5.20515	SOL
05/11/2015	212	CRKS_GT052	DC	86	A1	10:39	53.43643	-5.20513	EOL
05/11/2015	213	CRKS_GT052	HG	87	A1	10:50	53.43476	-5.20516	
05/11/2015	214	CRKS_GT097	DC	88	A1	11:19	53.42862	-5.18957	SOL
05/11/2015	214	CRKS_GT097	DC	88	A1	11:39	53.42988	-5.18778	EOL

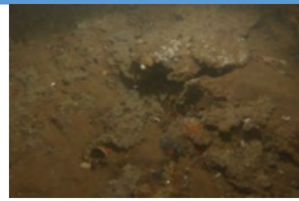
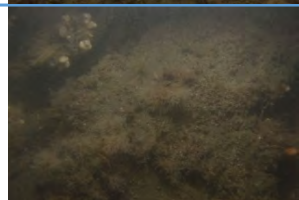
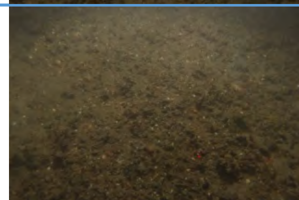
Date	Station No.	Station Code	Gear Code	Water Depth (m)	Attempt	Time	Latitude	Longitude	SOL/EOL
05/11/2015	215	CRKS_GT097	HG	88	A2	12:09	53.42946	-5.18835	
05/11/2015	215	CRKS_GT097	HG	88	A3	12:16	53.42951	-5.18837	
05/11/2015	215	CRKS_GT097	HG	88	A1	11:59	53.42947	-5.18842	
05/11/2015	216	CRKS_GT094	DC	89	A1	12:42	53.42188	-5.19495	SOL
05/11/2015	216	CRKS_GT094	DC	89	A1	13:02	53.42042	-5.19628	EOL
05/11/2015	217	CRKS_GT094	HG	89	A1	13:26	53.42111	-5.19554	
05/11/2015	217	CRKS_GT094	HG	89	A2	13:28	53.42111	-5.19561	
05/11/2015	217	CRKS_GT094	HG	89	A3	13:46	53.42117	-5.19560	
05/11/2005	218	CRKS_GT085	DC	95	A1	14:15	53.42905	-5.22701	SOL
05/11/2005	218	CRKS_GT085	DC	95	A1	14:36	53.42775	-5.22506	EOL
05/11/2015	219	CRKS_GT085	HG	101	A1	14:51	53.42839	-5.22608	
05/11/2015	220	CRKS_GT081	DC	92	A1	15:16	53.41579	-5.23636	SOL
05/11/2015	220	CRKS_GT081	DC	92	A1	15:38	53.41752	-5.23714	EOL
05/11/2015	221	CRKS_GT081	HG	93	A1	15:55	53.41654	-5.23673	
05/11/2015	222	CRKS_GT079	DC	108	A1	16:21	53.42877	-5.24858	SOL
05/11/2015	222	CRKS_GT079	DC	108	A1	16:41	53.42695	-5.24860	EOL
05/11/2015	223	CRKS_GT079	HG	108	A1	16:57	53.42792	-5.24859	
05/11/2015	224	CRKS_GT151	NWB	98	A1	18:15	53.34111	-5.16791	
05/11/2015	224	CRKS_GT151	NWB	98	B1	18:30	53.34111	-5.16786	
05/11/2015	224	CRKS_GT151	NWB	98	C1	18:44	53.34113	-5.16786	

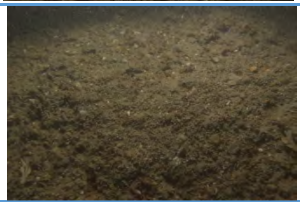
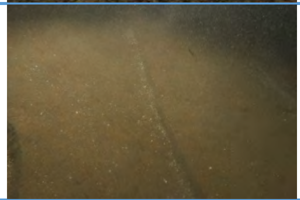
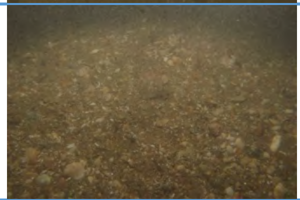
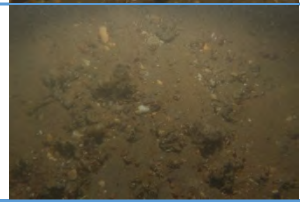
Appendix 7. Habitat types

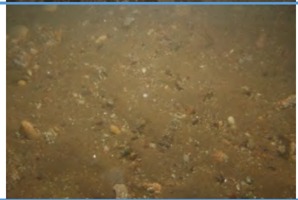
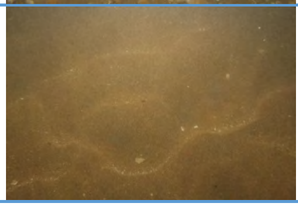
Table 8. A representation of Broadscale habitat types observed during each drop camera deployment on CEND23/15. Note that these observations are preliminary and may change following detailed analysis following the survey.

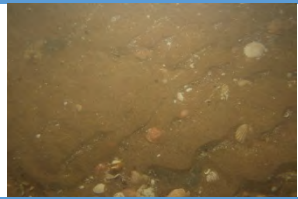
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT008_STN_005_A1				Low energy circalittoral rock, Subtidal mixed/ Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT075_STN_006_A1				Subtidal coarse	Yes
CRKS_CEND2315_GT125_STN_007_A1				High energy circalittoral rock, Subtidal coarse	Yes
CRKS_CEND2315_GT010_STN_008_A1				Subtidal coarse/ Subtidal sand	Yes

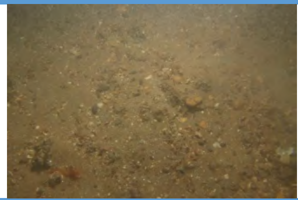
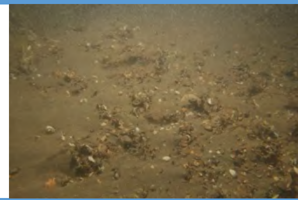
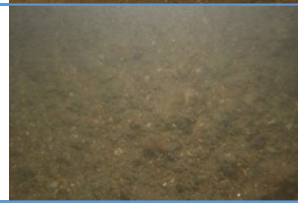
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT124_STN_009_A1				Subtidal mixed	No
CRKS_CEND2315_GT077_STN_010_A1				Moderate energy circalittoral rock, Subtidal mixed/ Subtidal sand	No
CRKS_CEND2315_GT082_STN_012_A1				Subtidal mixed	No
CRKS_CEND2315_GT126_STN_013_A1				Subtidal coarse/ Subtidal mixed	Yes
CRKS_CEND2315_GT012_STN_014_A1				Moderate energy circalittoral rock, Subtidal mixed/ Subtidal coarse	Yes

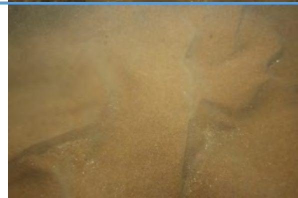
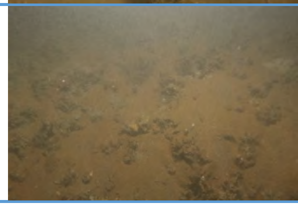
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT014_STN_015_A1				Moderate energy circalittoral rock, Subtidal mixed/ Subtidal coarse	Yes
CRKS_CEND2315_GT017_STN_016_A1				Subtidal mixed/ Subtidal coarse/ Subtidal sand	No
CRKS_CEND2315_GT020_STN_017_A1				Moderate energy circalittoral rock, Subtidal mixed	Yes
CRKS_CEND2315_GT135_STN_018_A1				High energy circalittoral rock, Subtidal coarse	Yes
CRKS_CEND2315_GT023_STN_019_A1				Moderate energy circalittoral rock, Subtidal mixed	No

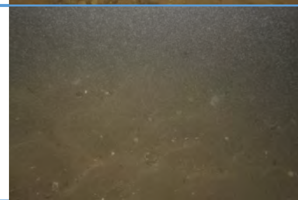
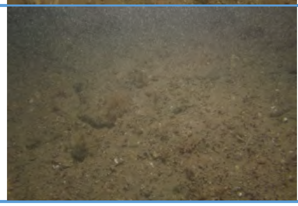
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT116_STN_020_A1				Moderate energy circalittoral rock, Subtidal mixed	Yes
CRKS_CEND2315_GT043_STN_021_A1				Subtidal mixed	No
CRKS_CEND2315_GT053_STN_022_A1				Subtidal coarse/ Subtidal sand	No
CRKS_CEND2315_GT037_STN_023_A1				Subtidal coarse/ Subtidal sand	No
CRKS_CEND2315_GT132_STN_024_A1				Moderate energy circalittoral rock, Subtidal mixed	Yes

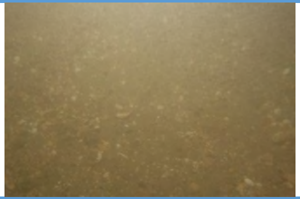
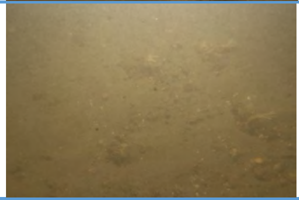
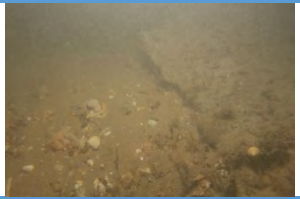
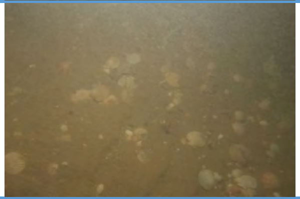
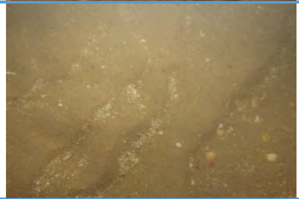
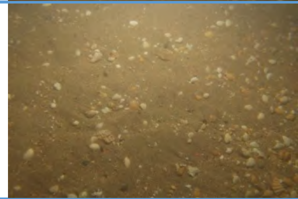
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT006_STN_025_A1				Subtidal coarse	Yes
CRKS_CEND2315_GT026_STN_026_A1				Subtidal coarse/ Subtidal sand	No
CRKS_CEND2315_GT030_STN_027_A1				Subtidal mMixed	Yes
CRKS_CEND2315_GT044_STN_028_A1				Subtidal coarse/ Subtidal mixed	No
CRKS_CEND2315_GT093_STN_029_A1				Subtidal coarse/ Subtidal sand	No

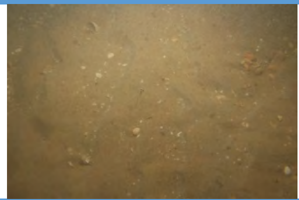
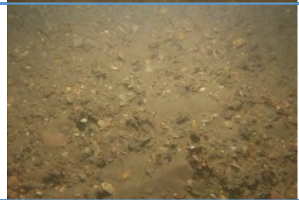
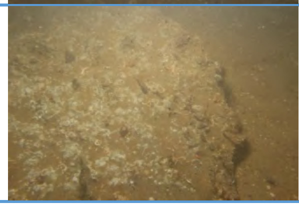
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT099_STN_030_A1				Subtidal coarse/ Subtidal sand	No
CRKS_CEND2315_GT054_STN_031_A1				Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT038_STN_032_A1				Subtidal coarse	Yes
CRKS_CEND2315_GT133_STN_033_A1				Subtidal coarse	No
CRKS_CEND2315_GT133_STN_034_A1				Subtidal mixed/ Subtidal coarse/ Subtidal sand	Yes

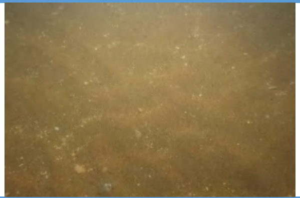
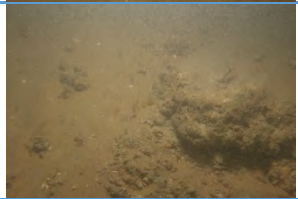
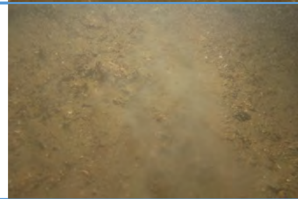
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT005_STN_040_A1				Moderate energy circalittoral rock, Subtidal mixed/ Subtidal sand	Yes
CRKS_CEND2315_GT027_STN_041_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT083_STN_042_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal mixed	Yes
CRKS_CEND2315_GT131_STN_043_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT031_STN_044_A1				Subtidal mixed/ Subtidal sand	No

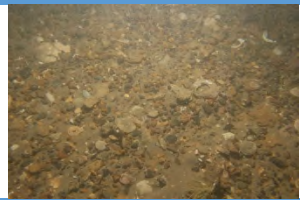
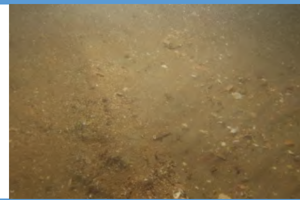
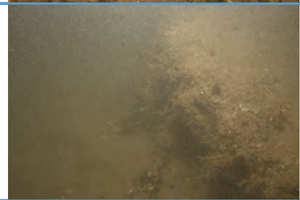
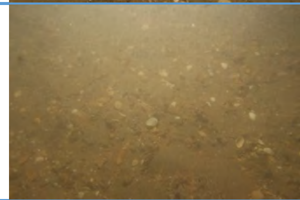
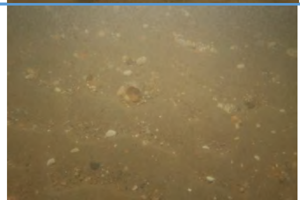
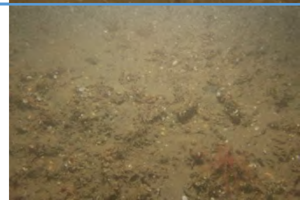
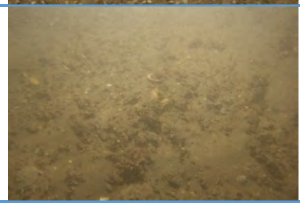
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT045_STN_045_A1				Subtidal coarse/ Subtidal sand	No
CRKS_CEND2315_GT060_STN_046_A1				Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT100_STN_047_A1				Subtidal coarse/ Subtidal sand	No
CRKS_CEND2315_GT066_STN_048_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT055_STN_049_A1				Subtidal coarse, Moderate energy circalittoral rock	Yes

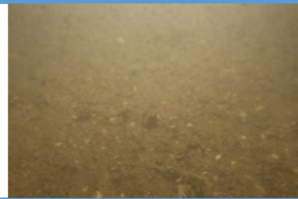
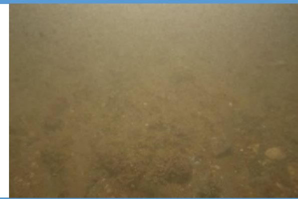
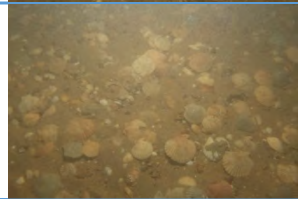
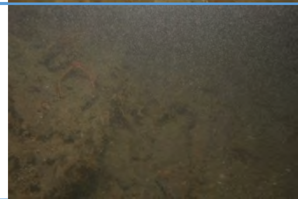
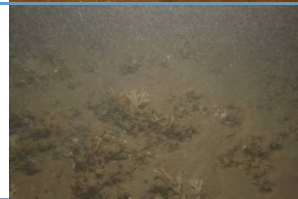
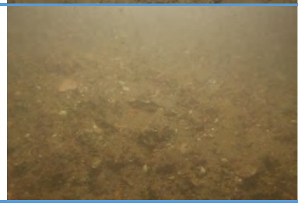
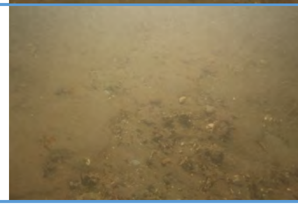
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT028_STN_050_A1				Subtidal coarse	No
CRKS_CEND2315_GT024_STN_051_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal mixed	Yes
CRKS_CEND2315_GT080_STN_052_A1				Subtidal coarse	No
CRKS_CEND2315_GT015_STN_053_A1				Subtidal coarse	Yes
CRKS_CEND2315_GT127_STN_054_A1				Subtidal coarse/ Subtidal sand	Yes

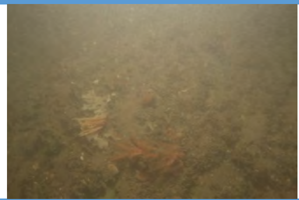
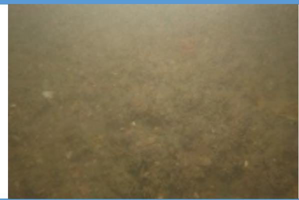
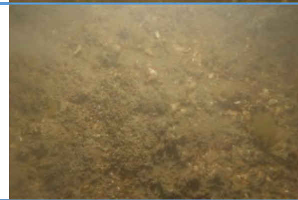
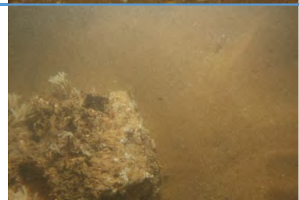
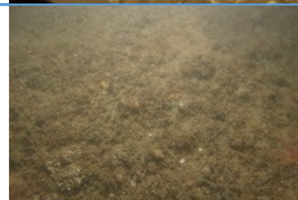
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT007_STN_058_A1				Subtidal sand	Yes
CRKS_CEND2315_GT036_STN_059_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT050_STN_060_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT087_STN_061_A1				Subtidal coarse/ Subtidal sand	No
CRKS_CEND2315_GT065_STN_062_A1				Subtidal sand	Yes

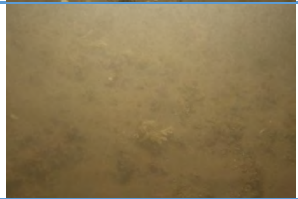
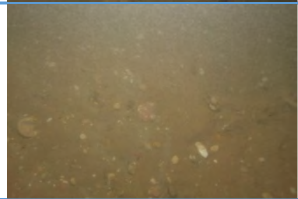
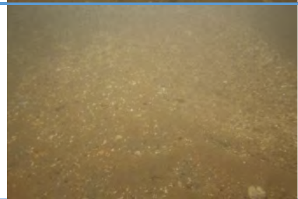
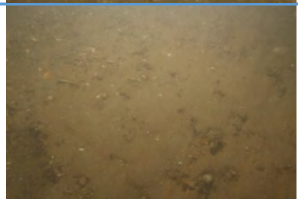
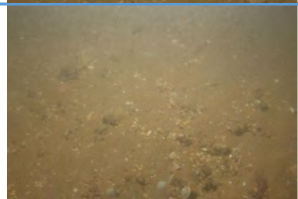
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT096_STN_063_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT108_STN_064_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT111_STN_065_A1				Subtidal sand	Yes
CRKS_CEND2315_GT114_STN_066_A1				Subtidal sand	Yes
CRKS_CEND2315_GT120_STN_067_A1				Subtidal sand	Yes

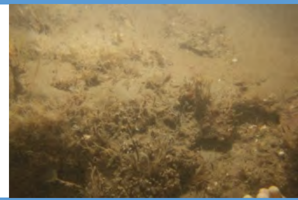
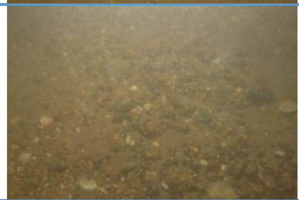
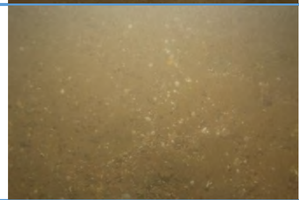
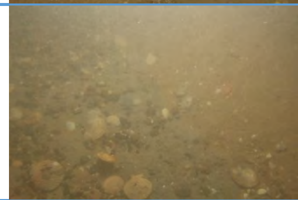
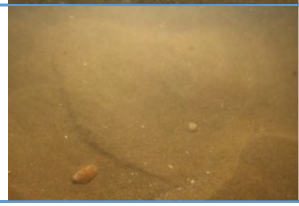
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT119_STN_068_A1				Subtidal sand/Subtidal coarse	yes
CRKS_CEND2315_GT104_STN_069_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT074_STN_070_A1				Subtidal coarse/ Subtidal sand	No
CRKS_CEND2315_GT117_STN_071_A1				Moderate energy circalittoral rock, Subtidal coarse	Yes
CRKS_CEND2315_GT064_STN_072_A1				Subtidal coarse/ Subtidal sand	Yes

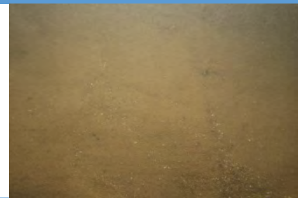
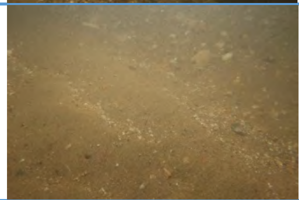
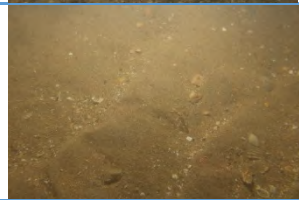
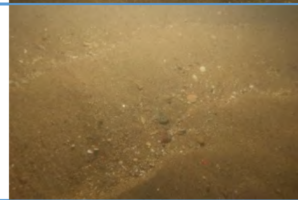
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT070_STN_073_A1				Subtidal coarse Tow abandoned	Yes
CRKS_CEND2315_GT070_STN_073_A2				Subtidal coarse	Yes
CRKS_CEND2315_GT013_STN_079_A1				Moderate energy circalittoral rock, Subtidal sand	Yes
CRKS_CEND2315_GT130_STN_080_A1				Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT002_STN_081_A1				Subtidal mixed/ Subtidal sand	Yes

Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT016_STN_082_A1				Subtidal sand	No
CRKS_CEND2315_GT018_STN_083_A2				Moderate energy circalittoral rock, Subtidal sand	Yes
CRKS_CEND2315_GT001_STN_084_A1				Moderate energy circalittoral rock, Subtidal coarse	Yes
CRKS_CEND2315_GT134_STN_085_A1				Moderate energy circalittoral rock, Subtidal coarse	Yes
CRKS_CEND2315_GT025_STN_086_A1				Subtidal coarse	Yes

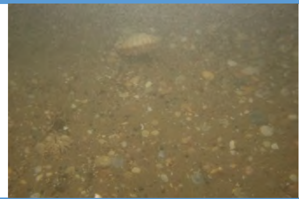
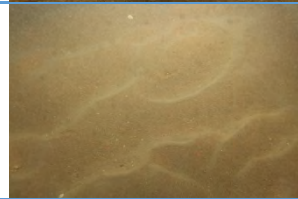
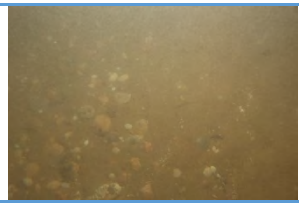
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT084_STN_087_A1				Subtidal coarse	No
CRKS_CEND2315_GT029_STN_088_A1				Subtidal coarse/ Subtidal mixed	Yes
CRKS_CEND2315_GT032_STN_089_A1				Subtidal coarse/ Subtidal sand	No
CRKS_CEND2315_GT046_STN_090_A1				Subtidal coarse	Yes
CRKS_CEND2315_GT061_STN_093_A1				Subtidal coarse	Yes

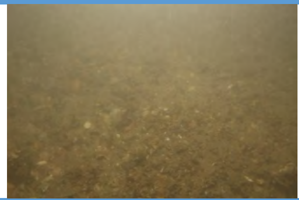
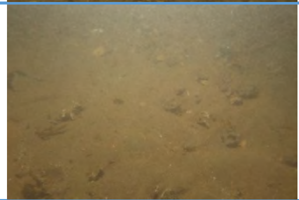
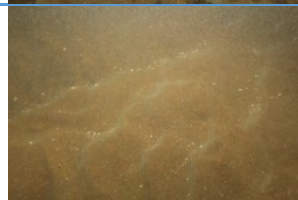
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT071_STN_094_A1				Subtidal Sand	Yes
CRKS_CEND2315_GT102_STN_095_A1				Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT122_STN_096_A1				Tow abandoned	No
CRKS_CEND2315_GT122_STN_096_A2				Tow abandoned	No
CRKS_CEND2315_GT122_STN_096_A3				Moderate energy circalittoral rock, Subtidal mixed/ Subtidal sand	Yes

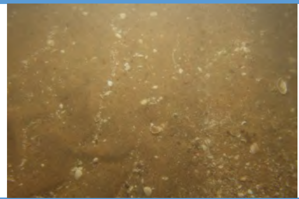
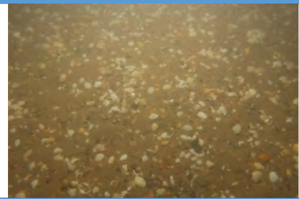
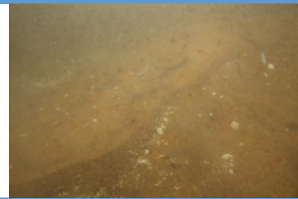
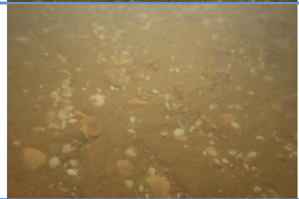
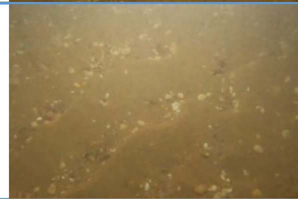
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT106_STN_097_A1				Subtidal mixed/ Subtidal coarse	Yes
CRKS_CEND2315_GT112_STN_098_A1				Subtidal mixed/ Subtidal coarse	Yes
CRKS_CEND2315_GT115_STN_099_A1				Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT109_STN_100_A1				Subtidal coarse	Yes
CRKS_CEND2315_GT103_STN_101_A1				Subtidal coarse	Yes

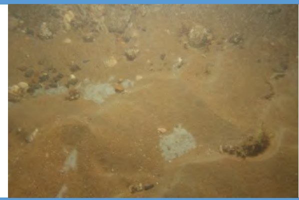
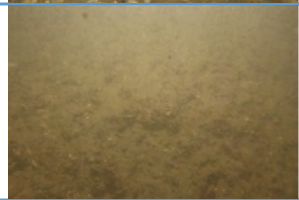
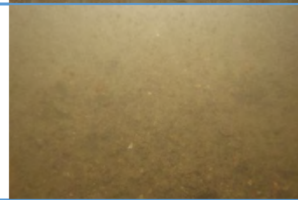
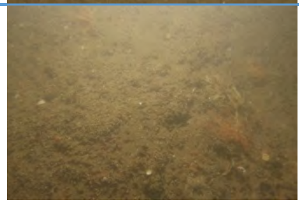
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT004_STN_102_A1				Subtidal coarse	Yes
CRKS_CEND2315_GT041_STN_105_A1				Subtidal coarse/ Subtidal sand	Yes (small fragment)
CRKS_CEND2315_GT059_STN_106_A1				Subtidal coarse/ Subtidal sand	No
CRKS_CEND2315_GT049_STN_107_A1				Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT035_STN_108_A1				Subtidal coarse/ Subtidal sand	Yes

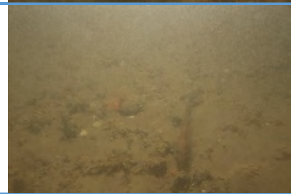
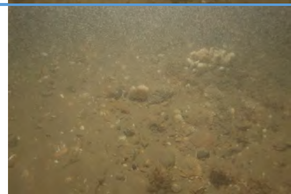
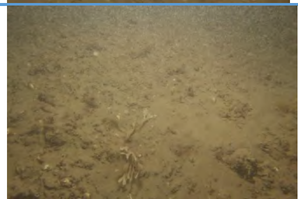
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT040_STN_109_A1				Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT118_STN_110_A1				Subtidal coarse/ Subtidal sand	No
CRKS_CEND2315_GT063_STN_111_A1				Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT141_STN_112_A1				Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT107_STN_113_A1				Subtidal coarse/ Subtidal sand	Yes

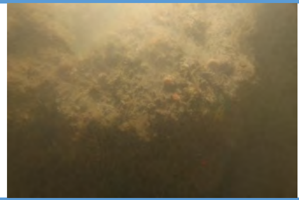
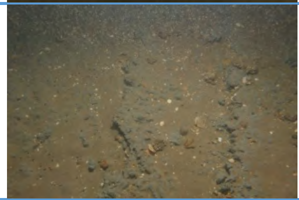
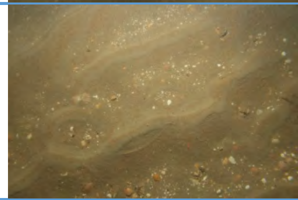
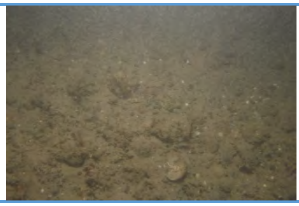
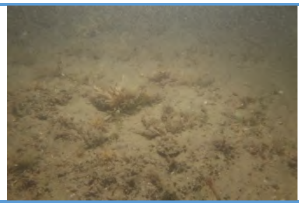
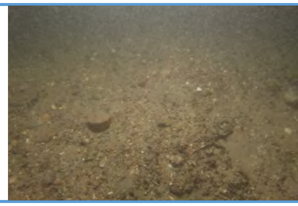
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT113_STN_114_A1				Subtidal mixed	Yes
CRKS_CEND2315_GT139_STN_115_A1				Subtidal coarse/ Subtidal mixed	Yes
CRKS_CEND2315_GT138_STN_116_A1				Subtidal coarse/ Subtidal mixed	Yes
CRKS_CEND2315_GT039_STN_117_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal mixed	Yes
CRKS_CEND2315_GT034_STN_118_A1				Subtidal coarse/ Subtidal mixed/ Subtidal sand	No

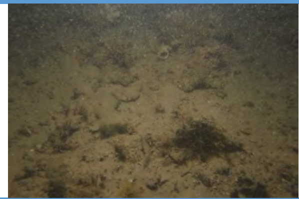
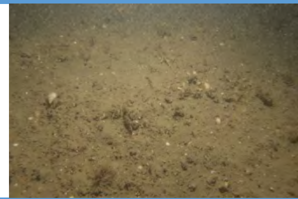
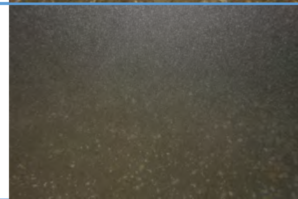
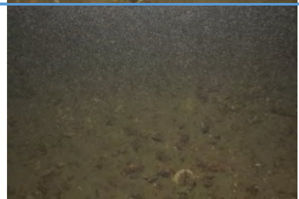
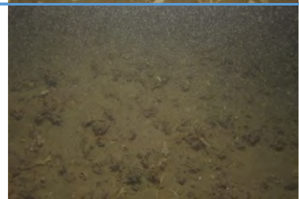
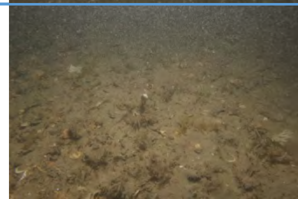
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT003_STN_119_A1				Subtidal coarse/ Subtidal mixed	Yes
CRKS_CEND2315_GT145_STN_122_A1				Subtidal coarse	Yes
CRKS_CEND2315_GT101_STN_123_A1				Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT098_STN_124_A1				Subtidal sand	No
CRKS_CEND2315_GT147_STN_125_A1				Subtidal sand	Yes

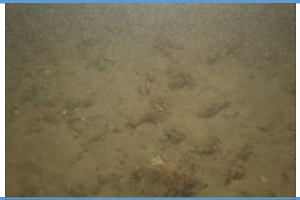
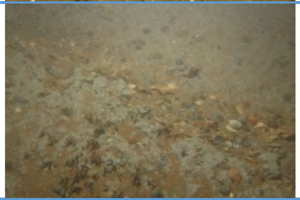
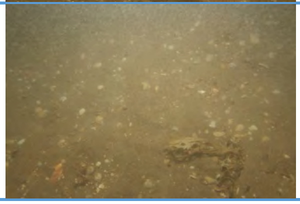
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT092_STN_126_A1				Subtidal sand	No
CRKS_CEND2315_GT095_STN_127_A1				Subtidal sand	No
CRKS_CEND2315_GT051_STN_128_A1				Subtidal coarse/ Subtidal mixed/ Subtidal sand	No
CRKS_CEND2315_GT091_STN_129_A1				Subtidal coarse/ Subtidal sand	No
CRKS_CEND2315_GT042_STN_130_A1				Subtidal coarse/	Yes

Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT090_STN_131_A1				Subtidal coarse/ Subtidal sand	No
CRKS_CEND2315_GT089_STN_132_A1				Subtidal coarse	No
CRKS_CEND3215_GT146_STN_133_A1				Subtidal coarse	No
CRKS_CEND3215_GT144_STN_134_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal mixed	Yes
CRKS_CEND3215_GT123_STN_135_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal mixed	Yes

Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND3215_GT088_STN_136_A1				Subtidal coarse/ Subtidal sand/ Subtidal mixed	Yes
CRKS_CEND2315_GT148_STN_137_A1				Moderate energy circalittoral rock, Subtidal coarse	Yes
CRKS_CEND2315_GT142_STN_138_A1				Subtidal coarse/ Subtidal mixed/ Subtidal sand	Yes
CRKS_CEND2315_GT136_STN_139_A1				Subtidal coarse	Yes
CRKS_CEND2315_GT009_STN_140_A1				Subtidal coarse/ Subtidal sand	Yes

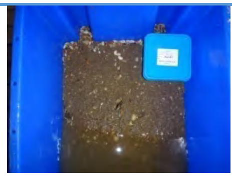
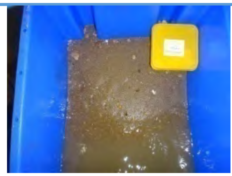
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT143_STN_141_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT105_STN_201_A1				Subtidal coarse/ Subtidal mixed	Yes
CRKS_CEND2315_GT110_STN_202_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal sand	Yes
CRKS_CEND2315_GT121_STN_204_A1				Moderate energy circalittoral rock, Subtidal coarse/ Subtidal mixed	Yes
CRKS_CEND2315_GT129_STN_206_A1				Subtidal coarse/ Subtidal sand	Yes

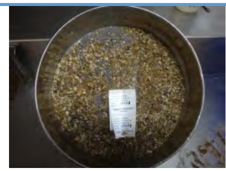
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT076_STN_208_A1				Subtidal coarse	Yes
CRKS_CEND2315_GT150_STN_210_A1				Moderate energy circalittoral rock, Subtidal coarse	Yes
CRKS_CEND2315_GT052_STN_212_A1				Subtidal coarse	Yes
CRKS_CEND2315_GT097_STN_214_A1				Subtidal coarse / Mixed	Yes?
CRKS_CEND2315_GT094_STN_216_A1				Subtidal coarse / Mixed	No

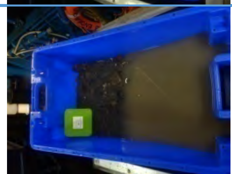
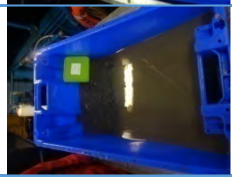
Station code / filename	Representative sample 1	Representative sample 2	Representative sample 3	Preliminary BSH	Possible MDAC Present
CRKS_CEND2315_GT085_STN_218_A1				Subtidal sand / Mixed	No
CRKS_CEND2315_GT081_STN_220_A1				Moderate energy circalittoral rock	Yes
CRKS_CEND2315_GT079_STN_222_A1				Subtidal sand	No

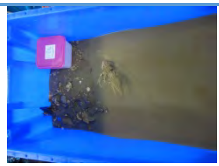
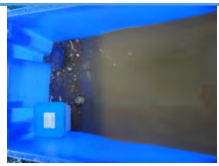
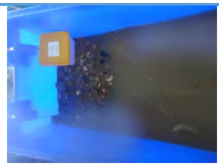
Appendix 8. Benthic grab samples

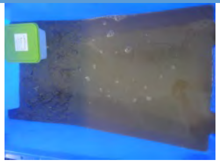
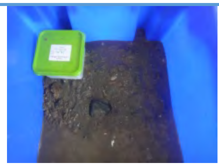
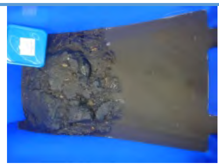
Table 9. Preliminary observations made during the processing of benthic grab samples acquired during the on CEND23/15. Note that these observations are preliminary and may change following full laboratory analysis.

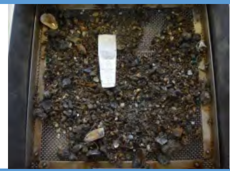
Station code	Sample image	5mm	1mm	Preliminary BSH	Sample volume (l)	Container size (l)
CRKS_CEND2315_GT007_STN_142_A2				MIXED	5	5
CRKS_CEND2315_GT036_STN_143_A2				MIXED	4.5	5
CRKS_CEND2315_GT050_STN_144_A1				MIXED	5.5	5
CRKS_CEND2315_GT087_STN_145_A1				SAND	4	5
CRKS_CEND2315_GT065_STN_146_A1				COARSE	3	2.5

Station code	Sample image	5mm	1mm	Preliminary BSH	Sample volume (l)	Container size (l)
CRKS_CEND2315_GT096_STN_147_A2				SAND	9.5	5
CRKS_CEND2315_GT120_STN_150_A2				SAND	11	2.5
CRKS_CEND2315_GT107_STN_151_A1				SAND	5	2.5
CRKS_CEND2315_GT120_STN_152_A3		DAY GRAB		SAND	9.5cm	0.5
CRKS_CEND2315_GT120_STN_152_A4		DAY GRAB		SAND	7.5cm	0.5

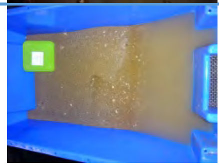
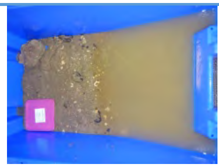
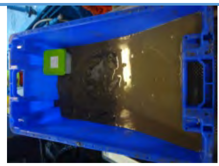
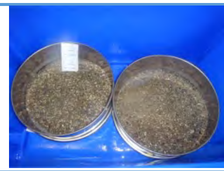
Station code	Sample image	5mm	1mm	Preliminary BSH	Sample volume (l)	Container size (l)
CRKS_CEND2315_GT120_STN_152_A5		DAY GRAB		SAND	6cm	0.5
CRKS_CEND2315_GT141_STN_154_A1				MIXED	6.5	5
CRKS_CEND2315_GT139_STN_155_A1				SAND	6	2.5
CRKS_CEND2315_GT039_STN_156_A1				COARSE	4	2.5
CRKS_CEND2315_GT035_STN_157_A1				MIXED	4	5
CRKS_CEND2315_GT0118_STN_158_A1				MIXED	4	5

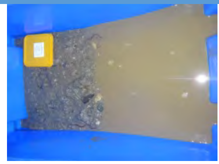
Station code	Sample image	5mm	1mm	Preliminary BSH	Sample volume (l)	Container size (l)
CRKS_CEND2315_GT103_STN_161_A4				MIXED	5.5	2.5
CRKS_CEND2315_G106_STN_162_A4				MIXED	4.5	2.5
CRKS_CEND2315_GT122_STN_164_A3				SAND	5	1
CRKS_CEND2315_GT071_STN_165_A3				MIXED	5	2.5
CRKS_CEND2315_GT066_STN_166_A3				SAND	4	5
CRKS_CEND2315_GT060_STN_167_A3				MIXED	3	2.5

Station code	Sample image	5mm	1mm	Preliminary BSH	Sample volume (l)	Container size (l)
CRKS_CEND2315_GT055_STN_168_A2				MIXED	5	5
CRKS_CEND2315_GT083_STN_170_A2				MIXED	5	5
CRKS_CEND2315_GT024_STN_171_A1				MIXED	5	5
CRKS_CEND2315_GT084_STN_172_A1				COARSE	7.5	10
CRKS_CEND2315_GT025_STN_173_A3				MIXED	7	5
CRKS_CEND2315_GT015_STN_174_A1				SAND	3	2.5

Station code	Sample image	5mm	1mm	Preliminary BSH	Sample volume (l)	Container size (l)
CRKS_CEND2315_GT009_STN_175_A1				MUD	5	5
CRKS_CEND2315_GT143_STN_179_A1				SAND	4	2.5
CRKS_CEND2315_GT144_STN_180_A2				SAND	6	10
CRKS_CEND2315_GT088_STN_181_A1				MUD	3.5	2.5
CRKS_CEND2315_GT075_STN_182_A1				SAND	3.5	5
CRKS_CEND2315_GT008_STN_183_A1				SAND	3	2.5

Station code	Sample image	5mm	1mm	Preliminary BSH	Sample volume (l)	Container size (l)
CRKS_CEND2315_GT077_STN_185_A1				COARSE	6	10
CRKS_CEND2315_GT126_STN_186_A5				MIXED	4	5
CRKS_CEND2315_GT126_STN_187_A1		DAY GRAB		MIXED	10cm	0.5
CRKS_CEND2315_GT126_STN_187_A2		DAY GRAB		MIXED	6cm	0.5
CRKS_CEND2315_GT126_STN_187_A4		DAY GRAB		MIXED	9cm	0.5
CRKS_CEND2315_GT014_STN_188_A1				MIXED	3	2.5

Station code	Sample image	5mm	1mm	Preliminary BSH	Sample volume (l)	Container size (l)
CRKS_CEND2315_GT082_STN_190_A1				MIXED	4	2.5
CRKS_CEND2315_GT116_STN_192_A1		DAY GRAB		MIXED	7cm	0.5
CRKS_CEND2315_GT147_STN_195_A3				COARSE	8.5	2.5
CRKS_CEND2315_GT110_STN_203_A2				COARSE	5	5
CRKS_CEND2315_GT121_STN_205_A1				COARSE	3.5	2.5
CRKS_CEND2315_GT076_STN_209_A2				MIXED	5	10

Station code	Sample image	5mm	1mm	Preliminary BSH	Sample volume (l)	Container size (l)
CRKS_CEND2315_GT150_STN_211_A1				MIXED	8	5
CRKS_CEND2315_GT052_STN_213_A1				SAND	4.5	2.5
CRKS_CEND2315_GT097_STN_215_A3				SAND	5	2.5
CRKS_CEND2315_GT094_STN_217_A3				Mixed	5	5
CRKS_CEND2315_GT085_STN_219_A1				Sand	5	5
CRKS_CEND2315_GT081_STN_221_A1				Mud	4.5	2.5

Station code	Sample image	5mm	1mm	Preliminary BSH	Sample volume (l)	Container size (l)
CRKS_CEND2315_GT079_STN_223_A1				Sand	10	5

Appendix 9. Marine Mammal Observations Report

The Marine Mammal Observations Report is available on the JNCC website as a report in its own right:

JNCC/Cefas Partnership Report Series. *Croker Carbonate Slabs cSAC/SCI CEND23/15 Marine Mammal Observations Report*, **No. 8**. Archer, S. & Albrecht, J.

JNCC/Cefas Partnership Report Series. *CEND23/15 Cruise Report: Monitoring Survey of Croker Carbonate Slabs cSAC/SCI*, **No. 10**. Wood, D., Jenkins, C., Eggett, A., Judd, A. & Golding, N. March 2016. ISSN 2051-6711.