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CEND 5/14 Fladen Grounds Survey Cruise Report

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Summary

This report summarises the data collected during a survey of the Fladen Grounds in March 2014, focusing in part on the Central Fladen Nature Conservation Marine Protected Area (NCMPA). Evidence was gathered to support the development of monitoring options at the Central Fladen NCMPA and also, more generally, for offshore mud habitats. Seabed imagery and sediment samples were collected to assess benthic fauna assemblages within and surrounding a management scenario and also from areas along a gradient of abrasion pressure (calculated through analysis of VMS data). Any preliminary results from this report of the survey are provided in the knowledge that more detailed analyses and interpretations are to be carried out and reported subsequently.

Contents

1 Introduction

This report presents the data collected during a cruise (code CEND0514) on the RV Cefas Endeavour from 20–31 March 2014 to survey the area within and around the Central Fladen NCMPA. The final results, analysis and interpretations will be reported in due course. The cruise specific 'Plan of Action' (PoA) document drafted by the Joint Nature Conservation Committee (JNCC) and the Centre for Environment, Fisheries and Aquaculture Science (Cefas) listed a number of survey objectives to be carried out which are summarised in Section 1.1 of this report. The PoA also detailed two other evidence collection surveys within the Swallows Sand and Farnes East Marine Conservation Zones (MCZs) to be surveyed during the same cruise (CEND0514); these are reported under separate cruise reports. The current version of the PoA is available from JNCC and Cefas (O'Connor 2014).

1.1 Survey aims

The main aim of the 2014 Fladen Grounds survey was to collect evidence to support the development of monitoring options specifically for the Central Fladen NCMPA and, more generally, for offshore mud habitats. The survey designs reported here were developed by the JNCC with input from Cefas benthic ecologists and statisticians.

The Before-After-Control-Impact survey design is based on that suggested by Stewart-Oaten *et al* (1986) in response to problems concerning the appropriate design of sampling programmes to assess the impact upon the abundance of biological communities of certain environmental pressures. The Before-After-Control-Impact (BACI) survey was designed to address the effect of possible management scenarios on the seabed community and physical parameters of the seabed within and around a potential MPA.

The fishing pressure survey element was based on the conclusions drawn from previous work carried out in collaboration between Cefas and JNCC on the application of fishing activities data in defining future monitoring strategies (Whomersley *et al* 2012). The fishing pressure survey/study was designed to improve understanding of potential effect of fishing pressure on biological communities. Sampling was carried out along a fishing pressure gradient (informed by the JNCC 'abrasion layer') on the burrowed mud community characteristic of the Fladen Grounds.

A final survey objective spanning both survey designs was to collect benthic contaminant samples across the survey area (including one sample in close proximity to a live production well) to augment the information available regarding the level of organic and heavy metal contaminants in the sediment

1.2 Survey project team

The survey team completed both survey elements during cruise CEND0514 between 20–30 March 2014 and included Cefas marine ecologists, marine surveyors and representatives from JNCC.

Paul McIlwaine (Cefas-Marine ecologist)	Simon Pearson (Cefas-Technical lead)
Nicola Travell (Cefas-Plankton taxonomist)	Anna Downie (Cefas-GIS specialist)
Olga Andres (Cefas-Data manager)	Buster Rook-Bishop (Cefas-Technical specialist)
David Haverson (Cefas-Marine engineer)	Paulette Posen (Cefas-GIS specialist)
Rose Nicolson (Cefas-GIS specialist)	James Cook (Cefas-Technical specialist)

Sophie Lozach (Cefas-Marine ecologist)	Neil Golding (JNCC lead)
Michelle Watson (JNCC-MPA specialist)	Hugh Wright (JNCC-MPA specialist)
Roger Cogan (Geotech Ltd)	

1.3 Site description

The geographical location of this survey was an area known as the Fladen Grounds in the northern North Sea, approximately 80 nautical miles east of Orkney. In the formal advice submitted by Scottish Natural Heritage (SNH) and the JNCC to Scottish Government, three Nature Conservation MPAs were proposed in the Fladen Grounds area. These included the Central Fladen proposed NCMPA, which was proposed for burrowed mud habitat features, and the Western and South-east Fladen proposed NCMPAs, which were recommended as science based alternatives to Central Fladen for the representation of the sea pens and burrowed megafauna component of the burrowed mud habitat feature (Figure 1).

Subsequent to the planning and completion of the survey reported here, Central Fladen (inclusive of Central Fladen (Core)) was designated as a NCMPA on the 24 July 2014.

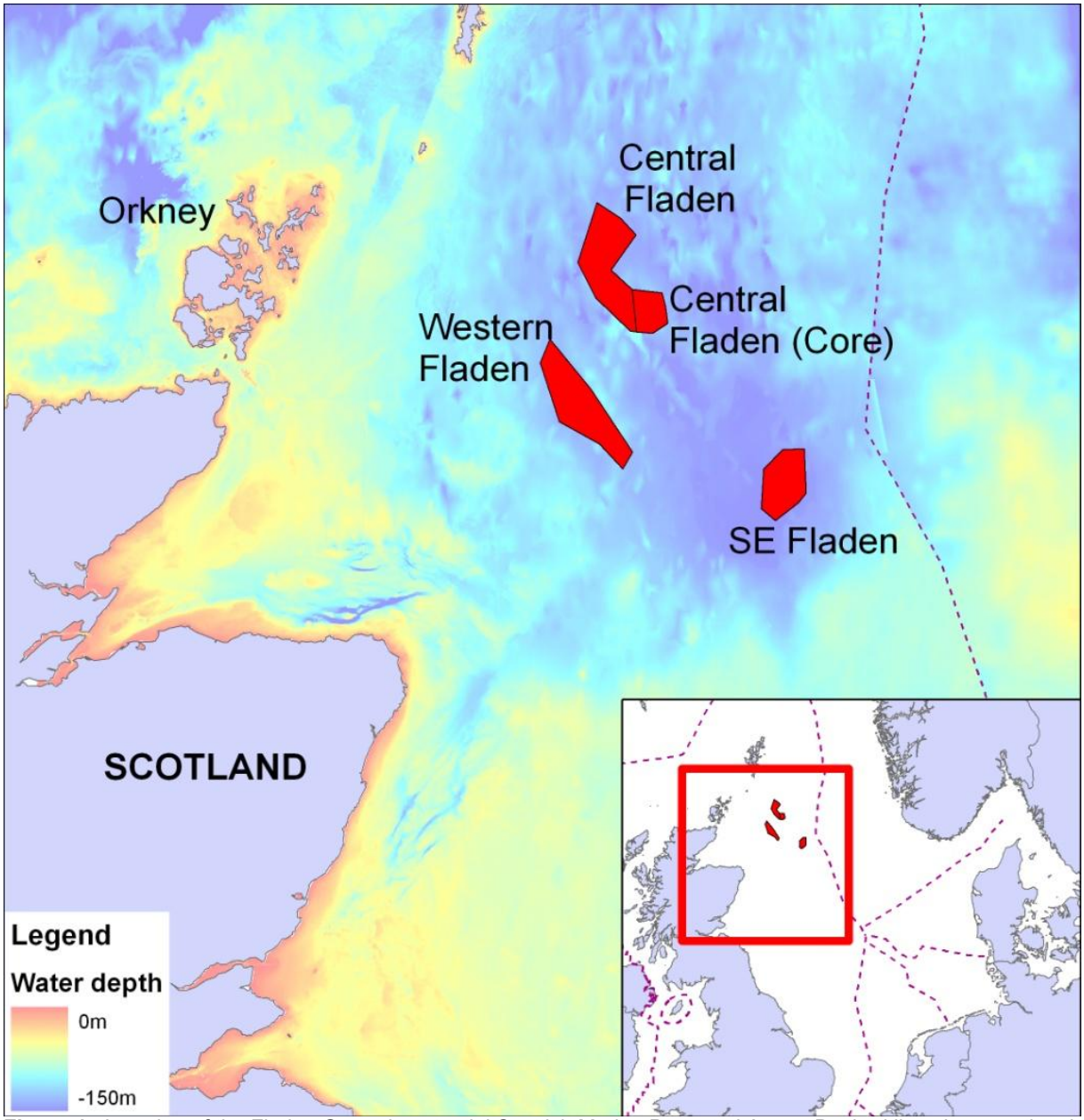

Figure 1. Location of the Fladen Grounds potential Scottish Marine Protected Areas. Dashed line shows national territorial limits. The underlying bathymetry is from the digital elevation model prepared by Astrium Oceanwise 2011.

1.4 Geological and biological context

Central Fladen Nature Conservation Marine Protected Area (NCMPA)

The Central Fladen NCMPA lies within the large expanse of muddy sand and sandy mud sediment plain of the Fladen grounds, in the northern North Sea. The sea pens and burrowing megafauna component of the burrowed mud habitat falls across the entire area of the MPA except for within the small patch of sand and gravel habitat at the south-east tip. The southern part of this MPA contains one of only two areas where the tall sea pen (*Funiculina quadrangularis*) has been observed on the east coast of Scotland; this species is classified as nationally uncommon. The proposed area has been shaped to include one of the tunnel valleys comprising the Fladen Deeps or 'The Holes' – a key area of geodiversity interest in Scotland's Seas which represents a series of large-scale tunnel valleys. In places, these are up to 150m in depth below the surrounding seafloor, 4km wide and 40km long and are likely to have been formed by pressurised melt-water flowing beneath the ice sheet.

Central Fladen NCMPA

Size: *The area of the MPA is 925 km^2.*

Features for which the site is designated:

Biodiversity:

- *Burrowed mud (sea pens and burrowing megafauna, and tall sea pen).*

Geodiversity:

- *Fladen Deeps Key Geodiversity Area - Quaternary of Scotland Block (Sub-glacial tunnel valleys)*

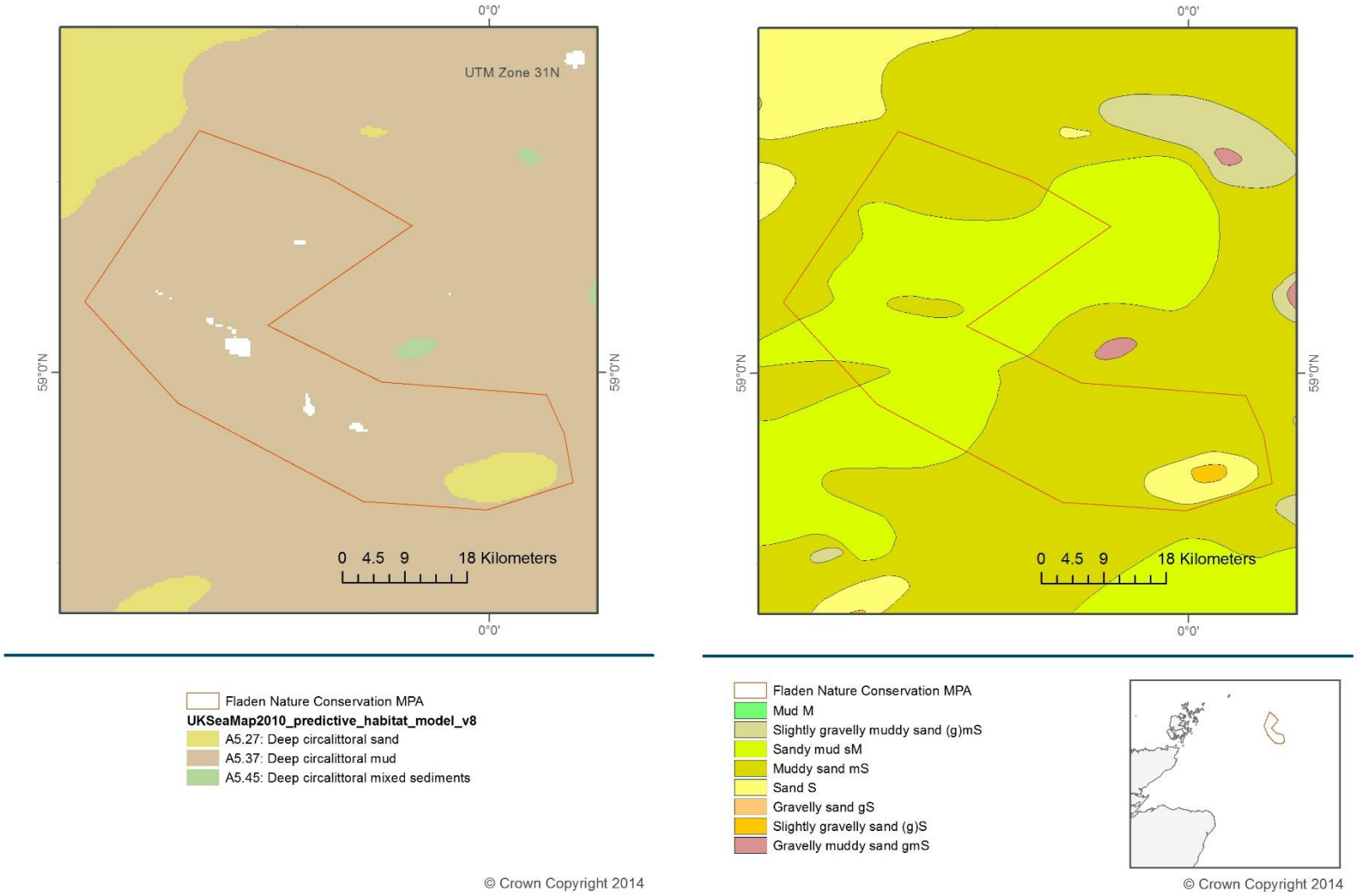

Figure 2 (Left). UKSeaMap 2010 predicted habitat distribution. **(Right)** Seabed sediment distribution from British Geological Survey.

2 Survey design and methods

2.1 Survey Planning and Design

2.1.1 Before-After-Control-Impact (BACI) survey

This part of the survey aimed to establish a BACI study for the Central Fladen NCMPA. This 'before' survey focussed on areas of sublittoral mud habitat within and outside management scenario areas. The intention will be to try and detect changes between benthic communities in the sublittoral mud habitat inside and outside of the management scenario area after subsequent surveys. Power analyses were conducted by Cefas on previously collected infauna community abundance data. These analyses identified that 40 samples per treatment would achieve an acceptable level of power (>80%) in detecting a 30% change in species number, and a 40% change in species abundance. Thus 40 sample stations, restricted to mud and sandy mud habitats, as predicted by modelled sediments (EU Seamap), were assigned randomly within each treatment. It was not envisaged that additional stations would be required as valid samples were expected from each target station.

2.1.2 Fishing pressure gradient survey

Fishing pressure layers (in the form of surface abrasion) from VMS data (2009-2013) were created to identify areas of consistently high and low surface abrasion, along with a gradient between the two. These areas are displayed as cells with known pressure values and are measured in 'swept area m^{2}'; calculated from the size of the fishing gears impact on the seabed and the length of tow. Originally, seven pressure categories were identified along this 'surface abrasion pressure gradient' and two replicate cells were selected within each category (1A & B – 7A & B). A power analysis, conducted by Cefas, to inform the sampling design for this study identified that 10 randomly placed fauna samples within each pressure cell would provide sufficient power to identify changes in benthic community structure along the pressure gradient. However, during the survey these pressure cells had to be amended (see section 2.1.5 & Table 1) to six pressure categories along a surface abrasion pressure gradient. Two replicate boxes were sampled in the low and high pressure category while four boxes (no replicates) were sampled in the intermediate pressure categories (Figure 4).

2.1.3 Sample Locations

The target sampling locations, and the station codes assigned to these, are shown in Figure 3 & Figure 4. In the BACI study (Figure 3) sample stations were given a station code; these were prefixed with 'CA' (control area), 'MSA' (management scenario area) and ranged from 01 to the total number of planned samples in the survey (e.g. CA01- CA40, MSA01-MSA40).

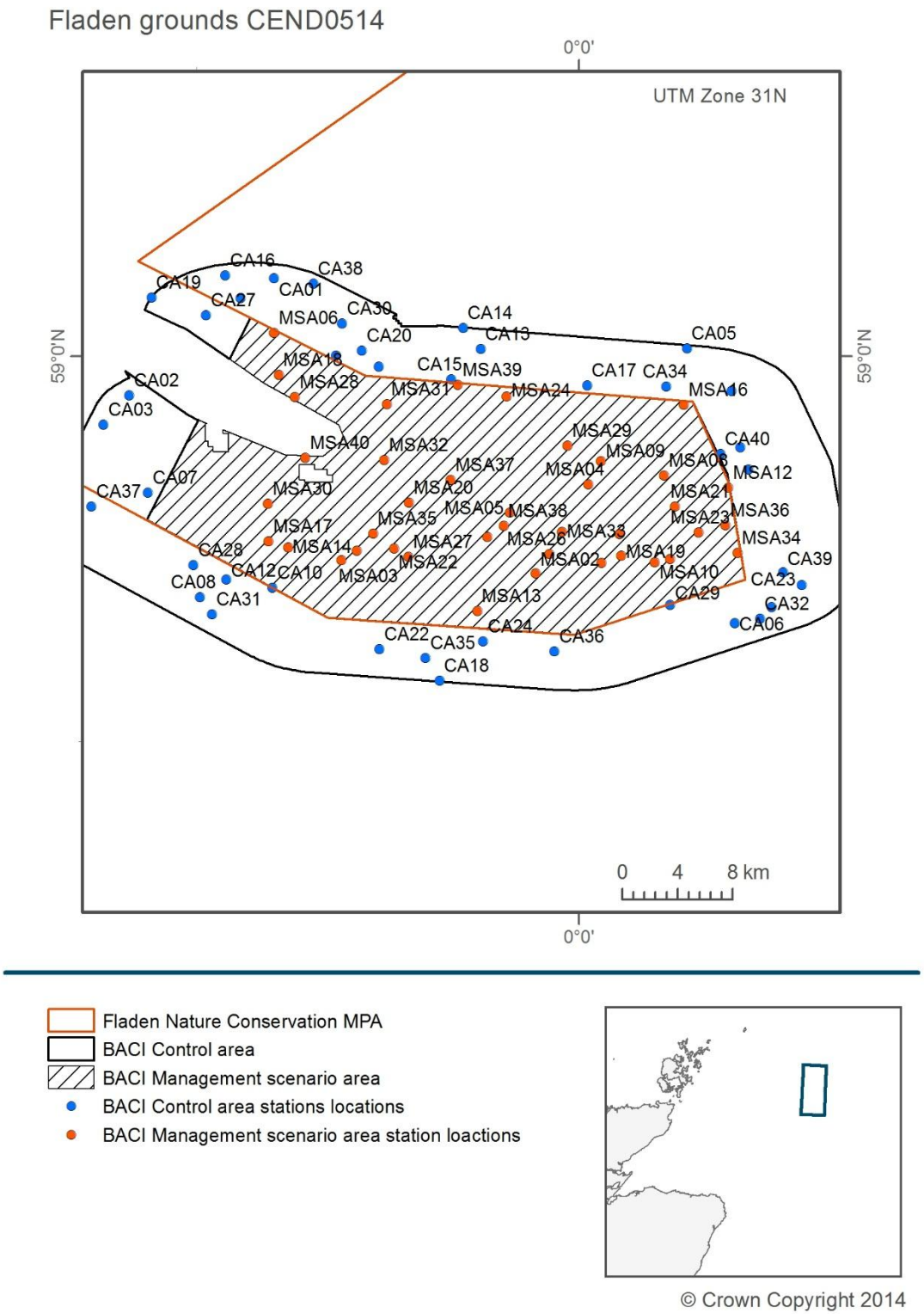

Figure 3. The Before-After-Control-Impact (BACI) survey design showing the location of all 80 target sampling stations (40 stations per treatment) at the Central Fladen NCMPA.

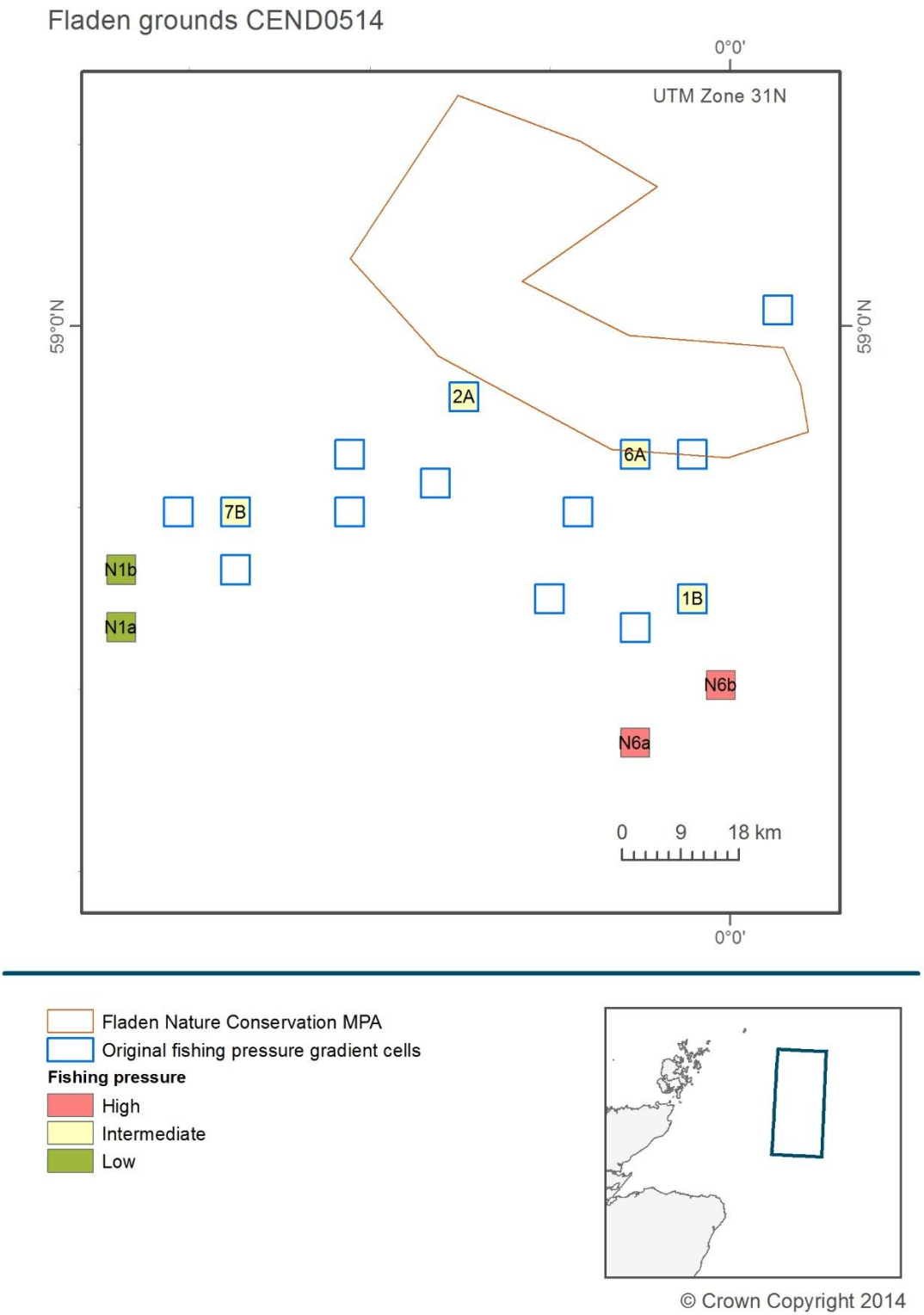

Figure 4. Fishing pressure cells. Original planned (blue boxes) and actual cells visited during CEND0514 (coloured according to high, intermediate or low fishing pressure (surface abrasion))

2.1.4 Proposed Sampling

Seabed imagery and sediment samples were to be collected at each pre-planned target station for both the BACI and fishing pressure surveys. Due to the soft sediments expected, the requirement to sample the intact sediment surface and to be consistent with the prior survey carried out during CEND0113x, a 0.1 m^2 Day grab was to be employed for all sediment sampling. Sediments were to be collected so that infauna community and particle size distribution analyses could be carried out to the nationally accepted standards (Worsfold *et al* 2010, Mason 2011). In addition, material was to be collected from each sediment sampling station of both the BACI and the fishing pressure survey to allow sediment environmental parameters (i.e. the level of organic carbon and nitrogen and the ratio of nitrate to phosphate in the top 2cm of sediment on the sediment water interface) to be calculated. The seabed imagery data were to be collected using a camera sledge towed astern of the vessel (Coggan *et al* 2007).

2.1.5 Changes to Sampling During the Survey

Due to inclement weather experienced during the BACI survey and minor adjustments to the VMS data interpretation, changes in the sampling design had to be made during CEND0514 which included a reduced number of fishing pressure cells being surveyed (Figure 4, Table 1). These changes were reported to the relevant personnel in JNCC and Cefas prior to commencing data collection for the fishing pressure gradient survey. In addition, multibeam bathymetry data was collected during periods of weather downtime when the sea state made it too unsafe to deploy equipment over the side of the vessel (Figure 7) - not within the original survey plans.

Table 1. Fishing pressure cell values calculated using the JNCC surface abrasion pressure layer derived from VMS data.

Cell code	Fishing pressure (swept area m^2)	Pressure category
N1B	55560	Low
N1A	470408	Low
7B	9776708	Intermediate
1B	17554490	Intermediate
2A	29662558	Intermediate
6A	40419592	Intermediate
N6A	56163752	High
N6B	58414856	High

2.2 Survey Equipment and Sample Processing

The survey was conducted from the RV Cefas Endeavour. Technical specifications of the vessel and the survey equipment used are given in Appendix 1.

2.2.1 Seabed Imagery

Video observations were made with a camera sledge (CS) system (Figure 5) deployed from the stern gantry. A video camera mounted on the sledge had the capability to also capture still images. Illumination was provided by four high intensity LED lights and a dedicated flash unit. The camera was orientated to provide a forward oblique view of the seabed and was fitted with a four-spot (red) laser-scaling device which projected the corners of a 17cm x 17cm square along the axis of the lens onto the seabed (Figure 5). Floats were used to reduce the weight of the frame, thus limiting the sediment plume during tows. A float was also added to the communications/tow cable to ensure this did not drag on the seabed and cause an artefact in the video footage.

Set-up and operation followed the MESH 'Recommended Operating Guidelines (ROG) for underwater video and photographic imaging techniques' (Coggan *et al* 2007). The sledge was controlled by a winch operator who had sight of the video monitor; the amount of tow cable deployed was noted to allow a 'lay back' to be applied to estimate the position of the sledge, if required. Camera tows lasted a minimum of 10 minutes, with the sledge being towed at ~ 0.5 – 0.7 knots through a 100m diameter target 'bullring' with the station position at its centroid. Note that the slightly faster speed was necessary to keep the sediment plume clear of the imagery field of view. However, this did not affect the ability to identify and perform counts of seapen species and other benthic fauna, as per the survey objectives. Still images were captured at regular one minute intervals with additional opportunistic images taken if specific features of interest were encountered during towing.

Video images were recorded simultaneously to a Sony GV-HD700 DV tape recorder and a computer hard drive. A video overlay was used to provide station metadata, time and position (of the GPS antenna) in the recorded video image. Field notes were made during each camera deployment, noting station and sample metadata, real-time observations of substrate and taxa, an initial assessment of the range of Broad Scale Habitats (BSHs) seen and the abundance of each of the three species of sea pens encountered.

2.2.2 Camera Clock Synchronisation

The internal clock of the camera used on the sledge was synchronised with GPS time to within five seconds. This clock creates a timestamp in the EXIF data stored in the digital image which is used to match the image to the positional reference.

Figure 5. Sledge mounted camera system and scaling lasers used to determine field of view and size.

2.2.3 Sediment Sampling

The primary sediment sampling gear was a 0.1 m^2 Day grab, ideally suited for the muddy and sandy sediments expected in the area. For the BACI study, a mini Hamon grab fitted with a video camera and lighting was available to collect sediment samples for infauna community analysis when the Day grab was unsuccessful. A Shipek grab was also available to collect sediment samples in conjunction with the mini Hamon or Day grab (Figure 6). For the fishing pressure gradient study, the 0.1 m^2 Day grab was the only gear deployed to collect sediment samples. All grab systems were deployed from the side gantry.

Samples were collected from within a 50m radius 'bull ring' around the target sampling location. On recovery of the grab, a photograph of the sample was taken (*in situ* for the Day and Shipek grabs and following transfer to a large container for the mini Hamon grab). The sampling depth (Day and Shipek grab) or volume (mini Hamon grab) was estimated before a sediment subsample was collected for particle size distribution analysis (PSA) using either a 3cm diameter core (Day and Shipek grab) or a 125ml scoop (mini Hamon grab). Sediment sub samples for PSA were placed in labelled containers and frozen immediately.

The remaining sample was decanted into a plastic box and transferred to the sample processing area on board the vessel if an infaunal sample was required. Benthic fauna were collected by washing the sample with sea-water over a 5mm and 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 Broad Scale Habitat (BSH) as per the MCZ Project Ecological Network Guidance document (Ashworth *et al* 2010).

A separate deployment of either the Day or Shipek grab was used to collect a 2cm deep surface scrape of sediment for either sediment organic carbon and nitrogen (Sed OCN) and nitrate:phosphate (N:P) or a suite of organic and heavy metal contaminants. In total, five samples for heavy metal and organohaline contaminant analysis collected; four stations from across the BACI and fishing pressure survey areas and one additional station in close proximity to the Claymore oil platform. The equipment used to collect contaminant samples was rinsed in Hexane solvent to prevent cross contamination between samples prior to use at contaminant stations.

Figure 6. The suite of grabs used to collect sediment samples during CEND0514. Left to right: 0.1 m^2 Day grab, 0.1 m^2 mini Hamon grab and Shipek grab.

2.2.4 Global Positioning System and Corrections

Position fixes were recorded using the Tower Navigation system on the RV Cefas Endeavour. This software records, as a minimum, the geographic position of the sampling equipment based on its location on-board. For grab sampling, the system applies offsets to calculate the position of the side gantry, whereas for camera deployments calculations are made to provide the stern gantry position (see Appendix 2). The actual position of the gear on the seabed was recorded using an Ultra Short Base Length (USBL) positioning beacon. In strong tides and deep water an offset of up to ~10 metres may occur. Comparison of the USBL position and the gantry position will allow for the accuracy to be determined.

Positions for grab samples were also recorded manually (manual fixes) at the instant the grab contacted the seabed.

During video tows, fixes were recorded every five seconds (five navigation cycles) between the start and end of each tow. Still images were matched to the nearest fix recorded. The corrected positional data for the still images provide geo-referenced still images for the service providers who will ultimately process the footage and images.

2.2.5 Multi Beam Echo Sounder

Although there was no acoustic survey planned, some opportunistic multibeam data was collected from within Central Fladen NCMPA. The onboard calibrated Kongsberg multibeam system consisted of a sub-surface blade mounted echo sounder, motion reference unit and data acquisition software. See Appendix 1 Section 1 & 5 for the MBES equipment specifications and calibration report.

3 Survey Narrative

The RV Cefas Endeavour left Lowestoft on the 13 March 2014 at 18:00 on cruise code CEND0514 and carried out seabed sampling at two MCZs and a port call to Aberdeen to collect additional equipment. The vessel arrived at the first station of the BACI survey within the Fladen Grounds on the 20 March and was unable to carry out camera sledge operations due to unsafe deployment conditions in rough seas. Sediment sampling was attempted at 00:54 on the 20 March 2014 and was stopped, after 11 deployments were required to collect samples from three stations at 04:06. A MBES line plan was generated and a Conductivity Temperature Depth micro logger (CTD) was deployed at 21:39 on the 20 March 2014 prior to collecting seven lines of MBES data, while waiting on more favourable sediment sampling conditions. Seabed imagery, in addition to sediment samples, was collected from each target station to the required specification when conditions allowed. It was not always possible to collect all the required samples from a station during one visit as the gears used have varying operational limits. This meant that the survey was significantly longer than planned, and reduced the time available to complete the next survey element (fishing pressure gradient). The camera sledge was lost and recovered between 07:11 and 09:30 on the 22 March 2014 due to a winch malfunction. Due to damage to the primary camera cable, a shorter alternative cable on a different winch was used. All objectives were completed for the BACI survey with the final camera sledge transect being completed at CA36 finishing at 22:14 on the 26 March 2014. Two stations, CA05 and CA37, were sampled for a suite of organic and metal contaminants as part of the study into site-wide contaminant levels.

Due to the limited time available to complete the planned sampling strategy of the fishing pressure survey and a slight amendment to the calculation of fishing pressure, it was necessary to reduce the number of fishing pressure cells being sampled.

The vessel transited to collect seabed imagery and sediment samples from the amended pressure cells, prioritising the paired highest and lowest fishing pressure cells, beginning with a day grab at station N6B10 at 00:27 on the 27 March 2014. Day grabs and camera sledges were obtained from these four boxes (40 stations) before limiting the sampling gear to camera sledge only. Ten camera sledge tows from four intermediate pressure boxes were then collected. One of the intermediate fishing pressure cells, Box 2A, was deeper than the charted depth with a maximum surveyed depth of 191m. This required a change back to the longer cable which had been damaged and repaired following the loss of the sledge earlier.

Survey operations were completed on 30 March 2014 at 08:19 with successful sediment sampling in the vicinity of the Claymore live oil production well before the vessel started its return journey to Lowestoft.

The vessel arrived off Lowestoft by 20:00 on 31 March 2014 and was alongside Cefas quay by 21:36. All samples were transferred to the Cefas Lowestoft laboratories or storage facility on the 1 April 2014.

4 Preliminary Results

The preliminary results contained in this document are initial field observations. The results will be updated following more detailed sample and data analyses and presented in a final summary report.

4.1 Acoustic Survey

Acquisition of Multi Beam Echo Sounder (MBES) data from the Fladen Grounds SMPA was not planned as part of this survey. However, due to a period of poor weather, MBES data acquisition was the only survey technique which could be safely employed in the prevailing weather conditions. Thus, seven lines, each approximately 8km long were collected from an area with a predicted change in sediment as modelled by a predictive sediment map. Run lines were orientated to maximise the potential of collecting fit for purpose MBES data. These data were not processed onboard therefore the achieved seabed coverage is not confirmed. Figure shows the predicted coverage through the use of a 170m buffer extending from either side of the surveyed line, based on the actual swathe of the sound beams recorded during acquisition.

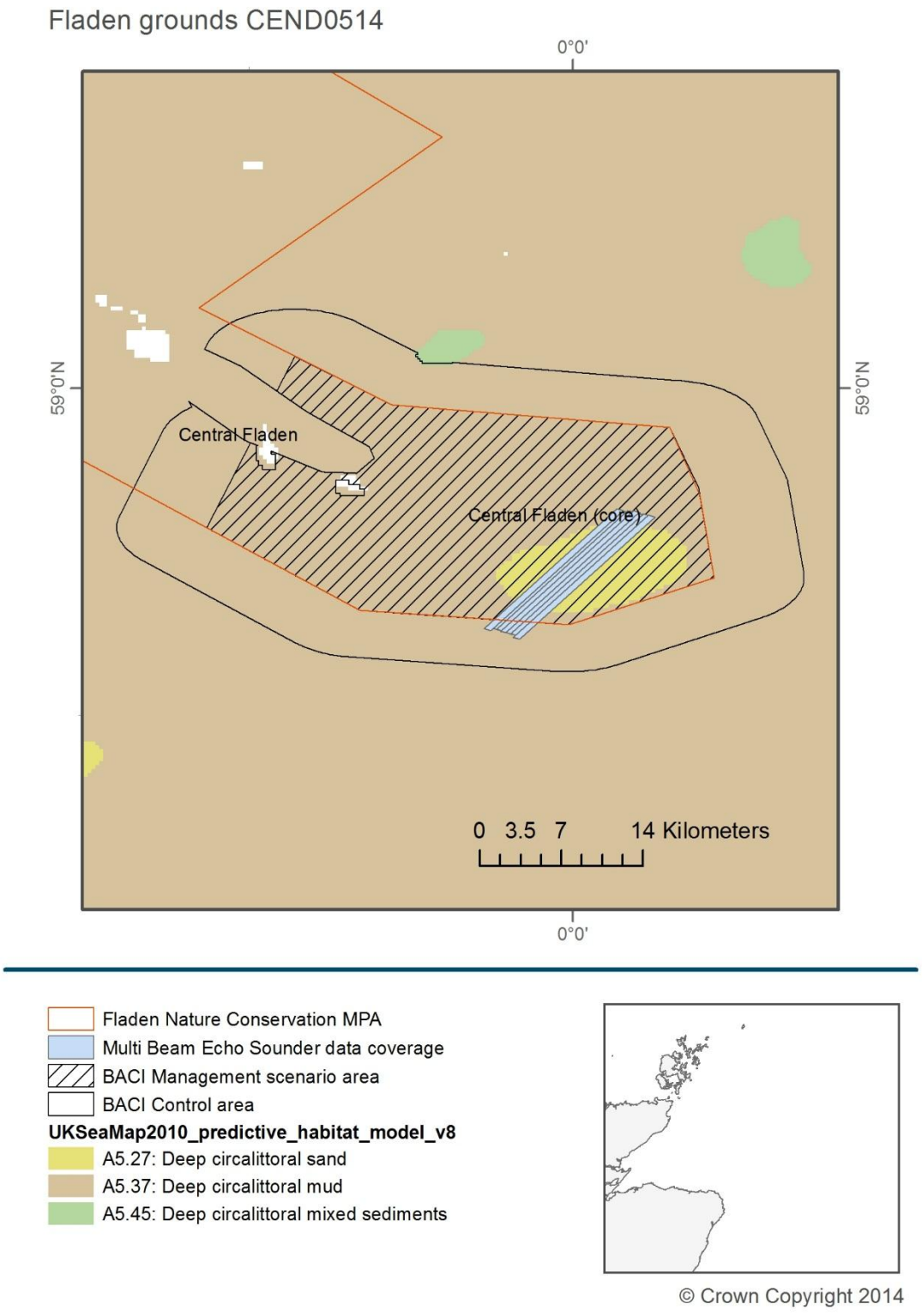

Figure 7. Estimated Multi Beam Echo Sounder data coverage over modelled change in sediment type (UK SeaMap). A 170m buffer was placed around an imaginary line joining the start and end of MBES run-line positions to estimate coverage.

4.2 Seabed Imagery

A successful camera sledge deployment was carried out at all 80 target stations during the Before-After-Control-Impact (BACI) survey (Figure). In total, 208 geo referenced-still images were obtained. A total of 787 geo-referenced still images were collected from 80 stations during the fishing pressure study.

It was noted that an area of deeper bathymetry than the other pressure cells was present within pressure cell 2A. This area was sampled using the camera sledge only and the maximum depth recorded was 191m (60-70m deeper than the surrounding seabed).

Three representative images are shown for each successful tow carried out in both the BACI and fishing pressure gradient sampling locations in the Tables in Appendix III. It must be noted that, due to the soft sediment and tidal regime in the area, much of the video footage contains sediment plumes arising from the impact of the sledge runner on the seabed. A full analysis of the seabed imagery will include a measure of visual integrity for each tow.

A cup coral (a solitary hard coral) speculatively identified as Flabellum (Ulocyathus) macandrewi (Gray 1849) was observed on some of the video footage captured during the surveys. A specimen was obtained with the Day grab at the final station visited, CLMR01 (Figure 8). The abundance of this fragile cup coral species can be enumerated, and its distribution mapped, following the processing of the seabed imagery.

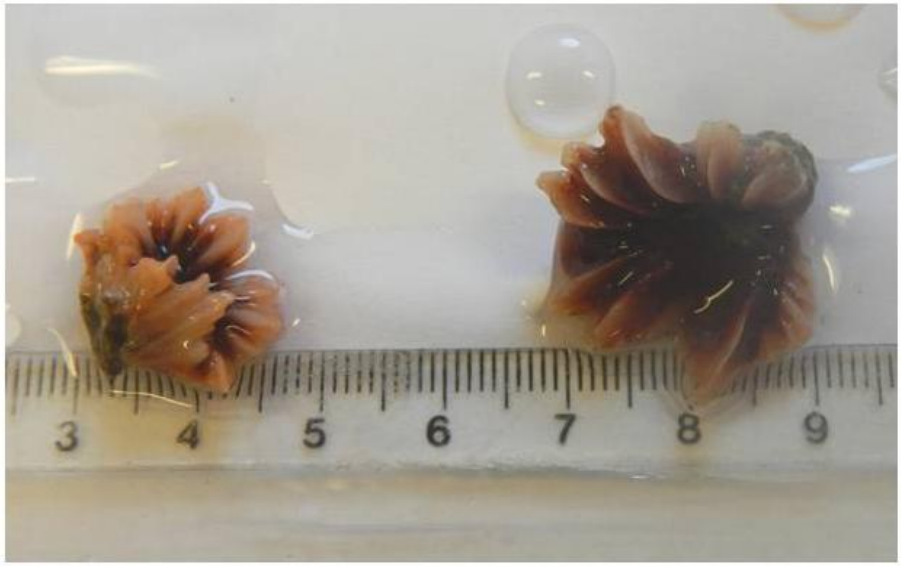

Figure 8. Cup corals collected from station CLMR01.

4.3 Sediment Sampling

All 80 stations were successfully sampled during the BACI survey (Figure 12). Samples collected using a variety of gears for infauna community analysis and sediment analyses are summarised on Table. During the fishing gradient study, 42 stations were successfully sampled (Figure 13) with the Day grab for the same analyses described above for the BACI survey. Ten samples were collected from each of the highest and lowest fishing pressure cells (N1A&B and N6A&B) and two from intermediate cells (1B and 7B).

Appendix 5 details the gears used and the attempts made with each whilst Figure 9 and Figure 10 show a geographical representation of the sediment samples collected during the BACI and fishing pressure gradient surveys respectively.

In total, five stations were also sampled for organic and heavy metal contaminant analyses (CA05, CA37, 1B02, 7B05 & CLMR01). Figure 10 shows the geographic spread of the contaminant stations across the surveyed area.

Table 2. Number of samples collected for each type of analysis using each of the three gear types employed during the Before-After-Impact-Control survey. PSA = Particle Size Analysis, N = Nitrogen, P = Phosphate, OCN = Organic Carbon and Nitrogen.

Gear name	**Gear code**	**Number of samples collected for infauna and PSA**	**Number of sediment surface scrapes for Sediment OCN and N:P**
0.1 m^2 Day grab	DG	75	76
0.1 m^2 mini Hamon grab	HC	5	0
0.04 m^2 Shipek grab	SH	0	4

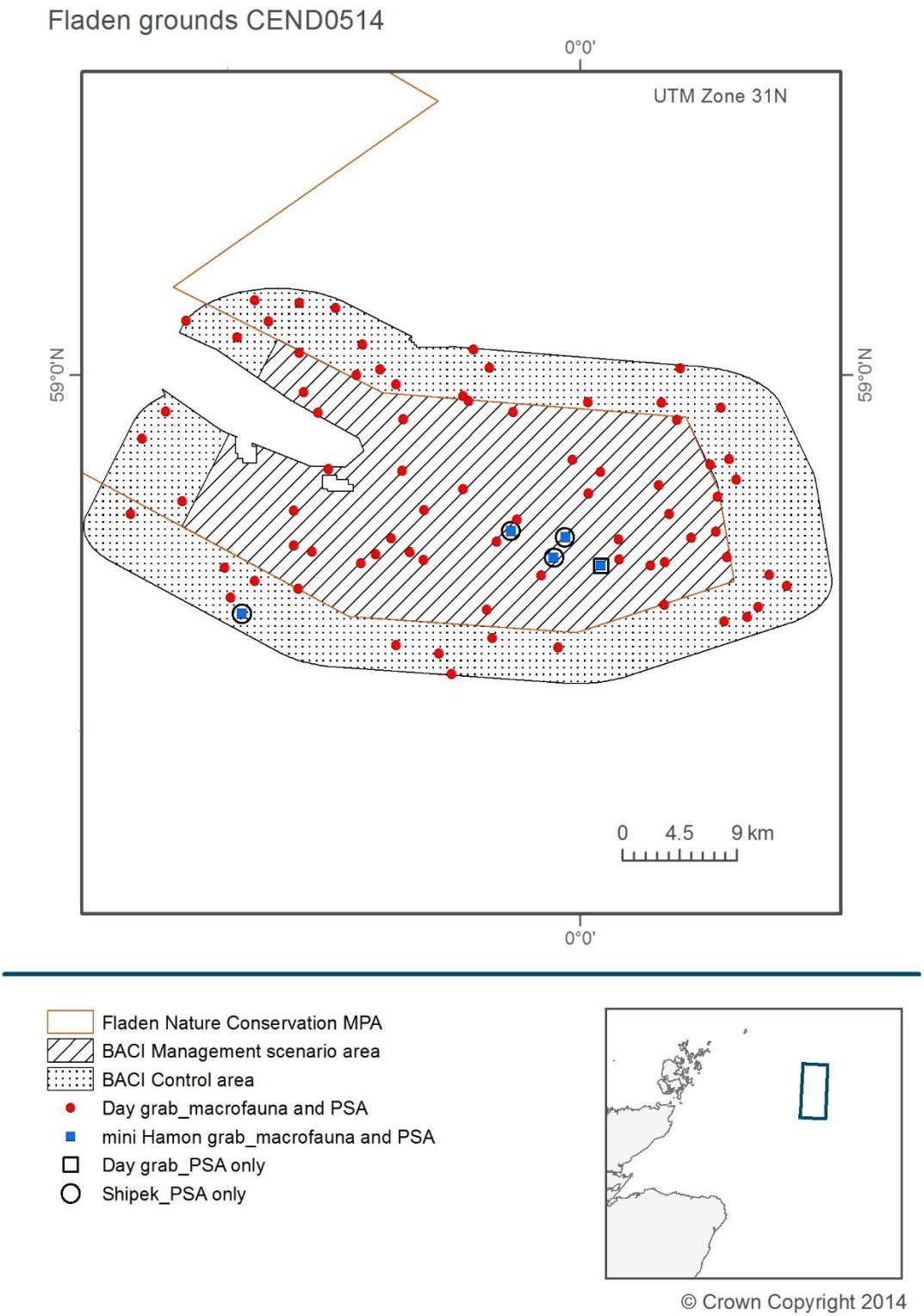

Figure 9. Location of BACI sampling stations during the survey in April 2014.

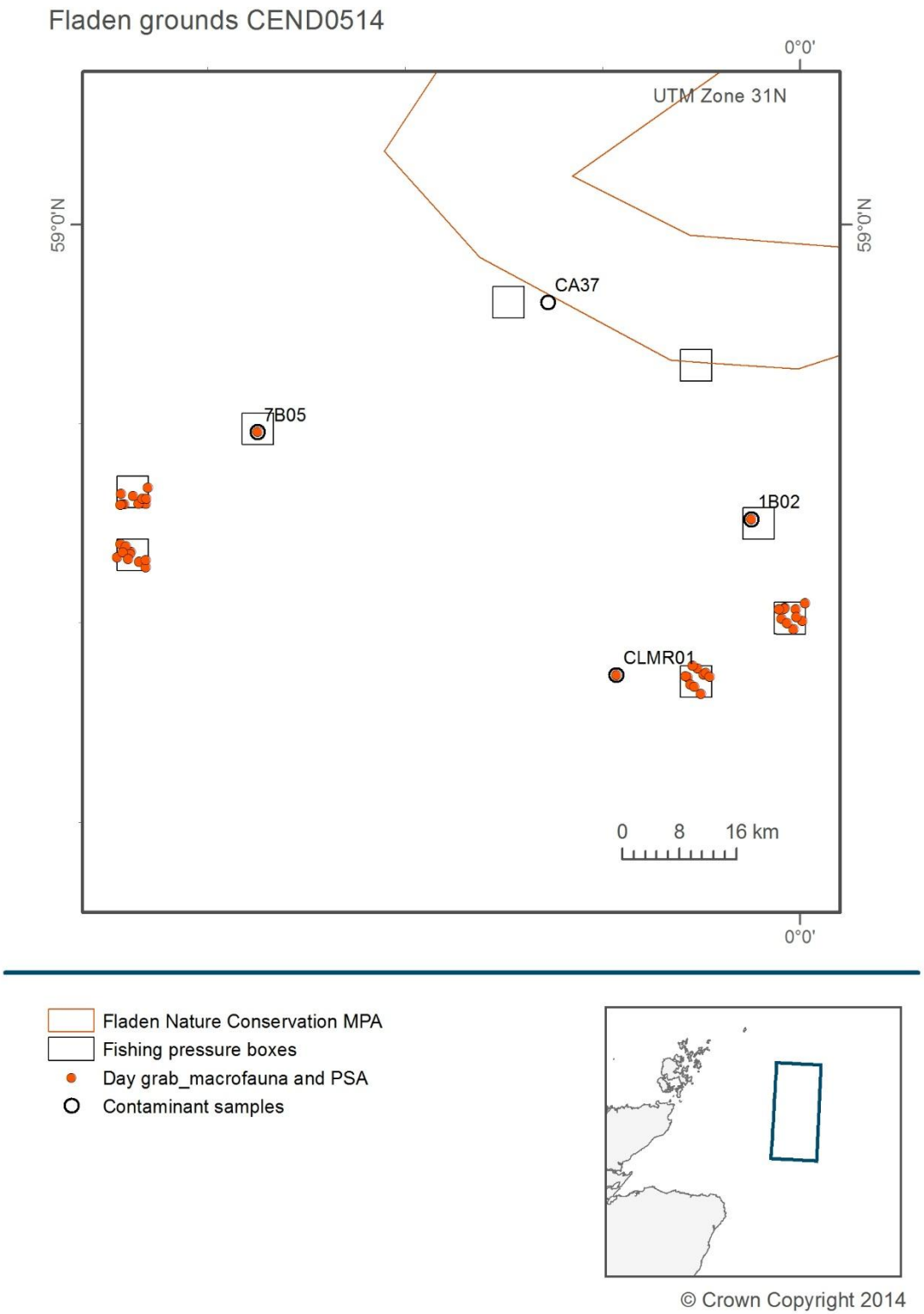

Figure 10. Locations of stations sampled with the Day grab and for contaminants in regions (cells) representing the gradient in fishing pressure.

4.4 Features of Conservation Importance (FOCI)

Burrowed mud habitats, a feature of the Central Fladen NCMPA, were present at most stations surveyed throughout the Fladen Grounds and will be identified through the processing of the seabed imagery collected.

The tall sea pen, *Funiculina quadrangularis* (Figure 11), was a specific 'search feature' for the Central Fladen NCMPA. The species had previously been observed in only a single video transect in 2010 by Marine Scotland Science. The verification survey carried out by Cefas with and on behalf of JNCC in January 2013 (cruise code CEND0113x) confirmed its presence in the area and identified a wider distribution (Eggleton *et al* 2013).

The tall sea pen, *Funiculina quadrangularis* was identified from nine stations sampled during the BACI survey from both within and outside of the management scenario area (Figure 12), (Table 3). The three solitary records (CA08, CA19 & CA31), if confirmed following analysis of the seabed imagery, will extend the known distribution of the tall sea pen as described from the results of Cefas surveys.

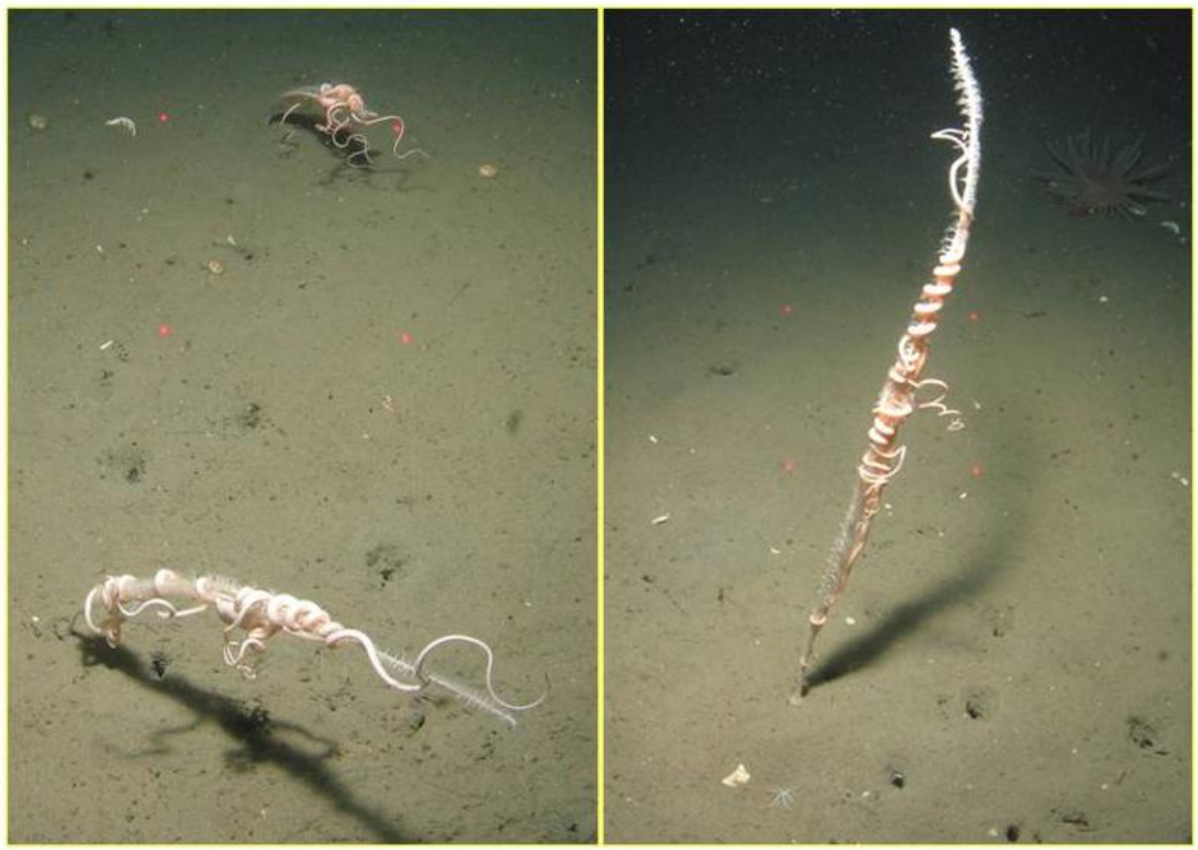

Figure 11. Tall sea pens, *Funiculina quadrangularis* as observed on the video tows at station MSA02 showing the brittlestar, *Asteronyx loveni*. Red scaling lasers are 170mm apart.

Table 3. Tall sea pen abundance recorded in seabed imagery data field observations during CEND0514.

Station code	**Abundance of tall pen, *Funiculina quadrangularis.***
CA08	1
CA19	1
CA31	1
MSA01	10
MSA02	72
MSA05	7
MSA26	6
MSA33	22
MSA38	6
Total	*126*

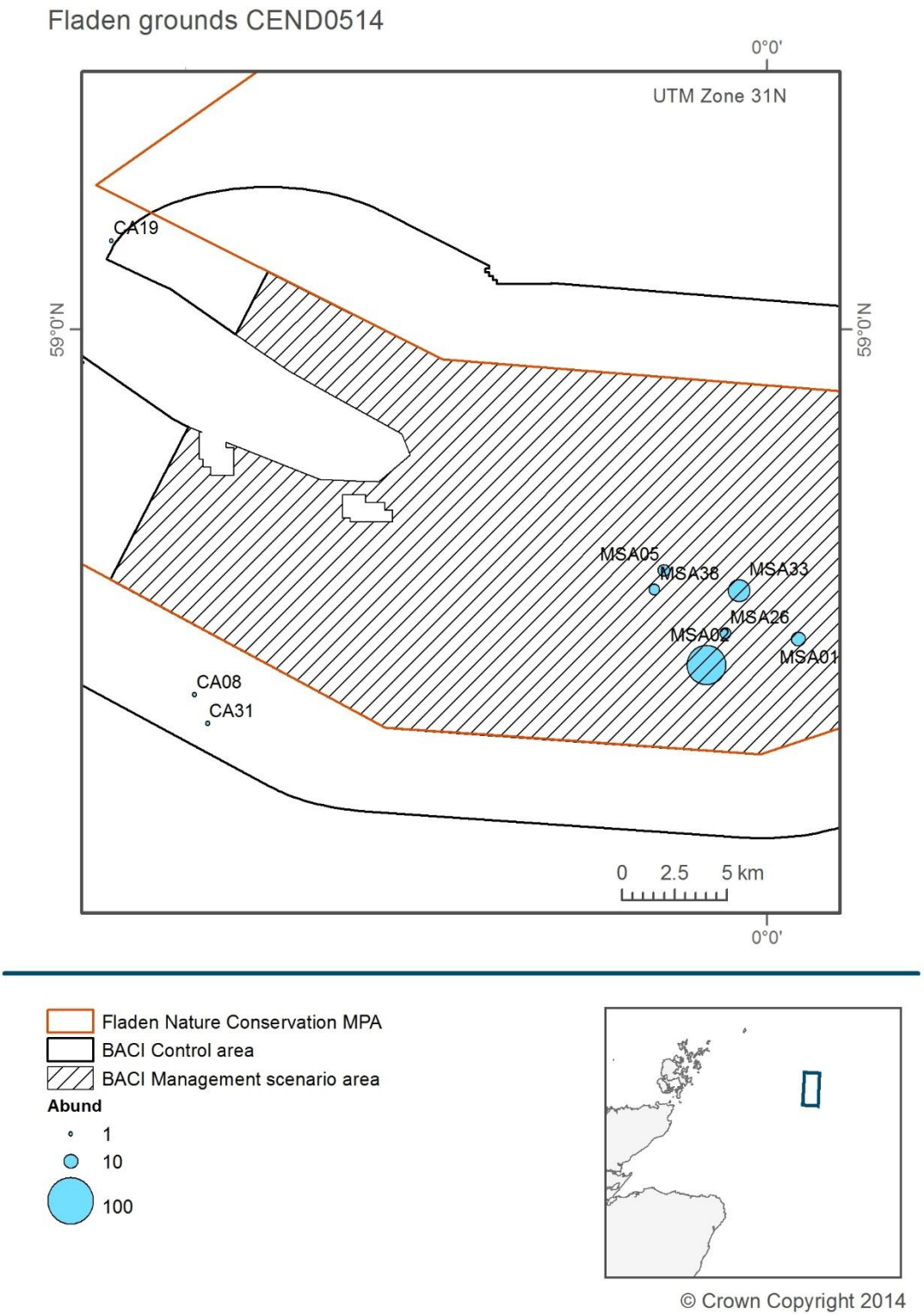

Figure 12. Map showing the proportional abundance of the tall sea pen, *Funiculina quadrangularis,* from nine stations within the Before After Control Impact (BACI) survey area, from preliminary field observations.

Although not a search feature for the Fladen Grounds potential SMPA, the long living mollusc species ocean quahog, *Arctica islandica* was recovered at several stations (Figure 13). All undamaged specimens were photographed and returned to the sea after recording various measurements as shown in Table (Appendix 3).

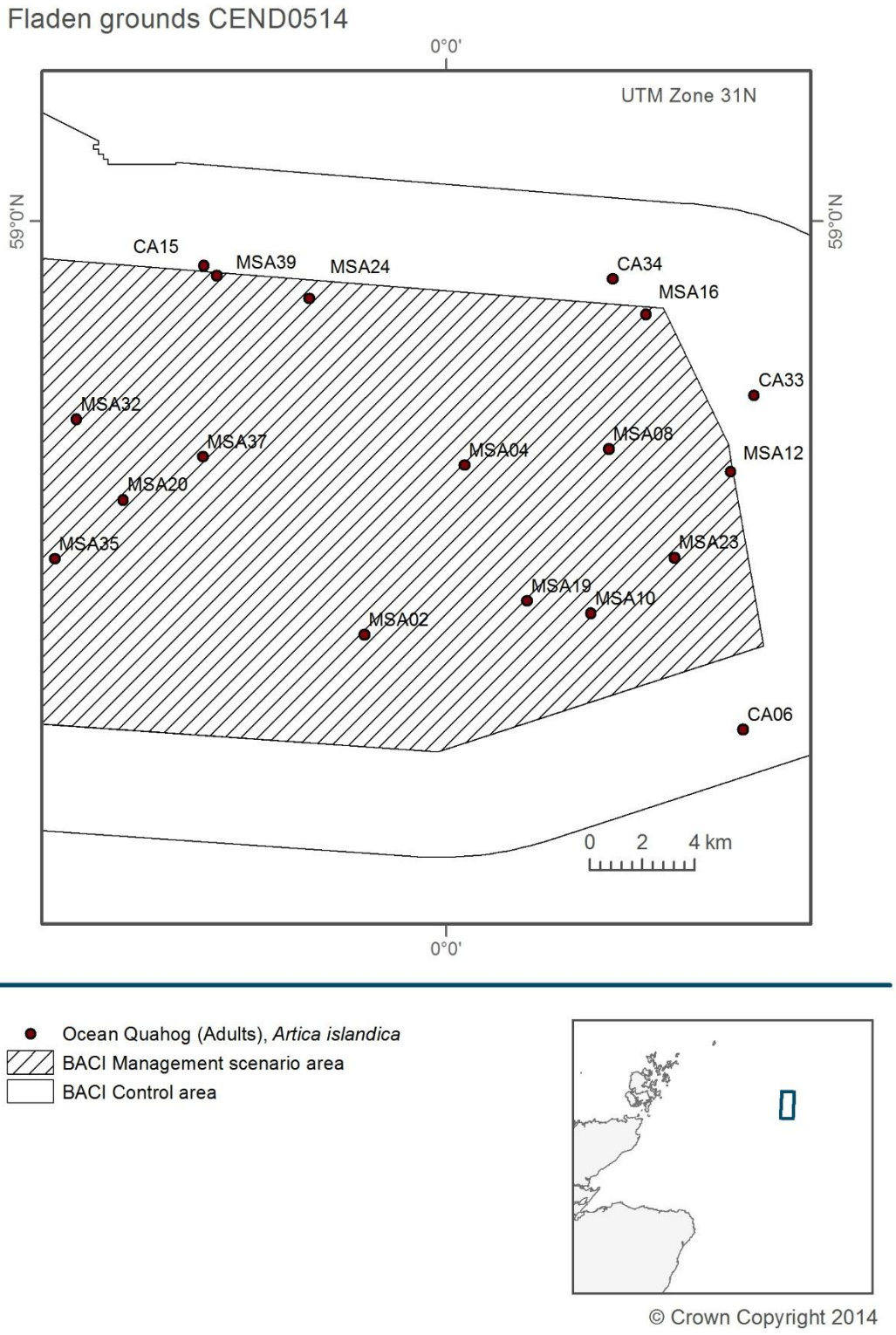

Figure 13. Map of the distribution of the ocean quahog (Adults) *Arctica islandica* from preliminary analysis of data collected during the Before-After-Control-Impact (BACI) grab survey.

5 Evidence of Anthropogenic Impacts

Possible trawl scars were observed during video tows from numerous stations during both the BACI survey and at fishing pressure gradient sites (Figure 14). Impacts of the Day grab were also observed at some stations (Figure 14).

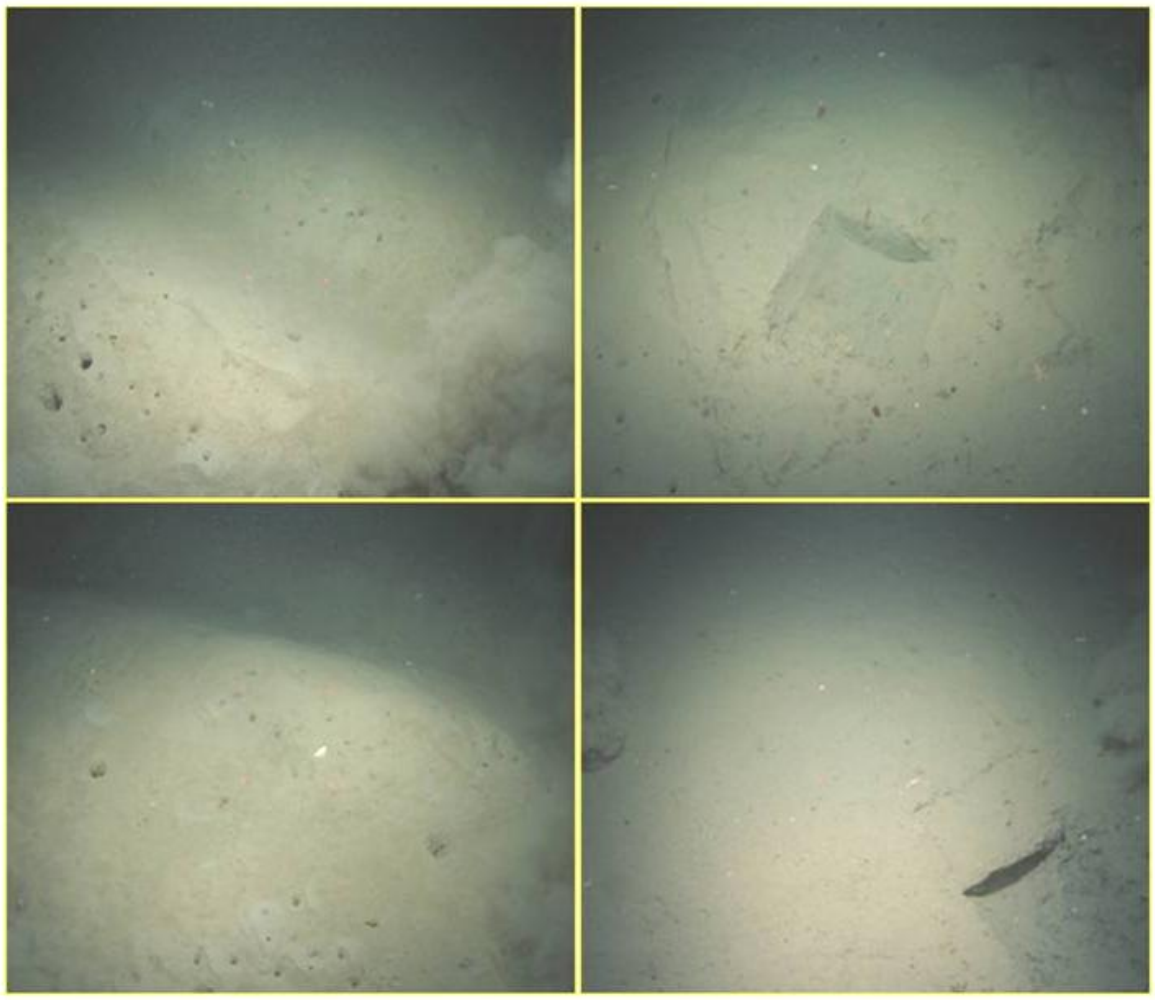

Figure 14. *Left:* Apparent trawl marks on the seabed at two stations within the high fishing pressure cell, N6A. *Right* : Impact of the 0.1m^2 Day grab on the seabed; images captured during the camera sledge at stations MSA08 and MSA31 immediately following the successful collection of sediment using a 0.1m^2 Day grab.

In addition to the observations of seabed disturbance potentially attributable to fishing activities, anthropogenic impacts related to the oil and gas developments in the area were also observed. The main features were pipelines running on or below the seabed, evident on the charts for the area and the single beam acoustic depth sounder (see Appendix 1). Processing of the seabed imagery will be able to quantify the presence and extent of anthropogenic impacts at each camera station. These analyses will need to take account of the impact of the Day grab captured on the video footage at certain stations (Figure 14).

6 Health and Safety Events

Health and safety inductions for staff who had not been on board the vessel in the last six months took place on 13 March 2014 at 13:00.

Two muster and drills took place during the survey; a life raft and breathing apparatus familiarisation and an emergency steering interactive demonstration, each lasting approximately one hour.

One amber flagged (Cefas risk flag system) health and safety incident occurred during the survey. Cefas, P&O Maritime and JNCC incident reports are available electronically.

7 References

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Appendix 1 Vessel and Equipment Specifications

1. RV Cefas Endeavour

Port of registry	Lowestoft
Length OA	73.00 m (excluding stern roller)
Length extreme	73.916 m
Breadth (MLD)	15.80 m
Depth (MLD)	8.20 m
Design draft	5.00 m
Deep draught	5.50 m
LBP	66.50 m
Gross tonnage	2983 tonnes
Net register tonnage	894 tonnes
Net lightship	2436 tonnes
Deadweight @ 5.00 m	784 tonnes
Deadweight @ 5.50 m	1244 tonnes
Displacement @ 5.00 m	3210 tonnes
Displacement @ 5.50 m	3680 tonnes
Builder	Ferguson Shipbuilders Limited, Port Glasgow
Commissioned	2003
Communications	In port BT Tel. Cellphone Voice/Fax/Data Radio TELEX Inmarsat C Fleet 77 (Inmarsat F) and VSAT (Eutelsat) internet access
Endurance	42 days
Complement	En-suite accommodation for 16 crew and 19 scientists with dedicated hospital facility
Propulsion System	AC/DC Diesel Electric 3 x diesel electric AC generators, individually raft mounted 2 x tandom 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 HiPAP 500 positioning sonar EK60 38/120/200 kHz scientific sounder EA 600 50/200 kHz scientific sounder SH80 high frequency omni-directional sonar KongsbergEM2040 multibeam echosounders Hull mounted Scanmar fishing computer transducers Scanmar net measuring system
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

2. Camera Sledge

Kongsberg Underwater Digital Stills Camera: model OE 14-208. Digital video and stills (5 Mega pixels).

Dedicated flash unit: model OE11-242.

Underwater lights –Bowtech LED x 4

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

Four underwater spot lasers.

3. Survey Navigation Package

All sampling events were logged using the Tower Hydrographics software package. The software automatically calculates actual sampling locations based on deployment location (side or stern gantry) using defined offsets from the actual GPS antenna locations.

4. Acoustic Systems

Single beam:

Olex is a navigation and charting system which calculates a sea floor map using data from GPS and an echo sounder. The map is calculated real time and provides a useful indication of bathymetry and seabed features.

Multi Beam:

Model: Kongsberg EM2040

Dedicated multi beam echo sounder operated at 200 kHz. Calibrated by patch test in January 2014 (see calibration report below).

Hardware online	**Type**	**Remarks**
Kongsberg EM2040	Multibeam echosounder	Head serial 220
Seapath 330 plus MRU-5	Motion and heading sensor: Primary Navigation: Secondary	Serial MRU-5 2043 Serial Seapath S/N10580
C-Nav 3050 GPS	Navigation: Primary	C-NAVC[1] correction service(GPS + GLONASS)
Thales 3011 GPS	Navigation: Tertiary	Fugro Seastar differential corrections
TSS MAHRS	Motion and heading sensor: Secondary	SN 040644
SAIV SD204	CTD profiler	Serial 718
Reson SVP24	Blade SVP sensor	Mounted next to sonar heads
Druck PTX 1830	Vessel draft sensor	

Software	**Type**	**Remarks**
Kongsberg SIS V3.9.2	Multibeam acquisition	
Caris HIPS V7.1.2 SP2	Multibeam bathymetry data processing	
QPS Fledermaus v7.3.3b	Multibeam backscatter data processing	
C-Nav C-tides Offline - Beta	C-Nav GPS Tide processing	Beta version

5. Acoustic Equipment Calibration Report

Kongsberg EM2040.

A patch test took place near the survey area in January 2014.

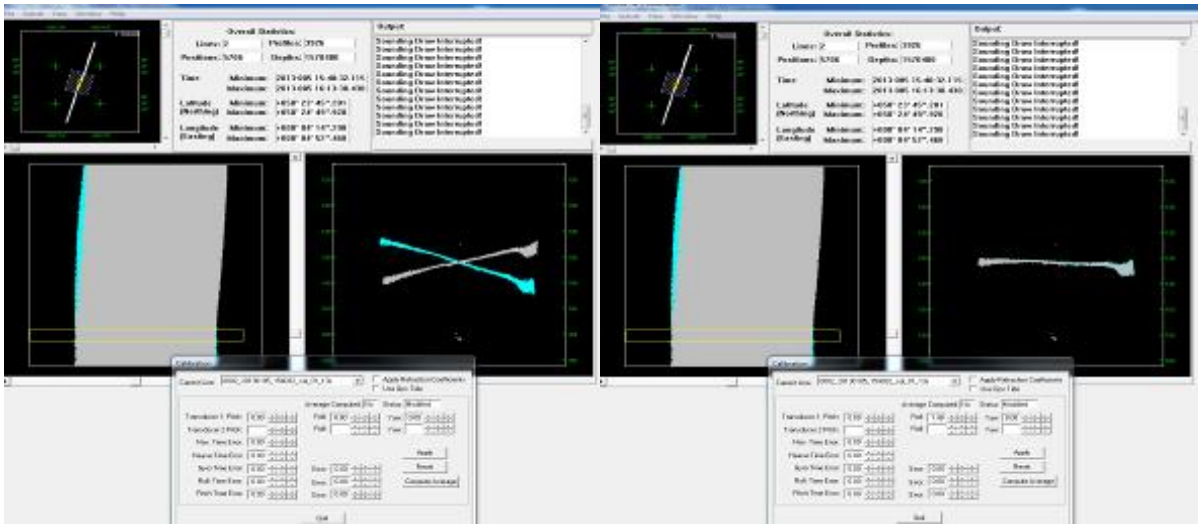
Four survey lines were run to calibrate for pitch, roll and yaw. No latency calibration was undertaken as 1 pulse per second (PPS) synchronisation is being used.

The corrections for the angular offsets were applied in SIS under "Attitude 1".

The lines were run on top of flat area with a wreck, at a depth of around 140 meters.

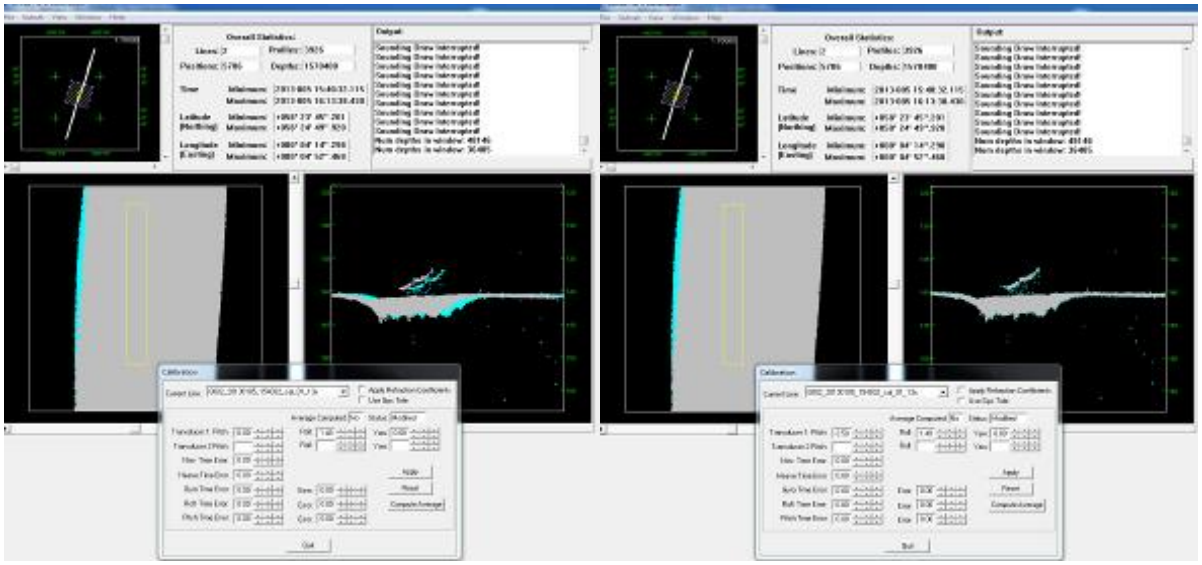
The CARIS HIPS Calibration Tool was used for processing.

Roll correction: 1.48



Before **After**

Pitch correction: -3.5



Before **After**

Yaw correction: no misalignment found – no correction applied.

The effect of the calibration can be seen in the images below, which show a clear improvement in the visualisation of the wreck over which the calibration took place.

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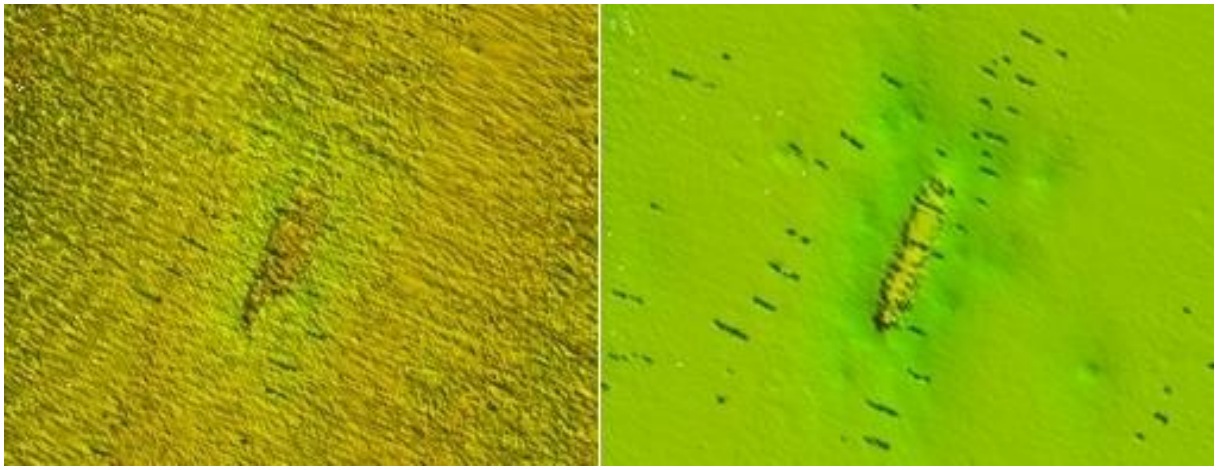
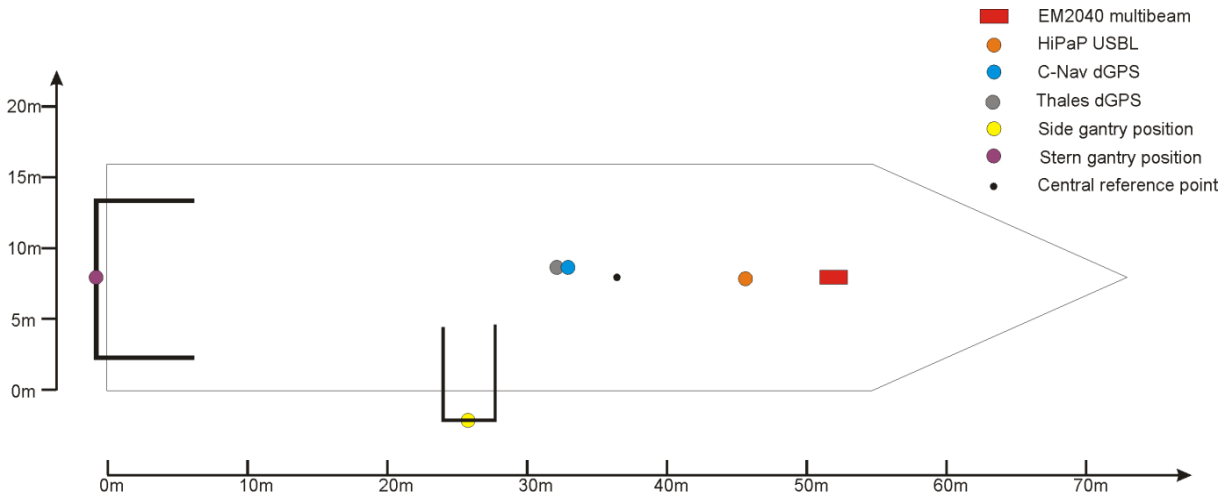


Before calibration **After calibration**

Appendix 2 Offsets



Type	X (m)	Y (m)	Z (m)
Central Reference Point	0	0	0
EM2040 multibeam	15.5	0	9.6
HiPAP transducer	9.2	-1	9.2
C-Nav dGPS	-3.5	-0.7	-21.7
Thales dGPS	-4.3	-0.8	-21.6
Side gantry	-10.7	10.1	n/a
Stern gantry	-36.6	0	n/a

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Appendix 3 Images Taken During Video Acquisition and Sediment Processing

Table 4. Three representative images of each successful camera sledge video tow collected during the Before-After-Control-Impact survey with notes on the presence (✓) or absence (✗) of the tall sea pen, *Funiculina quadrangularis*, as preliminarily assessed in the field.

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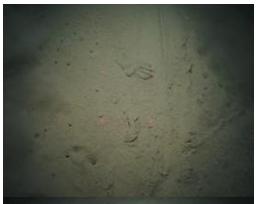
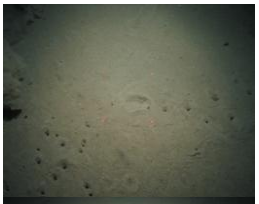
ZMPA_CEND0514_CA24_STN_225_A1	✗			
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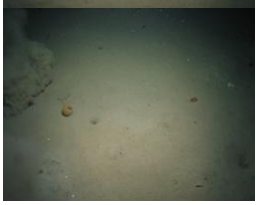
ZMPA_CEND0514_CA09_STN_256_A1	✗			

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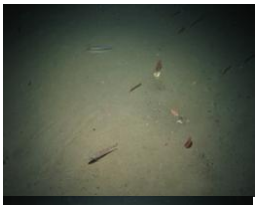
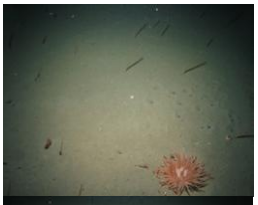
ZMPA_CEND0514_CA30_STN_258_A1	✘			
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CTFL_CEND0514_CA19_STN_268_A1	✓?(x1?)			
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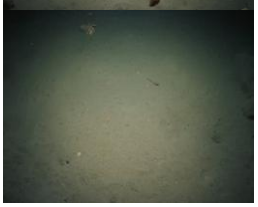
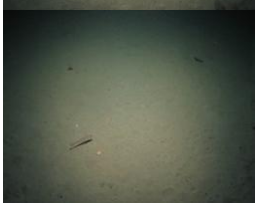
ZMPA_CEND0514_CA32_STN_293_A1	✘			

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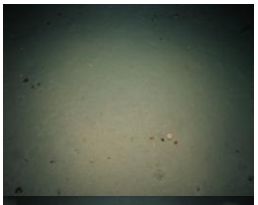
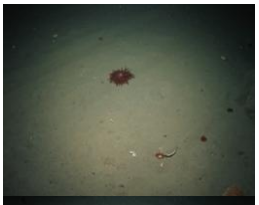
ZMPA_CEND0514_CA21_STN_295_A1	✘			
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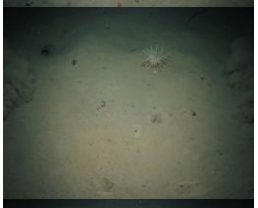
ZMPA_CEND0514_CA39_STN_299_A1	✘			
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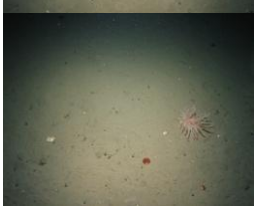
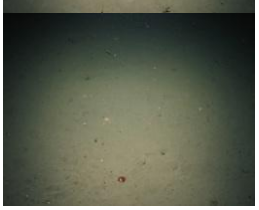
SCFL_CEND0514_MSA12_STN_311_A1	✘			

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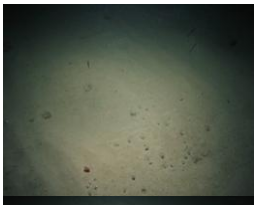
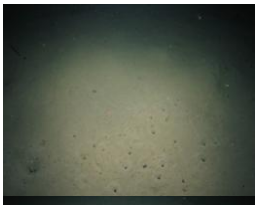
ZMPA_CEND0514_CA25_STN_313_A1	✘			
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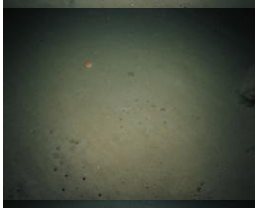
ZMPA_CEND0514_CA26_STN_319_A1	✘			
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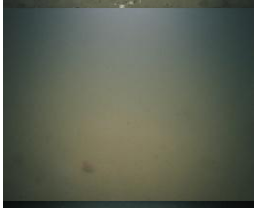
SCFL_CEND0514_MSA16_STN_323_A1	✘			
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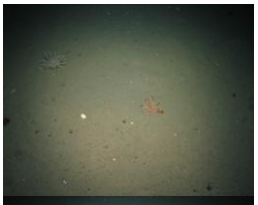
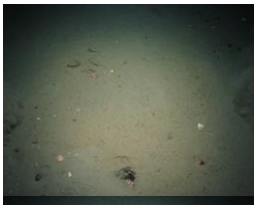
SCFL_CEND0514_MSA09_STN_331_A1	✘			
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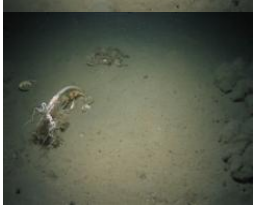
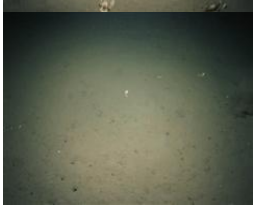
SCFL_CEND0514_MSA01_STN_343_A1	✓ (x10)			
SCFL_CEND0514_MSA26_STN_346_A1	✓ (x6)	No still images due to problem with camera flash.		

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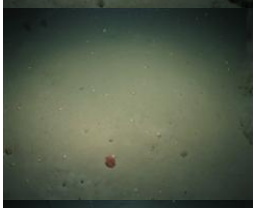
ZMPA_CEND0514_CA13_STN_357_A1	✘			
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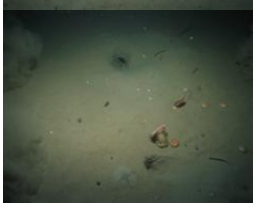
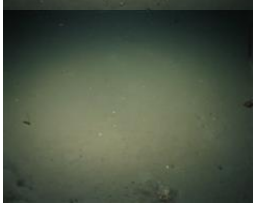
ZMPA_CEND0514_CA15_STN_361_A1	✘			

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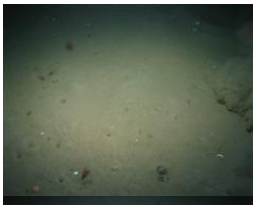
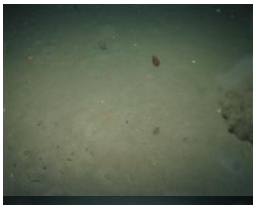
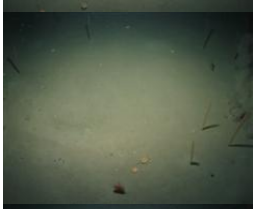
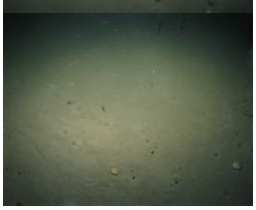
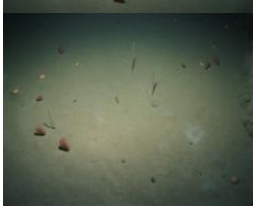
StnCode	*Funiculina* sp. ✘/✓	1	2	3
SCFL_CEND0514_MSA39_STN_363_A1	✘			
SCFL_CEND0514_MSA31_STN_365_A1	✘			
ZMPA_CEND0514_MSA_STN_366_A1	✘			
ZMPA_CEND0514_CA38_STN_367_A1	✘			
ZMPA_CEND0514_CA01_STN_368_A1	✘			
CTFL_CEND0514_MSA06_STN_369_A1	✘			
CTFL_CEND0514_MSA18_STN_370_A1	✘			
CTFL_CEND0514_CA03_STN_371_A1	✘			
ZMPA_CEND0514_CA37_STN_373_A1	✘			

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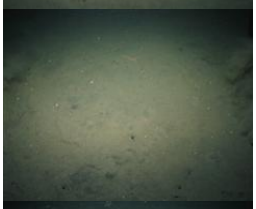
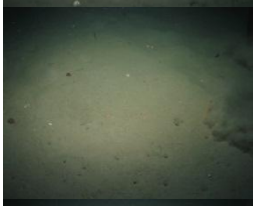
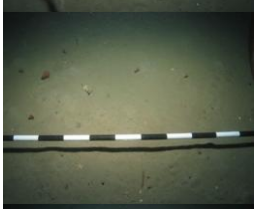
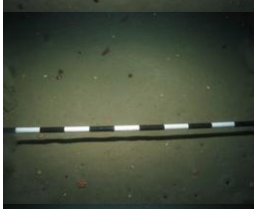
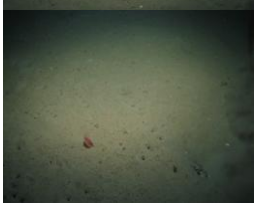
StnCode	*Funiculina* sp. ✘/✓	1	2	3
CTFL_CEND0514_CA07_STN_374_A1	✘			
CTFL_CEND0514_MSA40_STN_375_A1	✘			
SCFL_CEND0514_MSA32_STN_376_A1	✘			
SCFL_CEND0514_MSA20_STN_377_A1	✘			
CTFL_CEND0514_MSA30_STN_378_A1	✘			
ZMPA_CEND0514_CA28_STN_379_A1	✘			
ZMPA_CEND0514_CA08_STN_380_A1	✓ (x1)			
ZMPA_CEND0514_CA12_STN_383_A1	✘			
CTFL_CEND0514_CA10_STN_384_A1	✘			

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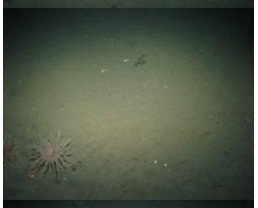
StnCode	*Funiculina* sp. ✗/✓	1	2	3
CTFL_CEND0514_MSA17_STN_385_A1	✘			
CTFL_CEND0514_MSA14_STN_386_A1	✘			
CTFL_CEND0514_MSA03_STN_387_A1	✘			
CTFL_CEND0514_MSA11_STN_388_A1	✘			
CTFL_CEND0514_MSA35_STN_389_A1	✘			
SCFL_CEND0514_MSA22_STN_390_A1	✘			
SCFL_CEND0514_MSA27_STN_391_A1	✘			
ZMPA_CEND0514_CA35_STN_392_A1	✘			
ZMPA_CEND0514_CA18_STN_393_A1	✘			

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StnCode	*Funiculina* sp. ✗/✓	1	2	3
ZMPA_CEND0514_CA36_STN_394_A1	✗			

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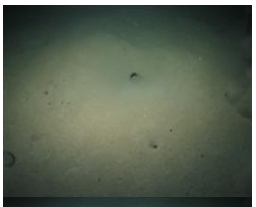
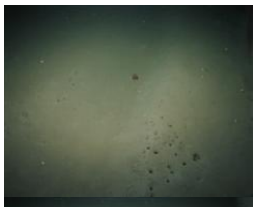
Table 5. Three representative images of each successful camera sledge video tow collected during the fishing pressure gradient survey with notes on the total abundance of sea pens present: *Pennatula phosphorea & Virgularia mirabilis*.

StnCode	Total No of Seapens (all species)	1	2	3
ZMPA_CEND0514_N6B10_STN_396_A1	180			
ZMPA_CEND0514_N6B04_STN_398_A1	224			
ZMPA_CEND0514_N6B01_STN_400_A1	152			
ZMPA_CEND0514_N6B05_STN_402_A1	208			
ZMPA_CEND0514_N6B09_STN_404_A1	211			
ZMPA_CEND0514_N6B02_STN_406_A1	130			
ZMPA_CEND0514_N6B07_STN_410_A1	77			
ZMPA_CEND0514_N6B03_STN_412_A1	133			

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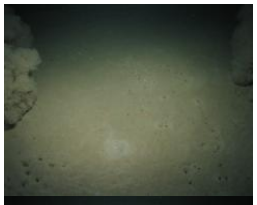
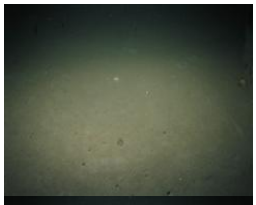
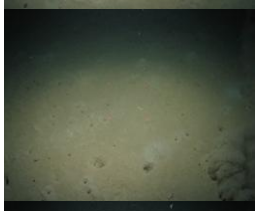
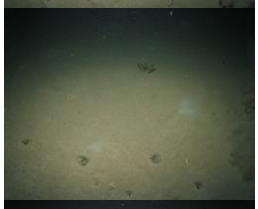
StnCode	Total No of Seapens (all species)	1	2	3
ZMPA_CEND0514_N6B06_STN_414_A1	167			
ZMPA_CEND0514_N6B08_STN_415_A1	88			
ZMPA_CEND0514_N6A09_STN_417_A1	18			
ZMPA_CEND0514_N6A02_STN_419_A1	23			
ZMPA_CEND0514_N6A07_STN_421_A1	22			
ZMPA_CEND0514_N6A06_STN_423_A1	28			
ZMPA_CEND0514_N6A08_STN_424_A1	43			
ZMPA_CEND0514_N6A10_STN_427_A1	31			
ZMPA_CEND0514_N6A05_STN_429_A1	108			

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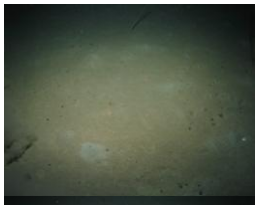
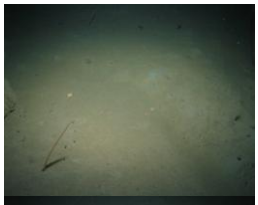
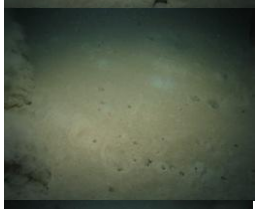
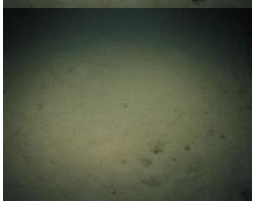
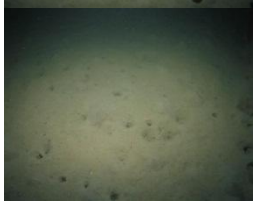
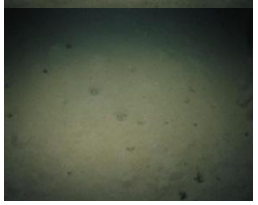
StnCode	Total No of Seapens (all species)	1	2	3
ZMPA_CEND0514_N6A04_STN_431_A1	191			
ZMPA_CEND0514_N6A01_STN_433_A1	42			
ZMPA_CEND0514_N6A03_STN_435_A1	45			
ZMPA_CEND0514_N1A05_STN_437_A1	236			
ZMPA_CEND0514_N1A10_STN_439_A1	244			
ZMPA_CEND0514_N1A04_STN_441_A1	394			
ZMPA_CEND0514_N1A02_STN_443_A1_01	767			
ZMPA_CEND0514_N1A07_STN_445_A1	414			
ZMPA_CEND0514_N1A09_STN_447_A1	50			

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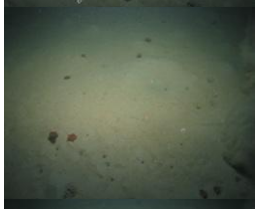
StnCode	Total No of Seapens (all species)	1	2	3
ZMPA_CEND0514_N1A03_STN_449_A1	820			
ZMPA_CEND0514_N1A08_STN_451_A1	707			
ZMPA_CEND0514_N1A06_STN_453_A1	185			
ZMPA_CEND0514_N1A01_STN_455_A1	12			
ZMPA_CEND0514_N1A10_STN_457_A1	834			
ZMPA_CEND0514_N1A09_STN_459_A1	> 870			
ZMPA_CEND0514_N1A05_STN_461_A1	> 660			
ZMPA_CEND0514_N1A08_STN_463_A1	> 900			
ZMPA_CEND0514_N1A06_STN_465_A1	> 800			

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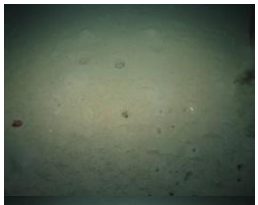
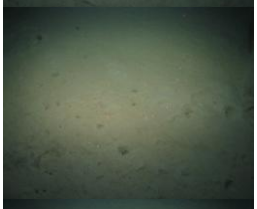
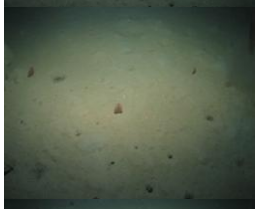
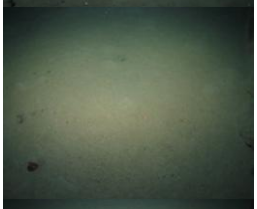
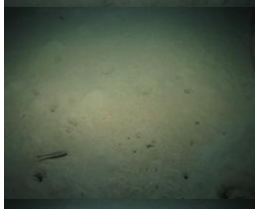
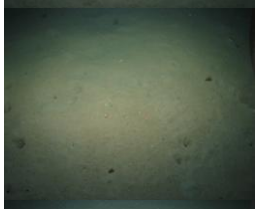
StnCode	Total No of Seapens (all species)	1	2	3
ZMPA_CEND0514_N1B03_STN_467_A1	> 300			
ZMPA_CEND0514_N1B04_STN_469_A1	> 450			
ZMPA_CEND0514_N1B01_STN_471_A1	> 450			
ZMPA_CEND0514_N1B07_STN_473_A1	> 350			
ZMPA_CEND0514_N1B02_STN_475_A1	> 320			
SWFL_CEND0514_7B05_STN_477_A1	>135			
SWFL_CEND0514_7B02_STN_478_A1	> 94			
SWFL_CEND0514_7B04_STN_479_A1	> 130			
SWFL_CEND0514_7B06_STN_480_A1	314			

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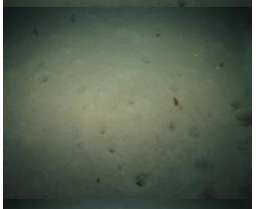
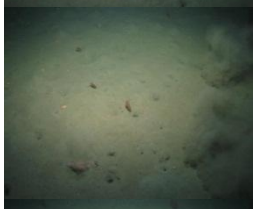
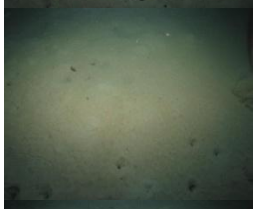
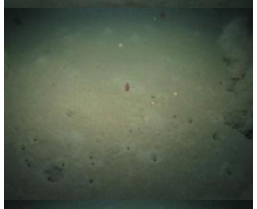
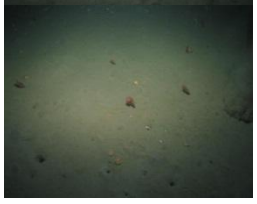
StnCode	Total No of Seapens (all species)	1	2	3
SWFL_CEND0514_7B07_STN_481_A1	334			
SWFL_CEND0514_7B10_STN_482_A1	520			
SWFL_CEND0514_7B03_STN_483_A1	478			
SWFL_CEND0514_7B09_STN_484_A1	347			
SWFL_CEND0514_7B08_STN_485_A1	239			
SWFL_CEND0514_7B01_STN_486_A1	493			
ZMPA_CEND0514_2A02_STN_487_A1	243			
ZMPA_CEND0514_2A05_STN_488_A1	111			
ZMPA_CEND0514_2A08_STN_491_A1	286			

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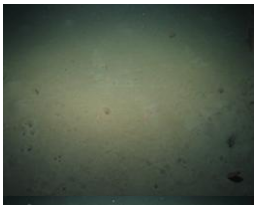
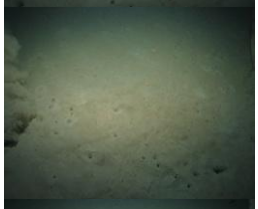
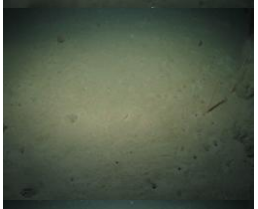
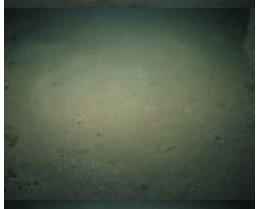
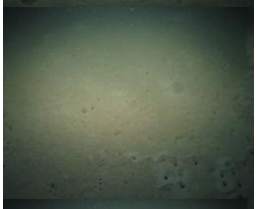
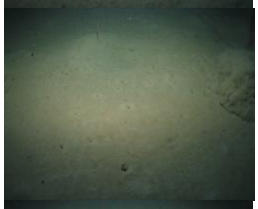
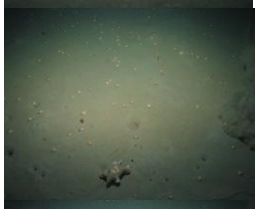
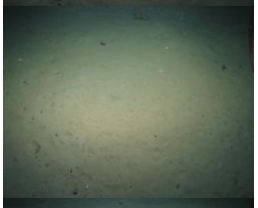
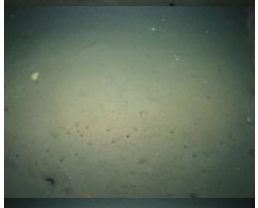
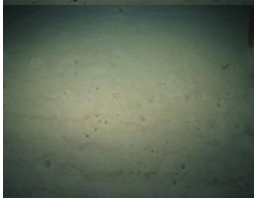
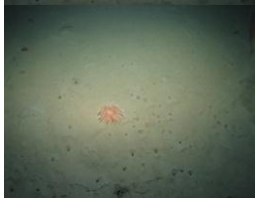
StnCode	Total No of Seapens (all species)	1	2	3
ZMPA_CEND0514_2A06_STN_492_A1	243			
ZMPA_CEND0514_2A10_STN_493_A1	49			
ZMPA_CEND0514_2A04_STN_494_A1	170			
ZMPA_CEND0514_2A03_STN_495_A1	107			
ZMPA_CEND0514_2A09_STN_496_A1	75			
ZMPA_CEND0514_2A01_STN_497_A1	156			
ZMPA_CEND0514_2A07_STN_498_A1	478			
CTFL_CEND0514_6A02_STN_499_A1	127			
CTFL_CEND0514_6A01_STN_500_A1	31			

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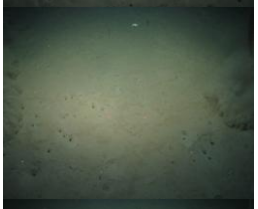
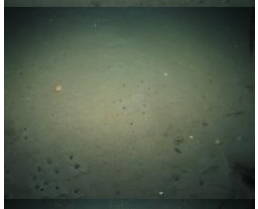
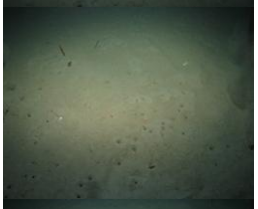
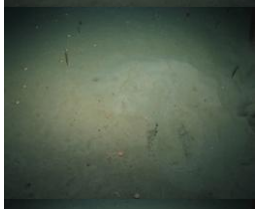
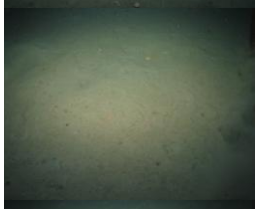
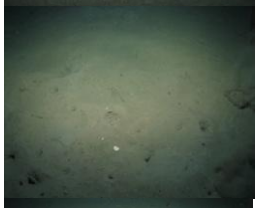
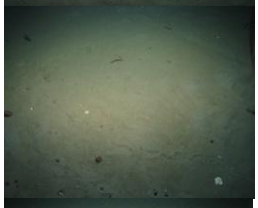
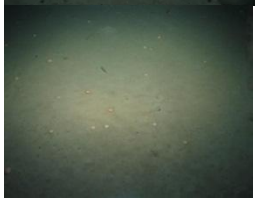
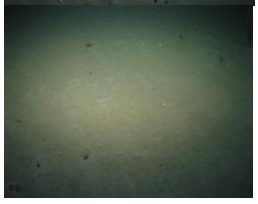
StnCode	Total No of Seapens (all species)	1	2	3
CTFL_CEND0514_6A06_STN_501_A1	84			
CTFL_CEND0514_6A10_STN_502_A1	280			
CTFL_CEND0514_6A05_STN_503_A1	> 800			
CTFL_CEND0514_6A09_STN_504_A1	372			
ZMPA_CEND0514_6A07_STN_505_A1	147			
ZMPA_CEND0514_6A03_STN_506	83			
ZMPA_CEND0514_6A08_STN_507_A1	425			
ZMPA_CEND0514_6A04_STN_508_A1	323			
ZMPA_CEND0514_1B02_STN_510_A1	133			

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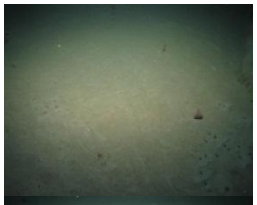
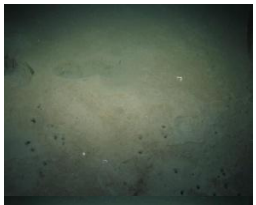
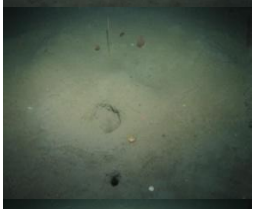
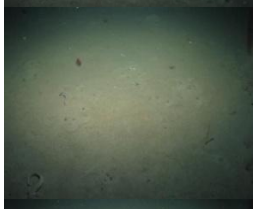
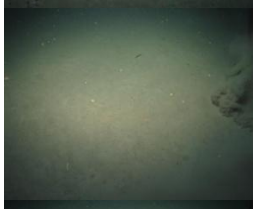
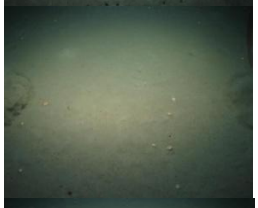
StnCode	Total No of Seapens (all species)	1	2	3
ZMPA_CEND0514_1B07_STN_511_A1	139			
ZMPA_CEND0514_1B01_STN_512_A1	166			
ZMPA_CEND0514_1B06_STN_513_A1	120			
ZMPA_CEND0514_1B04_STN_514_A1	110			
ZMPA_CEND0514_1B09_STN_515_A1	162			
ZMPA_CEND0514_1B08_STN_516_A1	181			
ZMPA_CEND0514_1B05_STN_517_A1	159			
ZMPA_CEND0514_1B10_518_A1	132			
ZMPA_CEND0514_1B03_STN_519_A1	151			

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Table 6. Images of the Before-After-Control-Impact survey infauna samples showing the sediment before and after the removal of the <1 mm fraction with notes on the preliminary broadscale habitat classification, sample volume and sediment container size.

Stn Code	Grab Depth (cm)	PSA	5mm	1mm	BSH
ZMPA_CEND0514_CA36_STN_212_A1	11				Mud
ZMPA_CEND0514_CA18_STN_213_A2	14				Mud
ZMPA_CEND0514_CA35_STN_214_A1	13				Mud
SCFL_CEND0514_MSA24_STN_224_A1	11.5				Mud
SCFL_CEND0514_MSA26_STN_226_A1	10				Mud
ZMPA_CEND0514_CA28_STN_228_A1	10.5				Mud
CTFL_CEND0514_MSA03_STN_230_A1	13				Mud
CTFL_CEND0514_MSA11_STN_231_A1	5				Mud

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Stn Code	Grab Depth (cm)	PSA	5mm	1mm	BSH
CTFL_CEND0514_MSA35_STN_232_A1	7				Mud
CTFL_CEND0514_MSA22_STN_233_A1	9				Mud
SCFL_CEND0514_MSA27_STN_234_A2	13				Mud
ZMPA_CEND0514_CA10_STN_235_A1	10				Mud
ZMPA_CEND0514_CA08_STN_239_A2	3				Muddy sand
ZMPA_CEND0514_CA12_STN_241_A1	10				Mud
ZMPA_CEND0514_CA28_STN_242_A1	9				Mud
CTFL_CEND0514_MSA17_STN_243_A1	10				Mud

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Stn Code	Grab Depth (cm)	PSA	5mm	1mm	BSH
CTFL_CEND0514_MSA14_STN_244	11				Mud
CTFL_CEND0514_MSA30_STN_245	11				Muddy sand
CTFL_CEND0514_MSA40_STN_246	8				Mud
CTFL_CEND0514_MSA48_STN_247	8				Mud
CTFL_CEND0514_MSA18_STN_249	7				Mud
CTFL_CEND0514_MSA06_STN_250	11				Mud
CTFL_CEND0514_CA11_STN_251	11				Mud
ZMPA_CEND0514_CA20_STN_253	11				Sand

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Stn Code	Grab Depth (cm)	PSA	5mm	1mm	BSH
ZMPA_CEND0514_CA09_STN_255	10.5				Sand
ZMPA_CEND0514_CA30_STN_257	11				Mud
ZMPA_CEND0514_CA38_STN_259_A1	13				Sandy mud
ZMPA_CEND0514_CA01_STN_260_A1	13				Muddy sand
ZMPA_CEND0514_CA04_STN_261_A1	12				Sandy mud
ZMPA_CEND0514_CA16_STN_263_A1	13				Mud
CTFL_CEND0514_CA27_STN_265_A3	14				Mud
CTFL_CEND0514_CA19_STN_267_A1	14				Mud

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Stn Code	Grab Depth (cm)	PSA	5mm	1mm	BSH
CTFL_CEND0514_CA02_STN_269_A1	15				Mud
CTFL_CEND0514_CA03_STN_271_A1	11				Mud
ZMPA_CEND0514_CA37_STN_272_A2	13				Mud
CTFL_CEND0514_CA07_STN_273	12				Mud
SCFL_CEND0514_MSA32_STN_274	8				Sandy mud
SCFL_CEND0514_MSA20_STN_275	7				Mud
SCFL_CEND0514_MSA37_STN_276	6				Mud
SCFL_CEND0514_MSA37_STN_277	7				Sand

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Stn Code	Grab Depth (cm)	PSA	5mm	1mm	BSH
SCFL_CEND0514_MSA37_STN_279	8.5				Sand
SCFL_CEND0514_MSA02_STN_280	7				Mud
SCFL_CEND0514_MSA26_STN_281					NO SAMPLE COLLECTED
SCFL_CEND0514_MSA33_STN_282					NO SAMPLE COLLECTED
SCFL_CEND0514_MSA01_STN_283					(Sediment OCN only)
SCFL_CEND0514_MSA19_STN_284	11				Mud
SCFL_CEND0514_MSA15_STN_285	10				Mud
SCFL_CEND0514_MSA10_STN_286	9				Mud

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Stn Code	Grab Depth (cm)	PSA	5mm	1mm	BSH
SCFL_CEND0514_MSA07_STN_287	11				Mud
SCFL_CEND0514_CA29_STN_288	9				Mud
ZMPA_CEND0514_CA06_STN_290	11.5				Mud
ZMPA_CEND0514_CA32_STN_292	9				Mud
ZMPA_CEND0514_CA21_STN_294	8				Mud
ZMPA_CEND0514_CA23_STN_296	12				Mud
ZMPA_CEND0514_CA39_STN_298	8				Mud
SCFL_CEND0514_MSA34_STN_300	12				Mud

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Stn Code	Grab Depth (cm)	PSA	5mm	1mm	BSH
SCFL_CEND0514_MSA36_STN_302	11				Mud
SCFL_CEND0514_MSA23_STN_304	11				Mud
SCFL_CEND0514_MSA21_STN_306	7				Mud
SCFL_CEND0514_MSA08_STN_308	11				Mud
SCFL_CEND0514_MSA12_STN_310	8				Mud
ZMPA_CEND0514_CA25_STN_312_A1	12				Mud
ZMPA_CEND0514_CA33_STN_314_A1	12				Mud
ZMPA_CEND0514_CA40_STN_316_A1	14				Mud

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Stn Code	Grab Depth (cm)	PSA	5mm	1mm	BSH
ZMPA_CEND0514_CA26_STN_318_A1	12				Mud
ZMPA_CEND0514_CA05_STN_320_B1	12				Mud
SCFL_CEND0514_MSA16_STN_322_A1	8				Sand
ZMPA_CEND0514_CA34_STN_324_A1	11.5				Mud
ZMPA_CEND0514_CA17_STN_326_A1	8				Mud
SCFL_CEND0514_MSA29_STN_328_A1	11.5				Mud
SCFL_CEND0514_MSA09_STN_330_A1	12				Mud
SCFL_CEND0514_MSA04_STN_332_A1	10				Sand

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Stn Code	Grab Depth (cm)	PSA	5mm	1mm	BSH
SCFL_CEND0514_MSA01_STN_338_A3	N/A				Mud
SCFL_CEND0514_MSA33_STN_341_A1	N/A				Mud
SCFL_CEND0514_MSA26_STN_344_A2	2				Mud
SCFL_CEND0514_MSA26_STN_345_A4	N/A				Mud
SCFL_CEND0514_MSA38_STN_349_A1	2.5				Mud
SCFL_CEND0514_MSA38_STN_350_A1	N/A				N/A
SCFL_CEND0514_MSA24_STN_354_A2	11				Sand
ZMPA_CEND0514_CA13_STN_356_A1	14				Sand

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Stn Code	Grab Depth (cm)	PSA	5mm	1mm	BSH
ZMPA_CEND0514_CA14_STN_358_A1	13				Mud
ZMPA_CEND0514_CA15_STN_360_A1	11				Mud
SCFL_CEND0514_MSA39_STN_362_A1	9.5				Sand
SCFL_CEND0514_MSA31_STN_364_A1	13				Mud

Table 7. images of the fishing pressure gradient survey infauna samples showing the sediment before and after the removal of the .1mm fraction with notes on the preliminary broadscale habitat classification, sample volume and sediment container size.

StnCode	Grab Depth (cm)	PSA	5mm	1mm	BSH
ZMPA_CEND0514_N6B10_STN_395_A1	14				Mud
ZMPA_CEND0514_N6B04_STN_397_A1	15				Mud
ZMPA_CEND0514_N6B01_STN_399_A1	14				Mud
ZMPA_CEND0514_N6B05_STN_401_A1	14				Mud

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StnCode	Grab Depth (cm)	PSA	5mm	1mm	BSH
ZMPA_CEND0514_N6B09_STN_403_A1	16				Mud
ZMPA_CEND0514_N6B02_STN_405_A1	14				Mud
ZMPA_CEND0514_N6B08_STN_407_A1	14				Mud
ZMPA_CEND0514_N6B07_STN_409_A1	14				Mud
ZMPA_CEND0514_N6B03_STN_411_A1	15				Mud
ZMPA_CEND0514_N6B06_STN_413_A1	15				Mud
ZMPA_CEND0514_N6A09_STN_416_A1	14				Mud
ZMPA_CEND0514_N6A02_STN_418_A1	14				Mud
ZMPA_CEND0514_N6A07_STN_420_A1	14				Mud

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StnCode	Grab Depth (cm)	PSA	5mm	1mm	BSH
ZMPA_CEND0514_N6A06_STN_422_A1	14.5				Mud
ZMPA_CEND0514_N6A08_STN_425_A1	15				Mud
ZMPA_CEND0514_N6A10_STN_426_A1	15.5				Mud
ZMPA_CEND0514_N6A05_STN_428_A1	14.5				Mud
ZMPA_CEND0514_N6A04_STN_430_A1	15				Mud
ZMPA_CEND0514_N6A01_STN_432_A2	15				Mud
ZMPA_CEND0514_N6A03_STN_434_A1	14				Mud
ZMPA_CEND0514_N1A05_STN_436_A1	13				Mud
ZMPA_CEND0514_N1A10_STN_438_A1	13				Mud

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StnCode	Grab Depth (cm)	PSA	5mm	1mm	BSH
ZMPA_CEND0514_N1A04_STN_440_A1	14				Mud
ZMPA_CEND0514_N1A02_STN_442_A1	12				Mud
ZMPA_CEND0514_N1A07_STN_444_A1	14				Mud
ZMPA_CEND0514_N1A09_STN_446_A1	9				Mud
ZMPA_CEND0514_N1A03_STN_448_A1	11				Mud
ZMPA_CEND0514_N1A08_STN_450_A1	14				Mud
ZMPA_CEND0514_N1A06_STN_452_A1	12				Mud
ZMPA_CEND0514_N1A01_STN_454_A1	9				Mud
ZMPA_CEND0514_N1B10_STN_456_A1	13				Mud

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StnCode	Grab Depth (cm)	PSA	5mm	1mm	BSH
ZMPA_CEND0514_N1B09_STN_458_A1	13				Mud
ZMPA_CEND0514_N1B05_STN_460_A1	14				Mud
ZMPA_CEND0514_N1B08_STN_462_A1	13				Mud
ZMPA_CEND0514_N1B06_STN_464_A1	12				Mud
ZMPA_CEND0514_N1B03_STN_466_A1	14				Mud
ZMPA_CEND0514_N1B04_STN_468_A1	14				Mud
ZMPA_CEND0514_N1B01_STN_470_A1	13				Mud
ZMPA_CEND0514_N1B07_STN_472_A1	14				Mud
ZMPA_CEND0514_N1B02_STN_474_A2	12.5				Mud

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StnCode	Grab Depth (cm)	PSA	5mm	1mm	BSH
SWFL_CEND0514_7B05_STN_476_A1	14				Mud
ZMPA_CEND0514_1B02_STN_509_A1	15				Mud
ZMPA_CEND0514_CLMR01_STN_520_A1	7				Mud

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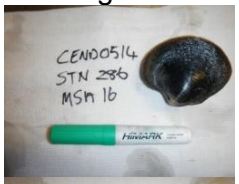
Table 8. Morpho-metrics and images of all specimens of the species Feature of Conservation Importance (FOCI) collected during the BACI grab survey and retuned alive. *Missing valve measurements will be completed through image analysis and an estimation of biomass will be calculated during infaunal sample processing, using reference material.

Station code	Specimen number	Maximum valve length (mm)	Maximum valve height (mm)	Maximum valve depth of both valves (mm)	Displacement volume (ml seawater)	Profile	Umbo	Ventral margin
MSA35	1	44	35	*	20			
MSA02	1	70	65	36	*			
MSA19	1	41	35	34	43	No image	No image	No image
MSA15	1	70	65	36	112	No image	No image	No image
MSA10	1	*	*	*	*			
CA06	1	55	51	24	45			

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Station code	Specimen number	Maximum valve length (mm)	Maximum valve height (mm)	Maximum valve depth of both valves (mm)	Displacement volume (ml seawater)	Profile	Umbo	Ventral margin
CA06	2	55	41	28	35			
MSA32	1	*	*	*	*		No image	
MSA08	1	*	*	*	*		No image	
CA33	1	56	49	26	*		No image	
MSA16	1	62	54	30	40			

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Station code	Specimen number	Maximum valve length (mm)	Maximum valve height (mm)	Maximum valve depth of both valves (mm)	Displacement volume (ml seawater)	Profile	Umbo	Ventral margin
CA34	1	51	44	27	25			
MSA04	1	54	46	26	30			
MSA24	1	88	80	51	235			
MSA24	2	69	56	34	55			
CA15	1	67	57	35	60	No image	No image	No image
CA15	2	72	56	32	50	No image	No image	No image
MSA23	1	-	-	-	-	No Image	No Image	No Image
MSA39	1	61	54	30	50			

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Station code	Specimen number	Maximum valve length (mm)	Maximum valve height (mm)	Maximum valve depth of both valves (mm)	Displacement volume (ml seawater)	Profile	Umbo	Ventral margin
MSA39	2	61	56	30	40			

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Appendix 4 Daily Progress Reports

The JNCC Daily Progress Reports for CEND0514 and covering the days which had activities relating to the Fladen Grounds survey are available electronically. The reports were compiled by Neil Golding (JNCC).

Appendix 5 Station Metadata

Station metadata for the Fladen Grounds survey on board CEND0514 is provided overlea. A full copy of the stations metadata is available electronically. Station Code is used to identify the location of the sampling station. Station Number is a sequential event number for the cruise, so changes each time a new gear is used or a new location is sampled. All positions are in decimal degrees, Lat/Long WGS84. MB2 = Kongsberg EM2040 Multibeam, DG = 0.1 m^2 Day grab, HC = Hamon Grab with video camera, SH = Shipek grab, CS = Camera Sledge, SOL = Start of Line, EOL = End of Line.

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen BACI 2014	20/03/2014	212	CA36	DG	143	A1	1	58.80843	-0.01560	81504	81505
Fladen BACI 2014	20/03/2014	212	CA36	DG	143	B1	2	58.80844	-0.01561		
Fladen BACI 2014	20/03/2014	212	CA36	DG	143	B2	3	58.80846	-0.01563		81506
Fladen BACI 2014	20/03/2014	213	CA18	DG	150	A1	4	58.78963	-0.09098		
Fladen BACI 2014	20/03/2014	213	CA18	DG	150	A2	5	58.78968	-0.09091	81432	81433
Fladen BACI 2014	20/03/2014	213	CA18	DG	150	B1	6	58.78980	-0.09101		
Fladen BACI 2014	20/03/2014	213	CA18	DG	150	B2	7	58.78975	-0.09101		
Fladen BACI 2014	20/03/2014	213	CA18	DG	150	B3	8	58.78973	-0.09109		
Fladen BACI 2014	20/03/2014	213	CA18	DG	150	B4	9	58.78972	-0.09116		81434
Fladen BACI 2014	20/03/2014	214	CA35	DG	145	A1	10	58.80404	-0.10019	81500	81501
Fladen BACI 2014	20/03/2014	214	CA35	DG	145	B1	11	58.80397	-0.10017		81502
Fladen BACI 2014	20/03/2014	215	CA33	DG	137	A1	12	58.94073	0.10620		
Fladen BACI 2014	20/03/2014	215	CA33	DG	137	A2	13	58.94072	0.10621		
Fladen BACI 2014	20/03/2014	216	CTD01	CTD	133	A1	14	58.82445	-0.04213		
Fladen BACI 2014	20/03/2014	217	MB_50	MB2		MB50	EOL	58.90717	0.03643		
Fladen BACI 2014	21/03/2014	218	MB_300	MB2		MB300	SOL	58.81585	-0.05965		
Fladen BACI 2014	21/03/2014	219	MB_550	MB2		MB550	EOL	58.90600	0.04500		
Fladen BACI 2014	21/03/2020	220	MB_800	MB2		MB800	SOL	58.81351	-0.05290		
Fladen BACI 2014	21/03/2014	221	MB1050	MB2		MB1050	EOL	58.90381	0.05283		
Fladen BACI 2014	21/03/2014	222	MB1300	MB2		MB1300	SOL	58.81152	-0.04502		
Fladen BACI 2014	21/03/2014	223	MB1550	MB2		MB1550	SOL	58.80888	-0.04327		
Fladen BACI 2014	21/03/2014	224	CA24	DG	144	A1	15	58.81495	-0.06246	81456	81457
Fladen BACI 2014	21/03/2014	224	CA24	DG	144	B1	16	58.81493	-0.06253		81458
Fladen BACI 2014	21/03/2014	225	CA24	CS	144	A1	176	58.81310	-0.06415		
Fladen BACI 2014	21/03/2014	226	MSA13	DG	144	A1	237	58.83509	-0.06619	81572	81573
Fladen BACI 2014	21/03/2014	226	MSA13	DG	144	B1	238	58.83504	-0.06624		81574

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen BACI 2014	21/03/2014	227	MSA13	CS	140	A1	271	58.83393	-0.06725		
Fladen BACI 2014	21/03/2014	228	CA22	DG	138	A1	380	58.80998	-0.13043	81448	81449
Fladen BACI 2014	21/03/2014	228	CA22	DG	138	B1	381	58.80997	-0.13041		81450
Fladen BACI 2014	21/03/2014	229	CA22	CS	139	A1	463	58.80841	-0.13077		
Fladen BACI 2014	22/03/2014	230	MSA03	DG	149	A1	541	58.86777	-0.15519	81532	81533
Fladen BACI 2014	22/03/2014	230	MSA03	DG	149	B1	542	58.86773	-0.15524		
Fladen BACI 2014	22/03/2014	230	MSA03	DG	149	B2	543	58.86773	-0.15524		81534
Fladen BACI 2014	22/03/2014	231	MSA11	DG	135	A1	544	58.87385	-0.14484	81564	81565
Fladen BACI 2014	22/03/2014	231	MSA11	DG	135	B1	545	58.87382	-0.14470		81566
Fladen BACI 2014	22/03/2014	232	MSA35	DG	125	A1	546	58.88503	-0.13403	81660	81661
Fladen BACI 2014	22/03/2014	232	MSA35	DG	125	B1	547	58.88501	-0.13398		
Fladen BACI 2014	22/03/2014	232	MSA35	DG	125	B2	548	58.88500	-0.13402		81662
Fladen BACI 2014	22/03/2014	233	MSA22	DG	130	A1	549	58.87545	-0.12078	81608	81609
Fladen BACI 2014	22/03/2014	233	MSA22	DG	130	B1	550	58.87545	-0.12078		81610
Fladen BACI 2014	22/03/2014	234	MSA27	DG	140	A1	551	58.86994	-0.11093		
Fladen BACI 2014	22/03/2014	234	MSA27	DG	140	A2	552	58.86996	-0.11088	81628	81629
Fladen BACI 2014	22/03/2014	234	MSA27	DG	140	B1	553	58.86993	-0.11094		81630
Fladen BACI 2014	22/03/2014	235	CA10	DG	134	A1	554	58.84959	-0.19987	81400	81401
Fladen BACI 2014	22/03/2014	235	CA10	DG	134	B1	555	58.84957	-0.20009		81402
Fladen BACI 2014	22/03/2014	236	CA31	DG	106	A1	556	58.83212	-0.23949		
Fladen BACI 2014	22/03/2014	236	CA31	DG	106	A2	557	58.83208	-0.23969		
Fladen BACI 2014	22/03/2014	236	CA31	DG	106	A3	558	58.83207	-0.23984		
Fladen BACI 2014	22/03/2014	236	CA31	DG	106	A4	559	58.83259	-0.24006		
Fladen BACI 2014	22/03/2014	237	CA31	CS	106	A1	615	58.83210	-0.24057		
Fladen BACI 2014	22/03/2014	238	CA31	DG	106	A1	684	58.83244	-0.23990		
Fladen BACI 2014	22/03/2014	238	CA31	DG	106	A2	685	58.83239	-0.24005		
Fladen BACI 2014	22/03/2014	239	CA08	DG	111	A1	686	58.84351	-0.24785		

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen BACI 2014	22/03/2014	239	CA08	DG	111	A2	688	58.84361	-0.24767	81392	81393
Fladen BACI 2014	22/03/2014	239	CA08	DG	111	B1	687	58.84357	-0.24775		81394
Fladen BACI 2014	22/03/2014	240	CA08	CS	110	A1	SOL	58.84356	-0.24756		
Fladen BACI 2014	22/03/2014	241	CA12	DG	125	A1	695	58.85529	-0.23029	81408	81409
Fladen BACI 2014	22/03/2014	241	CA12	DG	125	B1	696	58.85528	-0.23030		81410
Fladen BACI 2014	22/03/2014	242	CA28	DG	125	A1	697	58.86443	-0.25177	81472	81473
Fladen BACI 2014	22/03/2014	242	CA28	DG	125	B1	698	58.86441	-0.25177		81474
Fladen BACI 2014	22/03/2014	243	MSA17	DG	133	A1	699	58.88004	-0.20296	81588	81589
Fladen BACI 2014	22/03/2014	243	MSA17	DG	133	B1	700	58.88001	-0.20291		81590
Fladen BACI 2014	22/03/2014	244	MSA14	DG	132	A1	701	58.87574	-0.18984	81576	81577
Fladen BACI 2014	22/03/2014	244	MSA14	DG	132	B1	702	58.87576	-0.18985		81578
Fladen BACI 2014	22/03/2014	245	MSA30	DG	132	A1	703	58.90448	-0.20287	81642	81641
Fladen BACI 2014	22/03/2014	245	MSA30	DG	132	B1	704	58.90446	-0.20293		81642
Fladen BACI 2014	22/03/2014	246	MSA40	DG	146.7	A1	705	58.93393	-0.17842		81682
Fladen BACI 2014	22/03/2014	246	MSA40	DG	146.7	B1	706	58.93390	-0.17847	81680	81681
Fladen BACI 2014	22/03/2014	247	MSA28	DG	119	A1	707	58.97337	-0.18568		81634
Fladen BACI 2014	22/03/2014	247	MSA28	DG	119	B1	708	58.97335	-0.18577	81632	81633
Fladen BACI 2014	22/03/2014	248	MSA28	CS	121	A1	725	58.97347	-0.18599		
Fladen BACI 2014	22/03/2014	249	MSA18	DG	119	A1	831	58.98773	-0.19565	81592	81593
Fladen BACI 2014	22/03/2014	249	MSA18	DG	119	B1	832	58.98764	-0.19566		81594
Fladen BACI 2014	22/03/2014	250	MSA06	DG	122	A1	833	59.01531	-0.19907	81544	81545
Fladen BACI 2014	22/03/2014	250	MSA06	DG	122	B1	834	59.01526	-0.19922		81546
Fladen BACI 2014	22/03/2014	251	CA11	DG	128.6	A1	835	58.99339	-0.13043	81404	81405
Fladen BACI 2014	22/03/2014	251	CA11	DG	128.6	B1	836	58.99337	-0.13052		81406
Fladen BACI 2014	22/03/2014	252	CA11	CS	129	A1	860	58.99280	-0.13116		
Fladen BACI 2014	22/03/2014	253	CA20	DG	124	A1	934	59.00382	-0.14165		
Fladen BACI 2014	22/03/2014	253	CA20	DG	124	A2	935	59.00380	-0.14160	81440	81441

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen BACI 2014	22/03/2014	253	CA20	DG	124	B1	936	59.00383	-0.14161		
Fladen BACI 2014	22/03/2014	253	CA20	DG	124	B2	937	59.00384	-0.14164		81442
Fladen BACI 2014	22/03/2014	254	CA20	CS	124	A1	1041	59.00238	-0.14326		
Fladen BACI 2014	22/03/2014	255	CA09	DG	124	A1	1064	59.00010	-0.15850	81396	81397
Fladen BACI 2014	22/03/2014	255	CA09	DG	124	B1	1065	59.00026	-0.15859		81398
Fladen BACI 2014	22/03/2014	256	CA09	CS	123	A1	1180	58.99878	-0.16118		
Fladen BACI 2014	22/03/2014	257	CA30	DG	128	A1	1194	59.02122	-0.15429	81480	81481
Fladen BACI 2014	22/03/2014	257	CA30	DG	128	B1	1195	59.02124	-0.15436		81482
Fladen BACI 2014	22/03/2014	258	CA30	CS	126	A1	1282	59.02064	-0.15736		
Fladen BACI 2014	22/03/2014	259	CA38	DG	131	A1	1338	59.04700	-0.17322	81512	81513
Fladen BACI 2014	22/03/2014	259	CA38	DG	131	B1	1339	59.04701	-0.17313		81514
Fladen BACI 2014	22/03/2014	260	CA01	DG	133	A1	1340	59.05069	-0.19894	81364	81365
Fladen BACI 2014	22/03/2014	260	CA01	DG	133	B1	TARGET	59.05059	-0.19923		81366
Fladen BACI 2014	22/03/2014	261	CA04	DG	135	A1	1341	59.03756	-0.22069	81376	81377
Fladen BACI 2014	22/03/2014	261	CA04	DG	135	B1	1342	59.03762	-0.22069		81378
Fladen BACI 2014	22/03/2014	262	CA04	CS	137	A1	1357	59.03758	-0.22219		
Fladen BACI 2014	23/03/2014	263	CA16	DG	140	A1	1502	59.05254	-0.23056	81424	81425
Fladen BACI 2014	23/03/2014	263	CA16	DG	140	B1	1503	59.05253	-0.23062		81426
Fladen BACI 2014	23/03/2014	264	CA16	CS	138	A1	1543	59.05266	-0.23482		
Fladen BACI 2014	23/03/2014	265	CA27	DG	137	A1	1636	59.02658	-0.24279		
Fladen BACI 2014	23/03/2014	265	CA27	DG	137	A2	1637	59.02655	-0.24280		
Fladen BACI 2014	23/03/2014	265	CA27	DG	137	A3	1638	59.02657	-0.24279	81468	81469
Fladen BACI 2014	23/03/2014	265	CA27	DG	137	B1	1639	59.02657	-0.24275		81470
Fladen BACI 2014	23/03/2014	266	CA27	CS	138	A1	1698	59.02651	-0.24503		
Fladen BACI 2014	23/03/2014	267	CA19	DG	148	A1	1764	59.03789	-0.27895	81436	81437
Fladen BACI 2014	23/03/2014	267	CA19	DG	148	B1	1765	59.03791	-0.27893		81439
Fladen BACI 2014	23/03/2014	268	CA19	CS	148	A1	1808	59.03803	-0.28177		

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen BACI 2014	23/03/2014	269	CA02	DG	142	A1	1894	58.97443	-0.29337	81368	81369
Fladen BACI 2014	23/03/2014	269	CA02	DG	142	B1	1895	58.97440	-0.29327		81370
Fladen BACI 2014	23/03/2014	270	CA02	CS	144	A1	1976	58.97467	-0.29652		
Fladen BACI 2014	23/03/2014	271	CA03	DG	128	A1	2018	58.95533	-0.31037	81372	81373
Fladen BACI 2014	23/03/2014	271	CA03	DG	128	B1	2019	58.95536	-0.31034		81374
Fladen BACI 2014	23/03/2014	272	CA37	DG	128	A1	2020	58.90234	-0.31843		
Fladen BACI 2014	23/03/2014	272	CA37	DG	128	A2	2021	58.90229	-0.31843	81508	81509
Fladen BACI 2014	23/03/2014	272	CA37	DG	128	B1	2022	58.90237	-0.31886		81510
Fladen BACI 2014	23/03/2014	272	CA37	DG	128	B1	2022	58.90237	-0.31886		
Fladen BACI 2014	23/03/2014	273	CA07	DG	128	A1	2023	58.91127	-0.28188	81388	81389
Fladen BACI 2014	23/03/2014	273	CA07	DG	128	B1	2024	58.91133	-0.28175		81390
Fladen BACI 2014	23/03/2014	274	MSA32	DG	103	A1	2025	58.93270	-0.12632	81648	81649
Fladen BACI 2014	23/03/2014	274	MSA32	DG	103	B1	2026	58.93260	-0.12645		81650
Fladen BACI 2014	23/03/2014	275	MSA20	DG	112	A1	2027	58.90507	-0.11082		
Fladen BACI 2014	23/03/2014	275	MSA20	DG	112	A2	2028	58.90508	-0.11066	81600	81601
Fladen BACI 2014	23/03/2014	275	MSA20	DG	112	B1	2029	58.90505	-0.11060		81602
Fladen BACI 2014	23/03/2014	276	MSA37	DG	107	A1	2032	58.91978	-0.08307	81668	81669
Fladen BACI 2014	23/03/2014	276	MSA37	DG	107	B1	2030	58.91978	-0.08296		
Fladen BACI 2014	23/03/2014	276	MSA37	DG	107	B2	2033	58.91962	-0.08296		81670
Fladen BACI 2014	23/03/2014	277	MSA25	DG	115	A1	2035	58.88268	-0.05909	81620	81621
Fladen BACI 2014	23/03/2014	277	MSA25	DG	115	B1	2034	58.88265	-0.05893		81622
Fladen BACI 2014	23/03/2014	278	MSA38	DG	108	A1	2036	58.89007	-0.04858		
Fladen BACI 2014	23/03/2014	278	MSA38	DG	108	A2	2037	58.89009	-0.04863		
Fladen BACI 2014	23/03/2014	278	MSA38	DG	108	A3	2038	58.89013	-0.04860		
Fladen BACI 2014	23/03/2014	279	MSA05	DG	118	A1	2039	58.89845	-0.04468		81542
Fladen BACI 2014	23/03/2014	279	MSA05	DG	118	B1	2040	58.89847	-0.04480	81540	81541
Fladen BACI 2014	23/03/2014	280	MSA02	DG	118	A1	2041	58.85897	-0.02777	81528	81529

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen BACI 2014	23/03/2014	280	MSA02	DG	118	B1	2042	58.85887	-0.02789		81530
Fladen BACI 2014	23/03/2014	281	MSA26	DG	112	A1	2043	58.87140	-0.01876		
Fladen BACI 2014	23/03/2014	281	MSA26	DG	112	A2	2044	58.87143	-0.01878		
Fladen BACI 2014	23/03/2014	281	MSA26	DG	112	A3	2045	58.87141	-0.01877		
Fladen BACI 2014	23/03/2014	282	MSA33	DG	114	A1	2046	58.88570	-0.01090		
Fladen BACI 2014	23/03/2014	282	MSA33	DG	114	A2	2047	58.88577	-0.01102		
Fladen BACI 2014	23/03/2014	282	MSA33	DG	114	A3	2048	58.88580	-0.01102		
Fladen BACI 2014	23/03/2014	283	MSA01	DG	120	A1	2049	58.86562	0.01492		
Fladen BACI 2014	23/03/2014	283	MSA01	DG	120	A2	2050	58.86565	0.01492		
Fladen BACI 2014	23/03/2014	283	MSA01	DG	120	A3	2051	58.86570	0.01481		81526
Fladen BACI 2014	23/03/2014	283	MSA01	DG	120	B1	2052	58.86572	0.01480		
Fladen BACI 2014	23/03/2014	283	MSA01	DG	120	B2	2053	58.86576	0.01472		
Fladen BACI 2014	23/03/2014	283	MSA01	DG	120	B3	2054	58.86584	0.01482		
Fladen BACI 2014	23/03/2014	284	MSA19	DG	119	A1	2055	58.87038	0.02778	81596	81597
Fladen BACI 2014	23/03/2014	284	MSA19	DG	119	B1	2056	58.87056	0.02802		
Fladen BACI 2014	23/03/2014	284	MSA19	DG	119	B2	2057	58.87048	0.02811		81598
Fladen BACI 2014	23/03/2014	285	MSA15	DG	122	A1	2058	58.88440	0.02713	81580	81581
Fladen BACI 2014	23/03/2014	285	MSA15	DG	122	B1	2059	58.88445	0.02706		81582
Fladen BACI 2014	23/03/2014	286	MSA10	DG	123	A1	2060	58.86620	0.04983	81561	81562
Fladen BACI 2014	23/03/2014	286	MSA10	DG	123	B1	2061	58.86624	0.04973		
Fladen BACI 2014	23/03/2014	286	MSA10	DG	123	B2	2062	58.86625	0.04972		81563
Fladen BACI 2014	23/03/2014	287	MSA07	DG	126	A1	2063	58.86838	0.05979		81550
Fladen BACI 2014	23/03/2014	287	MSA07	DG	126	B1	2064	58.86840	0.05978	81548	81549
Fladen BACI 2014	23/03/2014	288	CA29	DG	125	A1	2065	58.83836	0.05971	81476	81477
Fladen BACI 2014	23/03/2014	288	CA29	DG	125	B1	2066	58.83837	0.05979		81478
Fladen BACI 2014	23/03/2014	289	CA29	CS	125	A1	2074	58.83837	0.05971		
Fladen BACI 2014	23/03/2014	290	CA06	DG	133	A1	2196	58.82681	0.10193	81384	81385

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen BACI 2014	23/03/2014	290	CA06	DG	133	B1	2197	58.82687	0.10198		81386
Fladen BACI 2014	23/03/2014	291	CA06	CS	132	A1	2201	58.82636	0.10168		
Fladen BACI 2014	24/03/2014	292	CA32	DG	129	A1	2351	58.82977	0.11821	81488	81489
Fladen BACI 2014	24/03/2014	292	CA32	DG	129	B1	2352	58.82976	0.11826		81490
Fladen BACI 2014	24/03/2014	293	CA32	CS	128	A1	2399	58.82861	0.11861		
Fladen BACI 2014	24/03/2014	294	CA21	DG	125	A1	2476	58.83701	0.12599	81444	81445
Fladen BACI 2014	24/03/2014	294	CA21	DG	125	B1	2477	58.83701	0.12601		81446
Fladen BACI 2014	24/03/2014	295	CA21	CS	124	A1	2495	58.83803	0.12595		
Fladen BACI 2014	24/03/2014	296	CA23	DG	138	A1	2613	58.85146	0.14618	81452	81453
Fladen BACI 2014	24/03/2014	296	CA23	DG	138	B1	2614	58.85146	0.14618		81454
Fladen BACI 2014	24/03/2014	297	CA23	CS	138	A1	2642	58.85238	0.14588		
Fladen BACI 2014	24/03/2014	298	CA39	DG	132	A1	2744	58.85949	0.13391	81516	81517
Fladen BACI 2014	24/03/2014	298	CA39	DG	132	B1	2745	58.85947	0.13389		81518
Fladen BACI 2014	24/03/2014	299	CA39	CS	133	A1	2842	58.86178	0.13351		
Fladen BACI 2014	24/03/2014	300	MSA34	DG	138	A1	2867	58.87181	0.10398	81656	81656
Fladen BACI 2014	24/03/2014	300	MSA34	DG	138	B1	2868	58.87184	0.10398		81658
Fladen BACI 2014	24/03/2014	301	MSA34	CS	138	A1	2878	58.87283	0.10400		
Fladen BACI 2014	24/03/2014	302	MSA36	DG	136	A1	2993	58.88995	0.09603	81664	81665
Fladen BACI 2014	24/03/2014	302	MSA36	DG	136	B1	2994	58.88993	0.09619		81666
Fladen BACI 2014	24/03/2014	303	MSA36	CS	136	A1	3082	58.89183	0.09608		
Fladen BACI 2014	24/03/2014	304	MSA23	DG	133	A1	3124	58.88547	0.07860	81612	81613
Fladen BACI 2014	24/03/2014	304	MSA23	DG	133	B1	3125	58.88538	0.07867		81614
Fladen BACI 2014	24/03/2014	305	MSA23	CS	133	A1	3208	58.88712	0.07857		
Fladen BACI 2014	24/03/2014	306	MSA21	DG	127	A1	3254	58.90221	0.06323	81604	81605
Fladen BACI 2014	24/03/2014	306	MSA21	DG	127	B1	3253	58.90229	0.06327		81606
Fladen BACI 2014	24/03/2014	307	MSA21	CS	127	A1	3262	58.90291	0.06316		
Fladen BACI 2014	24/03/2014	308	MSA08	DG	133	A1	3380	58.92244	0.05566	81552	81553

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Fladen BACI 2014	24/03/2014	308	MSA08	DG	133	B1	3381	58.92250	0.05565		81554
Fladen BACI 2014	24/03/2014	309	MSA08	CS	133	A1	3488	58.92021	0.05588		
Fladen BACI 2014	24/03/2014	310	MSA12	DG	127	A1	3509	58.91449	0.09743	81568	81569
Fladen BACI 2014	24/03/2014	310	MSA12	DG	127	B1	3510	58.91452	0.09756		81570
Fladen BACI 2014	24/03/2014	311	MSA12	CS	126	A1	3638	58.91159	0.09773		
Fladen BACI 2014	24/03/2014	312	CA25	DG	138	A1	3641	58.92646	0.11063	81460	8146
Fladen BACI 2014	24/03/2014	312	CA25	DG	138	B1	3642	58.92646	0.11072		81462
Fladen BACI 2014	24/03/2014	313	CA25	CS	137	A1	3645	58.92564	0.11103		
Fladen BACI 2014	24/03/2014	314	CA33	DG	139	A1	3769	58.94083	0.10534	81492	81493
Fladen BACI 2014	24/03/2014	314	CA33	DG	139	B1	3770	58.94086	0.10544		81494
Fladen BACI 2014	24/03/2014	315	CA33	CS	138	A1	3798	58.93935	0.10579		
Fladen BACI 2014	24/03/2014	316	CA40	DG	137	A1	3895	58.93681	0.09242	81520	81520
Fladen BACI 2014	24/03/2014	316	CA40	DG	137	B1	3896	58.93676	0.09240		81522
Fladen BACI 2014	24/03/2014	317	CA40	CS	137	A1	4020	58.93335	0.09190		
Fladen BACI 2014	24/05/2014	318	CA26	DG	141	A1	4025	58.97710	0.09970	81464	81465
Fladen BACI 2014	24/05/2014	318	CA26	DG	141	B1	4026	58.97707	0.09965		81466
Fladen BACI 2014	24/03/2014	319	CA26	CS	142	A1	4085	58.97858	0.10120		
Fladen BACI 2014	24/03/2014	320	CA05	DG	136	A1	4159	59.00484	0.07096		81383
Fladen BACI 2014	24/03/2014	320	CA05	DG	136	A1	4159	59.00484	0.07096		81382
Fladen BACI 2014	24/03/2014	320	CA05	DG	136	B1	4160	59.00479	0.07098	81380	81381
Fladen BACI 2014	24/03/2014	321	CA05	CS	0.7	A1	4240	59.00699	0.07021		
Fladen BACI 2014	24/03/2014	322	MSA16	DG	136	A1	4287	58.96838	0.06856	81584	81585
Fladen BACI 2014	24/03/2014	322	MSA16	DG	136	B1	4288	58.96843	0.06884		81586
Fladen BACI 2014	24/03/2014	323	MSA16	CS	137	A1	4338	58.96930	0.06806		
Fladen BACI 2014	24/03/2014	324	CA34	DG	134	A1	4410	58.98045	0.05751	81496	81497
Fladen BACI 2014	24/03/2014	324	CA34	DG	134	B1	4411	58.98031	0.05727		81498
Fladen BACI 2014	24/03/2014	325	CA34	CS	138	A1	4458	58.98111	0.05852		

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Fladen BACI 2014	24/03/2014	326	CA17	DG	122	A1	4535	58.98079	0.00559	81428	81429
Fladen BACI 2014	24/03/2014	326	CA17	DG	122	B1	4536	58.98074	0.00543		81430
Fladen BACI 2014	24/03/2014	327	CA17	CS	123	A1	4627	58.98063	0.00855		
Fladen BACI 2014	24/03/2014	328	MSA29	DG	125	A1	4662	58.94024	-0.00533	81636	81637
Fladen BACI 2014	24/03/2014	328	MSA29	DG	125	B1	4663	58.94020	-0.00529		81638
Fladen BACI 2014	24/03/2014	329	MSA29	CS	125	A1	4695	58.93869	-0.00357		
Fladen BACI 2014	24/03/2014	330	MSA09	DG	125	A1	4787	58.93181	0.01427	81556	81557
Fladen BACI 2014	24/03/2014	330	MSA09	DG	125	B1	4788	58.93183	0.01434		81558
Fladen BACI 2014	24/03/2014	331	MSA09	CS	125	A1	4886	58.92991	0.01574		
Fladen BACI 2014	24/03/2014	332	MSA04	DG	122	A1	4913	58.91678	0.00601	81536	81537
Fladen BACI 2014	24/03/2014	332	MSA04	DG	122	B1	4914	58.91680	0.00599		81538
Fladen BACI 2014	24/03/2014	333	MSA04	CS	124	A1	4968	58.91561	0.00696		
Fladen BACI 2014	24/03/2014	334	MSA15	CS	121	A1	5050	58.88353	0.02716		
Fladen BACI 2014	25/03/2014	335	MSA07	CS	125	A1	5272	58.86621	0.06022		
Fladen BACI 2014	25/03/2014	336	MSA10	CS	123	A1	5333	58.86795	0.04977		
Fladen BACI 2014	25/03/2014	337	MSA19	CS	119	A1	5461	58.86942	0.02859		
Fladen BACI 2014	25/03/2014	338	MSA01	HC	121	A1	5547	58.86599	0.01446		
Fladen BACI 2014	25/03/2014	338	MSA01	HC	121	A2	5548	58.86598	0.01445		
Fladen BACI 2014	25/03/2014	338	MSA01	HC	121	A3	5549	58.86597	0.01448	81524	81525
Fladen BACI 2014	25/03/2014	339	MSA01	CS	121	A1	5553	58.86493	0.01577		
Fladen BACI 2014	25/03/2014	340	MSA33	SH	114	A1	5561	58.88599	-0.01098		81654
Fladen BACI 2014	25/03/2024	341	MSA33	HC	114	A1	5562	58.88604	-0.01072	81652	81653
Fladen BACI 2014	25/03/2014	342	MSA33	CS	130	A1	5686	58.88886	-0.01200		
Fladen BACI 2014	25/03/2014	343	MSA01	CS	121	A1	5773	58.86794	0.01354		
Fladen BACI 2014	25/04/2014	344	MSA26	SH	111	A1	5856	58.87162	-0.01873		
Fladen BACI 2014	25/04/2014	344	MSA26	SH	111	A2	5858	58.87163	-0.01888		81626
Fladen BACI 2014	25/03/2014	345	MSA26	HC	111	A1	5859	58.87148	-0.01893		

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Fladen BACI 2014	25/03/2014	345	MSA26	HC	111	A2	5860	58.87148	-0.01891		
Fladen BACI 2014	25/03/2014	345	MSA26	HC	111	A4	5862	58.87154	-0.01926	81624	81625
Fladen BACI 2014	25/03/2014	345	MSA26	HC	111	A3	5861	58.87146	-0.01888		
Fladen BACI 2014	25/03/2014	346	MSA26	CS	111	A1	5871	58.87057	-0.01803		
Fladen BACI 2014	25/03/2014	347	MSA02	CS	119	A1	6124	58.85703	-0.02606		
Fladen BACI 2014	25/03/2014	348	MSA05	CS	118	A1	6189	58.89738	-0.04443		
Fladen BACI 2014	25/03/2014	349	MSA38	SH	110	A1	6295	58.89001	-0.04917		
Fladen BACI 2014	25/03/2014	349	MSA38	SH	110	A1	6295	58.89001	-0.04917		81674
Fladen BACI 2014	25/03/2014	350	MSA38	HC	110	A1	6296	58.89000	-0.04915	81672	81673
Fladen BACI 2014	25/03/2014	351	MSA38	CS	110	A1	6310	58.88933	-0.04830		
Fladen BACI 2014	25/03/2014	352	MSA25	CS	117	A1	6532	58.88107	-0.05800		
Fladen BACI 2014	25/03/2014	353	MSA37	CS	109	A1	6659	58.91826	-0.08175		
Fladen BACI 2014	25/03/2014	354	MSA24	DG	123	A1	6687	58.97398	-0.04742		
Fladen BACI 2014	25/03/2014	354	MSA24	DG	123	A2	6688	58.97399	-0.04742	81616	81617
Fladen BACI 2014	25/03/2014	354	MSA24	DG	123	B1	6689	58.97389	-0.04744		81618
Fladen BACI 2014	25/03/2014	355	MSA24	CS	123	A1	6774	58.97191	-0.04578		
Fladen BACI 2014	25/03/2014	356	CA13	DG	129	A1	6813	59.00499	-0.06435	81412	81413
Fladen BACI 2014	25/03/2014	356	CA13	DG	129	B1	6814	59.00493	-0.06453		81414
Fladen BACI 2014	25/03/2014	357	CA13	CS	130	A1	6916	59.00259	-0.06295		
Fladen BACI 2014	25/03/2014	358	CA14	DG	131	A1	6937	59.01800	-0.07560	81417	81418
Fladen BACI 2014	25/03/2014	358	CA14	DG	131	B1	6938	59.01816	-0.07572		81419
Fladen BACI 2014	25/03/2014	359	CA14	CS	132	A1	7021	59.01662	-0.07453		
Fladen BACI 2014	25/03/2014	360	CA15	DG	124	A1	7060	58.98496	-0.08298	81420	81421
Fladen BACI 2014	25/03/2014	360	CA15	DG	124	B1	7061	58.98486	-0.08294		81422
Fladen BACI 2014	25/03/2014	361	CA15	CS	126	A1	7113	58.98618	-0.08349		
Fladen BACI 2014	25/03/2014	362	MSA39	DG	123	A1	7183	58.98156	-0.07915	81676	81677
Fladen BACI 2014	25/03/2014	362	MSA39	DG	123	B1	7184	58.98165	-0.07913		81678

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Fladen BACI 2014	25/03/2014	363	MSA39	CS	125	A1	7279	58.97967	-0.07809		
Fladen BACI 2014	25/03/2014	364	MSA31	DG	126	A1	7316	58.96891	-0.12541	81644	81645
Fladen BACI 2014	25/03/2014	364	MSA31	DG	126	B1	7317	58.96892	-0.12524		
Fladen BACI 2014	25/03/2014	364	MSA31	DG	126	B2	7318	58.96891	-0.12524		81646
Fladen BACI 2014	25/03/2014	365	MSA31	CS	125	A1	7379	58.97075	-0.12543		
Fladen BACI 2014	25/03/2014	366	CA11	CS	128	A1	7491	58.99208	-0.12988		
Fladen BACI 2014	25/03/2014	367	CA38	CS	132	A1	7569	59.04626	-0.17298		
Fladen BACI 2014	26/03/2014	368	CA01	CS	134	A1	7786	59.04884	-0.19722		
Fladen BACI 2014	26/03/2014	369	MSA06	CS	123	A1	7898	59.01322	-0.19917		
Fladen BACI 2014	26/03/2014	370	MSA18	CS	118	A1	8051	58.98560	-0.19599		
Fladen BACI 2014	26/03/2014	371	CA03	CS	130	A1	8178	58.95332	-0.31070		
Fladen BACI 2014	26/03/2014	372	CA37	DG	130	A1	8187	58.90282	-0.31867		81511
Fladen BACI 2014	26/03/2014	373	CA37	CS	130	A1	8298	58.90021	-0.31814		
Fladen BACI 2014	26/03/2014	374	CA07	CS	130	A1	8365	58.91021	-0.28155		
Fladen BACI 2014	26/03/2014	375	MSA40	CS	150	A1	8571	58.93556	-0.18194		
Fladen BACI 2014	26/03/2014	376	MSA32	CS	104	A1	8611	58.93282	-0.12721		
Fladen BACI 2014	26/03/2014	377	MSA20	CS	114	A1	9451	58.90574	-0.11076		
Fladen BACI 2014	26/03/2014	378	MSA30	CS	132	A1	9620	58.90560	-0.20216		
Fladen BACI 2014	26/03/2014	379	CA28	CS	125	A1	9784	58.86627	-0.25060		
Fladen BACI 2014	26/03/2014	380	CA08	CS	112	A1	9829	58.84433	-0.24608		
Fladen BACI 2014	26/03/2014	381	CA31	SH	106	A1	9911	58.83230	-0.23985		81486
Fladen BACI 2014	26/03/2014	381	CA31	SH	106	A1	9911	58.83230	-0.23985		
Fladen BACI 2014	26/03/2014	382	CA31	HC	106	A1	9912	58.83229	-0.23983	81484	81485
Fladen BACI 2014	26/03/2014	383	CA12	CS	125	A1	9929	58.85486	-0.23103		
Fladen BACI 2014	26/03/2014	384	CA10	CS	133	A1	10044	58.84969	-0.19943		
Fladen BACI 2014	26/03/2014	385	MSA17	CS	133	A1	10267	58.87904	-0.20528		
Fladen BACI 2014	26/03/2014	386	MSA14	CS	131	A1	10397	58.87415	-0.19129		

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Fladen BACI 2014	26/03/2014	387	MSA03	CS	147	A1	10432	58.86716	-0.15488		
Fladen BACI 2014	26/03/2014	388	MSA11	CS	143	A1	10587	58.87303	-0.14553		
Fladen BACI 2014	26/03/2014	389	MSA35	CS	0.5	A1	10676	58.88459	-0.13487		
Fladen BACI 2014	26/03/2014	390	MSA22	CS	129	A1	10913	58.87637	-0.12295		
Fladen BACI 2014	26/03/2014	391	MSA27	CS	140	A1	10981	58.87042	-0.11229		
Fladen BACI 2014	26/03/2014	392	CA35	CS	141	A1	11144	58.80621	-0.10005		
Fladen BACI 2014	26/03/2014	393	CA18	CS	147	A1	11205	58.79059	-0.08988		
Fladen BACI 2014	26/03/2014	394	CA36	CS	140	A1	11301	58.80905	-0.01532		
Fladen Abrasion 2014	27/03/2014	395	N6B10	DG	143	A1	1	58.52462	0.00601	82527	82528
Fladen Abrasion 2014	27/03/2014	395	N6B10	DG	143	B1	2	58.52464	0.00600		82529
Fladen Abrasion 2014	27/03/2014	396	N6B10	CS	144	A1	125	58.52315	0.01074		
Fladen Abrasion 2014	27/03/2014	397	N6B04	DG	143	A1	129	58.51720	-0.00526	82509	82510
Fladen Abrasion 2014	27/03/2014	397	N6B04	DG	143	B1	130	58.51722	-0.00524		82511
Fladen Abrasion 2014	27/03/2014	398	N6B04	CS	142	A1	226	58.51633	-0.00085		
Fladen Abrasion 2014	27/03/2014	399	N6B01	DG	143	A1	254	58.51912	-0.01910	82500	82501
Fladen Abrasion 2014	27/03/2014	399	N6B01	DG	143	B1	255	58.51915	-0.01873		82502
Fladen Abrasion 2014	27/03/2014	400	N6B01	CS	144	A1	360	58.51827	-0.01566		
Fladen Abrasion 2014	27/03/2014	401	N6B05	DG	143	A1	379	58.51796	-0.01981	82512	82513
Fladen Abrasion 2014	27/03/2014	401	N6B05	DG	143	B1	380	58.51799	-0.01981		82514

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen Abrasion 2014	27/03/2014	402	N6B05	CS	141	A1	451	58.51740	-0.01811		
Fladen Abrasion 2014	27/03/2014	403	N6B09	DG	143	A1	507	58.51699	-0.02681	82524	82525
Fladen Abrasion 2014	27/03/2014	403	N6B09	DG	143	B1	508	58.51712	-0.02678		82526
Fladen Abrasion 2014	27/03/2014	404	N6B09	CS	142	A1	592	58.51586	-0.02390		
Fladen Abrasion 2014	27/03/2014	405	N6B02	DG	143	A1	636	58.50565	-0.02380	82503	82504
Fladen Abrasion 2014	27/03/2014	405	N6B02	DG	143	B1	637	58.50563	-0.02384		82505
Fladen Abrasion 2014	27/03/2014	406	N6B02	CS	142	A1	669	58.50520	-0.02231		
Fladen Abrasion 2014	27/03/2014	407	N6B08	DG	143	A1	762	58.49947	-0.01647	82521	82522
Fladen Abrasion 2014	27/03/2014	407	N6B08	DG	143	B1	763	58.49952	-0.01662		82523
Fladen Abrasion 2014	27/03/2014	408	N6B08	CS	142	A1	787	58.49925	-0.01555		
Fladen Abrasion 2014	27/03/2014	409	N6B07	DG	144	A1	865	58.50765	-0.00501	82518	82519
Fladen Abrasion 2014	27/03/2014	409	N6B07	DG	144	B1	866	58.50766	-0.00503		85220
Fladen Abrasion 2014	27/03/2014	410	N6B07	CS	144	A1	988	58.50637	0.00061		
Fladen Abrasion 2014	27/03/2014	411	N6B03	DG	144	A1	989	58.50247	0.00283	82506	82507
Fladen Abrasion 2014	27/03/2014	411	N6B03	DG	144	B1	990	58.50245	0.00288		82508
Fladen Abrasion 2014	27/03/2014	412	N6B03	CS	144	A1	1042	58.50170	0.00613		

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen Abrasion 2014	27/03/2014	413	N6B06	DG	143	A1	1117	58.49219	-0.00832	82515	82516
Fladen Abrasion 2014	27/03/2014	413	N6B06	DG	143	B1	1118	58.49216	-0.00837		82517
Fladen Abrasion 2014	27/03/2014	414	N6B06	CS	142	A1	1240	58.49205	-0.00298		
Fladen Abrasion 2014	27/03/2014	415	N6B08	CS	143	A1	1250	58.49957	-0.01478		
Fladen Abrasion 2014	27/03/2014	416	N6A09	DG	133	A1	1372	58.44635	-0.13578	82494	82495
Fladen Abrasion 2014	27/03/2014	416	N6A09	DG	133	B1	1373	58.44630	-0.13571		82496
Fladen Abrasion 2014	27/03/2014	417	N6A09	CS	136	A1	1463	58.44487	-0.13412		
Fladen Abrasion 2014	27/03/2014	418	N6A02	DG	133	A1	1781	58.44300	-0.12991	82473	82474
Fladen Abrasion 2014	27/03/2014	418	N6A02	DG	133	B1	1789	58.44298	-0.12985		82475
Fladen Abrasion 2014	27/03/2014	419	N6A02	CS	134	A1	1821	58.44239	-0.12760		
Fladen Abrasion 2014	27/03/2014	420	N6A07	DG	134	A1	1910	58.43699	-0.11942	82488	82489
Fladen Abrasion 2014	27/03/2014	420	N6A07	DG	134	B1	1911	58.43696	-0.11938		82490
Fladen Abrasion 2014	27/03/2014	421	N6A07	CS	134	A1	1915	58.43628	-0.11855		
Fladen Abrasion 2014	27/03/2014	422	N6A06	DG	132	A1	2036	58.43521	-0.12191	82485	82486
Fladen Abrasion 2014	27/03/2014	422	N6A06	DG	132	B1	2037	58.43526	-0.12200		82487
Fladen Abrasion 2014	27/03/2014	423	N6A06	CS	132	A1	2115	58.43465	-0.11958		

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen Abrasion 2014	27/05/2014	424	N6A08	CS	136	A1	2249	58.43224	-0.11415		
Fladen Abrasion 2014	27/03/2014	425	N6A08	DG	136	A1	2278	58.43255	-0.11446	82491	82492
Fladen Abrasion 2014	27/03/2014	425	N6A08	DG	136	B1	2279	58.43260	-0.11457		82493
Fladen Abrasion 2014	27/03/2014	426	N6A10	DG	133	A1	2280	58.41064	-0.12559	82497	82498
Fladen Abrasion 2014	27/03/2014	426	N6A10	DG	133	B1	2281	58.41071	-0.12561		82499
Fladen Abrasion 2014	27/03/2014	427	N6A10	CS	134	A1	2397	58.40894	-0.12472		
Fladen Abrasion 2014	27/03/2014	428	N6A05	DG	134	A1	2406	58.42012	-0.13410	82482	82483
Fladen Abrasion 2014	27/03/2014	428	N6A05	DG	134	B1	2407	58.42020	-0.13385		82484
Fladen Abrasion 2014	27/03/2014	429	N6A05	CS	134	A1	2415	58.42012	-0.13430		
Fladen Abrasion 2014	27/03/2014	430	N6A04	DG	134	A1	2565	58.42241	-0.13914	82479	82480
Fladen Abrasion 2014	27/03/2014	430	N6A04	DG	134	B1	2566	58.42242	-0.13929		82481
Fladen Abrasion 2014	27/03/2014	431	N6A04	CS	134	A1	2617	58.42255	-0.13597		
Fladen Abrasion 2014	27/03/2014	432	N6A01	DG	135	A1	2688	58.43166	-0.14251		
Fladen Abrasion 2014	27/03/2014	432	N6A01	DG	135	A2	2689	58.43164	-0.14250	82470	82471
Fladen Abrasion 2014	27/03/2014	432	N6A01	DG	135	B1	2690	58.43164	-0.14258		81472
Fladen Abrasion 2014	27/03/2014	433	N6A01	CS	135	A1	2764	58.43254	-0.13965		

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen Abrasion 2014	27/03/2014	434	N6A03	DG	135	A1	2812	58.43324	-0.14533	82476	82477
Fladen Abrasion 2014	27/03/2014	434	N6A03	DG	135	B1	2813	58.43322	-0.14529		82478
Fladen Abrasion 2014	27/03/2014	435	N6A03	CS	134	A1	2842	58.43365	-0.14416		
Fladen Abrasion 2014	28/03/2014	436	N1A05	DG	126	A1	2934	58.57009	-0.82857	82302	82303
Fladen Abrasion 2014	28/03/2014	436	N1A05	DG	126	B1	2935	58.57011	-0.82860		82304
Fladen Abrasion 2014	28/03/2014	437	N1A05	CS	125	A1	3059	58.57262	-0.82536		
Fladen Abrasion 2014	28/03/2014	438	N1A10	DG	126	A1	3061	58.57911	-0.82829	82317	82318
Fladen Abrasion 2014	28/03/2014	438	N1A10	DG	126	B1	3062	58.57912	-0.82832		82319
Fladen Abrasion 2014	28/03/2014	439	N1A10	CS	126	A1	3100	58.57779	-0.82611		
Fladen Abrasion 2014	28/03/2014	440	N1A04	DG	125	A1	3188	58.57715	-0.83666	82299	82300
Fladen Abrasion 2014	28/03/2014	440	N1A04	DG	125	B1	3189	58.57714	-0.83667		82301
Fladen Abrasion 2014	28/03/2014	441	N1A04	CS	125	A1	3257	58.57570	-0.83430		
Fladen Abrasion 2014	28/03/2014	442	N1A02	DG	123	A1	3318	58.58961	-0.84735	82293	82294
Fladen Abrasion 2014	28/03/2014	442	N1A02	DG	123	B1	3319	58.58961	-0.84736		82295
Fladen Abrasion 2014	28/03/2014	443	N1A02	CS	125	A1	3383	58.58799	-0.84428		
Fladen Abrasion 2014	28/03/2014	444	N1A07	DG	123	A1	3449	58.58643	-0.84835	82308	82309

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen Abrasion 2014	28/03/2014	444	N1A07	DG	123	B1	3450	58.58649	-0.84832		82310
Fladen Abrasion 2014	28/03/2014	445	N1A07	CS	122	A1	3491	58.58573	-0.84811		
Fladen Abrasion 2014	28/03/2014	446	N1A09	DG	118	A1	3575	58.58055	-0.85084	82314	82315
Fladen Abrasion 2014	28/03/2014	446	N1A09	DG	118	B1	3576	58.58064	-0.85102		82316
Fladen Abrasion 2014	28/03/2014	447	N1A09	CS	118	A1	3685	58.57897	-0.85095		
Fladen Abrasion 2014	28/03/2014	448	N1A03	DG	123	A1	3703	58.58223	-0.86440	82296	82297
Fladen Abrasion 2014	28/03/2014	448	N1A03	DG	123	B1	3704	58.58223	-0.86422		82298
Fladen Abrasion 2014	28/03/2014	449	N1A03	CS	123	A1	3723	58.58173	-0.86407		
Fladen Abrasion 2014	28/03/2014	450	N1A08	DG	124	A1	3830	58.58876	-0.85804	82311	82132
Fladen Abrasion 2014	28/03/2014	450	N1A08	DG	124	B1	3831	58.58875	-0.85805		82313
Fladen Abrasion 2014	28/03/2014	451	N1A08	CS	125	A1	3893	58.58961	-0.85951		
Fladen Abrasion 2014	28/03/2014	452	N1A06	DG	120	A1	3955	58.59637	-0.85345	82305	82306
Fladen Abrasion 2014	28/03/2014	452	N1A06	DG	120	B1	3956	58.59639	-0.85338		82307
Fladen Abrasion 2014	28/03/2014	453	N1A06	CS	125	A1	3999	58.59717	-0.85368		
Fladen Abrasion 2014	28/03/2014	454	N1A01	DG	117	A1	4081	58.59897	-0.86054	82290	82291
Fladen Abrasion 2014	28/03/2014	454	N1A01	DG	117	B1	4082	58.59896	-0.86053		82292

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen Abrasion 2014	28/03/2014	455	N1A01	CS	115	A1	4140	58.60001	-0.86066		
Fladen Abrasion 2014	28/03/2014	456	N1B10	DG	125	A1	4209	58.64812	-0.86016	82347	82348
Fladen Abrasion 2014	28/03/2014	456	N1B10	DG	125	B1	4210	58.64812	-0.86012		82349
Fladen Abrasion 2014	28/03/2014	457	N1B10	CS	125	A1	4224	58.64891	-0.86026		
Fladen Abrasion 2014	28/03/2014	458	N1B09	DG	125	A1	4335	58.64924	-0.85887	82344	82345
Fladen Abrasion 2014	28/03/2014	458	N1B09	DG	125	B1	4336	58.64922	-0.85886		82346
Fladen Abrasion 2014	28/03/2014	459	N1B09	CS	125	A1	4430	58.65068	-0.85665		
Fladen Abrasion 2014	28/03/2014	460	N1B05	DG	125	A1	4459	58.64938	-0.85573	82332	82333
Fladen Abrasion 2014	28/03/2014	460	N1B05	DG	125	B1	4460	58.64931	-0.85568		82334
Fladen Abrasion 2014	28/03/2014	461	N1B05	CS	125	A1	4525	58.64761	-0.85471		
Fladen Abrasion 2014	28/03/2014	462	N1B08	DG	125	A1	4581	58.66200	-0.85949	82341	82342
Fladen Abrasion 2014	28/03/2014	462	N1B08	DG	125	B1	4583	58.66198	-0.85944		82343
Fladen Abrasion 2014	28/03/2014	463	N1B08	CS	124	A1	4601	58.66138	-0.85845		
Fladen Abrasion 2014	28/03/2014	464	N1B06	DG	125	A1	4711	58.65981	-0.84442	82335	82336
Fladen Abrasion 2014	28/03/2014	464	N1B06	DG	125	B1	4712	58.65977	-0.84435		82337
Fladen Abrasion 2014	28/03/2014	465	N1B06	CS	125	A1	4775	58.65891	-0.84174		

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen Abrasion 2014	28/03/2014	466	N1B03	DG	126	A1	4834	58.64949	-0.83784	82326	82327
Fladen Abrasion 2014	28/03/2014	466	N1B03	DG	126	B1	4835	58.64946	-0.83779		82328
Fladen Abrasion 2014	28/03/2014	467	N1B03	CS	126	A1	4888	58.64881	-0.83719		
Fladen Abrasion 2014	28/03/2014	468	N1B04	DG	128	A1	4957	58.65617	-0.83251	82329	82330
Fladen Abrasion 2014	28/03/2014	468	N1B04	DG	128	B1	4958	58.65621	-0.83247		82331
Fladen Abrasion 2014	28/03/2014	469	N1B04	CS	128	A1	5054	58.65429	-0.83326		
Fladen Abrasion 2014	28/03/2014	470	N1B01	DG	129	A1	5079	58.65007	-0.82887	82320	82321
Fladen Abrasion 2014	28/03/2014	470	N1B01	DG	129	B1	5080	58.65012	-0.82885		82322
Fladen Abrasion 2014	28/03/2014	471	N1B01	CS	128	A1	5191	58.64816	-0.83107		
Fladen Abrasion 2014	28/03/2014	472	N1B07	DG	129	A1	5201	58.65581	-0.82752	82338	82339
Fladen Abrasion 2014	28/03/2014	472	N1B07	DG	129	B1	5202	58.65574	-0.82736		82340
Fladen Abrasion 2014	28/03/2014	473	N1B07	CS	129	A1	5207	58.65603	-0.82808		
Fladen Abrasion 2014	28/03/2014	474	N1B02	DG	129	A1	5340	58.67004	-0.82540		
Fladen Abrasion 2014	28/03/2014	474	N1B02	DG	129	A2	5341	58.67003	-0.82543	82323	82324
Fladen Abrasion 2014	28/03/2014	474	N1B02	DG	129	B1	5342	58.67003	-0.82552		82325
Fladen Abrasion 2014	28/03/2014	475	N1B02	CS	129	A1	5392	58.67145	-0.82559		

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen Abrasion 2014	28/03/2014	476	7B05	DG	130.4	A1	5464	58.73987	-0.68682	82220	82221
Fladen Abrasion 2014	28/03/2014	476	7B05	DG	130.4	B1	5465	58.73982	-0.68683		82222
Fladen Abrasion 2014	28/03/2014	476	7B05	DG	130.4	B1	5465	58.73982	-0.68683		82223
Fladen Abrasion 2014	28/03/2014	477	7B05	CS	130	A1	5470	58.74049	-0.68595		
Fladen Abrasion 2014	28/03/2014	478	7B02	CS	131	A1	5610	58.72773	-0.70338		
Fladen Abrasion 2014	28/03/2014	479	7B04	CS	130	A1	5835	58.73430	-0.69395		
Fladen Abrasion 2014	28/03/2014	480	7B06	CS	126	A1	5872	58.73292	-0.67652		
Fladen Abrasion 2014	29/03/2014	481	7B07	CS	127	A1	5972	58.72771	-0.67249		
Fladen Abrasion 2014	29/03/2014	482	7B10	CS	129	A1	6101	58.73464	-0.66704		
Fladen Abrasion 2014	29/03/2014	483	7B03	CS	126	A1	6251	58.73539	-0.67149		
Fladen Abrasion 2014	29/03/2014	484	7B09	CS	129	A1	6352	58.74232	-0.67795		
Fladen Abrasion 2014	29/03/2014	485	7B08	CS	130	A1	6473	58.75233	-0.68137		
Fladen Abrasion 2014	29/03/2014	486	7B01	CS	131	A1	6679	58.76291	-0.68174		
Fladen Abrasion 2014	29/03/2014	487	2A02	CS	130	A1	6718	58.88500	-0.37743		
Fladen Abrasion 2014	29/03/2014	488	2A05	CS	136	A1	6945	58.88161	-0.37217		
Fladen Abrasion 2014	29/03/2014	489	2A09	CS	194	A1	Target	58.89783	-0.36485		

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen Abrasion 2014	29/03/2014	490	2A03	CS	187	A1	Target	58.90280	-0.36661		
Fladen Abrasion 2014	29/03/2014	491	2A08	CS	123	A1	6967	58.91958	-0.35282		
Fladen Abrasion 2014	29/03/2014	492	2A06	CS	128	A1	7172	58.91104	-0.35057		
Fladen Abrasion 2014	29/03/2014	493	2A10	CS	183	A1	7231	58.90659	-0.37198		
Fladen Abrasion 2014	29/03/2014	494	2A04	CS	187	A1	7361	58.90666	-0.36768		
Fladen Abrasion 2014	29/03/2014	495	2A03	CS	187	A1	7454	58.90330	-0.36591		
Fladen Abrasion 2014	29/03/2014	496	2A05	CS	194	A1	7731	58.89838	-0.36209		
Fladen Abrasion 2014	29/03/2014	497	2A01	CS	129	A1	7823	58.89641	-0.34954		
Fladen Abrasion 2014	29/03/2014	498	2A07	CS	141	A1	8009	58.88726	-0.34934		
Fladen Abrasion 2014	29/03/2014	499	6A02	CS	131	A1	8068	58.84135	-0.15002		
Fladen Abrasion 2014	29/03/2014	500	6A01	CS	135	A1	8252	58.82779	-0.14734		
Fladen Abrasion 2014	29/03/2014	501	6A06	CS	133	A1	8417	58.83661	-0.13545		
Fladen Abrasion 2014	29/03/2014	502	6A10	CS	133	A1	8508	58.83993	-0.12127		
Fladen Abrasion 2014	29/03/2014	503	6A05	CS	134	A1	8672	58.83519	-0.12167		
Fladen Abrasion 2014	29/03/2014	504	6A09	CS	137	A1	8692	58.82964	-0.12450		
Fladen Abrasion 2014	29/03/2014	505	6A07	CS	137	A1	8928	58.82497	-0.13632		

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Area Name	Date	Station Number	Station Code	Gear Code	Water Depth (m)	Attempt / Line ID	Fix	Latitude DD	Longitude DD	Fauna Barcode	Sediment Barcode
Fladen Abrasion 2014	29/03/2014	506	6A03	CS	138	A1	8980	58.81640	-0.12767		
Fladen Abrasion 2014	29/03/2014	507	6A08	CS	140	A1	9095	58.81610	-0.12107		
Fladen Abrasion 2014	29/03/2014	508	6A04	CS	137	A1	9283	58.81957	-0.11594		
Fladen Abrasion 2014	30/03/2014	509	1B02	DG	146	A1	9297	58.63058	-0.06202	81728	81729
Fladen Abrasion 2014	30/03/2014	509	1B02	DG	146	B1	9298	58.63059	-0.06201		81730
Fladen Abrasion 2014	30/03/2014	509	1B02	DG	146	B1	9298	58.63059	-0.06201		
Fladen Abrasion 2014	30/03/2014	509	1B02	DG	146	B1	9298	58.63059	-0.06201		81731
Fladen Abrasion 2014	31/03/2014	510	1B02	CS	145	A1	9404	58.63226	-0.06115		
Fladen Abrasion 2014	30/03/2014	511	1B07	CS	145	A1	9477	58.64498	-0.05859		
Fladen Abrasion 2014	30/03/2014	512	1B01	CS	145	A1	9572	58.64246	-0.04981		
Fladen Abrasion 2014	30/03/2014	513	1B06	CS	145	A1	9693	58.62611	-0.03265		
Fladen Abrasion 2014	30/03/2014	514	1B04	CS	145	A1	9906	58.62347	-0.03485		
Fladen Abrasion 2014	30/03/2014	515	1B09	CS	145	A1	10022	58.61259	-0.03929		
Fladen Abrasion 2014	30/03/2014	516	1B08	CS	144	A1	10173	58.61107	-0.04672		
Fladen Abrasion 2014	30/03/2014	517	1B05	CS	143	A1	10352	58.60991	-0.06616		
Fladen Abrasion 2014	30/03/2014	518	1B10	CS	143	A1	10472	58.60600	-0.06609		

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Fladen Abrasion 2014	30/03/2014	519	1B03	CS	144	A1	10583	58.60465	-0.06659		
Fladen Abrasion 2014	30/03/2014	520	CLMR01	DG	113	A1	10608	58.43470	-0.23251	82530	82531
Fladen Abrasion 2014	30/03/2014	520	CLMR01	DG	113	B1	10609	58.43469	-0.23248		82533
Fladen Abrasion 2014	30/03/2014	520	CLMR01	DG	113	B1	10609	58.43469	-0.23248		82534

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