

Survey Report: C5650

Fulmar rMCZ 2012 Survey Report

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1 Background and Introduction

1.1 Survey Project Team

The Fulmar rMCZ survey was carried out during 6th – 10th May 2012 on the RV *CEFAS Endeavour* cruise CEND 08/12. The survey team for the duration of the fieldwork included Cefas marine ecologists and marine surveyors.

1.2 Site Description

Fulmar rMCZ is located approximately 224 km offshore of the NE coast of England (Figure 1). **(For a detailed site description see *NetGain Final Report and Recommendations for Marine Conservation Zones 2011*).**

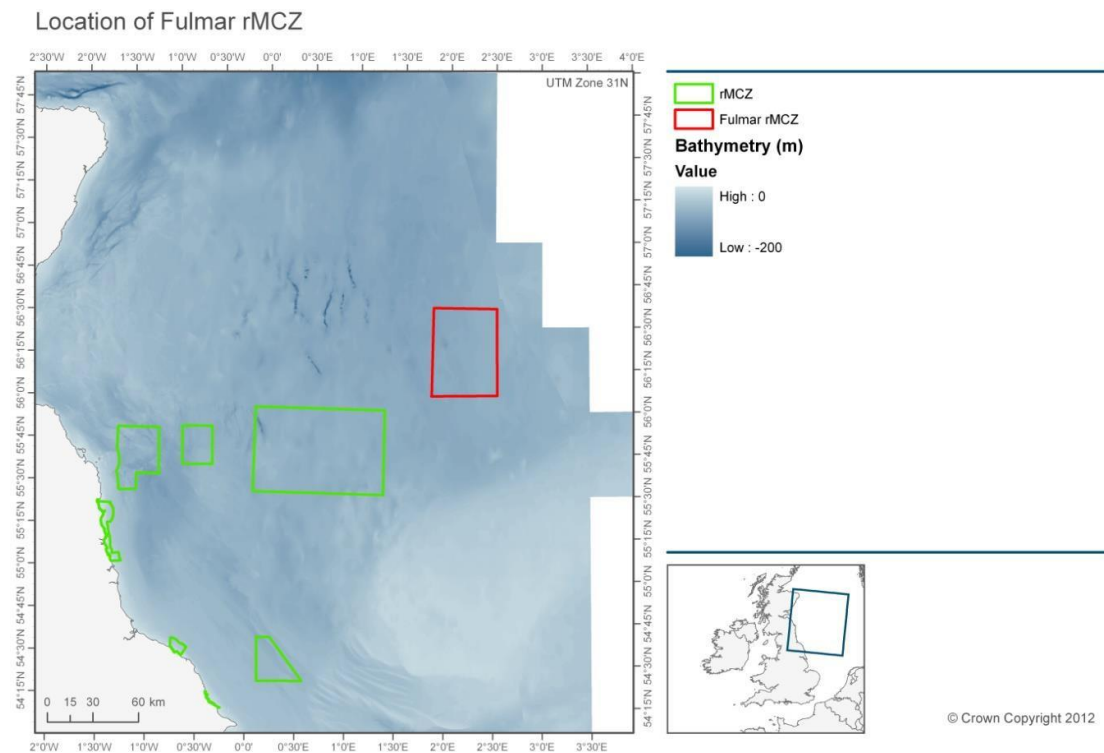


Figure 1. Location of Fulmar rMCZ. [Bathymetry is from the Defra Digital Elevation Model (Astrium, 2011)]

1.3 Geological and Biological Context

A number of Broad Scale Habitat (BSH) features and FOCI have been proposed for designation by the regional project within the Fulmar rMCZ (Table 1).

Table 1. Features proposed for designation within Fulmar rMCZ.

Feature Type	Feature Name
Broad Scale Habitat (BSH)	A5.1 Subtidal coarse sediment A5.2 Subtidal sand
Features of Conservation Interest (FOCI)	
Habitats	Subtidal sands and gravels*
Species	<i>Arctica islandica</i>
Geomorphological Feature	N/A

***Subtidal sands and gravels are considered to be adequately protected by its component habitat features subtidal sand and/or subtidal coarse sediment, and is no longer included within MCZ designations**

A number of additional species FOCI had previously been identified as present within the Fulmar rMCZ. However, these were not proposed for designation due to the limited evidence of their occurrence within the area of interest or their high mobility (Table 2).

Table 2. Features not proposed for designation within Fulmar rMCZ.

Feature Type	Feature Name
Broad Scale Habitat (BSH)	N/A
Features of Conservation Interest (FOCI)	
Habitats	N/A
Species	<i>Gitanopsis</i> <i>bispinosa</i> <i>Ostrea</i> <i>edulis</i> <i>Raja undulata</i>

1.4 Existing data and information utilised to inform survey planning

No existing data relating to the spatial extent of BSH or habitat FOCI were identified to assist with the planning of the Fulmar rMCZ survey. Only the Site Assessment Document (SAD) habitat map was used to guide the survey plan.

2 Survey Design and Methods

2.1 Survey planning and design

2.1.1 Acoustic survey

Multibeam bathymetry and backscatter data were collected opportunistically in transit between the survey stations. Additional targeted acoustic survey was applied where the acoustic data collected during transits indicated the presence of a habitat boundary or where potential features of interest were observed.

Full coverage acoustic data were acquired for a small area in the south-west of the rMCZ (where the SAD habitat map predicted a patch of coarse sediments to be present) under sub-contract by EGS Earth Sciences and Surveying Ltd. However, these acoustic data were not acquired in time to inform the groundtruthing survey planning at this site.

2.1.2 Groundtruthing

Selection and positioning of groundtruthing stations was informed using the predicted broadscale habitat extents derived from the SAD habitat map. Grab sampling stations were positioned within the sedimentary habitats using a triangular lattice grid overlaid on the SAD habitat map. Stations within the predicted subtidal sand sediments were at a grid spacing of 7.5 km and coarse sediments were at a grid spacing of 2 km.

Within the predicted sedimentary habitats, the selection of stations where the camera sled would be used in addition to the grab was informed by the sediment type present in the grab sample (i.e., where the grab sample confirmed the presence of a given BSH the camera was deployed to allow characterisation of the surface sediment types and epifaunal communities). The number of camera deployments per BSH varied depending on the uniformity of the habitat and its spatial extent.

2.2 Sample collection and processing methods

2.2.1 Sedimentary Broad Scale Habitats

Sedimentary habitats were groundtruthed by grab and underwater camera. The grab system comprised a 0.1 m² mini Hamon grab fitted with a video camera (Figure 2), the combined gear being known as a HamCam. This allowed an image of the undisturbed seabed surface to be obtained for each grab sample. On recovery, the grab was emptied into a large plastic bin and a representative sub-sample of sediment (approx. 0.5 litres) taken for Particle Size Analysis (PSA). The sample was stored in a labelled plastic container and frozen ready for transfer to a laboratory ashore.

The remaining sample was photographed and the volume of sediment measured and recorded. Benthic fauna were collected by washing the sample with sea-water over a 1 mm sieve. The retained >1 mm fraction was transferred to a labelled container and preserved in 4% buffered formaldehyde for later analysis ashore.



Figure 2. Mini Hamon grab with video camera (HamCam).

The camera sledge system comprised a video camera with capability to also capture still images (Figure 3). Illumination was provided by two Cefas high intensity LED striplights and a flash unit. The camera was fitted with a four-spot laser-scaling device to provide a reference scale in the video image. Set-up and operation followed the MESH 'Recommended Operating Guidelines (ROG) for underwater video and photographic imaging techniques'. Video was recorded simultaneously to a Sony GV-HD700 DV tape recorder and a computer hard drive. A video overlay was used to provide station metadata, time and GPS position (of the vessel) in the recorded video image.

Camera tows lasted a minimum of 10 minutes, with the sledge being towed at ~ 0.5 knots ($\sim 0.25 \text{ ms}^{-1}$) across a 50 m 'bullring' centred on the sampling station. Still images were captured at regular one minute intervals and opportunistically if specific features of interest were encountered. The sledge was controlled by a winch operator with sight of the video monitor. At a few stations a note was made of the amount of tow cable deployed to allow a 'lay back' to be applied to estimate the distance of the sledge behind the vessel.

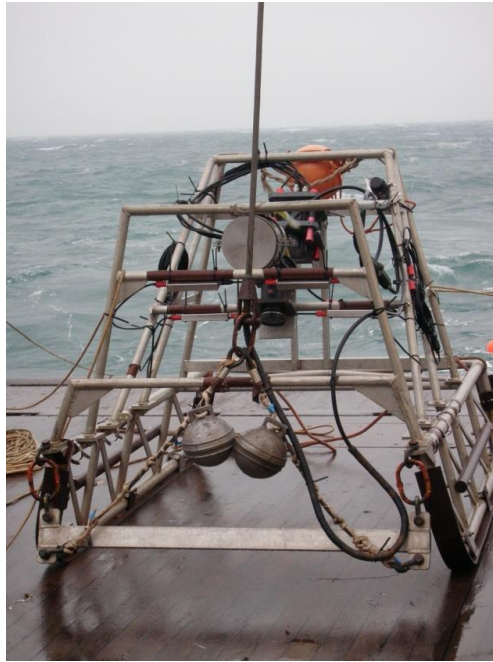


Figure 3. Camera sledge with video and still imaging system.

3 Survey Narrative

Survey began at the Fulmar rMCZ at 04:42 on 06/05/12. The Conductivity Temperature Depth (CTD) micrologger was deployed prior to survey commencing to obtain the Sound Velocity Profile (SVP) for the multibeam survey. Multibeam bathymetry and backscatter data were acquired for the full length of the site (diagonally from SW-NE corner) during transit to the first groundtruthing station. The groundtruthing survey then commenced using a combination of Hamon grabs and video and still imagery. Multibeam bathymetry and backscatter data were acquired during transits between groundtruthing stations to give a broadscale description of the seafloor characteristics across the survey area. The survey continued until 03:10 on 10/05/12. A total of 65 stations were sampled with the grab and 25 of those were also sampled with the camera sledge.

4 Preliminary Results

4.1 Acoustic Maps



Figure 4. Backscatter from opportunistic multibeam lines collected on transit between ground truth stations.

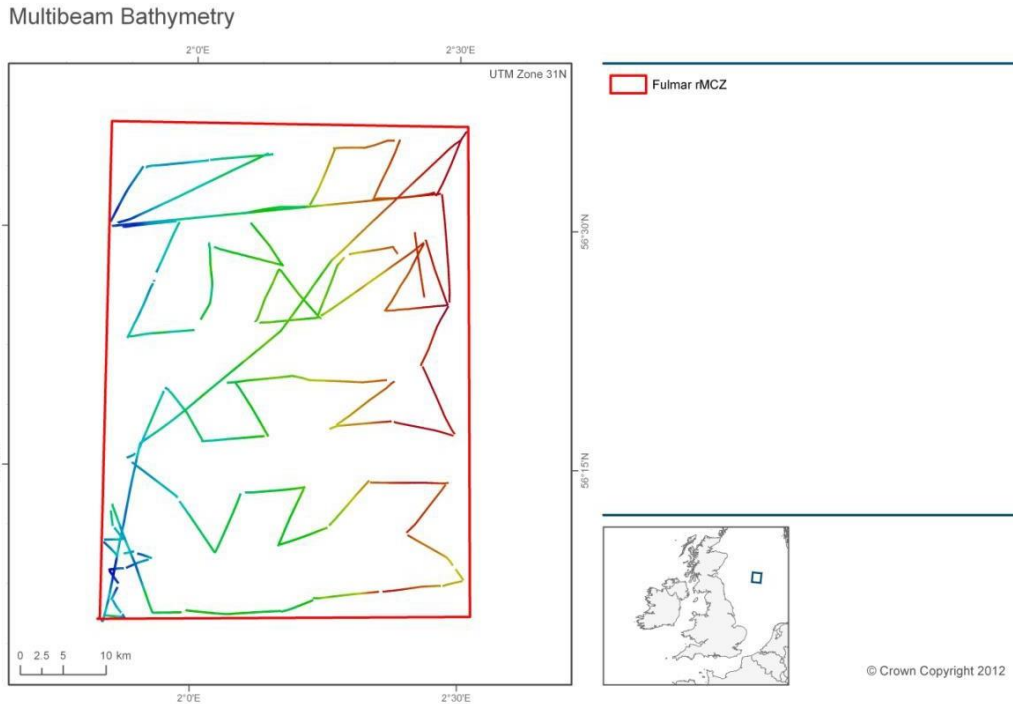

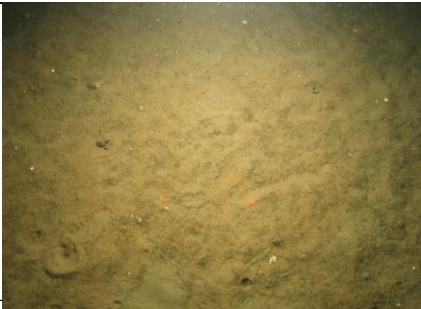




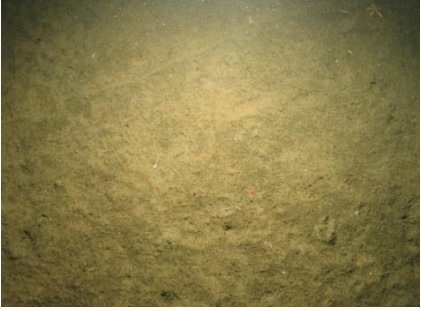

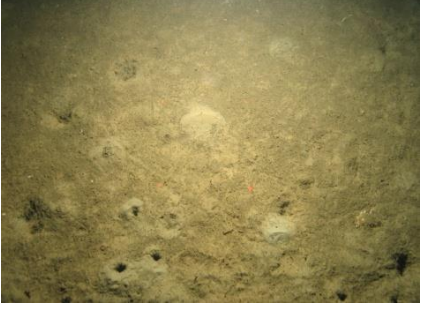
Figure 5. Bathymetry from opportunistic multibeam lines collected on transit between ground truth stations.






4.2 Seabed Imagery




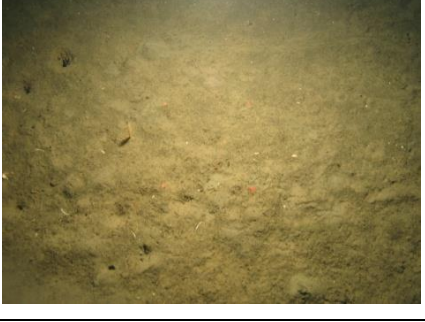

A preliminary summary of the seabed substrates and epifaunal communities observed in video and still images is given below for each of the predicted BSH's on the SAD habitat map.


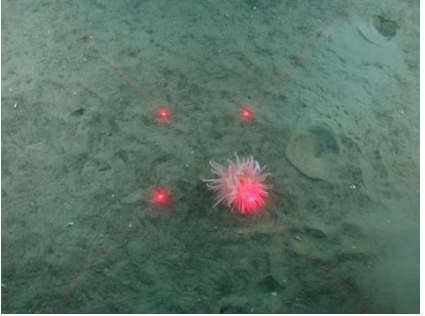


4.2.1 Stations in predicted sand sediment.

Stn Code	BSH Habitat/Faunal Summary	Still Image
FUL 03	Muddy sand <i>(Astropecten irregularis, Pagurus bernhardus, Myxine glutinosa, Atelecyclus rotundus)</i>	
FUL 05	Muddy sand <i>(Asterias rubens)</i>	

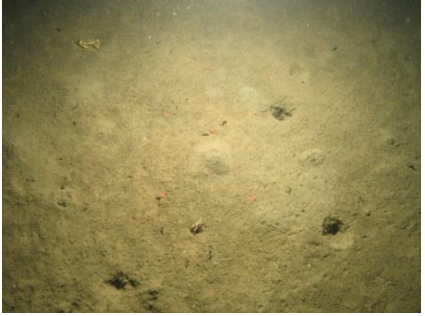
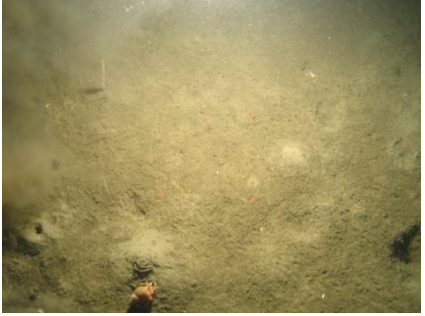


Stn Code	BSH Habitat/Faunal Summary	Still Image
FUL 07	Muddy sand (Nemertean, <i>Virgularia mirabilis</i>)	
FUL 08	Muddy sand (<i>Eutrigla gurnardus</i> , <i>Asterias rubens</i> , <i>Myxine glutinosa</i> , <i>Callionymus lyra</i> , <i>Pagurus bernhardus</i>)	
FUL 10	Muddy sand (<i>Asterias rubens</i>)	
FUL 12	Muddy sand with patches of broken shell (<i>Funiculina quadrangularis</i> , <i>Pagurus bernhardus</i> , <i>Asterias rubens</i> , <i>Astropecten irregularis</i>)	
FUL 14	Muddy sand (<i>Myxine glutinosa</i> , <i>Astropecten irregularis</i> , <i>Aequipecten opercularis</i>)	

Stn Code	BSH Habitat/Faunal Summary	Still Image
FUL 17	Muddy sand <i>(Corymorpha sp., Echinus esculentus)</i>	
FUL 18	Muddy sand with occasional pebble <i>(Virgularia mirabilis, Sabellidae, Myxine glutinosa, Funiculina quadrangularis)</i>	
FUL 25	Muddy sand with pebble and broken shell <i>(Virgularia mirabilis, Pagurus bernhardus, Epizoanthus incrustans, Astropecten irregularis, Modiolus modiolus, Asterias rubens)</i>	
FUL 27	Muddy sand <i>(Corymorpha sp., Asterias rubens, Astropecten irregularis)</i>	
FUL 30	Muddy sand with cobble and broken shell <i>(Buccinum undatum, Modiolus modiolus, Pagurus bernhardus, Virgularia mirabilis, Asterias rubens)</i>	

Stn Code	BSH Habitat/Faunal Summary	Still Image
FUL 32	Muddy sand with pebble and broken shell (<i>Modiolus modiolus</i> , <i>Virgularia mirabilis</i> , <i>Myxine glutinosa</i> , <i>Psammechinus miliaris</i>)	
FUL 34	Muddy sand (<i>Bolocera tuediae</i> , <i>Corymorpha sp.</i> , Paguridae)	
FUL 35	Muddy sand (<i>Eutrigla gurnardus</i> , <i>Pagurus bernhardus</i> , <i>Astropecten irregularis</i> , <i>Myxine glutinosa</i> , <i>Virgularia mirabilis</i>)	
FUL 37	Muddy sand (<i>Virgularia mirabilis</i> , <i>Funiculina</i> <i>quadrangularis</i> , <i>Aequipecten opercularis</i> , <i>Echinus acutus</i> , <i>Epizoanthus incrustatus</i> , <i>Pagurus bernhardus</i> , <i>Echinus sp.</i>)	
FUL 39	Muddy sand (<i>Alcyonium digitatum</i> , Hydroid turf)	

Stn Code	BSH Habitat/Faunal Summary	Still Image
FUL 42	Muddy sand (<i>Virgularia mirabilis</i> , <i>Buccinum undatum</i> , Paguridae)	
FUL 45	Muddy sand (<i>Asterias rubens</i> , <i>Bolocera tuediae</i>)	
FUL 46	Muddy sand <i>Virgularia mirabilis</i> , <i>Astropecten irregularis</i> , Gobidae, <i>Pagurus bernhardus</i>)	
FUL 49	Slightly rippled muddy sand (<i>Pagurus bernhardus</i> , <i>Alcyonium digitatum</i>)	

4.2.2 Stations in predicted coarse sediment.

Stn Code	BSH Habitat/Faunal Summary	Still Image
FUL 52	Muddy sand (<i>Virgularia mirabilis</i>)	
FUL 55	Muddy sand (<i>Virgularia mirabilis</i> , <i>Liocarcinus</i> sp., <i>Pagurus bernhardus</i>)	
FUL 56	Muddy sand (<i>Bolocera tuediae</i> , <i>Alcyonium digitatum</i> , <i>Limanda limanda</i>)	
FUL 62	Muddy sand with pebble and cobble (<i>Limanda limanda</i> , <i>Anapagurus laevis</i> , <i>Aequipecten opercularis</i> , <i>Astropecten irregularis</i> , <i>Pagurus bernhardus</i>)	

4.3 Grab Samples and sediment types

Preliminary observations of the spatial distribution of sediment types (EUNIS Level 3) for each grab sample were also summarised (Figure 6). These results are based on preliminary assessment and that they are subject to change following further analysis of sediment samples in the laboratory.

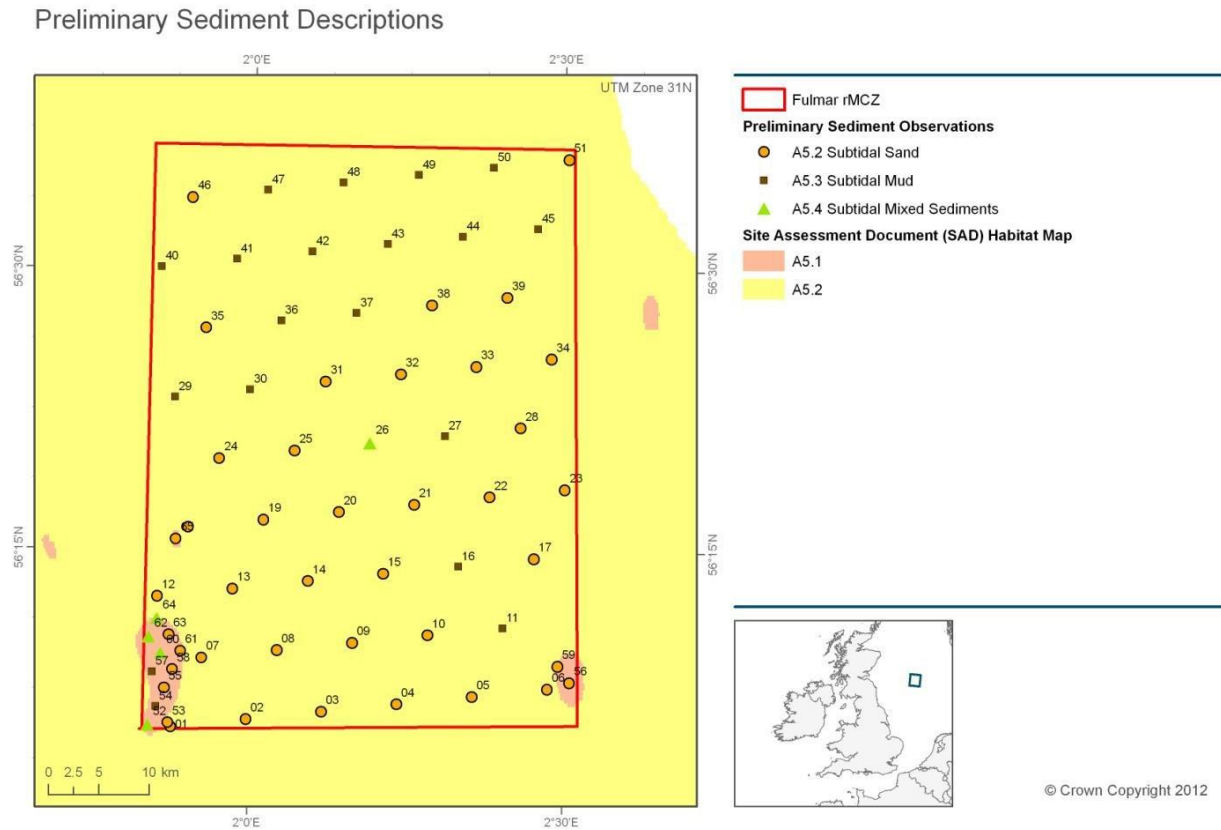


Figure 6. Preliminary assessment of sediment types from Hamon grab samples.

4.4 Preliminary observations of Features of Conservation Importance (FOCI)

The species FOCI *Arctica Islandica* was recorded at four stations sampled on CEND 8/12, supplementing other historical records for the area (Figure 7). These results are based on preliminary assessment and that they are subject to change following further analysis of the acquired seabed imagery in the laboratory.

Observations of *Arctica islandica*

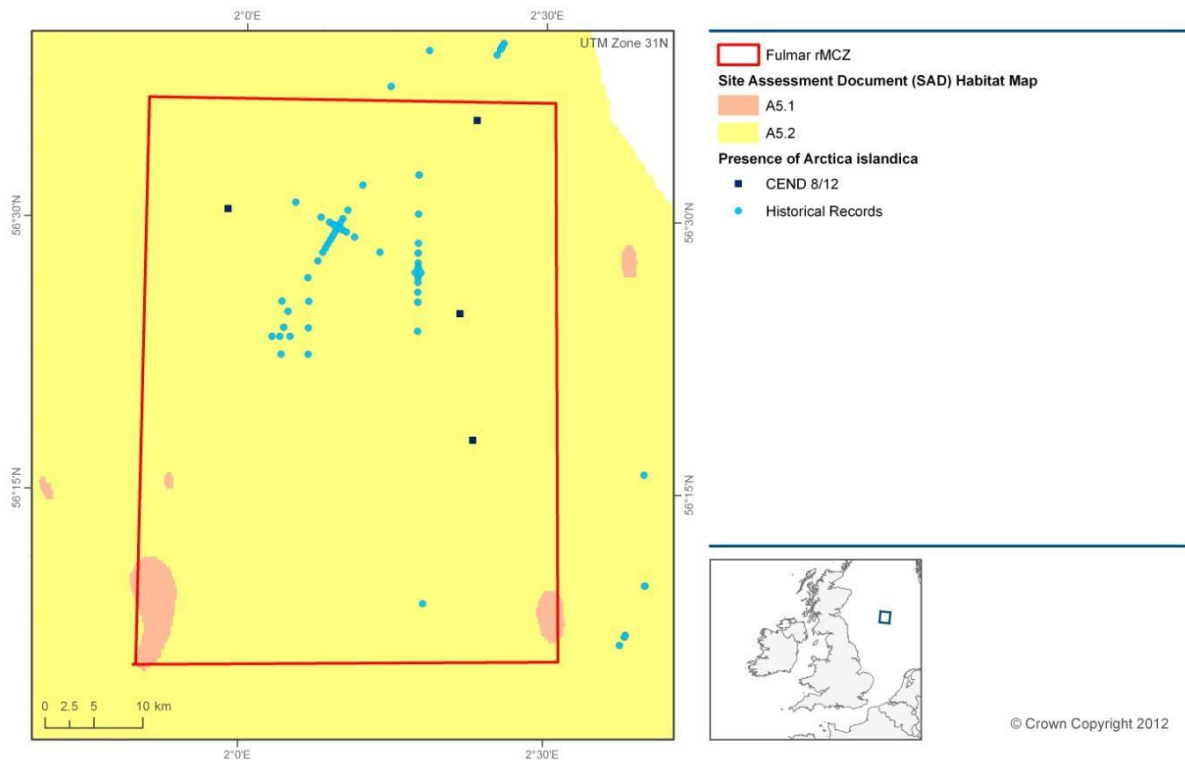


Figure 7. Records of species FOCI (*Arctica islandica*) from historic records and current survey.

5 Annexes

5.1 RV Cefas Endeavour



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

MMSI	235005270
Lloyds/IMO number	9251107
Side Gantry	7.5 tonne articulated side A-frame
Stern Gantry	25 tonne stern A-frame
Winches	3 x cranes 35 tM, heave compensated 2 x trawl winches 2 x drum winches, (1 double) Double barrel survey winch with motion compensation and slip rings Double barrel survey winch with slip rings Double barrel towing winch with slip rings Side-scan sonar winch with slip rings 3 x Gilson winches (one fitted to stern A-frame)
Transducers/Sea tube	Drop keel to deploy transducers outside the hull boundary layer in addition to hull mounted transducers 1.2 m diameter sea tube/moon-pool
Acoustic equipment	Kongsberg Simrad: HiPAP 500 positioning sonar EK60, 38/120 kHz scientific sounder EA 600, 50/200 kHz scientific sounder Scanmar net mensuration system SH80 high frequency omni- directional sonar EM3002 swathe bathymetry sounder Hull mounted Scanmar fishing computer transducers
Boats	2 x 8 m 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 Intereng anti-roll system Local Area Network with scientific data management system Ship-wide general information system CCTV
Class	LRS 100A1+LMC UMS SCM CCS ICC IP ES(2) DP(CM) ICE class 2

5.2 Camera Sledge

Flash model: Kongsberg 11-242

Underwater lights – Cefas high power LED strip lights

Video and stills camera settings variable depending on underwater visibility and ambient light levels.

5.3 Positioning Software-Tower

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

5.4 *Multibeam Bathymetry*

Model: Kongsberg EM2040

Frequency: 300kHz; swathe width variable running in hi res equidistant mode

Latency correction not determined – 1pps synchronised time system utilised on vessel.

5.5 *Metadata*

Station metadata for the Fulmar rMCZ survey on cruise CEND 08/12 is provided below.

(NB. Station No is a sequential event number for the cruise, so changes each time a new gear is used or a new location is sampled. Station Code is used to identify the location of the sampling station.) CTD=Conductivity, Temperature, Depth Micrologger, MB=Multibeam, HC=HamCam, CS=Camera Sledge).

Cruise code	Date	Station No.	Station code	Gear	Latitude	Longitude
CEND 8/12	06/05/2012	132	CTD	CTD	56.09383	2.83747
CEND 8/12	06/05/2012	133	MB TRANSIT	MB	56.60300	2.51200
CEND 8/12	06/05/2012	133	MB TRANSIT	MB	56.08800	1.83550
CEND 8/12	06/05/2012	134	FUL51	HC	56.59955	2.50606
CEND 8/12	06/05/2012	135	MB TRANSIT	MB	56.53600	2.45400
CEND 8/12	06/05/2012	135	MB TRANSIT	MB	56.59700	2.50290
CEND 8/12	06/05/2012	136	FUL45	HC	56.53786	2.45660
CEND 8/12	06/05/2012	137	FUL45	CS	56.53792	2.45660
CEND 8/12	06/05/2012	137	FUL45	CS	56.53926	2.45613
CEND 8/12	06/05/2012	138	MB TRANSIT	MB	56.53200	2.33500
CEND 8/12	06/05/2012	138	MB TRANSIT	MB	56.54025	2.45160
CEND 8/12	06/05/2012	139	FUL44	HC	56.53119	2.33548
CEND 8/12	06/05/2012	140	MB TRANSIT	MB	56.55900	2.38600
CEND 8/12	06/05/2012	140	MB TRANSIT	MB	56.53414	2.33732
CEND 8/12	06/05/2012	141	FUL50	HC	56.59320	2.38470
CEND 8/12	06/05/2012	142	MB TRANSIT	MB	56.58500	2.25800
CEND 8/12	06/05/2012	142	MB TRANSIT	MB	56.59400	2.37500
CEND 8/12	06/05/2012	143	FUL49	CS	56.58559	2.26475
CEND 8/12	06/05/2012	143	FUL49	CS	56.58653	2.26124
CEND 8/12	06/05/2012	144	FUL49	HC	56.58635	2.26326
CEND 8/12	06/05/2012	145	MB TRANSIT	MB	0.00000	0.00000
CEND 8/12	06/05/2012	146	FUL43	HC	56.52422	2.21499
CEND 8/12	06/05/2012	147	MB TRANSIT	MB	56.51600	2.09000
CEND 8/12	06/05/2012	147	MB TRANSIT	MB	56.52400	2.21200
CEND 8/12	06/05/2012	148	FUL42	HC	56.51742	2.09365
CEND 8/12	06/05/2012	149	FUL42	CS	56.51667	2.09324
CEND 8/12	06/05/2012	149	FUL42	CS	56.51487	2.09265

Cruise code	Date	Station No.	Station code	Gear	Latitude	Longitude
CEND 8/12	06/05/2012	150	MB TRANSIT	MB	56.46300	2.16500
CEND 8/12	06/05/2012	150	MB TRANSIT	MB	56.50600	2.10400
CEND 8/12	06/05/2012	151	FUL37	CS	56.46252	2.16501
CEND 8/12	06/05/2012	151	FUL37	CS	56.46009	2.16336
CEND 8/12	06/05/2012	152	MB TRANSIT	MB	56.40600	2.23800
CEND 8/12	06/05/2012	152	MB TRANSIT	MB	56.45800	2.16200
CEND 8/12	07/05/2012	153	FUL32	CS	56.40797	2.23780

Cruise code	Date	Station No.	Station code	Gear	Latitude	Longitude
CEND 8/12	07/05/2012	153	FUL32	CS	56.40882	2.23781
CEND 8/12	07/05/2012	154	MB TRANSIT	MB	56.48700	2.43300
CEND 8/12	07/05/2012	154	MB TRANSIT	MB	56.40900	2.23700
CEND 8/12	07/05/2012	155	FUL39	CS	56.48784	2.43419
CEND 8/12	07/05/2012	155	FUL39	CS	56.48854	2.43469
CEND 8/12	07/05/2012	156	MB TRANSIT	MB	56.42200	2.47900
CEND 8/12	07/05/2012	156	MB TRANSIT	MB	56.48900	2.43570
CEND 8/12	07/05/2012	157	FUL34	CS	56.42241	2.47867
CEND 8/12	07/05/2012	157	FUL34	CS	56.42323	2.47954
CEND 8/12	07/05/2012	158	MB TRANSIT	MB	53.23310	2.27960
CEND 8/12	07/05/2012	158	MB TRANSIT	MB	56.42500	2.48100
CEND 8/12	07/05/2012	159	MB TRANSIT	MB	56.32500	2.27840
CEND 8/12	07/05/2012	159	MB TRANSIT	MB	56.32500	2.27840
CEND 8/12	07/05/2012	160	MB TRANSIT	MB	56.56400	1.89900
CEND 8/12	07/05/2012	160	MB TRANSIT	MB	56.50500	1.83914
CEND 8/12	07/05/2012	161	FUL46	CS	56.56403	1.90037
CEND 8/12	07/05/2012	161	FUL46	CS	56.56294	1.89901
CEND 8/12	07/05/2012	162	FUL46	HC	56.56295	1.89871
CEND 8/12	07/05/2012	163	MB TRANSIT	MB	57.57100	2.02300
CEND 8/12	07/05/2012	163	MB TRANSIT	MB	56.56200	1.90400
CEND 8/12	07/05/2012	164	FUL47	HC	56.57163	2.02050
CEND 8/12	07/05/2012	165	MB TRANSIT	MB	56.57800	2.14500
CEND 8/12	07/05/2012	165	MB TRANSIT	MB	56.57187	2.02619
CEND 8/12	07/05/2012	166	FUL48	HC	56.57889	2.14187
CEND 8/12	07/05/2012	167	MB TRANSIT	MB	56.50400	1.85200
CEND 8/12	07/05/2012	167	MB TRANSIT	MB	56.57940	2.13540
CEND 8/12	07/05/2012	168	FUL40	HC	56.50210	1.85095
CEND 8/12	07/05/2012	169	MB TRANSIT	MB	56.50700	1.96400
CEND 8/12	07/05/2012	169	MB TRANSIT	MB	56.50000	1.86200
CEND 8/12	07/05/2012	170	FUL41	HC	56.50893	1.97168
CEND 8/12	07/05/2012	171	MB TRANSIT	MB	56.45300	1.92600
CEND 8/12	07/05/2012	171	MB TRANSIT	MB	56.50600	1.96900
CEND 8/12	07/05/2012	172	FUL35	HC	56.44750	1.92288
CEND 8/12	07/05/2012	173	FUL35	CS	56.44778	1.92333
CEND 8/12	07/05/2012	173	FUL35	CS	56.44632	1.92335
CEND 8/12	07/05/2012	174	MB TRANSIT	MB	56.38400	1.87300
CEND 8/12	07/05/2012	174	MB TRANSIT	MB	56.44100	1.92000
CEND 8/12	07/05/2012	175	FUL29	HC	56.38604	1.87502
CEND 8/12	07/05/2012	176	MB TRANSIT	MB	56.39300	2.00100
CEND 8/12	07/05/2012	176	MB TRANSIT	MB	56.38000	1.87500
CEND 8/12	07/05/2012	177	FUL30	HC	56.39369	1.99621
CEND 8/12	07/05/2012	178	FUL30	CS	56.39354	1.99647
CEND 8/12	07/05/2012	178	FUL30	CS	56.39234	1.99716

Cruise code	Date	Station No.	Station code	Gear	Latitude	Longitude
CEND 8/12	07/05/2012	179	MB TRANSIT	MB	56.48500	2.02500
CEND 8/12	07/05/2012	179	MB TRANSIT	MB	56.40500	2.01240
CEND 8/12	07/05/2012	180	FUL36	HC	56.48107	2.02586
CEND 8/12	07/05/2012	181	CTD	CTD	56.48100	2.03000
CEND 8/12	07/05/2012	182	MB TRANSIT	MB	56.46200	2.16790
CEND 8/12	07/05/2012	182	MB TRANSIT	MB	56.48080	2.03610
CEND 8/12	07/05/2012	183	FUL37	HC	56.46287	2.16637
CEND 8/12	07/05/2012	184	MB TRANSIT	MB	56.40200	2.11500
CEND 8/12	07/05/2012	184	MB TRANSIT	MB	56.45900	2.16000
CEND 8/12	07/05/2012	185	FUL31	HC	56.40095	2.11675
CEND 8/12	07/05/2012	186	MB TRANSIT	MB	56.40800	2.23500
CEND 8/12	07/05/2012	186	MB TRANSIT	MB	56.40100	2.12300
CEND 8/12	08/05/2012	187	FUL32	HC	56.40849	2.23660
CEND 8/12	08/05/2012	188	MB TRANSIT	MB	56.47100	2.28200
CEND 8/12	08/05/2012	188	MB TRANSIT	MB	56.41000	2.23300
CEND 8/12	08/05/2012	189	FUL38	HC	56.46970	2.28574
CEND 8/12	08/05/2012	190	MB TRANSIT	MB	56.47400	2.29100
CEND 8/12	08/05/2012	191	MB TRANSIT	MB	56.49800	2.41500
CEND 8/12	08/05/2012	191	MB TRANSIT	MB	56.43000	2.43400
CEND 8/12	08/05/2012	192	FUL39	HC	56.48892	2.43436
CEND 8/12	08/05/2012	193	MB TRANSIT	MB	56.41500	2.35900
CEND 8/12	08/05/2012	193	MB TRANSIT	MB	56.48600	2.43270
CEND 8/12	08/05/2012	194	FUL33	HC	56.41573	2.35885
CEND 8/12	08/05/2012	195	MB TRANSIT	MB	56.42200	2.47800
CEND 8/12	08/05/2012	195	MB TRANSIT	MB	56.41500	2.36300
CEND 8/12	08/05/2012	196	FUL34	HC	56.42243	2.48038
CEND 8/12	08/05/2012	197	MB TRANSIT	MB	56.35800	2.42830
CEND 8/12	08/05/2012	197	MB TRANSIT	MB	56.42100	2.47900
CEND 8/12	08/05/2012	198	FUL28	HC	56.36123	2.43005
CEND 8/12	08/05/2012	199	MB TRANSIT	MB	56.28700	2.49400
CEND 8/12	08/05/2012	199	MB TRANSIT	MB	56.35800	2.43100
CEND 8/12	08/05/2012	200	FUL23	HC	56.28669	2.49573
CEND 8/12	08/05/2012	201	MB TRANSIT	MB	56.29900	2.37800
CEND 8/12	08/05/2012	201	MB TRANSIT	MB	56.28500	2.49000
CEND 8/12	08/05/2012	202	FUL22	HC	56.29967	2.38079
CEND 8/12	08/05/2012	203	MB TRANSIT	MB	56.29100	2.25600
CEND 8/12	08/05/2012	203	MB TRANSIT	MB	56.30000	2.37300
CEND 8/12	08/05/2012	204	FUL21	HC	56.29227	2.26125
CEND 8/12	08/05/2012	205	MB TRANSIT	MB	56.34240	2.37930
CEND 8/12	08/05/2012	205	MB TRANSIT	MB	56.29600	2.27070
CEND 8/12	08/05/2012	206	FUL27	HC	56.34015	2.37337
CEND 8/12	08/05/2012	207	FUL27	CS	56.34015	2.37365
CEND 8/12	08/05/2012	207	FUL27	CS	56.34152	2.37455

Cruise code	Date	Station No.	Station code	Gear	Latitude	Longitude
CEND 8/12	08/05/2012	208	MB TRANSIT	MB	56.34700	2.18400
CEND 8/12	08/05/2012	208	MB TRANSIT	MB	56.34360	2.36440
CEND 8/12	08/05/2012	209	FUL26	HC	56.34631	2.18910
CEND 8/12	08/05/2012	210	MB TRANSIT	MB	56.33800	2.06200
CEND 8/12	08/05/2012	210	MB TRANSIT	MB	56.34600	2.18400
CEND 8/12	08/05/2012	211	ful25	HC	56.33909	2.06831
CEND 8/12	08/05/2012	212	FUL25	CS	56.33939	2.06902
CEND 8/12	08/05/2012	212	FUL25	CS	56.34031	2.07171
CEND 8/12	08/05/2012	213	MB TRANSIT	MB	56.28300	2.14900
CEND 8/12	08/05/2012	213	MB TRANSIT	MB	56.33920	2.07920
CEND 8/12	08/05/2012	214	FUL20	HC	56.28473	2.13990
CEND 8/12	08/05/2012	214	FUL20	HC	56.28469	2.13993
CEND 8/12	08/05/2012	215	MB TRANSIT	MB	56.27700	2.01600
CEND 8/12	08/05/2012	215	MB TRANSIT	MB	56.28300	2.13400
CEND 8/12	08/05/2012	216	FUL19	HC	56.27719	2.02091
CEND 8/12	08/05/2012	217	MB TRANSIT	MB	56.33200	1.94600
CEND 8/12	08/05/2012	217	MB TRANSIT	MB	56.27806	2.01880
CEND 8/12	08/05/2012	218	FUL24	HC	56.33216	1.94677
CEND 8/12	08/05/2012	219	MB TRANSIT	MB	56.26900	1.89990
CEND 8/12	08/05/2012	219	MB TRANSIT	MB	56.32910	1.94450
CEND 8/12	08/05/2012	220	CTD	CTD	56.27050	1.89980
CEND 8/12	08/05/2012	221	FUL18	HC	56.27030	1.89952
CEND 8/12	08/05/2012	222	FUL18	CS	56.27025	1.89968
CEND 8/12	08/05/2012	222	FUL18	CS	56.26902	1.89890
CEND 8/12	08/05/2012	223	MB TRANSIT	MB	56.25800	1.87600
CEND 8/12	08/05/2012	223	MB TRANSIT	MB	56.26300	1.89200
CEND 8/12	08/05/2012	224	FUL65	HC	56.25916	1.87938
CEND 8/12	08/05/2012	225	MB TRANSIT	MB	56.21700	1.97200
CEND 8/12	08/05/2012	225	MB TRANSIT	MB	56.25400	1.88600
CEND 8/12	08/05/2012	226	FUL13	HC	56.21580	1.97273
CEND 8/12	08/05/2012	227	MB TRANSIT	MB	56.16000	2.04500
CEND 8/12	08/05/2012	227	MB TRANSIT	MB	56.21400	1.97700
CEND 8/12	09/05/2012	228	FUL8	HC	56.16222	2.04440
CEND 8/12	09/05/2012	229	FUL8	CS	56.16255	2.04448
CEND 8/12	09/05/2012	229	FUL8	CS	56.16169	2.04418
CEND 8/12	09/05/2012	230	MB TRANSIT	MB	56.22300	2.09200
CEND 8/12	09/05/2012	230	MB TRANSIT	MB	56.16000	2.04500
CEND 8/12	09/05/2012	231	FUL14	HC	56.22282	2.09173
CEND 8/12	09/05/2012	232	FUL14	CS	56.22262	2.09080
CEND 8/12	09/05/2012	232	FUL14	CS	56.22335	2.09234
CEND 8/12	09/05/2012	233	MB TRANSIT	MB	56.23000	2.21400
CEND 8/12	09/05/2012	233	MB TRANSIT	MB	56.22400	2.10000
CEND 8/12	09/05/2012	234	FUL15	HC	56.23051	2.21181

Cruise code	Date	Station No.	Station code	Gear	Latitude	Longitude
CEND 8/12	09/05/2012	235	MB TRANSIT	MB	56.16800	2.16300
CEND 8/12	09/05/2012	235	MB TRANSIT	MB	56.22800	2.21000
CEND 8/12	09/05/2012	236	FUL09	HC	56.16920	2.16429
CEND 8/12	09/05/2012	237	MB TRANSIT	MB	56.18800	2.25600
CEND 8/12	09/05/2012	237	MB TRANSIT	MB	56.17000	2.16000
CEND 8/12	09/05/2012	238	FUL10	HC	56.18819	2.25515
CEND 8/12	09/05/2012	239	FUL10	CS	56.18806	2.25468
CEND 8/12	09/05/2012	239	FUL10	CS	56.18893	2.25609
CEND 8/12	09/05/2012	240	MB TRANSIT	MB	56.23800	2.33300
CEND 8/12	09/05/2012	240	MB TRANSIT	MB	56.19000	2.25900
CEND 8/12	09/05/2012	241	FUL16	HC	56.23780	2.33256
CEND 8/12	09/05/2012	242	MB TRANSIT	MB	56.23600	2.48300
CEND 8/12	09/05/2012	242	MB TRANSIT	MB	56.23600	2.33500
CEND 8/12	09/05/2012	243	FUL17	HC	56.23733	2.48605
CEND 8/12	09/05/2012	244	FUL17	CS	56.23702	2.48474
CEND 8/12	09/05/2012	244	FUL17	CS	56.23673	2.48333
CEND 8/12	09/05/2012	245	MB TRANSIT	MB	56.18300	2.40300
CEND 8/12	09/05/2012	245	MB TRANSIT	MB	56.23400	2.47600
CEND 8/12	09/05/2012	246	FUL11	HC	56.18338	2.40383
CEND 8/12	09/05/2012	247	MB TRANSIT	MB	56.14900	2.49200
CEND 8/12	09/05/2012	247	MB TRANSIT	MB	56.18100	2.40600
CEND 8/12	09/05/2012	248	FUL59	HC	56.14929	2.49184
CEND 8/12	09/05/2012	249	MB TRANSIT	MB	56.13400	2.51200
CEND 8/12	09/05/2012	249	MB TRANSIT	MB	56.14600	2.49700
CEND 8/12	09/05/2012	250	FUL56	HC	56.13519	2.51170
CEND 8/12	09/05/2012	251	FUL56	CS	56.13494	2.51136
CEND 8/12	09/05/2012	251	FUL56	CS	56.13447	2.51032
CEND 8/12	09/05/2012	252	MB TRANSIT	MB	56.12800	2.47200
CEND 8/12	09/05/2012	252	MB TRANSIT	MB	56.13400	2.50900
CEND 8/12	09/05/2012	253	FUL06	HC	56.12935	2.47566
CEND 8/12	09/05/2012	254	MB TRANSIT	MB	56.12100	2.35900
CEND 8/12	09/05/2012	254	MB TRANSIT	MB	56.12800	2.46900
CEND 8/12	09/05/2012	255	FUL05	HC	56.12183	2.35562
CEND 8/12	09/05/2012	256	FUL05	CS	56.12185	2.35673
CEND 8/12	09/05/2012	256	FUL05	CS	56.12186	2.35521
CEND 8/12	09/05/2012	257	MB TRANSIT	MB	56.11460	2.22980
CEND 8/12	09/05/2012	257	MB TRANSIT	MB	56.12188	2.35390
CEND 8/12	09/05/2012	258	FUL04	HC	56.11459	2.23557
CEND 8/12	09/05/2012	259	MB TRANSIT	MB	56.10000	2.17000
CEND 8/12	09/05/2012	259	MB TRANSIT	MB	56.11200	2.23000
CEND 8/12	09/05/2012	260	FUL03	HC	56.10020	2.17233
CEND 8/12	09/05/2012	261	FUL03	CS	56.10026	2.17236
CEND 8/12	09/05/2012	261	FUL03	CS	56.10067	2.17466

Cruise code	Date	Station No.	Station code	Gear	Latitude	Longitude
CEND 8/12	09/05/2012	262	MB TRANSIT	MB	56.10000	1.99100
CEND 8/12	09/05/2012	262	MB TRANSIT	MB	56.10000	2.17000
CEND 8/12	09/05/2012	263	FUL02	HC	56.09933	1.99530
CEND 8/12	09/05/2012	264	MB TRANSIT	MB	56.21000	1.85000
CEND 8/12	09/05/2012	264	MB TRANSIT	MB	56.09700	1.98300
CEND 8/12	09/05/2012	265	FUL12	HC	56.20847	1.85238
CEND 8/12	09/05/2012	266	FUL12	CS	56.20830	1.85223
CEND 8/12	09/05/2012	266	FUL12	CS	56.20770	1.85106
CEND 8/12	09/05/2012	267	MB TRANSIT	MB	56.18600	1.85200
CEND 8/12	09/05/2012	267	MB TRANSIT	MB	56.20300	1.84800
CEND 8/12	09/05/2012	268	FUL64	HC	56.18872	1.85260
CEND 8/12	09/05/2012	269	MB TRANSIT	MB	56.17200	1.87300
CEND 8/12	09/05/2012	269	MB TRANSIT	MB	56.18540	1.85590
CEND 8/12	09/05/2012	270	FUL63	HC	56.17464	1.87248
CEND 8/12	09/05/2012	271	MB TRANSIT	MB	56.17200	1.83600
CEND 8/12	09/05/2012	271	MB TRANSIT	MB	56.17330	1.87010
CEND 8/12	09/05/2012	272	FUL62	HC	56.17249	1.84048
CEND 8/12	09/05/2012	273	FUL62	CS	56.17201	1.83994
CEND 8/12	09/05/2012	273	FUL62	CS	56.17128	1.83913
CEND 8/12	09/05/2012	274	MB TRANSIT	MB	56.15650	1.86200
CEND 8/12	09/05/2012	274	MB TRANSIT	MB	56.17070	1.83850
CEND 8/12	09/05/2012	275	FUL60	HC	56.15775	1.85975
CEND 8/12	09/05/2012	276	MB TRANSIT	MB	56.16100	1.89350
CEND 8/12	09/05/2012	276	MB TRANSIT	MB	56.15850	1.87430
CEND 8/12	09/05/2012	277	FUL61	HC	56.16008	1.89078
CEND 8/12	09/05/2012	278	MB TRANSIT	MB	56.15400	1.92700
CEND 8/12	09/05/2012	278	MB TRANSIT	MB	56.15800	1.89900
CEND 8/12	09/05/2012	279	FUL07	HC	56.15496	1.92454
CEND 8/12	09/05/2012	280	FUL07	CS	56.15458	1.92395
CEND 8/12	09/05/2012	280	FUL07	CS	56.15388	1.92309
CEND 8/12	09/05/2012	281	MB TRANSIT	MB	56.14300	1.87800
CEND 8/12	09/05/2012	281	MB TRANSIT	MB	56.15300	1.92200
CEND 8/12	09/05/2012	282	FUL58	HC	56.14338	1.87696
CEND 8/12	09/05/2012	283	MB TRANSIT	MB	56.14100	1.84500
CEND 8/12	09/05/2012	283	MB TRANSIT	MB	56.14300	1.87400
CEND 8/12	09/05/2012	284	FUL57	HC	56.14149	1.84511
CEND 8/12	10/05/2012	285	MB TRANSIT	MB	56.12700	1.86500
CEND 8/12	10/05/2012	285	MB TRANSIT	MB	56.14000	1.84700
CEND 8/12	10/05/2012	286	FUL55	HC	56.12734	1.86545
CEND 8/12	10/05/2012	287	FUL55	CS	56.12746	1.86529
CEND 8/12	10/05/2012	287	FUL55	CS	56.12669	1.86524
CEND 8/12	10/05/2012	288	MB TRANSIT	MB	56.10900	1.85100
CEND 8/12	10/05/2012	288	MB TRANSIT	MB	56.12300	1.86300

Cruise code	Date	Station No.	Station code	Gear	Latitude	Longitude
CEND 8/12	10/05/2012	289	FUL54	HC	56.11032	1.85205
CEND 8/12	10/05/2012	290	MB TRANSIT	MB	56.09600	1.87100
CEND 8/12	10/05/2012	290	MB TRANSIT	MB	56.10900	1.85400
CEND 8/12	10/05/2012	291	FUL53	HC	56.09546	1.87132
CEND 8/12	10/05/2012	292	FUL53	CS	56.09577	1.87081
CEND 8/12	10/05/2012	292	FUL53	CS	56.09600	1.87227
CEND 8/12	10/05/2012	293	MB TRANSIT	MB	56.09000	1.87800
CEND 8/12	10/05/2012	293	MB TRANSIT	MB	56.09500	1.87300
CEND 8/12	10/05/2012	294	FUL01	HC	56.09188	1.87624
CEND 8/12	10/05/2012	295	MB TRANSIT	MB	56.09300	1.84000
CEND 8/12	10/05/2012	295	MB TRANSIT	MB	56.09200	1.87300
CEND 8/12	10/05/2012	296	FUL52	HC	56.09365	1.83959

5.6 Daily Progress Report

**DAILY LOG
STATUS REPORT
Markhams Triangle rMCZ
RV Cefas Endeavour – JNCC – DPR No. 8 – Saturday 6th May 2012**

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 8/12 Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No. 8 Date: 06/05/12	Location at 24:00: Fulmar rMCZ

To Company:	Person:	E-mail:
Cefas		
Cefas		
JNCC		
JNCC		
JNCC		
JNCC		
JNCC		

Safety

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

Summary of operations 0000-2400

Time UTC (start)	Time UTC (end)	Type	Comments
00:00	05:00	Transit	Transit to Fulmar rMCZ
05:00	12:00	MB Survey	MB Line diagonally up the rMCZ to first sampling station
12:00	24:00	GT Survey	At 21:00 the side gantry winch cut out. It was rebooted and the grab was recovered without any problems. No further grab sampling was carried out until the engineers had investigated the problem further. A combination of MB and video survey was carried out for the remainder of 06/05/12.

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)	Remarks
Mob/Demob			
Offshore Calibrations		02:49	
Total Operation Survey (TOSu)	07:00	87:15	
Total Operation Sampling (TOSa)	12:00	67:30	
Equipment/Downtime		02:45	
Ship/Plant Downtime			
Waiting On Weather			
Transit	05:00	28:50	
Standby Port			
Others			
Total:	24:00	179:09	

DAILY SLOG STATUS REPORT

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
EM2040	72	822		
Acoustic: Sidescan Sonar				
Gear type				

Overall Progress Groundtruthing Samples

Action	HC	CS			Remarks
Groundtruthing	8	6			

Weather forecast for the next 24 hours

Wind: W variable 3 or 4, becoming SE 5 or 6 later.
Sea State: Slight/Moderate.

Planned operation for the next 24 hours (00:00 to 24:00 on 6th May 2012)

Continue survey at Fulmar rMCZ.

Agreed Changes to Scope/Survey operation priorities

--

CEFAS/JNCC Comments

--

CEFAS SIC... [REDACTED]

JNCC Rep:

**DAILY LOG
STATUS REPORT
Markhams Triangle rMCZ
RV Cefas Endeavour – JNCC – DPR No. 9 – Saturday 7th May 2012**

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 8/12 Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No. 8 Date: 07/05/12	Location at 24:00: Fulmar rMCZ

To Company:	Person:	E-mail:
Cefas		
Cefas		
JNCC		
JNCC		
JNCC		
JNCC		
JNCC		

Safety

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

Summary of operations 0000-2400

Time UTC (start)	Time UTC (end)	Type	Comments
00:00	24:00	MB+GT Survey	CS and MB only carried out until side gantry winch had been fixed (10:30) after which HC could recommence.

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)	Remarks
Mob/Demob			
Offshore Calibrations		02:49	
Total Operation Survey (TOSu)	08:30	87:15	
Total Operation Sampling (TOSa)	15:30	67:30	
Equipment/Downtime		02:45	
Ship/Plant Downtime			
Waiting On Weather			
Transit		28:50	
Standby Port			
Others			
Total:	24:00	179:09	

DAILY SLOG STATUS REPORT

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
EM2040	167	989		
Acoustic: Sidescan Sonar				
Gear type				

Overall Progress Groundtruthing Samples

Action	HC	CS			Remarks
Groundtruthing	11	5			

Weather forecast for the next 24 hours

Wind: SE 5 or 7, veering S 4 or 5.
Sea State: Moderate/Rough

Planned operation for the next 24 hours (00:00 to 24:00 on 7th May 2012)

Continue survey at Fulmar rMCZ.

Agreed Changes to Scope/Survey operation priorities

--

CEFAS/JNCC Comments

--

CEFAS SIC. [REDACTED]

JNCC Rep:

**DAILY LOG
STATUS REPORT
Markhams Triangle rMCZ
RV Cefas Endeavour – JNCC – DPR No. 10 – Saturday 8th May 2012**

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 8/12 Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No. 10 Date: 08/05/12	Location at 24:00: Fulmar rMCZ

To Company:	Person:	E-mail:
Cefas		
Cefas		
JNCC		
JNCC		
JNCC		
JNCC		
JNCC		

Safety

	Today	To Date
Accidents/Incidents		
Near Misses		
Safety Drills/Induction		2
Additional comments:		

Summary of operations 0000-2400

Time UTC (start)	Time UTC (end)	Type	Comments
00:00	02:30	MB+GT Survey	
02:30	05:00	Weather Downtime	Sea state too rough for grabbing and acquisition of useable MB data.
05:00	24:00	MB+GT Survey	

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)	Remarks
Mob/Demob			
Offshore Calibrations		02:49	
Total Operation Survey (TOSu)	10:00	97:15	
Total Operation Sampling (TOSa)	11:30	79:00	
Equipment/Downtime		02:45	
Ship/Plant Downtime			
Waiting On Weather	02:30	02:30	
Transit		28:50	
Standby Port			
Others			
Total:	24:00	203:09	

DAILY SLOG STATUS REPORT

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
EM2040	146	1135		
Acoustic: Sidescan Sonar				
Gear type				

Overall Progress Groundtruthing Samples

Action	HC	CS			Remarks
Groundtruthing	19	4			

Weather forecast for the next 24 hours

Wind: South 4 or 5, becoming variable 3 or 4.
Sea State: Slight, occasionally moderate at first.

Planned operation for the next 24 hours (00:00 to 24:00 on 8th May 2012)

Finish survey at Fulmar rMCZ.

Agreed Changes to Scope/Survey operation priorities

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CEFAS/JNCC Comments

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CEFAS SIC... [REDACTED]

JNCC Rep:

**DAILY LOG
STATUS REPORT
Markhams Triangle rMCZ
RV Cefas Endeavour – JNCC – DPR No. 12 – Saturday 10th May 2012**

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 8/12 Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No. 12 Date: 10/05/12	Location at 24:00: Souter Point (54 59.707N, 1 16.800W)

To Company:	Person:	E-mail:
Cefas		
Cefas		
JNCC		
JNCC		
JNCC		
JNCC		
JNCC		

Safety

	Today	To Date
Accidents/Incidents		
Near Misses		
Safety Drills/Induction		2
Additional comments:		

Summary of operations 0000-2400

Time UTC (start)	Time UTC (end)	Type	Comments
00:00	03:00	GT and MB Survey	
03:00	11:30	Transit	
11:30	16:00	DC at Barmades Bank	
16:00	20:00	Transit	
20:00	24:00	MB and SS Survey at Souter Point	

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)	Remarks
Mob/Demob			
Offshore Calibrations		02:49	
Total Operation Survey (TOSu)	05:30	102:45	
Total Operation Sampling (TOSa)	6:00	85:00	
Equipment/Downtime		02:45	
Ship/Plant Downtime			
Waiting On Weather		02:30	
Transit	12:30	41:20	
Standby Port			
Others			
Total:	24:00	251:09	

DAILY SLOG STATUS REPORT

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
EM2040	21	1287		
Acoustic: Sidescan Sonar				
Edgetech 4200	11	11		

Overall Progress Groundtruthing Samples

Action	HC	CS	DC	Remarks
Groundtruthing	5	2	5	

Weather forecast for the next 24 hours

Wind: Cyclonic becoming NW, 5 to 7.
Sea State: Moderate to Rough

Planned operation for the next 24 hours (00:00 to 24:00 on 10th May 2012)

Finish Fulmar rMCZ survey. Transit to Barmades Bank for DC stations. Transit to Souther Point disposal site to carry out high resolution SS and MB of the capped area during deteriorating weather conditions offshore.

Agreed Changes to Scope/Survey operation priorities

CEFAS/JNCC Comments

CEFAS SIC. [REDACTED]

JNCC Rep:

About us

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

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

We have a long and successful track record in delivering high-quality services to clients in a confidential and impartial manner.

(www.cefas.defra.gov.uk)

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

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

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

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