Final Report (Project Code): C5650

Compass Rose rMCZ 2012 Survey Report

Authors: Paul Whomersley and Sue Ware

Issue date: January 2016
Publication Date: January 2023

Compass Rose rMCZ Survey Report

Authors: Paul Whomersley and Sue Ware

Issue date: January 2016
(Published January 2023)

This report should be cited:
Whomersley, P. & Ware, S. 2023. Compass Rose rMCZ Survey Report. [Contracted] Report by Cefas for Defra and JNCC (Project Code: C5650).

Head office

Centre for Environment, Fisheries & Aquaculture Science

Pakefield Road, Lowestoft, Suffolk NR33 0HT, UK

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

www.cefas.defra.gov.uk

Cefas is an executive agency of Defra

Table of contents

1 Background and Introduction

1.1 Survey Project Team

The Compass Rose rMCZ survey was carried out during 2nd – 4th March 2012 on the RV *CEFAS Endeavour* cruise CEND 04/12. The survey team for the duration of the fieldwork included Cefas marine ecologists, marine surveyors, marine modellers and GIS specialists along with MPA specialistsfrom the JNCC.

1.2 Site Description

The Compass Rose rMCZ is located in the North Sea approximately 43 km off the north Yorkshire coast (Figure 1).

(For a detailed site description see Final recommendations for Marine Conservation Net Gain 2011)

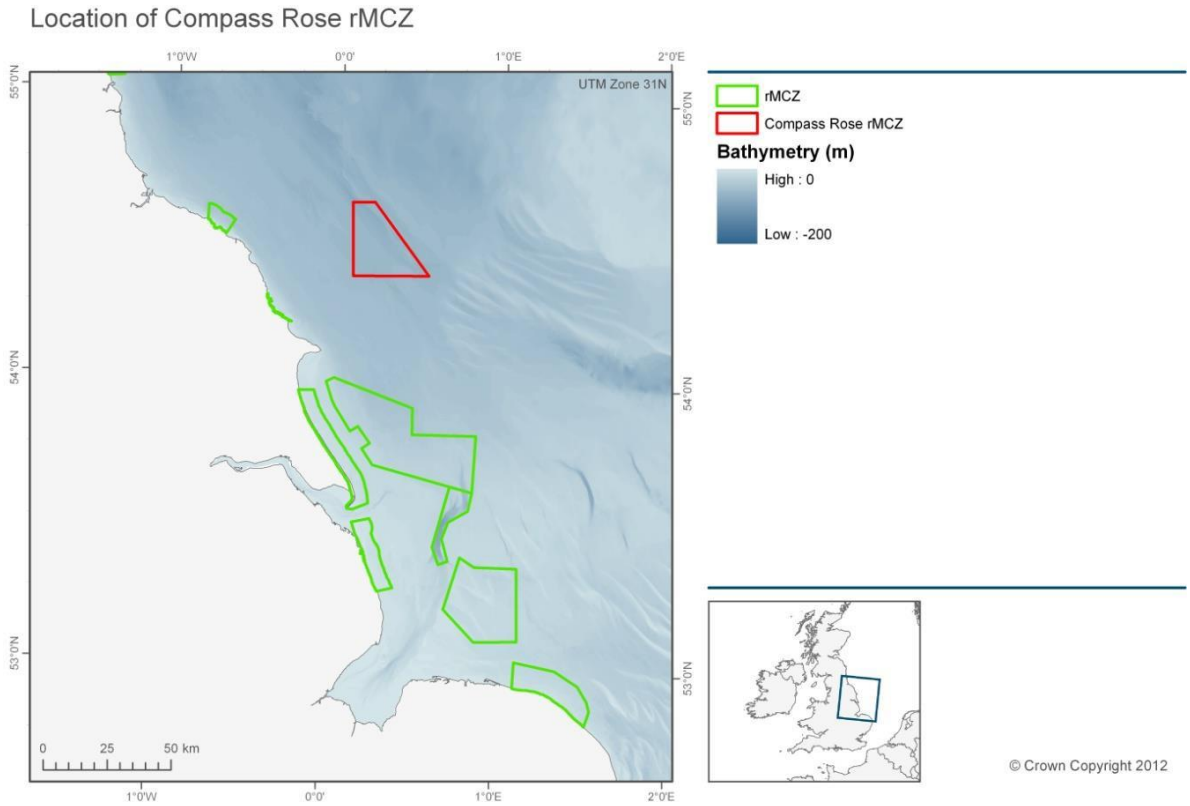


Figure 1. Location of the Compass Rose rMCZ [Bathymetry is from the Defra Digital Elevation Model (Astrium, 2011)].

1.3 Geological and Biological Context

A number of broadscale habitat features and Features of Conservation Interest (FOCI) have been proposed by the regional project for designation within the rMCZ (Table 1).

Table 1. Features proposed for designation within Compass Rose rMCZ.

Feature Type	Feature Name
Broad Scale Habitat (BSH)	A4.2 Moderate energy circalittoral rock A5.2 Subtidal sand
Features of Conservation Interest (FOCI)	
Habitats	Subtidal sands and gravels (modelled)*
Species	N/A
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.***

No additional features had been identified or proposed for designation within the Compass Rose rMCZ.

1.4 Existing data and information utilised to inform survey planning

The broadscale habitat map presented in the SAD was used in the planning of the ground-truthing survey carried out at this site.

2 Survey Design and Methods

2.1 Survey planning and design

Selection and positioning of groundtruthing stations was informed by the predicted broadscale habitats derived from the Site Assessment Document (SAD) habitat map. Stations were positioned within the sedimentary habitats using a triangular lattice grid overlaid on the predictive habitat map. Stations within the predicted classes 'moderate energy circalittoral rock' (A4.2) and 'subtidal sand sediments' were at a grid spacing of 3.5 km. 'Intelligent' station codes were constructed, each with 3 elements; CR indicating the Compass Rose site followed by a letter indicating the predicted substrate type for that location according to the SAR (R for rock, C for coarse sediment, S for sand), then a sequential number (e.g. CR_R_5, CR_S_21).

Within the predicted sedimentary habitats, the selection of stations where the camera gear 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 stations 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 m^2 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 1mm sieve. The retained >1mm fraction was transferred to a labelled container and preserved in 4% buffered formaldehydefor later analysis ashore.

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. Thecamera 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 recorded 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.

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

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

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

2.2.2 Circalittoral Rock Broadscale Habitats and Mixed sediments

A drop-camera system was available for sampling stations where a hard substrate was predicted by the SAD or observed in the acoustic survey. The system specification was similar to that used on thecamera sledge (as described above) but mounted in a rectangular drop-frame (Figure. 4) and deployed from the side gantry, amidships. Deployments lasted a minimum of 10 minutes, with the vessel executing a controlled drift at ~ 0.5 knots (~0.25 ms^{-1}) across a 50 m 'bullring' centred on the sampling station. Stills images were captured at regular one-minute intervals and opportunistically ifspecific features of interest were encountered. The height of the camera off the seabed was controlled by a winch operator with sight of the video monitor.

Figure. 4 Drop camera frame fitted with video and still imaging system

3 Survey Narrative

Survey work commenced at the Compass Rose rMCZ on 03/03/12 at 06:00. A CTD was deployed to obtain the sound velocity profile (SVP) for calibration of the multibeam. A multibeam acoustic surveythen commenced on the western side of the rMCZ and continued until 19:00 03/03/12.

Hamon grab sampling began in the north-west of the site within the predicted sublittoral sand BSH. Several positions in the north of the site had to be adjusted due to the presence of an exposed pipelinewhich had a 1 km exclusion zone around it. Several stations (CR_R_18, 20 and 21) in the predicted moderate energy circalittoral rock BSH (A4.2) were sampled and revealed the sediments to consist ofmuddy sand (BSH classification: Sand, A5.2).

Multibeam bathymetry and backscatter data were collected during transits between stations. Imagesof the seabed observed during the deployment of the HamCam guided the positioning of camera deployments. If the area was homogenous then camera deployments were carried out every third station to ensure an adequate density and spatial coverage of video footage (and still images) across the rMCZ.

A small area of subtidal sands and gravels BSH described in the SAD habitat map in the south of the site was targeted using the HamCam. Sampling at these stations revealed the sediments to also be muddy sand with an increased broken shell fraction.

Sediments across the site were consistently found to be rippled sand with shell fragments. Some cobbles colonised by *Alcyonium digitatum* were observed at several sites classified as sand.

4 Preliminary Results

4.1 Acoustic Survey

The multibeam data acquired opportunistically during transit between stations was processed for bathymetry and backscatter (Figure 5). Additional north-south survey lines were also collected andprocessed as no further acoustic survey work is currently planned at this site.

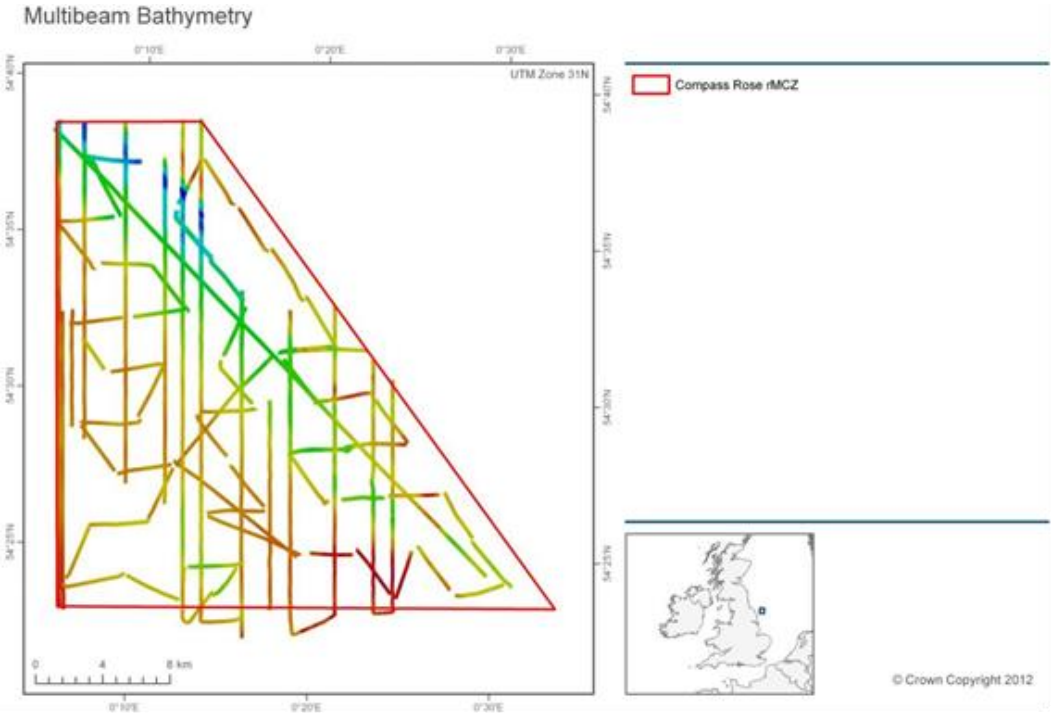


Figure 5. Multibeam bathymetry acquired during CEND 04/12 overlain on Compass Rose rMCZ.

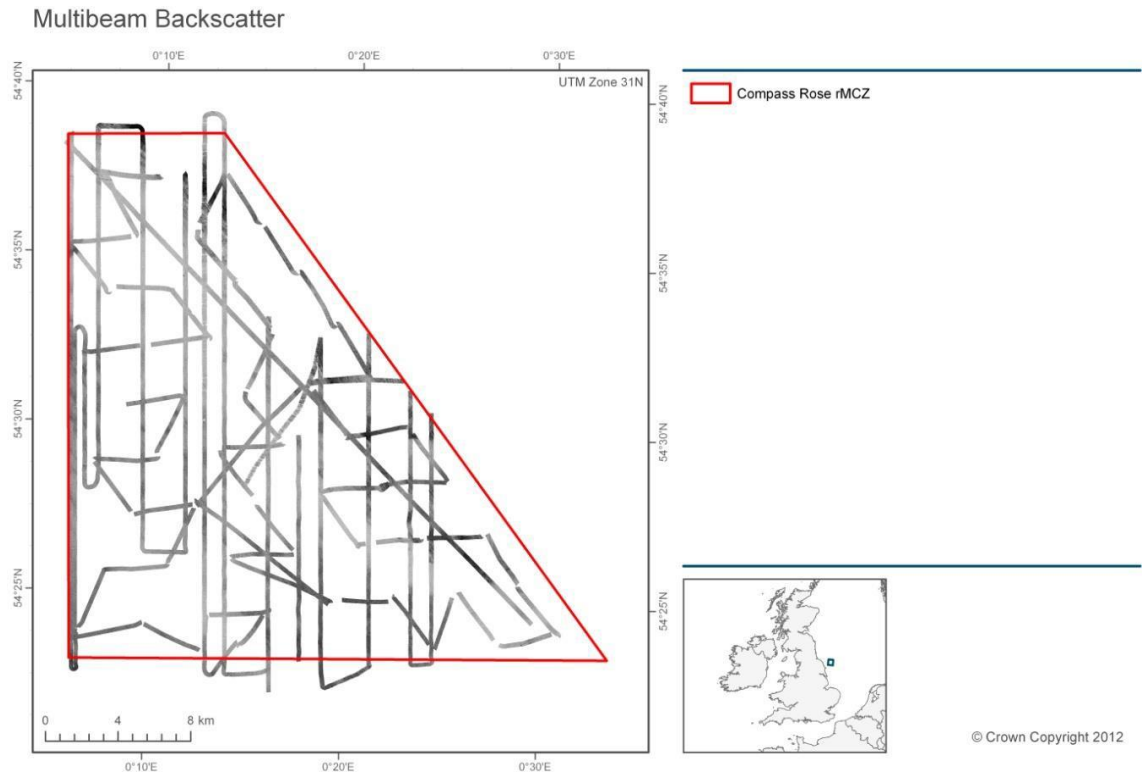
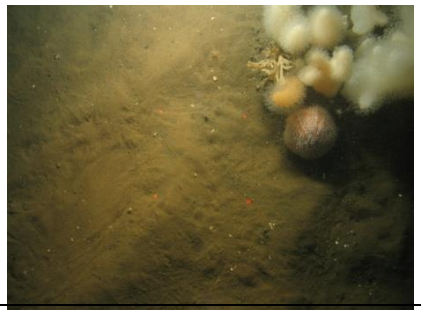
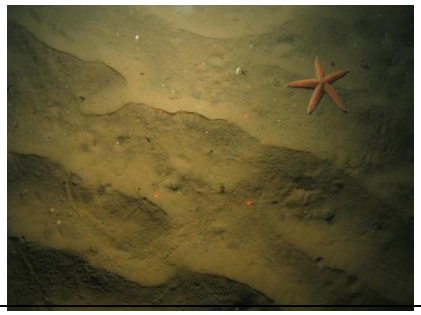
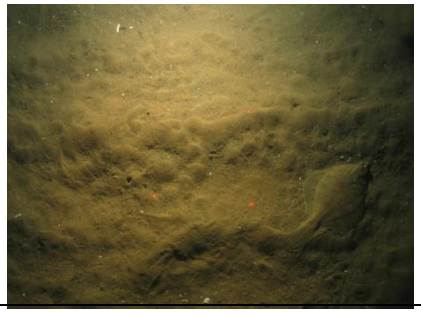
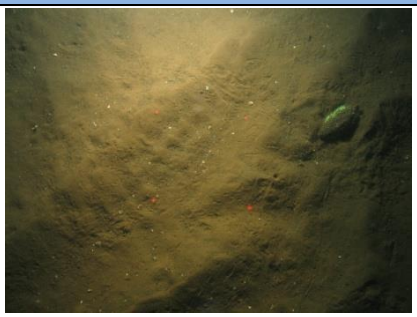
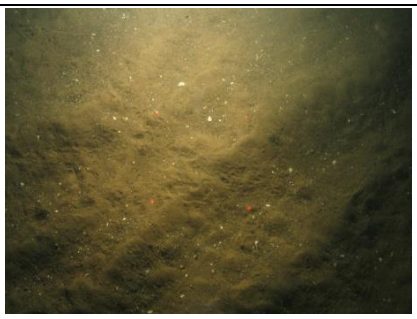
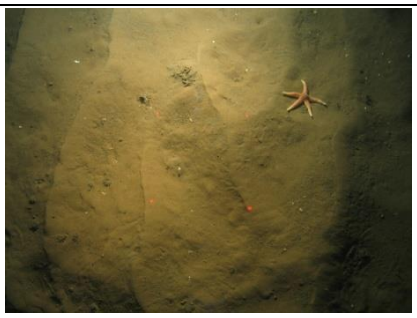
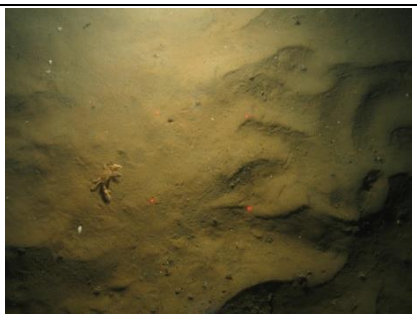


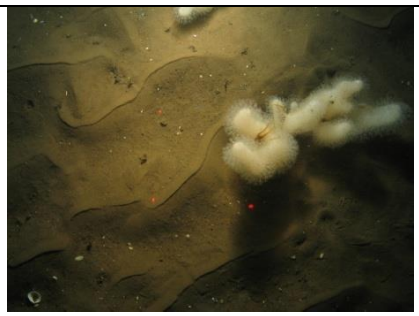
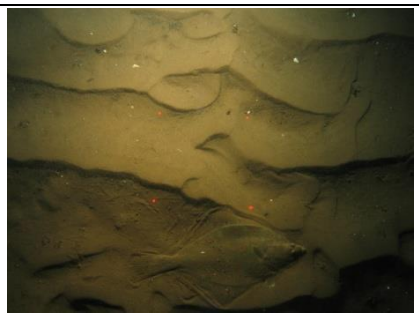
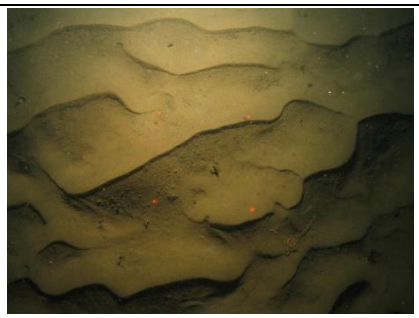
Figure 6. Multibeam bathymetry collected during CEND 04/12 overlain on Compass Rose rMCZ.

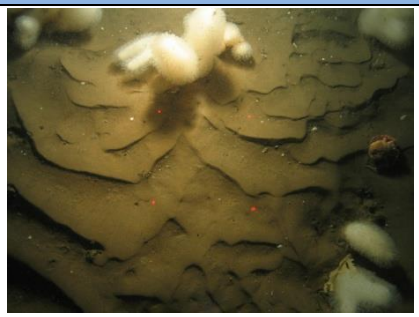
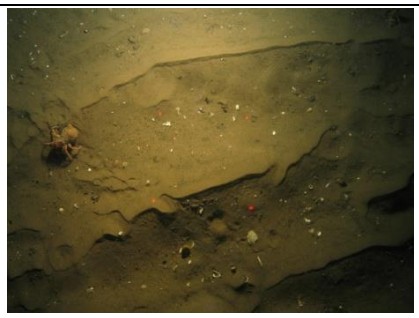
4.2 Seabed Imagery

Table 2. Preliminary summary of the seabed substrate and epifaunal communities observed in video and stills images.

Stn Code	BSH Habitat/Faunal Summary	Still Image
CR_S_29	Muddy fine sand *Pecten maximus, Alcyonium digitatum, Pagurus* sp.	
CR_S_25	Muddy fine sand with some broken shell *Pleuronectes platessa, Alcyonium digitatum, Astropecten irregularis, Echinus esculentus, Flustra foliacea*	
CR_S_19	Muddy fine sand with some broken shell *Pagurus sp, Asterias rubens, Alcyonium digitatum, Luidia sarsi*	
CR_R_18	Muddy fine sand with some broken shell *Pagurus sp, Pleuronectes platessa, Astropecten irregularis, Alcyonium digitatum*	
CR_S_13	Muddy fine sand with some broken shell and pebble *Alcyonium digitatum, Astropecten irregularis, Callionymus lyra*	

Stn Code	BSH Habitat/Faunal Summary	Still Image
CR_S_8	Muddy fine sand with some broken shell *Pleuronectes platessa, Aphrodite aculeata, Pagurus sp.*	
CR_S_2	Muddy fine sand with some broken shell and pebble *Pagurus sp, Asterias rubens*	
CR_S_05	Rippled sand with broken shell Paguridae sp, *Asterias rubens, Astropecten irregularis, Callionymus lyra, Alcyonium digitatum*	
CR_R_03	Rippled sand with broken shell Paguridae sp, *Asterias rubens, Callionymus lyra, Alcyonium digitatum*	
CR_C_02	Rippled sand *Asterias rubens, Alcyonium digitatum, Flustra foliacea, Liocarcinus sp*	

Stn Code	BSH Habitat/Faunal Summary	Still Image
CR_S_24	Rippled sand Paguridae sp, *Alcyonium digitatum*	
CR_S_19	Rippled sand *Flustra foliacea, Alcyonium digitatum*, *Ophiothrix fragilis*	
CR_S_12	Rippled sand with broken shell and cobble *Flustra foliacea, Alcyonium digitatum*, *Ophiothrix fragilis,, Halecium halecinum*	
CR_R_12	Rippled sand with shell fragments *Asterias rubens, Alcyonidium diaphanum, Alcyonium digitatum, Pleuronectes platessa*	
CR_S_04	Rippled sand with shell fragments *Callionymus lyra, Arnoglossus laterna, Pagurus sp, Ophiura ophiura*	

Stn Code	BSH Habitat/Faunal Summary	Still Image
CR_R_06	Rippled sand with shell fragments *Alcyonium digitatum, Alcyonidium diaphanum, Pagurus sp*	
CR_R_04	Rippled sand with shell fragments and occasional cobbles *Callionymus lyra, Pagurus sp, Alcyonidium diaphanum, Flustra foliacea, Asterias rubens*	
CR_R_10	Rippled sand with shell fragments *Asterias rubens, Limanda limanda, Astropecten irregularis, Flustra foliacea, Pagurus sp, Alcyonium digitatum*	
CR_R_19	Rippled sand with shell fragments with the occasional cobble Plumose anemone*, Trisopterus luscus, Ophiura ophiura*	

4.3 Grab samples and sediment types

Preliminary, on board, visual observations of the spatial distribution of sediment types (EUNIS Level 3) for each grab sample are summarised in Figure 7. It should be emphasised that this assignment of EUNIS classification is purely subjective and could change as a result of subsequent laboratory analysis and interpretation.

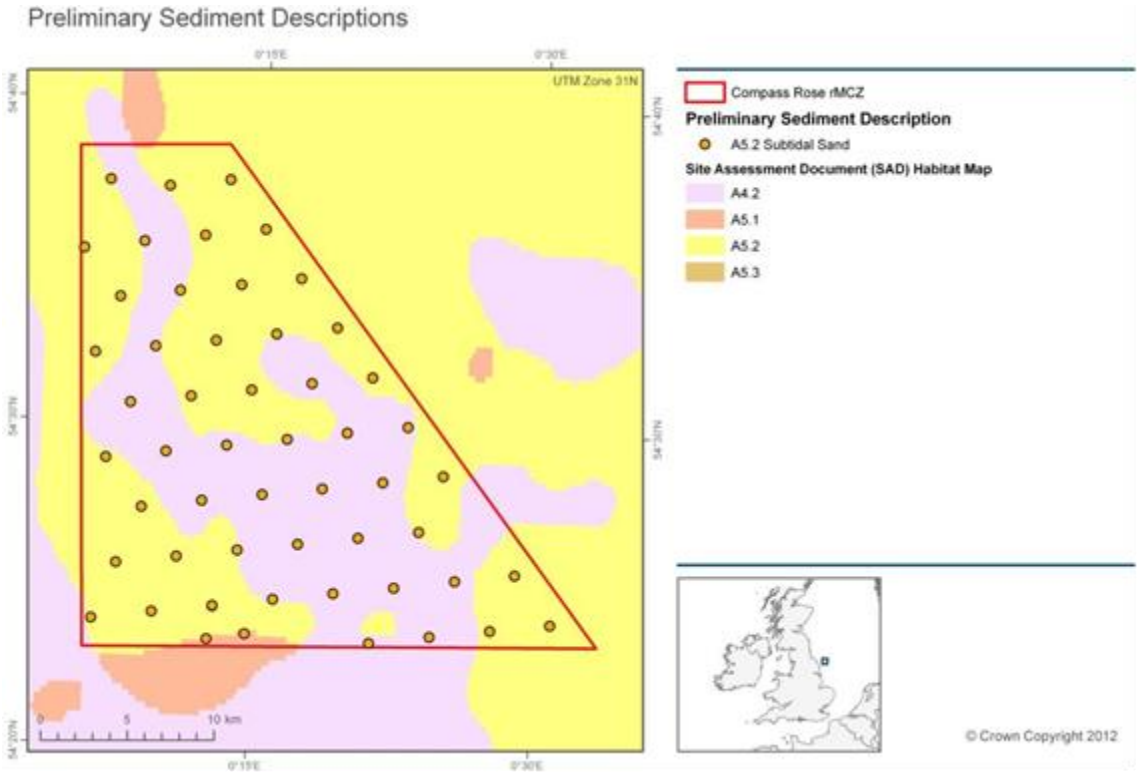


Figure 7. SAD habitat map overlaid with preliminary observations of sediment type, as determined by visual assessment of grab samples.

4.4 Preliminary observations of Features of Conservation Interest (FOCI)

No species FOCI were observed during the current survey (CEND 04/12) but maybe subsequently found when the samples are processed.

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 trawlwinches 2 x drum winches, (1 double) Double barrel survey winch with motion compensationand 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 hullboundary layer in addition to hull mounted transducers 1.2 m diameter sea tube/moon-pool
Acoustic equipment	Kongsberg Simrad: HiPAP 500 positioning sonar EK60, 38/120 kHz scientific sounder EA 600, 50/200 kHz scientific sounder Scanmar net mensuration system SH80 high frequency omni-directional sonar EM3002 swathe bathymetry sounder Hull mounted Scanmar fishing computer transducers
Boats	2 x 8m rigid work and rescue boats with suite ofnavigational equipment deployed on heave-compensated davits
Laboratories	8 networked laboratories designed for optimumflexibility of purpose 4 serviced deck locations for containerised laboratories
Special features	Dynamic positioning system Intering anti-roll system Local Area Network with scientific datamanagement 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 and Drop Camera

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 EM3002D
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 Compass Rose rMCZ survey on cruise CEND 04/12 are provided below. (NB. Stn No is a sequential event number for the cruise, so changes each time a new gear is used or a new location is sampled. Stn Code is used to identify the location of the sampling station. CTD = Conductivity temperature & depth profiler. MB= multibeam. HC = HamCam. CS = Camera Sledge. DC = Drop Camera.

Cruise	Date	Stn No.	Stn Code	Gear	Latitude	Longitude
CEND 04/12	03/03/2012	1	CTD1	CTD	54.40375	0.50069
CEND 04/12	03/03/2012	2	MB Transit	MB	56.67801	0.08104
CEND 04/12	03/03/2012	2	MB Transit	MB	54.40768	0.49339
CEND 04/12	03/03/2012	3	CRMB1	MB	54.38299	0.10398
CEND 04/12	03/03/2012	3	CRMB1	MB	54.64248	0.08600
CEND 04/12	03/03/2012	3	CRMB1	MB	54.38172	0.10717
CEND 04/12	03/03/2012	3	CRMB1	MB	54.54120	0.09578
CEND 04/12	03/03/2012	4	CRMB2	MB	54.47417	0.10897
CEND 04/12	03/03/2012	4	CRMB2	MB	54.54159	0.10504
CEND 04/12	03/03/2012	5	CRMB3	MB	54.64210	0.10877
CEND 04/12	03/03/2012	5	CRMB3	MB	54.47335	0.12020
CEND 04/12	03/03/2012	6	CRMB4	MB	54.44867	0.16017
CEND 04/12	03/03/2012	6	CRMB4	MB	54.64337	0.14661
CEND 04/12	03/03/2012	7	CRMB5	MB	54.61780	0.18497
CEND 04/12	03/03/2012	7	CRMB5	MB	54.44600	0.19600
CEND 04/12	03/03/2012	8	CR_S_29	HC	54.62213	0.16421
CEND 04/12	03/03/2012	8	CR_S_29	HC	54.62213	0.16421
CEND 04/12	03/03/2012	9	CR_S_29	CS	54.62342	0.16402
CEND 04/12	03/03/2012	9	CR_S_29	CS	54.62352	0.16391
CEND 04/12	03/03/2012	10	CR_S_28	HC	54.62435	0.11108
CEND 04/12	03/03/2012	11	CR_R_22	HC	54.59305	0.14356
CEND 04/12	03/03/2012	12	CR_R_22 to CR_S_25	MB	54.58819	0.89200
CEND 04/12	03/03/2012	12	CR_R_22 to CR_S_25	MB	54.59208	0.13870
CEND 04/12	03/03/2012	13	CR_S_25	HC	54.58871	0.09010
CEND 04/12	04/03/2012	14	CR_S_25	CS	54.58973	0.09122
CEND 04/12	04/03/2012	14	CR_S_25	CS	54.58892	0.09047
CEND 04/12	04/03/2012	15	CR_S_25to CR_S_22	MB	54.56400	0.12380
CEND 04/12	04/03/2012	15	CR_S_25to CR_S_22	MB	54.58720	0.08898
CEND 04/12	04/03/2012	16	CR_S_22	HC	54.56414	0.12383
CEND 04/12	04/03/2012	17	CR_S_22 TO CR_R_21	MB	54.56745	0.17180
CEND 04/12	04/03/2012	17	CR_S_22 TO CR_R_21	MB	54.56710	0.12995
CEND 04/12	04/03/2012	18	CR_R_21	HC	54.56829	0.17685
CEND 04/12	04/03/2012	19	CR_R_21 TO CR_S_18	MB	54.54326	0.21096
CEND 04/12	04/03/2012	19	CR_R_21 TO CR_S_18	MB	54.56690	0.17687
CEND 04/12	04/03/2012	20	CR_S_19	HC	54.54322	0.21053
CEND 04/12	04/03/2012	21	CR_S_19	CS	54.54251	0.21204
CEND 04/12	04/03/2012	21	CR_S_19	CS	54.54308	0.21093
CEND 04/12	04/03/2012	22	CR_S_19 TO CR_R_20	MB	54.53904	0.16005
CEND 04/12	04/03/2012	22	CR_S_19 TO CR_R_20	MB	54.54396	0.20882
CEND 04/12	03/03/2012	23	CR_S_29 to CR_S_28a	MB	54.37000	0.06670
CEND 04/12	03/03/2012	23	CR_S_29 to CR_S_28a	MB	54.37340	0.09840
CEND 04/12	03/03/2012	24	CR_S_28a- CR_R_22a	MB	54.35550	0.08830
CEND 04/12	03/03/2012	24	CR_S_28a- CR_R_22a	MB	54.37380	0.06760
CEND 04/12	04/03/2012	25	CR_R_20	HC	54.53918	0.15681
CEND 04/12	04/03/2012	26	CR_R_20 TO CR_S_18	MB	54.53366	0.10302
CEND 04/12	04/03/2012	26	CR_R_20 TO CR_S_18	MB	54.53861	0.15184
CEND 04/12	04/03/2012	27	CR_S_18	HC	54.53512	0.10343

Cruise	Date	Stn No.	Stn Code	Gear	Latitude	Longitude
CEND 04/12	04/03/2012	28	CR_S_18 TO CR_R_18	MB	54.51000	0.13640
CEND 04/12	04/03/2012	28	CR_S_18 TO CR_R_18	MB	54.52660	0.11510
CEND 04/12	04/03/2012	29	CR_R_18	HC	54.50989	0.13646
CEND 04/12	04/03/2012	30	CR_R_18	CS	54.51167	0.13486
CEND 04/12	04/03/2012	30	CR_R_18	CS	54.51091	0.13556
CEND 04/12	04/03/2012	31	CR_R_18 to CR_S_15	MB	54.51424	0.18959
CEND 04/12	04/03/2012	31	CR_R_18 to CR_S_15	MB	54.50934	0.14298
CEND 04/12	04/03/2012	32	CR_S_15	HC	54.51420	0.19015
CEND 04/12	04/03/2012	33	CR_S_15 to CR_R_14	MB	54.48614	0.16967
CEND 04/12	04/03/2012	33	CR_S_15 to CR_R_14	MB	54.51383	0.19054
CEND 04/12	04/03/2012	34	CR_R_14	HC	54.48519	0.16969
CEND 04/12	04/03/2012	35	CR_R_14 to CR_S_13	MB	54.44817	0.11678
CEND 04/12	04/03/2012	35	CR_R_14 to CR_S_13	MB	54.48485	0.17049
CEND 04/12	04/03/2012	36	CR_S_13	HC	54.48104	0.11621
CEND 04/12	04/03/2012	37	CR_S_13	CS	54.48245	0.11581
CEND 04/12	04/03/2012	37	CR_S_13	CS	54.48161	0.11617
CEND 04/12	04/03/2012	38	CR_S_13-CR_S_11	MB	4.45665	0.14981
CEND 04/12	04/03/2012	38	CR_S_13-CR_S_11	MB	54.48037	0.11688
CEND 04/12	04/03/2012	39	CR_S_11	HC	54.45621	0.14977
CEND 04/12	04/03/2012	40	CR_S_11-CR_R_10	MB	54.46117	0.20155
CEND 04/12	04/03/2012	40	CR_S_11-CR_R_10	MB	54.45509	0.15217
CEND 04/12	04/03/2012	41	CR_R_10	HC	54.46052	0.20305
CEND 04/12	04/03/2012	42	CR_R_10-CR_S_08	MB	54.32182	0.18274
CEND 04/12	04/03/2012	42	CR_R_10-CR_S_08	MB	54.45966	0.20303
CEND 04/12	04/03/2012	43	CR_S_08	HC	54.43132	0.18246
CEND 04/12	04/03/2012	44	CR_S_08	CS	54.43264	0.18285
CEND 04/12	04/03/2012	44	CR_S_08	CS	54.43183	0.18271
CEND 04/12	04/03/2012	45	CR_S_8 TO CR_S_06	MB	54.42713	0.12858
CEND 04/12	04/03/2012	45	CR_S_8 TO CR_S_06	MB	54.43141	0.18260
CEND 04/12	04/03/2012	46	CR_S_06	HC	54.42714	0.12894
CEND 04/12	04/03/2012	47	CR_S_06 TO CR_S_01	MB	54.39807	0.10888
CEND 04/12	04/03/2012	47	CR_S_06 TO CR_S_01	MB	54.42760	0.12910
CEND 04/12	04/03/2012	48	CR_S_01	HC	54.39806	0.10883
CEND 04/12	04/04/2012	49	CR_S_1	CS	54.39951	0.10939
CEND 04/12	04/04/2012	49	CR_S_1	CS	54.39860	0.10917
CEND 04/12	04/03/2012	50	CR_S_01 TO CR_S_03	MB	54.40204	0.16227
CEND 04/12	04/03/2012	50	CR_S_01 TO CR_S_03	MB	54.39621	0.10775
CEND 04/12	04/03/2012	51	CR_S_3	HC	54.40239	0.16224
CEND 04/12	04/03/2012	52	CR_S_08 TO CR_C_01	MB	54.38944	0.21199
CEND 04/12	04/03/2012	52	CR_S_08 TO CR_C_01	MB	54.40131	0.16422
CEND 04/12	04/03/2012	53	CR_C_01	HC	54.38927	0.21185
CEND 04/12	04/03/2012	54	CR_C_01 TO CR_S_5	MB	54.40626	0.21639
CEND 04/12	04/03/2012	54	CR_C_01 TO CR_S_5	MB	54.30129	0.21520
CEND 04/12	04/03/2012	56	CR_S_05	HC	54.40641	0.21591
CEND 04/12	04/03/2012	57	CR_S_05	CS	54.40676	0.21630
CEND 04/12	04/03/2012	57	CR_S_05	CS	54.40612	0.21526
CEND 04/12	04/03/2012	59	CR_S_05 to CR_R_03	MB	54.41958	0.26952
CEND 04/12	04/03/2012	59	CR_S_05 to CR_R_03	MB	54.40690	0.21863
CEND 04/12	04/03/2012	60	CR_R_03	HC	54.41096	0.26944
CEND 04/12	04/03/2012	61	CR_R_03	CS	54.41093	0.27081
CEND 04/12	04/03/2012	61	CR_R_03	CS	54.41078	0.26931
CEND 04/12	04/03/2012	62	CR_R_03 to CR_C_02	MB	54.39207	0.24560
CEND 04/12	04/03/2012	62	CR_R_03 to CR_C_02	MB	54.40839	0.26542
CEND 04/12	04/03/2012	63	CR_C_02	HC	54.39270	0.24550
CEND 04/12	04/03/2012	64	CR_C_02	CS	54.39139	0.24592
CEND 04/12	04/03/2012	64	CR_C_02	CS	54.39246	0.24533

Cruise	Date	Stn No.	Stn Code	Gear	Latitude	Longitude
CEND 04/12	04/03/2012	65	CR_C_02 to CRMB_7350	MB	54.38660	0.21708
CEND 04/12	04/03/2012	65	CR_C_02 to CRMB_7350	MB	54.39389	0.24467
CEND 04/12	04/03/2012	66	CRMB7350	MB	54.64584	0.19917
CEND 04/12	04/03/2012	66	CRMB7350	MB	54.38660	0.21708
CEND 04/12	04/03/2012	67	CRMB_8450	MB	54.38375	0.23398
CEND 04/12	04/03/2012	67	CRMB_8450	MB	54.64569	0.21627
CEND 04/12	05/03/2012	69	CRMB 10850	MB	54.98448	0.27121
CEND 04/12	05/03/2012	69	CRMB 10850	MB	54.55535	0.26015
CEND 04/12	05/03/2012	70	CRMB 12550	MB	54.38576	0.29680
CEND 04/12	05/03/2012	70	CRMB 12550	MB	54.49755	0.28950
CEND 04/12	05/03/2012	71	CRMB-13750	MB	54.38544	0.31558
CEND 04/12	05/03/2012	71	CRMB-13750	MB	54.54566	0.30405
CEND 04/12	05/03/2012	72	CRMB-16400	MB	54.38401	0.35629
CEND 04/12	05/03/2012	72	CRMB-16400	MB	54.54913	0.34598
CEND 04/12	05/05/2012	73	CR_R_01	HC	54.39012	0.35596
CEND 04/12	05/03/2012	74	CR_R_04	HC	54.41508	0.32283
CEND 04/12	05/03/2012	75	CR_R_04 to CR_S_09	MB	54.43573	0.23635
CEND 04/12	05/03/2012	75	CR_R_04 to CR_S_09	MB	54.41516	0.32237
CEND 04/12	05/03/2012	76	CR_S_09	HC	54.43565	0.23628
CEND 04/12	05/03/2012	77	CR_S_09 to CR_R_7	MB	54.43847	0.28916
CEND 04/12	05/03/2012	77	CR_S_09 to CR_R_7	MB	54.43592	0.23596
CEND 04/12	05/03/2012	78	CR_R_07	HC	54.43977	0.28981
CEND 04/12	05/03/2012	78	CR_R_07	HC	54.43975	0.28980
CEND 04/12	05/03/2012	79	CR_R_07 to CR_R_11	MB	54.46216	0.25626
CEND 04/12	05/03/2012	79	CR_R_07 to CR_R_11	MB	54.44053	0.28840
CEND 04/12	05/03/2012	80	CR_R_11	HC	54.46467	0.25657
CEND 04/12	05/03/2012	81	CR_R_11 to CR_R_15	MB	54.48837	0.22307
CEND 04/12	05/03/2012	81	CR_R_11 to CR_R_15	MB	54.46668	0.25220
CEND 04/12	05/03/2012	82	CR_R_15	HC	54.48942	0.22336
CEND 04/12	05/03/2012	83	CR_R_15 to CR_S_14	MB	54.49276	0.27689
CEND 04/12	05/03/2012	83	CR_R_15 to CR_S_14	MB	54.49003	0.22526
CEND 04/12	05/03/2012	84	CR_S_14	HC	54.49356	0.27702
CEND 04/12	05/03/2012	85	CR_S_14-CR_S_16	MB	54.51784	0.24310
CEND 04/12	05/03/2012	85	CR_S_14-CR_S_16	MB	54.49541	0.27349
CEND 04/12	05/03/2012	86	CR_S_16	HC	54.51844	0.24381
CEND 04/12	06/03/2012	87	CR_S_16-CR_S_20	MB	54.54697	0.26391
CEND 04/12	06/03/2012	87	CR_S_16-CR_S_20	MB	54.51960	0.24476
CEND 04/12	06/03/2012	88	CR_S_20	HC	54.54768	0.26423
CEND 04/12	06/03/2012	89	CR_S_20-CR_S_23	MB	54.57217	0.23087
CEND 04/12	06/03/2012	89	CR_S_20-CR_S_23	MB	54.54944	0.26217
CEND 04/12	06/03/2012	90	CR_S_23	HC	54.57236	0.23120
CEND 04/12	06/03/2012	91	CR_S_23-CR_S_26	MB	54.59681	0.19743
CEND 04/12	06/03/2012	91	CR_S_23-CR_S_26	MB	54.57261	0.23038
CEND 04/12	06/03/2012	92	CR_S_26	HC	54.59725	0.19747
CEND 04/12	06/03/2012	92	CR_S_26	HC	54.59729	0.19741
CEND 04/12	06/03/2012	93	CR_S_26-CR_S_30	MB	54.62587	0.21796
CEND 04/12	06/03/2012	93	CR_S_26-CR_S_30	MB	54.60046	0.19868
CEND 04/12	06/03/2012	94	CR_S_30	HC	54.62633	0.21805
CEND 04/12	06/03/2012	95	CR_S_30	CTD	54.62634	0.21803
CEND 04/12	06/03/2012	96	CR_S_30-CR_S_27	MB	54.60146	0.24012
CEND 04/12	06/03/2012	96	CR_S_30-CR_S_27	MB	54.62505	0.21010
CEND 04/12	06/03/2012	97	CR_S_27	HC	54.60141	0.25114
CEND 04/12	06/03/2012	98	CR_S_27-CR_S_24	MB	54.57710	0.28332
CEND 04/12	06/03/2012	98	CR_S_27-CR_S_24	MB	54.60981	0.25368
CEND 04/12	06/03/2012	99	CR_S_24	HC	54.57664	0.28438
CEND 04/12	06/03/2012	100	CS_S_24	CS	54.57531	0.28433

Cruise	Date	Stn No.	Stn Code	Gear	Latitude	Longitude
CEND 04/12	06/03/2012	100	CS_S_24	CS	54.57621	0.28437
CEND 04/12	06/03/2012	101	CR_S_24-CR_S_21	MB	54.55212	0.31770
CEND 04/12	06/03/2012	101	CR_S_24-CR_S_21	MB	54.57786	0.28510
CEND 04/12	06/03/2012	102	CR_S_21	HC	54.55196	0.31802
CEND 04/12	06/03/2012	103	CR_S_21-CR_S_17	MB	54.52650	0.35070
CEND 04/12	06/03/2012	103	CR_S_21-CR_S_17	MB	54.55280	0.31830
CEND 04/12	06/03/2012	104	CR_S_17	HC	54.52694	0.35108
CEND 04/12	06/03/2012	105	CR_S_17-CR_R_19	MB	54.52288	0.29711
CEND 04/12	06/03/2012	105	CR_S_17-CR_R_19	MB	54.52756	0.34908
CEND 04/12	06/03/2012	106	CR_R_19	HC	54.52285	0.29719
CEND 04/12	06/03/2012	107	CR_R_19	CS	54.52357	0.29691
CEND 04/12	06/03/2012	107	CR_R_19	CS	54.52272	0.29722
CEND 04/12	06/03/2012	108	C_R_19-CR_R_16	MB	54.49826	0.33040
CEND 04/12	06/03/2012	108	C_R_19-CR_R_16	MB	54.52997	0.30046
CEND 04/12	06/03/2012	109	CR_R_16	HC	54.49800	0.33033
CEND 04/12	06/03/2012	110	CR_R_16-CR_R_17	MB	54.50339	0.38169
CEND 04/12	06/03/2012	110	CR_R_16-CR_R_17	MB	54.49708	0.33032
CEND 04/12	06/03/2012	111	CR_R_17	HC	54.50211	0.38402
CEND 04/12	06/03/2012	112	CR_R_17-CR_S_12	MB	54.47738	0.41759
CEND 04/12	06/03/2012	112	CR_R_17-CR_S_12	MB	54.50026	0.38620
CEND 04/12	06/03/2012	113	CR_S_12	HC	54.47724	0.41708
CEND 04/12	06/03/2012	114	CR_S_12	CS	54.47781	0.41640
CEND 04/12	06/03/2012	115	CR_S_12-CR_R_13	MB	54.47511	0.36568
CEND 04/12	06/03/2012	115	CR_S_12-CR_R_13	MB	54.47659	0.41513
CEND 04/12	06/03/2012	116	CR_R_13	HC	54.47310	0.36349
CEND 04/12	06/03/2012	117	CR_R_13-CR_R_12	MB	54.46877	0.30978
CEND 04/12	06/03/2012	117	CR_R_13-CR_R_12	MB	54.47270	0.36296
CEND 04/12	06/03/2012	118	CR_12_R	HC	54.46879	0.30992
CEND 04/12	06/03/2012	119	CR_R_12	CS	54.46973	0.30829
CEND 04/12	06/03/2012	119	CR_R_12	CS	54.46910	0.30934
CEND 04/12	06/03/2012	120	cr_r_12-cr_r_8	MB	54.44548	0.34425
CEND 04/12	06/03/2012	120	cr_r_12-cr_r_8	MB	54.46714	0.31229
CEND 04/12	06/03/2012	121	CR_R_08	HC	54.44402	0.34319
CEND 04/12	06/03/2012	122	CR_R_8-CR_S_10	MB	54.44815	0.39704
CEND 04/12	06/03/2012	122	CR_R_8-CR_S_10	MB	54.44584	0.35829
CEND 04/12	06/03/2012	123	CR_S_10	HC	54.44822	0.39688
CEND 04/12	06/03/2012	124	CR_R_10-CR_S_09	MB	54.45090	0.44890
CEND 04/12	06/03/2012	124	CR_R_10-CR_S_09	MB	54.44895	0.40120
CEND 04/12	06/03/2012	125	CR_R_09	HC	54.40661	0.21603
CEND 04/12	06/03/2012	126	CR_R_09-CR_s_07	MB	54.42770	0.48060
CEND 04/12	06/03/2012	126	CR_R_09-CR_s_07	MB	54.45190	0.45300
CEND 04/12	06/03/2012	127	CR_S_07	HC	54.42754	0.48322
CEND 04/12	06/03/2012	128	CR_S_07-CR_S_04	MB	54.40250	0.51630
CEND 04/12	06/03/2012	128	CR_S_07-CR_S_04	MB	54.42663	0.48028
CEND 04/12	06/03/2012	129	CR_S_04	HC	54.40244	0.51616
CEND 04/12	06/03/2012	130	CR_S_02	CS	54.40175	0.51615
CEND 04/12	06/03/2012	130	CR_S_02	CS	54.40261	0.51599
CEND 04/12	06/03/2012	131	CR_S_04-CR_S_02	MB	54.39750	0.46550
CEND 04/12	06/03/2012	131	CR_S_04 -CR_S_02	MB	54.40370	0.50960
CEND 04/12	06/03/2012	132	CR_S_02	HC	54.39850	0.46293
CEND 04/12	06/03/2012	133	CR_S_12-CR_R_12	MB	54.42280	0.43030
CEND 04/12	06/03/2012	133	CR_S_12-CR_R_12	MB	54.39960	0.46090
CEND 04/12	06/03/2012	134	CR_R_06	HC	54.42347	0.43028
CEND 04/12	06/03/2012	135	CR_R_06	CS	54.42258	0.43070
CEND 04/12	06/03/2012	135	CR_R_06	CS	54.42326	0.43005
CEND 04/12	06/03/2012	136	CR_R_06-CR_R02	MB	54.39423	0.41161

Cruise	Date	Stn No.	Stn Code	Gear	Latitude	Longitude
CEND 04/12	06/03/2012	136	CR_R_06-CR_R02	MB	54.41995	0.42472
CEND 04/12	06/03/2012	137	CR_R_02	HC	54.39442	0.40950
CEND 04/12	06/03/2012	138	CR_R_02-CR_R_05	MB	54.41970	0.37570
CEND 04/12	06/03/2012	138	CR_R_02-CR_R_05	MB	54.39644	0.40664
CEND 04/12	06/03/2012	139	CR-R_05	HC	54.41921	0.37654
CEND 04/12	06/03/2012	140	CR_R05-CR_R_05	MB	54.41691	0.33141
CEND 04/12	06/03/2012	140	CR_R05-CR_R_05	MB	54.41690	0.37070
CEND 04/12	06/03/2012	141	CR_R_04	CS	54.41626	0.32289
CEND 04/12	06/03/2012	141	CR_R_04	CS	54.41544	0.32289
CEND 04/12	06/03/2012	142	CR_R_04-CR_R_10	MB	54.46320	0.20300
CEND 04/12	06/03/2012	142	CR_R_04-CR_R_10	MB	54.41450	0.31960
CEND 04/12	06/03/2012	143	CR_R_10	CS	54.46155	0.20282
CEND 04/12	06/03/2012	143	CR_R_10	CS	54.46065	0.20301
CEND 04/12	06/03/2012	144	CR_R_10-CR_R_19	MB	54.52250	0.29240
CEND 04/12	06/03/2012	144	CR_R_10-CR_R_19	MB	54.46050	0.20560
CEND 04/12	06/03/2012	145	CR_R_19	CS	54.52467	0.29631
CEND 04/12	06/03/2012	145	CR_R_19	CS	54.52366	0.29669
CEND 04/12	06/03/2012	147	CRMB 18700	MB	54.38740	0.39150
CEND 04/12	06/03/2012	147	CRMB18700	MB	54.52114	0.38284
CEND 04/12	06/03/2012	148	CRMB19850	MB	54.51130	0.40158
CEND 04/12	06/03/2012	148	CRMB 19850	MB	54.38700	0.40966

5.6 Fisheries Liaison Officer (FLO) Report

No Fisheries Liaison Officer was on board, but no fishing activity was observed during the survey(CEND 04/12) within the Compass Rose rMCZ.

About us

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

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

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

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

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

.

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

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

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

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

Web www.cefas.defra.gov.uk

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

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

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