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Offshore Overfalls rMCZ 2012

Survey Report

**Authors: Koen Vanstaen, Paul Whomersley, Julia Rance
and Alex Callaway**

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Table of contents

1	Background and Introduction	1
1.1	Survey Project Team	1
1.2	Site Description	1
1.3	Geological and Biological Context	1
1.4	Existing data and information used to inform survey planning.....	3
2	Survey Design and Methods	4
2.1	Survey planning and design.....	4
2.2	Sample collection and processing methods.....	5
2.2.1	Grab sampling.....	5
2.2.2	Video and Still Imagery	6
3	Survey Narrative	8
4	Preliminary Results	9
4.1	Acoustic Survey	9
4.2	Seabed Imagery.....	10
4.3	Grab samples and sediment descriptions	14
4.4	Preliminary observations of Features of Conservation Interest (FOCI)	15
5	Annexes	16
5.1	RV Cefas Endeavour	16
5.2	Camera Sledge	17
5.3	Positioning Software-Tower	17
5.4	Multibeam Bathymetry	17
5.5	Station metadata	18
5.6	Daily Progress Reports (as produced by JNCC staff).....	28

1 Background and Introduction

1.1 Survey Project Team

The survey at the Offshore Overfalls recommended Marine Conservation Zone (rMCZ) was carried out between 3 and 12 June 2012 on the RV *Cefas Endeavour* cruise CEND 08c/12. The survey team for the duration of the fieldwork included Cefas marine ecologists, marine surveyors, habitat mappers and marine chemists along with a marine monitoring specialist from the JNCC (see below).

Cefas-Marine Ecologist	Cefas-Marine Policy
Marine Ecologist	Cefas-Marine Policy
Cefas-Habitat Mapper	JNCC-Marine Monitoring
Cefas-Habitat Mapper	Exeter University
Cefas-Marine Ecologist	Exeter University
Cefas-Marine Surveyor	EGS-Marine Survey
Cefas-Marine Chemist	

1.2 Site Description

The Offshore Overfalls rMCZ covers an area of approximately 590 km² located approximately 18 km south-east of the Isle of Wight (Figure 1) within the region covered by the Balanced Seas project. Water depth varies from 20 m in the north-west of the site to over 60 m in the south-east. The 'Overfalls' mentioned in the site name refers to a turbulent stretch of water which is the manifestation of strong marine currents passing over an underwater obstruction such as a ridge. This phenomenon occurs in the north-west of the site over pronounced sand and gravel bank features. For a detailed site description see *Offshore Overfalls rMCZ No 17 - Marine Conservation Zone: Selection Assessment Document*.

1.3 Geological and Biological Context

The Site Assessment Document (SAD) described the site as follows:

*The main feature of this site is the 'Overfalls', an area in the north-west corner of the site lying across the 6 nm line, consisting of mixed sediments, sands and gravels distinct from the surrounding sandstone and chalk rock habitats and characterised by unusual morphological features such as sandwaves, 'megaripples' and large relic glacial deposits forming a series of large bank features in an area of high tidal currents. This has produced an ecologically important area for various fish species, particularly elasmobranchs such as Undulate Ray (*Raja undulata*).*

Offshore Overfalls rMCZ location

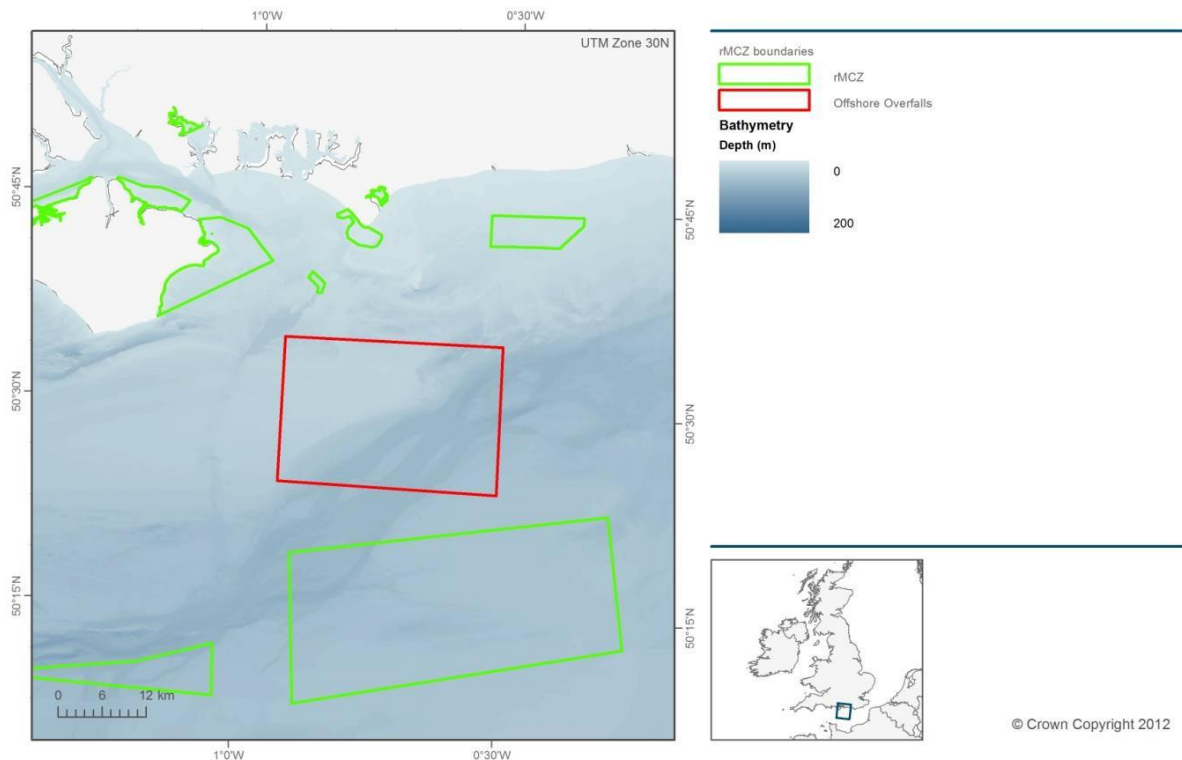


Figure 1. Location of Offshore Overfalls rMCZ. [Bathymetry is from the Defra Digital Elevation Model (Astrium 2011)].

The actual Overfalls area was suggested as a potential site for an MCZ early on in the process and arose as a result of the Overfalls Project, a multisector group set up to manage activities in the area. During the Balanced Seas project, attempts to meet shortfall ENG habitat targets identified the area to the south and east of the Overalls as a high priority, both for having high biodiversity and contributing a substantial area of necessary habitats, and the site was progressively extended to incorporate this. In the centre of the site the seabed depth drops significantly where it overlaps the Northern Palaeovalley, geomorphological remains of the ancient river valley that once flowed through what is now the English Channel and evidence of the English Channel Outburst Flood feature. The rMCZ straddles both the 6nm and 12 nm lines, with over half lying in offshore waters.

A number of Broad Scale Habitats (BSH) and Features of Conservation Interest (FOCI) have been proposed for designation by the regional project within the Offshore Overfalls rMCZ (Table 1).

Table 1. Features proposed for designation within Offshore Overfalls rMCZ.

Feature Type	Feature Name
Broad Scale Habitat (BSH)	A5.1 Subtidal coarse sediment A5.2 Subtidal sand A5.4 Subtidal mixed sediments
Features of Conservation Interest (FOCI)	
Habitats	Ross Worm (<i>Sabellaria spinulosa</i>) reef Subtidal sands and gravels*
Species	Undulate Ray (<i>Raja undulata</i>)
Geomorphological Feature	English Channel outburst flood features

***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 habitat and species FOCI have been identified as being present within the site but were not proposed for designation (Table 2).

Table 2. Features present but not proposed for designation within Offshore Overfalls rMCZ

Feature Type	Feature Name
Features of Conservation Interest (FOCI)	
Habitats	Native oyster beds Sheltered muddy gravels
Species	Native Oyster (<i>Ostrea edulis</i>)
Geomorphological Feature	N/A

1.4 Existing data and information used to inform survey planning

During the design of this survey, seabed habitat maps from the South Coast Regional Environmental Characterisation project (REC, James *et al.*, 2010¹) and the English Channel Synthesis project (James *et al.*, 2011²) were used in preference to UKSeaMap, as the former were considered to be more representative, being the result of directed survey and study.

¹ James JWC, Pearce B, Coggan RA, Arnott SHL, Clark RWE, Plim JF, Pinnion J, Barrio-Frójan C, Gardiner JP, Morando A, Baggaley PA, Scott G. & Bigourdan N, 2010. The South Coast Regional Environmental Characterisation. British Geological Survey Open Report OR/09/51. 249pp.

² James JWC, Pearce B, Coggan RA, Leivers M, Clark RWE, Plim JF, Hill JM, Arnott SHL, Bateson L, De-Burgh Thomas A and Baggaley PA, 2011. The MALSF synthesis study in the central and eastern English Channel. British Geological Survey Open Report OR/11/01.158pp.

2 Survey Design and Methods

2.1 Survey planning and design

Selection and positioning of ground-truth stations was informed by existing bathymetric data and the predicted Broad Scale Habitats (BSH) maps developed by the South Coast REC and English Channel Synthesis studies. Ground-truth sampling stations within the sedimentary habitats were positioned using triangular lattice grids overlaid on the predictive habitat map. A 5 km grid spacing was used over mixed sediments (A5.4), 1.5 km spacing over subtidal sand (A5.2) and 1 km over subtidal coarse sediment (A5.1). This resulted in an array of stations over the site, with station density varying according to the relative extent of the predicted habitat type (Figure 2). Stations were assigned 'intelligent' Station Codes, each with three elements; OO indicating the Offshore Overfalls site followed by one or two letters indicating the predicted substrate type for that location, then a sequential number (e.g. OO_Mx_22).

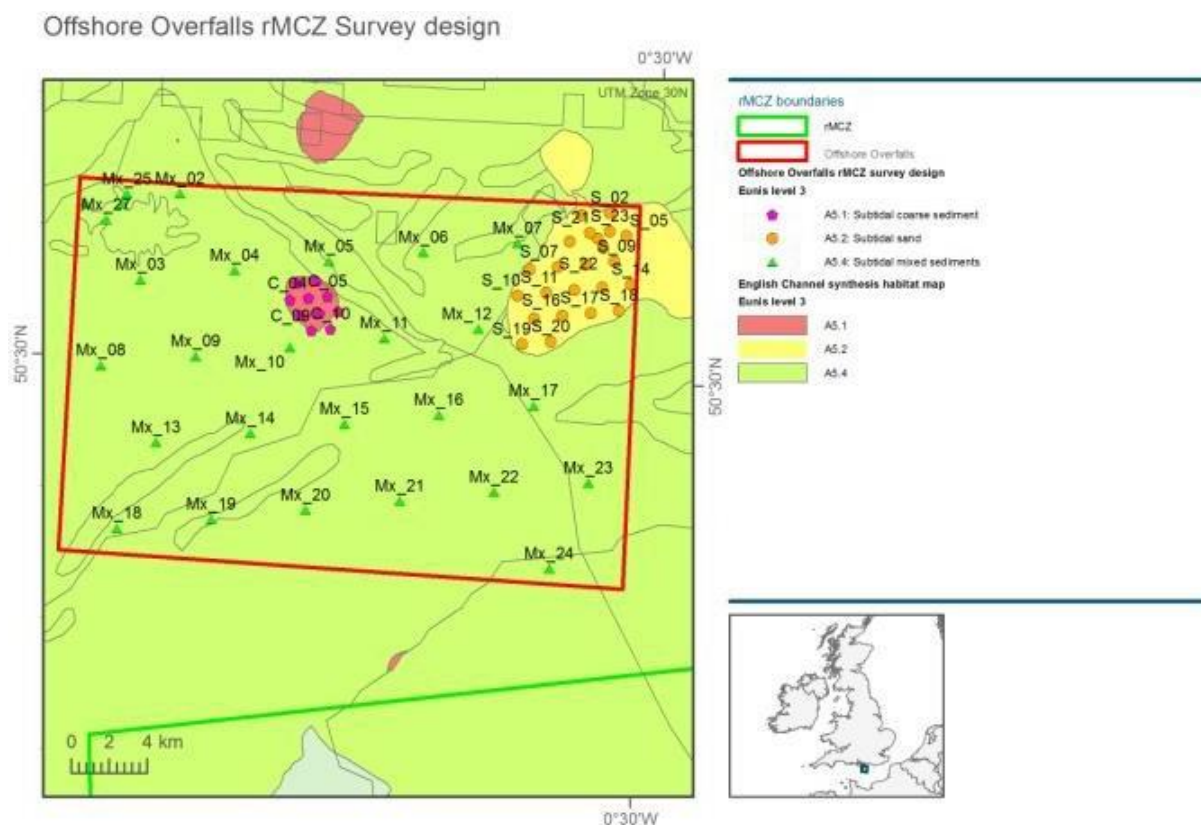


Figure 2. Ground truth survey design for Offshore Overfalls rMCZ overlain on predicted habitat map from the English Channel Synthesis project. Station codes reflect predicted substrate type (C = coarse sediment, S = sand, Mx = Mixed). The prefix 'OO_' has been omitted from station codes in this figure to aid clarity.

The plan was for grab samples to be collected at every station. The selection of stations where the camera would be used in addition to the grab was decided during the survey and was informed by the sediment type present in the grab sample. Where this confirmed the presence of the predicted BSH the camera was used at about every third station. If it showed a different substrate to that expected, the camera was used more frequently. The objective was to allow adequate characterisation of the surface sediment types and epifaunal communities within the site. The number of camera deployments per BSH varied depending on the uniformity of the habitat and its spatial extent.

Four blocks of acoustic survey were planned to help characterise the predicted habitats. These were located in

- a) the north-west, over the bathymetric feature to the north of station MX_03,
 - b) the centre, over the small patch of coarse sediment (A5.1),
 - c) the north-east, over an area predicted as sand (A5.2) and
 - d) the south-west, over the rim of the Northern Palaeovalley, targeting potential *Sabellaria* reef.
- e)
- Further ground-truth stations were selected within these areas during the survey, to target features revealed by the acoustic data. In addition, multibeam survey lines were run on an opportunistic basis during transits between the ground-truth sampling stations.

2.2 Sample collection and processing methods

Ground-truth samples were collected using a combination of grab and underwater camera techniques.

2.2.1 Grab sampling

The grab system comprised a 0.1 m² mini Hamon grab fitted with a video camera (Figure 3), 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 sub-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 formaldehyde for later analysis ashore.



Figure 3. Mini Hamon grab with video camera (HamCam).

2.2.2 *Video and Still Imagery*

A camera sledge system was available for sampling stations where sediment substrates were predicted by the modelled habitat map or observed in the acoustic survey. The sledge system comprised a video camera with capability to also capture still images (Figure 4). 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 towed at ~ 0.5 knots (~0.25 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 and on most deployments 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.

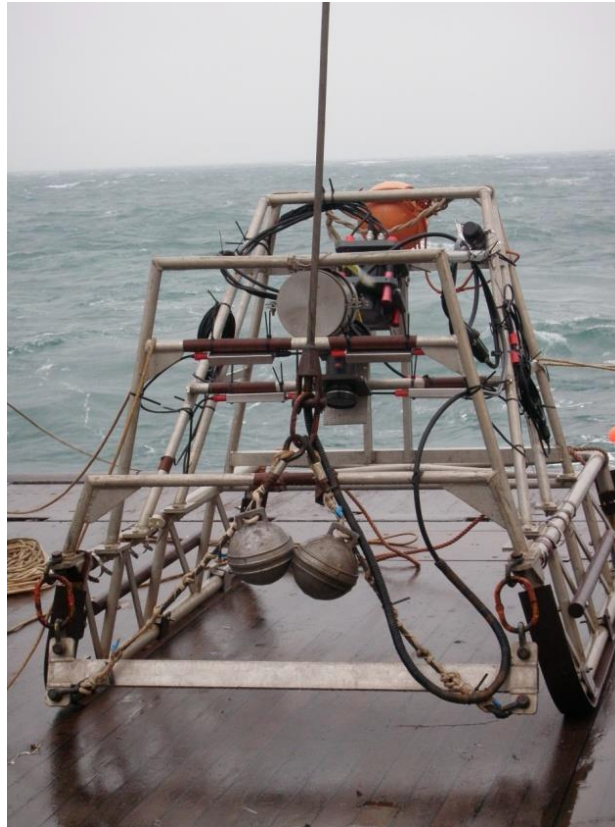


Figure 4. Camera sledge with video and still imaging system

2.3 **Geophysical data collection**

2.3.1 *Sidescan sonar*

Two prospective survey lines were run across the survey site in an east-west orientation. The survey lines crossed sandy, mixed and coarse sediment habitats and aimed to verify UKSeaMap and REC habitat boundaries. The sidescan sonar data was also reviewed for possible *Sabellaria spinulosa* signatures, a habitat FOCI at this site. An Edgetech FS-4200 dual frequency (300/600 kHz) sidescan sonar was used in combination with the Edgetech Discovery software for data recording. Data were recorded in XTF format and post-processed using the Triton Imaging software suite (Isis and TritonMap).

2.3.2 *Multibeam echosounder*

In the absence of full-coverage multibeam survey for the site, multibeam data were collected on the initial prospecting lines across the site, at the four locations detailed in Section 2.1 and opportunistically, in transit between the ground-truth sampling stations. Data were collected using a Kongsberg EM2040 multibeam system; bathymetry data were processed using Caris HIPS and backscatter data were produced with the QPS FMGT software package.

3 Survey Narrative

Survey work at the Offshore Overfalls rMCZ started at 13:10 on 3 June 2012 with a brief 'prospecting' acoustic survey, running two east-west trending lines approximately 4 km apart across the central region of the site. This was completed at around 22:00 hrs and was followed by the ground-truth survey, starting in the southeast over the predicted mixed sediment BSH. The area of predicted sandy habitat was targeted on 4th June and the area predicted as coarse sediment habitat on 5 June. The Cefas Endeavour departed the site at about 04:00 hrs on 6th June to conduct work at a neighbouring site (Offshore Brighton rMCZ) and returned at around 16:30 on 10th June to complete the detailed acoustic surveys.

Multibeam and Sidescan sonar survey was carried out in the south-west corner of the site (SS_MB Box 1) to investigate a potential presence of *Sabellaria spinulosa* reef that had been noted in the SAD. On completion, three further areas were targeted to assess the variability of broad scale sedimentary habitats within the rMCZ (see Figure 5). Additional grab samples were also collected in these acoustic survey areas, four in the predicted mixed sediment habitats in the north-west of the site and three from the predicted sand habitat in the north-east of the site.

Sampling at the Offshore Overfalls rMCZ was completed at 04:30 hrs on 12 June 2012. A total of 61 ground-truth stations were occupied. Grab samples were acquired at 26 of the 28 stations on predicted mixed sediment (exceptions were MX_03 and MX_04), all 10 of the stations on predicted coarse sediment and all 23 of the stations on predicted sand sediment. Video samples were acquired at 21 stations, 12 in predicted mixed sediments (including MX_03), three in predicted coarse sediments, and six in predicted sand sediment. Visibility over sandy substrates and shallow stations was often poor due to a combination of strong currents and particulate material in the water column. A sequential record of the sampling events is presented in the station metadata in Annex 5.

4 Preliminary Results

4.1 Acoustic Survey

The Multibeam data collected at the Offshore Overfalls rMCZ covered less than 8% of the site. The bathymetry data showed that depth varied between 18 m in the north-west of the site and 77 m in the south-east, within the palaeovalley (Figure 5). The northern edge of the palaeovalley was a prominent feature in the area surveyed in the south-west of the site. Sand waves were apparent in the north-western and north-eastern parts of the site; the area between these appeared to be mainly featureless but with some rocky expression.

The sidescan sonar backscatter was reviewed for indications of potential *Sabellaria spinulosa* reef but the mottled signature typically associated with this habitat type was not observed.

Offshore Overfalls rMCZ Multibeam Echosounder Data

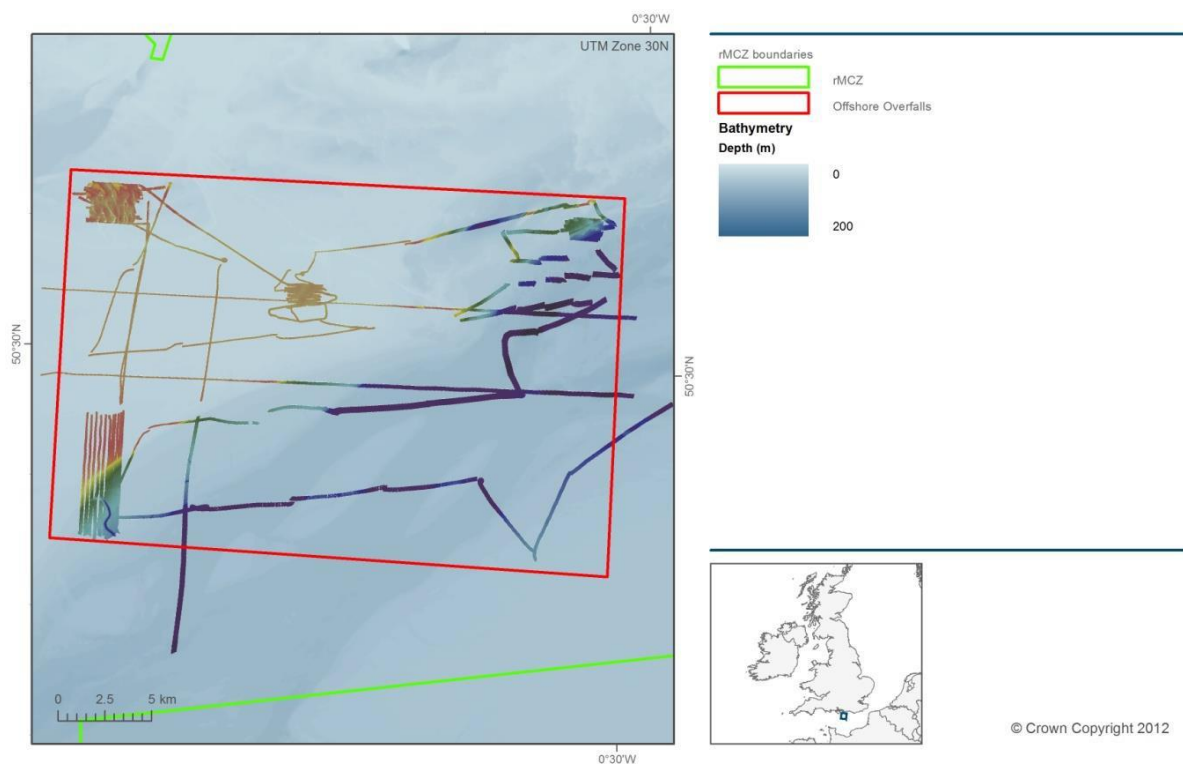


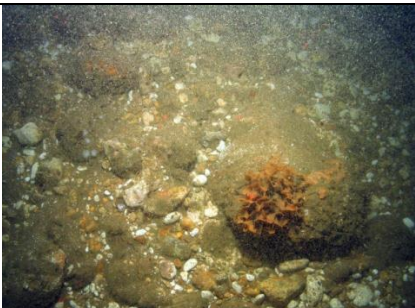
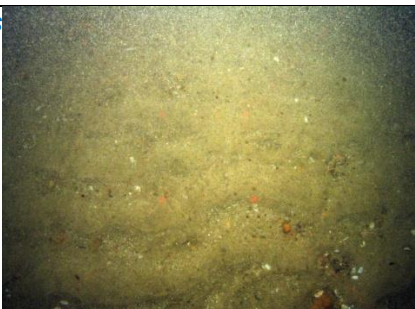

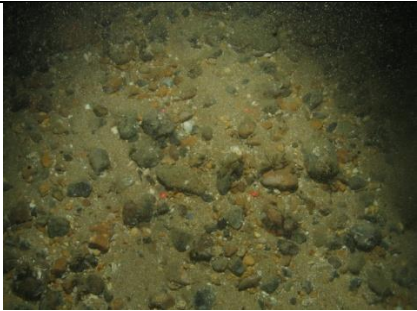









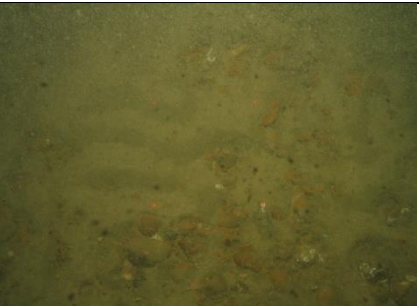
Figure 5. Acoustic data coverage at Offshore Overfalls rMCZ site






4.2 Seabed Imagery


Table 3. Preliminary summary of seabed substrate and epifaunal communities observed in video and still images. Station codes reflect predicted substrate type: Mx = mixed sediment, C = coarse sediment, S = sublittoral sand.

Stn Code	BSH Habitat/Faunal Summary	Still Image
OO_Mx_02	Sand with occasional pebbles and gravel <i>Asterias rubens</i>	
OO_Mx_03	Pebbles and cobbles over bedrock <i>Nemertesia ramosa</i> , <i>Urticina sp.</i> , <i>Cliona sp.</i> , <i>Flustra foliacea</i> , encrusting sponge, <i>Asterias rubens</i> , <i>Crossaster papposus</i> .	
OO_Mx_05	Cobbles and gravel with sand matrix <i>Asterias rubens</i> , <i>Alcyonium digitatum</i> , <i>Crossaster papposus</i> , <i>Pentapora sp.</i> , <i>Flustra foliacea</i>	
OO_Mx_07	Sand with shell fragments and occasional pebbles <i>Pagurus sp.</i> , <i>Urticina sp.</i> , <i>Asterias rubens</i>	
OO_Mx_09	Pebbles, cobbles and boulders in gravel and sand matrix over bedrock <i>Pomatoceros sp.</i> , <i>Urticina sp.</i> , <i>Pagurus sp.</i> , <i>Asterias rubens</i>	

Stn Code	BSH Habitat/Faunal Summary	Still Image
OO_Mx_11	<p>Sand with occasional cobbles, pebbles and shell fragments</p> <p><i>Pomatoceros sp.</i>, <i>Urticina sp.</i>, <i>Hydrallmania falcata</i>, encrusting sponge</p>	No Images available
OO_Mx_12	<p>Sand ripples with patches of gravel, pebbles and cobbles</p> <p><i>Urticina sp.</i>, <i>Crossaster papposus</i>, <i>Hydrallmania falcata</i>, <i>Pomatoceros sp.</i>, <i>Asterias rubens</i></p>	
OO_Mx_15	<p>Muddy gravel</p> <p><i>Urticina sp.</i>, <i>Pomatoceros sp.</i>, <i>Pagurus sp.</i>, <i>Hydrallmania falcata</i></p>	
OO_Mx_17	<p>Sandy gravel</p> <p><i>Crossaster papposus</i>, <i>Anseropoda placenta</i></p>	
OO_Mx_18	<p>Coarse ground with cobbles and shells <i>Alcyonium digitatum</i>, <i>Asterias rubens</i>, <i>Pagurus sp.</i>, <i>Urticina sp.</i>, <i>Polymastia boletiformis</i>, <i>Porania pulvillus</i>, <i>Hyas sp.</i>, <i>Axinella sp.</i>, <i>Atelecyclus rotundatus</i></p>	

Stn Code	BSH Habitat/Faunal Summary	Still Image
OO_Mx_21	<p>Sandy gravel</p> <p><i>Asterias rubens</i>, <i>Pomatoceros sp.</i>, <i>Flustra foliacea</i>, <i>Nemertesia ramosa</i>, <i>Crossaster papposus</i></p>	
OO_Mx_23	<p>Large pebbles and cobbles with shell debris</p> <p><i>Pagurus sp.</i>, <i>Urticina sp.</i>, <i>Asterias rubens</i>, <i>Alcyonium digitatum</i>, <i>Serpulidae</i>, <i>Hydrallmania falcata</i>, Ascidians</p>	
OO_S_01	<p>Sandy gravel</p> <p><i>Pagurus sp.</i>, <i>Urticina sp.</i>, <i>Asterias rubens</i>, <i>Raja clavata</i>, Ophiuroids</p>	
OO_S_05	<p>Sand with occasional cobbles</p> <p><i>Pagurus sp.</i>, encrusting sponge</p>	
OO_S_08	<p>Sand with cobbles and shell fragments</p> <p><i>Pagurus sp.</i>, <i>Asterias rubens</i>, <i>Urticina sp.</i>, <i>Hydrallmania falcata</i>, <i>Pomatoceros sp.</i>, <i>Atelecyclus sp.</i></p>	

Stn Code	BSH Habitat/Faunal Summary	Still Image
OO_S_10	Sand with some gravel and shell fragments <i>Pagurus sp.</i> , <i>Asterias rubens</i>	
OO_S_13	Gravelly sand with shell fragments <i>Urticina sp.</i> , <i>Asterias rubens</i> , <i>Pagurus sp.</i> , <i>Pecten maximus</i> (shells)	
OO_S_17	Pebbles and cobbles with sand and shell fragments <i>Alcyonidium digitatum</i> , <i>Urticina sp.</i> , <i>Asterias rubens</i> , <i>Pagurus sp.</i>	
OO_C_03	Sandy gravel with cobbles <i>Asterias rubens</i> , <i>Nemertesia ramosa</i> , <i>Urticina sp.</i> , <i>Pomatoceros sp.</i>	
OO_C_05	Gravel and cobbles with sand Encrusting bryozoans, <i>Urticina sp.</i> , <i>Pomatoceros sp.</i> , <i>Asterias rubens</i> , <i>Nemertesia ramosa</i> , <i>Pagurus sp.</i> , <i>Ophiocomina nigra</i>	

Stn Code	BSH Habitat/Faunal Summary	Still Image
OO_C_06	Cobbles with shells and occasional boulders <i>Hydrallmania falcata</i> , <i>Urticina sp.</i> , <i>Asterias rubens</i> , <i>Pagurus sp.</i> , <i>Pomatoceros sp.</i> , <i>Alcyonium digitatum</i>	

4.3 Grab samples and sediment descriptions

Preliminary observations of the spatial distribution of sediment types (EUNIS Level 3) for each grab sample were also summarised (Figure 6). It should be emphasised that the EUNIS classifications presented in Figure 6 may change as a result of the outcomes of laboratory processing and interpretation.

The preliminary observations showed the northern half of the site to be dominated by coarse sediment habitats, whereas the southern half was dominated by mixed sediment habitats. In the predicted sand habitat in the north-eastern corner of the site sediment samples suggested a combination of coarse and mixed sediment habitats.

Offshore Overfalls rMCZ preliminary sediment descriptions

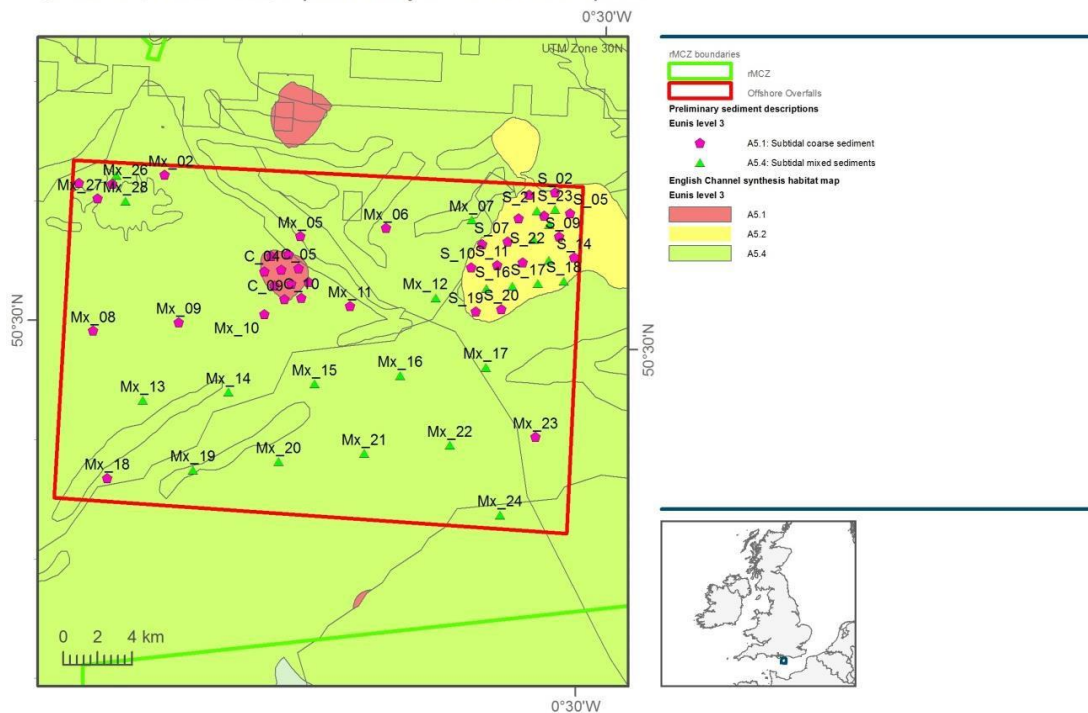


Figure 6. English Channel Synthesis habitat map overlaid with preliminary observations of sediment type, as determined by visual assessment of grab samples.

4.4 Preliminary observations of Features of Conservation Interest (FOCI)

Sabellaria sp. reef was listed as a habitat FOCI for the Offshore Overfalls site. No *Sabellaria* species or habitats were observed in any of the grab or video samples taken in this survey. Furthermore, no *Sabellaria* reef signature was observed on the limited area covered by sidescan sonar during this survey.

The ray *Raja undulata* was listed as a species FOCI for this site but was not observed in any of the video or still images taken during this 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 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 Interling 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 EM3002D

Frequency: 300 kHz; swathe width variable running in hi res equidistant mode Latency correction not determined – 1pps synchronised time system utilised on vessel.

Model: Simrad EM2040

Frequency: 200/300/400 kHz, swathe width variable dependant on water depth.

5.5 Station metadata

Station metadata for the Offshore Overfalls rMCZ survey on cruise CEND 08c/12 is provided below. 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. Station Code identifies the various sampling stations. Sampling gears are coded as HC = HamCam, CS = Camera Sledge MB = Multibeam, CTD = conductivity temperature and depth probe. Replicate code 'X' indicates an unsuccessful or abandoned sampling event; start and end of survey lines are indicated by SOL and EOL respectively. Positions in Lat/Long WGS84.

Date	Time	Station code	Gear	Station number	Replicate	Latitude	Longitude
03/06/2012	13:30	CTD_01	CTD	85	A	50.52650	-0.52273
03/06/2012	14:11	MB_SSS	MB	86	00-01A-SOL	50.52670	-0.49970
03/06/2012	17:45	MB_SSS	MB	86	00-01A-EOL	50.52700	-0.94900
03/06/2012	18:17	MB_SSS	MB	86	00-02-SOL	50.48952	-0.94688
03/06/2012	21:14	MB_SSS	MB	86	00-02-EOL	50.89520	-0.49870
03/06/2012	21:30	02-MX_23	MB	87	A-SOL	50.48667	-0.46983
03/06/2012	22:06	02-MX_23	MB	87	A-EOL	50.45130	-0.54460
03/06/2012	22:22	MX_23	HC	88	A	50.45201	-0.54194
03/06/2012	22:38	MX_23	CS	89	A-SOL	50.45202	-0.54159
03/06/2012	22:48	MX_23	CS	89	A-EOL	50.45162	-0.54267
03/06/2012	22:51	MX_23-MX_24	MB	90	A-SOL	50.45130	-0.54340
03/06/2012	23:24	MX_23-MX_24	MB	90	A-EOL	50.40800	-0.56600
03/06/2012	23:46	MX_24	HC	91	A	50.41040	-0.56828
03/06/2012	23:55	MX_24-MX_22	MB	92	A-SOL	50.41203	-0.56851
03/06/2012	00:22	MX_24-MX_22	MB	92	A-EOL	50.44610	-0.61179
04/06/2012	00:45	MX_22	HC	93	A	50.44569	-0.61158
04/06/2012	00:54	MX_22-MX_21	MB	94	A-SOL	50.44600	-0.61400
04/06/2012	01:21	MX_22-MX_21	MB	94	A-EOL	50.43800	-0.68500
04/06/2012	01:42	MX_21	HC	95	A	50.43872	-0.68208
04/06/2012	02:01	MX_21	CS	96	A-SOL	50.43825	-0.68349
04/06/2012	02:11	MX_21	CS	96	A-EOL	50.43864	-0.68234
04/06/2012	02:22	MX_21-MX_20	MB	97	A-SOL	50.43990	-0.68284
04/06/2012	02:50	MX_21-MX_20	MB	97	A-EOL	50.43269	-0.75494
04/06/2012	03:05	MX_20	HC	98	A	50.43214	-0.75214
04/06/2012	03:15	MX_20-MX_19	MB	99	A-SOL	50.43089	-0.75262
04/06/2012	03:38	MX_20-MX_19	MB	99	A-EOL	50.42544	-0.82121
04/06/2012	04:05	MX_19	HC	100	A	50.42556	-0.82125

Offshore Overfalls rMCZ 2012 Survey Report

Date	Time	Station code	Gear	Station number	Replicate	Latitude	Longitude
04/06/2012	04:21	MX_19-MX_18	MB	101	A-SOL	50.42510	-0.89502
04/06/2012	04:59	MX_19-MX_18	MB	101	A-EOL	50.41882	-0.89502
04/06/2012	05:16	MX_18	HC	102	A	50.41939	-0.89075
04/06/2012	05:35	MX_18	CS	103	A-SOL	50.41899	-0.89089
04/06/2012	05:45	MX_18	CS	103	A-EOL	50.41897	-0.89294
04/06/2012	05:55	MX_18-MX_13	MB	104	A-SOL	50.42169	-0.89211
04/06/2012	06:17	MX_18-MX_13	MB	104	A-EOL	50.46175	-0.86232
04/06/2012	06:46	MX_13	HC	105	A	50.46146	-0.86490
04/06/2012	06:52	MX_13-MX_14	MB	106	A-SOL	50.46200	-0.86330
04/06/2012	07:05	MX_13-MX_14	MB	106	A-EOL	50.46700	-0.78300
04/06/2012	07:37	MX_14	HC	107	A	50.46747	-0.79485
04/06/2012	07:49	CTD_MX_14	CTD	108	A	50.46745	-0.79468
04/06/2012	08:27	MX_14-MX_15	MB	109	A-SOL	50.47332	-0.77330
04/06/2012	08:48	MX_14-MX_15	MB	109	A-EOL	50.47411	-0.72000
04/06/2012	09:26	MX_15	HC	110	A	50.47396	-0.72533
04/06/2012	09:45	MX_15	CS	111	A-SOL	50.47394	-0.72522
04/06/2012	09:55	MX_15	CS	111	A-EOL	50.47356	-0.72631
04/06/2012	10:04	MX_15-MX_16	MB	112	A-SOL	50.47509	-0.72414
04/06/2012	10:33	MX_15-MX_16	MB	112	A-EOL	50.48090	-0.65265
04/06/2012	10:47	MX_16	HC	113	A	50.48048	-0.65562
04/06/2012	10:52	MX_16-MX_17	MB	114	A-SOL	50.48103	-0.65469
04/06/2012	11:21	MX_16-MX_17	MB	114	A-EOL	50.48790	-0.58313
04/06/2012	11:44	MX_17	HC	115	A	50.48690	-0.58595
04/06/2012	11:58	MX_17	CS	116	A-SOL	50.48609	-0.58782
04/06/2012	12:08	MX_17	CS	116	A-EOL	50.48656	-0.58695
04/06/2012	12:16	MX_17-MX_19	MB	117	A-SOL	50.48823	-0.58571
04/06/2012	12:37	MX_17-MX_19	MB	117	A-EOL	50.51640	-0.59356
04/06/2012	12:51	S_19	HC	118	A	50.51613	-0.59627
04/06/2012	12:56	S_19-S_20	MB	119	A-SOL	50.51660	-0.59500
04/06/2012	13:06	S_19-S_20	MB	119	A-EOL	50.51772	-0.57300
04/06/2012	13:17	S_20	HC	120	A	50.51801	-0.57522
04/06/2012	13:23	S_20-S_18	MB	121	A-SOL	50.51889	-0.57261
04/06/2012	13:49	S_20-S_18	MB	121	A-EOL	50.51720	-0.57300
04/06/2012	14:14	S_18	HC	122	A	50.53403	-0.52644
04/06/2012	14:22	S_18-S_17	MB	123	A-SOL	50.53350	-0.53470

Offshore Overfalls rMCZ 2012 Survey Report

Date	Time	Station code	Gear	Station number	Replicate	Latitude	Longitude
04/06/2012	14:29	S_18-S_17	MB	123	A-EOL	50.53321	-0.54991
04/06/2012	14:44	S_17	HC	124	A	50.53249	-0.54648
04/06/2012	14:58	S_17	CS	125	A-SOL	50.53188	-0.54845
04/06/2012	15:08	S_17	CS	125	A-EOL	50.53229	-0.54734
04/06/2012	15:17	S_17-S_16	MB	126	A-SOL	50.53350	-0.54899
04/06/2012	15:24	S_17-S_16	MB	126	A-EOL	50.52971	-0.57050
04/06/2012	15:32	S_16	HC	127	A	50.53025	-0.56725
04/06/2012	15:42	S_16-S_15	MB	128	A-SOL	50.53106	-0.57040
04/06/2012	15:49	S_16-S_15	MB	128	A-EOL	50.52830	-0.59134
04/06/2012	15:59	S_15	HC	129	A	50.52835	-0.58829
04/06/2012	16:06	S_15-MX_12	MB	130	A-SOL	50.52913	-0.59147
04/06/2012	16:21	S_15-MX_12	MB	130	A-EOL	50.52180	-0.63330
04/06/2012	16:36	MX_12	HC	131	A	50.52245	-0.62985
04/06/2012	16:48	MX_12	CS	132	A-SOL	50.52227	-0.63119
04/06/2012	17:01	MX_12	CS	132	A-EOL	50.52219	-0.63505
04/06/2012	17:09	MX_12-S_10	MB	133	A-SOL	50.52368	-0.63719
04/06/2012	17:29	MX_12-S_10	MB	133	A-EOL	50.54082	-0.59827
04/06/2012	17:38	S_10	HC	134	A	50.53899	-0.60135
04/06/2012	17:52	S_10	CS	135	A-SOL	50.53951	-0.59929
04/06/2012	18:02	S_10	CS	135	A-EOL	50.53896	-0.60110
04/06/2012	18:16	S_10-S_11	MB	136	A-SOL	50.54073	-0.58970
04/06/2012	18:21	S_10-S_11	MB	136	A-EOL	50.54098	-0.57742
04/06/2012	18:40	S_11	HC	137	A	50.54105	-0.58030
04/06/2012	18:44	S_11-S_12	MB	138	A-SOL	50.54333	-0.56982
04/06/2012	18:49	S_11-S_12	MB	138	A-EOL	50.54253	-0.55610
04/06/2012	19:02	S_12	HC	139	A	50.54323	-0.55967
04/06/2012	19:09	S_12-S_13	MB	140	A-SOL	50.54574	-0.55465
04/06/2012	19:16	S_12-S_13	MB	140	A-EOL	50.54489	-0.53573
04/06/2012	19:02	S_13	HC	141	A	50.54529	-0.53847
04/06/2012	19:51	S_13	CS	142	A-SOL	50.54525	-0.53836
04/06/2012	20:02	S_13	CS	142	A-EOL	50.54482	-0.53948
04/06/2012	20:14	S_13-S_14	MB	143	A-SOL	50.54706	-0.53451
04/06/2012	20:22	S_13-S_14	MB	143	A-EOL	50.54751	-0.51393
04/06/2012	20:43	S_14	HC	144	A	50.54736	-0.51673
04/06/2012	20:49	S_14-S_09	MB	145	A-SOL	50.54914	-0.51776

Offshore Overfalls rMCZ 2012 Survey Report

Date	Time	Station code	Gear	Station number	Replicate	Latitude	Longitude
04/06/2012	20:57	S_14-S_09	MB	145	A-EOL	50.55900	-0.53157
04/06/2012	21:10	S_09	HC	146	A	50.55763	-0.53060
04/06/2012	21:15	S_09-S_08	MB	147	A-SOL	50.55719	-0.53166
04/06/2012	21:24	S_09-S_08	MB	147	A-EOL	50.55603	-0.55444
04/06/2012	21:38	S_08	HC	148	A	50.55565	-0.55152
04/06/2012	21:53	S_08	CS	149	A-SOL	50.55585	-0.55091
04/06/2012	22:04	S_08	CS	149	A-EOL	50.55534	-0.55188
04/06/2012	22:12	S_08-S_07	MB	150	A-SOL	50.55433	-0.55405
04/06/2012	22:21	S_08-S_07	MB	150	A-EOL	50.55415	-0.57518
04/06/2012	22:32	S_07	HC	151	A	50.55357	-0.57258
04/06/2012	22:39	S_07-S_06	MB	152	A-SOL	50.55165	-0.57485
04/06/2012	22:48	S_07-S_06	MB	152	A-EOL	50.55085	-0.59654
04/06/2012	22:57	S_06	HC	153	A	50.55170	-0.59352
04/06/2012	23:02	S_06-MX_07	MB	154	A-SOL	50.55280	-0.59240
04/06/2012	23:13	S_06-MX_07	MB	154	A-EOL	50.56554	-0.60471
05/06/2012	23:22	MX_07	HC	155	A	50.56417	-0.60312
04/06/2012	23:40	MX_07	CS	156	A-SOL	50.56400	-0.60501
04/06/2012	23:50	MX_07	CS	156	A-EOL	50.56420	-0.60373
04/06/2012	23:58	MX_07-S_06	MB	157	A-SOL	50.56479	-0.60164
04/06/2012	00:16	MX_07-S_06	MB	157	A-EOL	50.56570	-0.56238
05/06/2012	00:27	S_03	HC	158	A	50.56609	-0.56479
05/06/2012	00:34	S_03-S_04	MB	159	A-SOL	50.56700	-0.56700
05/06/2012	00:44	S_03-S_04	MB	159	A-EOL	50.56900	-0.54400
05/06/2012	00:56	S_04	HC	160	A	50.56799	-0.54375
05/06/2012	01:02	S_04-S_05	MB	161	A-SOL	50.56800	-0.54240
05/06/2012	01:13	S_04-S_05	MB	161	A-EOL	50.57200	-0.52300
05/06/2012	01:25	S_05	HC	162	A	50.56984	-0.52263
05/06/2012	01:42	S_05	CS	163	A-SOL	50.56960	-0.52448
05/06/2012	01:52	S_05	CS	163	A-EOL	50.56981	-0.52329
05/06/2012	02:00	S_05-S_02	MB	164	A-SOL	50.56970	-0.52114
05/06/2012	02:14	S_05-S_02	MB	164	A-EOL	50.58470	-0.54090
05/06/2012	02:30	S_02	HC	165	A	50.58038	-0.53573
05/06/2012	02:37	S_02-S_01	MB	166	A-SOL	50.58081	-0.53992
05/06/2012	02:45	S_02-S_01	MB	166	A-EOL	50.57814	-0.55989
05/06/2012	02:58	S_01	HC	167	A	50.57846	-0.55684

Offshore Overfalls rMCZ 2012 Survey Report

Date	Time	Station code	Gear	Station number	Replicate	Latitude	Longitude
05/06/2012	03:16	S_01	CS	168	A-SOL	50.57822	-0.55849
05/06/2012	03:26	S_01	CS	168	A-EOL	50.57847	-0.55726
05/06/2012	03:32	S_01-MX_06	MB	169	A-SOL	50.57874	-0.55567
05/06/2012	04:21	S_01-MX_06	MB	169	A-EOL	50.55600	-0.67700
05/06/2012	04:33	MX_06	HC	170	A	50.55747	-0.67338
05/06/2012	04:39	MX_06-MX_05	MB	171	A-SOL	50.55838	-0.67325
05/06/2012	05:06	MX_06-MX_05	MB	171	A-EOL	50.55050	-0.74584
05/06/2012	05:25	MX_05	HC	172	A	50.55121	-0.74309
05/06/2012	05:34	MX_05	CS	173	A-SOL	50.55120	-0.74323
05/06/2012	05:53	MX_05	CS	173	A-EOL	50.55157	-0.74128
05/06/2012	06:00	MX_05-C_02	MB	174	A-SOL	50.55072	-0.74412
05/06/2012	06:10	MX_05-C_02	MB	174	A-EOL	50.55940	-0.75228
05/06/2012	06:26	C_02	HC	175	A	50.54129	-0.75149
05/06/2012	06:34	C_02-C_01	MB	176	A-SOL	50.54050	-0.75204
05/06/2012	07:10	C_02-C_01	MB	176	A-EOL	50.54182	-0.76107
05/06/2012	07:35	C_01	HC	177	A	50.53986	-0.76499
05/06/2012	08:06	C_03	HC	178	A	50.53156	-0.77050
05/06/2012	08:29	C_03	CS	179	A-SOL	50.53185	-0.76906
05/06/2012	08:39	C_03	CS	179	A-EOL	50.53160	-0.77041
05/06/2012	09:17	C_04	HC	180	A	50.53316	-0.75689
05/06/2012	09:50	C_05	HC	181	A	50.53444	-0.74308
05/06/2012	10:09	C_05	CS	182	A-SOL	50.53436	-0.74302
05/06/2012	10:19	C_05	CS	182	A-EOL	50.53395	-0.74419
05/06/2012	10:27	C_01-C_08	MB	183	A-SOL	50.53269	-0.74635
05/06/2012	11:20	C_01-C_08	MB	183	A-EOL	50.52700	-0.73450
05/06/2012	11:47	C_08	HC	184	A	50.52730	-0.73449
05/06/2012	11:54	C_08-C_07	MB	185	A-SOL	50.52649	-0.73804
05/06/2012	11:58	C_08-C_07	MB	185	A-EOL	50.52581	-0.74893
05/06/2012	12:11	C_07	HC	186	A	50.52582	-0.74839
05/06/2012	12:16	C_07-C_06	MB	187	A-SOL	50.52254	-0.74957
05/06/2012	12:22	C_07-C_06	MB	187	A-EOL	50.52385	-0.76448
05/06/2012	12:45	C_06	HC	189	A	50.52449	-0.76265
05/06/2012	12:57	C_06	CS	190	A-SOL	50.52461	-0.76442
05/06/2012	13:07	C_06	CS	190	A-EOL	50.52458	-0.76284
05/06/2012	13:13	C_06-C_09	MB	191	A-SOL	50.52460	-0.76182

Offshore Overfalls rMCZ 2012 Survey Report

Date	Time	Station code	Gear	Station number	Replicate	Latitude	Longitude
05/06/2012	13:22	C_06-C_09	MB	191	A-EOL	50.51780	-0.75435
05/06/2012	13:40	C_09	HC	192	A	50.51749	-0.75376
05/06/2012	13:46	C_09-C_10	MB	193	A-SOL	50.51768	-0.75017
05/06/2012	13:51	C_09-C_10	MB	193	A-EOL	50.51879	-0.73994
05/06/2012	13:59	C_10	HC	194	A	50.51878	-0.73955
05/06/2012	14:03	C_10-MX_11	MB	195	A-SOL	50.51859	-0.73916
05/06/2012	14:21	C_10-MX_11	MB	195	A-EOL	50.51675	-0.69751
05/06/2012	14:52	MX_11	HC	196	A	50.51580	-0.69952
05/06/2012	15:18	MX_11	CS	197	A-SOL	50.51556	-0.70063
05/06/2012	15:29	MX_11	CS	197	A-EOL	50.51579	-0.69942
05/06/2012	15:37	MX_11-MX_10	MB	198	A-SOL	50.51630	-0.70366
05/06/2012	16:02	MX_11-MX_10	MB	198	A-EOL	50.50973	-0.77228
05/06/2012	16:14	MX_10	HC	199	A	50.50927	-0.76970
05/06/2012	16:20	MX_10-MX_09	MB	200	A-SOL	50.51030	-0.77020
05/06/2012	16:49	MX_10-MX_09	MB	200	A-EOL	50.50245	-0.84207
05/06/2012	17:09	MX_09	HC	201	A	50.50268	-0.83883
05/06/2012	17:21	MX_09	CS	202	A-SOL	50.50277	-0.84131
05/06/2012	17:31	MX_09	CS	202	A-EOL	50.50278	-0.84009
05/06/2012	17:40	MX_09-MX_08	MB	203	A-SOL	50.50412	-0.84104
05/06/2012	18:08	MX_09-MX_08	MB	203	A-EOL	50.49536	-0.91097
05/06/2012	18:24	MX_08	HC	204	A	50.49617	-0.90863
05/06/2012	18:31	MX_08-MX_03	MB	205	A-SOL	50.49734	-0.90917
05/06/2012	18:56	MX_08-MX_03	MB	205	A-EOL	50.53835	-0.87978
05/06/2012	19:13	MX_03	HC	206	X	50.53787	-0.88267
05/06/2012	21:15	MX_03	CS	207	A-SOL	50.53800	-0.88141
05/06/2012	21:26	MX_03	CS	207	A-EOL	50.53789	-0.88278
05/06/2012	21:35	MX_03-MX_02	MB	208	A-SOL	50.54027	-0.88094
05/06/2012	22:08	MX_03-MX_02	MB	208	A-EOL	50.58095	-0.85567
05/06/2012	22:16	MX_02	HC	209	A	50.57964	-0.85678
05/06/2012	22:40	MX_02	CS	210	A-SOL	50.57930	-0.85765
05/06/2012	22:50	MX_02	CS	210	A-EOL	50.57901	-0.85892
05/06/2012	22:53	MX_02-MX_01	MB	211	A-SOL	50.57882	-0.85982
05/06/2012	23:24	MX_02-MX_01	MB	211	A-EOL	50.37375	-0.92953
05/06/2012	23:44	MX_01	HC	212	A	50.57310	-0.92674
05/06/2012	23:50	MX_01-MX_04	MB	213	A-SOL	50.57160	-0.92473

Offshore Overfalls rMCZ 2012 Survey Report

Date	Time	Station code	Gear	Station number	Replicate	Latitude	Longitude
05/06/2012	01:08	MX_01-MX_04	MB	213	A-EOL	50.54452	-0.81373
06/06/2012	00:56	MX_01	HC	214	X	50.54443	-0.81290
06/06/2012	01:07	CTD_MX_04	CTD	215	A	50.54440	-0.81349
06/06/2012	01:25	OO-OB	MB	216	A-SOL	50.54200	-0.81600
06/06/2012	03:18	OO-OB	MB	216	A-EOL	50.35300	-0.83600
10/06/2012	16:59	CTD_BOX_1	CTD	349	A	50.41141	-0.88275
10/06/2012	17:31	SS_MB_Box1	MB	350	2050-SOL	50.41141	-0.88275
10/06/2012	18:13	SS_MB_Box1	MB	350	2050-EOL	50.47064	-0.88300
10/06/2012	18:51	SS_MB_Box1	MB	350	1800-SOL	50.46901	0.88673
10/06/2012	19:27	SS_MB_Box1	MB	350	1800-EOL	50.60905	0.88757
10/06/2012	19:43	SS_MB_Box1	MB	350	1550-SOL	50.40798	0.89117
10/06/2012	20:20	SS_MB_Box1	MB	350	1550-EOL	50.46862	0.89022
10/06/2012	20:39	SS_MB_Box1	MB	350	1650-SOL	50.46817	0.88884
10/06/2012	21:15	SS_MB_Box1	MB	350	1650-EOL	50.40846	0.88896
10/06/2012	21:19	SS_MB_Box1	MB	350	1950-SOL	50.41016	0.88551
10/06/2012	21:54	SS_MB_Box1	MB	350	1950-EOL	50.46970	0.88466
10/06/2012	21:46	SS_MB_Box1	MB	350	B1-B2-SOL	50.47400	-0.88460
10/06/2012	22:54	SS_MB_Box1	MB	350	B1-B2-EOL	50.56020	-0.88050
10/06/2012	22:54	SS_MB_Box1	MB	350	B2 L1-SOL	50.56020	-0.88050
10/06/2012	23:08	SS_MB_Box1	MB	350	B2 L1-EOL	50.56000	-0.91917
10/06/2012	23:11	SS_MB_Box1	MB	350	100-SOL	50.61330	-0.91866
10/06/2012	23:23	SS_MB_Box1	MB	350	100-EOL	50.56107	-0.88250
10/06/2012	23:45	E. OF BOX_2	CTD	351	A	50.56189	-0.86850
11/06/2012	00:12	MB_BOX_2	MB	352	200-SOL	50.56192	-0.88179
11/06/2012	00:25	MB_BOX_2	MB	352	200-EOL	50.50200	-0.91520
11/06/2012	00:31	MB_BOX_2	MB	352	300-SOL	50.56335	-0.91514
11/06/2012	00:46	MB_BOX_2	MB	352	300-EOL	50.56252	-0.87631
11/06/2012	00:51	MB_BOX_2	MB	352	400-SOL	50.56356	-0.87869
11/06/2012	01:05	MB_BOX_2	MB	352	400-EOL	50.56393	-0.91665
11/06/2012	01:12	MB_BOX_2	MB	352	500-SOL	50.56474	-0.91665
11/06/2012	01:24	MB_BOX_2	MB	352	500-EOL	50.56460	-0.88188
11/06/2012	01:32	MB_BOX_2	MB	352	600-SOL	50.56562	-0.88137
11/06/2012	01:45	MB_BOX_2	MB	352	600-EOL	50.56574	-0.91665
11/06/2012	02:03	MB_BOX_2	MB	352	700-SOL	50.56677	-0.91918
11/06/2012	02:19	MB_BOX_2	MB	352	700-EOL	50.56631	-0.88158

Offshore Overfalls rMCZ 2012 Survey Report

Date	Time	Station code	Gear	Station number	Replicate	Latitude	Longitude
11/06/2012	02:29	MB_BOX_2	MB	352	800-SOL	50.56728	-0.88160
11/06/2012	02:44	MB_BOX_2	MB	352	800-EOL	50.56700	-0.91580
11/06/2012	02:54	MB_BOX_2	MB	352	900-SOL	50.56844	-0.91159
11/06/2012	03:05	MB_BOX_2	MB	352	900-EOL	50.56827	-0.88228
11/06/2012	03:12	MB_BOX_2	MB	352	1000-SOL	50.56900	-0.88260
11/06/2012	03:26	MB_BOX_2	MB	352	1000-EOL	50.56938	-0.91632
11/06/2012	03:30	MB_BOX_2	MB	352	1100-SOL	50.57040	-0.91610
11/06/2012	03:45	MB_BOX_2	MB	352	1100-EOL	50.56986	-0.88210
11/06/2012	04:42	SS_BOX_1	CTD	353	A	50.47593	-0.89738
11/06/2012	05:03	SS_BOX_1	MB	354	1400-SOL	50.46770	-0.89350
11/06/2012	05:40	SS_BOX_1	MB	354	1400-EOL	50.40990	-0.89280
11/06/2012	05:53	SS_BOX_1	MB	354	1150-SOL	50.40950	-0.89640
11/06/2012	06:31	SS_BOX_1	MB	354	1150-EOL	50.46670	-0.89603
11/06/2012	06:39	SS_BOX_1	MB	354	900-SOL	50.46790	-0.89982
11/06/2012	07:15	SS_BOX_1	MB	354	900-EOL	50.40640	-0.90030
11/06/2012	07:33	SS_BOX_1	MB	354	650-SOL	50.40962	-0.90401
11/06/2012	08:08	SS_BOX_1	MB	354	650-EOL	50.46915	-0.90323
11/06/2012	08:19	SS_BOX_1	MB	354	400-SOL	50.46773	-0.90669
11/06/2012	08:55	SS_BOX_1	MB	354	400-EOL	50.40917	-0.90710
11/06/2012	09:07	SS_BOX_1	MB	354	150-SOL	50.40900	-0.91100
11/06/2012	09:42	SS_BOX_1	MB	354	150-EOL	50.46800	-0.90900
11/06/2012	09:55	SS_BOX_1	MB	354	1600-SOL	50.46810	-0.88970
11/06/2012	10:30	SS_BOX_1	MB	354	1600-EOL	50.40950	-0.89000
11/06/2012	10:41	SS_BOX_1	MB	354	1950-SOL	50.41100	-0.88510
11/06/2012	11:17	SS_BOX_1	MB	354	1950-EOL	50.46800	-0.88400
11/06/2012	11:20	SS_BOX_1	MB	354	B1-B2-SOL	50.47300	-0.88500
11/06/2012	12:21	SS_BOX_1	MB	354	B1-B2-EOL	50.57130	-0.87250
11/06/2012	12:35	BOX 2	CTD	355	A	50.57081	-0.87152
11/06/2012	12:52	MB_Box2	MB	356	1250-SOL	50.57122	-0.88131
11/06/2012	13:07	MB_Box2	MB	356	1250-EOL	50.57137	-0.91201
11/06/2012	13:10	MB_Box2	MB	356	1350-SOL	50.57321	-0.91948
11/06/2012	13:26	MB_Box2	MB	356	1350-EOL	50.57238	-0.87628
11/06/2012	13:30	MB_Box2	MB	356	1200-SOL	50.57077	-0.87940
11/06/2012	13:45	MB_Box2	MB	356	1200-EOL	50.57139	-0.91699
11/06/2012	13:47	MB_Box2	MB	356	1450-SOL	50.57319	-0.91523

Offshore Overfalls rMCZ 2012 Survey Report

Date	Time	Station code	Gear	Station number	Replicate	Latitude	Longitude
11/06/2012	13:59	MB_Box2	MB	356	1450-EOL	50.57282	-0.87871
11/06/2012	14:04	MB_Box2	MB	356	1550-SOL	50.57398	-0.87652
11/06/2012	14:21	MB_Box2	MB	356	1550-EOL	50.57408	-0.92026
11/06/2012	14:26	MB_Box2	MB	356	1650-SOL	50.57532	-0.92159
11/06/2012	14:42	MB_Box2	MB	356	1650-EOL	50.57503	-0.87695
11/06/2012	14:45	MB_Box2	MB	356	1750-SOL	50.57553	-0.87740
11/06/2012	15:03	MB_Box2	MB	356	1750-EOL	50.57621	-0.92140
11/06/2012	15:07	MB_Box2	MB	356	1850-SOL	50.57734	-0.91589
11/06/2012	15:22	MB_Box2	MB	356	1850-EOL	50.57693	-0.87920
11/06/2012	15:25	MB_Box2	MB	356	1950-SOL	50.57750	-0.88081
11/06/2012	15:41	MB_Box2	MB	356	1950-EOL	50.57790	-0.91911
11/06/2012	15:44	MB_Box2	MB	356	2050-SOL	50.57914	-0.91581
11/06/2012	15:59	MB_Box2	MB	356	2050-EOL	50.57889	-0.88024
11/06/2012	15:59	Box2	MB	357	T-SOL	50.57856	-0.87976
11/06/2012	16:52	Box2	MB	357	T-EOL	50.53491	-0.76393
11/06/2012	16:52	Box2	MB	357	C1-SOL	50.53490	-0.76239
11/06/2012	17:02	Box2	MB	357	C1-EOL	50.53594	-0.73722
11/06/2012	17:05	Box2	MB	357	C100-SOL	50.53358	-0.74048
11/06/2012	17:14	Box2	MB	357	C100-EOL	50.53453	-0.76478
11/06/2012	17:20	Box2	MB	357	C200-SOL	50.53310	-0.76658
11/06/2012	17:33	Box2	MB	357	C200-EOL	50.53271	-0.73603
11/06/2012	17:35	Box2	MB	357	C300-SOL	50.53201	-0.74063
11/06/2012	17:44	Box2	MB	357	C300-EOL	50.53250	-0.76414
11/06/2012	17:50	Box2	MB	357	C400-SOL	50.53130	-0.76669
11/06/2012	18:02	Box2	MB	357	C400-EOL	50.53188	-0.73627
11/06/2012	18:05	Box2	MB	357	C500-SOL	50.53036	-0.73976
11/06/2012	18:13	Box2	MB	357	C500-EOL	50.53120	-0.76434
11/06/2012	18:17	Box2	MB	357	C600-SOL	50.52991	-0.76444
11/06/2012	18:27	Box2	MB	357	C600-EOL	50.52987	-0.73833
11/06/2012	18:32	Box2	MB	357	C700-SOL	50.52832	-0.73935
11/06/2012	18:41	Box2	MB	357	C700-EOL	50.52944	-0.76434
11/06/2012	18:45	Box2	MB	357	C800-SOL	50.52799	-0.76482
11/06/2012	18:55	Box2	MB	357	C800-EOL	50.52820	-0.73903
11/06/2012	19:00	Box2	MB	357	C900-SOL	50.52654	-0.73922
11/06/2012	19:08	Box2	MB	357	C900-EOL	50.52714	-0.76251

Offshore Overfalls rMCZ 2012 Survey Report

Date	Time	Station code	Gear	Station number	Replicate	Latitude	Longitude
11/06/2012	19:17	Box2	MB	357	C1000-SOL	50.52641	-0.76329
11/06/2012	19:26	Box2	MB	357	C1000-EOL	50.52604	-0.73933
11/06/2012	20:53	BOX 4 SAND	MB	359	S1050-SOL	50.56365	-0.55338
11/06/2012	21:01	BOX 4 SAND	MB	359	S1050-EOL	50.56363	-0.53182
11/06/2012	21:04	BOX 4 SAND	MB	359	S950-SOL	50.56453	-0.53032
11/06/2012	21:13	BOX 4 SAND	MB	359	S950-EOL	50.56468	-0.55383
11/06/2012	21:21	BOX 4 SAND	MB	359	S850-SOL	50.56600	-0.55400
11/06/2012	21:29	BOX 4 SAND	MB	359	S850-EOL	50.56555	-0.53232
11/06/2012	21:32	BOX 4 SAND	MB	359	S750-SOL	50.56645	-0.52867
11/06/2012	21:42	BOX 4 SAND	MB	359	S750-EOL	50.56658	-0.55401
11/06/2012	21:47	BOX 4 SAND	MB	359	S650-SOL	50.56810	-0.55695
11/06/2012	21:56	BOX 4 SAND	MB	359	S650-EOL	50.56749	-0.53178
11/06/2012	22:00	BOX 4 SAND	MB	359	S550-SOL	50.56869	-0.53014
11/06/2012	22:09	BOX 4 SAND	MB	359	S550-EOL	50.56854	-0.55581
11/06/2012	22:14	BOX 4 SAND	MB	359	S450-SOL	50.56946	-0.55835
11/06/2012	22:24	BOX 4 SAND	MB	359	S450-EOL	50.56921	-0.53117
11/06/2012	22:28	BOX 4 SAND	MB	359	S350-SOL	50.57027	-0.52949
11/06/2012	22:38	BOX 4 SAND	MB	359	S350-EOL	50.57011	-0.55517
11/06/2012	22:43	BOX 4 SAND	MB	359	S250-SOL	50.57143	-0.55753
11/06/2012	22:53	BOX 4 SAND	MB	359	S250-EOL	50.57056	-0.52821
11/06/2012	22:56	BOX 4 SAND	MB	359	S150-SOL	50.57165	-0.52854
11/06/2012	23:06	BOX 4 SAND	MB	359	S150-EOL	50.57100	-0.55500
11/06/2012	23:13	BOX 4 SAND	MB	359	S50-SOL	50.57288	-0.55059
11/06/2012	23:20	BOX 4 SAND	MB	359	S50-EOL	50.57272	-0.52907
12/06/2012	00:26	S_21	HC	360	A	50.57047	-0.54991
12/06/2012	00:57	S_23	HC	361	A	50.57171	-0.53511
12/06/2012	01:17	S_22	HC	362	A	50.56365	-0.53932
12/06/2012	03:23	MX_25	HC	363	A	50.57798	-0.89634
12/06/2012	03:43	MX_26	HC	364	A	50.57353	-0.89922
12/06/2012	04:03	MX_27	HC	365	A	50.56543	-0.91054
12/06/2012	04:29	MX_28	HC	366	A	50.56483	-0.88768

DAILY LOG STATUS REPORT

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)	Remarks
Mob/Demob			
Offshore Calibrations	00:40	01:10	
Total Operation Survey (TOSu)	08:10	12:50	
Total Operation Sampling (TOSa)	05:50	45:45	
Equipment/Downtime			
Ship/Plant Downtime			
Waiting On Weather			
Transit	09:20	19:15	
Standby Port			
Others			
Total:	24:00	79:00	

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
Multibeam EM2040	80.7	107.8		(SSS 70.3km)

Overall Progress Groundtruthing Samples

Action	Today (Lkm/sam ples)	Accum. (Lkm/sam ples)	Remarks
Hamon grab (0.1m ²)	2	49	
Camera sledge	7	16	
Drop camera	0	10	
Shipek	0	30	

Weather forecast for the next 24 hours

Decreasing wind and sea state.

Planned operation for the next 24 hours (00:00 to 24:00 on 2nd June 2012)

Continue hamcam, camera sledge and multibeam at Offshore Overfalls MCZ.

Agreed Changes to Scope/Survey operation priorities

Currently none

CEFAS/JNCC Comments

Current plan to complete grabs, cameras and transit multibeam before heading to Offshore Brighton where the priority will also be camera, grabs and opportunistic multibeam. On completion of this phase current recently collected data and previously provided evidence will be used to target patches of BSH for intensive MB and possible SSS (where looking for Sabellaria spinulosa).

CEFAS SIC: [REDACTED]

JNCC Rep: [REDACTED]

**DAILY LOG
STATUS REPORT
Name of Area Survey
RV Cefas Endeavour – JNCC – DPR No. 5 – 4th Jun 2012**

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 8_12C Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No. 5 Date: 04/06/12	Location at 24:00: 50° 33.1' N 000° 35.6'W

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

Safety

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	2	2 (Inductions and drill)
Additional comments:		

Summary of operations 0000-2400

Time UTC (start)	Time UTC (end)	Type	Comments
00:00	00:30	MB	Multibeam – Offshore Overfalls
00:30	00:45	HC	HamCam
00:45	01:35	MB	
01:35	01:40	HC	
01:40	02:10	CS	Camera Sledge
02:10	03:05	MB	
03:05	03:10	HC	
03:10	04:05	MB	
04:05	04:10	HC	
04:10	05:15	MB	
05:15	05:45	CS	
05:45	06:30	MB	
06:30	06:45	HC	
06:45	07:30	MB	
07:30	07:40	HC	
07:40	07:50	CTD	Callibration
07:50	09:20	MB	
09:20	09:25	HC	
09:25	09:55	CS	
09:55	10:40	MB	
10:40	10:45	HC	
10:45	11:25	MB	
11:25	11:45	HC	
11:45	12:10	CS	
12:10	12:45	MB	
12:45	12:50	HC	
12:50	13:10	MB	
13:10	13:20	HC	
13:20	14:00	MB	

**DAILY LOG
STATUS REPORT**

14:00	14:15	HC	
14:15	14:40	MB	
14:40	14:45	HC	
14:45	15:10	CS	
15:10	15:25	MB	
15:25	15:30	HC	
15:30	15:55	MB	
15:55	16:00	HC	
16:00	16:30	MB	
16:30	16:35	HC	
16:35	17:00	CS	
17:00	17:35	MB	
17:35	17:40	HC	
17:40	18:00	CS	
18:00	18:35	MB	
18:35	18:40	HC	
18:40	18:55	MB	
18:55	19:00	HC	
19:00	19:30	MB	
19:30	19:40	HC	
19:40	20:00	CS	
20:00	20:35	MB	
20:35	20:45	HC	
20:45	21:05	MB	
21:05	21:10	HC	
21:10	21:35	MB	
21:35	21:40	HC	
21:40	22:05	CS	
22:05	22:30	MB	
22:30	22:35	HC	
22:35	22:55	MB	
22:55	23:00	HC	
23:00	23:20	MB	
23:20	23:50	CS	
23:50	00:00	MB	

Weather

Weather/sea state conditions	0000-0600	0600-1200	1200-1800	1800-2400	Remarks
Wind	290, 26kts	040, 16kts	Light Airs	Light Airs	
Sea state	5	4	3	2	
Swell	4	2	1	1	
Vis	7	7	7	6	
Baro	1017.8	1025	1029	1030	

DAILY LOG STATUS REPORT

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)	Remarks
Mob/Demob			
Offshore Calibrations	00:10	01:20	
Total Operation Survey (TOSu)	16:10	29:00	
Total Operation Sampling (TOSa)	07:40	53:25	
Equipment/Downtime			
Ship/Plant Downtime			
Waiting On Weather			
Transit		19:15	
Standby Port			
Others			
Total:	24:00	103:00	

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
Multibeam EM2040	81.9	189.7		(SSS 70.3km)

Overall Progress Groundtruthing Samples

Action	Today (Lkm/samples)	Accum. (Lkm/samples)	Remarks
Hamon grab (0.1m ²)	27	76	
Camera sledge	10	26	
Drop camera	0	10	
Shipek	0	30	

Weather forecast for the next 24 hours

Increasing wind and sea state, force 4-5.

Planned operation for the next 24 hours (00:00 to 24:00 on 2nd June 2012)

Complete hamcam, camera sledge and multibeam at Offshore Overfalls MCZ before progressing to Offshore Brighton.

Agreed Changes to Scope/Survey operation priorities

Currently none

CEFAS/JNCC Comments

As with yesterday: Current plan to complete grabs, cameras and transit multibeam before heading to Offshore Brighton where the priority will also be camera, grabs and opportunistic multibeam. On completion of this phase current recently collected data and previously provided evidence will be used to target patches of BSH for intensive MB and possible SSS (where looking for Sabellaria spinulosa).

CEFAS SIC: [REDACTED]

JNCC Rep: [REDACTED]

**DAILY LOG
STATUS REPORT
Name of Area Survey
RV Cefas Endeavour – JNCC – DPR No. 6 – 5th Jun 2012**

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 8_12C Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No. 6 Date: 05/06/12	Location at 24:00: 50° 34.8' N 000° 51.6'W

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

Safety

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	2	2 (Inductions and drill)
Additional comments:		

Summary of operations 0000-2400

Time UTC (start)	Time UTC (end)	Type	Comments
00:00	00:20	MB	Multi-beam
00:20	00:25	HC	HamCam
00:25	00:50	MB	
00:50	00:55	HC	
00:55	01:20	MB	
01:20	01:25	HC	
01:25	01:55	CS	Camera Sledge
01:55	02:25	MB	
02:25	02:30	HC	
02:30	02:55	MB	
02:55	03:00	HC	
03:00	03:25	CS	
03:25	04:30	MB	
04:30	04:35	HC	
04:35	05:10	MB	
05:10	05:25	HC	
05:25	05:55	CS	
05:55	06:15	MB	
06:15	06:30	HC	
06:30	07:20	MB	
07:20	08:10	HC	
08:10	08:40	CS	
08:40	09:50	HC	
09:50	10:20	CS	
10:20	11:30	MB	
11:30	11:50	HC	
11:50	12:10	MB	
12:10	12:15	HC	
12:15	12:30	MB	

**DAILY LOG
STATUS REPORT
Name of Area Survey
RV Cefas Endeavour – JNCC – DPR No. 11 – 10th Jun 2012**

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 8_12C Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No. 11 Date: 10/06/12	Location at 24:00: 50° 33.6' N 000° 53.3'W

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

Safety

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	3 (Inductions and drill)
Additional comments:		

Summary of operations 0000-2400

Time UTC (start)	Time UTC (end)	Type	Comments
00:00	00:45	MB	Multibeam
	01:05	Cam	Camera using HamCam
	02:00	MB	
	02:05	CTD	Calibration
	05:15	MB	
	07:15	MB	
	07:25	HC	
	07:40	MB	
	08:00	HC	
	08:15	MB	
	08:30	HC	
	08:50	MB	
	09:05	HC	
	15:10	MB	Multibeam lines at Offshore Brighton
	17:30	Transit	Transit to Offshore Offshore Overfalls
	00:00	MB	

Weather

Weather/sea state conditions	0000-0600	0600-1200	1200-1800	1800-2400	Remarks
Wind	140, 11kts	095, 6kts	090, 20kts	080, 6kts	
Sea state	3	2	4	3	
Swell	1	1	2	1	
Vis	7	7	6	7	
Baro	1021	1018.9	1015.5	1013	

DAILY LOG STATUS REPORT

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)	Remarks
Mob/Demob			
Offshore Calibrations	00:05	02:10	
Total Operation Survey (TOSu)	20:15	77:25	
Total Operation Sampling (TOSa)	01:20	89:05	
Equipment/Downtime		03:10	
Ship/Plant Downtime			
Waiting On Weather		32:00	
Transit	02:20	19:15	
Standby Port			
Others			
Total:	24:00	223:00	

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
Multibeam EM2040	162.0	649.1		(SSS 70.3km)

Overall Progress Groundtruthing Samples

Action	Today (Lkm/samples)	Accum. (Lkm/samples)	Remarks
Hamon grab (0.1m ²)	4	135	
Camera sledge	0	56	
Drop camera	0	10	
Shipek	0	30	
Camera	1	7	Camera tows using hamcam

Weather forecast for the next 24 hours

Continued light winds and moderate sea state

Planned operation for the next 24 hours (00:00 to 24:00 on 2nd June 2012)

Complete intensive multibeam sites before transiting to Portland

Agreed Changes to Scope/Survey operation priorities

None

CEFAS/JNCC Comments

Back at Offshore Overfalls completing intensive multibeam sites

CEFAS SIC: [REDACTED]

JNCC Rep: [REDACTED]

**DAILY LOG
STATUS REPORT
Name of Area Survey
RV Cefas Endeavour – JNCC – DPR No. 12 – 11th Jun 2012**

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 8_12C Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No. 12 Date: 11/06/12	Location at 24:00: 50° 34.3' N 000° 32.1'W

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

Safety

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	3 (Inductions and drill)
Additional comments:		

Summary of operations 0000-2400

Time UTC (start)	Time UTC (end)	Type	Comments
00:00	00:00	MB	Intensive multibeam at Offshore Overfalls rMCZ, Intensive SSS run at block in south west corner to explore possibility of <i>S. spinulosa</i> .

Weather

Weather/sea state conditions	0000-0600	0600-1200	1200-1800	1800-2400	Remarks
Wind	310, 28kts	300, 24kts	320, 20kts	350, 22kts	
Sea state	4	4	4	4	
Swell	2	2	2	2	
Vis	7	7	7	7	
Baro	1011	1012	1012	1014.2	

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)	Remarks
Mob/Demob			
Offshore Calibrations		02:10	
Total Operation Survey (TOSu)	24:00	101:25	
Total Operation Sampling (TOSa)		89:05	
Equipment/Downtime		03:10	
Ship/Plant Downtime			

DAILY LOG STATUS REPORT

Waiting On Weather		32:00	
Transit		19:15	
Standby Port			
Others			
Total:	24:00	247:00	

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
Multibeam EM2040	165.7	814.8		

Overall Progress Groundtruthing Samples

Action	Today (Lkm/samples)	Accum. (Lkm/samples)	Remarks
Hamon grab (0.1m ²)	0	135	
Camera sledge	0	56	
Drop camera	0	10	
Shipek	0	30	
Camera	0	7	Camera tows using hamcam

Weather forecast for the next 24 hours

Continued moderate seas with increasing winds

Planned operation for the next 24 hours (00:00 to 24:00 on 2nd June 2012)

Ground truthing at intensive MB sites and then transit to Portland

Agreed Changes to Scope/Survey operation priorities

None

CEFAS/JNCC Comments

None.

CEFAS SIC: [REDACTED]

JNCC Rep: [REDACTED]

**DAILY LOG
STATUS REPORT
Name of Area Survey
RV Cefas Endeavour – JNCC – DPR No. 13 – 12th Jun 2012**

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: MCZ Site Verification CEND 8_12C Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No. 13 Date: 12/06/12	Location at 24:00: Portland dock

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

Safety

	Today	To Date
Accidents/Incidents	0	0
Near Misses	0	0
Safety Drills/Induction	0	3 (Inductions and drill)
Additional comments:		

Summary of operations 0000-2400

Time UTC (start)	Time UTC (end)	Type	Comments
00:00	04:30	HC	HamCam at Offshore Overfalls
04:30	11:00	Transit	Transit to Portland

Weather

Weather/sea state conditions	0000-0600	0600-1200	1200-1800	1800-2400	Remarks
Wind	350, 21kts	345, 28kts			
Sea state	3	4			
Swell	1	2			
Vis	7	7			
Baro	1014.5	1015.5			

Overall Progress

Type	Today (hh:mm)	Accum (hh:mm)	Remarks
Mob/Demob			
Offshore Calibrations		02:10	
Total Operation Survey (TOSu)		101:25	
Total Operation Sampling (TOSa)	04:30	93:35	
Equipment/Downtime		03:10	
Ship/Plant Downtime			
Waiting On Weather		32:00	
Transit	06:30	25:45	

DAILY LOG STATUS REPORT

Standby Port			
Others			
Total:	24:00	247:00	

Overall Progress Geophysical Data Acquisition MBES/Sidescan

Segment/Area/Line	Today (Lkm)	Accum. (Lkm)	Current estimated total (Lkm)	Remarks
Acoustic: Multibeam				
Multibeam EM2040	0	814.8		

Overall Progress Groundtruthing Samples

Action	Today (Lkm/samples)	Accum. (Lkm/samples)	Remarks
Hamon grab (0.1m ²)	7	149	
Camera sledge	0	56	
Drop camera	0	10	
Shipek	0	30	
Camera	0	7	Camera tows using hamcam

Weather forecast for the next 24 hours

N/A

Planned operation for the next 24 hours (00:00 to 24:00 on 2nd June 2012)

N/A

Agreed Changes to Scope/Survey operation priorities

None

CEFAS/JNCC Comments

None

CEFAS SIC: ██████████ 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.

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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

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