CENTRE FOR ENVIRONMENT, FISHERIES AND AQUACULTURE SCIENCE

LOWESTOFT LABORATORY, SUFFOLK, NR33 0HT

2014 RESEARCH VESSEL PROGRAMME

REPORT: Cefas Endeavour: Survey CEND0114.

STAFF: Part 1 (03/01/14-18/01/14)

Suzanne Ware (Cefas-Marine Ecologist)
Joanna Murray (Cefas-Marine Ecologist)
Christopher Jenkins (Cefas-Marine Ecologist)
Alexander Callaway (Cefas-Marine Ecologist)
William Meadows (Cefas-Marine Surveyor)
James Cook (Cefas–Trainee Engineer)
Nigel Lyman (Cefas-Marine Surveyor)
Ross Bullimore (NE-Marine Monitoring Specialist)
Matt Eade (Cefas-Aquaculturist)
Oliver Williams (Cefas-Data Manager)
Stefania Schinaia (Cefas-Geoscientist)
Georgia Bayliss-Brown (Cefas-Climate Change Scientist)
Freya Goodsir (Cefas-Marine Scientist)
Manuel Nicolaus (Cefas-Marine Biologist)
Michael Young (NE-Senior Marine Monitoring Specialist)
Fiona Neale (NE-Marine Monitoring Specialist)

STAFF: Part 2 (18/01/14-27/01/14)

Joanna Murray (Cefas-Marine Ecologist)
Chris Lynam (Cefas-Ecosystem Modeller)
Alexander Callaway (Cefas-Marine Ecologist)
William Meadows (Cefas-Marine Surveyor)
Manuel Nicolaus (Cefas-Marine Biologist)
Sara Stones (Cefas-Sedimentology Analyst)
Nathan Edmonds (Cefas-Marine Ecologist)
Joe Turner (NE-Marine Monitoring Specialist)
Sarah Watts (Cefas-Marine Management Scientist)
Bernardo Garcia-Carreras (Cefas-Ecosystem Modeller)
Trisha Breen (Cefas-Marine Environmental Mapper)
David James (Cefas-Analytical Chemist)
Marc Whybrow (Cefas-Marine Surveyor)
Nigel Lyman (Cefas- Marine Surveyor)
Bryony Townhill (Cefas-Marine Ecologist)

DURATION: 03/01/14-27/01/14

LOCATION: English Channel

AIMS: Objectives under the 'MCZ Data and Evidence Gathering Programme'

Data and evidence gathering to increase certainty in presence and extent of habitat features included in proposals for designation of Marine Conservations Zones (MCZs). In order to meet these aims, a combination of acoustic (MBES) and ground-truthing surveys were conducted at Kentish Knock East rMCZ, Goodwin Sands rMCZ, Inner Bank rMCZ and Skerries Bank and Surrounds MCZ.

Kentish Knock East rMCZ

NARRATIVE:

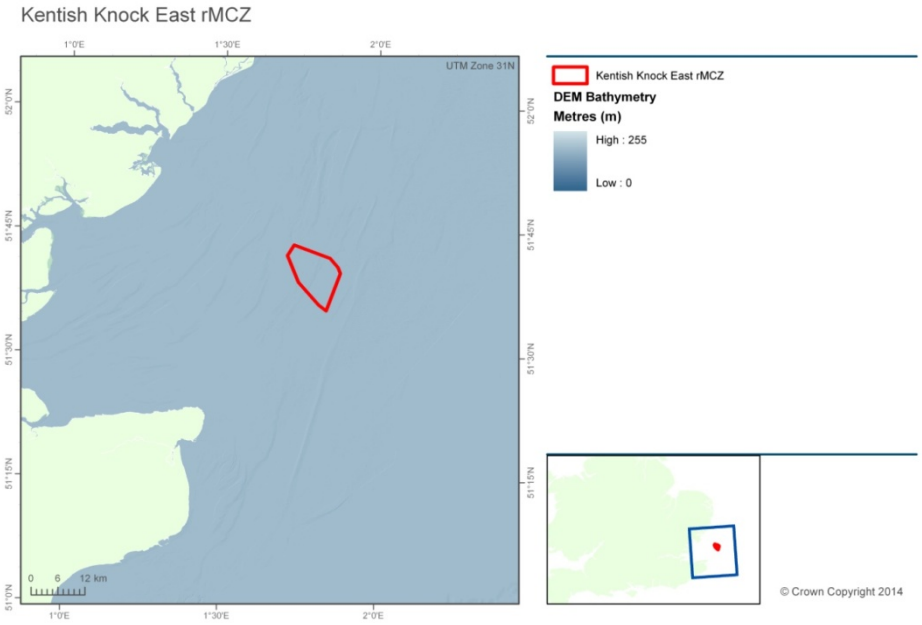

Figure 1. Location of the Kentish Knock East rMCZ.

Multibeam Echosounder (MBES) Survey

The MBES survey was designed in 'blocks' (minimum 6 survey lines per block) to ensure that, in the absence of 100% coverage being achieved (due to weather downtime, prioritisation of data acquisition at alternative rMCZ sites), the MBES data acquired would be distributed across the full spatial extent of the Kentish Knock East rMCZ. Where time permitted, the areas between the blocks of MBES data could be 'infilled' to provide larger spatial extents of 100% MBES coverage data. Areas selected for 'infill' would be focused on those areas identified to exhibit the greatest variability in both bathymetry and backscatter as identified from the acoustic survey blocks.

Survey lines were pre-planned at a spacing of 20 m across the site, in a N-S orientation to allow compliance with the required direction of travel within the 'Sunk Traffic Separation Scheme (TSS)' with which the rMCZ coincides. Line spacing of 20 m was selected to allow the required flexibility in line selection to achieve the necessary MBES data coverage (and overlap) across the full depth range (e.g., approximately 20-55 m) present within the site.

Ground-truthing Survey

Groundtruth stations were distributed across the rMCZ to ensure adequate density of sampling across all acoustically defined facies identified in the newly acquired MBES bathymetry and backscatter data (Figure 2).

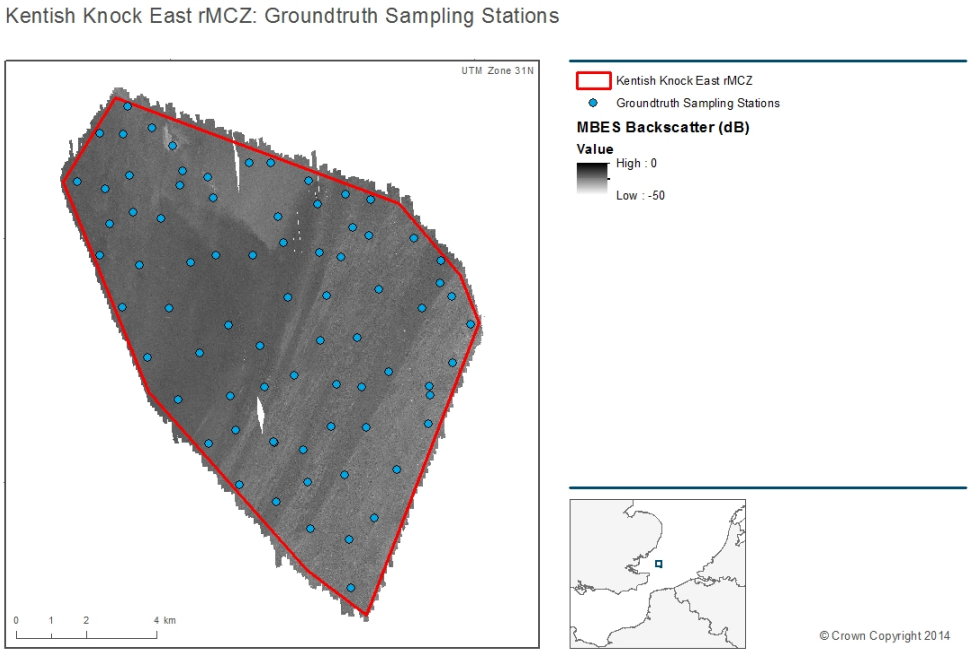

Figure 2. Groundtruth sample station positions planned using the newly acquired acoustic data.

The survey at Kentish Knock East rMCZ was completed between 11:30 hrs on 4th January 2014 and 27th January 2014. Following the MBES calibration patch test, survey at the Kentish Knock East rMCZ commenced with MBES data acquisition within the pre-planned survey 'blocks' with lines being run in a N-S orientation. Direction of travel along the acoustic survey lines complied with the required direction of vessel traffic within the lanes of the TSS where relevant.

Phase 1 of acoustic survey collected 100% MBES data across four blocks and was completed at 08:00 on 08/01/2014. A period of 4 hours and 15 minutes of 'operational downtime' occurred during this phase of acoustic survey to allow the 'running in' of the third engine as required following servicing during the maintenance period which occurred prior to the CEND 01/14 survey being mobilised. Following completion of the initial phase of acoustic survey, groundtruth sampling commenced during which 20 grab samples were successfully collected and 20 drop camera transects were successfully carried out. Following completion of the first phase of groundtruth sampling, acoustic survey re-commenced at 17:00 on 08/01/2014 during which time MBES data were collected across the full extent of seven further blocks.

Following completion of this second phase of acoustic survey (at 17:00 on 09/01/2014) the second phase of the groundtruth sampling campaign began. This phase of groundtruth survey was completed at 08:30 on 11/01/2014, during which time 51 grab samples were successfully collected and 51 drop camera transects were carried out. This phase of survey also incorporated a Natural England staff changeover off Margate which took approximately 6 hours (between 05:00 and 11:00 on 10/01/2014). The third phase of acoustic survey commenced at 10:00 on 11/01/2014 during which 100% coverage MBES data were acquired across the remaining three acoustic blocks. Another period of operational downtime (lasting approximately 2.5 hours) occurred during this phase of survey following the discovery of an electrical distribution failure which required investigation. This third phase of acoustic survey (which aimed to achieve 100% coverage within the pre-planned survey blocks) was successfully completed at 09:30 on 15/02/14. The final phase of groundtruth sampling then commenced during which the four remaining grab samples and video transects were successfully completed. The vessel departed Kentish Knock East rMCZ at 18:30 (15/01/14) and transited to the Goodwin Sands rMCZ to commence the next phase of survey.

The Kentish Knock East rMCZ was revisited several times (during weather 'downtime' at the other survey sites) to allow infilling of MBES data gaps across the shallower areas of the site. MBES data was successfully collected across the entire rMCZ with the exception of two areas which could not be covered due to the presence of Cardinal Marker Buoys.

RESULTS:

Multibeam bathymetry showed the seabed within the rMCZ to be characterised by two areas of broadly distinct bathymetry: a shallower area of variable topography towards the northwest (likely sandbanks), changing abruptly to a deeper area of striated bedforms towards the southeast. The abrupt change in depth occurs at around 35 m below Chart Datum (CD), falling sharply to 45 m below CD along a contour line running perpendicular to the southwestern rMCZ boundary, northeastwards across the widest part of the rMCZ boundary (Figure 3). The striated bedforms in the southeastern half of the rMCZ run parallel to this steep sided flank and appear to follow the direction of the predominant tidal currents flowing between the English Channel and southern North Sea. The bathymetry along all of the survey lines ranged from c. 20 m to c. 50 m below CD. Multibeam data were processed following standard Cefas procedures, as detailed in section 2.2.

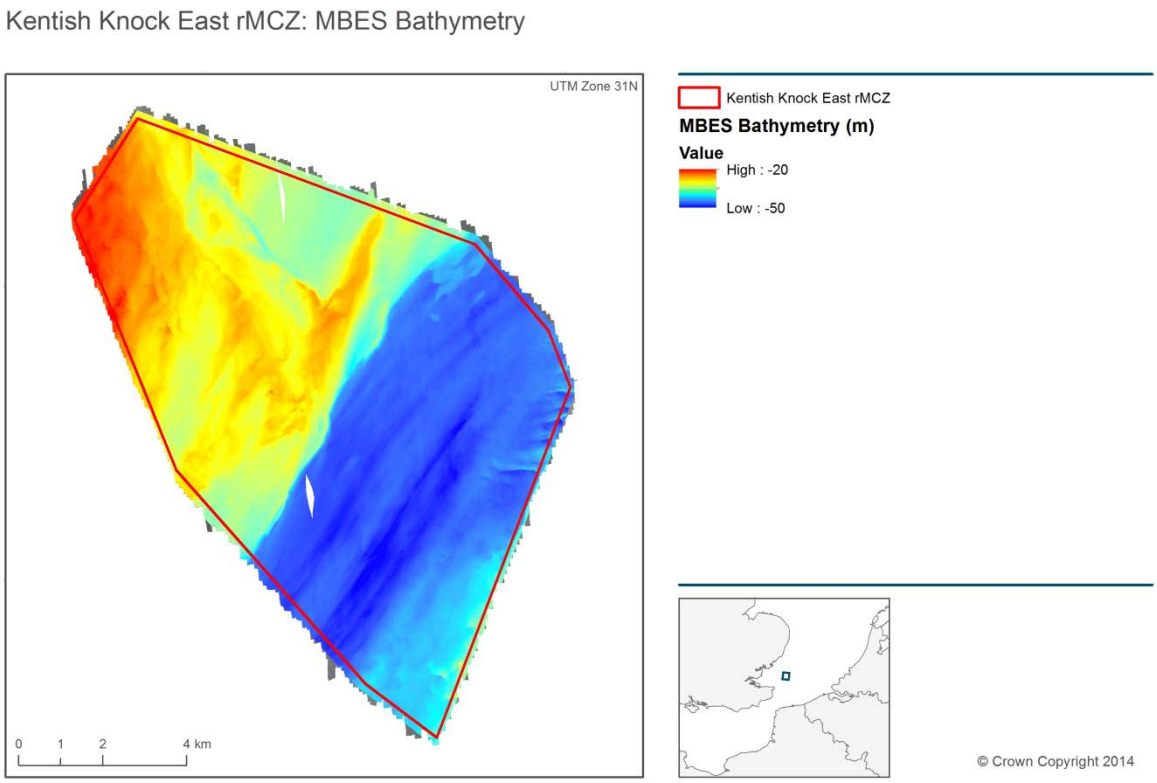

Figure 3. 4Multibeam bathymetry acquired at the Kentish Knock East rMCZ.

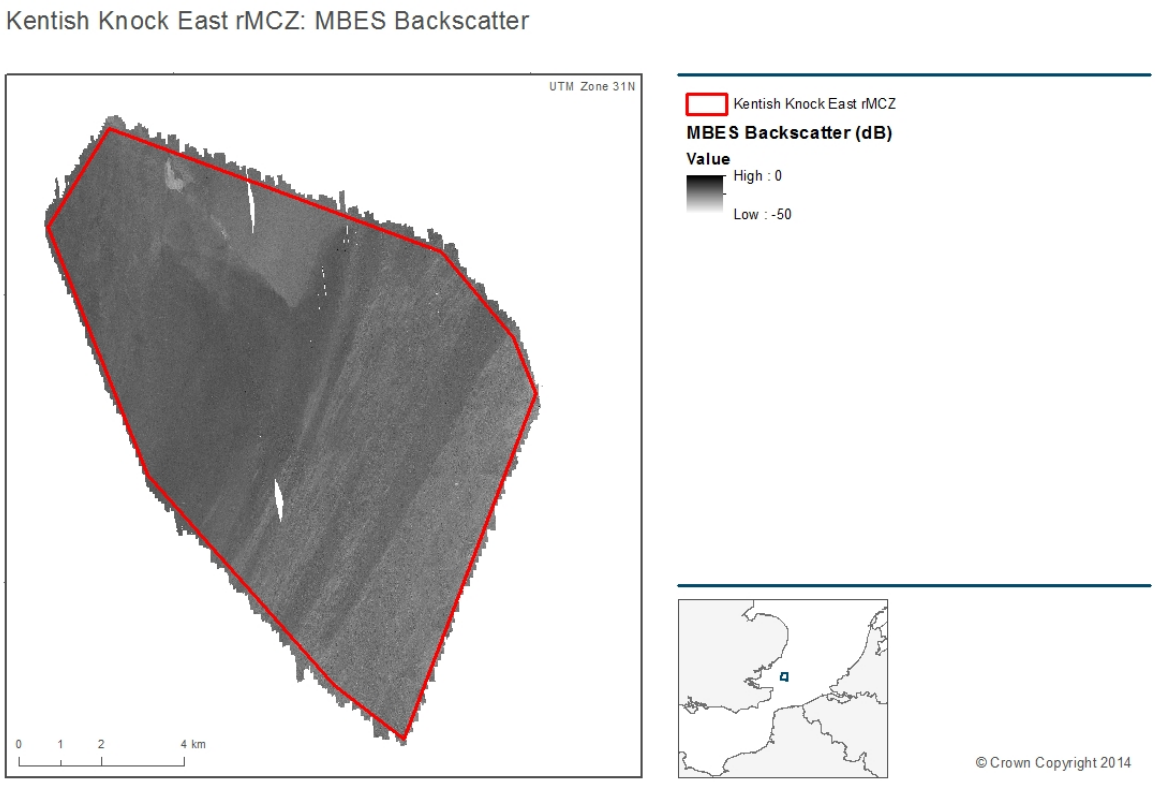

Figure 5. Multibeam backscatter data acquired at the Kentish Knock East rMCZ.

Grab samples and video imagery data were successfully collected at all 75 palnned ground-truthing stations.

Goodwin Sands rMCZ

NARRATIVE:

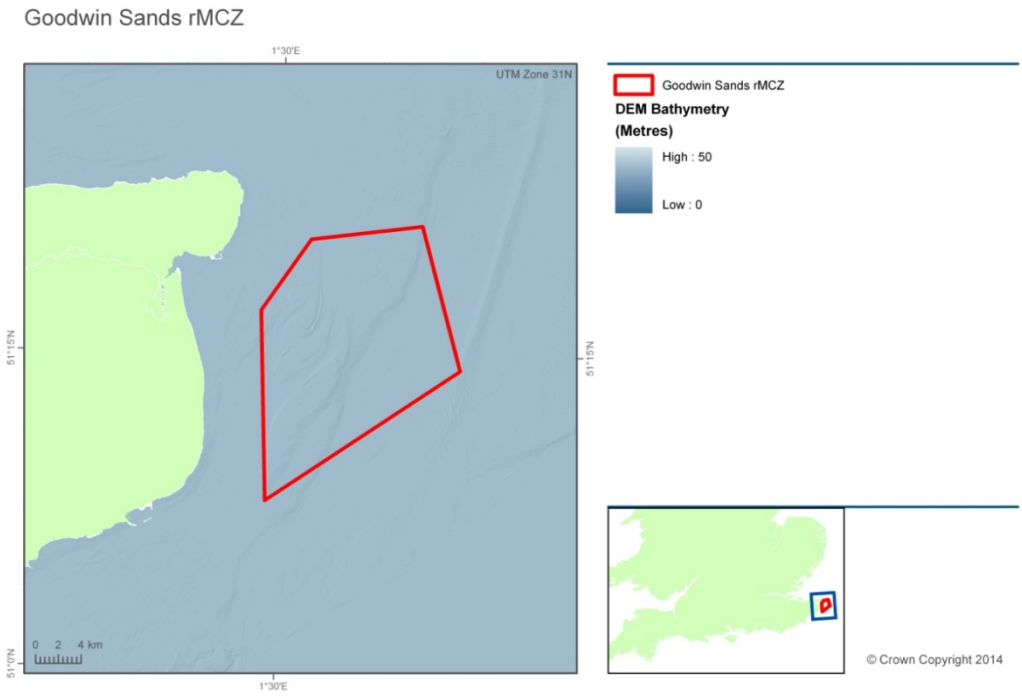

Figure 6. Location of the Goodwin Sands rMCZ.

Multibeam Echosounder (MBES) Survey

No MBES survey was planned for the CEND 01/14 survey as this rMCZ had been selected as an option for MBES infill (of existing CHP data) under the FY2013/14 Invitation to Tender (ITT) exercise.

Ground-truthing Survey

As no MBES data existed across the offshore region of the site coincident with the area accessible to RV Cefas Endeavour (and thus selected for inclusion in survey CEND 01/14), positions of the groundtruthing stations were selected by applying a 2 km triangular lattice grid to target predicted BSH according to the SAD (Figure 3).

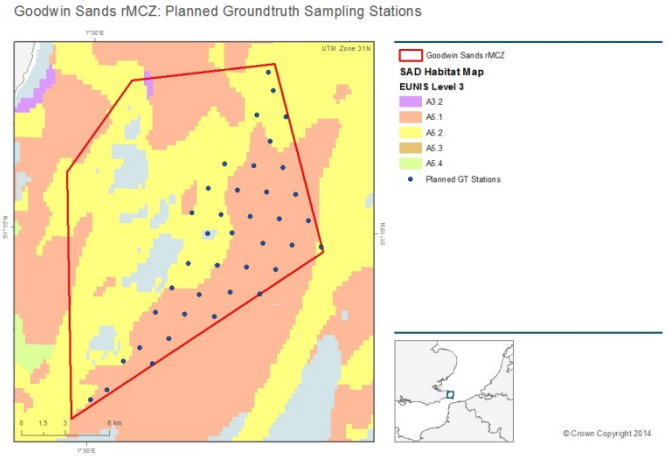

Figure 7. Location of the planned grab and video sampling points overlaid on the SAD habitat map.

The survey at Goodwin Sands rMCZ was completed between 20:30 hrs on 15th January 2014 and 05:00 on 18th January 2014. The CEND 01/14 survey at this site only involved ground-truth sampling

(using a combination of Hamon grab and underwater video techniques) ahead of potential acoustic infill survey of the existing Civil Hydrographic Programme (CHP) MBES data planned under the 2014/15 ITT exercise.

Survey commenced at the Goodwin Sands rMCZ at 20:30 on 15/01/14 and continued until 22:30 on 16/01/14, during which time 15 mini Hamon grab samples were successfully acquired and 31 video transects were carried out. Deteriorating weather conditions resulted in the survey at this site being suspended until 12:00 on 16/01/14 when the vessel relocated to the Kentish Knock East rMCZ to complete multibeam echosounder (MBES) infill at this site.

Weather conditions improved sufficiently for continuation of the groundtruth sampling at Goodwin Sands rMCZ at 21:00 on 17th January 2014. Survey operations continued at this site until 05:00 on 18th January 2014 during which time the remaining 8 video stations were successfully completed.

RESULTS:

Grab samples were successfully acquired at 15 stations and underwater video and still images were successfully acquired at 39 stations.

Inner Bank rMCZ

NARRATIVE:

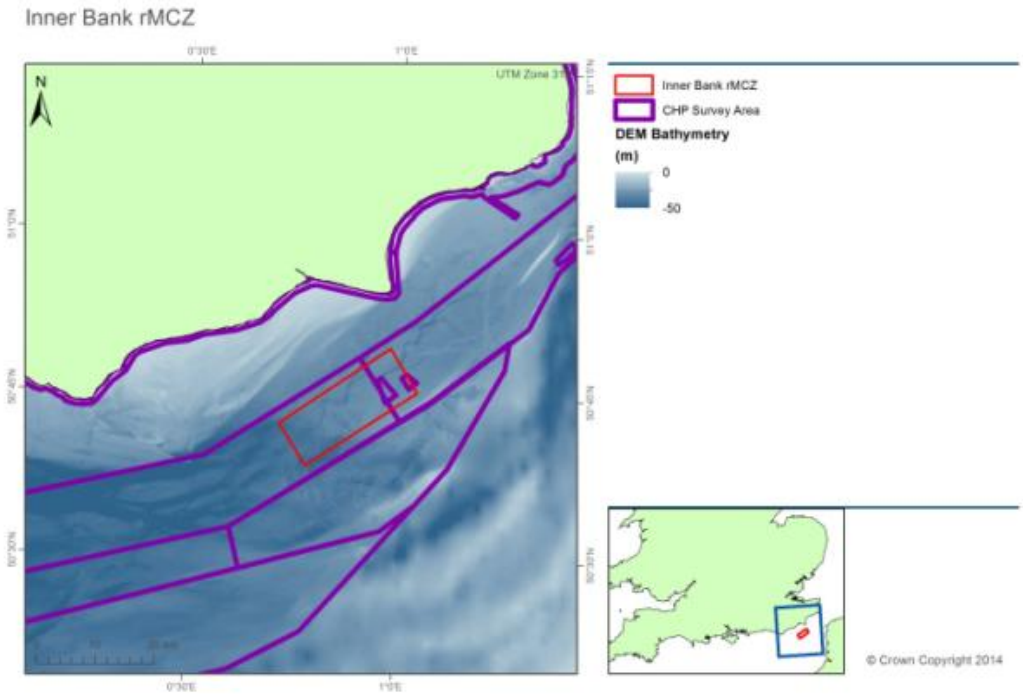

Figure 8. Location of the Inner Bank rMCZ.

Multibeam Echosounder (MBES) Survey

The Civil Hydrography Programme (CHP) has collected multibeam echosounder data for the area because of its location in the Dover Strait shipping channel. The bathymetric component of these data are utilised in the creation of the Defra DEM which was used to inform the sampling design of the ground-truthing survey. Available backscatter data were not of acceptable quality to aid survey design.

Ground-truthing Survey

Ground-truth sampling was achieved using grabs and underwater video cameras across the planned grid of sample stations shown below in Figure 9.

Figure 9. Ground-truth sample station positions planned using the existing MBES Bathymetry collected under the Civil Hydrography Programme (CHP).

The vessel arrived on station at 08:00 19/01/2014 and began working the grid of planned sample stations progressing from the north eastern region of the site to the south. Due to the need to observe

the restrictions on direction of travel for vessels in the traffic separation lanes off Dover, the sample grid was split into two parts. The first part encompassed the majority of the northern half of the site and the second the southern half. At each station the mini Hamon grab and drop camera were deployed. In areas where a successful grab sample was not achieved and a short camera tow was intended the tow length was increased to 10 min. At 17:30 20/01/2014 there was 30 min operational downtime for a P&O safety briefing with regard to equipment deployment and recovery. Cefas staff were required to read P&O standard operational procedures and discuss a safe working environment. At 04:00 21/01/2014, 57 stations had been targeted and the first part of the survey was complete and a 2 hr transit to the north east was made to commence the second part of the ground-truth survey. The vessel was on station at 06:30 21/01/2014 and sampling continued at a further 15 stations until 17:00 when the survey was terminated due to time constraints.

RESULTS:

Grab samples were collected at 68 stations and seabed imagery was successfully collected at 72 stations.

Skerries Bank and Surrounds MCZ

NARRATIVE:

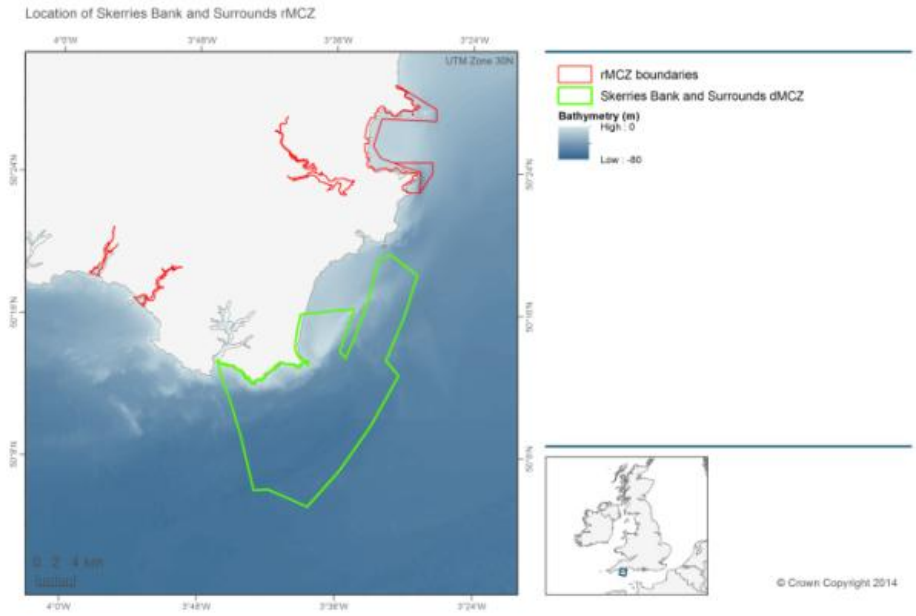

Figure 10. Location of the Skerries Bank and Surrounds MCZ.

Multibeam Echosounder (MBES) Survey

Civil hydrography programme (CHP) collected multibeam echosounder (MBES) backscatter data from several different surveys were used to design the ground-truthing survey. Three circalittoral regions were delineated based upon changes in backscatter signature that could be clearly identified. No attempt was made to discriminate the facies further due to the varying intensity and of the backscatter between regions which impacted on the ability to trace the continuity of textural features between survey areas.

A series of survey lines were planned to infill a small area of the MCZ not covered by CHP surveys. The survey was designed for three different orientations north to south, east to west and north-east to south-west to reduce the impact of prevailing weather conditions. The north-east to south-west orientation of the survey was chosen to provide optimal data in the conditions experienced (Figure 11).

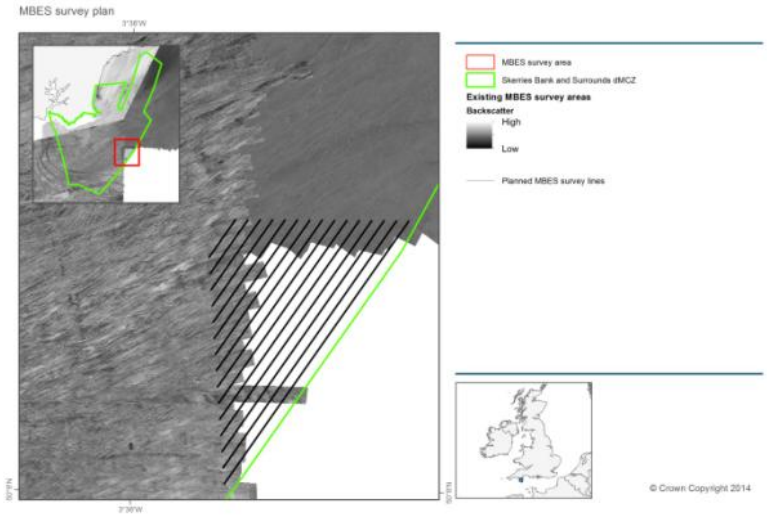

Figure 11. MBES survey plan for the acoustic survey at Skerries Bank and surrounds MCZ.

Ground-truthing Survey

Ground-truth stations were distributed according to a 1.5 km triangular lattice grid across the site (Figure 12). Station positions were modified where they coincided with known obstructions (e.g. wrecks) and additional stations were added over features of textural interest and in areas where the triangular lattice did not provide suitable cover. The near-shore region of the site was surveyed by the Environment Agency and these station locations are not included here.

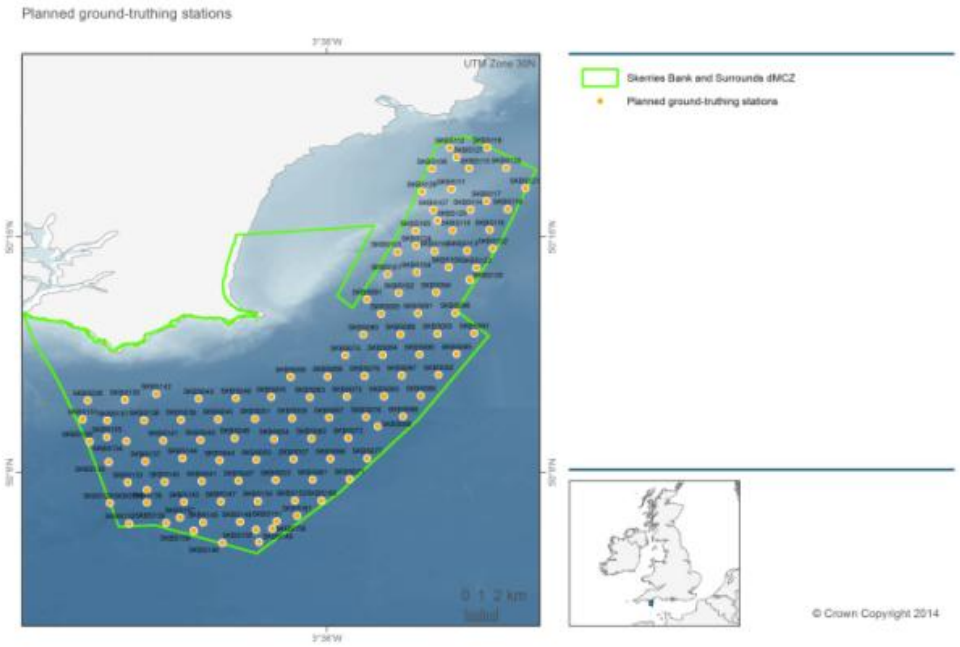

Figure 12. Ground-truth sample station positions planned using CHP acoustic data.

At 08:50 22/01/2014 the ground-truthing survey at Skerries Bank and Surrounds dMCZ commenced. Each station was targeted with both mini Hamon grab and camera equipment. For short (2 min) video tows the Drop Camera was used. The Camera Sledge was used for all long (10 min) tows where ground-type and prevailing conditions permitted. Ground-truthing continued until 14:00 24/01/2014 when a braking system on the side gantry coring winch failed during deployment. The crew of *RV Cefas Endeavour* were able to unlock the brake and recover the grab to the deck. While repairs were carried out ground-truthing operations were suspended and the multibeam echosounder (MBES) infill survey was carried out. The acoustic survey was undertaken from 16:50 – 22:50 achieving 100% coverage of the planned survey area. Ground-truthing operations then recommenced and were carried out for the remainder of the survey to completion of all target stations. An attempt was made to collect data from three additional stations in the vicinity of station SKBS055 (503) where the pink seafan *Eunicella verrucosa* was observed but weather conditions deteriorated on transit to prevent safe working. The survey was completed at 09:45 26/01/2014 and the vessel transited to Lowestoft for demobilisation.

RESULTS:

Grab samples were successfully collected at 98 stations and underwater imagery data were successfully collected at 100 stations.

Sue Ware/Alex Callaway
Scientist In Charge
17/04/14

SEEN IN DRAFT
Master: Terry Byrne
Senior Fishing Mate:
INITIALLED:
DISTRIBUTION: