

**DEPARTMENT FOR ENVIRONMENT, FOOD AND RURAL AFFAIRS.**  
2008 RESEARCH VESSEL PROGRAMME: *RV CEFAS ENDEAVOUR*  
Cruise Report: C END 11/08

**STAFF**

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**DURATION:**

18<sup>th</sup> May – 31<sup>st</sup> May

## LOCALITY:

Mid-Irish Sea, Solan Bank and Souter Point.

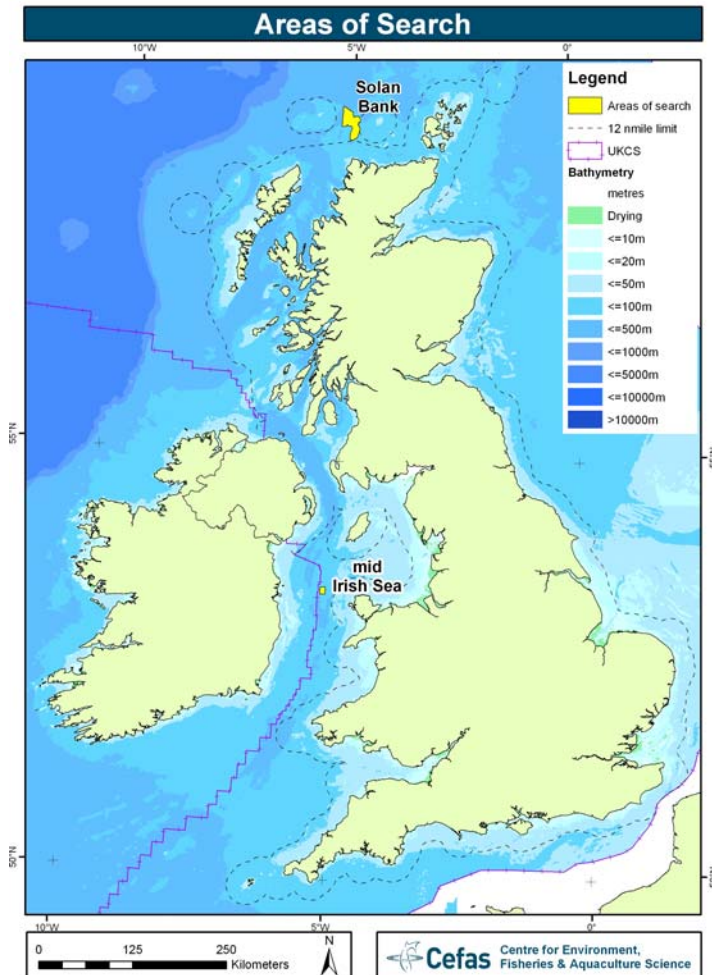


Figure 1. Shows the location of the mid-Irish Sea and Solan Bank sites.

## AIMS:

1. To conduct multidisciplinary (acoustic and sampling) surveys within a discrete area in the mid-Irish Sea and another north of Cape Wrath (Solan Bank). This work is in support of JNCC's requirement to designate SACs under the EU Annex I Habitats Directive.
2. To conduct 12hrs of SPI camera work at the Souter Point dredged material disposal site.

## Narrative:

All times are in GMT.

Cefas staff traveled to Swansea on 18<sup>th</sup> May and began mobilising the vessel during the day. JNCC and BGS staff joined the vessel in Swansea on 19<sup>th</sup> May. Safety inductions were held for staff in the afternoon and a toolbox talk was held in the evening. Mobilization was completed on the 19<sup>th</sup> and the Endeavour sailed at 18:00, as planned. The vessel steamed immediately for the mid-Irish Sea AoS, situated roughly midway between Ireland and Anglesey arriving on site at 07:30.

### **Area 1. Mid-Irish Sea**

A CTD dip was completed ahead of the planned acoustic survey. Six broadscale sidescan, multibeam and AGDS survey lines were run between 08:00 and 21:00 on 20<sup>th</sup> May.

It was agreed that we would run the three acoustic lines in the central part of the planned grid of 10 lines as a priority to establish a signature for MDAC (methane derived authigenic carbonate) over sites where it had previously been identified during SEA6. We would then run the remainder of the planned lines to the west of the AoS, avoiding Irish waters. Lines MIS 03 & MIS 07 were intended to be longer than the remainder of the grid in order to provide wider information on the presence of MDAC. However, it was decided to truncate these lines to the same length as the remainder of the grid lines. The acoustic data was processed as it was acquired so that georeferenced acoustic images could be loaded onto a project GIS along with existing data from SEA6 (Texel 10 and Texel 11) and BGS. The GIS data was used to select sites that would be used to groundtruth the acoustic images. The SEA6 video and acoustic data was used to target areas where we had some confidence that MDAC would be present. We used the acoustic signature from confirmed SEA6 MDAC sites to assist us in initially interpreting the acoustic data collected during this survey and help to predict where we might find further MDAC reef/crust structures. The multibeam data was used to identify positive topographic features which did not appear to be related to seabed sediment transport processes. The sidescan and multibeam backscatter, co-geolocated with the multibeam data, was used to provide further evidence of reef-like features possibly attributable to MDAC structures.

This information was used to select an initial tranche of groundtruthing sites placed over the area surveyed so far using acoustic methods.

The initial groundtruthing campaign involved the use of the towed video sledge fitted with digital stills and video camera systems, lights and a laser scaling system. Each tow was placed over a particular feature of interest and was generally around 200m in length. The tow-line was entered into the vessels survey software package and the ship used dynamic positioning (DP) to run each line at a speed of 0.5KN. Still images were taken at 1 minute intervals and also if any features or biota of interest was observed.

Sampling with the camera sledge began at 23:00 on 20<sup>th</sup> May and continued uninterrupted until 11:00 on 21<sup>st</sup> May. At Stn CS01 the camera sledge became trapped in a field of MDAC boulders and was pulled apart as the vessel moved along the survey line. Only a small part of the sledge was recovered at this stage. Further searching using the Hamon grab fitted with a camera, in tandem with the vessels USB system managed to locate the wreckage of the remainder of the sledge on the seabed. Grapples fitted to the Hamon grab were maneuvered into the camera frame and the remainder of the sledge was recovered with all camera equipment intact. Approximately 7hrs of time was lost during the recovery of the sledge. Whilst a backup camera system was being constructed, an additional acoustic survey line was run to the east of the part of the grid surveyed so far.

The acoustic line was completed during the evening and the camera groundtruthing survey was recommenced, using a drop-down system, at 10:00 on 21<sup>st</sup> May. The drop system was fitted with a similar camera/light/laser configuration as the fated sledge. The drop camera frame was lowered to within a metre or so of the seabed (the chosen survey height depending on visibility) and the bridge was given the instruction to move along a pre-determined survey line using DP. Still images were taken systematically every 1 minute, and also when features or fauna of interest was encountered.

This initial tranche of camera sites was completed by 02:00 on 22<sup>nd</sup> May, at which point 15 sites had been visited. A short (2hr) delay to wait for daylight was forced during this exercise due to the presence of fixed fishing gear (crab pots) close to camera sites. The presence of fixed fishing gear across the AoS eventually forced us to avoid the use of towed survey gear altogether during the hours of darkness (22:00 – 04:00).

The camera survey had identified sites where hard rocky material was present on the seabed. However, it was not possible to determine if this material was bedrock or MDAC structures, from images alone. A number of the towed camera sites were selected for physical/biological sampling using a Hamon grab fitted with a video camera. This would place samples of the rocky material on the deck and allow confirmation of their nature and would also collect quantitative physical and biological samples for subsequent analysis. In order to understand the wider context of the biological communities associated with MDAC it was important to collect samples of the sediments and biota that occurred immediately adjacent to MDAC and also over the AoS as a whole. Therefore, the grab sampling exercise was designed to collect samples of:

1. MDAC.
2. Quantitative samples of sediments/biota closely associated with MDAC.
3. Quantitative samples of sediments/biota present over the wider area that were not apparently directly associated with MDAC.

Hamon grab sites were selected to achieve the above aims. Where possible, the intention was to collect an MDAC sample and also a sample of the sediments closely associated with MDAC, from the same site. Therefore, the following approach was adopted. At each site, the Hamon grab was lowered close to the seabed and the vessel was driven along a pre-determined line using DP. The video camera was used to locate one or other of the sediment types targeted (MDAC, non-MDAC), at which point the grab was dropped and a sample collected. The grab was then deployed again at the same site and the second sediment type was sampled, again using the video mounted on the grab to guide deployment. Samples were recovered on deck and examples of potential MDAC were treated with phosphoric acid. Samples of MDAC fizzed vigorously, whilst other less rusty rocks collected did not. Samples of MDAC were also kept for subsequent laboratory analysis to help understand their formation process. Samples for biological analysis were washed over a 1mm sieve and preserved in 4% formaldehyde for later taxonomic identification. Sediment samples for subsequent particle size analysis (PSA) were also retained.

Sampling at the Hamon grab sites commenced at 03:00 on 22<sup>nd</sup> May and continued until 08:30 on the same day, by which time 5 sites had been visited and 9 samples had been collected.

During the groundtruthing exercise, additional infill acoustic survey lines had been produced. This infill survey would provide 100% sidescan and multibeam coverage over the area where much of the MDAC had been discovered. It would also link this survey with the 100% acoustic coverage surveys of Texel 10 and Texel 11 conducted as part of the SEA6 initiative. The infill acoustic survey began at 09:00 on 22<sup>nd</sup> May and continued until 21:00 on the same day.

Whilst the acoustic infill survey was being conducted, a second tranche of groundtruthing stations was selected using all data now available to us. These sites were composed of drop-camera and Hamon grab sampling and also limited Rock dredge deployments. The Rock dredge was chosen to collect samples of MDAC in areas where it formed large (cobble/boulder sized) fragments on the seabed. Sample of this nature would enable us to construct a more complete species list for communities associated with a range of MDAC formations. It would also provide voucher specimens to assist with the identification of fauna from video footage and still images. The Rock dredge was towed at a speed of 0.5KN for 2 minutes. The sample was recovered on deck and all conspicuous species were identified on a presence/absence basis. Species that could not be identified confidently were preserved in formalin as part of a reference collection to be identified in the laboratory.

Sampling at the second tranche of groundtruthing sites began at 22:00 on 22<sup>nd</sup> May. This continued throughout the night and was completed at 10:00 on 23<sup>rd</sup> May. The final 3 acoustic infill lines were then completed by 11:30. Multibeam data was then collected over the northern half of an additional broadscale survey

line at the eastern extremity of the AoS. This data would provide information on the likely eastern extent of MDAC within the AoS. Sampling at the mid-Irish Sea AoS was completed by 12:30 on 23<sup>rd</sup> May and Endeavor left the site to begin the steam to the Solan Bank.

## **Area 2. Solan Bank**

Endeavour steamed from the mid-Irish Sea site through the Minches, and arrived at the Solan Bank site at 16:30 on 24<sup>th</sup> May. On arrival a CTD deployment was conducted to provide speed of sound information ahead of acoustic survey work. Two 'prospecting' sidescan sonar lines were run over the AoS to provide backscatter data over the existing MCA multibeam bathymetry survey. This would help us to provide more certainty about the distribution of rocky and stony reef that was inferred by the bathymetry data. This survey was completed by 23:30 on 24<sup>th</sup> May. The sidescan sonar data were processed and mosaiced as the survey progressed and the georeferenced images were loaded into a project GIS. The data underwent an initial interpretation, and 15 groundtruthing (Drop-camera) sites were selected which would characterise the various habitats encountered. Video tow lines were approximately 250m in length and were placed in a way that enabled us to characterise discrete habitats and also locate and position boundaries between habitats that had been inferred from the sidescan record. The vessels DP system was used to run these lines precisely at 0.5Kn or less. During the camera tows, the ships position was displayed in GIS over the sidescan sonar mosaic so that we could link what we were seeing on the seabed with the sidescan data. Video data was recorded to hard drive and digital tape simultaneously. Still images were collected systematically every minute and images were also taken of species or features of particular interest. Work on initial tranche of 15 sites commenced immediately after the sidescan survey was finished, and was completed successfully by 15:00 on 25<sup>th</sup> May.

During the camera survey, further acoustic lines were created in GIS which provided broadscale coverage across the entire AoS. This broadscale survey also encompassed a large area of seabed outside of the current AoS. This area was included (after discussion between JNCC, Cefas and BGS) as it appeared to hold linear topographic features similar to moraine-like features already identified within the AoS. This acoustic survey commenced at 16:00 on 25<sup>th</sup> May and continued until midnight the same day, when a problem developed with the Benthos SIS1624 sidescan fish. The fish was recovered on deck and replaced with the Benthos SIS1500 chirp sonar fish which was used for the remainder of the cruise. Sidescan sonar operations were re-commenced at 13:30 on 26<sup>th</sup> May and continued until 10:30 the following morning.

During the sidescan survey the data gathered was continually being processed and mosaiced within the project GIS. This acoustic data, along with the MCA multibeam data, was used to produce the second tranche of groundtruthing

stations. This second tranche of sites involved groundtruthing using the drop-camera system over all sites, sampling of sandy sites with the Hamon grab fitted with a video camera and also limited sampling of cobbly areas using the rock dredge. The groundtruthing survey commenced at 11:30 on 26<sup>th</sup> May and continued until 05:00 on 27<sup>th</sup> May. The remaining broadscale sidescan sonar lines were run between 06:30 and 23:00 on 27<sup>th</sup> May. During the sidescan sonar survey, further groundtruthing positions were selected using the mosaiced backscatter images. This final tranche of groundtruthing sites was commenced at 23:45 on 27<sup>th</sup> May and was continued until the evening of 28<sup>th</sup> May. At 18:30 on 28<sup>th</sup> May, bad weather (Easterly F8) forced an end to groundtruthing operations. Multibeam survey lines were placed in a section of the AoS where no MCA multibeam had been collected. These lines were run from 21:10 on 28<sup>th</sup> May until 00:05 on 29<sup>th</sup> May. Endeavour then steamed to Scrabster Harbour where JNCCV, BGS and Cefas staff were put ashore at 09:00 on 29<sup>th</sup> May via small boat. Some in-water equipment tests were undertaken, whilst waiting for favorable tides round The Pentland, prior to a transit to the Souter Point disposal site off Newcastle to perform a secondary aim of the cruise.

### **Souter Point**

Endeavour arrived at Souter Point disposal site at 08:10 on 30<sup>th</sup> May to carry out a SPI (Sediment Profile Imagery) survey at ?? selected points over the area. The SPI camera was fitted with a downwards looking video camera and light to allow depth of penetration to be assessed in-situ, and recorded for later assessment of the surficial sediment. Ship's DP was used to place the SPI within a 100m radius target area. The survey was completed at 17:00. Six lines of sidescan data were then collected over the site using the SIS1500 200kHz Chirp sidescan system, for assessment of the sediment disposition over the disposal area. The survey completed at 20:50 and Endeavour set course for Lowestoft, eventually docking at 18:01 on 31<sup>st</sup> May.

D Limpenny (Scientist-in-Charge)

29<sup>th</sup> May 2008

W Meadows (Scientist-in-Charge)

31<sup>st</sup> May 2008