Survey Report of the Clean Seas Environmental Monitoring Programme voyage on the RV Cefas Endeavour

CENTRE FOR ENVIRONMENT, FISHERIES AND AQUACULTURE SCIENCE
LOWESTOFT LABORATORY, SUFFOLK, NR33 0HT

2016 RESEARCH VESSEL PROGRAMME

REPORT: Cefas Endeavour: Survey 23/16.

Sail: 22nd October at ~8:30 from Swansea
Dock: 27th October in the evening in Liverpool

STAFF:

Name	Name
Manuel Nicolaus	Lee Warford
Freya Goodsir	Sara Stones
John Bignell	Tom Hill
Michelle Pond	Craig Stenton
Nathan Edmonds	Derry Gibson
Scott Davis	Fiona McNie
Paul Nelson	Philip Lamb
Matt Green	

DURATION: 22ND OCTOBER TO 27TH OCTOBER, 2016

LOCATION: Welsh Coastline and Irish Sear

AIMS:
The information generated during this survey will be used to meet UK's obligations for reporting of contaminant and marine litter data to MERMAN and the ICES database and for subsequent assessments for OSPAR and Good Environmental Status (GES descriptors 1, 4, 8, 9 & 10) under the Marine Strategy Framework Directive (MFSD). After discussions with EA and NRW staff, a coordinated approach is being taken to help deliver additional EQSD requirements for the EA and NRW.

Specific aims:

1. To collect samples of demersal fish for chemical analysis from the Irish Sea, and Welsh Coast in support of the Clean Seas Environmental Monitoring Programme (CSEMP; table 1) (MSFD Descriptor 8 & 9).

2. To collect fish samples at CSEMP sites for fish disease biochemical markers (e.g. EROD and bile metabolites analysis) (MSFD Descriptor 8).

3. To sample representative CSEMP stations using day grab, for polycyclic aromatic hydrocarbons (PAHs), trace metal contaminants, organic

contaminants (PCBs, PBDEs and HBCD), sediment particle size analysis (PSA), benthic fauna and marine litter (MSFD Descriptor 1, 4, 8 and 10; table 2).

4. To conduct marine litter surveys (MSFD Descriptor 10) by collecting benthic litter information from the trawls and also collecting sediment samples for litter analysis.

5. To conduct marine mammal observations.

6. To conduct stomach content analysis using taxonomic and DNA analytical methods

Table 1. CSEMP fishing stations

CSEMP Number	Location	Mid tow Lat. and Lon.	
616	Camarthen Bay	51 32.82 N	04 35.13 W
649	North Cardigan Bay	52 42.44 N	04 32.29 W
654	South Cardigan Bay	52 10.90 N	04 29.87 W
706	Burbo Bight	53 28.24 N	03 20.47 W
715	Liverpool Bay	53 28.32 N	03 41.91 W
769	St Bees Head	54 30.71 N	03 47.63 W
776	Red Wharf Bay	53 22.46 N	04 12.84 W
796	Morecambe Bay	53 55.31 N	03 23.23 W
805	SE Isle of Man	54 03.36 N	03 52.47 W
Trend	Liverpool Bay Trend	53 23.76N	03 37.55 W

Table 2. CSEMP spatial and temporal sediment stations

Station Name	Lat.	Lon.
655	52.3583	-4.175
655_5_03	52.3241	-4.6881
655_5_04	52.284	-4.3065
655_5_08	52.2433	-4.6058
715	53.5	-3.6917
715_5_11	53.6268	-3.6782
715_5_12	53.6033	-3.7108
715_5_15	53.5837	-3.6435
805_20_01	53.8992	-3.5239
805_20_10	54.2669	-3.7093
805_20_11	54.1846	-3.7399
805	54	-3.8333

NARRATIVE:

The survey took place between the 22nd October and 27th October, 2016

Survey Summary

The survey was very successful and we achieved all our aims apart of one which was the collection of passive samplers, due to a malfunction of the system. In total, we carried out 32 trawls at 10 fishing stations. At one station (South East Isle of Man, CSEMP 805) we could not collect our target species (dab). The collection of benthic sediment samples was also successfully completed at 12 sediment sites.
The information generated at the CSEMP stations will be used to meet UK's obligations for reporting of contaminant, eutrophication and marine litter data to MERMAN and the ICES database and for subsequent assessments for OSPAR and Good Environmental Status (GES descriptors 1, 4, 5, 8, 9 & 10) under the Marine Strategy Framework Directive (MFSD).

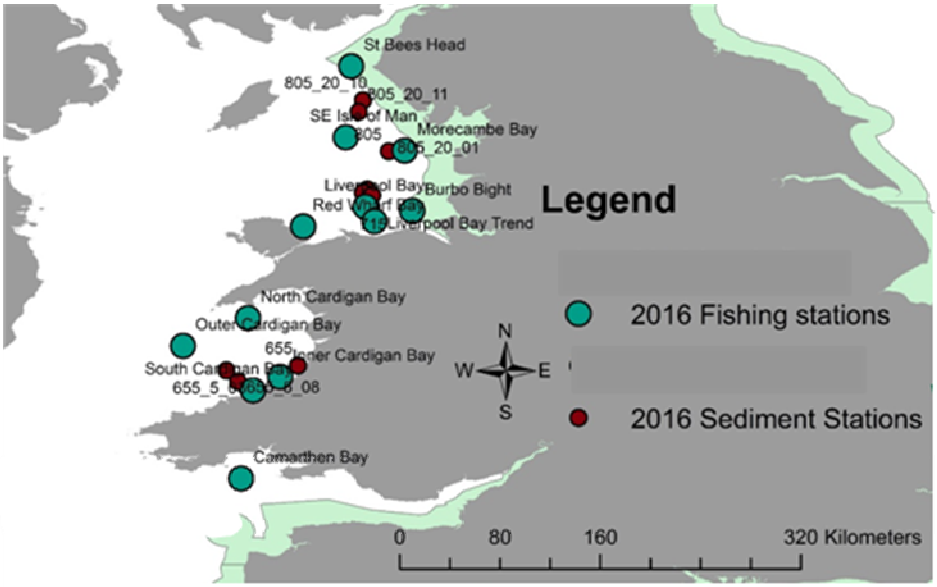

Figure 1. CSEMP fishing and temporal/spatial sediment stations

Daily Logbook:

21st October

Scientific staff boarded the Cefas Endeavour between 14:40 and 17:00.
At 16:15, staff (Scott Davies, Lee Warford, Tom Hill, Craig Stenton, Derry Gibson, Sara Stones, Philip Lamb) that were not on the vessel in the last 6 months undertook a detailed induction including a health and safety briefing by the crew's health and safety officer.

22nd October

We left Swansea harbour with the morning tide around 8:30 under sunny and fair weather conditions. We set sail to our first fishing station (CSEMP 616) in Camarthen Bay (figure 2). At 11:00 we had a toolbox talk followed by a safety drill at 11:30. It was a very educational man over board drill. We reached the first fishing station (CSEMP 616 in Camarthen Bay) of the survey at 12:30.

The first and second tows indicated some issues with the gear as we did not catch any benthic living fish or fauna. We realised swiftly on the third tow that the winches kept on reeling in automatically, not allowing the net to settle on to the bottom. The problem was resolved quickly allowing normal fishing to resume. The third and fourth tow was successful giving us enough fish for chemistry (50), fish disease, biological effects and stomach analysis. Fishing was finished at 17:56. The processing of all the fish was completed at 21:30.

We moved on to the Cardigan Bay fishing and sediment stations 90 miles away.

23rd October

We arrived at the first grabbing site (655_5_3; figure 2) at 03:30, which was completed successfully. We arrived at the second grabbing site (655_5_8) at 04:30, which was completed unsuccessfully (gravelly ground).

We arrived at the South Cardigan Bay (CSEMP 654) fishing station at 06:00 (figure 3). We completed three successful tows between 06:20 and 09:30. Then we moved on to sediment stations 655_5_4 and 655, which were completed by 12:10.

Then we took course to North Cardigan Bay (CSEMP 649) fishing station under slightly windy conditions of 20-25 knots. We completed three tows here between 14:29 and 18:26 and finished processing all fish by 20:30. The belly of the net ripped on the first tow so had to be mended, which took almost 2 hours. We also took one CTD sample at 19:26. We then transited to fishing station Red Wharf Bay to arrive there at 06:00 in the morning of the 24th October.

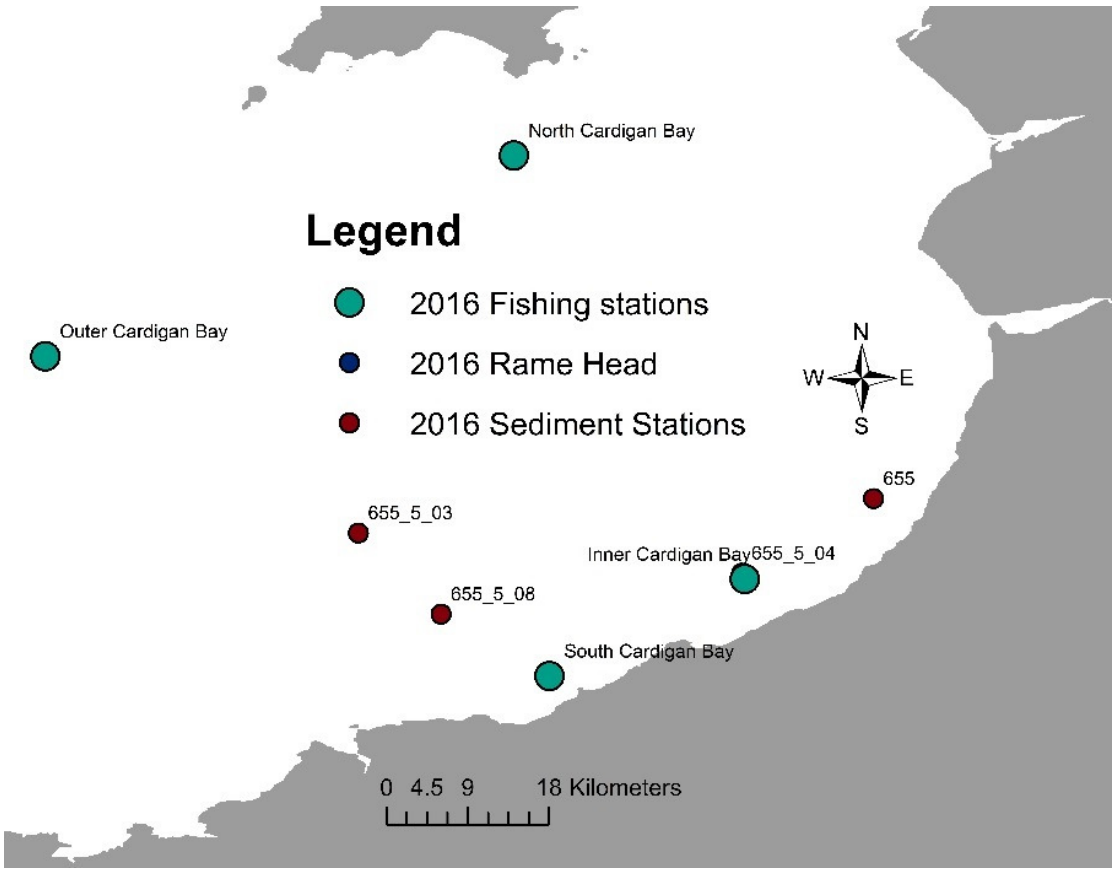

Figure 2. Cardigan Bay sampling sites in detail

24th October

We arrived at Red Wharf Bay (CSEMP776; figure 3) at 05:00 and shot the trawl just after 06:00. We trawled here 4 times before we finished this site at 10:16 with a CTD. We then moved on to the Liverpool Bay fishing station (CSEMP715). We towed here 3 times between 12:20 and 16:01. We also took a grab sample for benthic fauna, PSA, Metals, Oraganics and marine litter at the temporal sediment station CSEMP 715. We moved on swiftly after that to the Liverpool Bay trend site to collect Whiting, Dab and Plaice in various size categories for trend assessments. This took place between 17:05 and 18:31. In the late evening between 20:00 and 21:30 we took grab samples at three spatial sites, 715_5_12, 715_5_11, 715_5_15. We then made our way back south to the Liverpool Bay trend site to resume fishing in the morning of the 25th October.

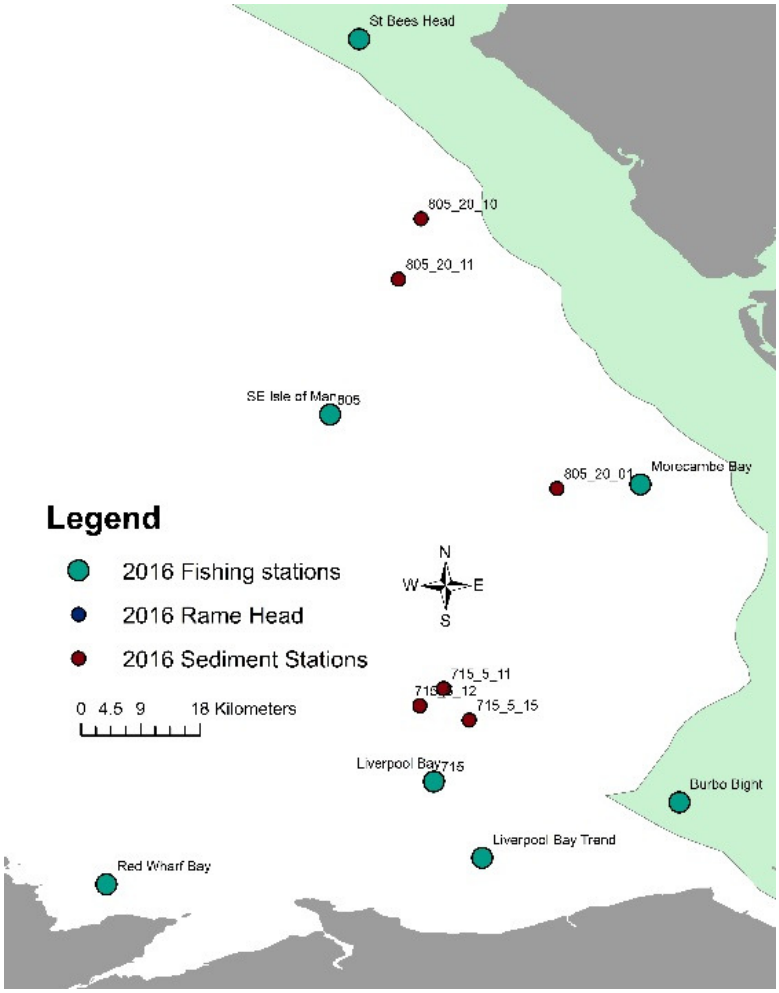

Figure 3. Irish Sea sampling sites in detail

25th October

We resumed fishing at the Liverpool Bay trend site surrounded by wind farms and designated anchorage areas (figure 3) at 06:06 and finished fishing here at 08:00. Fishing was rather difficult under these circumstances but we managed very well. We then took a CTD sample at 08:05. We held position here until 10:15 to ensure we had enough fish to carry out our analysis for biomarkers, biological effects, fish disease and stomach content. Additionally, we collected all the required fish samples for whiting, plaice and dab to carry out our temporal trend assessments. At 10:20 we set course to the Burbo Bight (CSEMP 706) fishing station (figure 3). We towed twice to get the required fish for contaminant and biological effects assessments. We left Burbo Bight at 14:00. We then made our way to the Morecambe Bay fishing station (CSEMP 796). We arrived at the fishing station at 16:45 and shot at 17:02 for our first trawl. The echo sounder showed a lot of activity in the water column which was confirmed when the tow came up. We caught around 20 baskets full of sprat and released them as quick as possible. Fishing was stopped for the evening to ensure not more shoals of sprat were caught as unnecessary by-catch. Instead we went off to our sediment station (805_20_01). The sample was successful.

26th October

We started fishing at 06:10 at Morecambe Bay (CSEMP 796; figure 3). The weather was slightly windy with strong rains. The weather cleared as soon as the sun kissed the horizon. We were surrounded by wind turbines which gave the morning an emerging atmosphere. We continued fishing until 8:45 and completed three trawls. We caught enough fish to carry out our fish disease, chemistry and biological effects assessments. We then took course to the South East Isle of Man (CSEMP 805; figure 3) sediment and fishing station. We completed the sediment grabs at 12:45, which was followed by a CTD dip, to measure bottom water temperature. We shot shortly after lunch at 12:40 (figure 3). We trawled three times at different locations within a 5 mile proximity of the fishing station, but were not successful of acquiring the necessary number of dab to carry out any assessments. We therefore abandoned fishing and moved on to the two remaining spatial grabbing stations (CSEMP 805_20_11 and 805_20_10). On the steam to these stations we watched the sun disappearing in the horizon. All grabbing was completed at 19:25. At the 805_20_10 grabbing station we also collected mud samples for the chemical QUASIME assessments. We then set course to the St. Bees fishing station and set anchor for the night at 08:10. We also hope to spot the Aurora borealis that made its way across the UK, but the thick clouds prevented us from seeing this natural wonder.

27th October

We started fishing St. Bees Head (CSEMP 769) bright and early as every day on this survey at 06:00. We caught a reasonable amount which raised our spirits for the day after the low catch rates yesterday. The second tow was even more successful allowing our Marine Mammal Observers (MMOs) to run some transects, while we processed the fish. We hoped to see a little bit of sunshine this morning but a thick layer of clouds is covering the sky. At 9:45, we concluded to have enough fish that we did not need to fish again. At 10:30 we carried out safety drill which involved an accident of a scientist with the day grab. The scientist pretended to suffer from a cut in the hand with blood gushing out. The scientific staff took the initiative and went to the patient raising the arm and putting pressure on to the upper arm to reduce bleeding. The bridge was also informed immediately. The master was also at the

scene shortly after with a first aid kit, followed by a first aider. Both treated the patient calmly and with great competence.
The MMOs were able to run two more east to west transects for their study. We then steamed back to Liverpool for docking in the late evening at 21:00.

28th October
Cefas scientific staff were leaving the vessel at 11:00.

RESULTS:

1. We sampled all sediment stations successfully apart from one, where the ground was to gravelly, but sampled another station instead.
2. We collected fish for contaminant, fish disease and biomarker analysis at the stations indicated in table 3.
3. We could not deploy any passive samplers due to the malfunction of the system.
4. Marine benthic litter was also noted down and categorised after each of the 32 fishing tows. In total we collected 67 litter items. A breakdown of the total litter items per km^2 per station can be found in table 3.
   Figure 4 gives an overview of the amount (%) of litter items collected within each of the six categories.

Table 4. Summary of fishing and litter results

Date	Location	Mid tow Lat decimal	Mid tow lon decimal	Litter item km-2	Fish for Chemistry	Biomarker	Fish disease
22/10/2016	Camarthen Bay	51.553	-4.5886	58.74	50 dab	Y	80
23/10/2016	South Cardigan Bay	52.215	-4.4446	44.23	50 dab	Y	80
23/10/2016	North Cardigan Bay	52.690	-4.5467	27.29	25 dab	Y	40
25/10/2016	Burbo Bight	53.462	-3.3757	32.12	50 dab	Y	80
24/10/2016	Liverpool Bay	53.490	-3.7042	37.02	50 dab	Y	At Trend
27/10/2016	St Bees Head	54.508	-3.8283	12.30	50 dab	Y	80
24/10/2016	Red Wharf Bay	53.349	-4.0914	15.33	50 dab	Y	70
26/10/2016	Morecambe Bay	53.910	-3.3914	31.00	50 dab	Y	80
26/10/2016	SE Isle of Man	54.035	-3.5318	22.12	11 dab	X	X
25/10/2016	Liverpool Bay Trend	53.407	-3.7321	3.38	all size classes for dab, whiting, plaice	Y	80

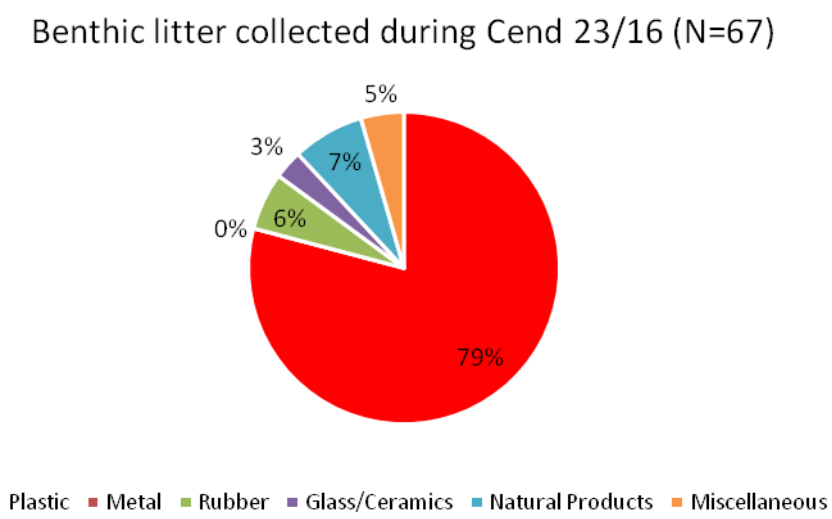

Figure 5. Abundance of benthic litter items collected during Cend 23/16 (N=67)

5. A comprehensive survey of marine birds and cetaceans as part of the Marine Life UK programme was also successfully completed.

6. A variety of fish species such as whiting, dab, cod, plaice, red gurnard, and sprat were collected whole and frozen. Molecular gut contents analysis will be conducted at UEA to assess for jellyfish feeding events as part of Phil Lamb's UEA/Cefas strategic alliance PhD.

E. E. Manuel Nicolaus
Scientist In Charge
28/10/2016

SEEN IN DRAFT

Master:
Senior Fishing Mate:

INITIALLED:

DISTRIBUTION: