

Survey Report of the Clean Seas Environmental Monitoring Programme survey 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 14/16.

STAFF:

Name	Name
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Paul Nelson	Brian Harley
Matt Green	

DURATION: 30th June-10th July 2016

LOCATION: Western Channel and Celtic Deep

AIMS: The information generated during this survey 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 (MSFD). 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, Celtic Sea and Western English Channel in support of the Clean Seas Environmental Monitoring Programme (CSEMP) (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).
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 undertake sediment sampling as part of the C6794 dredge spoil monitoring project at Rames Head and Lantic Bay.
6. To conduct surveys of marine animals (birds and cetaceans) and part of Marine Life UK programme.
7. To collect water conductivity, temperature and depth information, and Plankton community information to provide additional knowledge on Eutrophication levels (MSFD D5), as well as additional information on zooplankton community at the West Gabbard SmartBuoy site (MSFD D4, Food webs).
8. The recently completed draft assessment of eutrophication status under the OSPAR COMP has shown that there are very few data on the indicators for growing season (Mar-Oct) in chlorophyll and near-bed Dissolved Oxygen (June-Oct) for the western Channel and Celtic Sea, particularly in coastal waters (no data). It is a concern as the winter DIN levels in coastal waters exceed the threshold. For MSFD assessments, other member states have observed that there are very few data for the Eastern English Channel, which is also a concern. During this survey samples of chlorophyll ($\mu\text{g/l}$) and near-bed DO (mg/l) will be collected where possible in coastal waters (salinity <30) to deduce the lack of information. Additionally, we will collect and filter on board water samples for determination of chlorophyll and suspended particulate materials, that will be used for calibrating SmartBuoy, Ferrybox and ocean colour space-borne data (for the EU FP7 project HIGHROC, C5878);
9. To conduct 5 passive sampler transects to analyse samples for performance reference compounds (PRCs), PAHs, PCBs, OCPs and PBDEs in the water column (MSFD D8) using the Ferrybox water sampling system.

10. To collect triplicate plankton tows aiming to identify abundances of microplastics and plankton in as many unique settings as possible (usually one site per day). Plankton will also be depurated to look for plastic contamination in faecal pellets.

NARRATIVE:

The survey took place between the 30th June and 10th July 2016

Survey Summary

The survey was planned to take part between the 30th June and 10th of July, but was cut short due to an electrical fault of the generator that powers the main diesel engines. Nevertheless, we managed to sample 3 CSEMP fishing stations (South Eddystone, West Lundy and Celtic Deep), collected sediment samples at 3 temporal sediment stations (Off Tamar 1- 575, Celtic Deep- 605 and Lyme Bay- 536) and 9 spatial sediment stations in close proximity to the temporal sediment sites (Fig.1). 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 (MSFD).

Additionally, to the collection of fish and sediments at the CSEMP stations, we collected sediments for contaminant and macrofauna (>1mm) assessment at 14 stations at the Rame Head dredge disposal site and 16 stations at Lantic Bay. We also managed to achieve fully or partially aims number 2, 4, 6, 7, 8 and 9. The only aim we could not address was aim number 10.

The survey will be continued later in the year (October, 2016) 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 (MSFD).

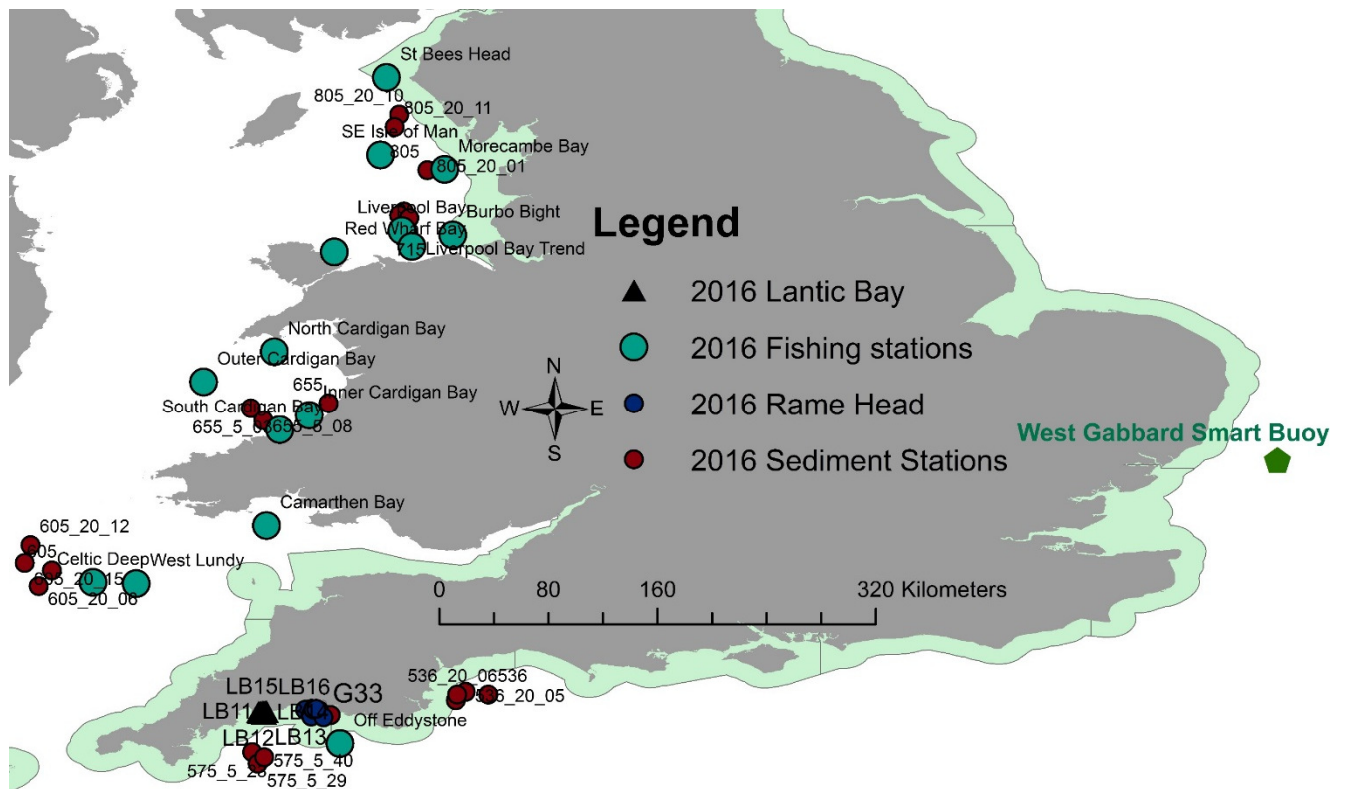


Figure 1. CSEMP fishing and temporal/spatial sediment, and dredge disposal sediment stations

29th June, 2016

Staff boarded the Cefas Endeavour at 13:45 on the 29th June 2016 to participate in an induction carried out by a member of the P&O Maritime crew. All essential scientific gear was loaded over the course of the day.

30th June, 2016

At 06:15 the RV Cefas Endeavour set sail from Lowestoft under clear and bright weather conditions with a westerly breeze. At 07:00 I had a quick discussion with the master and James (marine life observer) about the best way forward to carry out marine life observations from the bridge. After breakfast at 08:10 I had a quick catch up with the scientific crew to discuss responsibilities during the course of the survey.

- John, Freya, Michelle, Hessah, Denise, Matt, Tim, Brian and Eisa to set up the wet lab
- Alex and Briony to start organising the sediment sampling (set up of printer for label printing), reading stations into tower; after the wet lab is set up, you can set up the sieving equipment
- Sara and Paul to set up the plankton net and passive samplers
- James observation of marine life

At 10:20 the Plankton net and profiler was deployed at the West Gabbard smart buoy site (51° 57.38 2° 7.03) to collect water conductivity, temperature and depth information, and Plankton community

information to provide additional knowledge on Eutrophication levels (MSFD D5), as well as additional information on zooplankton community at the West Gabbard SmartBuoy site (MSFD D4, Food webs). This was carried out by Paul Nelson. As soon as this was finished we started the steam to the South Eddystone fishing site. At 11:15 a tool box talk was carried out to discuss the aims of the survey with the RV crew to give them an understanding of the survey. This was followed by an abandon ship drill at 11:40.

1st July, 2016

Reached South Eddystone (CSEMP 584) fishing site at 13:30. Deployed the trawl 4 times to collect target species *Limanda limanda* in sufficient quantity for contaminant analyses and for biomarker and fish disease assessment. Enough fish within the right size range were captured for further assessment. Additionally, we also collected whiting for contaminant assessment if required. We also deployed a CTD profiler and Niskin bottles for nutrient and bottom water temperature assessment as requested by ICES to validate biomarkers. Fishing was stopped at 18:46 to move to the sediment sampling sites. Started grabbing work at Off Tamar 1 (CSEMP 575) at 19:52 for temporal trend assessment of metals and organics (Fig.2). Additionally, sediments were collected for macrofauna, Particle Size Analysis and marine litter assessments. At 20:52 we started work at Rame Head dredge disposal site with a total of 14 sites. 3 replicate samples for macrofauna were collected with a mini Hamon grab and 1 replica was collected with a Shipek grab for metals and organics assessment (Fig. 2).

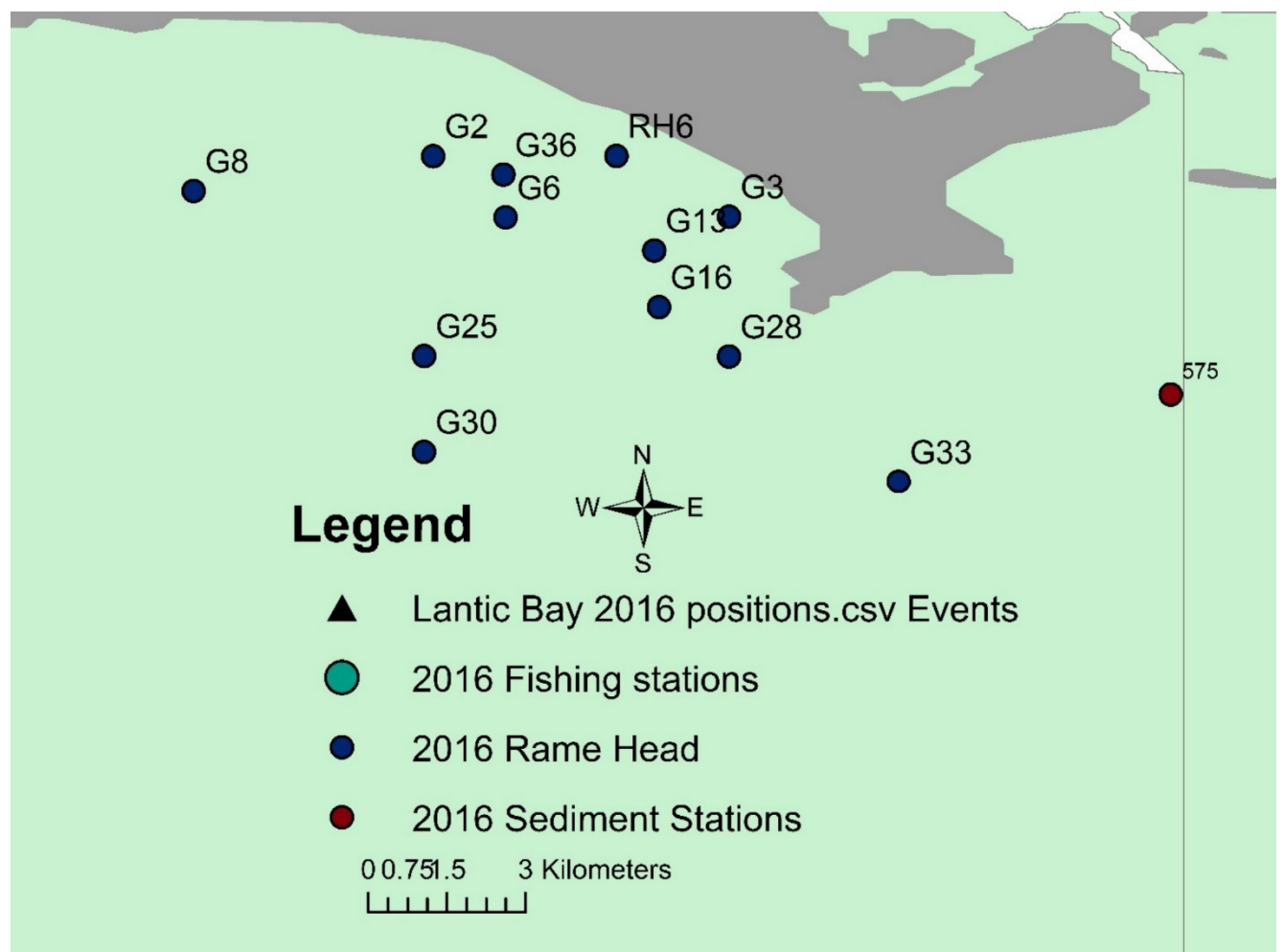


Figure 2. Rame's Head dredge disposal and CSEMP 575 sediment monitoring site

2nd July, 2016

We finished sediment sampling at Rame Head dredge disposal site at 13:16 with the deployment of the CTD profiler and Niskin bottles for nutrient assessment. At 15:45 we arrived at Lantic Bay, which is considered as a new dredge disposal site (Fig. 3). At first we deployed the CTD profiler and Niskin bottles for nutrient assessment at LB12 station. We sampled 16 sediment stations in Lantic Bay using a shipek grab for metal and organics contaminant assessment. We finished sampling Lantic bay at 20:31 and set off to West Lundy fishing station.

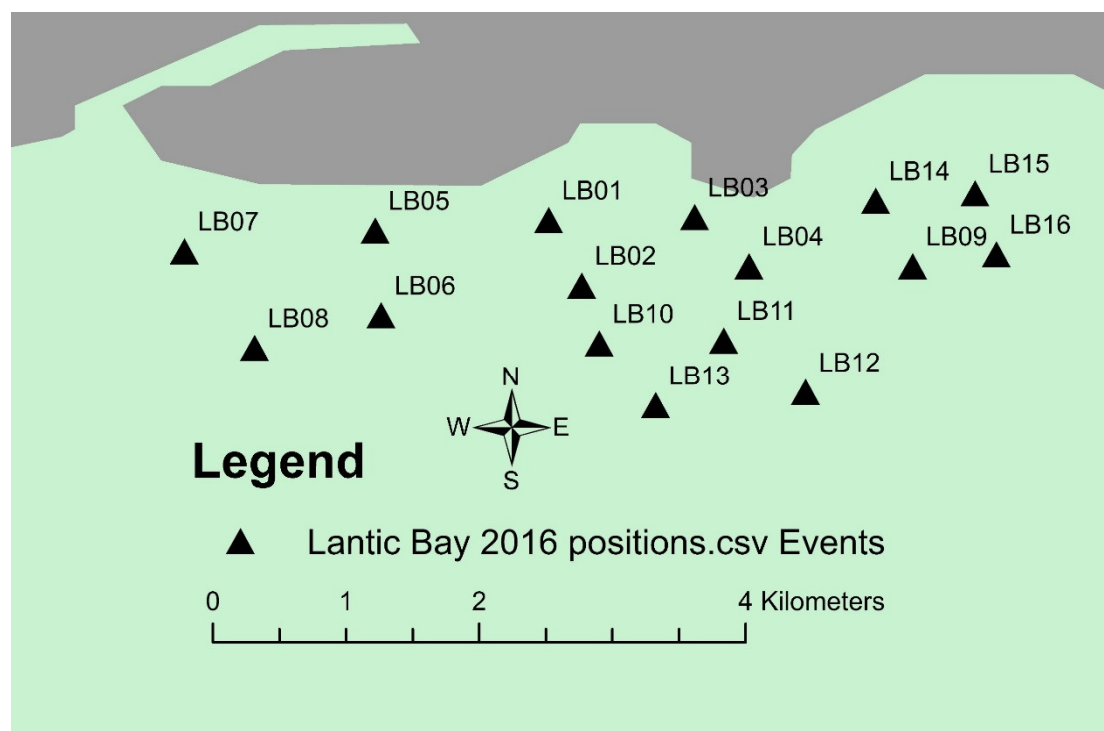


Figure 3. Lantic Bay dredge disposal sediment sites

3rd July, 2016

We arrived at West Lundy fishing station at 09:00 (Fig. 4). We carried out 4 tows at West Lundy (CSEMP 604) fishing site. Collected 50 dab for chemical analysis, 20 fish for biomarker analysis and 60 fish for external fish disease and histopathology analysis. In the afternoon we carried out fishing at Celtic Deep (CSEMP 605) fishing site, with a total of 3 tows. We did not collect dab in sufficient numbers for contaminant analysis, but collected 25 Whiting and 25 Haddock for chemical analysis instead. We also collected sediment samples at the temporal Celtic Deep sediment station CSEMP 605. Additionally, we also collected sediment samples for chemical assessment at 3 further spatial stations in the Celtic Deep area.

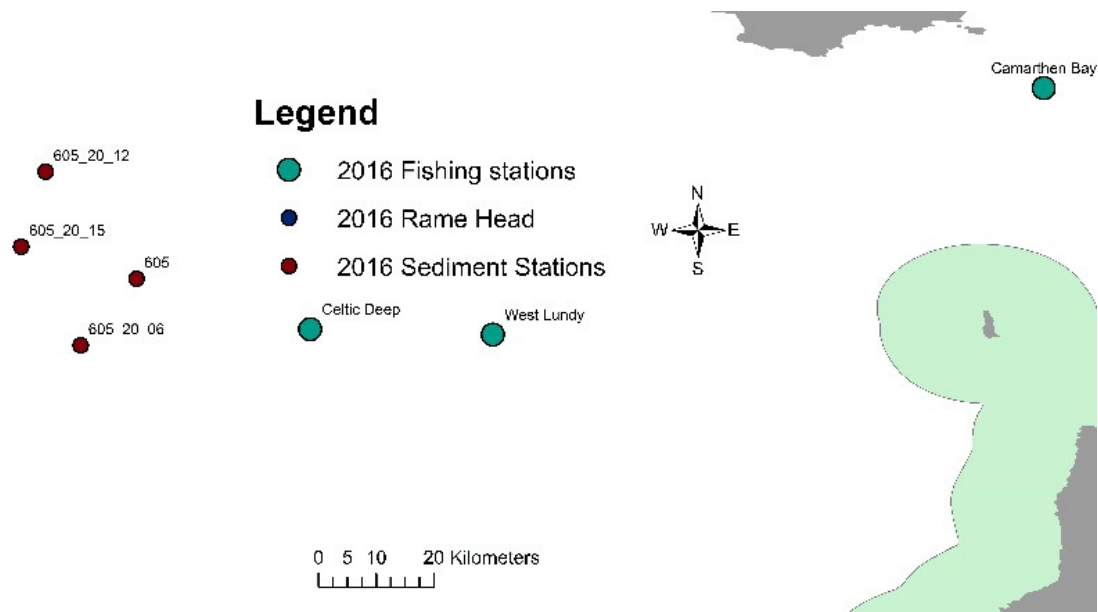


Figure 4. West Lundy, Celtic Deep and Camarthen Bay sampling sites

4th July, 2016

On transit from the Celtic Deep sediment site to the Camarthen Bay fishing site the ship broke down at 4am on the 4th July. I was informed about the break down at 8am. No scientific operations could go ahead due to break down of the research vessel.

The chief engineer explained to me that the propulsion system had failed and that one of the engines leaked around 15L of oil causing smoke development in the engine room. An emergency battery system should have kicked in to keep the propulsion system running but this failed so the engineer had to stop the system manually.

By 15:00 it was decided to get a tug boat from Milford Haven to tow the Endeavour to port. The tug boat arrived around 21:00, but it became apparent really quickly that the tug was not suitable to pull the Endeavour into port as it could only pull vessels from the aft. A second tug was sent out.

5th July, 2016

The second tug boat arrived approximately at 01:00 and pulled the Research Vessel safely to Milford Haven, arriving at approximately 07:30 on the 5th July.

The master gave me (Scientist in Charge) a quick update about the procedures happening over the day at 08:00. They include to assess the current situation with various experts from P&O and CLASS, to ensure safety can be assured.

A scientific crew change was also carried out. 4 scientific staff left the vessel including one sedimentologist, and three general marine scientists from the middle east who came on board as a knowledge exchange programme at 10am. Taking on two marine litter experts (macro-litter and micro-plastics) and a Marine wildlife observer.

6th July, 2016

The RV was still not fixed and it was estimated to sail on the 7th July at 17:00.

I was updated from Cefas Lowestoft at 15:00 that the best tide would be at 20:30 on the 7th July.

Update from Alan Rowan (P&O) at 18:53 via email indicated that sailing in the evening of the 7th July would be unlikely.

7th July, 2016

The Master gave me an update over breakfast (7:30) highlighting that the ordered generator base did not arrive on time over night, and is only expected over the course of the day. An update by the master at 09:00 indicated a delivery of the generator base at 13:00. A follow up meeting with the master at 10:30 highlighted above mentioned issues putting sailing for tonight into jeopardy. At 14:00 it was decided to postpone sailing to the evening of the 8th July. The CSEMP survey was called off due to the amount of survey time lost and has been rescheduled for October, 2016. Following on from this, I made arrangements to send 3 scientific staff home as we would not be able to continue the CSEMP survey as it was originally planned. I would only need a core team to collect additional samples during the steam to the planned harbour (Fowey).

8th July, 2016

The Cefas Endeavour sailed out of Milford Haven with the evening tide of the 8th July.

9th July, 2016

We reached the off Tamar 1 (CSEMP 575) spatial and temporal sediment sites and collected the required sediment samples using a Day grab.

10th July, 2016

We reached Fowey harbour for a partial crew change.

14th July, 2016

As part of the survey Cend 15/16 we collected the required CSEMP sediment samples from the spatial and temporal stations in Lyme Bay (CSEMP 536).

RESULTS:

1. We sampled all sediment sites at the Rame Head and Lantic Bay dredge disposal sites.
2. We also collected sediment samples at 3 temporal and 9 spatial CSEMP sites.
3. We collected fish for contaminant, fish disease and biomarker analysis at 2 fishing sites) South Eddystone and West Lundy) and fished a third fishing station (Celtic Deep) unsuccessfully.
4. Passive samplers were also used to analyse the water quality in specific areas around the Western English Channel and Celtic Sea.
5. Marine benthic litter was also categorised and noted down after each of the 12 fishing tows. Figure 5 gives an overview of the amount and categories collected.

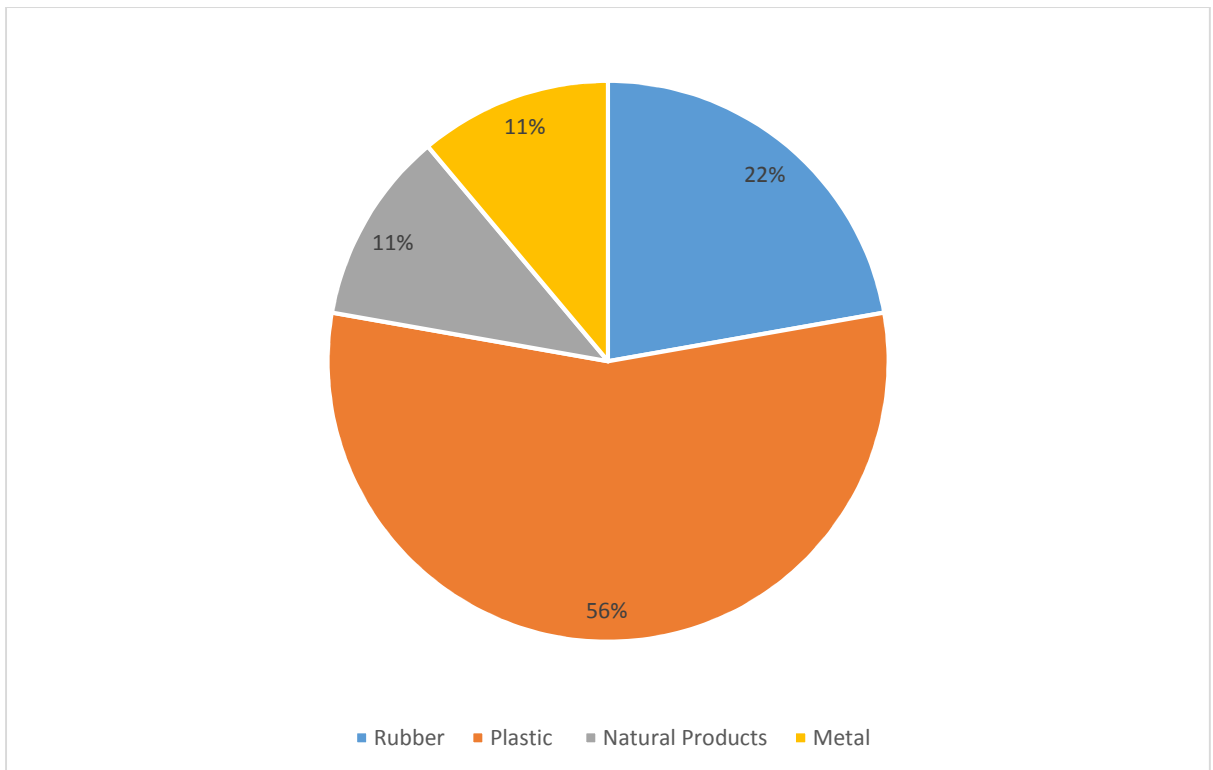


Figure 5. Abundance of benthic litter items collected during Cend 14/16 (N=9)

6. We also collected water conductivity, temperature and depth information, and Plankton community information to provide additional knowledge on Eutrophication levels (MSFD D5), as well as additional information on zooplankton community at the West Gabbard SmartBuoy site (MSFD D4, Food webs).
7. OSPAR COMP has shown that there are very few data on the indicators for growing season (Mar-Oct) in chlorophyll and near-bed Dissolved Oxygen (June-Oct) for the western Channel and Celtic Sea, particularly in coastal waters (no data). To get a better idea on these levels we also collected chlorophyll and near-bed Dissolved Oxygen samples.
8. A comprehensive survey of marine birds and cetaceans as part of the Marine Life UK programme was also successfully completed.

E. E. Manuel Nicolaus
 Scientist In Charge
 20/07/2016

SEEN IN DRAFT

Master:
 Senior Fishing Mate:

INITIALLED:

DISTRIBUTION: