Annex 10.1

South Humber Channel
Marine Studies: Intertidal and
Subtidal Benthic & Fish
Surveys 2010

(*IECS*)
South Humber Channel Marine Studies: 
Intertidal and Subtidal Benthic & Fish 
Surveys 2010

Report to Yorkshire Forward

Institute of Estuarine and Coastal Studies 
University of Hull

21st January 2011

Author(s):
D. Burdon, K. Mazik, R. Perez-Dominguez

Fieldwork & Laboratory Analysis:
M. Bailey, C. Baulcomb, O. Dawes, A. 
Leighton, W. Musk, T. Smith

Report: 
ZBB752-F1-2010-Benthic & Fish

Institute of Estuarine & Coastal Studies 
(IECS) 
The University of Hull 
Cottingham Road 
Hull 
HU6 7RX 
UK 

Tel: +44 (0)1482 464120 
Fax: +44 (0)1482 464130 

E-mail: iecs@hull.ac.uk 
Web site: http://www.hull.ac.uk/iecs
Yorkshire Forward

South Humber Channel Marine Studies: Intertidal and Subtidal Benthic and Fish Surveys 2010

21st January 2011

Reference No:

ZBB752-F1-2010-Benthic & Fish

For and on behalf of the Institute of Estuarine and Coastal Studies
Approved by: Nick Cutts
Signed: 
Position: Deputy Director, IECS
Date: 21 January 2011

This report has been prepared by the Institute of Estuarine and Coastal Studies, with all reasonable care, skill and attention to detail as set within the terms of the Contract with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This is a confidential report to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such parties rely on the report at their own risk.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>TABLE OF CONTENTS</td>
<td>I</td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>2. METHODOLOGY</td>
<td>2</td>
</tr>
<tr>
<td>2.1 Benthos and fish survey logs</td>
<td>2</td>
</tr>
<tr>
<td>2.2 Intertidal benthic survey</td>
<td>3</td>
</tr>
<tr>
<td>2.3 Subtidal benthic sampling</td>
<td>4</td>
</tr>
<tr>
<td>2.4 Intertidal fish and shellfish sampling</td>
<td>5</td>
</tr>
<tr>
<td>2.5 Subtidal fish and shellfish sampling</td>
<td>6</td>
</tr>
<tr>
<td>2.6 Laboratory analysis</td>
<td>7</td>
</tr>
<tr>
<td>2.6.1 Benthic sample sorting</td>
<td>7</td>
</tr>
<tr>
<td>2.6.2 Taxonomic identification</td>
<td>8</td>
</tr>
<tr>
<td>2.6.3 Biomass</td>
<td>9</td>
</tr>
<tr>
<td>2.6.4 Fish and shellfish processing</td>
<td>9</td>
</tr>
<tr>
<td>3. RESULTS</td>
<td>10</td>
</tr>
<tr>
<td>3.1 Intertidal benthic survey</td>
<td>10</td>
</tr>
<tr>
<td>3.1.1 Site descriptions</td>
<td>11</td>
</tr>
<tr>
<td>3.1.2 Abundance</td>
<td>11</td>
</tr>
<tr>
<td>3.1.3 Biomass</td>
<td>11</td>
</tr>
<tr>
<td>3.2 Subtidal benthic survey</td>
<td>19</td>
</tr>
<tr>
<td>3.2.1 Sample descriptions</td>
<td>20</td>
</tr>
<tr>
<td>3.2.2 Abundance</td>
<td>20</td>
</tr>
<tr>
<td>3.2.3 Biomass</td>
<td>20</td>
</tr>
<tr>
<td>3.3 Intertidal fish and shellfish survey</td>
<td>25</td>
</tr>
<tr>
<td>3.4 Subtidal fish and shellfish survey</td>
<td>27</td>
</tr>
<tr>
<td>4. SUMMARY OF FINDINGS</td>
<td>29</td>
</tr>
<tr>
<td>4.1 Benthos</td>
<td>29</td>
</tr>
<tr>
<td>4.1.1 Intertidal</td>
<td>29</td>
</tr>
<tr>
<td>4.1.2 Subtidal</td>
<td>29</td>
</tr>
<tr>
<td>4.2 Fish &amp; Shellfish</td>
<td>30</td>
</tr>
<tr>
<td>4.2.1 Intertidal</td>
<td>30</td>
</tr>
<tr>
<td>4.2.2 Subtidal</td>
<td>31</td>
</tr>
<tr>
<td>4.3 Annex 1 Habitats &amp; Annex 2 Species</td>
<td>31</td>
</tr>
<tr>
<td>ANNEX 1. INTERTIDAL BENTHIC SURVEY PHOTOS</td>
<td>34</td>
</tr>
<tr>
<td>ANNEX 2. SUBTIDAL BENTHIC SAMPLE PHOTOS</td>
<td>46</td>
</tr>
<tr>
<td>ANNEX 3. INTERTIDAL FISH SURVEY PHOTOS</td>
<td>49</td>
</tr>
<tr>
<td>ANNEX 4. SUBTIDAL FISH SAMPLE PHOTOS</td>
<td>51</td>
</tr>
</tbody>
</table>
1. INTRODUCTION

Yorkshire Forward is currently investigating the feasibility of a potential commercial development in the Humber Estuary between the Humber Sea Terminal and Immingham Port (Figure 1). This area may provide a suitable location for a variety of developments e.g. multi-user marine facility or tidal power generating farm. However, in order for any such development to take place a host of studies relating to the planning and design of the marine elements of the development are required.

![Figure 1: Potential development area in the Humber estuary.](image)

The Institute of Estuarine & Coastal Studies was commissioned in association with Roger Tym & Partners to undertake some of the ecological components required for Yorkshire Forward's investigations. This report presents the methodologies employed and the data obtained from the intertidal and subtidal benthic and fish surveys undertaken in May/June 2010. The aim of these surveys was to provide baseline data on the benthic and fish communities within the area. This report presents the initial findings of these surveys, with no further discussion or analysis of the data.

The information provided in this report will ultimately be used to assess the potential impacts to the benthic and fish communities in the vicinity of any proposed marine development in the Humber Estuary.
2. METHODOLOGY

2.1 Benthos and fish survey logs

The survey log presented in Table 1 summarises the timings of the intertidal and subtidal benthic and fish surveys. The methodology and results of the sediment analyses (PSA, organic carbon and contaminants) are presented along with the water quality data in a separate report.

Table 1: Survey log for the intertidal and subtidal benthic and fish surveys.

<table>
<thead>
<tr>
<th></th>
<th>Intertidal benthic survey</th>
<th>Subtidal benthic survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>Friday 14 May 2010</td>
<td>Date</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tuesday 4 May 2010</td>
</tr>
<tr>
<td>Personnel</td>
<td>Oliver Dawes (IECS)</td>
<td>Personnel</td>
</tr>
<tr>
<td></td>
<td>James Thurlow (Hovercraft Pilot)</td>
<td>Ann Leighton (IECS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Will Musk (IECS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(plus EA crew onboard)</td>
</tr>
<tr>
<td>Vessel</td>
<td>Hovercraft</td>
<td>Vessel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RV Water Guardian</td>
</tr>
<tr>
<td>Components undertaken</td>
<td>36 benthic samples</td>
<td>Components undertaken</td>
</tr>
<tr>
<td></td>
<td>36 PSA samples</td>
<td>30 benthic samples</td>
</tr>
<tr>
<td></td>
<td>36 organic carbon samples</td>
<td>30 PSA samples</td>
</tr>
<tr>
<td></td>
<td>36 contaminant samples</td>
<td>30 organic carbon samples</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 contaminant samples</td>
</tr>
</tbody>
</table>

|                     | Intertidal fish survey                               | Subtidal fish survey                          |
| Date                | Tuesday 8 June 2010                                  | Date                                          |
|                     | Wednesday 9 June 2010                                | Wednesday 5 May 2010                          |
| Personnel           | Mike Bailey (IECS)                                   | Personnel                                     |
|                     | Tim Smith (IECS)                                     | Will Musk (IECS)                              |
|                     |                                                      | Chris Baulcomb (IECS)                         |
|                     |                                                      | (plus EA crew onboard)                        |
| Vessel              | N/A                                                  | Vessel                                        |
|                     |                                                      | RV Water Guardian                             |
| Components undertaken| 4 double-ended fyke nets                             | Components undertaken                         |
|                     |                                                      | 8 beam trawls                                 |
2.2 Intertidal benthic survey

Each sample station was accessed either via hovercraft or on foot and each sample point was located using a hand-held WAAS enabled Thales Mobile Mapper GPS. At each of the sampling stations, a single 0.01m² core, penetrated to a depth of 15cm, was extruded from the sediment and placed into a sealable bag which was labelled externally detailing client, project, site, replicate, date and analysis required (e.g. YF Humber estuary Tran1_Mid 01/05/10 Macrofauna).

In addition, at each site, sediment samples were collected for particle size analysis, organic carbon and contaminants analysis. Each sample was collected using a clean plastic spoon to remove the top layer, 2-3cm, 5mm and 0-2cm respectively, of undisturbed sediment within two metres of the invertebrate core sample. The samples were stored in sealed plastic bags and labelled externally detailing client, project, site, date and analysis required.

The sediment samples were placed in a cool box containing ice packs to maintain a constant low temperature (approximately 4-5°C). At the end of each day the OC and PSA samples were transferred to the IECS laboratory where they were kept frozen until analysis. The sediments for contaminant analysis were forwarded to ALcontrol, a UKAS accredited laboratory, for analysis.

A complete survey log was maintained throughout the survey detailing time, position, physical characteristics of the sediment, climatic conditions, biological surface features (e.g. tubes, casts, feeding pits, faecal mounds) and any other notable features.

Particular attention was paid to the extent of ephemeral/opportunistic algae and other algal cover, as well as any modification to the community structure which may have resulted from the presence of algae. Evidence of human activities and pressures which may be influencing each survey area was also noted.

Photographs of the site and each sampling location were taken (see Annex 1). At the end of each day the invertebrate core samples were transferred to pre-labelled sealable containers and borax buffered 4% formo-saline solution containing Rose Bengal vital stain was added as a fixative.

The above methodology follows the protocol given by Rees et al. (1990)¹, & (1993)² Davies et al. (2001)³, with the rationale for different benthic sampling designs in Gray & Elliott (2009)⁴.


2.3 Subtidal benthic sampling

At each pre-determined station position (located by DGPS), a 0.1m\(^2\) Hamon grab was lowered to the seabed and the resulting sample recovered (see Plate 1). Due to the lack of inspection doors within the Hamon grab design, the volume of the sample cannot be assessed whilst the sample is retained within the grab, and therefore the collected sediment was removed to an underlying container prior to evaluation. The retained material should have a minimum volume of 5 litres, any less and the sample was rejected.

![Plate 1: Recovery of the Hamon grab.](image1)

![Plate 2: Sieving of a sample onboard.](image2)

If persistently less than 5 litres were collected, expert judgement was used to retain representative samples of less than 5 litres however this should be an occasional incidence rather than a frequent occurrence.

For the incidence of low levels of material, five attempts were made and the vessel repositioned, if required, between attempts. If no sample was accepted within a location, the sample point was moved and a further attempt conducted. If the additional attempt failed, the benthic sample would ordinarily be replaced by video footage, however due to the turbid nature of the Humber Estuary it is unlikely that adequate video footage could be collected. As such data from the bathymetry survey would be used to derive relevant information. Once an acceptable sample was placed in the sample container, a digital image was taken of the disturbed sediment (see Annex 2).

Two replicate grab samples were taken at each station, one for macrofaunal analysis and the second for sediment analysis. This is because given the expected volume of sediment removal from the sample for a suite of subsequent physico-chemical determinands, it was considered that the removal of a sediment sample from the macrofaunal grab would compromise the integrity of the invertebrate data, particularly as the potentially mixed nature of the sediment may limit the amount of sediment collected by the grab. A full survey log was maintained throughout the survey detailing time of sampling, position (DGPS derived), station, attempts, water depth, physical characteristics of the sample, digital image number (cross referencing (QA)), and the presence of any other relevant features.
The macrofaunal samples were processed on a sequential basis utilising a nested sieving technique. Each acceptable sample was removed from the Hamon grab, placed into a clean fish box and photographed (see Annex 2). The sample was then transferred into a hopper and sieved on-board through a nest of 5mm and 0.5mm sieves in order to separate large sediment types that could produce physical damage to invertebrates during sieving (see Plate 2 above). The sieved residues were gently back-washed into sealable containers and borax buffered 4% formo-saline solution (containing Rose Bengal vital stain) was added as a fixative. Each sample was labelled clearly on the side of the container and an additional internal label placed in the container.

The second grab sample, taken for sediment analysis, was removed from the Hamon grab, placed in a clean plastic fish box and photographed. A clean plastic scoop was then used to mix the sample and remove approximately 20g of sediment for organic carbon analysis. This sample was stored in a plastic bag, which was clearly labelled, and kept in a cool box until the end of the day, at which point it will be transferred to IECS and kept frozen until analysis. A second scoop of approximately 2kg was removed from the main sample using a clean plastic scoop and stored in appropriate containers, supplied by ALcontrol, for contaminant analysis. The remaining sediment was retained for PSA and stored in appropriately labelled plastic containers and kept in a cool box until the end of the day, at which point it was transferred to IECS and kept frozen until analysis.

2.4 Intertidal fish and shellfish sampling

One double fyke net assembly, consisting of two facing fyke nets joined by a central net wall (53cm entrance, 10 m central panel, 14mm mesh), was deployed at each station parallel to the shore (Plate 3). Fykes were secured with canes and/or anchors at low tide and left in place for 24h (two tidal cycles); the catch was collected after 12h and 24h to stop the catch drying out. Following sampling, the catch was placed in a shallow container. Coarse debris was carefully removed and the whole catch placed in a chilled insulated container. Macro invertebrates and epifaunal organisms (i.e. brown shrimps) were identified, quantified and released. A representative selection of crabs and prawns was taken to the laboratory to ensure accurate species identification and kept for further reference. All fish were transported to the laboratory for further processing or immediately frozen.
2.5 Subtidal fish and shellfish sampling

The survey used a 2m-wide research beam trawl (the trawl frame is comprised of two 60mm x 500mm x 500mm steel shoes, with a 2120mm steel tube brace) fitted with a 5mm cod end sleeve. The start point for each trawl commenced from the point at which the gear reached the seabed after the warp length is paid out and the winch is locked. Trawling was conducted with a warp length of three times the depth at constant speed (2 knots) following a straight path (towards or away from the station fix) to a predetermined finish point.

The survey leader supplied recording sheets on which the skipper recorded the start and end positions of each trawl, date, tow number and station, gear, shooting and hauling times and position (DGPS), time, any significant change in tow direction, depth, warp out and speed over ground. These and all other observations from individual trawls (e.g. tidal state, weather and sea conditions, and shipping activity) were recorded on the survey log.

After the completion of the sampling run, the trawl was quickly hauled to the vessel’s deck and the sample was recovered into a container. The net was then checked for any remaining epifauna and fish, before the cod end was refastened, prior to redeployment at the next station. Each accepted sample was initially cleared of large debris and the total catch was photographed (see Annex 4). Fish species will be sorted from epifaunal invertebrates, divided into species groups, counted and measured (total length) to the closest millimetre. All sample bags and buckets will be clearly coded inside and out and the same codes will be carried forward during all the sample analysis. Any species not identified on board will be coded and preserved in 10% buffered formaldehyde solution in seawater or frozen and identified on return to the IECS laboratory. A full survey log was maintained throughout the sorting and sample processing detailing station, date, processing time, gear, species ID, total counts and sub-sample lengths. The data derived from each haul and subsequent fish
analysis was compiled initially in Excel spreadsheet format and was then backed-up with all photographs onto secure digital media.

Plate 4: Measuring fish onboard the RV Water Guardian.

2.6 Laboratory analysis

IECS is one of the few independent laboratories to be part of the UK National Marine Biological Analytical Quality Control Scheme (NMBAQC). This scheme assesses the quality of marine benthic work carried out by laboratories, with independent checking of outputs, staff training and technique refinement. IECS is regularly placed within the top two laboratories for test compliance.

2.6.1 Benthic Sample Sorting

The same team of benthic technicians undertook the sample sorting for all samples, conducting all the sieving, sorting work and sample description using the standard methodology explained below. Standard sorting quality control was carried out by a member of IECS senior staff. Similarly, the identification of the sorted fauna derived from all samples was carried out by IECS’ team of senior taxonomists. Again, standard identification quality control was carried out by a different member of IECS staff. A standard sample tracking procedure was followed throughout the analysis period.

The proposed sorting methodology was as follows:

The 4% formaldehyde solution was decanted from the sample through a 212μm sieve using appropriate exposure prevention controls as detailed in the Health & Safety documentation.
Formaldehyde residue was stored in sealed containers and later disposed in full accordance with current hazardous substances regulations. Material retained on the sieve was washed back into the sample container. A small amount of sediment was then emptied onto a 0.5mm sieve and washed with running tap-water to remove excess formal-saline solution and to complete the sieving process. If there was a large proportion of stone or large shell fragment, a 1mm and 10mm sieve was placed above the 0.5mm sieve to separate into three fractions prior to sorting therefore preventing damage to specimens. The sieve contents were backwashed into a white tray and examined by eye using a 1.5x illuminated magnifier to remove larger specimens. The sample was then sorted under a low powered microscope to ensure the extraction of small specimens. Specimens were removed and sorted into major phyla. Sieves and trays were washed thoroughly between samples to ensure there is no contamination of subsequent samples. The sediment was gradually worked through in this manner until all the material had been sorted, with the internal label kept in the white tray until completion. Specimens were then stored in appropriately labelled containers (specifying client, date, site, and sample no.), preserved in 70% Industrial Methylated Spirits (IMS) and passed on for identification to the team of taxonomists.

The Institute values data quality greatly and uses a variety of in-house procedures to train staff and audit samples. The Institute is a subscriber to the NMBAQC scheme which involves the external auditing of work. A sample tracking procedure is used in the laboratory to ensure traceability and accountability of work.

2.6.2 TAXONOMIC IDENTIFICATION

The procedure for the identification of the sample material is as follows:

Identification was carried out using Olympus SZ40 zoom microscopes with 10x and 20x eyepieces, giving a maximum magnification of up to 80x. An additional 2x objective can occasionally be used to increase the potential magnification to 160X. Olympus BX41 compound microscopes are used for further magnification, if necessary, up to 1000x.

Identification of infaunal samples was to the lowest possible taxonomic level (i.e. species). During identification, all individuals were initially separated into families, with part animals being assigned to families where possible. The macrofauna were identified to species level using standard taxonomic keys, low and high power stereoscopic microscopes and dissection, when necessary, for identification. Juvenile bivalves were opened using sodium hypochlorite. Incomplete animals without anterior ends were not recorded as individuals to be included in the quantitative dataset, however they were identified where possible and recorded as present. Similarly, colonial sessile / epibenthic taxa (e.g. barnacles, hydroids), motile epibenthic taxa (e.g. decapods) and meiofauna were recorded but were not included within the infaunal quantitative dataset.

Regular cross reference identification was carried out by Mr Will Musk (IECS Senior Taxonomist) as part of the standard IECS QA procedure.

Each sample residue was described textually and the residue retained for further analysis and Analytical Quality Control (AQC). All fauna was retained under the standard codes and can be returned to the clients representative for further analysis and AQC should this be required. A reference collection was compiled containing three specimens of each taxa where possible, each vial being fully labelled using standard codes detailing species, sample origin and date.
It is IECS standard procedure to store identified taxa individually in pots for each sample with a label recording the site, date, replicate number and name of who analysed the sample. A permanent internal label bearing the same information is also included inside all containers.

The taxonomic literature used is essentially as given in Rees et al. (1990). Reporting nomenclature used Howson & Picton (1997)\(^5\).

### 2.6.3 BIOMASS

Biomass analysis was performed by wet weight (tissue blotted) and carried out for individual species in each sample. Each taxon was placed on blotting paper to allow the absorption of preservative into the blotting paper, the individuals were then placed on a zeroed microbalance for 30 seconds and the reading taken. The macrofaunal organisms were then placed back in their respective pots and stored. Biomass calculations include all identifiable fragments and were recorded to ± 0.0001g.

### 2.6.4 FISH AND SHELLFISH PROCESSING

In the laboratory, all the fish not processed in the field were identified using standard taxonomic literature (Ingle, 1983\(^6\); Whitehead et al., 1989\(^7\); Hayward & Ryland, 1990\(^8\), 1996\(^9\) and Maitland & Herdson, 2008\(^10\)) and were measured to the closest mm. All data from the field and laboratory were combined and were entered into an Excel spreadsheet. Data were recorded for each of the four fyke nets, in turn being sub-divided into the west and east fykes (hence the use of double-ended fyke nets). All sorted samples will be retained for at least 12 months following the reporting sign-off and thereafter a small reference collection will be maintained in case future external auditing is requested.

---


3. RESULTS

3.1 Intertidal benthic survey

Figure 2 presents the intertidal survey sampling stations at which samples were collected for benthos (abundance and biomass) and sediment analysis (PSA, organic carbon and contaminants). The positions of the sampling stations are presented in Table 2 below.

![Figure 2: Location of the 12 intertidal transects with upper, middle and lower shore sampling stations at each.](image-url)
Table 2: Positions of the intertidal sampling stations.

<table>
<thead>
<tr>
<th>Transect</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Transect</th>
<th>Latitude</th>
<th>Longitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transect 1 Upper</td>
<td>53.62759000</td>
<td>-0.17963200</td>
<td>Transect 7 Upper</td>
<td>53.65738200</td>
<td>-0.22699400</td>
</tr>
<tr>
<td>Transect 1 Middle</td>
<td>53.62829000</td>
<td>-0.17871100</td>
<td>Transect 7 Middle</td>
<td>53.65780000</td>
<td>-0.22606400</td>
</tr>
<tr>
<td>Transect 1 Lower</td>
<td>53.62879600</td>
<td>-0.17791200</td>
<td>Transect 7 Lower</td>
<td>53.65804100</td>
<td>-0.22551400</td>
</tr>
<tr>
<td>Transect 2 Upper</td>
<td>53.64520300</td>
<td>-0.21247000</td>
<td>Transect 8 Upper</td>
<td>53.65980500</td>
<td>-0.22845900</td>
</tr>
<tr>
<td>Transect 2 Middle</td>
<td>53.64588100</td>
<td>-0.21060200</td>
<td>Transect 8 Middle</td>
<td>53.66007400</td>
<td>-0.22860000</td>
</tr>
<tr>
<td>Transect 2 Lower</td>
<td>53.64653500</td>
<td>-0.20916900</td>
<td>Transect 8 Lower</td>
<td>53.66035000</td>
<td>-0.22829600</td>
</tr>
<tr>
<td>Transect 3 Upper</td>
<td>53.64926400</td>
<td>-0.21828200</td>
<td>Transect 9 Upper</td>
<td>53.66198200</td>
<td>-0.23130500</td>
</tr>
<tr>
<td>Transect 3 Middle</td>
<td>53.65011100</td>
<td>-0.21679200</td>
<td>Transect 9 Middle</td>
<td>53.66218000</td>
<td>-0.23068000</td>
</tr>
<tr>
<td>Transect 3 Lower</td>
<td>53.65069400</td>
<td>-0.21513400</td>
<td>Transect 9 Lower</td>
<td>53.66234400</td>
<td>-0.23053600</td>
</tr>
<tr>
<td>Transect 4 Upper</td>
<td>53.65212600</td>
<td>-0.22162700</td>
<td>Transect 10 Upper</td>
<td>53.66283100</td>
<td>-0.23213700</td>
</tr>
<tr>
<td>Transect 4 Middle</td>
<td>53.65277000</td>
<td>-0.22021100</td>
<td>Transect 10 Middle</td>
<td>53.66305000</td>
<td>-0.23196800</td>
</tr>
<tr>
<td>Transect 4 Lower</td>
<td>53.65334900</td>
<td>-0.21897000</td>
<td>Transect 10 Lower</td>
<td>53.66307000</td>
<td>-0.23155300</td>
</tr>
<tr>
<td>Transect 5 Upper</td>
<td>53.65349300</td>
<td>-0.22316400</td>
<td>Transect 11 Upper</td>
<td>53.66721800</td>
<td>-0.23849100</td>
</tr>
<tr>
<td>Transect 5 Middle</td>
<td>53.65407700</td>
<td>-0.22174600</td>
<td>Transect 11 Middle</td>
<td>53.66765500</td>
<td>-0.23822700</td>
</tr>
<tr>
<td>Transect 5 Lower</td>
<td>53.65456000</td>
<td>-0.22101600</td>
<td>Transect 11 Lower</td>
<td>53.66797500</td>
<td>-0.23752500</td>
</tr>
<tr>
<td>Transect 6 Upper</td>
<td>53.65523000</td>
<td>-0.22549500</td>
<td>Transect 12 Upper</td>
<td>53.66994200</td>
<td>-0.24337800</td>
</tr>
<tr>
<td>Transect 6 Middle</td>
<td>53.65612700</td>
<td>-0.22421800</td>
<td>Transect 12 Middle</td>
<td>53.67043900</td>
<td>-0.24247300</td>
</tr>
<tr>
<td>Transect 6 Lower</td>
<td>53.65640200</td>
<td>-0.22344100</td>
<td>Transect 12 Lower</td>
<td>53.67071900</td>
<td>-0.24244300</td>
</tr>
</tbody>
</table>

3.1.1SITE DESCRIPTIONS

Table 3 presents site descriptions from the three shore positions (upper, middle, lower) at each of the 12 intertidal transects. Photographs from each of the sampling stations have been appended in Annex 1.

3.1.2 ABUNDANCE

The abundance of each benthic species is presented in Table 4, whilst Table 5 presents the % dominance based on total abundance across the upper, middle and lower shore sites.

3.1.3 BIOMASS

The biomass of each benthic species from the intertidal surveys is presented in Table 6, whilst Table 7 presents the % dominance across the three shore heights, based on the biomass data.
### Table 3: Site and sample descriptions from the intertidal survey.

<table>
<thead>
<tr>
<th>Transect</th>
<th>Time</th>
<th>Sediment type</th>
<th>Biological surface features</th>
<th>Weather</th>
<th>Diatoms present</th>
<th>Human activities</th>
<th>Biological notes during sieving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transect 1 Upper</td>
<td>12:59:53</td>
<td>Mud</td>
<td><em>Hediste</em> burrows and tracks. Evidence of feeding birds</td>
<td>Cloudy</td>
<td>Yes</td>
<td>No</td>
<td>A few <em>Hediste</em>. Quite a few Oligochaetes. 1 <em>Macoma.</em></td>
</tr>
<tr>
<td>Transect 1 Middle</td>
<td>13:04:25</td>
<td>Mud</td>
<td>Evidence of feeding birds</td>
<td>Cloudy/ Sunny intervals</td>
<td>Yes</td>
<td>No</td>
<td>2 <em>Macoma</em>. Lots of Oligochaetes.</td>
</tr>
<tr>
<td>Transect 1 Lower</td>
<td>13:08:16</td>
<td>Mud</td>
<td>Evidence of feeding birds</td>
<td>Cloudy/ Sunny intervals</td>
<td>Yes</td>
<td>No</td>
<td>2 <em>Macoma.</em></td>
</tr>
<tr>
<td>Transect 2 Upper</td>
<td>13:25:16</td>
<td>Cracked mud-anoxic</td>
<td><em>Hediste</em> burrows and tracks Evidence of feeding birds</td>
<td>Cloudy/ Sunny intervals</td>
<td>Yes but only in surface pools</td>
<td>No</td>
<td>No animals</td>
</tr>
<tr>
<td>Transect 2 Middle</td>
<td>12:14:55</td>
<td>Mud</td>
<td>Evidence of feeding birds</td>
<td>Sunny</td>
<td>Yes</td>
<td>No</td>
<td>4 <em>Macoma</em>. A few Oligochaetes</td>
</tr>
<tr>
<td>Transect 2 Lower</td>
<td>12:26:55</td>
<td>Mud</td>
<td>Nothing visible</td>
<td>Cloudy/ Sunny intervals</td>
<td>No</td>
<td>No</td>
<td>2 <em>Macoma</em></td>
</tr>
<tr>
<td>Transect 3 Upper</td>
<td>14:28:25</td>
<td>Mud</td>
<td><em>Hediste</em> burrows and tracks Evidence of feeding birds</td>
<td>Sunny</td>
<td>Yes</td>
<td>No</td>
<td>Lots of <em>Hediste</em></td>
</tr>
<tr>
<td>Transect 3 Middle</td>
<td>12:07:49</td>
<td>Mud</td>
<td><em>Corophium</em> feeding on the surface</td>
<td>Sunny</td>
<td>Yes</td>
<td>No</td>
<td>Lots of <em>Corophium</em>. A few <em>Macoma</em></td>
</tr>
<tr>
<td>Transect 3 Lower</td>
<td>13:31:35</td>
<td>Mud</td>
<td>Nothing</td>
<td>Sunny</td>
<td>Yes</td>
<td>No</td>
<td>2 <em>Macoma</em>. Possibly Oligochaetes</td>
</tr>
<tr>
<td>Transect 4 Upper</td>
<td>14:34:54</td>
<td>Mud</td>
<td><em>Corophium</em> feeding on the surface</td>
<td>Cloudy</td>
<td>Yes</td>
<td>No</td>
<td>A few <em>Corophium</em>. Quite a few Oligochaetes</td>
</tr>
<tr>
<td>Transect 4 Middle</td>
<td>12:05:08</td>
<td>Mud</td>
<td><em>Corophium</em> feeding on the surface</td>
<td>Cloudy</td>
<td>No</td>
<td>No</td>
<td>A few <em>Corophium</em>. A few Oligochaetes</td>
</tr>
<tr>
<td>Transect 4 Lower</td>
<td>13:37:19</td>
<td>Mud</td>
<td>Nothing</td>
<td>Cloudy</td>
<td>Yes</td>
<td>No</td>
<td>A few Oligochaetes</td>
</tr>
<tr>
<td>Transect 5 Upper</td>
<td>14:39:25</td>
<td>Mud</td>
<td><em>Hediste</em> feeding holes and tracks Evidence of feeding birds</td>
<td>Sunny</td>
<td>Yes</td>
<td>No</td>
<td>2 <em>Hediste</em></td>
</tr>
<tr>
<td>Transect</td>
<td>Time</td>
<td>Sediment type</td>
<td>Biological surface features</td>
<td>Weather</td>
<td>Diatoms present</td>
<td>Human activities</td>
<td>Biological notes during sieving</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>---------------</td>
<td>-----------------------------</td>
<td>---------</td>
<td>----------------</td>
<td>-----------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Transect 5 Middle</td>
<td>11:57:15</td>
<td>Mud</td>
<td>Corophium feeding on the surface, Evidence of feeding birds</td>
<td>Cloudy</td>
<td>No</td>
<td>No</td>
<td>Lots of Corophium</td>
</tr>
<tr>
<td>Transect 5 Lower</td>
<td>13:41:43</td>
<td>Mud</td>
<td>Nothing</td>
<td>Sunny</td>
<td>No</td>
<td>No</td>
<td>No animals</td>
</tr>
<tr>
<td>Transect 6 Upper</td>
<td>14:43:26</td>
<td>Mud</td>
<td>Hediste feeding holes, Evidence of feeding birds</td>
<td>Sunny</td>
<td>Yes</td>
<td>No</td>
<td>1 Corophium, Quite a few Oligochaetes</td>
</tr>
<tr>
<td>Transect 6 Middle</td>
<td>11:48:11</td>
<td>Mud</td>
<td>Nothing</td>
<td>Sunny</td>
<td>No</td>
<td>No</td>
<td>No animals</td>
</tr>
<tr>
<td>Transect 6 Lower</td>
<td>13:48:31</td>
<td>Mud</td>
<td>Nothing</td>
<td>Cloudy</td>
<td>No</td>
<td>No</td>
<td>No animals</td>
</tr>
<tr>
<td>Transect 7 Upper</td>
<td>14:52:29</td>
<td>Mud</td>
<td>Evidence of Hediste / Corophium feeding, Evidence of feeding birds</td>
<td>Sunny</td>
<td>Yes</td>
<td>No</td>
<td>A few Macoma, A few Corophium, A few Hediste/Eteone</td>
</tr>
<tr>
<td>Transect 7 Middle</td>
<td>11:42:27</td>
<td>Mud</td>
<td>Evidence of Hediste / Corophium feeding</td>
<td>Sunny</td>
<td>Yes</td>
<td>No</td>
<td>A few Macoma, A few Corophium, A few Hediste</td>
</tr>
<tr>
<td>Transect 7 Lower</td>
<td>13:52:05</td>
<td>Mud</td>
<td>Nothing</td>
<td>Cloudy</td>
<td>No</td>
<td>No</td>
<td>No animals</td>
</tr>
<tr>
<td>Transect 8 Upper</td>
<td>14:57:41</td>
<td>Mud</td>
<td>Hediste feeding holes and tracks</td>
<td>Sunny</td>
<td>Yes</td>
<td>No</td>
<td>1-2 Corophium, Quite a few Hediste, 1 Macoma, A few Oligochaetes</td>
</tr>
<tr>
<td>Transect 8 Middle</td>
<td>11:34:54</td>
<td>Mud</td>
<td>Corophium feeding tracks</td>
<td>Sunny</td>
<td>Yes</td>
<td>No</td>
<td>A few Corophium, A few Macoma, A few Hediste/Eteone</td>
</tr>
<tr>
<td>Transect 8 Lower</td>
<td>13:58:29</td>
<td>Mud</td>
<td>Macoma burrow and feeding arrangement</td>
<td>Sunny</td>
<td>No</td>
<td>No</td>
<td>No animals</td>
</tr>
<tr>
<td>Transect 9 Upper</td>
<td>15:04:43</td>
<td>Mud</td>
<td>Hediste burrows and tracks/ Corophium feeding</td>
<td>Cloudy</td>
<td>Yes</td>
<td>No</td>
<td>Lots of Corophium, A few Hediste, A few Oligochaetes</td>
</tr>
<tr>
<td>Transect 9 Middle</td>
<td>11:29:04</td>
<td>Mud</td>
<td>Corophium feeding</td>
<td>Sunny</td>
<td>No</td>
<td>No</td>
<td>A few Corophium</td>
</tr>
<tr>
<td>Transect</td>
<td>Time</td>
<td>Sediment type</td>
<td>Biological surface features</td>
<td>Weather</td>
<td>Diatoms present</td>
<td>Human activities</td>
<td>Biological notes during sieving</td>
</tr>
<tr>
<td>---------------</td>
<td>------------</td>
<td>---------------</td>
<td>------------------------------------------------------</td>
<td>---------</td>
<td>----------------</td>
<td>-----------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Transect 9 Lower</td>
<td>14:02:05</td>
<td>Mud</td>
<td><em>Corophium</em> feeding</td>
<td>Sunny</td>
<td>Yes</td>
<td>No</td>
<td>A few <em>Corophium</em>. A few Oligochaetes</td>
</tr>
<tr>
<td>Transect 10 Upper</td>
<td>15:09:53</td>
<td>Mud</td>
<td><em>Hediste</em> burrows and tracks/<em>Corophium</em> feeding</td>
<td>Cloudy</td>
<td>Yes</td>
<td>No</td>
<td>A few <em>Corophium</em>. 1 <em>Hediste</em>. A few Oligochaetes</td>
</tr>
<tr>
<td>Transect 10 Middle</td>
<td>11:20:24</td>
<td>Mud</td>
<td>Nothing</td>
<td>Sunny</td>
<td>No</td>
<td>No</td>
<td>2 <em>Corophium</em>. 1 Oligochaete</td>
</tr>
<tr>
<td>Transect 10 Lower</td>
<td>14:06:15</td>
<td>Mud</td>
<td><em>Macoma</em> burrow and feeding arrangement</td>
<td>Sunny</td>
<td>Yes</td>
<td>No</td>
<td>1 <em>Macoma</em>?</td>
</tr>
<tr>
<td>Transect 11 Upper</td>
<td>15:20:23</td>
<td>Mud</td>
<td><em>Hediste</em> feeding holes and tracks/<em>Corophium</em> feeding</td>
<td>Cloudy</td>
<td>Yes</td>
<td>No</td>
<td>3 <em>Corophium</em>. A few <em>Hediste</em>. 1 <em>Macoma</em></td>
</tr>
<tr>
<td>Transect 11 Middle</td>
<td>11:13:50</td>
<td>Mud</td>
<td><em>Corophium</em> feeding/possibly <em>Hediste</em></td>
<td>Cloudy</td>
<td>Yes</td>
<td>No</td>
<td>Lots of <em>Corophium</em>. 1 or 2 <em>Macoma</em></td>
</tr>
<tr>
<td>Transect 11 Lower</td>
<td>14:11:29</td>
<td>Mud</td>
<td><em>Macoma</em> burrow and feeding arrangement</td>
<td>Cloudy</td>
<td>No</td>
<td>No</td>
<td>1 <em>Diastylis</em>. 1 <em>Macoma</em>. 1 <em>Nephtys</em>. A few Oligochaetes</td>
</tr>
<tr>
<td>Transect 12 Upper</td>
<td>15:27:26</td>
<td>Mud</td>
<td><em>Hediste</em> feeding holes and tracks/<em>Corophium</em> feeding Evidence of feeding birds</td>
<td>Cloudy</td>
<td>Yes</td>
<td>No</td>
<td>A few <em>Corophium</em>. A few <em>Hediste</em>.</td>
</tr>
<tr>
<td>Transect 12 Middle</td>
<td>11:03:46</td>
<td>Mud</td>
<td><em>Corophium</em> feeding</td>
<td>Cloudy</td>
<td>No</td>
<td>No</td>
<td>Lots of <em>Corophium</em>. 1 or 2 <em>Macoma</em></td>
</tr>
<tr>
<td>Transect 12 Lower</td>
<td>14:16:48</td>
<td>Mud</td>
<td><em>Corophium</em> feeding</td>
<td>Sunny</td>
<td>No</td>
<td>No</td>
<td>Quite a few <em>Corophium</em>. A few Oligochaetes</td>
</tr>
</tbody>
</table>
Table 4: Raw abundance data from the intertidal benthic surveys.

<table>
<thead>
<tr>
<th>MCS Code</th>
<th>Taxon</th>
<th>Qualifier</th>
<th>Upper</th>
<th>Mid</th>
<th>Lower</th>
<th>Upper</th>
<th>Mid</th>
<th>Lower</th>
<th>Upper</th>
<th>Mid</th>
<th>Lower</th>
<th>Upper</th>
<th>Mid</th>
<th>Lower</th>
</tr>
</thead>
<tbody>
<tr>
<td>E 2</td>
<td>TURBELLARIA</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HD 1</td>
<td>NEMATODA</td>
<td></td>
<td>5 35</td>
<td>10</td>
<td>5</td>
<td>6 6 6 1</td>
<td>3 3 1 2 7</td>
<td>11 3 2 2</td>
<td>2 5</td>
<td>1 6 3 1</td>
<td>4 4 4 20</td>
<td>1 3 5 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 117/118</td>
<td>Eteone flava/longa</td>
<td></td>
<td>12</td>
<td></td>
<td>26</td>
<td></td>
<td>5</td>
<td></td>
<td>24</td>
<td>4</td>
<td>3</td>
<td>13</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>P 462</td>
<td>Hediste diversicolor</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 499</td>
<td>Nephtys hombergii</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 672</td>
<td>Scoloplos armiger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 776</td>
<td>Pygospio elegans</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 799</td>
<td>Streblospio shubsolii</td>
<td></td>
<td>6 9</td>
<td>1</td>
<td>4</td>
<td>6 6 6 2</td>
<td>4 2 3 2 2 2 4 6 15</td>
<td>12 6 9</td>
<td>1 15</td>
<td>5 4 6 2 6 9 6 5 1 1</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P Tharya</td>
<td>Tharya killiensis</td>
<td>Sp. A</td>
<td>4</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 846</td>
<td>Tharya killiensis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 907</td>
<td>Capitella capitata</td>
<td>Sp. Complex</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 931</td>
<td>Arescota</td>
<td>Juvenile</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 1294</td>
<td>Manayunkia aestuarina</td>
<td></td>
<td>1 1</td>
<td>32</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 1420</td>
<td>Paranais litoralis</td>
<td></td>
<td>6 1 5 9 6 5</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 1479</td>
<td>Heterochaeta costata</td>
<td></td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 1490</td>
<td>Tubificoides benedii</td>
<td></td>
<td>38 136 1 12 12 1</td>
<td>43 4 2 55 5 1 38 4 1 50 10 1 30 16 1 6 56 1 1 3</td>
<td>4 3 5 2</td>
<td>19 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 1500</td>
<td>Tubificoides swinencoides</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 1501</td>
<td>Enchytraeidae</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 605</td>
<td>Corophium</td>
<td>Juvenile</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 616</td>
<td>Corophium volutator</td>
<td></td>
<td>3</td>
<td></td>
<td>2 34</td>
<td>12 10</td>
<td>32 1 10 10 1 13 12 52 4 2 2 15 3 70</td>
<td>13 27 71</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 1253</td>
<td>Dasyplax rathkei</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 385</td>
<td>Hydrobia ulvae</td>
<td></td>
<td>4 6 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 1695</td>
<td>Mytilus edulis</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 1906</td>
<td>Mysela bidentata</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 2007</td>
<td>TELLINACEA</td>
<td>Juvenile</td>
<td>13 1 1</td>
<td>1 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 2029</td>
<td>Macoma balthica</td>
<td></td>
<td>2 5 2 4 4 9 2 1 2</td>
<td>4 1 3 3</td>
<td>1 3 1 2 2 1 3 1</td>
<td>1 6 3 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 2064</td>
<td>Abra tenuis</td>
<td></td>
<td>3 3 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Abundance</td>
<td></td>
<td>84 197</td>
<td>5 10 36 14 120 64 26 82 25 6 59 49 5 57 45 22 63 31 10 47 79 18 65 19 8 9 13 32 64 84 11 49 61 106</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantitative Species Diversity</td>
<td>9 9 4 6 5 7 7 8 5 6 6 5 9 5 4 4 8 6 7 7 2 6 6 4 5 7 4 2 5 6 9 4 5 6 6 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qualitative Species Diversity</td>
<td>0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Species Diversity</td>
<td>9 9 4 6 5 7 7 8 5 6 6 5 9 5 4 4 8 6 7 7 2 6 6 4 5 7 4 2 5 6 9 4 5 6 6 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5: Abundance data displayed as % dominance at the upper, middle and lower shore sites.

<table>
<thead>
<tr>
<th>MCS Code</th>
<th>Taxon Qualifier</th>
<th>Upper %</th>
<th>MCS Code</th>
<th>Taxon Qualifier</th>
<th>Middle %</th>
<th>MCS Code</th>
<th>Taxon Qualifier</th>
<th>Lower %</th>
</tr>
</thead>
<tbody>
<tr>
<td>P 1490</td>
<td>Tubificoides benedii</td>
<td>268</td>
<td>P 1490</td>
<td>Tubificoides benedii</td>
<td>271</td>
<td>P 799</td>
<td>S. benedii</td>
<td>91</td>
</tr>
<tr>
<td>P 462</td>
<td>Hediste diversicolor</td>
<td>114</td>
<td>S 616</td>
<td>Conchitium volutator</td>
<td>202</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 616</td>
<td>Conchitium volutator</td>
<td>109</td>
<td>HD 1</td>
<td>NEMATODA</td>
<td>93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 799</td>
<td>S. brooksii</td>
<td>50</td>
<td>P 799</td>
<td>S. brooksii</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HD 1</td>
<td>NEMATODA</td>
<td>49</td>
<td>W 2029</td>
<td>Macoma balthica</td>
<td>47</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 1294</td>
<td>Manayunkia aestuarina</td>
<td>42</td>
<td>P 1420</td>
<td>Paranais litoralis</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 2007</td>
<td>TELLINACEA</td>
<td>16</td>
<td>W 385</td>
<td>Hydrobia ulvae</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 2039</td>
<td>Macoma balthica</td>
<td>13</td>
<td>P 776</td>
<td>Pygoespio elegans</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 1479</td>
<td>S. costata</td>
<td>7</td>
<td>P 1500</td>
<td>Tubificoides swirencoides</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 385</td>
<td>Hydrobia ulvae</td>
<td>5</td>
<td>P 2064</td>
<td>Abra tenuis</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 1501</td>
<td>Enchytraeidae</td>
<td>3</td>
<td>W 2007</td>
<td>TELLINACEA</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 2064</td>
<td>Abra tenuis</td>
<td>3</td>
<td>P 117/118</td>
<td>Etetone flavafonga</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F 2</td>
<td>TURBELLARIA</td>
<td>3</td>
<td>P 907</td>
<td>Capitella capitata</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 776</td>
<td>Pygoespio elegans</td>
<td>1</td>
<td>P 1294</td>
<td>Manayunkia aestuarina</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 117/118</td>
<td>Etetone flavafonga</td>
<td>0</td>
<td>S 605</td>
<td>Conchitium</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 499</td>
<td>Nephys hombergi</td>
<td>0</td>
<td>W 1605</td>
<td>Mytilus edulis</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 672</td>
<td>Scoleptis armiger</td>
<td>0</td>
<td>F 2</td>
<td>TURBELLARIA</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P Tharyx</td>
<td></td>
<td>0</td>
<td>P 462</td>
<td>Hediste diversicolor</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 846</td>
<td>Tharyx killianensis</td>
<td>0</td>
<td>P 499</td>
<td>Nephys hombergi</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 907</td>
<td>Capitella capitata</td>
<td>0</td>
<td>P 672</td>
<td>Scoleptis armiger</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 931</td>
<td>Arenicola</td>
<td>0</td>
<td>P 846</td>
<td>Hediste diversicolor</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 1500</td>
<td>Tubificoides swirencoides</td>
<td>0</td>
<td>P 931</td>
<td>Arenicola</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 605</td>
<td>Conchitium</td>
<td>0</td>
<td>P 1479</td>
<td>Heterochaeta costata</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 1253</td>
<td>Diastylis rathkei</td>
<td>0</td>
<td>P 1501</td>
<td>Enchytraeidae</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 1695</td>
<td>Mytilus edulis</td>
<td>0</td>
<td>S 805</td>
<td>Conchitium</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 1506</td>
<td>Mytilus bidentata</td>
<td>0</td>
<td>W 385</td>
<td>Hydrobia ulvae</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Abundance</td>
<td>706 100</td>
<td>Total Abundance</td>
<td>703 100</td>
<td>Total Abundance</td>
<td>263 100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6: Raw biomass data from the intertidal benthic surveys.

<table>
<thead>
<tr>
<th>Taxon Qualifier</th>
<th>MCS Code</th>
<th>Taxon</th>
<th>Total Biomass</th>
<th>Quantitative Species Diversity</th>
<th>Qualitative Species Diversity</th>
<th>Total Species Diversity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Upper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The table includes data for various taxa with their respective biomass and species diversity values.
Table 7: % dominance across the upper, middle and lower shore, with respect to total biomass.

<table>
<thead>
<tr>
<th>MCS Code</th>
<th>Taxon</th>
<th>Taxon Qualifier</th>
<th>Upper %</th>
<th>Middle %</th>
<th>Lower %</th>
</tr>
</thead>
<tbody>
<tr>
<td>P 462</td>
<td>Hediste diversicolor</td>
<td></td>
<td>76.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 616</td>
<td>Complium volutator</td>
<td></td>
<td>11.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 2029</td>
<td>Macoma balthica</td>
<td></td>
<td>7.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 1490</td>
<td>Tubificoides benedii</td>
<td></td>
<td>5.94</td>
<td>19.92</td>
<td>21.29</td>
</tr>
<tr>
<td>P 799</td>
<td>Streblospio shubosoki</td>
<td></td>
<td>4.33</td>
<td>13.44</td>
<td>12.21</td>
</tr>
<tr>
<td>W 385</td>
<td>Hydrobia ulvae</td>
<td></td>
<td>1.11</td>
<td>3.62</td>
<td>3.62</td>
</tr>
<tr>
<td>W 2007</td>
<td>Tellinacea</td>
<td>Juvenile</td>
<td>2.00</td>
<td></td>
<td>0.00</td>
</tr>
<tr>
<td>P 1479</td>
<td>Helicostoma costata</td>
<td></td>
<td>0.33</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 1294</td>
<td>Manayunkia aestuarina</td>
<td></td>
<td>0.03</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>HD 1</td>
<td>Nematoda</td>
<td></td>
<td>0.02</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>F 2</td>
<td>Turbellaria</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>W 2064</td>
<td>Abra tenuis</td>
<td></td>
<td>0.02</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 1420</td>
<td>Paranais tritubaria</td>
<td></td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 1501</td>
<td>Enchytraeida</td>
<td></td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 776</td>
<td>Pygospio elegans</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 117/118</td>
<td>Eteone flavo/longa</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 499</td>
<td>Nephys hombergi</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 672</td>
<td>Scoloplos armiger</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>F 2</td>
<td>Tharyx</td>
<td>Sp. A</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 846</td>
<td>Tharyx ill/lillensis</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 907</td>
<td>Capitella capitata</td>
<td>Sp. Complex</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 931</td>
<td>Arenicola</td>
<td>Juvenile</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 1500</td>
<td>Tubificoides swirencoides</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>S 605</td>
<td>Complium</td>
<td>Juvenile</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>S 1253</td>
<td>Distylus rathkei</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>W 1665</td>
<td>Mytilus edulis</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>W 1906</td>
<td>Mysella bidentata</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Total Biomass: 3.74
Quantitative Species Diversity: 15
Qualitative Species Diversity: 0
Total Species Diversity: 15

<table>
<thead>
<tr>
<th>MCS Code</th>
<th>Taxon</th>
<th>Taxon Qualifier</th>
<th>Upper %</th>
<th>Middle %</th>
<th>Lower %</th>
</tr>
</thead>
<tbody>
<tr>
<td>W 2029</td>
<td>Macoma balthica</td>
<td></td>
<td>69.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 616</td>
<td>Complium volutator</td>
<td></td>
<td>19.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 462</td>
<td>Hediste diversicolor</td>
<td></td>
<td>13.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 1906</td>
<td>Mysella bidentata</td>
<td></td>
<td>12.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 499</td>
<td>Nephys hombergi</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 672</td>
<td>Scoloplos armiger</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 1420</td>
<td>Paranais tritubaria</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 1501</td>
<td>Enchytraeida</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 846</td>
<td>Tharyx ill/lillensis</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 907</td>
<td>Capitella capitata</td>
<td>Sp. Complex</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 931</td>
<td>Arenicola</td>
<td>Juvenile</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 1500</td>
<td>Tubificoides swirencoides</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>S 605</td>
<td>Complium</td>
<td>Juvenile</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>S 1253</td>
<td>Distylus rathkei</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>W 1665</td>
<td>Mytilus edulis</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>W 1906</td>
<td>Mysella bidentata</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Total Biomass: 2.23
Quantitative Species Diversity: 17
Qualitative Species Diversity: 0
Total Species Diversity: 17

<table>
<thead>
<tr>
<th>MCS Code</th>
<th>Taxon</th>
<th>Taxon Qualifier</th>
<th>Upper %</th>
<th>Middle %</th>
<th>Lower %</th>
</tr>
</thead>
<tbody>
<tr>
<td>W 2029</td>
<td>Macoma balthica</td>
<td></td>
<td>40.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 616</td>
<td>Complium volutator</td>
<td></td>
<td>25.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 462</td>
<td>Hediste diversicolor</td>
<td></td>
<td>13.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 1906</td>
<td>Mysella bidentata</td>
<td></td>
<td>12.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 499</td>
<td>Nephys hombergi</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 672</td>
<td>Scoloplos armiger</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 1420</td>
<td>Paranais tritubaria</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 1501</td>
<td>Enchytraeida</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 846</td>
<td>Tharyx ill/lillensis</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 907</td>
<td>Capitella capitata</td>
<td>Sp. Complex</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 931</td>
<td>Arenicola</td>
<td>Juvenile</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P 1500</td>
<td>Tubificoides swirencoides</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>S 605</td>
<td>Complium</td>
<td>Juvenile</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>S 1253</td>
<td>Distylus rathkei</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>W 1665</td>
<td>Mytilus edulis</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>W 1906</td>
<td>Mysella bidentata</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Total Biomass: 0.51
Quantitative Species Diversity: 17
Qualitative Species Diversity: 0
Total Species Diversity: 17

Page 18
3.2 Subtidal benthic survey

Figure 3 presents the subtidal survey sampling stations at which samples were collected for benthos (abundance and biomass) and sediment analysis (PSA, LOI and contaminants). The locations and depths of the subtidal sampling stations are presented in Table 8 below.

Figure 3: The location of the 30 subtidal sampling stations.
### Table 8: Locations and depths of the subtidal benthic sampling sites.

<table>
<thead>
<tr>
<th>Station No.</th>
<th>Date</th>
<th>Time</th>
<th>Sea State</th>
<th>Attempt</th>
<th>Depth (m)</th>
<th>Position (WGS 84)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>04/05/2010</td>
<td>11:36</td>
<td>Calm</td>
<td>1st</td>
<td>10.4</td>
<td>53.67483 0.22367</td>
<td>Muddy sand</td>
</tr>
<tr>
<td>2</td>
<td>04/05/2010</td>
<td>11:44</td>
<td>Calm</td>
<td>1st</td>
<td>7.9</td>
<td>53.67433 0.24100</td>
<td>Mud</td>
</tr>
<tr>
<td>3</td>
<td>04/05/2010</td>
<td>11:58</td>
<td>Calm</td>
<td>2nd</td>
<td>14.1</td>
<td>53.67033 0.23383</td>
<td>Mud</td>
</tr>
<tr>
<td>4</td>
<td>04/05/2010</td>
<td>12:05</td>
<td>Calm</td>
<td>1st</td>
<td>12.6</td>
<td>53.66783 0.22950</td>
<td>Muddy sand</td>
</tr>
<tr>
<td>5</td>
<td>04/05/2010</td>
<td>12:13</td>
<td>Calm</td>
<td>1st</td>
<td>12.6</td>
<td>53.66683 0.21617</td>
<td>Mud &amp; clay</td>
</tr>
<tr>
<td>6</td>
<td>04/05/2010</td>
<td>12:18</td>
<td>Calm</td>
<td>1st</td>
<td>11.3</td>
<td>53.66450 0.22467</td>
<td>Muddy sand</td>
</tr>
<tr>
<td>7</td>
<td>04/05/2010</td>
<td>12:25</td>
<td>Calm</td>
<td>1st</td>
<td>11.5</td>
<td>53.66433 0.22767</td>
<td>Mud</td>
</tr>
<tr>
<td>8</td>
<td>04/05/2010</td>
<td>12:28</td>
<td>Calm</td>
<td>1st</td>
<td>7.7</td>
<td>53.66500 0.22567</td>
<td>Mud</td>
</tr>
<tr>
<td>9</td>
<td>04/05/2010</td>
<td>12:43</td>
<td>Calm</td>
<td>1st</td>
<td>12.2</td>
<td>53.66100 0.22317</td>
<td>Clay with surface layer of sand</td>
</tr>
<tr>
<td>10*</td>
<td>04/05/2010</td>
<td>12:40</td>
<td>Calm</td>
<td>1st</td>
<td>12.3</td>
<td>53.66150 0.21833</td>
<td>Sandy mud</td>
</tr>
<tr>
<td>11*</td>
<td>04/05/2010</td>
<td>13:40</td>
<td>Calm</td>
<td>1st</td>
<td>13.6</td>
<td>53.65917 0.21450</td>
<td>Sandy mud</td>
</tr>
<tr>
<td>12*</td>
<td>04/05/2010</td>
<td>12:50</td>
<td>Calm</td>
<td>1st</td>
<td>10.9</td>
<td>53.65800 0.21850</td>
<td>Medium sand</td>
</tr>
<tr>
<td>13</td>
<td>04/05/2010</td>
<td>13:07</td>
<td>Calm</td>
<td>1st</td>
<td>8.5</td>
<td>53.65850 0.22300</td>
<td>Muddy sand</td>
</tr>
<tr>
<td>14</td>
<td>04/05/2010</td>
<td>13:22</td>
<td>Calm</td>
<td>1st</td>
<td>7</td>
<td>53.65683 0.22133</td>
<td>Mud</td>
</tr>
<tr>
<td>15</td>
<td>04/05/2010</td>
<td>13:44</td>
<td>Calm</td>
<td>1st</td>
<td>11</td>
<td>53.65633 0.21683</td>
<td>Medium sand</td>
</tr>
<tr>
<td>16</td>
<td>04/05/2010</td>
<td>13:37</td>
<td>Calm</td>
<td>1st</td>
<td>12.8</td>
<td>53.65767 0.21183</td>
<td>Sand with compacted clay</td>
</tr>
<tr>
<td>17*</td>
<td>04/05/2010</td>
<td>13:28</td>
<td>Calm</td>
<td>1st</td>
<td>11.6</td>
<td>53.66067 0.20450</td>
<td>Muddy sand</td>
</tr>
<tr>
<td>18*</td>
<td>04/05/2010</td>
<td>14:20</td>
<td>Calm</td>
<td>3rd</td>
<td>10.6</td>
<td>53.65650 0.21067</td>
<td>Medium sand</td>
</tr>
<tr>
<td>19*</td>
<td>04/05/2010</td>
<td>13:56</td>
<td>Calm</td>
<td>1st</td>
<td>10.5</td>
<td>53.65433 0.21417</td>
<td>Muddy sand</td>
</tr>
<tr>
<td>20</td>
<td>04/05/2010</td>
<td>14:09</td>
<td>Calm</td>
<td>1st</td>
<td>10</td>
<td>53.65533 0.21650</td>
<td>Medium sand</td>
</tr>
<tr>
<td>21</td>
<td>04/05/2010</td>
<td>14:29</td>
<td>Calm</td>
<td>3rd</td>
<td>9.4</td>
<td>53.65367 0.21483</td>
<td>Muddy sand</td>
</tr>
<tr>
<td>22</td>
<td>04/05/2010</td>
<td>15:02</td>
<td>Calm</td>
<td>1st</td>
<td>10.2</td>
<td>53.65250 0.21233</td>
<td>Sand with compacted clay</td>
</tr>
<tr>
<td>23</td>
<td>04/05/2010</td>
<td>14:58</td>
<td>Calm</td>
<td>1st</td>
<td>10.9</td>
<td>53.65317 0.21217</td>
<td>Muddy sand with coal fragments</td>
</tr>
<tr>
<td>24</td>
<td>04/05/2010</td>
<td>14:53</td>
<td>Calm</td>
<td>3rd</td>
<td>11.3</td>
<td>53.65467 0.20967</td>
<td>Muddy sand with coal fragments</td>
</tr>
<tr>
<td>25</td>
<td>04/05/2010</td>
<td>15:14</td>
<td>Calm</td>
<td>2nd</td>
<td>11.2</td>
<td>53.65383 0.20033</td>
<td>Sandy mud</td>
</tr>
<tr>
<td>26</td>
<td>04/05/2010</td>
<td>15:18</td>
<td>Calm</td>
<td>1st</td>
<td>12.5</td>
<td>53.65183 0.20383</td>
<td>Sand with coal fragments</td>
</tr>
<tr>
<td>27</td>
<td>04/05/2010</td>
<td>15:29</td>
<td>Calm</td>
<td>1st</td>
<td>12.9</td>
<td>53.64983 0.20900</td>
<td>Sand with coal fragments</td>
</tr>
<tr>
<td>28</td>
<td>04/05/2010</td>
<td>15:36</td>
<td>Calm</td>
<td>2nd</td>
<td>12.1</td>
<td>53.64733 0.19983</td>
<td>Clay with a surface layer of sand</td>
</tr>
<tr>
<td>29</td>
<td>04/05/2010</td>
<td>15:44</td>
<td>Calm</td>
<td>1st</td>
<td>12.9</td>
<td>53.64417 0.19250</td>
<td>Clay with a surface layer of sand</td>
</tr>
<tr>
<td>30</td>
<td>04/05/2010</td>
<td>16:03</td>
<td>Calm</td>
<td>4th</td>
<td>11.6</td>
<td>53.63783 0.18333</td>
<td>Sand with shell &amp; coal fragments</td>
</tr>
</tbody>
</table>

* Sample collected from contaminant analysis

### 3.2.1 Sample Descriptions

Photographs of each subtidal benthic samples are presented in Annex 2, with brief descriptions provided in Table 8 above.

### 3.2.2 Abundance

The raw abundance data from the subtidal benthic survey is presented in Table 9, with the % dominance of each species, based on total biomass, presented in Table 10.

### 3.2.3 Biomass

The raw biomass data for the subtidal benthic stations is presented in Table 11, with the % dominance of each species, with respect to total biomass, presented in Table 12.
Table 9: Raw abundance data from the subtidal benthic survey.

<table>
<thead>
<tr>
<th>MCS Code</th>
<th>TAXON Qualifier</th>
<th>TAXON</th>
<th>Quantitative</th>
<th>Colonial</th>
<th>Total Taxa</th>
<th>Total Abundance</th>
</tr>
</thead>
</table>

- **Columns 1-30** represent different taxa, with columns labeled 1-30 corresponding to specific locations or other identifiers.
- **Quantitative** column indicates raw abundance data for each location.
- **Colonial** column indicates data specific to colonial species.
- **Total Taxa** column summarizes the total number of taxa observed.
- **Total Abundance** column provides a summary of the total abundance across all taxa.

Each row corresponds to a different taxa, detailing its presence or abundance in various locations.
Table 10: % dominance with respect to total abundance from the subtidal surveys (quantitative species only).

<table>
<thead>
<tr>
<th>MCS Code</th>
<th>TAXON</th>
<th>TAXON Qualifier</th>
<th>Total Abundance</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>R 78</td>
<td>Balanus improvisus</td>
<td></td>
<td>124</td>
<td>28</td>
</tr>
<tr>
<td>P 931</td>
<td>Arenicola marina</td>
<td></td>
<td>69</td>
<td>15</td>
</tr>
<tr>
<td>P 907</td>
<td>Capitella capitata</td>
<td>species complex</td>
<td>65</td>
<td>14</td>
</tr>
<tr>
<td>P 799</td>
<td>Streblospio shrubsolii</td>
<td></td>
<td>45</td>
<td>10</td>
</tr>
<tr>
<td>HD 1</td>
<td>NEMATODA</td>
<td></td>
<td>25</td>
<td>6</td>
</tr>
<tr>
<td>R 142</td>
<td>COPEPODA</td>
<td>indeterminate</td>
<td>22</td>
<td>5</td>
</tr>
<tr>
<td>R 68</td>
<td>Elminius modestus</td>
<td></td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>W 1696</td>
<td>Mytilus edulis</td>
<td>juvenile</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>P 753</td>
<td>Polydora cornuta</td>
<td></td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>P 1490</td>
<td>Tubificoides benedii</td>
<td></td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>F 1</td>
<td>PLATYHELMINTHES</td>
<td></td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>P 672</td>
<td>Scoloplos armiger</td>
<td></td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>D 662</td>
<td>ACTINIA</td>
<td></td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>P 1500</td>
<td>Tubificoides swrencoides</td>
<td></td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>W 2029</td>
<td>Macoma balthica</td>
<td></td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>P 499</td>
<td>Neptys hombergii</td>
<td></td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>S 481</td>
<td>Gammarus salinus</td>
<td></td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>S 1197</td>
<td>Bodotria scorpionis</td>
<td></td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>P 17/118</td>
<td>Eteone flaviflava</td>
<td>aggregate</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>P 845</td>
<td>Tharyx</td>
<td>species A</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>P 919</td>
<td>Mediomastus fragilis</td>
<td></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>P 1083</td>
<td>Protodriloides chaetifer</td>
<td></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>P 1498</td>
<td>Tubificoides pseudogaster</td>
<td></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Q 53</td>
<td>ACARI</td>
<td></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>R 14</td>
<td>CIRRIPEDIA</td>
<td>indeterminate</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>S 76</td>
<td>Neomysis integer</td>
<td></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>S 86</td>
<td>Schistomysis kervillei</td>
<td></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>S 471</td>
<td>Gammarus</td>
<td>juvenile</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>S 616</td>
<td>Corophium volutator</td>
<td></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>S 1253</td>
<td>Diastylis rathkei typica</td>
<td></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>W 2007</td>
<td>TELLINACEA</td>
<td>juvenile</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>D 158</td>
<td>Tubularidae</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>D 433</td>
<td>Sertularia</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Y 112</td>
<td>Walkeria uva</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Y 137</td>
<td>Bowerbankia</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Y 176</td>
<td>Electra crustulenta</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Y 177</td>
<td>Electra monostachys</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Y 187</td>
<td>Flustra foliacea</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Y 222</td>
<td>Amphiblestrum auritum</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Y 255</td>
<td>Bicellariella ciliata</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Total Abundance: 450
Total Quantitative Species: 31
Table 11: Raw biomass data from the subtidal benthic survey.

<table>
<thead>
<tr>
<th>MCS Code</th>
<th>TAXON Qualifier</th>
<th>TAXON</th>
<th>Quantitative</th>
<th>Colonial</th>
<th>Total Taxa</th>
<th>Total Biomass</th>
</tr>
</thead>
<tbody>
<tr>
<td>D 158</td>
<td>Tubulariidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D 433</td>
<td>Sertularia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D 540</td>
<td>Actinaria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F 1</td>
<td>Phæophytaeae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HD 1</td>
<td>Nematoidea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K 45</td>
<td>Pedicellina</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 117/118</td>
<td>Neone/Arca/Ampa</td>
<td>aggregate</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 409</td>
<td>Nephys hamborgi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 672</td>
<td>Ectoplepis armiger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 753</td>
<td>Polydena comata</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 799</td>
<td>Sibbaldiap aequale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 846</td>
<td>Thyrus species A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 909</td>
<td>Goniobela capitate</td>
<td>species complex</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>P 919</td>
<td>Mediomastus fragilis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 931</td>
<td>Anoxia marina</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 1083</td>
<td>Protobalanus charitleri</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 1490</td>
<td>Tubificides bironi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 1498</td>
<td>Tubificides pseudogaster</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 1500</td>
<td>Tubificides raucovides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q 53</td>
<td>AGARI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R 14</td>
<td>SIREPODA</td>
<td>indeterminate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R 68</td>
<td>Ellmius modestus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R 78</td>
<td>Balbus improvisus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R 142</td>
<td>CEPFEDA</td>
<td>indeterminate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 76</td>
<td>Neomyina oligo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 86</td>
<td>Schizomysis kervelli</td>
<td></td>
<td>0.018</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 471</td>
<td>Gommarus juvenilis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 481</td>
<td>Gommarus subirides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 616</td>
<td>Sirephylum victator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 1197</td>
<td>Buddentia scaphioides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 1253</td>
<td>Distylus rathekei typos</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 1066</td>
<td>Mylytus obtusus juvenilis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 2007</td>
<td>TELLINACEA juvenilis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 2029</td>
<td>Macoma balthica</td>
<td></td>
<td></td>
<td>0.004 0.006</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y 112</td>
<td>Wohleriura ura</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y 127</td>
<td>Bowerbankia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y 176</td>
<td>Electra cratustata</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y 177</td>
<td>Electra monostachylis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y 187</td>
<td>Fascia telata</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y 222</td>
<td>Anomiacinum aurantium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y 255</td>
<td>Basterdua clausa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Quantitative: 3 3 3 4 0 1 5 6 1 1 4 3 1 5 1 1 1 4 0 2 13 2 2 3 4 5 3 1 2 4

Total Taxa: 3 3 3 4 0 1 5 6 1 1 4 3 1 5 1 1 1 4 0 2 13 2 2 3 4 5 3 1 2 4

Total Biomass: 0.005 0.000 0.007 0.018 0.000 0.018 0.017 0.050 0.000 0.000 0.014 0.003 0.000 0.006 0.000 0.002 0.003 0.002 0.000 0.002 0.006 0.000 0.001 0.007 0.128 0.068 0.003 0.000 0.009 0.000
Table 12: % dominance with respect to total biomass from the subtidal surveys.

<table>
<thead>
<tr>
<th>MCS Code</th>
<th>TAXON Qualifier</th>
<th>TAXON</th>
<th>Total Biomass</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>R 78</td>
<td>Balanus improvisus</td>
<td></td>
<td>10.135</td>
<td>60.79</td>
</tr>
<tr>
<td>D 662</td>
<td>ACTINIARIA</td>
<td></td>
<td>3.750</td>
<td>22.49</td>
</tr>
<tr>
<td>R 68</td>
<td>Elminius modestus</td>
<td></td>
<td>1.368</td>
<td>8.20</td>
</tr>
<tr>
<td>P 931</td>
<td>Arenicola marina</td>
<td></td>
<td>1.119</td>
<td>6.71</td>
</tr>
<tr>
<td>S 481</td>
<td>Gammarus salinus</td>
<td></td>
<td>0.067</td>
<td>0.40</td>
</tr>
<tr>
<td>P 907</td>
<td>Capitella capitata</td>
<td>species complex</td>
<td>0.056</td>
<td>0.34</td>
</tr>
<tr>
<td>W 2029</td>
<td>Macoma balthica</td>
<td></td>
<td>0.054</td>
<td>0.32</td>
</tr>
<tr>
<td>P 672</td>
<td>Scoloplos armiger</td>
<td></td>
<td>0.030</td>
<td>0.18</td>
</tr>
<tr>
<td>W 1696</td>
<td>Mytilus edulis</td>
<td>juvenile</td>
<td>0.019</td>
<td>0.11</td>
</tr>
<tr>
<td>P 499</td>
<td>Nephtys hombergii</td>
<td></td>
<td>0.018</td>
<td>0.11</td>
</tr>
<tr>
<td>S 86</td>
<td>Schistomysis kervillei</td>
<td></td>
<td>0.018</td>
<td>0.11</td>
</tr>
<tr>
<td>P 799</td>
<td>Streblospio shrubsolii</td>
<td></td>
<td>0.012</td>
<td>0.07</td>
</tr>
<tr>
<td>S 76</td>
<td>Neomysis integer</td>
<td></td>
<td>0.009</td>
<td>0.05</td>
</tr>
<tr>
<td>P 1490</td>
<td>Tubificoides benedii</td>
<td></td>
<td>0.007</td>
<td>0.04</td>
</tr>
<tr>
<td>S 1253</td>
<td>Diastylis rathkei typica</td>
<td></td>
<td>0.003</td>
<td>0.02</td>
</tr>
<tr>
<td>P 753</td>
<td>Polydora cornuta</td>
<td></td>
<td>0.003</td>
<td>0.02</td>
</tr>
<tr>
<td>R 142</td>
<td>COPEPODA</td>
<td>indeterminate</td>
<td>0.001</td>
<td>0.01</td>
</tr>
<tr>
<td>HD 1</td>
<td>NEMATODA</td>
<td></td>
<td>0.001</td>
<td>0.00</td>
</tr>
<tr>
<td>P 117/118</td>
<td>Etone flava/longa</td>
<td>aggregate</td>
<td>0.001</td>
<td>0.00</td>
</tr>
<tr>
<td>S 616</td>
<td>Corophium volutator</td>
<td></td>
<td>0.001</td>
<td>0.00</td>
</tr>
<tr>
<td>F 1</td>
<td>PLATYHELMINTHES</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>P 1500</td>
<td>Tubificoides swrencoide</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>S 1197</td>
<td>Bodotria scorpion</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>P 845</td>
<td>Tharyx</td>
<td>species A</td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>P 919</td>
<td>Mediomastus fragilis</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>P 1083</td>
<td>Protodriloides chaetifer</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>P 1498</td>
<td>Tubificoides pseudogaster</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>Q 53</td>
<td>ACARI</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>R 14</td>
<td>CIRRIPIEDIA</td>
<td>indeterminate</td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>S 471</td>
<td>Gammarus</td>
<td>juvenile</td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>W 2007</td>
<td>TELLINACEA</td>
<td>juvenile</td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>D 158</td>
<td>Tubulariidae</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>D 433</td>
<td>Sertularia</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>D 510</td>
<td>Hartlaubella gelatinosa</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>K 45</td>
<td>Pedicellina</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>Y 112</td>
<td>Walkeria uva</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>Y 137</td>
<td>Bowerbankia</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>Y 176</td>
<td>Electra crustulenta</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>Y 177</td>
<td>Electra monostachys</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>Y 187</td>
<td>Flustra foliacea</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>Y 222</td>
<td>Amphiblestrum auritum</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>Y 255</td>
<td>Bicellariella ciliata</td>
<td></td>
<td>0.000</td>
<td>0.00</td>
</tr>
<tr>
<td>Total Biomass</td>
<td>16.672</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Quantitative Species</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.3 Intertidal fish and shellfish survey

The locations of both the intertidal and subtidal fish sampling stations are shown in Figure 4.

![Figure 4: The locations of the 4 intertidal fyke nets and the 8 subtidal fish trawls.](image)
The details of the intertidal fish surveys, including station positions, deployment and retrieval information, and weather conditions, is presented in Table 13.

Table 13: Survey details from the intertidal fish survey.

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Position (WGS 84)</th>
<th>Deployment</th>
<th>Retrieval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lat (N)</td>
<td>Long (W)</td>
<td>Date</td>
</tr>
<tr>
<td>FK 1</td>
<td>53.64932</td>
<td>0.2182</td>
<td>08/06/2010</td>
</tr>
<tr>
<td>FK 2</td>
<td>53.65362</td>
<td>0.22324</td>
<td>08/06/2010</td>
</tr>
<tr>
<td>FK 3</td>
<td>53.65599</td>
<td>0.22579</td>
<td>08/06/2010</td>
</tr>
<tr>
<td>FK 4</td>
<td>53.65948</td>
<td>0.22891</td>
<td>08/06/2010</td>
</tr>
</tbody>
</table>

Weather conditions: Overcast and breezy with showers

Photos of the catch from each of the deployed fyke nets are presented in Annex 3. The abundance of each species, within each fyke net is presented in Table 14.

Table 14: Abundance data for each of the four intertidal double ended fyke nets (west and east).

<table>
<thead>
<tr>
<th>MCS Code</th>
<th>Taxon</th>
<th>Common Name</th>
<th>Fyke Net 1</th>
<th>Fyke Net 2</th>
<th>Fyke Net 3</th>
<th>Fyke Net 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>1584</td>
<td>Carcinus maenas</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ZG</td>
<td>111</td>
<td>Ciliata mustela</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ZG</td>
<td>136</td>
<td>Polachius virens</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ZG</td>
<td>479</td>
<td>Pomatoschistus minutus</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ZG</td>
<td>576</td>
<td>Platichthys flesus</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>ZG</td>
<td>591</td>
<td>Solea solea</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Taxa | 1 | 0 | 0 | 1 | 2 | 0 | 4 | 3 |

Total Abundance | 2 | 0 | 0 | 3 | 4 | 0 | 16 | 14 |

Table 15 over page, presents the raw length data (in mm) of each species caught, per fyke net.
Table 15: Raw length data (in mm) for each of the fish species caught in the intertidal surveys.

<table>
<thead>
<tr>
<th>MCS Code</th>
<th>Taxon</th>
<th>Common Name</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>1594</td>
<td>Carcinus maenas</td>
<td>Shore crab</td>
<td>212</td>
<td>155</td>
<td>183</td>
</tr>
<tr>
<td>ZG</td>
<td>111</td>
<td>Ciliata mustela</td>
<td>Five-beard rockling</td>
<td>235</td>
<td>205</td>
<td>160</td>
</tr>
<tr>
<td>ZG</td>
<td>136</td>
<td>Pollachius virens</td>
<td>Pollock</td>
<td>205</td>
<td>215</td>
<td>232</td>
</tr>
<tr>
<td>ZG</td>
<td>479</td>
<td>Pomatoschistus minutus</td>
<td>Sand goby</td>
<td>198</td>
<td>178</td>
<td>168</td>
</tr>
<tr>
<td>ZG</td>
<td>576</td>
<td>Platichthys flesus</td>
<td>European flounder</td>
<td>132</td>
<td>230</td>
<td>116</td>
</tr>
<tr>
<td>ZG</td>
<td>591</td>
<td>Solea solea</td>
<td>Common sole</td>
<td>110</td>
<td>93</td>
<td>83</td>
</tr>
</tbody>
</table>

3.4 Subtidal fish and shellfish survey

The locations of the subtidal trawls are presented in Figure 3 (above). Further details regarding the subtidal fish sampling, including start and end positions, date, time in and out, water depth, sea state and weather conditions, can be seen in Table 16 below.

Table 16: Survey log for the subtidal fish survey.

<table>
<thead>
<tr>
<th>Trawl No.</th>
<th>Start Position</th>
<th>End Position</th>
<th>Date</th>
<th>Time in</th>
<th>Time Out</th>
<th>Water depth (m)</th>
<th>Sea state</th>
</tr>
</thead>
<tbody>
<tr>
<td>T 1</td>
<td>53.66217 0.22750</td>
<td>53.65800 0.22300</td>
<td>05/05/2010</td>
<td>09:00</td>
<td>09:10</td>
<td>12</td>
<td>Calm</td>
</tr>
<tr>
<td>T 2</td>
<td>53.65017 0.21383</td>
<td>53.65517 0.21833</td>
<td>05/05/2010</td>
<td>09:17</td>
<td>09:30</td>
<td>11.3</td>
<td>Calm</td>
</tr>
<tr>
<td>T 3</td>
<td>53.65667 0.21583</td>
<td>53.65217 0.21133</td>
<td>05/05/2010</td>
<td>09:42</td>
<td>09:53</td>
<td>10.2</td>
<td>Calm</td>
</tr>
<tr>
<td>T 4</td>
<td>53.66017 0.22383</td>
<td>53.65850 0.22050</td>
<td>05/05/2010</td>
<td>10:01</td>
<td>10:13</td>
<td>12.1</td>
<td>Calm</td>
</tr>
<tr>
<td>T 5</td>
<td>53.67117 0.22133</td>
<td>53.66700 0.21667</td>
<td>05/05/2010</td>
<td>10:26</td>
<td>10:36</td>
<td>12.2</td>
<td>Calm</td>
</tr>
<tr>
<td>T 6</td>
<td>53.67233 0.22533</td>
<td>53.67783 0.23133</td>
<td>05/05/2010</td>
<td>10:45</td>
<td>10:55</td>
<td>10</td>
<td>Calm</td>
</tr>
<tr>
<td>T 7</td>
<td>53.68217 0.24217</td>
<td>53.67750 0.23883</td>
<td>05/05/2010</td>
<td>11:01</td>
<td>11:10</td>
<td>8.9</td>
<td>Calm</td>
</tr>
<tr>
<td>T 8</td>
<td>53.68817 0.25183</td>
<td>53.68350 0.24750</td>
<td>05/05/2010</td>
<td>11:20</td>
<td>11:29</td>
<td>8.3</td>
<td>Calm</td>
</tr>
</tbody>
</table>

Weather conditions: Dry with sunny spells and light breeze

Photos of each sample, both on board the survey vessel and in the laboratory are presented in Annex 4.

Table 17 presents the raw abundance data, from each of the 8 beam trawls. For the fish species, the mean length data (in mm) and abundance (n) is presented in Table 18.
Table 17: Raw abundance data for the subtidal trawl survey.

<table>
<thead>
<tr>
<th>MCS Code</th>
<th>Taxon</th>
<th>Common name</th>
<th>Trawl Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>S 44</td>
<td>Gastrosaccus spinifer</td>
<td>Opossum shrimp</td>
<td>1</td>
</tr>
<tr>
<td>S 76</td>
<td>Neomysis integer</td>
<td>Opossum shrimp</td>
<td>14</td>
</tr>
<tr>
<td>S 82</td>
<td>Palaemon flexuosus</td>
<td>Channeleon shrimp</td>
<td>1</td>
</tr>
<tr>
<td>S 86</td>
<td>Schizotomus kervillei</td>
<td>Mysid shrimp</td>
<td>25</td>
</tr>
<tr>
<td>S 89</td>
<td>Schizotomus spinulosus</td>
<td>Mysid shrimp</td>
<td>3</td>
</tr>
<tr>
<td>S 415</td>
<td>Dexamante spinosa</td>
<td>Gammanid amphipod</td>
<td>1</td>
</tr>
<tr>
<td>S 453</td>
<td>Gammarus zaddachi</td>
<td>Gammanid amphipod</td>
<td>6</td>
</tr>
<tr>
<td>S 939</td>
<td>Motea linearis</td>
<td>Isopod</td>
<td>1</td>
</tr>
<tr>
<td>S 1253</td>
<td>Diastylis rathkei</td>
<td>A. cumacean</td>
<td>1</td>
</tr>
<tr>
<td>S 1518</td>
<td>Palaemon longirostris</td>
<td>Delta prawn</td>
<td>4</td>
</tr>
<tr>
<td>S 1385</td>
<td>Grangon crangon</td>
<td>Common shrimp</td>
<td>68</td>
</tr>
<tr>
<td>S 1594</td>
<td>Carcinus maenas</td>
<td>Shore crab</td>
<td>1</td>
</tr>
<tr>
<td>ZE 11</td>
<td>Lampetra fluviatilis</td>
<td>River lamprey</td>
<td>1</td>
</tr>
<tr>
<td>ZG 111</td>
<td>Callala mustela</td>
<td>Fivebeard rockling</td>
<td>4</td>
</tr>
<tr>
<td>ZG 123</td>
<td>Merlangus merlangus</td>
<td>Whiting</td>
<td>1</td>
</tr>
<tr>
<td>ZG 143</td>
<td>Trisopterus luscus</td>
<td>Bib</td>
<td>2</td>
</tr>
<tr>
<td>ZG 244</td>
<td>Syngnathus rostellatus</td>
<td>Nilsson's pipefish</td>
<td>1</td>
</tr>
<tr>
<td>ZG 296</td>
<td>Liparis liparis</td>
<td>Sea snail</td>
<td>1</td>
</tr>
<tr>
<td>ZG 479</td>
<td>Pomatoschistus minutus</td>
<td>Sand goby</td>
<td>10</td>
</tr>
<tr>
<td>ZG 576</td>
<td>Platichthys flesus</td>
<td>European flounder</td>
<td>1</td>
</tr>
<tr>
<td>ZG 591</td>
<td>Solea solea</td>
<td>Common sole</td>
<td>2</td>
</tr>
</tbody>
</table>

| Total taxa | 10 | 6 | 12 | 9 | 11 | 13 | 6 | 10 |
| Total abundance | 126 | 52 | 145 | 150 | 1077 | 226 | 41 | 137 |

Table 18: Raw length data (in mm) for each of the fish species caught in the subtidal trawls.

<table>
<thead>
<tr>
<th>Taxa</th>
<th>Trawl 1</th>
<th>Trawl 2</th>
<th>Trawl 3</th>
<th>Trawl 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean length</td>
<td>n</td>
<td>Mean length</td>
<td>n</td>
</tr>
<tr>
<td>Lampetra fluviatilis</td>
<td>River lamprey</td>
<td>125</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Ciliata mustela</td>
<td>Fivebeard rockling</td>
<td>89</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Merlangus merlangus</td>
<td>Whiting</td>
<td>152</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Trisopterus luscus</td>
<td>Bib</td>
<td>132</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Syngnathus rostellatus</td>
<td>Nilsson's pipefish</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liparis liparis</td>
<td>Sea snail</td>
<td>265</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Pomatoschistus minutus</td>
<td>Sand goby</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platichthys flesus</td>
<td>European flounder</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solea solea</td>
<td>Common sole</td>
<td>192</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Carcinus maenas</td>
<td>Shore crab</td>
<td>50</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Taxa</th>
<th>Trawl 5</th>
<th>Trawl 6</th>
<th>Trawl 7</th>
<th>Trawl 8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean length</td>
<td>n</td>
<td>Mean length</td>
<td>n</td>
</tr>
<tr>
<td>Lampetra fluviatilis</td>
<td>River lamprey</td>
<td>125</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Ciliata mustela</td>
<td>Fivebeard rockling</td>
<td>89</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Merlangus merlangus</td>
<td>Whiting</td>
<td>152</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Trisopterus luscus</td>
<td>Bib</td>
<td>132</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Syngnathus rostellatus</td>
<td>Nilsson's pipefish</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liparis liparis</td>
<td>Sea snail</td>
<td>265</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Pomatoschistus minutus</td>
<td>Sand goby</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platichthys flesus</td>
<td>European flounder</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solea solea</td>
<td>Common sole</td>
<td>192</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Carcinus maenas</td>
<td>Shore crab</td>
<td>50</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
4. SUMMARY OF FINDINGS

4.1 Benthos

4.1.1 INTERTIDAL

- The most commonly occurring species were the oligochaete *Tubificoides benedii*, Nematoda, the polychaete *Streblospio shrubsolii* and the amphipod crustacean *Corophium volutator*. These species were present in most of the samples and were present at higher abundances than all other species throughout the survey area. The bivalve *Macoma balthica* was widespread and the polychaete *Hediste diversicolor* was present at most of the upper shore stations.

- *T. benedii* was the dominant species at the upper and mid shore stations. *S. shrubsolii* was dominant at the lower shore stations where the sediments were presumably sandier.

- Species richness (number of species recorded) ranged from 2-9 species/sample. Abundance (number of individuals/sample) ranged from 5-197. There were no immediately obvious spatial patterns in these parameters in the raw data set.

- Biomass ranged from <0.001 to 1.37g / sample and was generally higher at stations where *H. diversicolor* was recorded.

- All species found from the survey are typical for the intertidal area of the middle region of the Humber Estuary. There are no species of particular conservation importance although many of those present are important prey species for birds.

4.1.2 SUBTIDAL

- Species richness ranged from 0-17 (including colonial taxa) with values of 5 or less being recorded from all but 2 stations. The most widespread species (occurring in the greatest number of samples) was the polychaete *Capitella capitata* with the barnacles *Balanus improvisus* and *Elminius modestus* being the most abundant species.

- Abundance ranged from 0-184 individuals/sample with abundance in most samples being less than 20.

- The highest species richness and abundance values were recorded from station 21 where high numbers of barnacles were found together with Actiniaria (Anthozoa), *Hartlaubella gelatinosa* (Hydrozoa), the polychaetes *Polydora cornuta* and *Arenicola marina*, *Mytilus edulis* (Bivalvia) and the bryozoans *Electra crustulenta*, *E. monostachys* and *Flustra foliacea*.

- The species recorded from station 21 (many epifaunal, colonial and sedentary species) are consistent with a coarse sediment substratum. It should be noted that whilst the sediment type is described as muddy sand (Table 8), three attempts were required to collect an acceptable grab sample. The particle size data may misrepresent the sediment characteristics at this station.

- Biomass ranged from <0.001 to 15.5 g/sample (station 21) with values at most stations being <0.05 g.
• Considering the whole dataset, the barnacle *B. improvisus* is the dominant species, together with *Arenicola marina* and *Streblospio shrubsolii*. However, the distribution of *B. improvises* is patchy (relating to availability of suitable substratum) and should not be considered a characterising species for the survey area as a whole.

4.2 Fish & Shellfish

• Fish communities in the middle and lower reaches of the Humber Estuary are dominated by small bodied demersal gobid species of the genus *Pomatoschistus* and juvenile stages of larger species that use the estuary as a nursery ground (especially shallow areas and the intertidal zone). This latter component is often the most commonly recorded with typically 80% or more of the total abundance. Typical examples are flounder (*Platichthys flesus*), plaice (*Pleuronectes platessa*), sole (*Solea solea*), whiting (*Merlangius merlangus*), spratt (*Sprattus sprattus*), seabass (*Dicentrarchus labrax*), cod (*Gadus morhua*), herring (*Clupea harengus*), lesser weaver fish (*Echiichthys vipera*), and pollock (*Pollachious virens*).

• In addition to this large group of mostly demersal or benthic juveniles (exceptions are sprat and herring juveniles that are pelagic), the Humber Estuary features a number of estuarine residents, and diadromous fish species which use the estuary for passage to or from fresh water areas. The most common examples of the resident group are flounder, 5-bearded rockling (*Ciliata mustela*), pogee (*Agonus cataphractus*), sea snail (*Liparis sp.*), Nilsson's pipefish (*Syngnathus rostellatus*) and 3-spined stickleback (*Gasterosteus aculeatus*). Smelt (*Osmerus eperlanus*), eel (*Anguilla anguilla*) and river lamprey (*Lamprenta fluviatilis*) are the most common of the diadromous species. Some of these species are listed under Annex 2 of the Habitats and Species Directive, or have other high conservation value.

• Finally a number of marine species appear occasionally in catches, most of them following a marked seasonality with higher probability of capture in the summer and early autumn. Of relevance for this last group are sand eels (*Ammodites sp.*), lump sucker (*Cyclopterus lumpus*), witch (*Glyptocephalus cynoglossus*), dab (*Limanda limanda*), grey mullets (*Liza sp.*), brill (*Scopthalmus rhombus*), short-spined sea scorpion (*Taurulus bubalis*), bib (*Trisopterus luscus*), and dragonet (*Callionymus lyra*).

• Crustaceans (Decapods) are the most abundant of all the invertebrate groups in the southern North Sea. Shellfish species present in the Humber area include edible crab (*Cancer pagurus*), velvet crab (*Necora puber*) lobster (*Homarus gammarus*) and pink (*Pandalus spp.*) and brown shrimp (*Crangon spp.*) which are particularly abundant in the coastal area. Large seasonal abundances are also recorded for small crustacean groups like mysis and euphausiids (krill or opossum shrimp).

4.2.1 Intertidal

• Given the background information available for the Humber Estuary and adjacent coastal area, and the gear selectivity profile of fyke nets, the fish and shellfish assemblage found during the summer survey is considered normal. However, the
abundance was low compared to previous survey programs (e.g. the HARBASINS Report Chapter 4.11).

- The catch is dominated by benthic flatfishes (flounder and sole) most probably 1+ flounder (born the year before) and mostly 0+ sole, which highlights the role of the area (typical mudflat) as a flatfish nursery. Sand goby (*Pomatoschistus minutus*) was recorded but due to the small size of this fish, it is normally misrepresented in fyke net catches. Same gear effect probably confounded the shellfish assessment resulting in the recording of large shore crabs only.

### 4.2.2 SUBTIDAL

- Similarly to the intertidal assessment, the subtidal assemblage is consistent with previous survey results for the area with a real dominance of sand goby. Interestingly flounder (the more abundant species in the intertidal catch) was recorded only once. This observation suggests the greater importance of the intertidal zone for flounder.

- Sole caught in the subtidal assessment were substantially larger that those found in the fyke nets. This is remarkable and clearly shows a segregation of sole year classes and indicates a distinct habitat dependency between 0+ sole and older juveniles.

- The remaining species recorded are common but as with the intertidal assessment; these were recorded at somewhat lower abundances than expected. This effect, found to be consistent across the two surveys, may be associated with natural fluctuations of fish stocks as a consequence of recruitment failure.

- Crustacean catches were dominated by the common shrimp (*Crangon crangon*), a species of economical importance in the east coast. Occasional large catches of mysids and euphausiids were also recorded although the mesh size used in the beam trawl was too large to provide a truly quantitative assessment. It is likely, however, that these organisms are present in large numbers throughout and represent the base of the local food chain leading to the subtidal fish fauna recorded in this assessment.

### 4.3 Annex 1 Habitats & Annex 2 Species

- During the intertidal and subtidal survey works, no Annex 1 species were recorded. However, the intertidal mudflats and sandflats which were surveyed are classed as Annex 1 Habitats that are a primary reason for site selection as a Special Area of Conservation (SAC).

- Similarly, the Humber is designated as an SAC for its ‘Estuarine’ habitat (an Annex 1 habitat), which is present throughout the survey area.

- Saltmarsh communities were also identified within the survey area. These communities included constituents of the Atlantic Salt Meadow community, which is classified as an Annex 1 habitat under the Habitats Directive. However, although
present as a qualifying feature, these saltmarsh communities are not a primary reason for site selection. The extent of these features in relation to the survey area are identified in Figure 5.

- No Annex 2 species were recorded from the survey area.
Figure 5. Annex 1 Habitats identified within the proposed survey area, Humber estuary.

Note: A detailed NVC survey was last conducted in 2001 by Bulliers Consultants where SM5, SM24, SM11 and SM14c communities were recorded. Some of these communities are constituents of Atlantic Salt Meadows habitat which is classified under Annex 1 of the Habitats Directive.
ANNEX 1. INTERTIDAL BENTHIC SURVEY PHOTOS

Transect 1 – view from the lower shore

Transect 1 Upper  Transect 1 Middle  Transect 1 Lower
<table>
<thead>
<tr>
<th>Transect 2 – view from the lower shore</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Image of wet sand]</td>
</tr>
<tr>
<td>[Image of wet sand]</td>
</tr>
<tr>
<td>[Image of wet sand]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transect 2 Upper</th>
<th>Transect 2 Middle</th>
<th>Transect 2 Lower</th>
</tr>
</thead>
</table>
Transect 3 – view from the lower shore

| Transect 3 Upper | Transect 3 Middle | Transect 3 Lower |
Transect 4 – view from the lower shore

| Transect 4 Upper | Transect 4 Middle | Transect 4 Lower |
Transect 5 – view from the lower shore

<table>
<thead>
<tr>
<th>Transect 5 Upper</th>
<th>Transect 5 Middle</th>
<th>Transect 5 Lower</th>
</tr>
</thead>
</table>

![Image](image_url)
Transect 6 – view from the lower shore

Transect 6 Upper  Transect 6 Middle  Transect 6 Lower
Transect 7 – view from the lower shore

Transect 7 Upper | Transect 7 Middle | Transect 7 Lower
Transect 8 – view from the lower shore

Transect 8 Upper  Transect 8 Middle  Transect 8 Lower
Transect 9 – view from the lower shore

| Transect 9 Upper | Transect 9 Middle | Transect 9 Lower |
Transect 10 – view from the lower shore

| Transect 10 Upper | Transect 10 Middle | Transect 10 Lower |
Transect 11 – view from the lower shore

Transect 11 Upper  Transect 11 Middle  Transect 11 Lower
Transect 12 – view from the middle shore

<table>
<thead>
<tr>
<th>Transect 12 Upper</th>
<th>Transect 12 Middle</th>
<th>Transect 12 Lower</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Transect 12 Upper Image]</td>
<td>![Transect 12 Middle Image]</td>
<td>No photo taken</td>
</tr>
</tbody>
</table>

No photo taken
## ANNEX 2. SUBTIDAL BENTHIC SAMPLE PHOTOS

<table>
<thead>
<tr>
<th>Subtidal Sample 1</th>
<th>Subtidal Sample 2</th>
<th>Subtidal Sample 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtidal Sample 4</td>
<td>Subtidal Sample 5</td>
<td>Subtidal Sample 6</td>
</tr>
<tr>
<td>Subtidal Sample 7</td>
<td>Subtidal Sample 8</td>
<td>Subtidal Sample 9</td>
</tr>
<tr>
<td>Subtidal Sample 10</td>
<td>Subtidal Sample 11</td>
<td>Subtidal Sample 12</td>
</tr>
<tr>
<td>Subtidal Sample 13</td>
<td>Subtidal Sample 14</td>
<td>Subtidal Sample 15</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td>Subtidal Sample 16</td>
<td>Subtidal Sample 17</td>
<td>Subtidal Sample 18</td>
</tr>
<tr>
<td><img src="image4.png" alt="Image" /></td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
<tr>
<td>Subtidal Sample 19</td>
<td>Subtidal Sample 20</td>
<td>Subtidal Sample 21</td>
</tr>
<tr>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
<td><img src="image9.png" alt="Image" /></td>
</tr>
<tr>
<td>Subtidal Sample 22</td>
<td>Subtidal Sample 23</td>
<td>Subtidal Sample 24</td>
</tr>
<tr>
<td><img src="image10.png" alt="Image" /></td>
<td><img src="image11.png" alt="Image" /></td>
<td><img src="image12.png" alt="Image" /></td>
</tr>
<tr>
<td>Subtidal Sample 25</td>
<td>Subtidal Sample 26</td>
<td>Subtidal Sample 27</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Subtidal Sample 28</td>
<td>Subtidal Sample 29</td>
<td>Subtidal Sample 30</td>
</tr>
</tbody>
</table>
## ANNEX 3. INTERTIDAL FISH SURVEY PHOTOS

<table>
<thead>
<tr>
<th>Fyke Net 1 East</th>
<th>Fyke Net 1 West</th>
</tr>
</thead>
<tbody>
<tr>
<td>No fish captured</td>
<td>No fish captured</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fyke Net 2 East</th>
<th>Fyke Net 2 West</th>
</tr>
</thead>
<tbody>
<tr>
<td>No fish captured</td>
<td>No fish captured</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fyke Net 3 East</th>
<th>Fyke Net 3 West</th>
</tr>
</thead>
<tbody>
<tr>
<td>No fish captured</td>
<td>No fish captured</td>
</tr>
<tr>
<td>Fyke Net 4 East</td>
<td>Fyke Net 4 West</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td><img src="image1" alt="Fyke Net 4 East" /></td>
<td><img src="image2" alt="Fyke Net 4 West" /></td>
</tr>
</tbody>
</table>
ANNEX 4. SUBTIDAL FISH SAMPLE PHOTOS

<table>
<thead>
<tr>
<th>Subtidal Sample 1 (onboard)</th>
<th>Subtidal Sample 1 (lab)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtidal Sample 2 (onboard)</td>
<td>Subtidal Sample 2 (lab)</td>
</tr>
<tr>
<td>Subtidal Sample 3 (onboard)</td>
<td>Subtidal Sample 3 (lab)</td>
</tr>
</tbody>
</table>
Subtidal Sample 7 (onboard)

Subtidal Sample 7 (lab)

Subtidal Sample 8 (onboard)

Subtidal Sample 8 (lab)