2.1 Introduction

The following information describes the laboratory processing and analysis undertaken on samples acquired during baseline monitoring in the East Channel Region.

Specifically, reference is made to the processing undertaken, the development of analysis methodologies, and reasons for changes to original proposals. Where relevant, reference is also made to the agreed protocols that were finally adopted.

2.2 Laboratory Processing of Hamon Grab Samples for Particle Size Analysis

The method to be employed for the laboratory particle size analysis was not specified in the Blueprint v0.3.

Methods for the analysis of samples submitted for particle size distribution were based on Emu Ltd. in-house procedures (Emu, 2005) based on BS1377; part two; 1990. On return to the Emu laboratory, representative sub-samples of each sediment sample were oven dried to constant weight and sieved through a series of mesh apertures corresponding to whole phi units described by the Wentworth Scale.

The weight of the sediment fraction retained on each mesh was measured and recorded. Where sediment samples were found to contain >5% fine material (particles of <63 µm diameter) these were then were then subjected to further analysis via laser diffraction to determine the proportion of the silt/clay components at 0.5 phi intervals. Outputs from this analysis include a phi-unit x weight matrix for all samples and laser particle size data for relevant samples (**Appendix 10**).

Sample Number	example		Gear Type	example		Wet Seive <0.063mm		NB add wet seive <0.063mm to D18

*Broad Description of Grain Size	Aperture mm	Aperture (phi units)	Weight Retained (g)	Fractional % retained	Cumulative % coarser
Cobble	64	-6.0	0	0.00	0.00
Pebble	32	-5.0	0	0.00	0.00
	16	-4.0	12	2.22	2.22
Gravel	8	-3.0	22	4.07	6.30
	4	-2.0	38	7.04	13.33
Coarse Sand	2	-1.0	120	22.22	35.56
	1	0.0	111	20.56	56.11
Medium Sand	0.5	1.0	139	25.74	81.85
	0.25	2.0	55	10.19	92.04
Fine Sand	0.125	3.0	34	6.30	98.33
	0.063	4.0	7	1.30	99.63
Silt/Clay	<0.063	5.0	2	0.37	100.00
		Total Weight	540.000		

	Sample Description	
gravel	very coarse sand	silt
well sorted	poorly sorted	poorly sorted
coarse skew	symmetrical	fine skew
platykurtic	mesokurtic	leptokurtic
outer limit	Sample Description	outer limit

Cobbles % >64mm	0.00
Gravel % <64-2mm	13.33
Sand % <2 - 0.063 mm	86.30
Silt/Clay % <0.063mm	0.37
Folk Classification (without cobbles)	gS
Wentworth Classification	S

Coarser than percentiles			
%ile	phi	%ile	mm
5	-3.32	5	9.97
16	-1.88	16	3.68
25	-1.48	25	2.78
50	-0.30	50	1.23
75	0.73	75	0.60
84	1.21	84	0.43
95	2.47	95	0.18

Md (phi)	-0.30	GM (phi)	-0.32
SD	1.65	Sorting	1.65
Sk	-0.03	d50 (mm)	1.23
Ku	1.07		

Sediment from Hamon grab samples were sieved and the results entered into standardised spreadsheets to calculate descriptive statistical measures and provide graphical representation of the results. The spreadsheet calculated d50 (mm), median (phi), sorting, skewness, kurtosis and both Wentworth and Folk sediment descriptions.

2.3 Laboratory Processing of Clamshell Grab Samples for Particle Size Analysis

A total of 65 core samples were taken from the clamshell grab samples acquired from within and surrounding Area 473 East. The samples were processed as follows.

Core samples were forwarded to Andrews Survey Ltd for initial processing. Following photography and logging, the specifications called for the isolation and retention of the >1000micron, the 1000-63micron and the <63micron fractions by sieve analysis. Wet sieving was undertaken in order to determine the distribution of particle sizes greater than 63micron, with the <63micron particles being retained. The >63micron sample was then dry sieved as per the standards through the 64, 31.5, 16, 8,4, 2, 1mm and 63micron sieve aperture sizes. The 1000-63micron fraction was bagged and any further sample <63microns was added to the previous amount retained during the wet sieving. The weights for the 1000-63micron and <63micron fractions were determined and then forwarded to the Geography Department of Liverpool University for laser sizing. The Andrews analysis is more fully described in **Appendix 2**.

Following this initial sieve analysis the fine fractions were forwarded to Liverpool University for laser particle size analysis. Prior to laser analysis, individual samples were well mixed and a small (spatula sized) sub sample taken and made into a paste on watch glass with Calgon. The sample was then introduced to a Coulter LS200 (pump speed set to 70, sample sonicated during loading, run time 60 seconds) for analysis. A Fraunhofer conversion model was used on the resulting data.

Data generated by the sieve and laser analysis are included in **Appendix 11**.

Each of the hand-core samples taken from the clamshell grabs were photographed and logged.

Following this the samples were processed to provide sieve particle size analysis of the >1mm fraction of the sediment and laser particle size analysis of <2mm fraction.

2.4 Laboratory Processing of Macrobenthic Samples

The laboratory analysis of the macrobenthic samples collected by mini-Hamon grab was carried out by Emu Ltd and Unicomarine. **Appendix 12** details which samples were analysed by each laboratory.

Macrobenthic analysis carried out by each laboratory was done following the respective laboratory's Standard Operating Procedure (Emu, 2005). In addition, detailed descriptions of the methods employed in the laboratory are documented in full within the ECA Processing Requirements Protocol (PRP) for the Analysis of Macrobenthos Samples: East Channel Association projects, Draft 5, January 2006. This document forms the main part of v0.3 SOP Ecological Sample Analysis in the Blueprint v0.3 and has been included in **Appendix 13** of this report for reference.

The PRP is distinct from each laboratory standard operating procedure (SOP) in that it details only elements essential to the processing of the samples; the SOP includes procedures recommended within a particular laboratory, which could be done differently elsewhere while producing the same results. For example, counting all polychaete heads would be specified in the PRP, while separating polychaetes into family pots before identification would be an optional recommendation in the SOP of some laboratories.

Key points from the PRP are summarised in **Appendix 13** together with details of any deviations (including rationale behind these) from those proposed within Draft 5.

Pomatoceros triqueter **(main image) was the most frequently occurring polychaete species being evident at 83% of all Hamon grab sites sampled.** ***Galathea intermedia*** **(inset) were also frequently observed (images Emu Ltd).**

2.5 Laboratory Processing of 2m Beam Trawl Samples

The laboratory analysis of the 2m beam trawl sub-samples (5l) was carried out by Emu Ltd. These samples were retained for semi-quantitative analysis. The laboratory identifications were subject to QC, the results of which are presented in **Appendix 14**, with the full species list for each the 2m beam trawl site presented in **Appendix 14**.

Samples returned to the laboratory were analysed for 'conspicuous biota' only as stipulated in Blueprint v0.3. Epibiotic species were identified and enumerated following the same method as that listed under 'actual field method' within **Appendix 17** for the 4m beam trawling. Epibiotic species not listed in within the Blueprint v0.3 and **Appendix 17** were either counted (solitary species such as Ascidians, anemones and saddle oysters) or recorded as present/absent (colonial species such as bryozoans, hydroids, encrusting algae, sponges, and colonial ascidians).

Pomatoceros Spp and barnacles were counted in the 2m beam trawl samples and returned to the laboratory as these counts related to a sub-sample of a known volume and therefore counts could be adjusted to related to the entire sample obtained in the field. Specimens which could not be confidently identified in the field were also returned to the laboratory for identification. Where these species were commercial shellfish or fish these were also subsequently measured (length in cm as per Blueprint v0.3).

Field measurements for all fish and commercial shellfish were entered electronically and QC checks carried out on the data transcription. Field data for 'other species' (non fish and commercial shellfish) was also entered electronically. The results of the laboratory identifications were then added to (or used to amend) the appropriate electronic data sets. Outputs from the 2m beam trawl sample analysis include sample identification record sheets, excel species x abundance data matrix (**Appendix 14**), specimen reference collections and sample progress forms.

Samples acquired using 2m beam trawl gear were analysed to provide enumerated data for epibiotic species noted in the Blueprint v0.3 and solitary species, and presence/absence data for colonial species such and bryzoans, hydroids, encrusting algae and sponges.

2.6 Laboratory Processing of Scallop Dredge Samples

In order to comply with the Blueprint v0.3, the occurrence and distribution of the following key commercially important epifaunal species have been determined:

- ***Aequipecten opercularis (Queen Scallop)***
- ***Pecten maximus (King Scallop)***
- ***Cancer pagurus (Brown crab)***
- ***Buccinum undatum (Common whelk)***
- ***Maja squinado (Spider crab)***

The laboratory analysis of the samples collected by scallop dredging was carried out by Emu Ltd. These samples were retained for confirmation of species identifications which could not be determined with confidence in the field. The laboratory identifications were subject to QC, the results of which are presented in **Appendix 15** with the full species list for each the scallop dredge site presented in **Appendix 15**.

Specimens returned to the laboratory were identified and enumerated following the same method as that listed under 'actual field method' within **Appendix 17** for the 4m beam trawling. In addition, any commercial shellfish (excluding *Aequipecten opercularis*) and all fish species were also measured (length in cm as per Blueprint v0.3).

Epibiotic species not listed in within the Blueprint v0.3 and **Appendix 17** were either counted (solitary species such as Ascidians, anemones and saddle oysters) or recorded as present/absent (colonial species such as bryozoans, hydroids, encrusting algae, sponges, and colonial ascidians, and *Pomatoceros* Spp and barnacles). The latter 2 species were logged as presence/absence only as it was not possible to relate counts from the sample in the laboratory to the entire sample obtained in the field.

Field measurements for all fish and commercial shellfish were entered electronically and QC checks carried out on the data transcription. Field data for other species (non fish and commercial shellfish) was also entered electronically. The results of the laboratory identifications were then added to (or used to amend) the appropriate electronic data sets

Outputs from the laboratory analysis include sample identification record sheets, excel species x abundance data matrix (**Appendix 15**), specimen reference collections and sample progress forms.

The King Scallop (above left) and Queen Scallop (above right) are important commercial shellfish species in the ECR. The regional survey aims to describe their distribution and abundance across the survey area (images from www.bim.ie)

2.7 Laboratory Processing of 4m Beam Trawl Samples

The data collated has been used in two primary ways:

1. Individual fish species were selected and length frequency data for these species determined at each site. Use of length-frequency plots of individual, long-lived species within the community will enable potential changes within population structure to be detected.
2. Abundances per 1000m^2 for 7 key fish species have been calculated and plotted to show the distribution of certain fish species across the EEC regional survey array. These seven species are:

- ***Red Gurnard (Aspitrigla cuculus)***
- ***Dragonet (Callionymus lyra)***
- ***Lesser Spotted Dogfish (Scyliorhinus canicula)***
- ***Thornback Ray (Raja clavata)***
- ***Poor Cod (Trisopterus minutus)***
- ***Common (Dover) Sole (Solea solea)***
- ***Plaice (Pleuronectes platessa)***

In addition to this initial analysis, subsequent investigation of the data will analyse all fish and epibenthic data retained by the 4m beam trawl in order to view the sample as a single community data set at each sampling site. This is proposed as a method suitable for investigating potential community interaction between the epibenthos and fish species.

The laboratory analysis of the samples collected by 4m beam trawling was carried out by Emu. These samples were retained for confirmation of species identifications which could not be determined with confidence in the field.

The laboratory identifications were subject to QC, the results of which are presented in **Appendix 16**, with the full species list for each the 4m beam trawl site presented in **Appendix 16**.

Specimens returned to the laboratory were analysed in the same manner as the scallop dredge samples (**Appendix 17**). Field measurements for all fish and commercial shellfish were then entered electronically and QC checks carried out on the data transcription. Field data for other species (non fish and commercial shellfish) was also entered electronically. The results of the laboratory identifications were then added to (or used to amend) the appropriate electronic data sets.

Outputs from the 4m beam trawl sample analysis include sample identification record sheets, excel species x abundance data matrix (**Appendix 16**), specimen reference collections and sample progress forms.

Common sole (*Solea solea*) were one of the commercial species targeted by the 4m beam trawl survey. Length measurements were taken of fish retained in the trawl to determine the characteristics of fish species communities within the ECR

Report Part 1 – Section 2: Summary

→ Processing, by sieve analysis, of samples acquired during regional Hamon grab surveys provided particle size analysis data from across the region.

→ The hand-cores taken from Area 473 East clamshell grab samples were processed using both sieve analysis and laser size analysis.

→ Processing of Hamon grabs provided data regarding the infaunal and epifaunal benthic communities.

→ 2m and 4m beam trawl and scallop dredge samples were processed to provide epibenthic invertebrate, fish and shellfish data.

Notes: