Cruise report

Environmental Survey of Coastal Waters (Galway - Dublin – Galway): – Winter nutrients, benthic macro-invertebrate and contaminants monitoring (CV22-003).

Vessel Name: RV Celtic Voyager

Call Sign: EIQN

Start Date: 17/01/2022

End Date: 02/02/2022

Port of Departure: Galway

Port of Return: Cork

Francis O'Beirn and Garvan O'Donnell

Marine Environment and Food Safety Services,

Marine Institute, Rinville, Oranmore,

Galway, Ireland

Table of Contents

1. Introduction & Rationale

The 2022 survey continues the Marine Institute's Winter Nutrients monitoring that commenced in 1990/91. The survey has evolved and expanded during this time period with respect to target areas, parameters and sampling strategy. In 2011 this survey was re-established as a winter environmental survey with a broader remit to provide supporting information for OSPAR and Water Framework Directive (WFD- Directive 2000/60/EC) assessments and also to maintain the winter time series on key biogeochemical parameters in Irish waters in response to pressures such as land based inputs of nutrients and climate change. Since 2011 the survey circumnavigates the Island of Ireland every two years, alternating south-about and north-about, starting in the Irish Sea and ending in Galway. This provides a complete coverage of Ireland's coastal waters over 2-year periods. However, given the timing of the surveys, winter by necessity to ensure minimal biological activity and therefore highest concentrations of dissolved nutrients, the weather is a significant factor in determining the actual as opposed to planned coverage of the target stations.

The 2022 survey was designed to collect multidisciplinary information on physical conditions, water chemistry (dissolved nutrients, total alkalinity (TA), dissolved inorganic carbon (DIC) and salinity), sediment chemistry (persistent organic pollutants POPs and trace metals), sediment particle size distribution and benthic macroinvertebrates (at targeted waterbodies around the coast). This contributes to data collection needs of various statutory drivers (WFD and the Marine Strategy Framework Directive (MSFD) Directive 2008/56/EC) as well as providing a research dataset on status and changing conditions (trends and variations) for key environmental variables.

As a result of the COVID pandemic, in 2021 operational adjustments were implemented such that scientific complement on-board was limited to 2-3 persons at any one time. In light of this, the survey plan was adjusted to allow the survey to be completed in two legs (both south-about):

1. Leg 1 – Galway – Dublin: benthic macro-invertebrate sampling
2. Leg 2 – Dublin – Galway: winter nutrient, carbon and contaminants sampling.

This survey structure was continued in 2022. Furthermore, and in order to fully achieve this plan, the number of survey days was increased to 17.

2. Objectives

A) *Winter Nutrients Survey*: The survey aims to fulfil Ireland's requirements under the Coordinated Environmental Monitoring Programme (CEMP) of the 1992 'Oslo Paris Convention for the Protection of the North East Atlantic' (OSPAR) and to contribute to assessments under the Common Procedure for the Identification of the Eutrophication Status of the OSPAR maritime area. This requires the answering of three key questions:

1. What is the spatial distribution of winter nutrients in Irish coastal and shelf waters?
2. Are nutrient concentrations changing over time (trends)?
3. Are nutrient concentrations significantly elevated in coastal waters (>50%) above salinity related and/or regionally specific background levels and what are the background concentrations?

Coastal nutrient data are provided to the EPA and contribute to the assigning of *ecological status* to coastal water bodies in accordance with the requirements of the Water Framework Directive (Directive 2000/60/EC)

Offshore nutrient profiles in shelf waters contribute to determining long-term variability, which can be influenced by climate change related processes.

As weather down time may disrupts coverage of Winter Surveys the sampling plan assigns a priority ranking to the stations.

B) *Collect sediment samples for assessment of hazardous substances in the marine environment*:

- obtain sediment samples to be used for trend analysis (Dublin Bay & Irish Sea) for organic and inorganic hazardous substances (OSPAR CEMP, WFD).

C) *Conduct Water Framework Directive monitoring (Dir 2000/60/EC) and provide supporting information for the implementation of the Natura Directives (Habitats Directive 92/43/EEC).*

- Collect samples to provide data to contribute to classification of WFD (client EPA) ecological status of selected water bodies for physico-chemical (nutrients) and benthic macro-invertebrate ecological quality elements in a select number of waterbodies around Ireland's coast.
- Collect sediment samples for particle size analysis to contribute to WFD hydromorphology sampling. These data are used directly in Metric 8a. Change in dominant fraction particle size of the EPA's HQI assessment tool. The initial application of the HQI identified that in many cases there is little data available for assessment of change. Ongoing monitoring will assist in the further application of this tool and a better assessment of morphological change in the marine environment
- Using benthic invertebrates and associated sediment information (particle size analysis) the survey will be able to provide additional habitat distribution data (ground truth data) for a variety of WFD waterbodies sites.
- Collect sediment samples for micro-plastics analysis in selected waterbodies as part of an on-going temporal study of prevalence in coastal waterbodies.

***D**) Collect samples for measuring carbonate system parameters (DIC, TA, $pCO_{2calc,}$ $pH_{calc, and}$ Ω_{calc}) in coastal waters to contribute to baseline dataset for these variables*.

3. Personnel

Scientific Complement:

LEG 1:
Role: Chief Scientist
Name: Francis O'Beirn (FOB) – Benthos
Organisation Name: Marine Environment & Food Safety Services, Marine Institute
Address: Marine Institute, Rinville, Oranmore, Galway, Ireland
Email: Francis.XOBeirn@Marine.ie

Name: Louise Healy (LH) – Benthos
Organisation Name: Marine Environment & Food Safety Services, Marine Institute
Address: Marine Institute, Rinville, Oranmore, Galway, Ireland
Email: louise.healy@marine.ie

LEG 2:
Role: Chief Scientist
Name: Garvan O Donnell (GOD) – Chemistry
Organisation Name: Marine Environment & Food Safety Services, Marine Institute
Address: Marine Institute, Rinville, Oranmore, Galway, Ireland
Email: garvan.odonnell@marine.ie

Name: Tomasz Szumski (TS) - Chemistry
Organisation Name: Marine Environment & Food Safety Services, Marine Institute
Address: Marine Institute, Rinville, Oranmore, Galway, Ireland
Email: tomasz.szumski@marine.ie

Name: Ferdia Murray (FM) - Chemistry
Organisation Name: Marine Environment & Food Safety Services, Marine Institute
Address: Marine Institute, Rinville, Oranmore, Galway, Ireland
Email: ferdia.murray@marine.ie

Celtic Voyager Crew:

Leg 1:

Master:	Kenny Downing
1st Mate:	Diarmuid Joyce
OOW:	Stephen Barr
Chief- Engineer:	David Stack
Motorman:	Finbarr Goggin
AS:	Martin Goggin
Cook:	William McGoldrick

Leg 2:

Master:	Colin McBrearty
1st Mate:	Stephen Lantry
OOW:	Sean O'Sullivan
Chief- Engineer:	Brendan Barry
Motorman:	Tommy Byrne
AS:	Alec Carty
Cook:	Paul Shannon
Tech support:	Joshua Abse

4. Methods & Protocol

4.1. Equipment Listing

4.1.1. CTD Profiler and Rosette Sampler
Make: Seabird SBE 911
Model: SBE 911plus
Sampling Protocols - CTD deployed at designated stations and times. Data collected from temperature, conductivity and pressure sensors. Water samples for nutrients, DIC/TA and salinity were collected at most stations from the maximum depth reached and surface (~ 3 m) using Niskin bottles (5 L) and applying standard MI procedures in line with best practice (Dickson et al. 2007, Grasshof et al. 1999).
Also deployed on frame was Wetlabs fluorometer, DO Sensor.

4.1.2. Fluorometer
Make: Wetlabs
Model:
Sampling Protocols - OSS fluorometer deployed on CTD frame.

4.1.3. DO sensor
Make: Seabird
Model: SBE-43
Sampling Protocols - Deployed on CTD frame.
SBE-43 DO sensor deployed on the frame and calibrated shortly before the survey as Winkler titrations were not carried out on this survey.

4.1.4. On board Seawater Pump
Make:
Model:
Sampling Protocols: The seawater pump was used to collect surface water at all underway stations.

4.1.5. Data were also generated by underway fluorometer, onboard ADCP and MDM 400.

4.1.6. Piston Corer
Make: unknown
Model:
Sampling Protocols: Sediment samples were taken for contaminant monitoring: Surface sediment was transferred into glass and plastic bottles for organic and inorganic analysis, respectively. Sampling material in contact with the side of the grab was avoided.

4.1.7 Grab sampler
Make: Day Grab
Model: P&O design
Sampling Protocols: Sediments were sampled for benthic infauna using Day grab. Sediment samples were removed from the grab and a small subsample retained (and frozen) for PSA and organic carbon analysis (LOI). The remaining sediment was sieved through a 1-mm mesh sieve and fixed in formalin (5%).

4.1.8 SCS system: The system was used to log all sampling events with automated date, time and GPS stamping.

4.2. On-board processing

Water Samples - chemistry:
Surface Samples (~3 m) from underway stations were collected for nutrients and salinity as below using the onboard pump. From CTD stations the following were sampled using Niskin bottles according to standard protocol and in the following order: TA/DIC (selected stations), nutrients and salinity.

1. Samples for accurate salinity measurement: Unfiltered, glass bottle stored at room temperature for subsequent salinity analysis. Sample salinities subsequently measured in the Marine Institute using a Guildline Portasal salinometer.
2. 2 x 50 ml PP tubes filled with water filtered through a 0.45 µm cellulose acetate (acid-cleaned polycarbonate) filter and frozen immediately after collection for post-cruise nutrient analysis. These analyses were carried out by the Marine Institute using standard colorimetric methods for determination of nutrients in seawater employing a Skalar segmented flow auto-analyser.
3. DIC/TA samples collected at designated stations. Samples preserved with mercuric chloride (Dickson et al. 2007). Samples were analysed post survey in NUIG for DIC/TA using a Vindta-3C system and methods of Dickson et al. (2007).

Sediment Samples – marine chemistry:
Surface sediments for metals and organics analysis were sampled using Rieneck box core. Surface sediment was split between glass (solvent washed – for organic analysis) and plastic jars (acid washed – metal analysis) and frozen immediately after collection. Samples will be analysed (<63 µm fraction) in the MI and additional specialist labs for a variety of persistent organic pollutants, trace metals and various cofactors.

Benthic Sediment and faunal Samples:
A 1-m^2 Day Grab sampler was used to collect all benthic faunal and sediment samples.
At all benthic stations where suitable and sufficient sediments (>2.5 L) could be sampled, a subsample of sediments (100-200 g) was taken for Particle Size Analysis (PSA) and Loss on Ignition (LOI). These samples were labelled and stored in plastic bags and frozen.
At a number of water bodies (Galway Bay, Dublin Bay and Roaringwater Bay), additional sediment samples were retained for micro-plastics analysis – these samples were retrieved from grab with a stainless steel spatula and samples were stored in glass jars sealed with aluminium foil and frozen.

The remaining sediment was washed on a 1-mm mesh sieve. All faunal and residue (e.g. sediment and shell matter) were retained and stored in a plastic container and fixed with V:V 4% neutral buffered formalin.

5. Narrative

As identified above, the survey was split into two legs. Leg 1 from Galway to Dublin (south-about) was designated to carry out benthic macro-invertebrate sampling and Leg 2 was for chemistry sampling. Leg 1 was carried out from 17th Jan (Galway) to 23rd Jan (Dublin Port).

Leg 2 was to sample nutrients, carbon and contaminants and departed from Dublin Port on January 23rd, travelled south-about and finished in Cork on Feb 2nd, 2022. The narrative of this report is split below to reflect the two legs of the survey

5.1 Leg 1: Jan 17th-23rd

The weather conditions for this leg of the survey were good. While challenging in the 1st day, it improved thereafter and allowed full sampling of 1st leg.

Day 1 - 17th Jan

1000hrs: Scientific complement (**FOB, LH**) joined the vessel at Galway Docks
1100hrs: Took delivery of and commenced securing in wet lab, Chemistry supplies for Leg 2
1600hrs: Survey commenced with departure from Galway Docks
1630hrs: Sampling commenced in inner Galway Bay and completed at 1640hrs (2hrs 12min sampling time). 10 grab samples were attempted with 10 successful samples retained (100%). Fauna, sediment and microplastic.
1850hrs: Sampling complete (with 20 min break for dinner)
1900hrs: Vessel commenced transit to Shannon – good sea conditions.

Day 2 - 18th Jan

0810hrs: Arrive 1st station in Mouth of Shannon WB and commenced sampling. 17 grab samples were attempted with 15 successful samples retained (88%). Both site had had very mixed substrate and shell/cobble held grab open. (3 grab attempts at each station) Notable fauna was monkfish (intact) and numerous sandeels.
1330hrs: Sampling in Shannon completed (5 hour 20minutes sampling time).
1330hrs: Transit to Kenmare – good seas

Day 3 - 19th Jan

0800hr: Sampling commenced in inner portion of Kenmare River. 23 attempts with 23 successful samples retained.
Note: FOB failed to record location and pre-sieve image for sample MIBE22-069

1405hrs: Complete sampling in Kenmare Bay (6hr sampling time) and transit to Roaringwater Bay. Very smooth passage.

Day 4 - 20th Jan

0800hrs: Commence sampling in Roaringwater Bay
1310hrs: Complete sampling (5hr 10 min – incl. 1 hour for breaks). 14 stations samples – 13 faunal samples, 14 sediment and 14 micro-plastic samples retained.
Note: Sediment at site MIBE22-059 was very coarse and not retained, BEU should review this site and MIBEXX-062 and 051 for history of coarse sediments
1315hrs: Commence passage to Cork Harbour – very smooth passage

Day 5 – 21st Jan

0700hrs: Commence sampling at Outer Cork Harbour
0945hrs: Complete sampling in Cork Harbour – 15 Stations attempted – 15 faunal and 15 PSA samples successfully retained - (Duration of sampling = 2hrs 15mins)
0950hrs: Commence passage to Waterford Harbour
1425hrs: Arrive Waterford Harbour and commence sampling.
1659hrs: Complete sampling in Waterford harbour. 10 stations attempted – 10 faunal and 10 PSA successfully retained.
1700hrs: Commence passage to Killiney Bay

Day 6 – 22nd Jan

0800hrs: Commence sampling in Killiney Bay.
1040hrs: Complete sampling in Killiney Bay - (1hr 55min sampling time)
10 stations attempted – 9 successful faunal and PSA samples
1 sample MIBE22-024 –failed – cobble in grab (3-attmpts)
1105hrs: Commence sampling in Dublin Bay
1345hrs: Complete sampling in Dublin Bay - (2hrs 15mins)
15 stations attempted – 13 stations successful for Fauna, PSA and Micro-plastics
2 stations failed (MIBE22-002 and -007) with stones in grab jaws – 3 attempts at each.
1350hrs: Transit to Dublin port
1438hrs: Arrive Dublin Port

Day 7-23rd Jan

0800hrs: Pack-up samples and equipment for transport to Galway.
1130hrs: Hand-over to Chemistry team and sign-off the vessel.

5.2 Leg 2: Jan 23rd – 2nd Feb

Day 1 23/01/2022: 1030h - Scientific complement (GOD, TS, FM) joined the vessel at Dublin Port. 17:30 h - ship left Dublin. Completed Dublin Bay transect, including three outermost stations (415, 416, 417). It was too dark to take sediment samples. Sediment samples will be taken on way back from Drogheda transect (in daylight).

Day 2 24/01/2022: Boyne transect completed, including four outermost stations (411–414).

Day 3 25/01/2022: Courtown transect plus underway stations along the coast were completed. Some underway stations are not accessible due to there being a lot of fishing gear in the area (Stations 99, 100 (CTD).

Day 4 26/01/2022: Completed St. George's channel transect and stations connecting St. George's channel and Courtown transects. Station 124 (CTD) not on ship's system. Stations 122 and 102 are very close to each other. Station 122 (CTD) sampled. 19:00 h: ship waiting off Wexford coast for wind to ease off.

Day 5 27/01/2022: 06:00h still waiting off Wexford coast for wind to ease off. 09:00 h: moved off and started station 145 at 10:30 h. Completed Waterford transect and some coastal stations along Waterford coast. Skipper decided that due to weather forecast for bad weather for weekend that it would not be possible for ship to make it back to Galway. We will not be able to complete southwest and western stations. De-mob will be in Cork.

Day 6 28/01/2022: Completed transect connecting St. George's channel and Waterford transects. Plan is to head for Cork to wait out the weather. Sampled some underway stations on the way into Cork. 16:30 h: tie up in Cork.

Day 7 29/01/2022: 12:30 h: left Cork. Captured stations that were not done when coming into Cork Harbour on the previous day. Plan to do Cork and Youghal transects. After discussion with skipper it was decided it would not be possible to do Waterford Estuary or underway stations east of Hook Head as weather will only allow us to do Cork and Youghal transects or Waterford Estuary and not both.

Day 8 30/001/2022: 06:00h: Steamed east to underway station 153 (east of Hook Head). ETA: 07:30 h. Completed underway stations along Wexford/Waterford coast including CTD station at mouth of Waterford estuary. 13:30 h: F=finish underway stations and wait out weather just off Dungarvan.

Day 9 31/01/2022: 007:45 h underway station 251 completed (near Dungarvan). Finished Kinsale transect at 21:00 h. Will steam inshore again and start underway station 410 at

07:39 h. A lot of nearshore stations can only be done in daylight as there is a lot of fishing gear in these areas.

Day 10 01/02/2022: Station 410 (near Kinsale) completed at 07:00 h. Plan is to move further west and do as may samples as possible. Last station 472 (underway) completed at 13:00 h (near Cape Clear island). It was not possible to go any further west due to high winds. Transit to Cork

Day 11 02/02/2022: Sign off @1100hrs

5.3 Equipment Issues

SCS

23/01/2022: First (possibly 2 UW stations) were not logged at correct time. SCS not logging. Problem fixed by technician.

24/01/2022: PC in dry lab set up to log CTD data only. Laptop in wet lab set up with SCS – logging UW and sediment stations. Data recorded in two separate files. Technician fixed this: set up SCS to log all sample data from SCS in one file. Laptop in wet lab is an image of PC in dry lab (achieved using teamviewer). First 10 CTD stations were logged separately to SCS log.

Issue with depth reading on ship's display in dry lab. Depth was frozen at 60 m. Samples logged on SCS with incorrect depth. Cause: fuse blown. Fixed by technician. Not a big issue as scientists took depth from bridge.

CTD

Bottle 1 not firing on CTD rosette. Technician unable to fix. Not an issue as there were enough bottles on CTD rosette.

6. Summary

Chemistry:

Completed most of east and south east coast, including St. Georges' channel, Waterford and connecting transects. We also completed three transects on Cork coast (Youghal, Cork and Kinsale transects. Bad weather prevented ship from sampling stations west of Cape Clear in west Cork. Therefore, stations on west and south west coast were not done. Note: some CTD and underway stations were not done as these stations could not be accessed due to fishing gear in the area.

CTDs: 66 (Planned 122) – 54% completion
Underway: 208 (Planned 313) – 66% completion
Sediments: 3
Carbon: 50 (Planned 94) – 53% completion

Actual stations sampled for chemistry are shown in Figure 1 below.

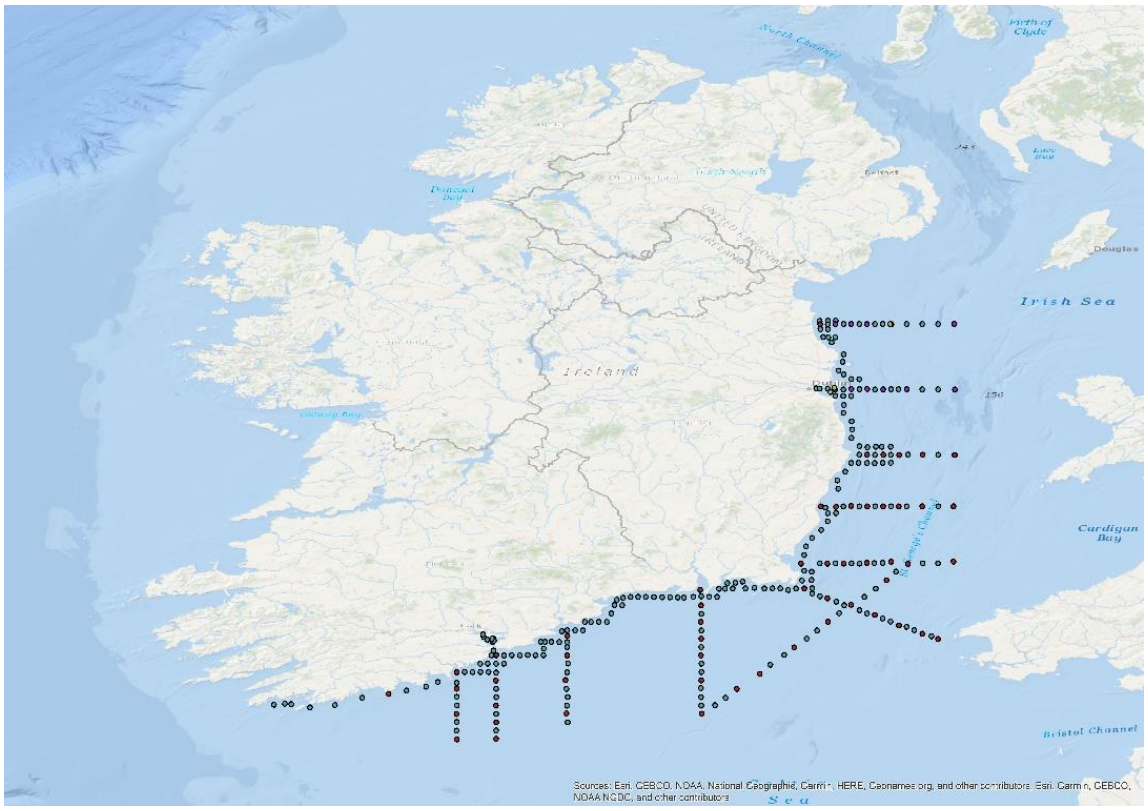

Figure 1: Stations sampled for seawater chemistry during CV22-003 survey.

The chief scientist on this leg of survey trialed a Jupyter notebook script to process CTD files on board as requested by OCIS. This involves completing an electronic logsheet, copying CDT raw files to a specific folder and running the Jupyter notebook script. The Jupyter notebook CTD processing was successful.

Benthos:

Benthic macroinvertebrates and PSA (Figure 2) sampling were carried out at the target WFD waterbodies - inner-Galway Bay North, Mouth of Shannon, Kenmare Bay, Roaringwater Bay, Outer Cork Harbour, Waterford Harbour, South-western Irish Sea-Killiney Bay and Dublin Bay (Figure 2). Sampling was attempted from 114 stations of which 109 yielded successful samples (96% success rate). Microplastics (n=37 samples) were sampled in Dublin Bay, Roaringwater Bay and Inner Galway Bay North. Appendix 1 provides a summary of the benthic sampling locations and parameters sampled through the survey.

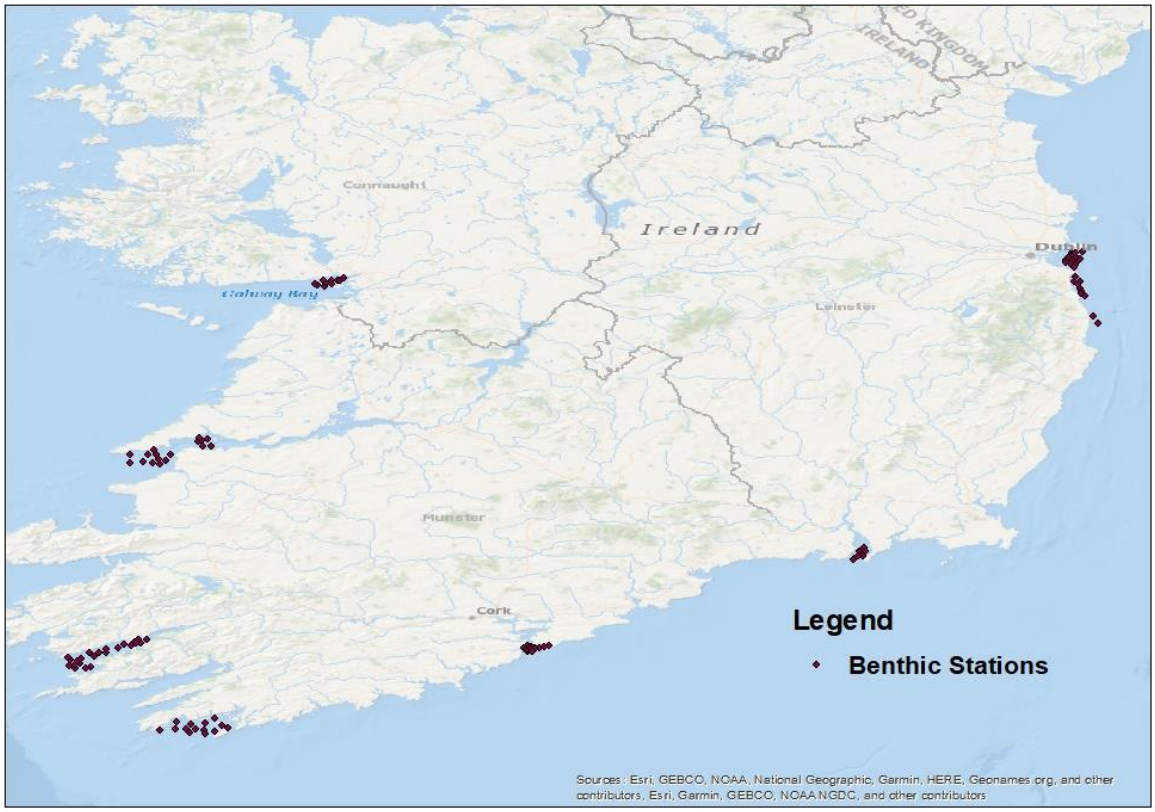

Figure 2: Stations sampled for Benthic macro-invertebrates during CV22-003 survey

7. Conclusions & Recommendations

The 1st leg of the survey was considered very successful aided considerably by the very benign weather conditions. Transit between waterbodies and sampling within the waterbodies was seamless aided by the calm conditions. Benthic sampling was completed on time for all the priority areas targeted.

The second leg of the survey was considered successful despite bad weather. We were unable to sample planned stations on the southwest and west coast of Ireland. The ship was unable to

get around the south coast due to bad weather and the survey finished in Cork and not Galway as planned.

The scientific team would like to thank the Masters (Kenny Downing and Colin McBraerty) and all of the crew, as well as shore based staff of MI RV operations and P&O for their excellent support and help over the course of this survey.

8. References

Dickson, A.G., Sabine, C.L. and Christian, J.R. (Eds.) 2007. Guide to best practices for ocean CO_2 measurements. PICES Special Publication 3, 191 pp. http://cdiac.ornl.gov/oceans/Handbook_2007.html.

Grasshof, K., Kremling, K. Ehrhardt, M. Eds. 1999. Methods of Seawater Analysis, Third Edition. Wiley-VCH Verlag GmbH DOI: 10.1002/9783527613984.

Appendix 1. Benthic sampling summary table.

	Sample ID	Waterbody	latitude	longitude	Date	Depth (m)	Sediment type	Microplastics
1	MIBE22-142	Inner Galway Bay-North	53.2273	-9.1204	2022-01-17	19.1	Medium Sand, Mud	yes
2	MIBE22-143	Inner Galway Bay-North	53.2236	-9.1124	2022-01-17	21	Mud	yes
3	MIBE22-138	Inner Galway Bay-North	53.2213	-9.0841	2022-01-17	16.3	Medium Sand	yes
4	MIBE22-137	Inner Galway Bay-North	53.2275	-9.0570	2022-01-17	16.1	Coarse Sand, Mud	yes
5	MIBE22-144	Inner Galway Bay-North	53.2346	-9.0773	2022-01-17	15.8	Fine Sand, Mud	yes
6	MIBE22-141	Inner Galway Bay-North	53.2424	-9.0873	2022-01-17	16.1	Mud	yes
7	MIBE22-140	Inner Galway Bay-North	53.2444	-9.0557	2022-01-17	15.1	Mud	yes
8	MIBE22-136	Inner Galway Bay-North	53.2432	-9.0326	2022-01-17	13.1	Mud	yes
9	MIBE22-139	Inner Galway Bay-North	53.2419	-9.0209	2022-01-17	12.5	Mud	yes
10	MIBE22-145	Inner Galway Bay-North	53.2513	-9.0101	2022-01-17	10.3	Mud	yes
11	MIBE22-130	Mouth of Shannon	52.5112	-9.7407	2022-01-18	18	Fine Sand	no
12	MIBE22-131	Mouth of Shannon	52.5139	-9.7705	2022-01-18	20	Fine Sand	no
13	MIBE22-133	Mouth of Shannon	52.5185	-9.8058	2022-01-18	25.1	Fine Sand	no
14	MIBE22-134	Mouth of Shannon	52.5156	-9.8591	2022-01-18	41	Fine Sand	no
15	MIBE22-135	Mouth of Shannon	52.5472	-9.8588	2022-01-18	38.1	Coarse Sand	no
16	MIBE22-132	Mouth of Shannon	52.5468	-9.7896	2022-01-18	19	Fine Sand	no
17	MIBE22-127	Mouth of Shannon	52.5667	-9.7666	2022-01-18	16	Fine Sand	no
18	MIBE22-128	Mouth of Shannon	52.5467	-9.7560	2022-01-18	24	Coarse Sand	no
19	MIBE22-129	Mouth of Shannon	52.5295	-9.7462	2022-01-18	15	Fine Sand	no
20	MIBE22-126	Mouth of Shannon	52.5232	-9.7173	2022-01-18	16	Fine Sand	no
21	MIBE22-125	Mouth of Shannon	52.5495	-9.6968	2022-01-18	16.5	Fine Sand	no
22	MIBE22-124	Mouth of Shannon	52.6018	-9.5906	2022-01-18	24	mixed	no
23	MIBE22-122X	Mouth of Shannon	52.6080	-9.5759	2022-01-18	11	no sample	no
24	MIBE22-123X	Mouth of Shannon	52.6150	-9.5820	2022-01-18	18.5	No sample	no

	Sample ID	Waterbody	latitude	longitude	Date	Depth (m)	Sediment type	Microplastics
25	MIBE22-121	Mouth of Shannon	52.6081	-9.5512	2022-01-18	10	Fine Sand	no
26	MIBE22-119	Mouth of Shannon	52.5799	-9.5342	2022-01-18	12	Medium Sand, shell	no
27	MIBE22-120	Mouth of Shannon	52.5809	-9.5674	2022-01-18	22	mixed shelly	no
28	MIBE22-066	Kenmare	51.7005	-10.0186	2022-01-19	45	Fine Sand	no
29	MIBE22-068	Kenmare	51.6961	-10.0376	2022-01-19	45	Fine Sand	no
30	MIBE22-070	Kenmare	51.6944	-10.0803	2022-01-19	65	Fine Sand	no
31	MIBE22-069	Kenmare	51.7041	-10.1005	2022-01-19	67	Fine Sand	no
32	MIBE22-071	Kenmare	51.7118	-10.0775	2022-01-19	65	Fine Sand	no
33	MIBE22-072	Kenmare	51.7143	-10.0584	2022-01-19	62	Fine Sand	no
34	MIBE22-074	Kenmare	51.7233	-10.0681	2022-01-19	62	Mud	no
35	MIBE22-067	Kenmare	51.7303	-10.0962	2022-01-19	62	Fine Sand	no
36	MIBE22-065	Kenmare	51.7401	-10.1059	2022-01-19	45	Medium Sand	no
37	MIBE22-073	Kenmare	51.7367	-10.0551	2022-01-19	58.6	Mud	no
38	MIBE22-075	Kenmare	51.7587	-10.0211	2022-01-19	44.2	Coarse Sand, Mud	no
39	MIBE22-076	Kenmare	51.7458	-10.0020	2022-01-19	52.4	Mud	no
40	MIBE22-077	Kenmare	51.7581	-9.9811	2022-01-19	49.01	Mud	no
41	MIBE22-078	Kenmare	51.7600	-9.9559	2022-01-19	47.1	Mud	no
42	MIBE22-079	Kenmare	51.7719	-9.9570	2022-01-19	46	Mud	no
43	MIBE22-080	Kenmare	51.7772	-9.9092	2022-01-19	44.4	Fine Sand, Mud	no
44	MIBE22-081	Kenmare	51.7895	-9.8855	2022-01-19	40.5	Mud	no
45	MIBE22-085	Kenmare	51.8037	-9.8408	2022-01-19	34.6	Mud	no
46	MIBE22-086	Kenmare	51.8102	-9.8278	2022-01-19	31.9	Mud	no
47	MIBE22-087	Kenmare	51.8089	-9.7954	2022-01-19	33.4	Mud	no
48	MIBE22-083	Kenmare	51.7966	-9.8159	2022-01-19	32.2	Coarse Sand, mixed	no
49	MIBE22-084	Kenmare	51.7990	-9.8344	2022-01-19	35	Mud	no

	Sample ID	Waterbody	latitude	longitude	Date	Depth (m)	Sediment type	Microplastics
50	MIBE22-082	Kenmare	51.7853	-9.8533	2022-01-19	39	Mud	no
51	MIBE22-056	Roaringwater Bay	51.4388	-9.6230	2022-01-20	47	Medium Sand	yes
52	MIBE22-057	Roaringwater Bay	51.4554	-9.5981	2022-01-20	47	Fine Sand, Mud	yes
53	MIBE22-060	Roaringwater Bay	51.4472	-9.5670	2022-01-20	48	Fine Sand, Mud	yes
54	MIBE22-064	Roaringwater Bay	51.4358	-9.5603	2022-01-20	45	Fine Sand	yes
55	MIBE22-063	Roaringwater Bay	51.4440	-9.5233	2022-01-20	40	Fine Sand	yes
56	MIBE22-061	Roaringwater Bay	51.4681	-9.4922	2022-01-20	32.1	Fine Sand	yes
57	MIBE22-062	Roaringwater Bay	51.4601	-9.4717	2022-01-20	16.7	Coarse Sand, Medium Sand	yes
58	MIBE22-059	Roaringwater Bay	51.4972	-9.5209	2022-01-20	24.9	Coarse Sand	yes
59	MIBE22-058	Roaringwater Bay	51.4765	-9.5578	2022-01-20	39.8	Fine Sand, Mud	yes
60	MIBE22-054	Roaringwater Bay	51.4724	-9.6157	2022-01-20	45.5	Fine Sand, Mud	yes
61	MIBE22-055	Roaringwater Bay	51.4555	-9.6369	2022-01-20	48.1	Fine Sand, Mud	yes
62	MIBE22-053	Roaringwater Bay	51.4833	-9.6751	2022-01-20	30.7	Fine Sand, Mud	yes
63	MIBE22-052	Roaringwater Bay	51.4527	-9.6766	2022-01-20	52.4	Fine Sand	yes
64	MIBE22-051	Roaringwater Bay	51.4476	-9.7401	2022-01-20	51	Coarse Sand	yes
65	MIBE22-029	Waterford	52.1527	-6.9450	2022-01-21	12	Fine Sand, Mud	no
66	MIBE22-030	Waterford	52.1593	-6.9426	2022-01-21	10	Fine Sand, Mud	no
67	MIBE22-031	Waterford	52.1653	-6.9544	2022-01-21	9	Fine Sand, Mud	no
68	MIBE22-033	Waterford	52.1698	-6.9409	2022-01-21	9	Fine Sand, Mud	no
69	MIBE22-034	Waterford	52.1752	-6.9354	2022-01-21	8	Fine Sand, Mud	no
70	MIBE22-032	Waterford	52.1638	-6.9262	2022-01-21	9	Fine Sand, Mud	no
71	MIBE22-027	Waterford	52.1434	-6.9394	2022-01-21	12.6	Fine Sand, Mud	no
72	MIBE22-028	Waterford	52.1458	-6.9565	2022-01-21	14.3	Fine Sand, Mud	no
73	MIBE22-026	Waterford	52.1350	-6.9692	2022-01-21	18.4	Fine Sand, Mud	no
74	MIBE22-035	Waterford	52.1321	-6.9775	2022-01-21	19	Fine Sand, Mud	no

	Sample ID	Waterbody	latitude	longitude	Date	Depth (m)	Sediment type	Microplastics
75	MIBE22-046	Outer Cork Harbour	51.7865	-8.1879	2022-01-21	13	Fine Sand, Mud	no
76	MIBE22-045	Outer Cork Harbour	51.7805	-8.2101	2022-01-21	21	Fine Sand, Mud	no
77	MIBE22-044	Outer Cork Harbour	51.7783	-8.2259	2022-01-21	22	Fine Sand, Mud	no
78	MIBE22-043	Outer Cork Harbour	51.7782	-8.2462	2022-01-21	19.1	Fine Sand, Mud	no
79	MIBE22-047	Outer Cork Harbour	51.7827	-8.2596	2022-01-21	18.7	Fine Sand, Mud	no
80	MIBE22-038	Outer Cork Harbour	51.7864	-8.2766	2022-01-21	14.8	Mud	no
81	MIBE22-050	Outer Cork Harbour	51.7758	-8.2889	2022-01-21	13.9	Medium Sand	no
82	MIBE22-037	Outer Cork Harbour	51.7675	-8.2814	2022-01-21	16.5	Fine Sand, Mud	no
83	MIBE22-036	Outer Cork Harbour	51.7634	-8.2761	2022-01-21	18.4	Fine Sand, Mud	no
84	MIBE22-041	Outer Cork Harbour	51.7689	-8.2700	2022-01-21	18.9	Mud	no
85	MIBE22-040	Outer Cork Harbour	51.7723	-8.2745	2022-01-21	17.8	Mud	no
86	MIBE22-039	Outer Cork Harbour	51.7782	-8.2667	2022-01-21	19.5	Mud	no
87	MIBE22-042	Outer Cork Harbour	51.7705	-8.2593	2022-01-21	18.3	Fine Sand	no
88	MIBE22-049	Outer Cork Harbour	51.7710	-8.2471	2022-01-21	20.4	Fine Sand	no
89	MIBE22-048	Outer Cork Harbour	51.7625	-8.2553	2022-01-21	21.4	Fine Sand, Medium Sand	no
90	MIBE22-016	Killiney Bay (SW Irish Sea)	53.2587	-6.0916	2022-01-22	14	Fine Sand, Mud	no
91	MIBE22-017	Killiney Bay (SW Irish Sea)	53.2408	-6.0946	2022-01-22	17.6	Fine Sand, Mud	no
92	MIBE22-022	Killiney Bay (SW Irish Sea)	53.2400	-6.0722	2022-01-22	22.6	Fine Sand, Medium Sand	no
93	MIBE22-018	Killiney Bay (SW Irish Sea)	53.2277	-6.0817	2022-01-22	22.7	Medium Sand, Mud	no
94	MIBE22-019	Killiney Bay (SW Irish Sea)	53.2101	-6.0719	2022-01-22	20	Medium Sand, Mud	no
95	MIBE22-023	Killiney Bay (SW Irish Sea)	53.2028	-6.0667	2022-01-22	27	Fine Sand ,Mud	no
96	MIBE22-020	Killiney Bay (SW Irish Sea)	53.1910	-6.0681	2022-01-22	22	Mud	no
97	MIBE22-021	Killiney Bay (SW Irish Sea)	53.1812	-6.0533	2022-01-22	24	Fine Sand, Mud	no
98	MIBE22-024x	Killiney Bay (SW Irish Sea)	53.0985	-6.0212	2022-01-22	10.7	No sample - cobble	no
99	MIBE22-025	Killiney Bay (SW Irish Sea)	53.0734	-5.9991	2022-01-22	21	Coarse Sand, Medium Sand	no

	Sample ID	Waterbody	latitude	longitude	Date	Depth (m)	Sediment type	Microplastics
100	MIBE22-003	Dublin Bay	53.3573	-6.0613	2022-01-22	12	Fine Sand, Gravel	yes
101	MIBE22-002	Dublin Bay	53.3548	-6.1057	2022-01-22	10	Fine Sand	yes
102	MIBE22-001	Dublin Bay	53.3479	-6.1013	2022-01-22	11.1	Fine Sand	yes
103	MIBE22-005	Dublin Bay	53.3401	-6.0982	2022-01-22	13.7	Fine Sand	yes
104	MIBE22-006	Dublin Bay	53.3359	-6.0850	2022-01-22	13.8	Fine Sand	yes
105	MIBE22-008	Dublin Bay	53.3194	-6.0835	2022-01-22	17.9	Fine Sand, Mud	yes
106	MIBE22-015	Dublin Bay	53.3237	-6.1049	2022-01-22	13.8	Fine Sand, Mud	yes
107	MIBE22-009	Dublin Bay	53.3326	-6.1213	2022-01-22	10	Fine Sand	yes
108	MIBE22-010	Dublin Bay	53.3259	-6.1278	2022-01-22	10	Fine Sand, Mud	yes
109	MIBE22-011	Dublin Bay	53.3162	-6.1283	2022-01-22	10	Fine Sand	yes
110	MIBE22-012	Dublin Bay	53.3104	-6.1116	2022-01-22	12.7	Fine Sand, Mud	yes
111	MIBE22-014	Dublin Bay	53.3067	-6.0893	2022-01-22	20.9	Fine Sand, Mud	yes
112	MIBE22-013	Dublin Bay	53.2971	-6.0952	2022-01-22	14.5	Fine Sand, Mud	yes
113	MIBE22-004x	Dublin Bay	53.3517	-6.0928	2022-01-22	10	No sample – cobble, rock	no
114	MIBE22-007x	Dublin Bay	53.3279	-6.0718	2022-01-22	19.9	No sample – cobble, rock	no

Transit through Roaringwater Bay