TC24022 Celtic Sea Submerged Landscapes Survey ‘24
NRW Band 1 Licence application

Method Statement

June 2024

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Introduction

The Celtic Sea ecosystem has been subject to more than a century of increasing fishing pressure, yet research in the Celtic Sea is limited compared to other Atlantic regions, with broad-scale seabed habitats modelled at a low degree of confidence. The relationship between the geomorphology of the Celtic Sea with seabed habitat types remains understudied, and the genesis and significance of the palaeo-channel network faintly evident in existing seabed data persists as an enigma to science.

To resolve the relationships between paleo-channels, seabed morphology and benthic habitats, the *Celtic submerged landscapes expedition* survey TC24022 is carried out by University College Cork with support of the Marine Institute / Foras Na Mara and in collaboration with CEFAS, University College Dublin, the University of Bremen, the University of Plymouth and the University of Angers. It is a multidisciplinary survey the Celtic Sea both in Irish and UK waters.

Background

TC24022 is a marine survey for the purpose of scientific discovery and research. The scientific objectives are:

1. Study the geomorphological and sedimentological relics of the river/tunnel valley network within the Celtic Sea, to better understand their significance and if they constitute a potential seafloor hazard. These data directly feed a UCC-UoP funded Doctoral Training Partnership.
2. Characterise and assess the impact of the palaeo-channel network on benthic habitat distribution to better inform future endeavours of marine spatial planning and Marine Protected Areas (MPAs) designation. These data directly feed into the MI funded Cullen PhD Scholarship "ABC Celtic Sea" Ref No: CS/20/010.
3. Assess the occurrence and investigate potential methane seeps at different locations defined by anomalies in seabed bathymetry.
4. Provide ground-truthing for the development of a geomorphological and geological map for Ireland's shallow-water territories. Data from all previous objectives feeds the MI funded Postdoctoral Fellowship "NOMANS_TIF" Grant number PDOC 19/08/03.

Due to its complexity, understanding the seabed geomorphology and near surface geology is critical for ecological habitat mapping but also to support energy transition projects, including offshore renewable energy.

Description of the proposed project and scope of works

The temporal scope of work extends from September 22nd, 2024 to October 6th, 2024. This survey aims to shed light at the palaeo-channel network of the Celtic Sea and assess potentially important benthic habitats.

A vibrocorer will be used to obtain sediment cores to a depth of 6 m below seafloor. These will be analysed and described to obtain a better understand palaeo-environmental conditions that led to the formation of channels, the relics of which are evident in INFOMAR seabed data. At most, a dozen vibro-cores are foreseen to be collected. An airgun and a chirp will be used to collect seismic data to inspect the Quaternary stratigraphy of the area and develop a detailed model of the sedimentary architecture of the subsurface and channels. A multibeam echosounder (MBES) will be also used to collect high-resolution bathymetry data in the study area and especially at vibrocore stations.

Supporting data will be collected using an ROV or drop camera, to obtain high definition seafloor observations of value to ecological assessments and habitat mapping. Opportunistic seawater samples and conductivity-temperature-depth (CTD) profiles may be taken, with all equipment tabulated in Table 2. Indicative vibrocore stations, MBES lines, and seismic lines are provided in Figure 2.

Survey Vessel

The Irish multi-purpose marine research vessel, the *RV Tom Crean,* will be used for the proposed surveys (Figure 1). The RV Tom Crean was commissioned in 2022 and was designed as a silent research vessel, in order to meet the stringent criteria of the ICES 209 noise standard for fisheries research. The vessel specifications are given in Table 1.

Figure 1: RV Tom Crean

Table 1: RV Tom Crean: Vessel specifications

Vessel size	
Vessel length	52.8m
Beam	14m
Draught	5.2m (maximum)
Tonnage (GRT)	1935 Tonnes
Main diesel generators	
Make	Mitsubishi
Type	S16R-(Z3)MPTAW
Number and power	2 x ~1437kW
Speed	1500 rpm
Mounting	Double resilient
Exhaust silencers	SCR system with 45dB(A) attenuation
Auxiliary diesel generators	
Make	Scania
Type	DI 13-91 M
Power	426 kWm
Speed	1500 rpm
Mounting	Resilient
Exhaust silencers	At least 25 dB(A)
Propulsion motor	
Make	Indar
Type	Squirrel cage – Induction motor IMU-710-X/8
Power	2000 kW at 179rpm
Rated frequency	12.6 Hz

Survey Equipment

Table 2: Survey equipment

Benthic and seabed sampling equipment				
Equipment	Model/Type	Deployment	Company	Type of data
Multibeam echosounder	EM2040	Hull-mounted	Kongsberg	Bathymetry/backscatter data

Multichannel airgun & chirp	Sercel micro G.I. gun & Knudsen 3260 9 x 3.5Khz, 1 x 12Khz	Overboard	Sercel and Knudsen	Multichannel seismic stratigraphy
Vibrocorer	Geo-Vibro Corer 6000	Overboard	Geo-Marine Survey Systems	Sediment data
ROV	Inspection-class	Overboard		Imagery
Drop-camera	Simrad		Kongsberg	Imagery
CTD	SBE 911 with Rosette	Overboard	Seabird Electronics	Chemistry

Vibrocorer

The Geo-Vibro Corer 6000 allows sampling sub-surficial sediments to a maximum depth of ~6m, depending on stiffness. Penetration is achieved by an electric motor, vibrating at 28Hz and actuating the barrel at 30kN into the seabed. The design of the Geo-Vibro Corer allows for penetration of the core over very short vibration duration, typically less than a minute.

The use of the vibrocorer will be limited to soft sediments. The foot print the vibrocorer has a superficial foot print due to the size of the frame of ~4.7m^2, but a much smaller sediment collection footprint (121mm – the diameter of the barrel) and a penetration depth up to 5.9 m. The subtidal sediment habitat within the area of the proposed survey area is comprised of sands, coarse sediments and mixed sediment. The habitat in this area is considered to represent an exposed environment comprised of robust specialists capable of withstanding disturbance and smothering. Any disturbance caused by sampling would be undetectable within days. Benthic species damage would be negligible due to the scale of sampling and would not have the potential to significantly impact the community types present. There are no species communities recorded for this area that are known to be sensitive to physical damage/abrasion or disturbance. Sediment removal will be extremely limited, with an absolute maximum of ~0.714 m^3 per vibrocore (often much less than that due to penetration constraints). On successful recovery no repeated collection will be carried out in the same place, and stations are broadly spaced across the study area (see Figure 2).

Operations

Indicative coring locations are provided in the map of Figure 2 and in Table 3. Plans are subject to eventual change depending on weather and findings, but stations and line plan will be nonetheless strictly within the target area.

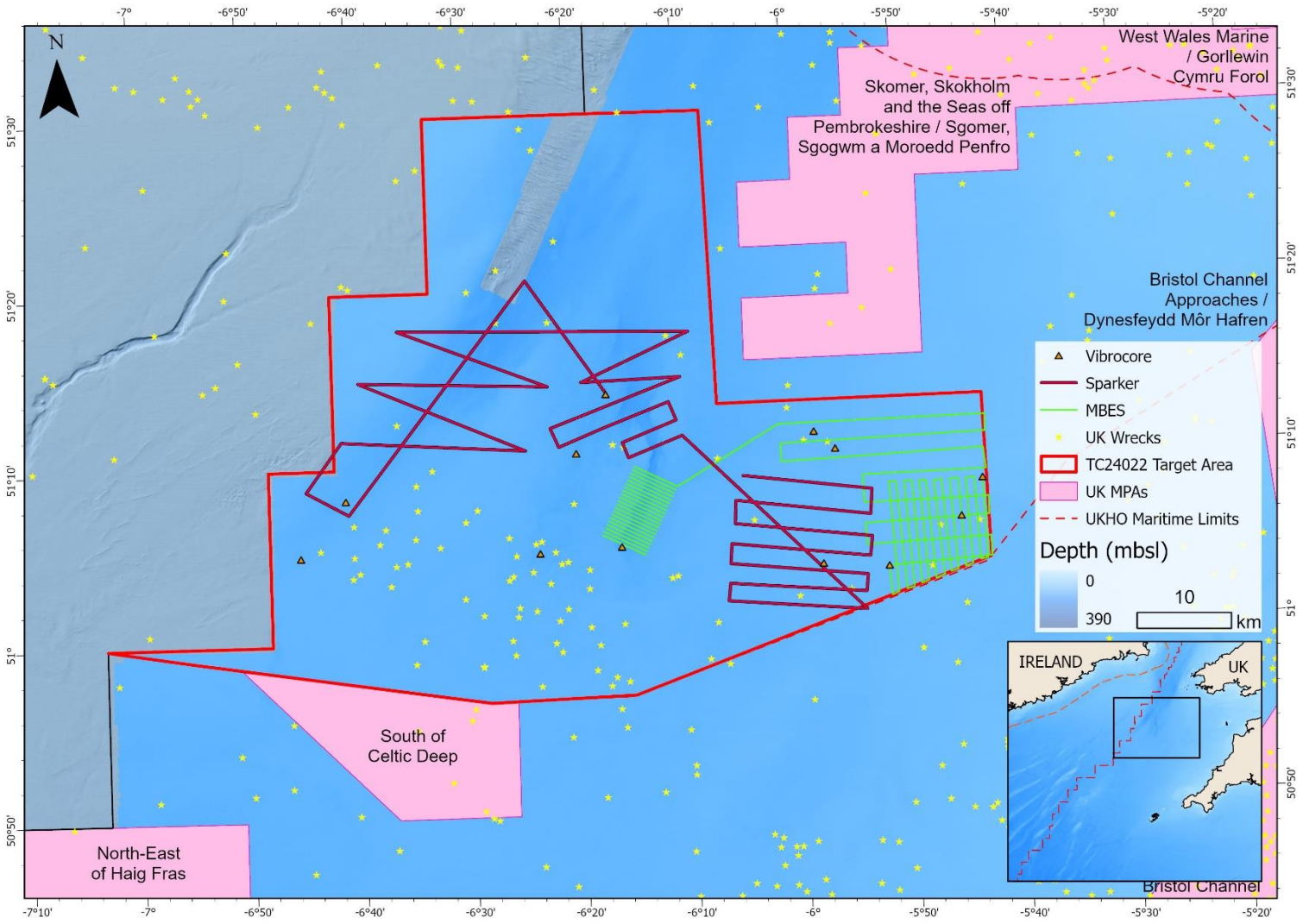

Figure 2: location of the target area in UK waters. Coordinate system is WGS84 UTM 29N. Plans are subject to eventual change depending on weather and findings, but stations and line plan will be nonetheless within the target area

Table 3: location of core stations. Coordinates are given in decimal degrees WGS84 UTM 29N

Vibrocore ID	X	Y
1	-5.71663	51.13908
2	-5.75081	51.10335
3	-5.86301	51.05877
4	-5.93846	51.17224
5	-5.96996	51.18924
6	-5.96263	51.06313
7	-6.26719	51.08596
8	-6.33167	51.17639
9	-6.28385	51.23189
10	-6.68368	51.13741
11	-6.3912	51.08216
12	-6.7542	51.08392

Mitigations

After consultation with RCSHMW, MCA and Trinity House the following mitigations will be put in place:

Navigation (MCA)

1. All maritime safety legislation will be complied with;
2. Local notification will be issued to marine users, including fishermen's organisations, relevant authorities and other local stakeholders, to ensure that they are made fully aware of the activity at least five days before commencement of the works;
3. Zone24@hmcg.gov.uk will be notified prior to commencement of activities.
4. A notification will be sent to The Source Data Receipt team, UK Hydrographic Office (email: sdr@ukho.gov.uk) of commencement of the licensed activities, at least 10 days before commencement of the works. The information supplied will include the start date and end date, a description of the works, positions of the work area (WGS84), and details of any marking arrangements.

RCAHMW

1. MBES data will be collected in advance of coring to avoid any potential collision with unknown wrecks. Any information about newly discovered wrecks found during the MBES element of the survey will be shared with RCAHMW.
2. RCAHMW will be notified when the survey data are publicly released, as they have the potential to enhance our knowledge of wreck sites as per the Welsh National Marine Plan.