

**APPLICATION FOR THE CONSENT TO CONDUCT MARINE SCIENTIFIC  
RESEARCH IN AREAS UNDER NATIONAL JURISDICTION OF THE UNITED  
KINGDOM**

Date: 10<sup>th</sup> October 2011

**1. General information**

**1.1 Cruise name and/or number:** CV11016

**1.2 Sponsoring institution:**

**Name:** Marine Institute  
**Address:** Rinville  
Oranmore  
Co. Galway  
Ireland

**Name of Chief Executive:** Dr. Peter Heffernan

**1.3 Scientist in charge of the project:**

**Name:** Dr Rory Quinn  
**Address:** School of Environmental Sciences  
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Northern Ireland

**Telephone:** 0044(0)2871324884

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**1.4 Scientist(s) from UNITED KINGDOM involved in the planning of the project**

**Name(s):** Dr Ruth Plets and Dr Kieran Westley  
**Address:** School of Environmental Sciences  
University of Ulster  
Cromore Road  
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BT52 1SA  
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**1.5 Submitting officer:**

**Name and address:**  
Marine Institute  
Rinville  
Ornamore  
Galway

**Country:** Ireland

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## **2. Description of project (Attach additional pages as necessary)**

**Undergraduate student training cruise.** The over-arching scientific objective of the training programme is to provide the next generation of marine scientists graduating from the University of Ulster with the necessary offshore seabed survey and data processing skills to meet the demands of a range of employers within the marine sector within Ireland. In recent years Ireland has experienced rapid growth in this area with initiatives such as the Irish National Seabed Survey, INFOMAR and the JIBS projects generating enormous data sets and a demand for skilled personnel/graduates to process and interpret data.

### **2.1 Nature of objectives of the project:**

Specifically, the proposed training programme can be divided into two main sets of objectives; a) field-based survey skills training and b) post-cruise data processing and interpretation skills training.

#### a) Field-based survey skills training

Field-based training will focus on acoustic and biological benthic survey techniques. The training will provide a solid understanding and experience in the acquisition and processing of data whilst at sea in the following area:

- Multibeam sonar (MBES) data collection and processing
- Sidescan sonar (SSS) data collection and processing
- Seismic (pinger) data collection and processing
- Single-beam sonar (SBES) (ground discrimination) data collection and processing
- Benthic grab sample collection and processing (sediments and biology)
- Benthic corer sample collection and processing (sediments and biology)
- Beam-trawl sample collection and processing (epifauna and demersal fish)
- Underwater video surveys using a passive dropdown video system

#### b) Post-cruise data processing and interpretation skills training

The data generated from the field exercises will be used to meet scientific training objectives in taught modules at the University in subsequent semesters/years. Post-cruise training objectives will include:

- Acoustic (MBES, SSS and SBES) data processing and interpretation
- Benthic grab sample processing and community analysis
- Particle grain-size analysis

Underwater video assessment of benthic habitats and communities

### **2.2 Relevant previous or future research cruises:**

Dr's Quinn, Plets and Westley have taken part in numerous cruises in connection with the objectives stated above as part of undergraduate field schools in previous years. The proposed sites have been selected for the training exercises to fit in with research interests at these areas. Data generated as part of the exercises will feed into undergraduate dissertation projects, therefore the sites have been selected where some data already exists to maximise the benefits of the data collected.

The exercises undertaken as part of the training-cruise will play to the strength of the academic staff within the University of Ulster. Specifically, the focus will be on seafloor systems (benthic ecology and seafloor dynamics/processes) and benthic mapping (physical and biological components of the seafloor) and on submerged archaeology. Marine science staff have a strong research record in this area, and the Marine Science degree modules currently incorporate a significant amount of taught material in this field.

### **2.3 Previously published research data relating to the project:**

- Bell, T., Westley, K., Plets, R., Quinn, R., and Renouf, P., 2008, Submerged archaeological landscapes: from ancient myth to new frontier, *Journal of Ocean Technology*, 3(4): 13-20.
- Quinn, R., Forsythe, W., Breen, C., Boland, D., Lane, P. and Lali Omar, A., 2007, Process-based models for port evolution and wreck site formation at Mombasa, Kenya, *Journal of Archaeological Science*, 34 (9): 1449-1460.
- McGonigle, C., Brown, C., Quinn, R. and Grabowski, J., 2009, Evaluation of image-based multibeam sonar backscatter classification for benthic habitat discrimination and mapping at Stanton Banks, UK, *Estuarine, Coastal and Shelf Science*, 81(3): 423-437.
- Quinn, R., 2006, The Role of Scour in Shipwreck Site Formation Processes and the Preservation of Wreck-Associated Scour Signatures in the Sedimentary Record - Evidence from Seabed and Sub-surface Data. *The Journal of Archaeological Science*, 33 (10): 1419-1432.
- Plets, R, Quinn, R, Forsythe, W, Westley, K, Bell, T, Benetti, S, McGrath, F and Robinson, R (2011) Using Multibeam Echo-Sounder Data to Identify Shipwreck Sites: archaeological assessment of the Joint Irish Bathymetric Survey data. *International Journal of Nautical Archaeology*, 40 (1). pp. 87-98. ISSN 10572414
- Quinn, R., Dean, M., Lawrence, M., Liscoe, S. and Boland, D., 2005, Backscatter responses and resolution considerations in archaeological side-scan sonar surveys: a control experiment, *The Journal of Archaeological Science*, 32: 1252-1264.
- Quinn, R., Breen, C., Forsythe, W., Barton, K., Rooney, S. and O' Hara, D., 2002, Integrated Geophysical Surveys of The French Frigate La Surveillante (1797), Bantry Bay, Co. Cork, Ireland, *The Journal of Archaeological Science*, 29: 413-422.
- Quinn, R., Forsythe, W., Breen, C., Dean, M., Lawrence, M. and Liscoe, S., 2002, Comparison of the Maritime Sites and Monuments Record with side-scan sonar and diver surveys: A case study from Rathlin Island, Ireland. *Geoarchaeology*, 17 (5): 441-451.
- Westley, K, Quinn, R, Forsythe, W, Plets, R, Bell, T, Benetti, S, McGrath, F and Robinson, R (2011) Mapping Submerged Landscapes Using Multibeam Bathymetric Data: a case study from the north coast of Ireland. *International Journal of Nautical Archaeology*, 40 (1). pp. 99-112. ISSN 10572414
- Westley, K, Bell, T, Plets, R and Quinn, R (2011) Investigating Submerged Archaeological Landscapes: a research strategy illustrated with case studies from Ireland and Newfoundland, Canada. In: *Submerged Prehistory*. Oxbow Books, pp. 129-144. ISBN 978-1-84217-418-0

## **3. Methods and means to be used**

### **3.1 Particulars of vessel**

**Name:** R.V. Celtic Voyager  
**Nationality:** Irish  
**Owner:** Marine Institute

**Overall length:** 31.5m

**Maximum draught:** 4m

**Net tonnage:** 340T

**Propulsion:** Wärtsilä UD25M5 (626 kW),

**Cruising speed:** 8kn

**Call sign:** EIQN

**Method and capability of communication** – GMDSS A class, E-mail. Mini M SAT C and GSM

**Name of master:** Philip Baugh/Colin McBrearty

**Number of crew:**

**Number of scientists on board:** 6

**3.2 Aircraft or other craft to be used in the project:** N/A

### 3.3 Particulars of methods and scientific instruments

Types of samples and data	Methods to be used	Instruments to be used
Acoustic data	Hull-mounted acoustic survey methodology	Multibeam sonar, Single beam sonar, Pinger
Biological samples (infauna and epifauna)	Grabs, cores and trawls	Day grab, Hamon grab, Shipek grab, Box core, 2m beam trawl
Sediment grain size samples	Grabs, cores and trawls	Day grab, Hamon grab, Shipek grab, Box core, 2m beam trawl
Video data	Underwater video surveys	Drop-down and towed video frames

### 3.4 Indicate whether harmful substances will be used:

Biological samples will be preserved in 4% Formaldehyde solution. No other harmful substances will be used.

### 3.5 Indicate whether drilling will be carried out:

No drilling will be carried out

### 3.6 Indicate whether explosives will be used

No explosives will be used

## 4. Installations and equipment

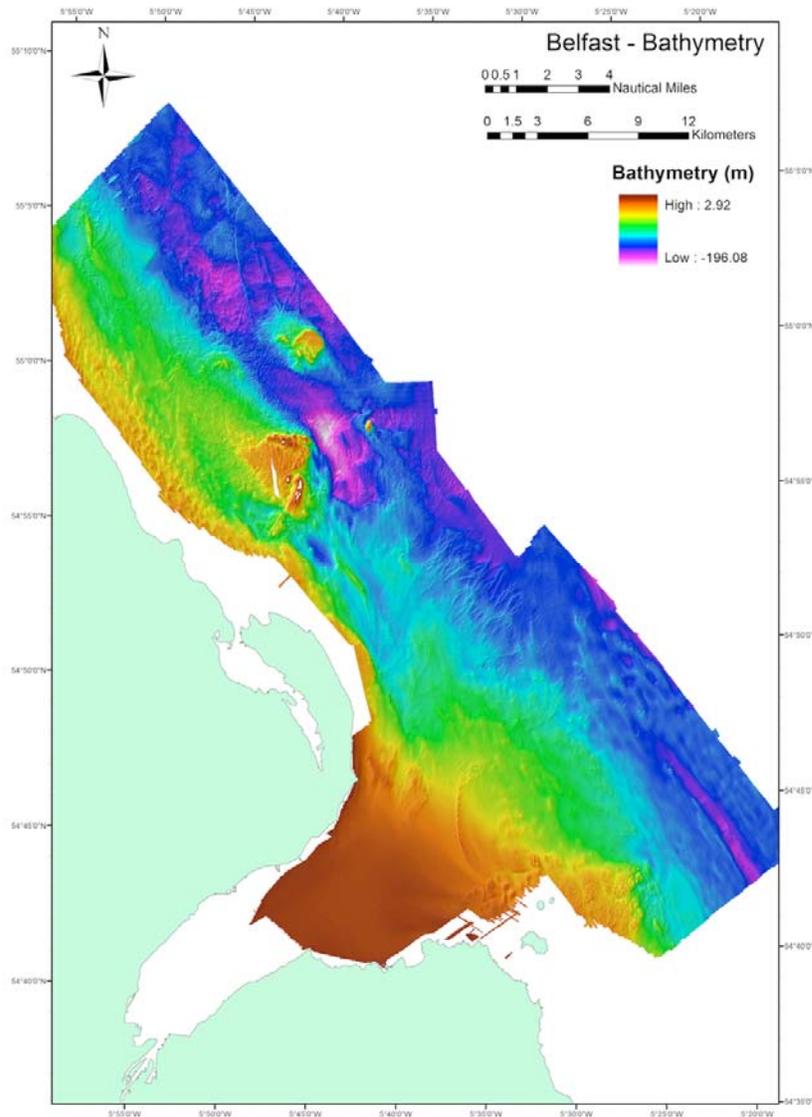
Details of installations and equipment (dates of laying, servicing, recovery, exact locations and depth):

No equipment will be installed at the survey sites.

## 5. Geographical areas

5.1 Indicate geographical areas in which the project is to be conducted (with reference in latitude and longitude): Study area centred around Belfast Lough (see chart below)

**5.2 Attach chart(s) at an appropriate scale showing the geographical areas of the intended work and, as far as practicable, the positions of intended stations, the tracks of survey lines, and the locations of installations and equipment.**



We will use the multi-beam sonar data presented in the chart above as the basis for our investigations. These data were acquired by the British Navy and ASFBI and released to the University of Ulster for research purposes.

At the chosen survey site acoustic survey lines will be plotted prior to survey and will depend on sea state and water depth over the area. Ground-truthing stations will be selected based on the acoustic data sets. The following is a guide for the approximate number of proposed samples using each of the sampling techniques. The number of stations has been kept low to maximise training time and allow students to learn the various skills without the time pressures of a normal commercial or research focused cruise:

- Grab samples - Day grab (10 stations)
- Grab samples – Shipek grab (10 stations)
- Core samples – Box core (10 stations)
- 2m beam trawl (10 stations)

- Under water video (10 stations)

Survey lines and grab station co-ordinates will be decided at the time of survey depending on weather conditions and time restraints.

## **6. Dates**

**6.1 Expected dates of first entry into final departure from research area of the research vessel:**

**08.11.11-14.11.11**

**6.2 Indicate if multiple entry is expected:**

## **7. Port calls**

**7.1 Dates and names of intended ports of calls in UNITED KINGDOM:**

Belfast or Bangor for mobilisation and demobilisation on 08.11.11 and 14.11.11

**7.2 Any special logistical at ports of call:**

**7.3 Names/ Address / Telephone of shipping agent (if available)**

## **8. Participation**

**8.1 Extent to which UNITED KINGDOM will be able to participate to be represented in research project:**

The cruise will be run by UK scientists and data will feed into UK Higher Education via the University of Ulster BSc Marine Science degree programme.

**8.2 Proposed dates and ports for embarkation / disembarkation:**

Belfast or Bangor for mobilisation and demobilisation on 08.11.11 and 14.11.11

## **9. Access to data, samples and research results**

**9.1 Expected dates of submission to UNITED KINGDOM preliminary reports which should include the expected dates of submission of the final results:**

CRUISE REPORT AVAILABLE EARLY 2012.

**9.2 Proposed means for access by UNITED KINGDOM to data and samples:**

UNIVERSITY OF ULSTER (UK) STAFF AND STUDENTS WILL HAVE IMMEDIATE ACCESS TO DATA AND SAMPLES

**9.3 Proposed means to provide UNITED KINGDOM with assessment of data, samples and research results or provide assistance in their assessment or interpretation:**

Data and samples will be processed by University of Ulster undergraduate and post-graduate students. Results will be published, if appropriate, in leading marine science journals. Data will be freely available to UK government agencies (DEFRA, SNH, EHS, AFBI, FRS etc.)

**9.4 Proposed means of making research results internationally available:**

Research results will be published in leading marine science journals.

**10. Scientific Equipment**

**COMPLETE THE FOLLOWING TABLE-  
SEPARATE PAGE FOR EACH COSTAL STATE:**

INDICATE YES OR NO

LIST SCIENTIFIC WORK BY FUNCTION Eg: MAGNETOMETRY: GRAVITY DIVING SEISMICS BATHYMETRY SEABED SAMPLING TRAWLING ECHO SOUNDING WATER SAMPLING U/W TV MOORED INSTRUMENTS TRAWLING ECHO SOUNDING WATER SAMPLING	Water column including sediment sampling of the Seabed	Fishes research within fishing limits	Research concerning the natural resources of the continental shelf or its physical characteristics	DISTANCE FROM COAST		
				Within 12nms	Between 12-200nms	(Continental shelf work only)  Beyond 200nm but within the continental margin
SEISMICS BATHYMETRY ECHO SOUNDING	Yes	No	No	Yes	No	<u>No</u>
SEABED SAMPLING TRAWLING	Yes	No	No	Yes	No	<u>No</u>
U/W TV	Yes	no	no	Yes	No	<u>No</u>

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(On behalf of the Principle Scientist)

Dated -----