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

Date: 19th October 2009

## 1. General information

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

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
University of Ulster
Cromore Road
Coleraine
Co. Derry
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Northern Irleand

**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
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Cromore Road
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**1.5 Submitting officer:**

**Name and address:**
Rinville
Oranmore

Co. Galway

**Country:** Ireland

**Telephone:** 00 353 91 387200

**Telefax:** 00 353 91 387201

## 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:**


1. 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.
2. 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.
3. 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.
4. 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.
5. 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.


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

**3.1 Particulars of vessel**

**Name:** Celtic Explorer
**Nationality:** Irish

**Owner:** Marine Institute

**Overall length:** 65.5m
**Maximum draught:** 5.7m
**Net tonnage:** 727
**Propulsion:** 2 x 1530 KW, 1000Rpm, 1 x 1020 KW, 1000 Rpm
**Cruising speed:** 10 Kts
**Call sign:** EI

**Method and capability of communication –**
**Vsat Satellite Broadband**
**Imarsat –c**
**HF**
**VHF**
**Mini –M**

**Name of master:** Ciaran Flannagan/Philip Baugh
**Number of crew:**
**Number of scientists on board:**

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

**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**

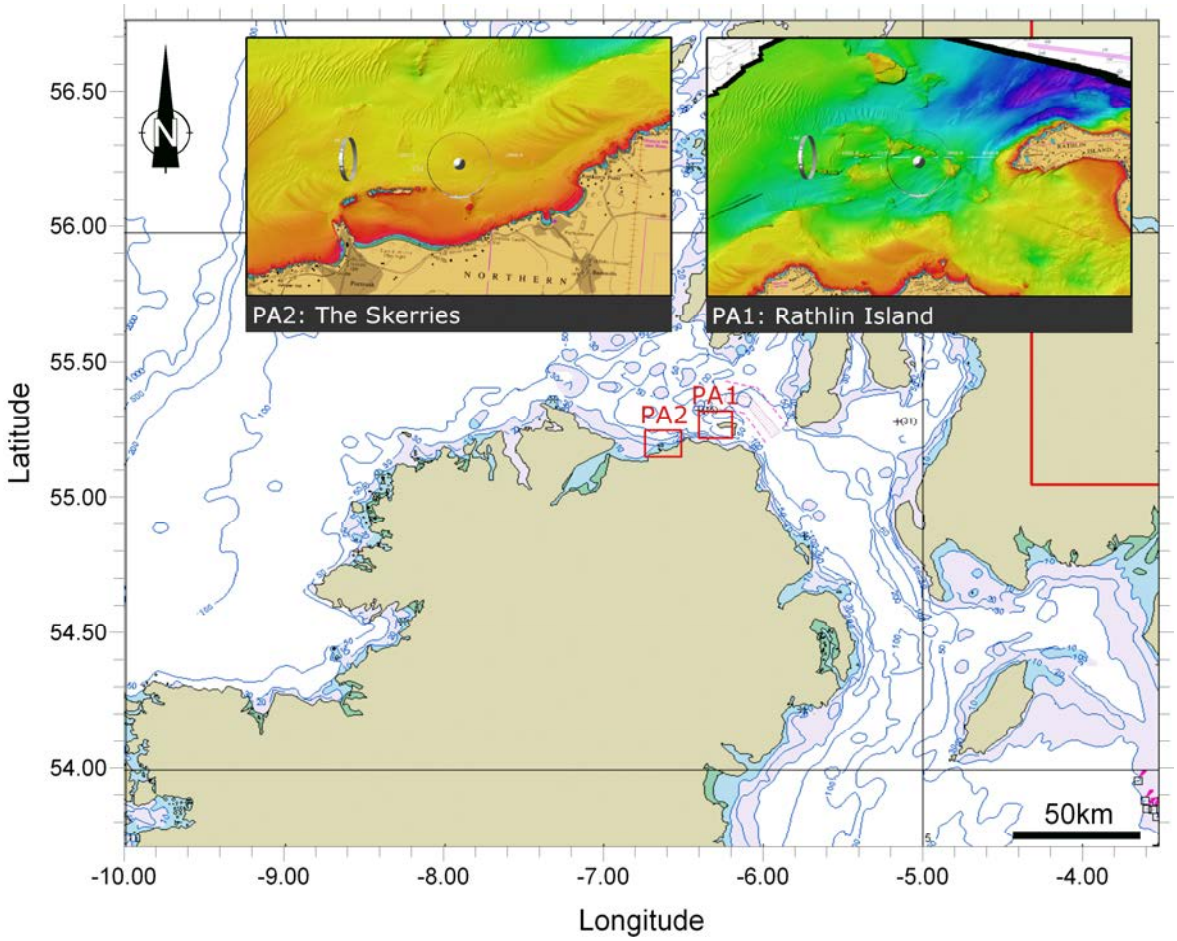
5.1 Indicate geographical areas in which the project is to be conducted (with reference in latitude and longitude):

Surveys will be conducted at the following areas (Figure 1) which form part of the Joint Irish Bathymetric Survey (JIBS) study area:

1) Rathlin Island. Survey effort will be focused on rocky reefs and soft sediment sites to the west of the Island. This area (Figure 1) is an ideal training ground for students. The area encompasses a diverse range of substrate types and benthic habitats ideal for teaching a range of sampling approaches. The area is also very dynamic and will provide an interesting region for comparison of temporal data sets which can be incorporated into final year dissertation projects from a range of disciplinary angles. Benthic sampling (grabs, cores and trawls) will be conducted outside of the SAC boundary. Only non-destructive survey methods (acoustics and drop-down video) will be conducted inside of the SAC.

2) The Skerries. Survey effort will be focused on rocky reefs and soft sediment sites to the north of the islands. This area (Figure 1) is also an ideal training ground for students. The area encompasses a diverse range of substrate types and benthic habitats ideal for teaching a range of sampling approaches. The area is also very dynamic and will provide an interesting region for comparison of temporal data sets which can be incorporated into final year dissertation projects from a range of disciplinary angles.

These sites have been selected based on current research activities at the University of Ulster. The areas were surveyed as part of the JIBS project, and existing MBES data is available for these sites. Repeat acoustic surveys at these sites will allow an assessment of change in the benthic environment which can be incorporated into final year dissertation projects, comparing the extant JIBS MBES data with the data acquired as part of the training exercises. The data generated as part of the training exercise will also feed into ongoing Postgraduate research projects, maximising the benefits of the survey work.




**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.**

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. Night-time working on the cruise will be utilized for acoustic data collection to maximise value-for-money in terms of use of ship-time. 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 wil 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:**

16-21 December 2009

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

## 7. Port calls

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

Lisahally – mid-way through cruise to allow for personnel changeover

**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 enable 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 Killybegs: 16th December 2009

Belfast or Killybegs: 21st December 2009

## 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 BY THE END OF FEBRUARY 2009.

**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 | Fisheries research within fishing limits | Research concerning the natural resources of the continental shelf or its physical character i-stics | DISTANCE FROM COAST | | |
|---|---|---|---|---|---|---|
| | | | | Within 12nms | Between 12-200nms | (Continental shelf work only)<br>Beyond 200nm but within the continental margin |
| SEISMICS BATHYMETRY ECHO SOUNDING | Yes | No | No | Yes | No | No |
| SEABED SAMPLING TRAWLING | Yes | No | No | Yes | No | No |
| U/W TV | Yes | no | no | Yes | No | No |

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(On behalf of the Principle Scientist)

Dated ----------