

SRDG and MREDS
Newsletter

Inside this issue

Page 2

SRDG international networking and dissemination, research proposals and publications

Lobsters at Billia Croo wave tesite

Report to Scottish Government

All Energy 2010

Page 3

Strategic meeting of marine scientists on marine renewables

Researchers develop model to understand tidal flow of the Pentland Firth and Orkney Waters

More SCHEMing ...

Page 4

ICES takes an interest in marine renewables

Report available from 2009 SRDG annual advisory stakeholder workshop

Update from MREDS & SRDG steering group meeting

Can fisheries and marine renewable energy co-exist?

Future research funding opportunities with NERC



SRDG: Advancing Marine Renewable Energy Research Capacity in Scotland



BY PROF JONATHAN SIDE

It has been a busy year for the ICIT/ERI SDRG team and a busy year for marine renewable energy as a whole. The contents of this newsletter give a brief account of some of the work being done by the SDRG research team. However it is worth taking a moment to consider how the whole marine energy sector has advanced over the past year. Arguably the single most important event of the year was the announcement in March by the Crown Estate of results of the sea bed leasing round in the Orkney and Pentland Firth area. These agreements are the first sea bed leases for commercial arrays of wave and tidal energy devices creating a potential for 1.2GW of development. This has been further augmented by the recent announcement of a lease for 400MW of tidal development in the Inner Sound between the isle of Swona and the Scottish mainland. The significance of these leases lies in the fact that they are for commercial arrays rather than single test devices which has



been the case to date. Furthermore several of the leases have been taken by large utilities, and this is further indication of a step change from prototype testing to fully commercial development. This change in activity brings with it a number of challenges. Not least understanding the potential environmental effects of these devices and conversely how these devices will react to real world waves and tides. There is also the need to develop the regulatory framework including the new marine planning system. Establishing this regulatory regime is vitally important as it will help resolve any future conflicts between sea users. These challenges are the focus of the current

research taking place at ERI and ICIT. I hope you find the contents of this newsletter interesting and we look forward to another exciting year of marine energy research and development in the north of Scotland.

EU FP7 MESMA project: Monitoring and Evaluation of Spatially Managed Areas

ICIT is currently one year into a four year EU funded project which aims to develop a generic framework and tools for marine spatially managed areas (SMAs) across Europe. Project MESMA is co-ordinated by IMARES (Netherlands) and ICIT is accompanied by 20 other universities and research institutions across 12 European coun-

tries. ICIT is a key partner from the UK and is leading a case study of the Pentland Firth and Orkney Waters (PFOW) area as one of ten case studies in the MESMA programme. The area of the PFOW has been designated for urgent marine planning by the UK and Scottish Governments because of its role in the development of marine renewable energy extraction for the purpose of

generating electricity. The case study pays particular attention to the socio-economic uses and developments in the PFOW and the role of the stakeholders and their institutions in the planning process. For further information about MESMA contact Dr Kate Johnson (K.R.Johnson@hw.ac.uk).



Baseline monitoring starts on west coast of Orkney

Exposure to wave energy is an important factor in determining the community structure and relative abundance of species found on the rocky shore. Andrew Want –

Research Associate at ICIT – has been monitoring several potential sentinel species along west coast of Mainland Orkney for the past 18 months. Energy extraction by wave energy converting devices (WECs) might be expected to change exposure characteristics shoreward of their location. In addition, it is assumed that rising sea temperatures, as one component of observed global climatic change, will also

alter the species composition of rocky shore communities. Identifying species which respond differentially to changes in energy exposure and sea temperature, and monitoring changes in the relationship between these species could allow for discrimination between the relative roles played by these environmental variables. The selected species are being monitored for distribution, abundance, density, and growth. Sampling regimes include: biometric measurements, quadrat photography, and density determination on intact and cleared sites that will provide baseline/control data for the west coast of Orkney, an important area in the development of marine energy technologies. For further information contact Andrew Want (A.Want@hw.ac.uk)



SRDG international networking and dissemination, research proposals and publications



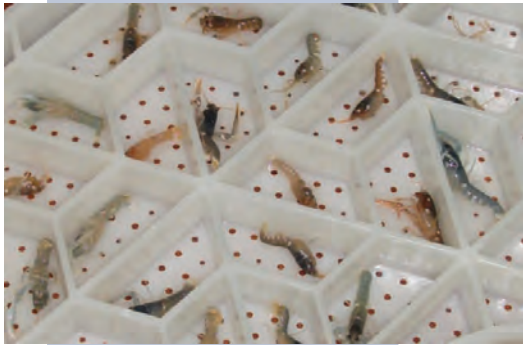
SRDG staff with BBC Countryfile team in Orkney 2010

Investigators and PDRA's involved in SRDG have given 2 keynote addresses, presented 2 posters and 4 presentations at international conferences, in addition to many other reports and seminar presentations, which include:

- All Energy 2010
- British Ecological Society meeting
- European Marine Biology Symposium
- ICES Annual Science Conference in Nantes
- MASTS/MREDS marine renewables workshops
- NERC Workshop: *An environmental research roadmap for the growing renewable energy sector*
- NERC Marine Renewable Energy Sandpit
- Press and broadcast organisation interviews (including BBC Countryfile)
- Science Festival
- Scottish Development International (SDI) Wave/Tidal Mission to North America and OREG (Ocean Renewable Energy) Fall Symposium

A total of 10 new research proposals have been submitted over the last year to various UK and European funding bodies/organisations. So far 2 have been successful, 2 unsuccessful and 6 are awaiting an outcome. A total of 6 peer-reviewed journal papers have been published by Investigators and PDRA involved in SRDG.

Lobsters at Billia Croo wave test site



Juvenile lobsters, immediately after tagging. Each individual is around 15-20mm in length.

ICIT is working alongside EMEC and local fisheries organisations in a Scottish Government-funded project examining the potential benefits of wave energy developments for local lobster fisheries. Potential benefits may accrue from new habitat structure provided by the physical presence of

energy extraction devices and their moorings and from the exclusion of fishing in their immediate vicinity. About 4,500 juvenile lobsters were released at

EMEC's wave test facility at Billia Croo on the west coast of Orkney. Juveniles reared at the Orkney Lobster Hatchery have been fitted with internal microwave tags that will allow their survival to recruit to the lobster fishery to be measured by monitoring of commercial lobster catches in the area. Growth to commercial size is likely to take around seven years, but monitoring of undersized lobsters should allow their detection within three to five years. Tagging of adult lobsters is also planned for summer 2011, aimed at characterising the size and composition of the current wild lobster population at Billia Croo.



Craig Burton of Seafood Scotland, tagging a juvenile lobster at Orkney Lobster Hatchery, November 2010.

For further information contact Dr Mike Bell (M.C.Bell@hw.ac.uk).

Report to Scottish Government

ICIT and ERI staff have contributed to a report to Scottish Government reviewing the potential impacts of wave and tidal energy developments on Scotland's marine environment. Led by the Stromness-based environmental consultancy Aquatera Ltd, the work was undertaken as a

partnership of eight organisations involved in marine science in Scotland. Devices for extraction of wave and tidal energy are extremely diverse in their structural forms, modes of operation, occupancy of different marine environments and mooring methods, and each of these aspects

has a bearing on the potential for impacts on marine organisms and habitats. Outputs from the work should allow impact assessments to focus on the most likely impacts for a given development and to identify appropriate mitigating actions.

ICIT, Heriot-Watt University
Old Academy,
Stromness,
Orkney, KW16
3AW
Tel. 01856 850605
Email:
icit@pet.hw.ac.uk



Stand at All Energy 2010

All Energy 2010

ICIT was well represented as part of the Orkney pavilion at the UK's key renewable energy conference - All Energy 2010. Along with EMEC, Aquatera, Scotrenewables, Xodus Aurora, the Orkney Renewable Energy Forum and others they drew considerable interest in Orkney's future as a world leader in marine renewable energy.

ICIT had plenty of material to give away on courses and research undertaken, as well as a 'guess the underwater diving bird noise' competition with the prize of a bottle of Highland Park whisky, this proved to be very popular. Congratulations to Graham Saunders from Edinburgh who was the winner.

Strategic meeting of marine scientists on marine renewables



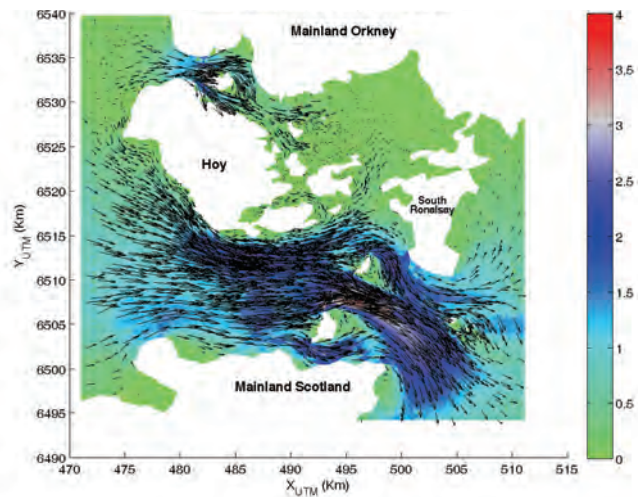
ICIT recently hosted a meeting of over 50 Scottish marine scientists engaged in setting the research agenda in marine renewables, marine spatial planning and marine mapping. The group brought together under the auspices of the MASTS and MREDS Scottish research pools spent 3 days in detailed discussions on the environmental research needs to support the emerging marine renewables sector, and associated governance of this under the new Marine Scotland Act. The workshops were chaired by Professor Alan Miller, chair of the MASTS Governing Council, and Heriot-Watt University Deputy Principal. The Marine Alliance for Science & Technology for Scotland (MASTS) is a research pooling initiative, involving about 700 researchers, and the management of resources, comprising over £66 million annually, in marine



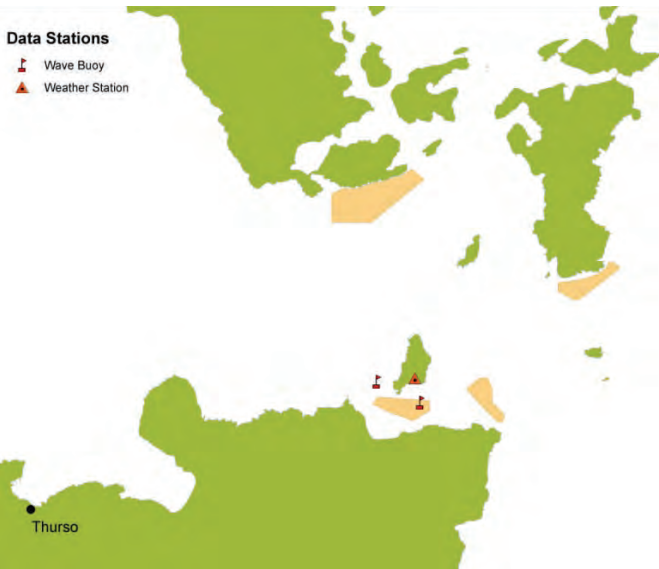
science from the whole of Scotland. Prof. Miller said "We are delighted that Heriot-Watt's Orkney Campus has organised and hosted these important discussions, and that we have been able to hold them in Orkney where the first wave and tidal energy developments are occurring, and so very pleased to have attracted such a wide participation from Scottish University researchers interested in pursuing these questions". A report of the workshop discussions and outcomes will be available shortly and will form the foundation for the development of new research projects and collaborations among the Scottish Universities. For further information contact Dr Kate Johnson (K.R.Johnson@hw.ac.uk). All presentations are available to view online at www.mreds.co.uk/downloads.htm

Researchers develop model to understand tidal flow of the Pentland Firth and Orkney Waters

The Pentland Firth and Orkney Waters (PFOW) has recently been the subject of seabed leasing by The Crown Estate for 'Round 1' marine energy development sites. However, hydrodynamics in this area is still not well understood. In order to improve the knowledge of tidal propagation through the Pentland Firth implementation of a numerical model is being undertaken by ICIT researchers. SUNTANS is a CFD model developed at Stanford University (California). The acronym stands for: Stanford Unstructured Nonhydrostatic Terrain-following Adaptive Navier-Stokes Simulator. Preliminary results confirm the complex hydrodynamics of the Pentland Firth, identifying eddies, fronts, and tidal races, including sites of high flow rate (≈ 3.5 m/s). For further information contact Dr Susana Baston (S.Baston@hw.ac.uk)



SUNTANS model showing complex hydrodynamics of the Pentland Firth



Tidal stream leases and measurement sites within Pentland Firth

More SCHEMing ...

By David Woolf and Jason McIlvenny, ERI, UHI-NHC

Scientists and technicians at Environmental Research Institute are continuing the development of their observational capability for marine energy sites. Stroma Channel, between the island of Stroma and the Scottish mainland has been chosen as a focus for exemplary studies. This channel is logistically convenient and a lease to develop a potential 400MW tidal stream energy site has recently been awarded to MeyGen. Following underway surveys by ERI in 2009, the capability for sustained observations in this area is being developed. A meteorological station has been established on Stroma. Deployments at two locations, one within the Stroma Channel and the other to the west of Stroma, will be completed soon. Directional wave buoys will be deployed at the two locations, with Acoustic Doppler Current Profilers on the seabed near each. The intention is to build a fairly comprehensive measurement capability for Stroma Channel, the "Stroma Channel Holistic Environmental Measurement Array (SCHEMA)". The latest investment has been enabled by the MaREE programme, which is funded at ERI and SAMS by Scottish Funding Council, Highlands and Islands Enterprise and the European Regional Development Fund. For further information contact Dr David Woolf (David.Woolf@thurso.uhi.ac.uk)



MARINE RENEWABLE ENERGY DEVELOPMENT IN SCOTLAND

ICES takes an interest in marine renewables



SRDG scientists have been raising the profile of wave and tidal energy in an international context with the International Council for the Exploration of the Sea (ICES), the intergovernmental body that coordinates research on living marine resources, marine environments and ecosystems and oceanography in the North Atlantic. ICIT Research Associate Dr Mike Bell presented a paper on the potential for fishery interactions with wave and tidal energy developments at the ICES Annual Science Conferences in Nantes, and has been appointed chair for a new ICES expert group, the Study Group

on the Environmental Impacts of Wave and Tidal Energy which will meet for the first time in Edinburgh in March 2011. ICIT staff will also be convening a special session at next year's ICES Annual Science Conference to be held in Gdańsk in September 2011, addressing the theme 'Extracting energy from waves and tides – what are the consequences for ecosystems, physical processes and other sea users?'. It is hoped that papers presented at this session may be published in a special journal issue. The deadline for abstracts will be in April 2011. Keep an eye on the ICES website www.ices.dk for further details of the conference and theme session, or contact Dr Mike Bell (M.C.Bell@hw.ac.uk).

The report from last year's SRDG Annual Stakeholder workshop is now available. The report *Wave and Tidal Energy in the Pentland Firth Area - how much environmental monitoring is enough?: Report on SRDG Stakeholder Workshop 1st December 2009* captures the views of over 50 delegates who attended the workshop. The delegates represented a range of stakeholders from government funded bodies, local government, non-government organisations, environmental groups, wave and tidal Developers and environmental consultants. Interesting presentations were given by Sue Barr, Open Hydro, Karen Hall and

Report available from 2009 SRDG annual advisory stakeholder workshop

Andy Douse from SNH and Dr Rowena Langston, RSPB on environmental monitoring from the view of industry, non-government organisation and the regulator. The report and all presentations from the workshop are available to view online at (www.mreds.co.uk/events.htm). A similar event postponed from 6 December 2010 owing to severe weather, is planned for 9 February 2011. It will look at the role of stakeholders in the planning and development process. An end of workshop report will be produced and disseminated to participants and other key decision makers. For further information contact Kate Bullen (K.L.Bullen@hw.ac.uk).



2009 stakeholder workshop session

Update from MREDS & SRDG steering group meeting

The 2nd annual MREDS and SRDG Steering Group meeting was held in Inverness on 1 December 2009. The steering group meets once a year to discuss & identify research priorities and funding opportunities under ICIT Heriot-Watt's strategic research programme MREDS, a collaborative administration of five research establishments in Scotland seeking ways to strengthen the marine renewables sector nationally. Some key priority areas were highlighted by the Steering Group to take forward including

Knowledge Transfer Partnership (KTP) opportunities with industry, engagement with the utilities sector as well as the petroleum industry and establishing a developers' forum in partnership with the Crown Estate and other interested partners. Socio-economic issues surrounding marine renewables development was also highlighted as an issue. The next Steering Group meeting will be held on 9 February 2011. For further information contact Kate Bullen (K.L.Bullen@hw.ac.uk).

Can fisheries and marine renewable energy co-exist?

Research at ICIT has been examining the extent to which fisheries and wave and tidal energy developments may compete for space in the marine environment. Comparison of the spatial distribution of landings with that of the wave and tidal energy resource indicates that at a national scale the potential overlaps are relatively small, but it appears that there may be considerable potential for interaction at a local scale. This would most likely involve small inshore vessels

for which there are few data on the fine-scale distribution of catch and effort. Simple spatial fishery models indicate that exclusion of fishing activities from areas around developments may have some potential to protect spawning potential and to increase resilience of yield at high levels of fishing effort. However, at realistic levels of fishing ground closure, the benefits are likely only to apply to species of very limited mobility, i.e. shellfish. Potential for habitat crea-

tion around developments is also greatest for shellfish, e.g. settlement surfaces for mussels and creation of juvenile lobster habitat. In addition to improving the information available on fine-scale distribution of fishing effort, future research should concentrate on understanding how fish and shellfish are likely to move and aggregate around developments. For further information contact Dr Mike Bell (M.C.Bell@hw.ac.uk).

Future research funding opportunities with NERC



The UK's Natural Environment Research Council (NERC) is currently developing a Marine Renewable Energy research programme, aiming towards an improved understanding of the potential environmental and ecological risks associated with the development of marine renewable energy. In September, staff from ICIT and ERI attended a two day NERC workshop, held in conjunction with the Energy Generation & Supply Knowledge Transfer

Network, where scientists met with regulators and developers to develop a 'roadmap' for marine environmental research addressing obstacles to development. Staff attended a NERC 'sandpit' event in December – a strategic workshop where research projects addressing these needs were developed. This is expected to give rise to multi-institution collaborative research proposals for funding by NERC and other UK Research Councils.