Addressing Collision Risks in Tidal and River Turbines;

next steps for the marine energy sector

Tuesday 26th February 1000 – 1545
COSLA Conference Centre, Verity House, 19 Haymarket Yards, Edinburgh, EH12 5BH

Background

The Collision Risk workshop builds on the OES-Environmental (Annex IV) team's work engaging international stakeholders such as regulators, researchers, and industry in discussions on the current status and next steps for addressing collision risk in tidal and river turbines. Workshop have previously been hosted on this topic in 2014 (EIMR Conference; Best Practices for Monitoring Environmental Effects of Marine Energy Devices) and in 2016 (A Coordinated Action Plan for Addressing Collision Risk for Marine Mammals and Tidal Turbines).

This workshop brought together MRE researchers, developers, and other stakeholders in order to:

- Further the collective knowledge base;
- Assess progress on the collision risk action plan written in 2017 (with input derived from Annex IV/ORJIP workshop held in Edinburgh in 2016);
- Review and interpret the latest monitoring efforts relevant to collision risk and animal interactions collected around operational tidal turbines, in order to establish the current knowledge base;
- Provide up to date information for the 2020 State of the Science report; and
- Reach consensus on the remaining state of uncertainty around collision risk, and to identify key gaps in knowledge to be filled by further research and monitoring.

Twenty seven members of the MRE community from 4 different countries participated in the workshop. Participants represented industry, consultancies, research institutions, and government (see Appendix for attendee list). There were two presentations to set the scene on the State of the Science as it pertains to marine mammals and fish, from a UK perspective (Carol Sparling, SMRU) and a North American perspective (Andy Seitz, University of Fairbanks, Alaska), respectively. This was followed by four presentations concerning four different integrated monitoring systems that have been built and tested in recent years. These were the Plug and Play Platform (St Andrews University, UK); the Adjustable Monitoring Platform or AMP (PMEC, US); the FAST Platform (FORCE, Canada) and the FLOWBEC Platforms (University of Aberdeen, UK). Following these presentations there were two presentations from developers on the reality of environmental monitoring around deployed arrays (Daniel Coles, Simec Atlantis Energy and Kate Smith, Nova Innovations).

These presentations lead into the discussion sessions in which the participants were asked to develop detailed project plans for high priority strategic research projects as identified in the ORJIP Ocean Energy Forward Look, as informed by the 2016 State of the Science report (See discussion templates in Appendix). These breakout groups were repeated twice.. The workshop concluded with a report out of each group's discussion, discussing next steps for implementation.

Main Points derived from the Workshop:

- There has been significant progress made in the understanding of collision risk over the past few years. However, there are still improvements to be made, particularly in the methodologies used to collect, store, and analyse data;
- There needs to be greater integration of experts from fields such as IT and engineering in order to improve the technologies used in monitoring, as well as data management and analysis;
- Reliability and survivability of monitoring kit is most important at the moment; capability is important too but cannot be traded for reliability and survivability;
- It may be possible to classify risk, based on a variety of spatial scales, by having sufficient baseline data to show where animals tend to be, and with enough understanding of the risk of deploying tidal turbines
    - There is a need to understand that variability in sites, species, and technology types, as well as sufficient sample size, in order to make this a possibility;
- There should be a 'toolbox' developed of monitoring kit and types of data that can be collected. This can be modified by the user, depending on the needs and budget of a project; and
- There is a general understanding that there will be no 'simple and complete' solution to collision risk as it is impossible to prove that there will never be a risk of collision between marine animals and tidal turbines. Therefore a greater understanding of how to manage this risk is needed.

Projects suggested within discussion sessions

- To reduce uncertainty around fine scale behaviour of key species around operational tidal turbines;
- To reduce uncertainty regarding the potential ecosystem effects of tidal developments;
- Combine acoustic system and optical data to understand a known site;
- To understand variability of presence of seals and other animals around turbines diurnally, seasonally, spatially;
- To improve sharing of data between regulators, project developers and researchers;
- To improve understanding of the efficacy of management measures;
- Need to improve the preprocessing of data in order to improve efficiency of data management, storage, and analysis;
- Investigate alternative power sources for integrated monitoring platforms;
- Investigate use of instruments in high flow environments in order to collect data at times of high turbulence;
- Investigate collision risk and management measures for alternative tidal technologies such as the tidal kite; and
- Improve understanding of the differences and similarities of collision risk in fixed and floating tidal turbines.

Next Steps

The workshop organizers will:

- Update the Collision Risk Action Plan and circulate to all attendees, the OES-Environmental analysts, ORJIP Ocean Energy Network, and via Tethys;
- Complete detailed project plans for high priority strategic research projects and circulate; and
- Identify appropriate funding streams and work with stakeholders on project proposals.

Workshop

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1000 – 1015	**Introductions and plan for the day (Andrea Copping and Ian Hutchison)**
1015 – 1100	**Current state of the science (Carol Sparling & Andy Seitz)**
1100 – 1115	**Break**
1115 – 1155	**Development of integrated monitoring platforms** • **Plug and play platform – Doug Gillespie, St Andrews** • **AMP – James Joslin, University of Washington, PMEC** • **FAST – Dan Hasselman, FORCE** • **FLOWBEC- Benjamin Williamson, University of Aberdeen**
1155 - 1230	**Realities of environmental monitoring around tidal arrays** **Discussion session with case study presentations from** **Daniel Coles, SIMEC Atlantis Energy** **Kate Smith, Nova Innovation**
1230 - 1300	**Lunch**
1300 - 1500	**Break-out sessions: developing strategic research and monitoring projects for priority funding**
1500 - 1530	**Report out from breakout sessions and group discussion**
1530 - 1545	**Conclusions and next steps**

Workshop Attendees:

Name and Role	Organisation	Country
Andrea Copping (Facilitator)	PNNL	USA
Ian Hutchison (Facilitator)	Aquatera Ltd	Scotland
Jennifer Fox (Scribe)	Aquatera Ltd	Scotland
Leuserina Garniati (Scribe)	Aquatera Ltd	Scotland
Natalie Isaksson	Aberdeen University	Scotland
Richard Montague	Blue Marble Engineering	Scotland
Ignazio Maria Viola	Edinburgh University	Scotland
Caitlin Long	EMEC	Scotland
Ana Couto	EMEC/ Aberdeen University PhD Student	Scotland
Dan Hasslemann	FORCE	Canada
Janelle Braithwaite	Marine Scotland	Scotland
Ross Culloch	Marine Scotland	Scotland
Ross Gardiner	Marine Scotland	Scotland
Tom Evans	Marine Scotland	Scotland
Craig Chandler	Mersey Consulting	Canada
Kat Route Stephens	Natural Resources Wales	Wales
Kate Smith	Nova Innovation	Scotland
Gemma Veneruso	SEACAMS	Wales
Daniel Coles	Simec Atlantis Energy	Scotland
Penny Jeffcoate	SME	Scotland
Carol Sparling	SMRU Consulting	Scotland
Doug Gillespie	St Andrews	Scotland
Laura Palmer	St Andrews	Scotland
James Joslin	University WA, PMEC	USA
Benjamin Williamson	University of Aberdeen	Scotland
Beth Scott	University of Aberdeen	Scotland
Andy Seitz	University of Fairbanks, Alaska	USA

The following template will be populated for each Project:

Factor	Comment(s)
Aim	
Objective(s)	
Required outputs e.g. datasets, software package, equipment etc	
Anticipated impact of the project on the consenting process	
Outline approach	
Baseline data required (specify purpose)	
Equipment required	
Data storage and management requirements	
Software requirements	
Data analysis support required	
Candidate project(s)/locations	
Data transferability – opportunities and limitations	
Indicative timescales	
Labour and expertise (key roles and duration or each)	
Direct (list major budget drivers)	
Key challenges identified	
Ongoing relevant research	
Knowledge transfer plan	
Potential funding sources	

Priority projects for discussion

The following projects and outputs have been identified from the ORJIP Ocean Energy Forward[1] Look and the Collision Risk Action Plan[2] developed following the previous workshops, as those to be discussed during the breakout sessions:

1. Near-field monitoring of marine wildlife around operational tidal turbines and first arrays to collect empirical behavioural monitoring data
    - Improved understanding of evasion and avoidance behaviour
    - Improved evasion and avoidance rates for input and validation of predictive models
2. Development of cost effective, reliable equipment, software and processes for monitoring wildlife behaviour around operational tidal turbines and first arrays
    - Development of a fully automated cost effective collision/evasion/avoidance monitoring system suitable for use in high energy tidal environments
    - Advancement in battery power/redundancy or other power sources, power and data cable protection and performance
    - Solutions to video camera fouling issues
    - Advancement in algorithms for animal detection and pre-processing software
    - Solutions to data storage and management issues (data mortgages)
3. Development of 'next generation' predictive models to inform collision risk assessment

Other projects and ideas can be put forward and discussed during the workshop. There will be opportunities to capture new/additional ideas (post-its etc).

[1] http://www.orjip.org.uk/sites/default/files/ORJIP%20Ocean%20Energy%20Forward%20Look%203%20FINAL.pdf

[2] http://www.orjip.org.uk/sites/default/files/Collision-risk-workshop-report-August-2016.pdf