Workshop: Latest Results & Key Priorities in Environmental Monitoring

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1. Context

The "Latest results & key priorities in environmental monitoring" workshop was held at the Ocean Energy Europe (OEE) Conference in Aviemore, Scotland, on 5 November 2024. This workshop aimed to engage marine renewable energy (MRE) developers, researchers, and stakeholders in discussing two key stressor-receptor[1] interactions: collision risk and underwater noise.

The workshop began with a presentation on the European Technology & Innovation Platform (ETIP) for Ocean Energy. Then, there was a presentation on the environmental effects of MRE based on Ocean Energy Systems (OES)-Environmental research with a focus on collision risk and underwater noise, describing the status of knowledge and research needs.

After the presentations, participants were separated into four breakout groups, each with a facilitator to moderate discussions. Facilitators used a series of questions (see Appendix 1) to

[1] OES-Environmental uses the stressor-receptor interaction framework to assess the risk to the environment from MRE devices. Stressors are the components of an MRE device or system that may cause stress, injury or death to marine animals, habitats, or ecosystems. Receptors are the species, habitats, and oceanographic and ecological systems that could be affected.

guide participants through discussions around the concern of collision risk and underwater noise effects on marine animals throughout a project timeline, progressing towards consenting, deployment, build out, and dissemination of results.

2. Breakout Discussions Summary

There were 33 participants (developers, researchers, and regulators) in attendance at the workshop. Three breakout groups focused on collision and one group focused on underwater noise. The topics of discussion are summarized by stressor-receptor interaction in the sections below.

Underwater Noise

Participants discussed concerns about underwater noise, highlighting that many marine animal populations are already at risk from many other sources of anthropogenic noise. Additional noise from MRE devices is of concern, even if MRE noise levels are low compared to other sources.

To understand the risks of underwater noise from MRE, it was recommended that developers should first characterize underwater noise output from their single devices. The International Electrochemical Commission (IEC) TC114 specification for underwater noise monitoring was discussed by participants as an option for how underwater noise data should be collected for wave energy converters and tidal turbines. It includes specifications such as hydrophone location and proximity to devices, which units and resolutions should be used, and how to report data. The IEC specification does not set thresholds for underwater noise – though it was noted that these exist in the United States for harm to marine mammals and fish, and that the operational noise from MRE devices measured so far is much lower than these thresholds. It was also recommended that developers communicate with their regulators to understand the noise measurements that the regulators need to be able to assess risk to species and habitats.

Participants noted that noise propagation models seem to break down in shallow and high-energy areas. Due to this, in situ monitoring data need to be used for validating models. It was noted that it is difficult for developers to contribute resources to underwater noise monitoring efforts, and that at least some research funding is likely needed for comprehensive environmental monitoring for underwater noise. Uncertainty remains on the minimum number of devices to monitor to evaluate effects, especially as the industry moves towards large-scale arrays. Planning for the scale-up in noise output from arrays is needed early in the development and consenting processes.

Participants recommended methods of sharing and publishing environmental monitoring data to help satisfy regulatory requirements. In some countries and cases, this is a requirement for

publicly funded projects. Building this information database will benefit the industry and improve regulators' and stakeholders' understanding of underwater noise from a variety of MRE devices.

Collision Risk

Developers are facing challenges with regulatory requirements resulting from uncertainty around collision risk during the consenting process and post-consent monitoring even for small or single-device deployments. Challenges are also arising during the build-out of the first arrays. In some instances, regulators are asking developers to provide specific collision risk modeling outputs to demonstrate that strict limits or thresholds for collision will not be reached. For example, one developer reported being asked to demonstrate that 0.1% fish mortality would not be breached for a small demonstration project. These thresholds can seem arbitrarily determined and it may not be possible for developers to provide such data.

There is also debate about whether current collision risk models are suitable for regulatory purposes and how much of a role modeling should play in environmental impact assessments and the wider consenting process, given the limited data available. Several issues surrounding collision risk modeling were discussed, including the suitability of the available models, accuracy of the assumptions around animal behavior such as evasion and avoidance probability being used, the ability of models to account for realistic potential consequences of collision events, as well as a lack of model validation and improvement.

Participants discussed the need for environmental monitoring data to reduce uncertainty and retire collision risk. Marine mammal, fish, and seabird monitoring data that may be required around operational tidal turbines can be collected through methods such as acoustic monitoring, active sonar, underwater video, carcass surveys, etc. Collecting baseline information before devices are deployed is also important. This may include the collation and analysis of existing data, or the collection of new site data, or a combination of both.

Participants cautioned the issue of real versus perceived risks, and the effect that public opinion and perception can have on policy, and associated requirements for environmental monitoring. For example, a conservation NGO referred to a canceled tidal project as an "environmental win", even though the project was canceled for economic reasons, not environmental concerns. It is important to work with NGOs and get ahead of the conversation to avoid misunderstandings.

Participants also expressed concerns about double standards across industries, with MRE project applicants being asked to collect data that operators or developers in other marine and maritime sectors are not required to provide. This compounds when MRE project developers are expected to perform environmental monitoring but are not able to apply findings from the

data collected to inform risks at their other project sites, but may be required to share data with other developers.

Another issue with sharing data is that not all data are immediately available, either due to the size of the dataset or proprietary concerns. There is limited support available for researchers and developers to help collect and analyze monitoring data. Participants proposed the creation of a global fund to support strategic environmental monitoring priorities, so no one MRE developer has to take the burden of all strategic monitoring and research costs. An example of this is the Crown Estate Scotland's environment fund (Sustainable Communities Funds), which supports lease holders (i.e., project developers) to create sustainable developments. Strategic support can help developers and researchers collect and analyze data and reduce uncertainty.

Another concern raised was the poor retention of experienced staff within companies, regulatory agencies, advisory bodies, and stakeholder organizations. This can lead to discussions around issues such as collision risk being delayed or reopened due to shifts in staff during the consenting process and in post-consent activities (e.g., around the preparation and agreement of environmental monitoring plans).

3. Recommendations

To better inform understanding of underwater noise risk, participants recommended:

- Widespread implementation of international standards (i.e., IEC TC 114) for underwater noise monitoring,
- Increased public funding to support underwater noise monitoring and data publishing by developers, and
- Additional collection of underwater noise field data, monitoring, and planning for scaling to large arrays.

To better inform understanding of collision risk, participants recommended:

- Creation of a global fund to support strategic environmental monitoring to reduce uncertainty around collision risk
- Investment in data storage and automated data analysis methods,
- Development of a "collision risk action plan" with clear recommendations on what is required to reduce uncertainty and eventually retire the risk, and
- Continued collection of environmental monitoring data to reduce uncertainty and provide data and information suitable to support the scaling up of arrays and general sustainable roll-out of tidal energy projects around the world, across all market applications.

To better support industry advancement and reduce uncertainty among key stakeholders across stressor-receptor interactions, participants recommended:

- Collaboration between regulators, developers, researchers, advisors, funders and consultants to share monitoring data/results/information, methods, and best practices,
- Development of workshops and expert/advisory forums to address key gaps and share information with regulators, advisors, and other stakeholders.
- Investment in data storage and analysis.
- Widespread implementation of existing international standards and thresholds to streamline consenting.

Appendix 1: Breakout questions

Questions asked during the breakout discussions for each stressor-receptor interaction are below:

- Consenting:
  - What information is needed, and how to collect that information?
  - How to report results to gain consent?

- Post-installation:
  - What is needed for a monitoring plan?
  - How do we collect the data?
  - How do we analyze and report the information?

- Phased Development:
  - How do we use initial results to get to the next phase?

- Disseminate results:
  - What are effective reporting and dissemination methods?
  - How great a concern is this stressor-receptor interaction to regulators and stakeholders?