



European Technology & Innovation Platform for Ocean Energy

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Latest results & key priorities in environmental monitoring









Agenda

Time	ltem	Speaker
13:45- 13:50	Welcome	Lotta Pirtti
13:50-14:05	 Introduction Presentation on OES-Environmental research Focus on collision risk and underwater noise Purpose of workshop 	Andrea Co Garavelli, F
14:05- 14:55	Breakout discussions	All
14:55- 15:15	Report out and open discussion	Moderator



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ETIP Ocean brings the sector together

- Promotes ocean energy development EU & globally
- Recognised European Commission advisory body & part of SET Plan
- Identifies research priorities for EU & national funding programmes
- Knowledge-sharing: wide network of ocean energy professionals

SETIPOCEAN



Commission



Creating & sharing knowledge

- Reports based on research & consultation
 - gathering information from the sector & giving recommendations to policymakers and industry
- Knowledge-sharing webinars & workshops
- 'Knowledge Hub' at <u>www.etipocean.eu</u>

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	Strategic Research and Innovation Agenda for Ocean Energy
6	October 2024
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Environmental Effects of Marine Renewable Energy – Collision Risk and Underwater Noise



PNNL is operated by Battelle for the U.S. Department of Energy



Why Study the Environmental Effects of MRE?



- Drivers for marine renewable energy (MRE) are clear ٠
- MRE in early stage of development, deployment, and commercialization
- Environmental concerns continue to slow consenting / • permitting worldwide



Collecting & sharing information can be key strategy to progressing MRE







OES-Environmental

- Established by the International Energy Agency-Ocean Energy Systems in 2010
- Examines environmental effects of MRE development to advance the industry in a responsible manner
- Led by the U.S. Department of Energy Water Power Technologies Office and implemented by Pacific Northwest National Laboratory
- Phase 4: 16 member countries
- New Phase 5 beginning now









2024 State of the Science Report

https://tethys.pnnl.gov/2024-sos



OES-ENVIRONMENTAL 2024 State of the Science Report





2024 State of the Science Report

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Social and Economic Effects of Marine Renewable Energy

Authors: Mikaela C. Freeman, Deborah J. Rose





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Marine Renewable Energy Data and Information Systems

Author: I bydee For





Environmental Effects of MRE

- Stressors Marine energy devices, systems that may cause harm
- Receptors Marine animals, habitats, ecosystem processes

Priority stressorreceptor interactions







Collision Risk



- Collision = physical contact between marine animals and moving components of MRE devices (or with dynamically moving technologies)
- Often the first question raised by regulators for new tidal or riverine energy project \bullet
- Continues to be the interaction that causes the most significant delays in consenting ullet
- Animals of concern: lacksquare
 - Fish
 - Marine mammals
 - Seabirds
- Perceived risk remains high due to:
 - Uncertainties about probability of collisions
 - Consequences may be great if collisions occur
 - Limited understanding by general public





Illustration by Stephanie King

Status of Knowledge



- Avoidance behavior more often documented than evasion
 - Limitations of monitoring technologies to observe evasion
 - Mainly observed during turbine operations for fish and marine mammals
- Collision
 - Fish: rarely observed during operations of riverine turbines
 - Marine mammals & seabirds: no observed contacts
- Numerical models are used to estimate the probability of encounter and collision
 - Sensitive to animals' behavior parameters
 - Dependent on data availability
- Probabilistic approach
 - Framework for organizing data to move toward quantification of the likelihood of collision risk







Underwater Noise

- Marine animals use underwater sound to communicate and navigate
- Noise from MRE devices may add to existing sources
- Main receptors:
 - Marine mammals
 - Sea turtles
 - Some fish and invertebrates that have sensory capabilities for detecting sound or particle motion
- Could cause behavioral changes or physical harm, including loss of hearing





Status of Knowledge

- Operating MRE devices generally expected to generate relatively low frequency noise (up to 1000 Hz)
- Higher frequency noise reported more recently for wave and tidal energy converters
- Many new research studies on underwater noise generated by devices or at MRE project sites have been completed in recent years
 - ISWEC (Italy), MARMOK Á-5 (Spain), CalWave (US), PacWave South (US)
- Noise levels of MRE devices generally fall below those likely to cause injury or harm





Progressing the Industry through Collaboration

- Access to deployed devices for research
- Importance of shared data, open data sites for storage
- Dissemination of results to gain public approval





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Progressing the Industry through Collaboration

Example in the United States:

PRIMRE

The Portal and Repository of Information on Marine Renewable Energy (PRIMRE) provides access to MRE data, information, and resources to help advance the industry.

- Knowledge Hubs
- MRE Basics
- **Events Calendar & Webinars**
- **Educational Resources**
- Data, Tools, & Software

Funded by the US Department of Energy's Water Power Technologies Office and led by 3 National Laboratories







- Each Knowledge Hub houses a different type and format of information related to MRE.
- Several Knowledge Hubs were developed under other projects, but all have been integrated and improved.
- PRIMRE has a one-stop search that allows users to find data and info throughout the system.

https://primre.org/



Breakout Discussions

- Two topics: collision risk, underwater noise
- Project timeline:



- 1. Consenting project:
 - What information is needed, how to collect that information?
 - How to report results to gain consent?
- 2. Post-installation:
 - What is needed for monitoring plan?
 - \circ How to collect the data?
 - How to analyze and report the information?

3. Phased development:

• How to use initial results to get to the next phase?

4. Disseminate results:

• What are effective reporting and dissemination methods?



Report Out





OES-Environmental Resources

Data Transferability

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https://tethys.pnnl.gov/data-transferability

Evidence Bases



https://tethys.pnnl.gov/risk-retirement-evidence-bases

Risk Retirement



https://tethys.pnnl.gov/risk-retirement

Guidance Documents











Thank you

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Read the 2024 State of the Science report here:

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Workshop Survey





