

Entanglement Risk

RELEVANCE TO MARINE RENEWABLE ENERGY

Most marine renewable energy (MRE) devices are attached to the seabed with mooring lines or anchors, which allow them to maintain their position within the water column or on the sea surface. In an array, cables are also used to carry power from multiple devices to a single power export cable installed on the seabed. The potential for these lines and cables to become a hazard for marine animals that may become entangled or entrapped in them is uncertain but has been raised by stakeholders. Greater understanding of the entanglement risk to marine animals is needed to evaluate how this issue may affect consenting processes for MRE development.



STATUS OF KNOWLEDGE

Little is known about risk of marine animals becoming entangled with lines or cables associated with MRE devices, and no direct interaction has been observed. The greatest entanglement concerns are for large marine animals such as migratory whales that may encounter MRE device mooring lines and draped cables. There are some concerns that smaller marine mammals, diving seabirds, sea turtles, or large pelagic sharks could also become entangled.

The research about entanglement risk has largely focused on observations of injury and mortality caused by entanglement with fishing gear or submarine telecommunications cables. These events mostly involved large marine animals being entangled in the loose end of a line, a net, or a slack line that can loop around the animal. For small marine animals, higher risks of entanglement have been linked to abandoned fishing gear and marine debris. Compared to fishing gear, the mooring lines on MRE devices are never sufficiently slack to create a loop, nor are there any loose ends.

It is important to consider the characteristics of marine animals when assessing the probability of encounters with mooring lines. Modeling studies that include the size of marine animals and their behavior relative to different mooring configurations predict a low probability of entanglement because of the tautness of the MRE lines. Furthermore, some marine mammals are likely to detect mooring lines under water, either visually or using echolocation, which may help them further distance themselves from entanglement risk. Overall, the probability of entanglement of marine animals with mooring structures or cables associated with single MRE devices is likely to be low.

REMAINING UNCERTAINTIES

Although the concerns about entanglement of marine animals with mooring lines and electrical cables around single MRE devices are minimal, the risk of entanglement with cables and mooring lines in an array of MRE devices is not known and may need to be investigated as arrays are deployed in the future. There are no field studies of the potential of encounters between marine animals and MRE mooring lines for any species. Although models predicting encounters and potential entanglement exist, species-specific diving and swimming behavior is often not considered, and these models have not been validated with data from MRE deployments. Collecting information about critical habitats (e.g., breeding, feeding, migration) for large whales as well as for other small marine animals such as sea turtles or sharks could help with the siting MRE farms to minimize the risk to these animals.

RECOMMENDATIONS

Remaining uncertainties related to the entanglement of marine animals with mooring lines and cables associated with MRE devices may be mitigated by identifying the swimming or diving behaviors of marine animals of concern, routinely monitoring mooring systems to detect the malfunction of mooring systems or the accumulation of derelict fishing gear. Future studies might also be focused on the risk from mooring lines from MRE arrays.



REPORT AND MORE INFORMATION

OES-Environmental 2020 State of the Science full report and executive summary available at:
<https://tethys.pnnl.gov/publications/state-of-the-science-2020>

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Go to <https://tethys.pnnl.gov> for a robust collection of papers, reports, archived presentations, and other media about environmental effects of MRE development.