ABSTRACT FOR EIMR2020

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**Title:** Potential environmental effects of Multi-Purpose Platforms containing aquaculture and marine renewable energy technologies.

**Abstract:** The global finfish aquaculture sector is expected to continue to expand in response to growing demand, which will likely lead to farms becoming established in increasingly remote, exposed areas. In such locations, integration of Marine Renewable Energy (MRE) technologies into farms can provide local and lower carbon power. Development of such Multi-Purpose Platforms (MPPs) is therefore likely to accelerate, but brings with it the potential for novel environmental interactions that should be considered carefully.

The present study sought to qualitatively assess potential interactions (positive and negative) between an aquaculture-MRE MPP and its surrounding environment, using a hypothetical example of a salmon farm in western Scotland. Assessments of relationships between individual MPP components and environmental receptors were undertaken using a consistent analytical approach developed for this project (known as the ‘Cross-Disciplinary Questions’ [CDQ] methodology). Relevant MPP components included aquaculture systems (cages, walkways, netting etc.), various MRE technologies (wind, wave, solar PV), onboard Energy Storage Systems (ESS), Floating Support Structures (FSS), anchors and mooring systems, power transmission cables, as well as Operation/Maintenance. Environmental receptors included birds, mammals, fish and invertebrates.

Our assessments identified several environmental interactions of potential significance beyond those experienced by the two industries if kept independent. These particularly involved large mobile species such as birds, mammals and fish. Examples include 1) wind turbines integrated with fish farms pose an elevated threat of injury and mortality to birds and bats, particularly those species that may use the fish cages and infrastructure for foraging and/or resting. 2) Operational wind turbines will create additional underwater noise but the significance of this for marine species depends on turbine design, support structure features and different species’ hearing abilities. 3) Incorporating additional infrastructure such as wave energy converters will further enhance MPPs’ attractiveness as ‘artificial reefs’ for epibenthic communities and mobile species, but may also aid spreading of invasive non-native species. This study highlights the need to consider that co-locating industries into MPPs may enhance existing environmental interactions, or generate entirely new ones, when compared against each sector individually.