Understanding the effects of electromagnetic field emissions from Marine Renewable Energy Devices (MREDs) on the commercially important edible crab, *Cancer pagurus* (L.)

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With the rapid increase in Marine Renewable Energy Devices (MREDs) worldwide, there is a clear need for the implications to be properly assessed with regards to current ecological status and potential future consequences. Proposed sites and developments are based on current knowledge and assessments of the local environment, despite relatively little being known about the ecological effects of such developments on marine benthic organisms. Electromagnetic fields (EMF) originate from both anthropogenic (telecommunication cables, power cables, MREDs) and natural (Earth's natural geomagnetic field) sources. Several decapod crustaceans are known to be magneto sensitive, yet information available on the effects of electromagnetic fields emitted from MREDs is scarce[1,2].

The effects of simulated electromagnetic fields (EMF), emitted from sub-sea power cables, on the commercially important decapod, edible crab (*Cancer pagurus*), were assessed. Crabs were obtained from the St Abbs and Eyemouth Voluntary Marine Reserve (North Sea), and transported to St Abbs Marine Station. Crabs were exposed for 24-hours to static EMFs at strengths of 2.8mT and 40mT. Stress related parameters were measured (L-Lactate, D-Glucose, Haemocyanin and respiration rate) along with behavioural and response parameters (antennular flicking, activity level, attraction/avoidance, shelter preference and time spent resting/roaming).

Exposure to electromagnetic fields, of the strength predicted around sub-sea cables, had significant physiological effects on *Cancer pagurus* and changed their behaviour. Crabs showed a clear attraction to EMF exposed shelter (69%) compared to control shelter (9%) and significantly reduced their time spent roaming by 21%. These results predict that in benthic areas surrounding MREDs, where there is increased EMFs, there will be an increase in the abundance of *Cancer pagurus* present due to altered behaviour resulting in an attraction to the source of the EMF emissions. EMF disrupted the circadian rhythm of haemolymph L-Lactate and D-Glucose levels. Melatonin levels in several species have been found to be affected by EMF exposure[3,4]. This suggests that EMF exposure could affect crustaceans on a hormonal level. This potential aggregation of crabs around benthic cables and the subsequent physiological changes brought about by EMF exposure, is a cause for concern. This study shows that the impact of EMF on crustaceans must be considered when planning MREDs.

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