The ecological impacts of offshore energy extraction

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Work stream 10: Ecological consequences of wave and tidal energy conversion

Introduction

Harnessing Scotland’s available marine energy will involve deployment of energy extraction devices and infrastructure in offshore waters. The construction of offshore renewable energy structures (ORES) will radically alter the geographical availability of shallow water and intertidal hard surfaces around the UK. These structures may impact upon the marine world in several ways including: connectivity and the creation of ‘stepping stones’; assisting the spread of invasive species; and modifying habitats.

Offshore renewable energy structures as artificial islands: implications for dispersal, population connectivity, and biogeography of coastal species.

Offshore renewable energy devices represent new hard habitats which may span existing marine vicariance boundaries. Colonization may have significant implications for the biogeography of coastal species.

Understanding of the processes involved in marine population connectivity is lacking. Robust measurements of dispersal and opportunities to evaluate models of larval transport are also rare. The construction of ORES represents an opportunity to investigate the mechanisms limiting dispersal and geographic distributions of populations.

This project will link physical models of larval transport on coastal shelves to population dynamics for key intertidal taxa and investigate the role of ORES as ‘stepping stones’ for population connectivity.

The impacts of offshore power production: mitigation through habitat provision.

The emplacement of ORES may substantially modify habitat from both a natural and socio-economic perspective.

The ‘reef-effect’ of ORES has received little attention in both the literature and in Environmental Impact Assessments. Yet these structures may compensate for habitat lost by creating new habitat, which may in turn benefit local fisheries.

This research aims to understand the socio-economic benefits which may be accrued from the targeting of habitat types for specific commercial species and applied to offshore renewable energy structures. It also aims to assess possible fisheries management of these newly created habitats along with any conflict that may arise.

The performance of invasive marine species on off-shore artificial structures.

The introduction and establishment of species outside their natural range has wide scale impacts on marine ecology and ecosystem functioning. The creation of new habitats through the construction of ORES may facilitate the spread of non-native species.

1. By providing a refuge in an area devoid of hard substrate, facilitating the range expansion of non-native species via the creation of corridors linking habitats previously unconnected.
2. Through acting as a source population of non-native species, providing strong propagule pressure to surrounding natural habitats.

Field and aquarium based studies will investigate the above focusing on the mechanism(s) responsible for a disproportional selection of non-native species on artificial structures and validate experimental work with field observations.

References