

## Project report for MESH10: To what extent are marine renewable energy devices and vessels acting as stepping stones for colonisation of marine invasive species?

The objectives for this study were:

1. Determine the genetic connectivity and diversity (via mitochondrial DNA COI Barcoding) of *Schizoporella japonica* samples collected from marinas/pontoons and renewable energy devices from Scotland.
2. Determine genetic connectivity between Scottish, Norwegian and North American samples to try to elucidate the route of transmission. Are the genetic haplotypes that are causing issues in North America the same as European haplotypes?

During this project funds were spent on buying PCR beads, PCR cleanup kits and on sequencing of PCR products generated from samples of *Schizoporella japonica* colonies which had been collected from different geographical regions. Despite a range of samples being tested, and a number of approaches taken in the lab, considerable difficulties were experienced such that sequence information revealed problems of contamination when using the standard available COI barcoding primers. Unfortunately during this project we have not been able to obtain successful amplification using this approach and therefore have not been able to address the objectives outlined above. However, work is ongoing and in collaboration with Dr Andrea Waeschenbach, from the DNA unit at the Natural History Museum in London we are adopting a different strategy to designing specific DNA markers for *Schizoporella japonica* using a long PCR approach of the mitochondrial genome. Recent advances in the knowledge of bryozoan genomics mean that we can now take advantage of novel genome information recently published from other closely related bryozoan species to design a long PCR primer set suitable for amplification. In the longer term this will mean that even in contaminated samples the PCR amplification should be successful due to improved specificity of the primers.

Aside from the difficulties experienced in the lab work, some success was made with regards to developing the understanding of distribution of samples. This information will be used in future studies regarding species distribution modelling and to further understanding of the potential for artificial structures such as renewable devices, harbours and pontoons to act as stepping stones to the natural environment. Three peer-reviewed journal articles have been published:

Porter JS, Spencer Jones ME, Kuklinski P, Rouse S. 2015 First records of marine invasive non-native Bryozoa in Norwegian coastal waters from Bergen to Trondheim *BioInvasions Records* 4, (3) 157–169

Loxton J, Wood CA, Bishop JDD, Porter J, Jones MES, Nall CR. Distribution of the invasive bryozoan *Schizoporella japonica* in Great Britain and Ireland and a review of its European distribution. *Biological Invasions*. Apr 28, 2017. DOI: 10.1007/s10530-017-1440-2

Want A, Crawford R, Kakkonen JE, Kiddie G, Miller S, Harris RE, Porter, JS Biodiversity characterisation and hydrodynamic consequences of marine fouling communities on submerged marine structures in the Orkney Islands Archipelago, Scotland, UK. *Journal of Biofouling and Bioadhesion*. Accepted for publication 16 May, 2017