

## MARMICROTOX project: Effects of microplastics in marine organisms and use of mussels to assess their presence in the Scottish coast

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**Are you a student?** No

Among the most prominent and ubiquitous anthropogenic changes in the marine environment has been the accumulation of plastic debris throughout the oceans. Small (< 5 mm) pieces of plastic, termed microplastics (MPs), have been reported in some coastal areas of Europe, but few areas, including the Scottish coast, have been evaluated and the extent of this environmental issue is unknown.

Microplastics are ingested by organisms and the prominent concerns of this exposure include accumulation in internal tissues, trophic transfer in the food web and increasing the bioavailability of toxic substances (co-contaminants) that may be associated with microplastics. The abundance and extent of plastic debris in marine environments is now recognised as among the highest priority issues for environmental policy

Currently, there are critical and priority issues that need to be investigated concerning the presence of microplastic debris in marine environments, and these include: 1) evaluation of the extent and severity of microplastic contamination in marine organisms in different locations; 2) investigation of the accumulation, absorption and negative effects of microplastics in lower trophic-level marine invertebrates; 3) examination of trophic transfer of microplastics and pathophysiology in fish and 4) determination of effects of microplastics on co-contaminant bioavailability in marine organisms.

On a first stage, our goal is to assess abundance and type of microplastics in wild mussels collected from sites located in both the East and West coast of Scotland. We are currently evaluating and quantifying the presence of microplastics in mussels within the Mytilidae family: horse mussels, *Modiolus modiolus* (a subtidal filter feeder) and blue

mussels *Mytilus edulis* (intertidal filter feeder). We have developed an extraction and quantification method and applied it to individuals collected along the Scottish coast (Atlantic and North Sea).

On a second stage, this study will focus on evaluating microplastic accumulation, absorption and negative effects, including physical tissue disruption, on the mussel *M. edulis*. The project will further assess whether association between co-contaminants and microplastics influences co-contaminant bioavailability in mussels.

Finally, we will artificially expose sea trout individuals (brown trout, *Salmo trutta*) to food items containing known amounts of microplastics. The goal is to investigate the trophic transfer of microplastics by dietary exposure in *S. trutta* and the effects on tissue surfaces, digestive system physiology, as well as overall organism health including growth and food conversion efficiency.

This project, MARMICROTOX, is funded under the European Commission FP7 scheme of the Marie Curie Actions for Intra-European Fellowships (IEF) and has the duration of two years (July 2014 - July 2016). The project also includes a large component of outreach activities and public dissemination that will be developed together with local communities, including schools.