Environment Agency

Evidence

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Assessing the impact of exposure to microplastics in fish

Project summary SC120056

This report presents the findings of research undertaken by Portsmouth University on behalf of the Environment Agency to assess the potential impacts on fish of microplastics in the aquatic environment.

Each year approximately 245 million tonnes of plastic are used globally. This production volume, coupled with high durability, has led to widespread accumulation of discarded plastic in landfills and as litter in terrestrial and aquatic habitats worldwide. Once in the environment, plastic debris progressively fragments into smaller pieces. These minute fragments of plastic debris, termed microplastics (particles of plastics with dimensions less than 5 mm) can comprise as much as 85% of plastic debris in the environment. Manufactured microplastics from consumer products, such as cosmetics and industrial abrasives, also enter the aquatic environment.

Plastic debris, particularly microplastics, can be consumed by a variety of animals, including fish, which mistake particles for food. This may lead to blocking of the intestinal tract and/or starvation through stomach filling. There is also evidence that microplastics may act as a vector transferring potentially harmful chemicals through the food chain.

This research project used sticklebacks as a model organism in three experiments to assess the potential impacts of microplastics on fish.

The experiments used green fluorescing microspheres to detect ingestion of microplastics and measured varying expressions of vitollegenin (an indicator of oestrogen exposure) and CYP1A (an indicator of exposure to organic pollutants) to detect exposure to pollutants.

Collectively, these experiments demonstrate that fish will actively feed on microplastics from the water column, in addition to consuming them via their diet. Although ingestion of the microplastics does not appear to have negative impacts on the health of adult fish, at least in the short term, the results indicated changes in body condition of larvae which are currently unexplained.

There was also evidence to suggest that microplastics have the potential to partition an organic pollutant and act as a vector to transport this chemical into the food chain. These results highlight the need for longer-term studies that can more fully evaluate the environmental impacts of plastic ingestion for aquatic organisms.

This summary relates to information from project SC120056, reported in detail in the following output(s):

Report: SC120056/R
Title: Assessing the impact of exposure to microplastics in fish

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