

Science for Environment Policy

Plastic litter found in fish guts

Tiny pieces of plastic are being taken up by a range of different fish species with unknown effects on their health, according to a new study. Researchers examined the gut contents of ten different species of fish found in UK waters and showed that so-called 'microplastics' were found in all species.

Between 60 and 80% of marine litter is plastic. Although larger items are well documented, much less is known about distribution or effects of microplastics - fragments below 5mm in size. Such microlitter is given special consideration under the Marine Framework Strategy Directive¹ and in a recent report² experts recommended that approaches for sampling this marine [litter](#) should be standardised, both in terms of methods and coverage.

There is particular concern that these particles could clog or carry harmful pollutants into the guts of marine animals. Sea creatures, including crustaceans and mussels, have been shown to ingest these microplastics in the laboratory, but studies in natural environments are rare.

For this study, researchers examined the guts of 504 individual fish of ten species caught in the English Channel. Over a third of the fish (184) were found to contain microplastics, which made up 92% of all plastic material found. Five of the species included were pelagic fish, which are bottom-dwellers, and five species were demersal fish, which live higher up the water column.

Researchers found microplastics in the guts of all species, with no difference in amounts between pelagic and demersal species. Across all species, the average number of pieces of microplastic per fish was just less than two, although there were examples of fish ingesting up to 15 pieces.

The quantities per individual fish were, on average, very low, and probably do not present a hazard to the fish. Neither do the results suggest a risk linked to human consumption, as the plastic was found in the gut - which we do not normally eat. However, the research does demonstrate that the problem of microplastics is widespread, not only in natural habitats but also in marine organisms.

To analyse the types of plastic swallowed by fish, the researchers used a technique called Fourier transform infrared spectroscopy (FT-IR), which identifies what samples are made of based on how they absorb different wavelengths of light. More than half of the microplastic litter was rayon and around a third was polyamide, with polyester, polystyrene, polyethylene and acrylic making up the remainder.

Polyester and polyamide are commonly used by the fishing industry (in ropes, nets and lines), whilst rayon could have come from textiles or via sewage, hygiene products or nappies. Polystyrene, polyethylene and acrylic were only found in pelagic fish. These are less dense than polyester and rayon and it is not clear from the results why they are being taken up more by bottom-dwelling fish.

Further studies will be necessary to understand the extent of the problem at larger scales. In particular, it will be important to consider the age of fish to understand whether microplastic waste accumulates or passes through the digestive tract naturally over time. The length of time that microplastics spend in the gut is also crucial to determining the severity of any physical or toxic effects.



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1. http://ec.europa.eu/environment/water/marine/directive_en.htm

2. http://publications.jrc.ec.europa.eu/repository/bitstream/11111/1111/22826/2/msfd_ges_tsg_marine_litter_report_eur_25009_en_online_version.pdf