

Science for Environment Policy

Fin whales exposed to high levels of potentially toxic microplastics in the Mediterranean Sea

Fin whales (*Balaenoptera physalus*) are likely being exposed to microplastics and associated toxic additives in the Mediterranean Sea, finds new research. The research analysed levels of microplastics and biological and chemical markers of exposure in whales from the Mediterranean Sea and the comparatively pristine Sea of Cortez, off the coast of Mexico. The results suggest that the vulnerable Mediterranean fin whale may be suffering as a consequence of microplastic pollution.

Approximately 80% of the world's marine litter is made up of plastic. As large pieces of plastic break into smaller pieces, microplastics (which are no larger than 5 mm) outweigh larger debris in marine habitats, this study asserts. The Mediterranean Sea has become highly polluted with such litter, as it is surrounded by 22 countries and 450 million people. Pollution is the result of *inter alia* poor waste management and the fact that it is a relatively enclosed ocean basin, which tend to accumulate more plastics than open seas.

Over time, plastics and the toxic chemicals they contain can be 'bioaccumulated' by marine animals — a build up caused by chemicals being absorbed or consumed at a rate faster than they are lost. This can have a negative impact on marine life: obstructing the digestive system leading to starvation or slowly poisoning biota due to the toxic chemicals contained in the plastics.

While many studies have examined the effects of microplastics on organisms such as fish and mussels, few have examined exposure and effects on large filter-feeding species, such as baleen whales. Newly published research has attempted to address this knowledge gap, focussing on fin whales (a species of baleen whale) in the Mediterranean Sea.

The researchers examined the levels of microplastics in fin whale summer feeding grounds in the Mediterranean Sea (the Pelagos Sanctuary) and compared them to the relatively pristine and highly diverse marine environment of the Sea of Cortez (also known as the Gulf of California).

Water samples (for measuring microplastics) and skin samples from fin whales were taken in the summer feeding months (July, August and September) at each location. The density of microplastics found in the Pelagos Sanctuary was close to those found in other studies of the Mediterranean, averaging around 0.31 items per cubic metre (m³) of water. Microplastics were far less abundant in the Sea of Cortez, where 0.14 microplastic items per m³ were found.

The biopsies (totalling 30 individuals in the Mediterranean and 10 in the Sea of Cortez) were used to detect 'Persistent, Bioaccumulative and Toxic' (PBT) chemicals, such as organochlorine pesticides and a metabolite of toxic plastic additives called phthalates, as well as biological indicators of exposure to toxins.

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The researchers found higher average concentrations for six (of eight) of the measured parameters in samples from whales in the Pelagos Sanctuary compared to the Sea of Cortez. For example, polychlorinated biphenyls (PCBs) averaged 13.3 milligrams (mg) per gram of sample from the Pelagos Sanctuary, and 8.8 mg per g from the Sea of Cortez.

Concentrations of microplastic and PBT compounds in the summer feeding grounds of Mediterranean fin whales were much higher than those in the Sea of Cortez. The authors suggest the higher levels of plastic additives found in Mediterranean fin whales is due to directly ingested plastic, and indirect ingestion via contaminated prey, such as krill.

While these findings do not directly show that microplastics are having a negative effect on fin whales, they represent a warning about the status of the vulnerable Mediterranean population, say the researchers. The population in the Pelagos Sanctuary has seen declines by around a factor of six since the 1990s.

The authors note that future studies on the impact of microplastics on the biota of the Mediterranean Sea, as well as mitigation efforts, are mandatory under the European [Marine Strategy Framework Directive](#) and the Marine Litter Action Plan of the [Barcelona Convention](#).

