2020

The Importance of Understanding Trophic Transfer in Top Marine Predators due to an Increase in Plastic Production

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Microplastics have the potential of accumulating in humans just has they have been seen to bioaccumulate in the top predators in the marine food web.

SOURCE: Environmental Pollution
By Annika Markovich *6 April 2020*

Plastic pollution poses an increasing problem for the oceans. Common images of sea birds stranded with a stomach full of plastic and sea turtles with plastic straws in their nose show the dangers of large plastic debris are everywhere. But what happens when those plastics break down into microparticles that cannot be seen? What damage can they do?

Microplastics are a recently recognized problem facing the oceans and marine species. Microplastics are any plastic particle smaller than 5 millimeters, which is about the size of a pencil eraser. These small plastic particles come from a wide variety of sources like fishing gear, plastic bags, plastic cups, and other large plastic debris. These large plastics are broken down and degraded due to sunlight radiation and wave action until they become so small that they are able to be ingested by ocean animals.

Microplastics end up in organisms when they directly ingest small plastic. However, microplastics could potentially bioaccumulate in marine organisms through food web interactions, such as prey-predator movement. Nelms et al. investigated this by analyzing top marine predators (seals) to see if they had microplastics in their digestive system. They also looked to see if they could identify the source of the microplastics within the seals diet.

The study analyzed the gastrointestinal tract (GIT) of mackerel fish and counted the number of microplastic particles while also determining the type of plastic. To determine if the plastics were being transferred from the mackerel to the seals through predation, the seals were fed the same mackerel and the seal scat was analyzed. The study revealed that the microplastics found in the mackerel matched the ones found in the seal scat in both size color and material type. This showed that microplastics can end up in an organism from their prey and have the potential to accumulate in predators. The Nelms et al study was unique and showed that microplastics are able to bioaccumulate in the stomachs of top predators.

Humans consume large amounts of seafood every year, but it remains to be seen whether microplastics have made their way into humans. Microplastics have the potential to cause a variety of health complications if they buildup in an organism. In marine organisms, microplastics have been shown to cause reductions in feeding capacity, energy reserves, and even reproductive health. These problems arise from plastic in the stomach and gastrointestinal tract of organisms, not the muscle and other tissues. It is still unknown whether microplastics can accumulate in muscle tissue and what the physiological effects of that would be. As humans continue consuming potentially microplastic infected organisms there is a potential for these particles to accumulate just as it did in the seals. With many unknowns concerning microplastics the longer these problems are relatively unresearched the potential for lasting effects is growing exponentially. This study is a first for making a step forward towards understanding microplastics and the role they play in large organisms.

Citation: Nelms, S. E., Galloway, T. S., Godley, B. J., Jarvis, D. S., Lindeque, P. K. 2018. Investigating microplastic trophic transfer in marine top predators. Elsevier. *Environmental Pollution*, **238**: 999-1007.