

National Survey Finds Microplastics Pollution Around Britain's Coastline Up to 100 Times Worse Than Previously Recorded

The data was collected last summer by teams competing in the GB Row Challenge

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Significantly higher concentrations of microplastics than previously recorded on a national survey around Great Britain's coastline have been reported by scientists at the University of Portsmouth.

In some areas it amounts to almost 100 times more than data published six years ago. Research also showed the presence of a species of shrimp not normally found this far north, which could be an indicator of climate change and warming seas.

The data was collected last summer by teams competing in the [GB Row Challenge](#), a 2,000-mile event that circumnavigates Great Britain. The aim of the research project was to build a picture of the many challenges facing British coastal waters. Using specialist equipment, the rowers gathered data on microplastics, temperature, noise pollution, and biodiversity. Samples were brought back to researchers at the University of Portsmouth for analysis. Three rowing teams gathered comprehensive and crucial data that will help preserve precious marine environments and wildlife.

Image: One of the ocean rowing boats used in the GB Row Challenge last year



In 2017, Cefas (Centre for Environment, Fisheries & Aquaculture Science) published microplastic [data](#) from many of their offshore trawls. It found just 0 – 1.5 microplastic particles per m³ (MP/m³) that were bigger than 0.3 mm in size. The samples collected during the Challenge event show much higher concentrations, with almost 100 times more microplastics in some areas. Scientists say the main reason for the big difference is the smaller sizes of particles that were captured in special steel filters. Nearly all of the microplastics collected by the GB Row teams were smaller than 0.3 mm.

[Dr Fay Couceiro](#), School of Civil Engineering and Surveying and researcher from [Revolution Plastics](#) at the University of Portsmouth, said: “Ocean pollution is one of the biggest challenges of our generation. The data collected by GB Row Challenge will greatly enhance our understanding of conditions in the seas around the UK. The equipment used to collect data during the event has enabled us to capture much smaller particles – so we have been able to get a more accurate picture of where and how concentrated microplastics are. Over time it will significantly improve our understanding of the challenging problem of microplastics in our water.”

As well as higher concentrations in coastal waters, the initial research data also showed up to four times more microplastics in the Thames than was collected in October 2017. A previous study found a maximum of 36.7 MP/m³ in Putney. Microplastics samples from the Thames Estuary analysed by Dr Couceiro gave 121 MP/m³. Although this variance in data may be due to the different sampling locations, methods and time of year, it is thought likely that the concentration of microplastics are increasing.

Microplastics are pieces of plastics smaller than 5mm. They may be plastics made that size on purpose (e.g. nurdles) or small pieces of plastic that have broken off from larger pieces (e.g. fragments). Scientists began to notice microplastics in the oceans almost 20 years ago. Since then methods for detecting them have improved and studies have been conducted to determine if they are harmful. However, most of these studies have taken place in sea animals and unfortunately the results are troubling.

Lead researcher, Dr Couceiro said: “There is currently no complete map for the UK concentrations of microplastics in our coastal waters. These comparisons really show the need for a comprehensive map of these smaller sized microplastics and an annual monitoring method, which we have begun with this University of Portsmouth and GB Row Challenge collaboration. The long-term aim is to collect these datasets for each GB Row Challenge between 2022 and 2025, which will give a great baseline for the entire UK and also show any changes happening over that time.”

From the 2022 samples, a map has been produced which estimates summer microplastics concentration in the seas around the UK. This is currently taken from a small dataset but as the four-year project continues and more samples are taken, the distance between sample

sites will decrease and the accuracy of this map will increase. Comparisons between years will also be possible, determining if the problem is getting worse or better.

University scientists have also been analysing samples of underwater marine sounds. Some 376 were examined in more detail – of those, 97 instances were identified as boats, 27 as Cetacea (whales, dolphins and porpoises) and 48 as snapping shrimp. Researchers highlighted the presence of snapping shrimp in Scotland as unusual and concerning. Dr Fay Couceiro explained: “Hearing the snapping shrimp so far north up in the East of Scotland is of particular interest. They are normally found in more southern areas and their movement may be an indicator of climate change and warming seas.”

Environmental DNA (eDNA) samples were also collected by the crews to survey marine biodiversity. This involved filtering 1L of water twice a day to capture the tiny traces of DNA that animals leave behind like fingerprints in the water. From just 77 litres of water, about a quarter of a bathtub, 82 marine vertebrate species were identified. These ranged from critically endangered European eels and endangered undulated rays to commercial fish such as herring, salmon and cod, as well as many other beautiful fish such as wrasse, gobies and garfish. Mammals were also detected (seals, porpoises and dolphins) and even some seabirds such as the vulnerable Atlantic Puffin.

Samples were analysed by eDNA specialist company NatureMetrics. Their founder Dr Kat Bruce – also a member of one of the rowing crews – said: “Making this incredible journey around the coast of Great Britain, you can’t help but be awed by the beauty and diversity of this island we live on. We had many incredible encounters with wildlife, including dolphins, porpoises, seals and seabird colonies, but most of the biodiversity is under the water and we had no idea what species were there until we got home and analysed the DNA we’d filtered out of the water. Even after all these years it amazes me how much biodiversity we can detect in these small volumes of water, and the way it lets us see how different species are distributed in the environment, from tiny gobies up to dolphins and seals. I can’t wait to see how this data develops over the next few years.”

While the observation of southern species moving north is more evidence of warming seas, it also highlights the dangers of losing some of the northern species from UK waters. Scientists believe it is not just climate change that can cause disruptions to species – pollution events and fishing can also negatively impact biodiversity. In contrast, conservation projects can improve biodiversity in an area. Dr Couceiro said: “Mapping the biodiversity of UK seas annually is a great way to monitor these impacts on the species diversity.”

GB Row Founder William De Laszlo said “Scientific research, adventure, collaboration and endurance are at the heart of this ground-breaking project. At the core, however, is understanding the human impact on our most precious resource – our oceans. With data comes evidence, evidence becomes action and, we hope, behavioural change. We need to keep striving and protect our seas.”

Dr Couceiro added: “In many species, eating large numbers of microplastics has negative impacts ranging from reduced growth, to aberrant development, to cell toxicity. Considering the possible negative impacts, it is essential that we have a better understanding of how many microplastics are in our waters and that we have a way to monitor them.”

The results of the three data sets collected (microplastics, sound and eDNA) during last year's race each give an important contribution to the knowledge of UK seas. But the scientists believe the real strength of the project is how these data sets are combined going forward. They believe the results seen so far are just the tip of the iceberg.

Ben Green Sustainability officer at Harwin. "We are delighted to be part of this project as Chief Technology Partner. The understanding of our natural environment and how humans impact it, is key to the survival of our planet. Engineering and technology are a vital element in understanding our impact and also coming up with solutions to rectify the problems".

The next data collection will take place in this year's GB Row Challenge event starting on 4th June 2023 at Tower Bridge, London.

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