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Quantification of Microplastics and Microfibers on U.S. National Park Beaches

The National Park Service and Clemson University teamed up with the NOAA Marine Debris Program to collect and analyze beach sediments to assess the abundance and distribution of microplastics and microfibers on U.S. National Park beaches.

Type of Project: Research

Region: National

Project Dates: June 2015 - June 2017

Who is involved?
The National Park Service (https://www.nps.gov/index.htm) (NPS) and Clemson University's Baruch Institute of Coastal Ecology and Forest Science (https://www.clemson.edu/cafls/research/baruch/) conducted a two-year research project that assessed the abundance of microplastics and microdebris on beaches in 35 National Parks,

Resources - Links

- NPS Story Map: Marine Debris in Coastal Parks (https://nps.maps.arcgis.com/apps/MapJournal/index.html?appid=9b064e09473c4f7f9c85e1fb8316698b)
- Report: Quantification of Microplastics on National Park Beaches (https://marinedebris.noaa.gov/reports/quantification-microplastics-national-park-beaches)

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Monuments, Recreation Areas, and Seashores on the ocean and Great Lakes, and explored potential sources and distribution of this debris at regional scales. The NOAA Marine Debris Program funded this project through a contract with Genwest Systems Inc (http://www.genwest.com/).

(https://marinedebris.noaa.gov/sites/default/files/styles/1250wide/public/article-images/NPSmicroplasticsampling2_CreditNPS.jpg?itok=-liNC_Gr)

A volunteer with the National Park Service collects sand for microplastic and microfiber sampling at Hawai'i Volcanoes National Park, Hawaii. (Photo Credit: NPS)

What is the project and why is it important?

Microplastics are small plastic particles less than five millimeters in size. They include microbeads, pellets, or small fragments broken down from larger plastic items. Microfibers are another common type of small debris, or "microdebris." They consist of synthetic or processed fibers, such as those released from clothing when it's washed or shed from ropes or nets in the ocean. Microfibers may be composed of plastic polymers or naturally occurring fibers (such as cotton). While the impacts of microplastics and microfibers are not completely understood, scientists have found them in many levels of the food web, from very small animals such as in zooplankton to larger marine invertebrates, fish, and marine mammals. Current research is examining the links between chemicals associated with microplastics and their impacts on marine organisms. While these studies are underway, there is still a data gap in the distribution and abundance of microplastics and microfibers. Microplastics have been quantified in surface waters of some regions of the ocean (such as large ocean gyres) and larger lake systems like the Great Lakes, but estimates of microplastic and microfiber concentrations on beaches, especially studies using consistent sampling methodology, are limited.

Click photo for more details

What were the project results?

This study utilized the network of National Park beaches to measure the abundance and distribution of microplastics and microfibers over a wide geographic area and used consistent sampling methodology. Park staff and NPS volunteers collected beach sediment samples from 37 beaches, representing 35 national parks, monuments, recreation areas, and seashores. These samples were sent to the Baruch Institute of Coastal Ecology and Forest Science, where scientists and students analyzed the samples to quantify microplastics and microfibers from each site. Microfibers were the predominant type of debris found (97% by count). The highest concentrations of microplastics were found at beaches in the Great Lakes and Pacific Islands,

although microplastics were even found in remote areas of Alaska.

This sampling effort provided the opportunity to examine the distribution of microplastics and microfibers in relation to a variety of factors such as local geography, ocean currents, and levels of urbanization. The examined distribution of microplastics and microfibers across a wide geographic area helped us understand how this debris migrates, its most likely sources, and what geographic areas are most prone to its impacts. From this, we can begin to identify how best to reduce input and impacts to humans and wildlife.

Note that this was a 'snapshot' study - results were based on one sampling point in time.