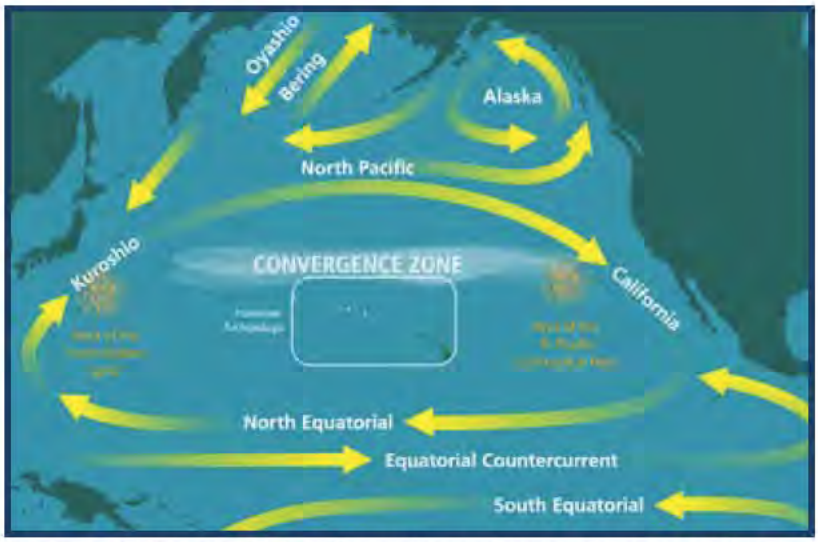
Marine Debris

NOAA Marine Debris Program | Office of Response and Restoration | NOAA National Ocean Service

NOAA Marine Debris Program
Efforts and Activities Related to the "Garbage Patches"

NOAA has been inundated the past few years with questions regarding marine debris in the North Pacific. Currently there is little rigorous scientific research conducted in the areas known as the "garbage patches," (eastern and western) and NOAA is working to rectify this through a multi-layered approach in our research of this area.



This map shows the locations of the eastern and western "garbage patches." Keep in mind that this is an oversimplification of the contstantly moving and changing features of the North Pacific Ocean.

Here is what NOAA has been doing to understand these areas...

Ships of Opportunity

The MDP worked with scientists and sailors to develop a volunteer at-sea visual survey form for floating marine debris. This data collection form has been in use since 2009 and continues to be updated. Sailors with the TransPacific Yacht Race and Pacific Cup have been instrumental in helping implement, test, and improve this survey. This data will be used to build our understanding of the density of marine debris items in the North Pacific Ocean, particularly in the area of the N. Pacific Subtopical High (*aka* eastern garbage patch).

At-sea Detection of Derelict Fishing Gear

The NOAA Marine Debris Program (MDP), with support from Papahānaumokuākea Marine National Monument and Pacific Islands Fisheries Science Center's Coral Reef Ecosystem Division, continues efforts to develop the capability to detect derelict fishing gear in the open ocean. Partners engaged in this endeavor include representatives of NOAA (NOS, NMFS, NESDIS, and OAR programs), NASA, US Coast Guard, US Fish and Wildlife Service, State of Hawai'i, University of Hawai'i, a nongovernmental organization, and the private sector. A special issue on the at-sea detection

Marine debris is
any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or the Great Lakes.

of derelict fishing gear is being edited by MDP staff for the peer-reviewed journal Marine Pollution Bulletin. In addition, the three NOAA Hawaii offices are developing strategies with NASA, NOAA's Unmanned Aerial Systems Program, the Coastal Storms Program, and OMAO to develop and test sensor-and-platform systems that will allow us to detect and ultimately remove derelict fishing gear before it enters sensitive nearshore environments.

Derelict fishing gear can be difficult to spot in the open ocean. *Photo courtesy of Andrea Neal, PhD, Scripps Institute of Oceanography.*

Partnership with the NOAA *Okeanos Explorer*

The MDP is working with NOAA Fisheries scientists, NOAA's Office of Ocean Exploration and Research, staff with the NOAA Ship *Okeanos Explorer*, and Scripps Institution of Oceanography on the first comprehensive scientific survey of plastic marine debris collected between Hawaii and California, in the area of the eastern "garbage patch." Plastic debris is collected by a special net called a manta net, which is towed by the ship. It measures the volume of water passing through it and collects tiny plastic samples in its fine mesh. Samples of plastic particles from both collection methods, many too small to be seen by the eye, will be counted at Scripps (at UC San Diego). NOAA Fisheries Northwest Fisheries Science Center will perform several chemical analyses to test the particles for PCBs, DDT, BPA and other toxins that might be on or in the particles. All these laboratory analyses are designed to improve our understanding of the impact of microplastic marine debris on the marine ecosystem and ultimately on humans.

Manta net being towed behind the ship to collect floating plastic debris. *Photo courtesy of NOAA Okeanos Explorer Program.*

Marine Debris Monitoring

A question that is often posed to the NOAA Marine Debris Program (MDP) is "How much debris is actually out there?" The MDP has recognized the need for this answer as well as the growing interest and value of citizen science. To that end, the MDP is developing and testing two types of monitoring and assessment protocols: 1) rigorous scientific survey and 2) volunteer at-sea visual survey.

These types of monitoring programs are necessary in order to compare marine debris, composition, abundance, distribution, movement, and impact data on national and global scales. Research efforts in recent years have significantly increased our

Staff analyzing for micro-debris as part of shoreline assessment process. Cove Point, MD.

knowledge of marine debris. However, significant gaps remain in standardized monitoring practices. Currently a single best method is not available to estimate total densities in the water column, subsurface, and shoreline.

"Microplastics," as defined by NOAA for use in this project, are particles composed of synthetic polymers less than or equal to 5mm.

Microplastics Research

The MDP is leading efforts within NOAA on the emerging issue of microplastic (≤ 5mm) marine debris. Standardized field methods for collecting sediment, sand, and surface water microplastic samples are in development and are undergoing further testing. This project seeks to determine a relatively simple, cost-effective, and unbiased laboratory method to estimate the quantity of three plastics (polyethylene, polypropylene, and polyvinylchloride) in environmental samples as well as in common personal care products. Eventually these field and laboratory protocols will allow for global comparisons of the amount of microplastics released into the environment, which is the first step in determining their final distribution, impacts, and fate.

For more information on the *garbage patches* visit

www.MarineDebris.noaa.gov/info/patch.html

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