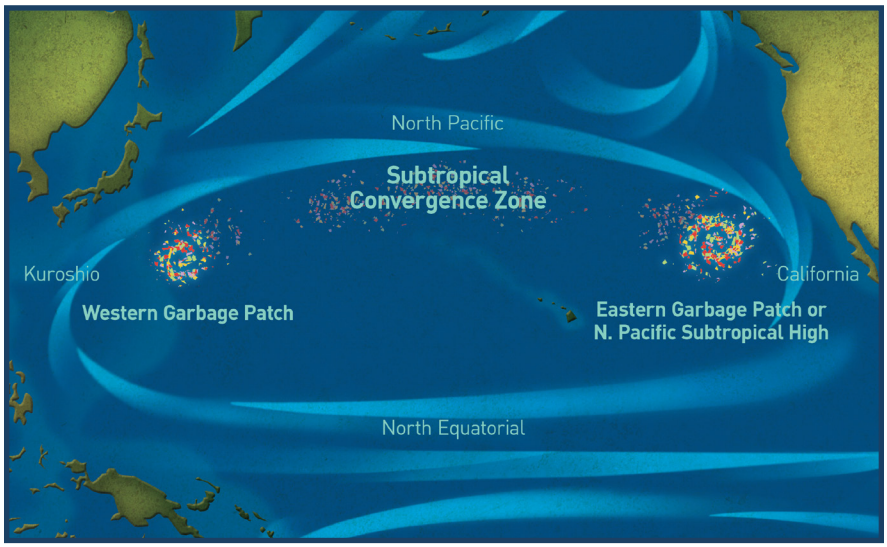
NOAA Marine Debris Program | Office of Response and Restoration | NOAA National Ocean Service

What We Know About:
The "Garbage Patches"

The "garbage patches" (both the eastern and western) are areas of marine debris concentration in the North Pacific Ocean. Because there has been little scientific research conducted in these areas, the exact size and content of these areas are difficult to accurately predict.



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.

What's in a name?

The name "garbage patch" is a misnomer. There is no island of trash forming in the middle of the ocean nor a blanket of trash that can be seen with satellite or aerial photographs. This is likely because much of the debris found here is small bits of floating plastic not easily seen from a boat.

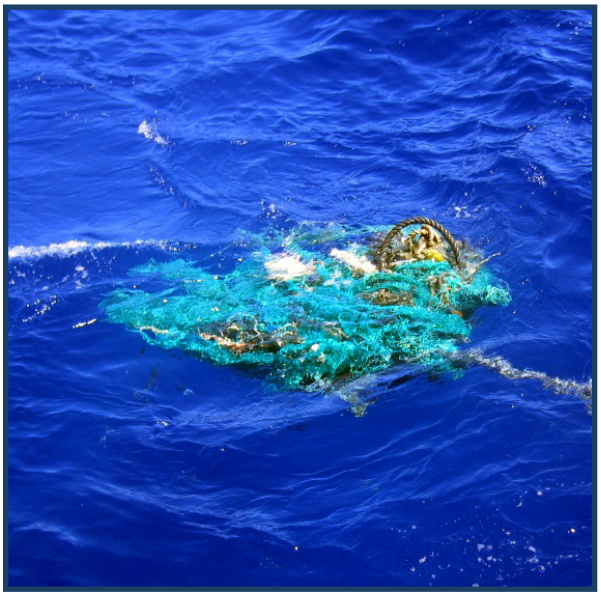
Eastern & western patches

- **Eastern garbage patch** - Concentrations of marine debris have been noted in an area midway between Hawai'i and California known as the North Pacific Subtropical High or the "eastern garbage patch." The High is not a stationary area, but one that rotates, moves, and changes.
- **Western garbage patch** - Another area of marine debris concentration is located off the coast of Japan, and researchers believe it to be a small recirculation gyre (ocean feature made up of currents that spiral around a central point) likely created by winds and ocean eddies.

Small plastic pieces, such as microplastics (< 5mm), may be found in areas of marine debris concentration, such as the "garbage patches."

"Garbage patch" recipe

- Floatable marine debris from land- and ocean-based sources (e.g., tiny pieces of plastic)
- Ocean and atmospheric conditions suitable for the concentration of marine debris (e.g., waters rotating--large or small area, fast or slow rotation--in a cyclone-like fashion)



Derelict fishing nets are a navigational hazard in areas where marine debris accumulates. *Photo courtesy of NOAA PIRO Observer Program.*

Other areas? Other oceans?

The "patches" are not the only open ocean areas where marine debris is concentrated. Another important area is the North Pacific is the Subtropical Convergence Zone (STCZ). This area, located north of the Hawaiian archipelago, has a high abundance of marine life, is a known area of marine debris concentration, and is one of the mechanisms for accumulation of debris in the Hawaiian Islands (Pichel et al., 2007).

Oceanographic features similar to the North Pacific Subtropical High and STCZ exist in other oceans of the world, such as the Atlantic Ocean. There have been anecdotal reports and some studies of debris concentrations in the Atlantic. A good example is Sea Education Association's work in the western North Atlantic and Caribbean Sea (Law et al., 2010). Still, compared to the North Pacific Ocean, there is a paucity of published literature on marine debris in the high-seas Atlantic Ocean.

Can it be cleaned up?

The answer to this is not as simple as you may think. It is certainly not cost-effective to skim the surface of the entire ocean. Even a cleanup focusing on "garbage patches" would be a tremendous challenge. Keep in mind these points:

- Concentration areas move and change throughout the year
- These areas are typically very large
- The marine debris is not distributed evenly within these areas
- Modes of transport and cleanup will likely require fuel of some sort
- Most of the marine debris found in these areas is small bits of plastic

This all adds up to a bigger challenge than even sifting beach sand to remove bits of marine debris. In some areas where marine debris concentrates, so does marine life (as in the STCZ). This makes simple skimming the debris risky—more harm than good may be caused. Remember that much of our ocean life is in the microscopic size range.

Regardless of the exact size, mass, and location of the "garbage patches,"
manmade debris does not belong in our oceans and waterways.

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

Law, K., S. Moret-Ferguson, N. Maximenko, G. Proskurowski, E. Peacock, J. Hafner, and C. Reddy. 2010. Plastic Accumulation in the North Atlantic Subtopical Gyre. Science Express. 19 August 2010 issue.

Pichel, W., J. Churnside, T. Veenstra, D. Foley, K. Friedman, R. Brainard, J. Nicoll, Q. Zheng, and P. Clemente-Colon. 2007. Marine debris collects within the North Pacific Subtropical Convergence Zone. Marine Pollution Bulletin 54: 1207-1211.