

Massive North Atlantic Garbage Patch Mapped

Jess McNally, 19 August 2010



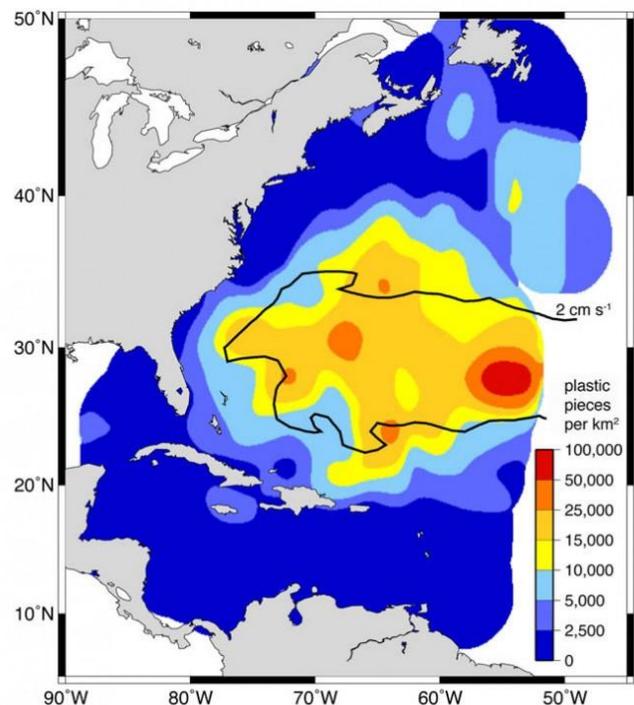
Millions of pieces of plastic — most smaller than half an inch — float throughout the oceans. They are invisible to satellites, and except on very calm days you won't even see them from the deck of a sailboat. The only way to know how much junk is out there is to tow a fine net through the water.

Scientists have gathered data from 22 years of surface net tows to map the North Atlantic garbage patch and its change over time, creating the most accurate picture yet of any pelagic plastic patch on earth.

The data were gathered by thousands of undergraduates aboard the [Sea Education Association](#) (SEA) sailing semester, who hand-picked, counted and measured more than 64,000 pieces of plastic from 6,000 net tows between 1986 to 2008.

“The highest concentrations that we observe in the North Atlantic [garbage patch](#) are comparable to that of the North Pacific, but we don't have enough data about the size of the North Pacific one to say whether they are comparable in size,” said oceanographer Kara Law of SEA, lead author of the study published August 19 in *Science*.

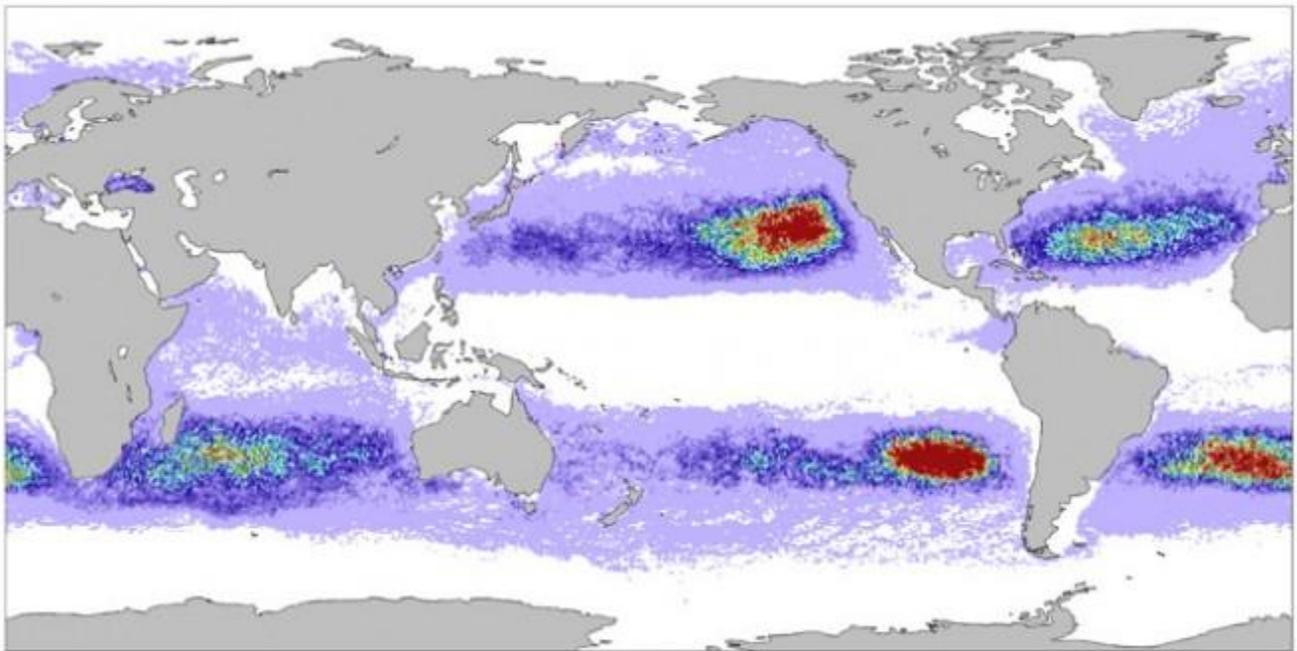
“As far as I'm aware this is the most complete and long term data set for little bits of trash floating in the ocean,” said oceanographer Miriam Goldstein of Scripps Institution of Oceanography. “It is hard to get long term data sets of the ocean, there aren't many programs that do it, and measure it the same way from year to year so you can compare the changes over time.”



Average plastic concentration and range of the North Atlantic garbage patch.

The highest concentrations of plastic were found roughly from the latitude of Virginia to the latitude of Cuba. While they were able to clearly define the north and south boundaries of the patch, the cruise tracks didn't venture far enough east to find the eastern boundary. They estimate the average concentration of plastic in this area is about 4,000 pieces per square mile, though it is as high as 250,000 pieces per square mile in some places.

To determine where the plastic is coming from, researchers used data from more than 1,600 satellite-tracked drifting buoys deployed between 1989 and 2009 to map surface currents in the region. More than 100 buoys passed through the Atlantic plastic region, most originating from the eastern seaboard. In most cases, the buoys reached the plastic patch in less than 60 days.



Computer model output of where plastic is likely to accumulate worldwide.

Plastic accumulated in regions called gyres, where currents circle and push water toward the center, trapping the floating bits. There are five major gyres in the world, one in each major ocean.

To estimate the range and highest accumulation of plastic in the North Atlantic and elsewhere, the research team created a computer model to simulate where plastic would go over time if it originally had been distributed evenly across the planet (image above).



Albatross chick that starved to death after its parents inadvertently fed it too much plastic.

“We saw very high concentrations of plastic in the model in the Atlantic in the same places we observed the plastic directly,” Law said. She hopes the computer model will help target future efforts to map plastic in the oceans. One surprising conclusion of the study found the concentration of plastic in the North Atlantic

has remained fairly steady during the past 22 years despite a five-fold increase in global plastic production and a four-fold increase in the amount of plastic the United States discards.

“If you are increasing the amount you put in, you’d theoretically be seeing more over time,” said Law. “It makes you ask other questions about the fact that the plastic might be sinking out. I’m also fairly certain that the pieces are breaking down into pieces that are smaller than the 335 micron (0.01 inch) size of our net.”

Optimistically, the study found a 1991 program by the Environmental Protection Agency to recapture industrial plastic pellets led to a significant decrease in the average number of pellets found in the Atlantic. The pellets account for less than 10 percent of the plastic out there, but the finding suggests efforts to reduce plastic waste on land can be effective.

No one knows how long plastic stays in the ocean or where most of it ultimately will end up. [Sea animals](#) such as birds and turtles often consume plastic, sometimes carrying it to land. Some likely will sink over time or wash up on shore.

“Cleaning up what is out there is really not feasible, and would likely cause as much harm as good because of all the other small creatures in the ocean that would get filtered out too,” said Law. “So what’s left is hoping that nature break this plastic down over hundreds of years or millenia.”

“Ultimately, we need to prevent adding to what is out there,” she added.

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