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Afloat in the Ocean, Expanding Islands of Trash

By LINDSEY HOSHAW

ABOARD THE ALGUITA, 1,000 miles northeast of Hawaii — In this remote patch of the Pacific Ocean, hundreds of miles from any national boundary, the detritus of human life is collecting in a swirling current so large that it defies precise measurement.

Light bulbs, bottle caps, toothbrushes, Popsicle sticks and tiny pieces of plastic, each the size of a grain of rice, inhabit the Pacific garbage patch, an area of widely dispersed trash that doubles in size every decade and is now believed to be roughly twice the size of Texas. But one research organization estimates that the garbage now actually pervades the Pacific, though most of it is caught in what oceanographers call a gyre like this one — an area of heavy currents and slack winds that keep the trash swirling in a giant whirlpool.

Scientists say the garbage patch is just one of five that may be caught in giant gyres scattered around the world's oceans. Abandoned fishing gear like buoys, fishing line and nets account for some of the waste, but other items come from land after washing into storm drains and out to sea.

Plastic is the most common refuse in the patch because it is lightweight, durable and an omnipresent, disposable product in both advanced and developing societies. It can float along for hundreds of miles before being caught in a gyre and then, over time, breaking down.

But once it does split into pieces, the fragments look like confetti in the water. Millions, billions, trillions and more of these particles are floating in the world's trash-filled gyres.

PCBs, DDT and other toxic chemicals cannot dissolve in water, but the plastic absorbs them like a sponge. Fish that feed on plankton ingest the tiny plastic particles. Scientists from the [Algalita Marine Research Foundation](#) say that fish tissues contain some of the same chemicals as the plastic. The scientists speculate that toxic chemicals are leaching into fish tissue from the plastic they eat.

The researchers say that when a predator — a larger fish or a person — eats the fish that eats the plastic, that predator may be transferring toxins to its own tissues, and in greater concentrations since toxins from multiple food sources can accumulate in the body.

Charles Moore found the Pacific garbage patch by accident 12 years ago, when he came upon it on his way back from a sailing race in Hawaii. As captain, Mr. Moore ferried three researchers, his first mate and a journalist here this summer in his 10th scientific trip to the site. He is convinced that several similar garbage patches remain to be discovered.

“Anywhere you really look for it, you’re going to see it,” he said.

Many scientists believe there is a garbage patch off the coast of Japan and another in the Sargasso Sea, in the middle of the Atlantic Ocean.

Bonnie Monteleone, a [University of North Carolina](#), Wilmington, graduate student researching a master’s thesis on plastic accumulation in the ocean, visited the Sargasso Sea in late spring and the Pacific garbage patch with Mr. Moore this summer.

“I saw much higher concentrations of trash in the Pacific garbage patch than in the Sargasso,” Ms. Monteleone said, while acknowledging that she might not have found the Atlantic gyre’s highest concentration of trash.

Ms. Monteleone, a volunteer crew member on Mr. Moore’s ship, kept hoping she would see at least one sample taken from the Pacific garbage patch

without any trash in it. “Just one area — just one,” she said. “That’s all I wanted to see. But everywhere had plastic.”

The Pacific garbage patch gained prominence after three independent marine research organizations visited it this summer. One of them, [Project Kaisei](#), based in San Francisco, is trying to devise ways to clean up the patch by turning plastic into diesel fuel.

Environmentalists and celebrities are using the patch to promote their own causes. The actor [Ted Danson](#)’s nonprofit group [Oceana](#) designated Mr. Moore a hero for his work on the patch. Another Hollywood figure, Edward Norton, narrated a public-service announcement about plastic bags, which make their way out to the patch.

Mr. Moore, however, is the first person to have pursued serious scientific research by sampling the garbage patch. In 1999, he dedicated the Algalita foundation to studying it. Now the foundation examines plastic debris and takes samples of polluted water off the California coast and across the Pacific Ocean. By dragging a fine mesh net behind his research vessel Alguita, a 50-foot aluminum catamaran, Mr. Moore is able to collect small plastic fragments.

Researchers measure the amount of plastic in each sample and calculate the weight of each fragment. They also test the tissues of any fish caught in the nets to measure for toxic chemicals. One rainbow runner from a previous voyage had 84 pieces of plastic in its stomach.

The research team has not tested the most recent catch for toxic chemicals, but the water samples show that the amount of plastic in the gyre and the larger Pacific is increasing. Water samples from February contained twice as much plastic as samples from a decade ago.

“This is not the garbage patch I knew in 1999,” Mr. Moore said. “This is a totally different animal.”

For the captain’s first mate, Jeffery Ernst, the patch was “just a reminder that there’s nowhere that isn’t affected by humanity.”

Travel expenses were paid in part by readers of [Spot.Us](#), a nonprofit Web project that supports freelance journalists.

This article has been revised to reflect the following correction:

Correction: November 26, 2009

An article on Nov. 10 about garbage patches in the world’s oceans referred incorrectly to the travels of a graduate student researching a master’s thesis on plastic accumulation in the oceans. The student, Bonnie Monteleone, visited the Sargasso Sea, which is part of a feature known as the Atlantic gyre. Thus, it was not the case that she “might not have found” the gyre. (Ms. Monteleone said instead that she might not have found the zone with the highest concentration of trash.)