

Science from Bath Toys

On January 10, 1992, a cargo ship was traveling from Asia to North America. It hit a storm in the North Pacific Ocean near where the 45th parallel intersects the International Date Line. (44.7°N, 178.1°E). Twelve containers were lost overboard. One of the containers spilled 28,800 floating bathtub toys into the ocean. The yellow ducks, blue turtles, red beavers, and green frogs were packed in sets of four but the packaging dissolved at sea.



In August and September of that year, beachcombers around Sitka, Alaska started to find hundreds of the toys washed up on the beaches. Twelve years later they were still finding them!

Dean Orbison and his 22-year-old son Tyler Orbison found 111 toys near Sitka during 1993–2004. At a fair in Sitka, they showed a basket of the toys they found. It held 18% turtles, 35% ducks, 26% beavers, and 21% frogs. Many of the toys were faded, bitten by animals, and ruptured from being smashed against rocks by the surf.

Dean had carefully recorded the dates and locations where they found ninety of the fist-sized toys. It was surprising to find that most of the toys were found during five years: 1992, 1994, 1998, 2001, and 2004. There were gaps of 2–4 years between those “peak” years. Dean and Tyler spent about the same amount of time along the shore each year. The Orbisons were not recording yet in 1992, but other people found hundreds of the toys near Sitka that year.

Dr. Curtis Ebbesmeyer studies ocean movements. He is considered to be a world expert on flotsam and jetsam, floating trash that falls or is thrown from a ship. His friend Jim Ingraham is an oceanographer at the National Oceanic and Atmospheric Administration (NOAA). There, he has worked to develop a computer program that calculates the way that ocean currents move. The program is called OSCURS for Ocean Surface CURRENT Simulator. It can predict where the water from a specific location will be on the next day, or any on any day right up until the present. Using OSCURS, the scientists have found that water moves around

in rings or circles call gyres. They have studied the movement of many drifting objects that move the same way, including the tub toys. Other objects include satellite-tracked buoys, migrating salmon and a sea turtle, bottles, several derelict vessels. They also tracked hundreds of Nike sneakers and hockey gloves from another spill.

After the first tub toys were found in Sitka, others were found further north. They had drifted west along coastal Alaska and the Aleutian Islands. Hundreds of toys were found near Shemya, 3,500 miles from the spill. Many continued on westward to Kamchatka and Japan, and then turned back across the Pacific to Sitka. They completed a 6,800-mile loop around the North Pacific Sub polar Gyre (hereafter the Gyre). It is the northernmost gyre in the Pacific Ocean.

Some toys went to Washington state, where Karen Gerber and Verne Krause recovered a turtle and duck, respectively. In the Queen Charlotte Islands, Guthrie Schweers found two turtles and four frogs.

The Orbisons' data indicate that flocks of toys completed four orbits of the Gyre. The first took 2 years, and the latter three were slower (4, 3, 3 years), probably because the toys developed holes and continued floating full of water. They rode lower in the water and didn't float as fast.

In the 1950s, Canadian oceanographers also studied movement and speed around the Gyre. They hurled 33,869 Messages in Bottles (MIBs) into the Gulf of Alaska. They tracked twelve that drifted around the Gyre in 1.9–4.2 years. This was about the same amount of time that it took for the toys (2–4 years). The toys, plus MIBs, provide twenty estimates that were used to find the average (mean) time that it takes to orbit the Gyre. It takes about 2.9 years, and the toys move at a speed of about 6.9 miles per day around the 6,800-mile course of the Gyre. Dean and Tyler's beachcombing provided an important contribution to oceanographic science.

How many more trips around the Gyre will the toys make in future years? Only four toys were found in Sitka in 2004, by mid July. This compares with 25 toys in 1994, suggesting that the numbers are decreasing sharply as time goes on.

What became of the thousands of toys beachcombers never reported? In 1996 a turtle was found on Kure Island, Hawaii, and in 1997 a beaver and a frog were found on Hawaii's Lanai Island. In 2003, a duck was found in Maine and a frog was found in Scotland.

The sun disintegrates the plastic toys, and eventually they will turn to dust. They will become part of the scum of plastic powder on the surface of the ocean.