

Name _____ Period _____ Date: _____

Ms. Randall Marine Science

Lab activity: Nike Shoes Wash Up

Introduction: From the reading selection, you learned that ships in the ocean occasionally spill large numbers of objects into the ocean. These objects later wash up on beaches. In this activity, you will use the location of Nike shoes that have washed up on beaches to discover how currents travel in the Pacific Ocean.

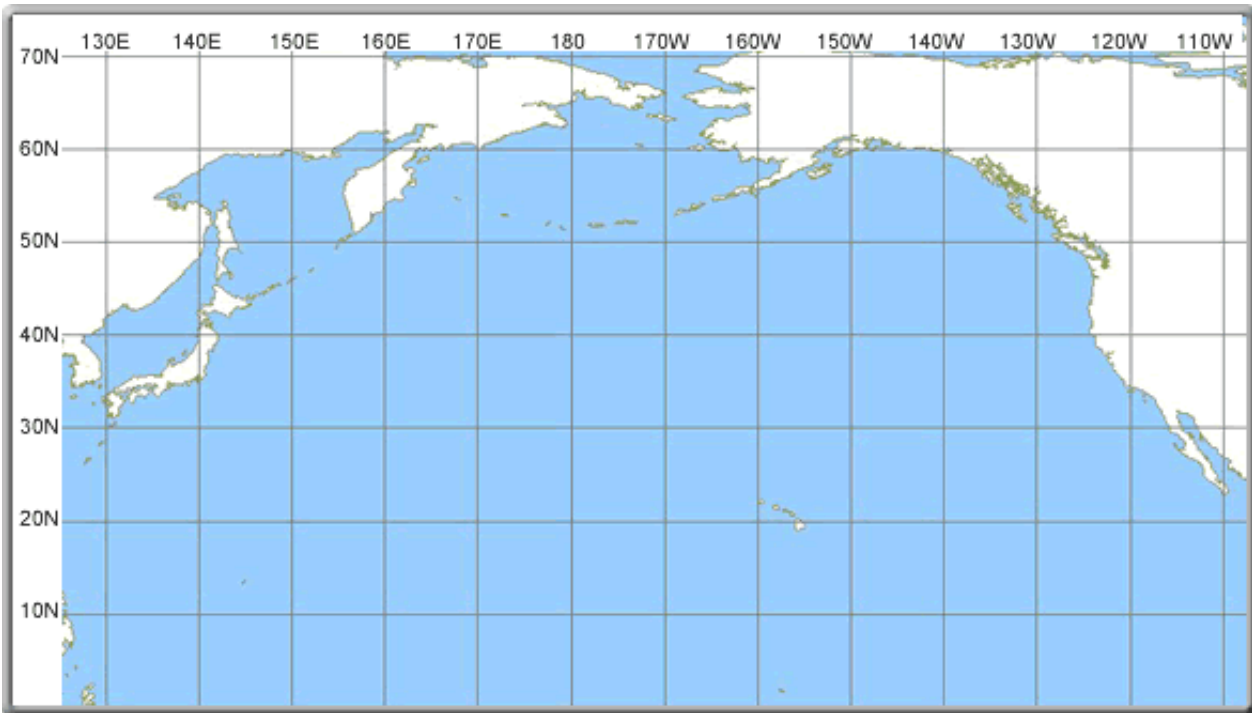


Procedures:

1. Use the data provided to mark the location of each “find” on the map provided. Use the number of the data point to label the location.
2. When you have placed all the numbers on the map, draw in the currents of the Pacific Ocean that would explain the movement of the shoes. Currents flow on the oceans surface like a river does on land.
3. Check your work with the map your teacher provides.
4. Answer the analysis questions to finish.

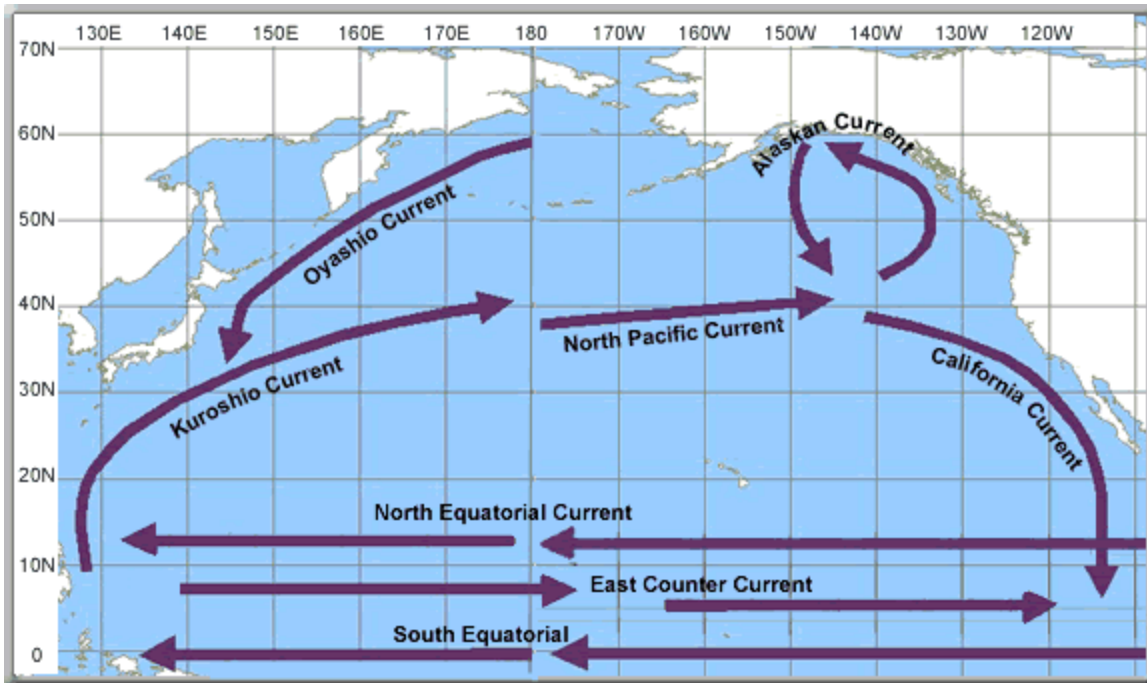
Data:

Spill #	What was recovered:	Latitude	Longitude
1	Shoes spill, May 27, 1990	48 N	161 W
2	200 recovered, Nov. 1990	56 N	134 W
3	100 recovered, Feb 7., 1991	53 N	129 W
4	200 recovered, Feb. 27.1991	47 N	125 W
5	250 recovered, Mar. 26, 1991	45 N	123 W
6	150 recovered, April 4, 1991	42 N	124 W
7	200 recovered May 9-10, 1991	40 N	124 W
8	200 recovered, May 18, 1991	39 N	123 W
9	Several recovered, Jan. 1993	19 N	155 W
10	Several recovered, Jan. 1994	32 N	132 E
11	Several recovered, April, 1996	54 N	133 W



Mapping the Sneakers' Journey Map

10 degrees longitude = 530 miles



Analysis:

- Using the key at the bottom of the blank current map, calculate approximately how far the shoes traveled between the point where they spilled and their first landfall. Which current(s) are the shoes traveling in?
- Considering the distance you figured in question 1, and the time it took for the shoes to make their first landfall, what was the speed (in miles per day) of the current moving those shoes?
- Calculate approximately how far the shoes traveled between California and Hawaii. Which current(s) are the shoes traveling in?

4. Considering the distance you figured in question 3, and the time it took for the shoes to move from California to Hawaii, what was the speed of the current moving those shoes (in miles per day)?
5. Which current is the fastest based on your answers to questions 1 through 4?
6. Ocean currents move warm and cold water around the planet, helping to maintain a more constant temperature. Which currents would you expect to carry cold water?

Nike Shoes Wash Up

Janice Posada / The Daily Herald (Everett WA) 18jun01

Two containers filled with Nike shoes fell off a container ship in the Pacific Ocean during a storm in 1999. Using information about the ocean's daily winds and currents, oceanographer Jim Ingraham created a simulated map of the Nikes' likely sea route. Cross Trainers appeared on Washington and Oregon coasts in February. They should appear near Everett this month.

As you read this, more than 50,000 Nike tennis shoes are circling the globe like a convoy of tiny striped canoes. But this flotilla of footwear is hardly alone at sea. It's been joined by thousands of Tommy Pickles cartoon heads, plastic turtles, rubber ducks, 3 million Lego pieces and, at last report, 34,000 hockey gloves.

All this stuff and more is bob, bob, bobbing to a beach near you, oceanographer Curtis Ebbesmeyer said. This month, Nike Cross Trainers are expected to wash up on Everett's beaches after falling into the Pacific Ocean in December 1999. This weekend will be a good time to comb local beaches, as low tides of more than minus three feet are predicted.

But be patient - some items won't wash ashore for another 10 years, said Ebbesmeyer, who has mapped Puget Sound from Tacoma to Whidbey Island since 1966. Each year, manufacturers around the world ship more than 100 million containers each the size of a semi-truck across the seven seas.

Gumball dispensers, doll heads and Beanie Babies stitched and glued in China sail across the Pacific Ocean to U.S. ports. Made-in-Hungary frocks and Pez candies travel 10th class across the Atlantic on container ships, which carry on average 4,500 containers. But not all of them will reach port.

Every year, more than 10,000 containers fall overboard and spill their cargo into the ocean. Storms are often to blame. An 8-foot by 40-foot container, which can carry up to 58,000 pounds of cargo, might hold 10,000 shoes; 17,000 hockey gloves or a million Legos.

Ebbesmeyer and his partners at Evans and Hamilton, Inc., a Seattle firm, design and manufacture instruments that measure ocean currents. The company is mapping north Puget Sound for a King County project that will locate a wastewater treatment plant in Snohomish County.

Until 1990, Ebbesmeyer dropped buoys, drift cards and markers into the sea to track current flows without giving much thought to what was already adrift.

But when his mom quizzed him about where beach junk comes from, he realized that the ocean was filled with readymade markers whose course he could plot from ship to shore. Over the years, he's become the big Kahuna of beachcombers with a Web site, a newsletter and a penchant for zipping around the country to attend beachcomber conferences. He prowls beaches for shoes, plastic toys, glass floats and tropical seeds.

Tall, with a raft of white hair and a salty beard, Ebbesmeyer could easily pass for a beach bum who traded his suit and tie for a straw-hat, a zinc oxide stripe and a pair of flip-flops. Far from being a curio, his hobby gives clues to the ocean's highway of currents.

Shipping companies keep meticulous records. A ship's captain is required to note where a container went overboard. If a Nike washes onto a local beach, check the serial number on the insole, he said, and then trace its route from the point where it went AWOL. Proof that even a floating shoe leaves a footprint.

"The oil companies don't like me saying this, but if a million gallons of oil spill in the Strait of Juan de Fuca, 1 percent 10,000 gallons -will show up in Everett and Puget Sound."

Based on his knowledge of ocean currents, Ebbesmeyer can predict when and where the goods will eventually turn up. Millions of Legos plastic pieces that spilled overboard in three containers in the Atlantic last year are expected to drift north into the Arctic Ocean and then through the Northeast Passage. In a few more years, they are expected to travel south toward the 49th state. Their expected arrival time on Alaskan beaches is 2012 and on Washington beaches in 2020, Ebbesmeyer said.

The coastline and inlet beaches of California, Oregon and Washington are well-known destinations for floating goods. In Puget Sound the 1 percent rule applies, Ebbesmeyer said. About 1 percent of whatever is spilled or floats into the Strait of Juan de Fuca will reach inland beaches. In 1990, 80,000 pairs of Nikes in eight containers jumped ship during a storm in the mid-Pacific. Ten years later, some are still circumnavigating the earth like miniature Magellan's.

A pair of athletic shoes can float for 10 years, Ebbesmeyer said. "They're still wearable even after three years at sea," he said. "A teen-ager will wear out a pair of Nikes in six months, proving that we're harder on shoes than the ocean."

Every beach is different, depending on the current. Items that wash up in Edmonds may not necessarily be found in Everett. "They're like restaurants some serve Thai food, some Indian or Chinese food. Some beaches are known for their glass or driftwood or artifacts."

In Edmonds, beach ranger Owen Caddy is used to finding the bright orange drift cards released by Ebbesmeyer's firm as part of the Puget Sound currents study.

And Caddy once assembled a little collection of his own. "When I was up in Alaska a few years ago, we were picking up little rubber duckies off the beach," Caddy said. In Everett, beachcombers have found beach glass, bottles and dishware dating from the 1800s. The spot where the Snohomish River drains into Puget Sound has proved an archaeologist's dream.

When the river cuts into its banks during the flood season, it sometimes washes out Indian artifacts, tools and arrowheads. "Five-thousand-year-old baskets have turned up at the mouth of the Snohomish. If you find one of those, call the Burke Museum," Ebbesmeyer advised.

Not everyone turns up treasures, but there are plenty of collectibles out there.

"Someone asked me if a plane-full of hockey players had crashed. They were finding hockey gloves all over the beach." Ebbesmeyer discovered that two 20-foot by 40-foot containers of hockey gloves, chest protectors and shin guards had fallen overboard in the middle of the Pacific in 1994.

Manufactured items, glass and sneakers are relative newcomers to the ocean's bounty; Mother Nature's spawn has been washing ashore for millions of years.

Sea beans, a tropical seed, can stay afloat for 30 years. They bob across the Pacific from Southeast Asia. They can be found on Edmonds and Mukilteo beaches, and despite the lengthy saltwater immersion, some will still sprout.

"But you don't want to do that," Ebbesmeyer said. "They're a tropical jungle vine, which grows to two feet in diameter think of Jack-in-the-Beanstalk. "The bad news is that they'll envelop your house. The good news is they can't stand any frost."

As for the manufactured junk floating in the ocean, it's not all a waste or a wash. Those Nike shoes, for instance, they're ambassadors of goodwill, a floating thrift store. "Poor people around the world know, if you need a pair of shoes you go to the beach."