

NAME:

DATE:

## The Nike Shoe Investigation

### Introduction:

On May 27, 1990 the freighter Hansa Carrier, enroute from Korea to the US, encountered a severe North Pacific storm. During the storm, a large wave washed twenty-one shipping containers overboard. Five of these 20-meter contains held a shipment of approximately 80,000 Nike shoes ranging from children's shoes to large hiking boots. It has been estimated that four of the five containers opened into the stormy waters, releasing over 60,000 shoes into the north Pacific Ocean. The shoes washed ashore one at a time but were wearable after a scrub-down to remove barnacles, algae, and tar. Beachcombers held swap meets to find matched pairs. In this investigation we will consider the starting point for the ocean adventure these shoes had, look at the places where shoes washed ashore, then make some conclusions about the general circulation patterns in the Pacific Ocean.

### Procedure:

1. Number each of the data points to reflect the true chronological order.
2. Plot the location of each point in chronological order
3. Draw small, neat arrows between the points.

### Data:

	Shoe spill, May 27, 1990	48°N, 161°W
	250 recovered, March 26, 1991	59°N, 139°W
	200 recovered, May 18, 1991	55°N, 130°W
	100 recovered, February, 1991	53°N, 131°W
	200 recovered, November, 1990	49°N, 126°W
	200 recovered, February, 1991	47°N, 125°W
	150 recovered, April 4, 1991	44°N, 124°W
	200 recovered, May 9-10, 1991	40°N, 124°W
	Several recovered, January, 1993	19°N, 155.5°W
	Several recovered, January, 1994	32°N, 132°E <-- East!
	Several recovered, April, 1996	54°N, 133°W

### Analysis:

1. Define these terms

a) Gyre

b) Current

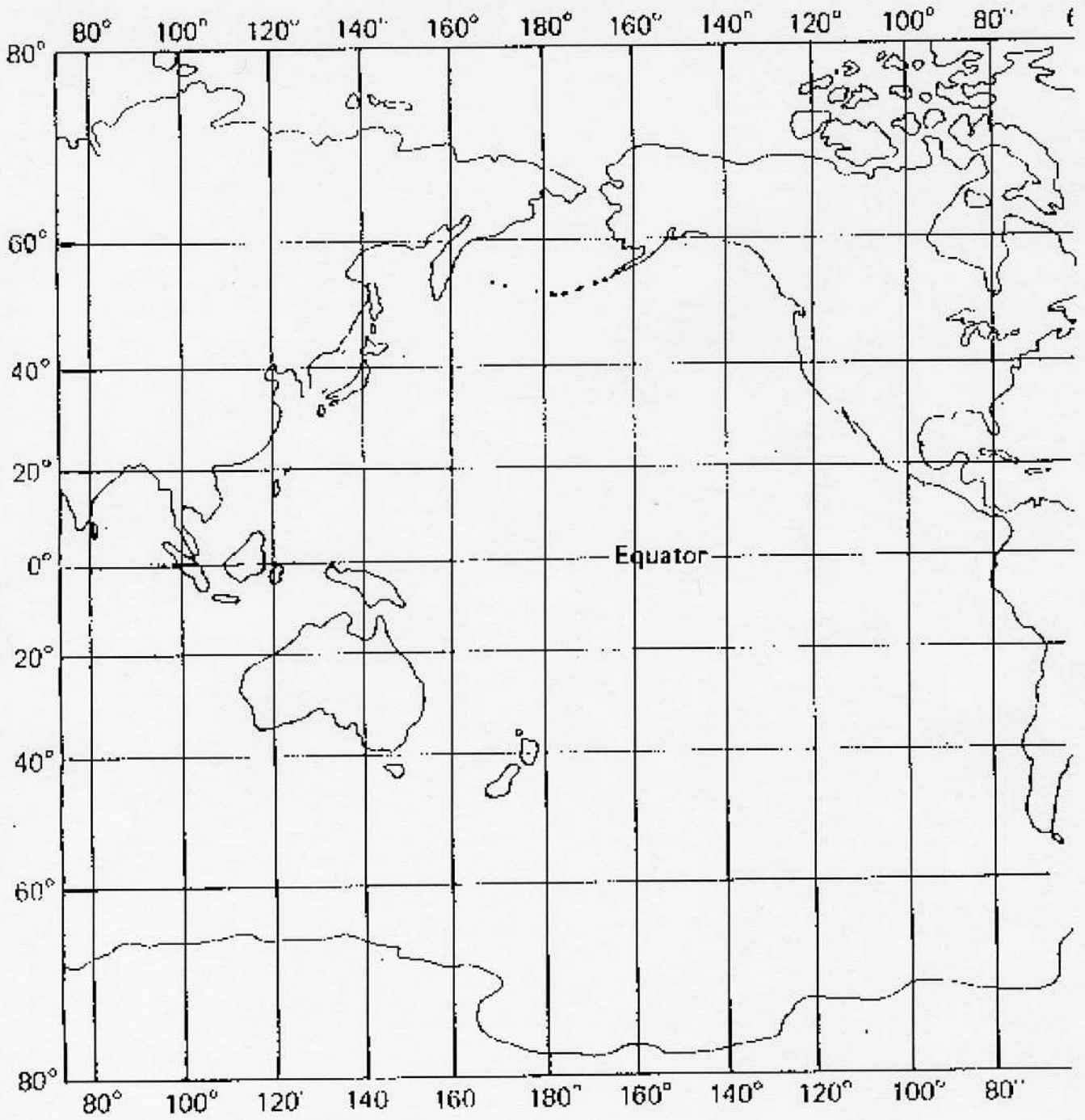
c) Eddy

2. Use an atlas or other reference showing the major surface currents in the Pacific Ocean, (a) list the names for each of the currents that affected the distribution of the shoes, and (b) write them on your map showing their correct location.

Name \_\_\_\_\_ Period \_\_\_\_\_

### THE NIKE SHOE INVESTIGATION

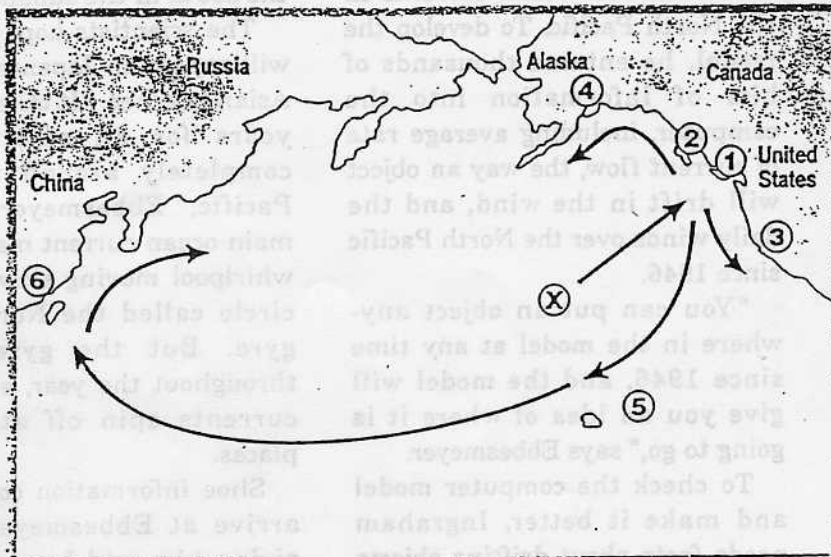
Map of the Pacific Ocean



# SHOES OVERBOARD!

Thousands of shoes spilled into the sea during a storm. Now scientists are using them to improve their performance in ocean research.

By Sharlene P. Nelson



Point X shows where the shoes spilled into the ocean. James Ingraham used a computer program to predict where some of the shoes might reach shore and about how long it would take them. Dr. Curtis Ebbesmeyer is keeping a record of when and where people are actually finding the shoes. The scientists are comparing their information to learn more about ocean currents.

Point on Map	Prediction by Computer Model	Shoes Found
1	Vancouver Island	Washington State and Vancouver Island
2	Queen Charlotte Islands	Queen Charlotte Islands
3	Oregon	Oregon
4	Prince William Sound	Middleton Island (seventy miles away)
5	Hawaii	Hawaii
6	Taiwan	No reports yet

From the late fall of 1990 through early 1991, beachcombers in the Pacific Northwest began to find hundreds of shoes lying on beaches and encrusted with salt and barnacles. They were puzzled. Where did the shoes come from? How did they get there? One scientist studied the puzzle and found some answers. His answers are teaching him more about ocean currents.

In May 1990 the container ship *Hansa Carrier* left Korea on its way across the Pacific Ocean toward the United States. Containers as large as a train's boxcar were strapped on the ship's deck. Five of them were filled with shoes: sneakers, sandals, hiking boots, and golf shoes.

Then a violent storm struck. Strappings snapped. Containers fell overboard, broke open, and spilled 61,000 Nike shoes into the ocean. Some of the shoes drifted on a current flowing east and washed ashore after floating 1,500 miles.

A beachcomber found 200 shoes on a Washington State beach. Later, shoes were found in British Columbia, 100 of them on Vancouver Island and 250 more on Queen Charlotte Islands. Still more shoes were discovered washed up on beaches

along the Oregon coast.

The puzzle-solving scientist is Dr. Curtis Ebbesmeyer, an oceanographer based in Seattle, Washington. Dr. Ebbesmeyer studies drifting objects to learn about ocean currents.

Currents are like wide rivers in oceans. They can influence weather. They have carried drifting boats and bottles with messages from one continent to another. Currents determine what direction an oil spill will go.

For twenty years Ebbesmeyer has studied one drifting object at a time, such as a bottle with a message found on a beach or an abandoned ship that landed on a shore. You can guess why he got excited when he read an article in a newspaper about beachcombers finding the shoes.

"I knew instantly this was a real opportunity," Ebbesmeyer says. "It is extremely rare that an oceanographer gets to study thousands of drifting objects in the ocean at one time."

He phoned beachcombers, including an Oregon artist, Steve McLeod. McLeod had collected information about when and where 1,600 shoes were found.

With a list of the identification

numbers found inside the shoes, Ebbesmeyer was able to learn that the shoes had been loaded aboard the *Hansa Carrier*. Using the name of the ship, he learned when and where the shoes were spilled. He took the information to his friend W. James Ingraham, Jr., who is also an oceanographer.

Ingraham is the creator of a computer program, or model, that simulates ocean currents in the North Pacific. To develop the model, he entered thousands of bits of information into the computer, including average rate of current flow, the way an object will drift in the wind, and the daily winds over the North Pacific since 1946.

"You can put an object anywhere in the model at any time since 1946, and the model will give you an idea of where it is going to go," says Ebbesmeyer.

To check the computer model and make it better, Ingraham needs facts about drifting objects like the floating shoes. Ingraham entered information about the shoe spill. The chart at left shows the major shoe beachings that the model predicted and what actually has happened so far.

The chart does not show the surprising shoe finds. The model predicted little scattering of the shoes as the currents carried them eastward. "But the shoes were found scattered from California to northern British Columbia," says Ebbesmeyer. "The north-south scattering must be caused by winds blowing to the north along the coast in the wintertime and changing toward the south in the summertime."

The scientists hope some shoes will appear on Japanese and other Asian beaches. "It takes five to six years for an object to drift completely around the North Pacific," Ebbesmeyer says. The main ocean current makes a huge whirlpool moving slowly in a big circle called the North Pacific gyre. But the gyre changes throughout the year, and smaller currents spin off at different places.

Shoe information continues to arrive at Ebbesmeyer's office, giving him and Ingraham more opportunities to improve the computer model. Eventually, they hope to be able to tell where to find valuable cargoes lost in storms and where to look for ships and people lost at sea.

Illustrated by R. Michael Thelin



## Did the Shoes Harm Wildlife?

Some trash can hurt wildlife. What did 61,000 running shoes do to the ocean's creatures? So far, no one has reported that fish or other animals were hurt by the shoes. "The larger question is, how many of these containers are spilled and what's in them?" says Dr. Curtis Ebbesmeyer.

If you find any unusual things along any shore, he would like to hear from you. Ask an adult if it's safe before you touch anything you find, even if it's small. Send a description of the objects—including any numbers printed on them and when and where you found them—and your name and address to Dr. Curtis Ebbesmeyer, 6306 21st Avenue, N.E., Seattle, Washington 98115.

Answer the following questions on the “**Shoes Overboard**” Article

1. Using your text, identify the currents that the shoes rode to reach each destination:
  - a. Washington State and Vancouver Island
  - b. Queen Charlotte Island
  - c. Prince William Sound
  - d. Hawaii
  
2. Why were the sneakers in the ocean?
  
3. How were the shoes tied to the Hansa Carrier?
  
4. Why was Ebbesmeyer so excited to find that beachcombers were finding the shoes?
  
5. What different pieces of information are in the computer model to predict the path of an object in the ocean?

How do the shoes help his work with the model?

6. The range of North/South scattering was unpredicted. What was the proposed cause?
  
  
  
  
  
  
  
  
  
  
7. The shoes are providing an opportunity to improve the computer model. How do they hope to eventually use the computer model?