# SCIENTISTS IN THE FIELD

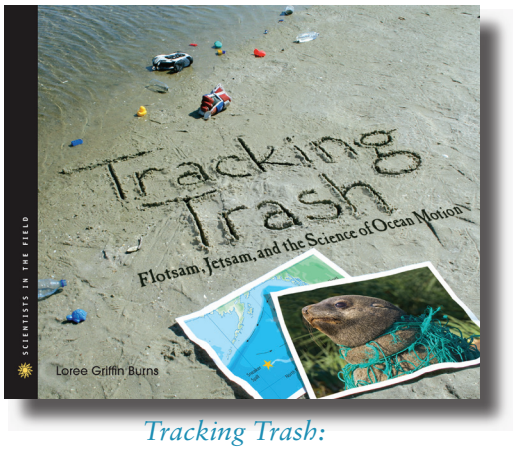
WHERE SCIENCE MEETS ADVENTURE

## DISCUSSION AND ACTIVITY GUIDE

*Tracking Trash: Flotsam, Jetsam, and the Science of Ocean Motion*
by Loree Griffin Burns

### *About the Series*

*Tracking Trash* is part of the award-winning Scientists in the Field series, which began in 1999. This distinguished and innovative series examines the work of real-life scientists doing actual research. Young readers discover what it is like to be a working scientist, investigate an intriguing research project in action and gain a wealth of knowledge about fascinating scientific topics. Outstanding writing and stellar photography are features of every book in the series. Reading levels vary, but the books will interest a wide range of readers.

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### *About the Book*

When Dr. Curt Ebbesmeyer's mother saw an article about hundreds of Nike sneakers washing up on Seattle beaches, she wondered why this was happening. Since her son studied ocean currents, she ordered him to find out. Spurred on by his mother's curiosity, Dr. Ebbesmeyer started to investigate, which eventually led to his becoming a leading expert in flotsam and jetsam—and solving the puzzle of the Nike sneakers in the process.

*Tracking Trash: Flotsam, Jetsam, and the Science of Ocean Motion* begins with the curious case of floating Nikes and follows the fascinating research of Dr. Ebbesmeyer and two other extraordinary scientists, Dr. W. James Ingraham and Captain Charles Moore. Their work has led to important discoveries in the study of ocean currents and the amount and impact of floating debris. The experiments use the latest in scientific equipment and computer technologies and, intriguingly, the efforts of ordinary beachcombers to gather data, illustrating the influence of science, discovery, and curiosity on our everyday lives.

### *About the Author*

Dr. Loree Griffin Burns holds a PhD in biochemistry and has found a way to combine her many interests, exchanging her life as a professional scientist for one as a writer of children's science books. *Tracking Trash,* published in 2007, was her first book and was a Boston–Globe Horn Book Honor book for nonfiction. Since then she has written two other outstanding books, *The Hive Detectives: A Chronicle of a Honey Bee Catastrophe.* (Houghton Mifflin 2010) and *Citizen Scientists: Be a Part of Scientific Discovery from Your Own Backyard* (Houghton Mifflin 2012). Her lively blog provides information about her life, and fascinating research trips, as well as a list of suggested books and websites.

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### *Pre-Reading Activity:*

Display a Nike sneaker, a floating bathtub toy, a handful of Legos, and a hockey glove. Have students explain what they have in common.

Walk around the school playground or the immediate neighborhood. Record precisely what kind of trash you find and exactly where you find it.

### *Discussion Questions:*

Why is trash in the ocean important to people who do not live near the ocean and who will never visit the ocean?

Dr. Ebbesmeyer states that the trash in the ocean is so vast that it is not practical to pick it up piece by piece. Does this mean that we should just leave it alone? What should we do?

Should our government regulate the use of nets in our oceans and lakes? How should we deal with the problem of ghost nets?

### *Applying and Extending Our Knowledge:*

Longitude and latitude are the guides that allow Dr. Ebbesmeyer to report precisely where in the ocean the sneakers spilled.

- Find the longitude and latitude of your school to the nearest degree.
- Using Google Maps, zoom in to the location of your school. Print out maps for students and have them insert and label a grid showing precise locations where they found trash.
- If your classroom has a document camera, use this tool to share several of the students' maps. Discuss the different ways students numbered or labeled their grids.
- Share the exact GPS location (which can be found online through a longitude latitude search: www.findlatitudeandlongitude.com). Discuss why it is important to have a standard reference. Discuss why a simpler numbering system might be easier for tracking trash at school.

**Common Core Connection**

**RH.6-8.7.** Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.

**RI.6.7.** Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

**W.6.7.** Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

Like wind, currents are not something that students can easily see. But when a tree branch moves, the effects of wind are visible. So too can we understand currents by tracking objects that are moved by them. Currents are influenced by many factors, including wind, water density, and seismic activity (among others).

- Using a tray of water, a cork, and a fan, observe what happens to the cork when a fan is placed in various locations (north, south, east, and west). Observe and record what the cork does each time the fan is moved. Time how long it takes the cork to move across the pan. Repeat with heavier or lighter corks. Repeat with other floating objects.
- Replace the water above with salt water and repeat.
- With either fresh water or salt water, repeat the activity above, but this time tap on the bottom of the pan in the center, lightly at first and then gradually harder. Change the location of where you tap and repeat. Observe and record what the cork does each time the tapping increases in intensity. Try this without the fan blowing.
- Place items such as bricks or rocks in the pan and repeat the activities above. Place a solid wall of bricks half-way across the pan and repeat. Ask students what ocean animals would have to do to stay alive if we assume that the cork is a food source.

Students should notice that it is possible to predict what the cork will do fairly accurately if we know the direction the wind is blowing, how soft or hard the tapping is, where the tapping is located, where the objects are located, etc. Discuss with the class the reliability of Dr. Ingraham's OSCURS program.

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**Common Core Connection**

**RST.6-8.3.** Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

**W.6.7.** Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

Trash is not limited to the ocean. In many ways trash moved by wind on the land is the same as trash moved by the ocean.

- Keep a weekly (or longer) trash log for a location in your neighborhood. Keep notes showing any movement, and any additions or subtractions to the trash, and make sure to indicate what kind of trash it is (plastic, paper, food scraps, etc.).
- Show students pictures of things such as fish eggs. Then find a plastic bag the same color and cut a piece of it roughly the same size and shape as the fish egg. Can students understand why fish might eat plastic that breaks into small pieces?
- Discuss what the author states as fact about how long it takes plastic to decompose. Use your library to research how long it takes plastic to break down. Is the author correct?
  An excellent website on this topic is from the NOAA Marine Debris Program. Plastic Marine Debris: What Do We Know. marinedebris.noaa.gov/info/plastic.html

**Common Core Connection**

**RST.6-8.9.** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

**RST.6-8.1.** Cite specific textual evidence to support analysis of science and technical texts.

**RI.6.1.** Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

**RI.7.8.** Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims.

## *Websites to Explore*

Beachcombers Alert!
beachcombersalert.org/

Dr. Curt Ebbesmeyer maintains this long-running website for beachcombers and others interested in flotsam and jetsam. He reports on items being tracked and other related issues. Contact him through this website to report beach finds.

NOAA Marine Debris Program
marinedebris.noaa.gov
The NOAA Marine Debris Program's mission is to investigate and solve the problems that stem from marine debris through research, prevention, and reduction activities. This interesting website includes factsheets on various types of marine debris, "garbage patches" and the Japan tsumami Debris. It also includes downloadable photos, as well as an excellent list of educational resources.

Ocean Motion and Surface Currents
oceanmotion.org/html/background/wind-driven-surface.htm

An excellent site from NASA that explains ocean motion, currents and gyres.

## *Further Reading*

Dash, Joan. *The Longitude Prize*. Farrar, Straus & Giroux, 2000.

Day, Trevor. *Exploring the Ocean*. Vol. 1: *The Physical Ocean*. Oxford University Press, 2003.

Knight, M. J. *Why Shouldn't I Drop Litter?* Smart Apple Media, 2009.

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