Teacher Background

Finding the Scent

Salmon are believed to use their powerful sense of smell to make their remarkable return migration back to the stream where they began their lives. Laboratory experiments on smell recognition in salmon have demonstrated that they can detect the odors of different species of water plants, as well as minerals in the water.

Lesson Plan

Student Objectives

The students will use their sense of smell, and their memory of a smell, to find their way "home."

Materials:

- One copy per student, FINDING THE SCENT
- 8-12 plastic film canisters or other opaque containers
- A variety of common cooking extracts
- A variety of other odorous substances (see below)
- Tissue paper
- A sheet of stick-on labels or masking tape
- A marking pen
- Student SCENT CARDS

Procedure:

1. Before your students arrive, prepare 6-8 smell jars using film canisters, each containing a different odorous substance covered by a piece of tissue. Good odors are cooking extracts (vanilla, lemon, peppermint, wintergreen, almond), or coffee, vinegar, cinnamon, molasses, onion, etc. Keep the lids on until they are to be used. Label each smell jar with a number, and place all together on a table or desk at the front of your classroom.

2. Also prepare 2-4 additional jars which will not be used at the outset. Some of these could contain odors representing pollution, such as motor oil, insect repellent, or kerosene, but others might simply be odors easily confused with the first set -- for example, wintergreen and spearmint.

3. On each of the student "Scent Cards," write the number corresponding to the label on one of the jars from the first set of smell jars. Each number should be used several times.

4. When the students arrive, distribute the student text, FINDING THE SCENT. Have them read the text and mark Hyak's entry into the Skokomish River on the SKOKOMISH WATERSHED MAP and answer the questions.

5. After they finish the work, pass the "Scent Cards" out among your students. Allow students to come forward a few at a time to smell the jar indicated on the card, but do not allow any discussion of the smells at this time. Have the students return to their seats.

6. Now, add the second set of smell jars to the first set. Relabel all jars by completely covering pre-existing labels with new labels, this time marking the jars with letters. The relationship between number labels and letter labels should be random. (It would be advisable for you to keep a record of old and new labels for each container, and to be able to recognize the odors yourself.) Distribute the jars around perimeter of the classroom.

7. Have the students leave their seats to search around the room for their original smell jars. As students "find their scent," have them return to their seats and record the new jar label on their Scent Cards.

8. As a class, now attempt to match the letter on each container with its original number. Can the students identify the odor in each of the smell jars?

9. Discuss with your student whether they found this easy or difficult. If the odor had not been familiar to them, would this task have been more difficult?

10. This activity actually involves two separate skills -- smell discrimination (distinguishing between odors), and smell memory (the ability to recognize an odor later). Discuss this distinction with your students. You may want to explore how well your class can remember odors for a longer period of time. To try this, allow them to smell a different jar, but delay allowing them to search for it for the rest of the class period -- or even until the next day.

11. Have your students discuss these questions.
    - How does the sense of smell in humans compare with that of salmon?
    - Would your sense of smell become more sensitive if you had to depend on it more?
    - Which of your five senses (sight, smell, touch, taste, and hearing) do you depend on most? Another way to ask this is which of your senses would you least want to lose?

Answer Key:

1. Scientists think salmon may navigate by the sun or by the earth's magnetic field when they are in the open ocean.
2. Salmon use their powerful and persistent sense of smell to find their way back to the stream they lived in as fry.

STUDENT SCENT CARDS

SCENT ____________ ____________

SCENT ____________ ____________

SCENT ____________ ____________

SCENT ____________ ____________

Finding the Scent

At the mouth of the Skokomish River, the school of salmon turns into the still water of the estuary. They rest briefly in a quiet pool, then nose their way into the fresh flowing current again. As the water rushes past, it carries clues which are helping her find her way home.

Salmon are remarkable animals. Nobody knows for sure how they are able to range thousands of miles at sea, yet return to the exact stream of their origin at precisely the same time. A run of salmon often returns to its river to spawn within a day or two of the same date every year! Some scientists think they are using the sun to navigate by while they are in the open ocean. Or perhaps they can "feel" the Earth's magnetic field.

1. What are two possible ways scientists think salmon may navigate in the open ocean?

When they begin searching for the river or stream where they began their life, however, they have another way of navigating which scientists do know something about. It appears that salmon have an extraordinary sense of smell. In one experiment, for example, the fish were able to distinguish between common water plants strictly by their smell. They also seem to be able to remember smells for an extremely long time. It is thought that very slight differences in the smells of individual streams are the salmon's only map home!

2. How do scientists think salmon find their way back to the stream of their origin?