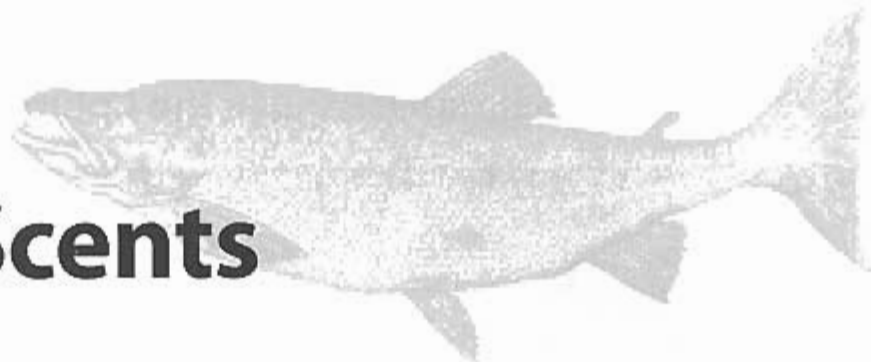


# Sockeye Scents



## Objectives

Students will (1) trace and label the migratory route that sockeye salmon take from the ocean to an upstream lake, (2) describe one theory about how a salmon can find its birth stream, and 3) explain how adaptations enable some species to survive and maintain their populations.

## Method

Students participate in map and simulation exercises that help them understand the migration of the sockeye salmon.

## Materials

A map of a the Columbia River system in Oregon (or local maps); pencils, crayons, and markers; 40 paper cups; paper towels; 40 rubber bands; 25 (if indoors) to 75 (if outdoors) yards of blue ribbon or chalk; four sample scents such as garlic, mint, chocolate, and anise; cotton balls

**Grade Level:** 3-4

**Subject Areas:** Social Studies, Science, Expressive Arts, Language Arts, Environmental Education

**Duration:** 2 hours

**Group Size:** small groups of four students

**Setting:** indoors or outdoors

**Conceptual Framework Topic Reference:** CAIIA, CAIIA1, CAIIA1c

**Key Terms:** migration, spawning, scent

**Appendices:** none

## Background

Salmon begin life as eggs in the gravel of a stream or (in the case of some sockeye) lake-shore. They migrate down rivers and spend several years in the ocean. Then at a certain time, the salmon swim back to their "home" rivers and migrate upstream to their exact birthplaces to spawn.

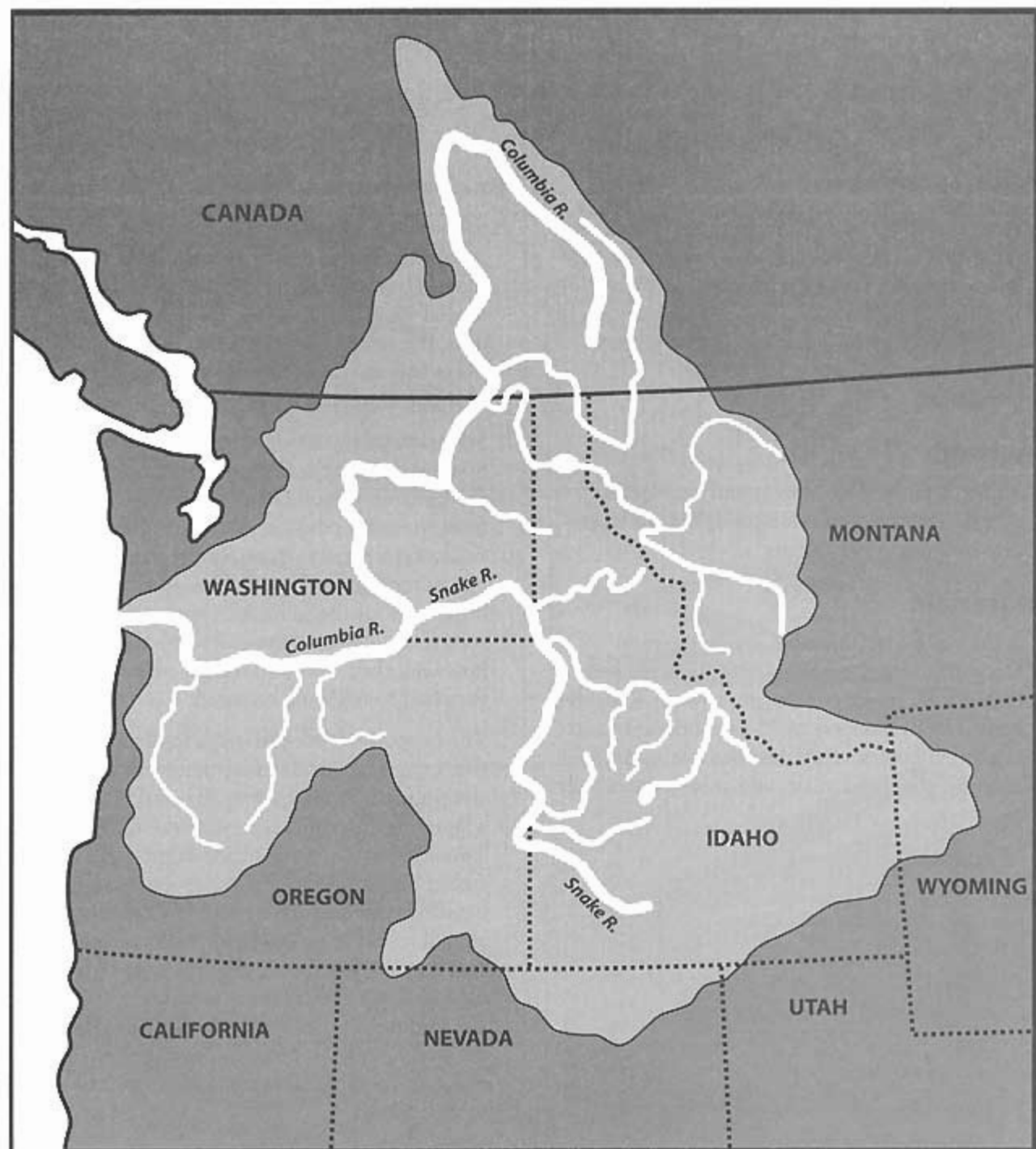
Scientists think salmon migrate back to their home streams by sensing their orientation to the Earth's magnetic field and receiving clues from the sun's position in the sky. They also think scent plays a major part in the ability of a salmon to find home. This adaptation is important for the salmon to reproduce and survive. Students might give some thought to how well they would find their own homes if they had to rely only on smell.

The purpose of this activity is to demonstrate that organisms exhibit adaptations to the environment in which they live and that these adaptations maximize the survival of the species. This activity is specific to the salmon of the Columbia River, Oregon; however, it can easily be adapted to any anadromous or catadromous animal found in coastal systems. Anadromous species, such as salmon, shad, bass, and others, migrate from the ocean to a stream to spawn. Catadromous species, such as eels, begin life in the ocean, migrate upstream where they spend much of their life, and then return to the ocean to reproduce.

NOTE: For more information on salmon, see the activity "Hooks and Ladders" on page 43 or "Where Have All the Salmon Gone?" on page 166. Also contact the Idaho Department of Fish and Game at (208) 334-2633. Check with your state's fish and wildlife agency for examples of life histories of other migrating aquatic organisms.

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## Historic Salmon Range in the Columbia River Basin



Adapted from "Wild About Salmon, An Educators Guide", Idaho Department of Fish and Game, 1999.

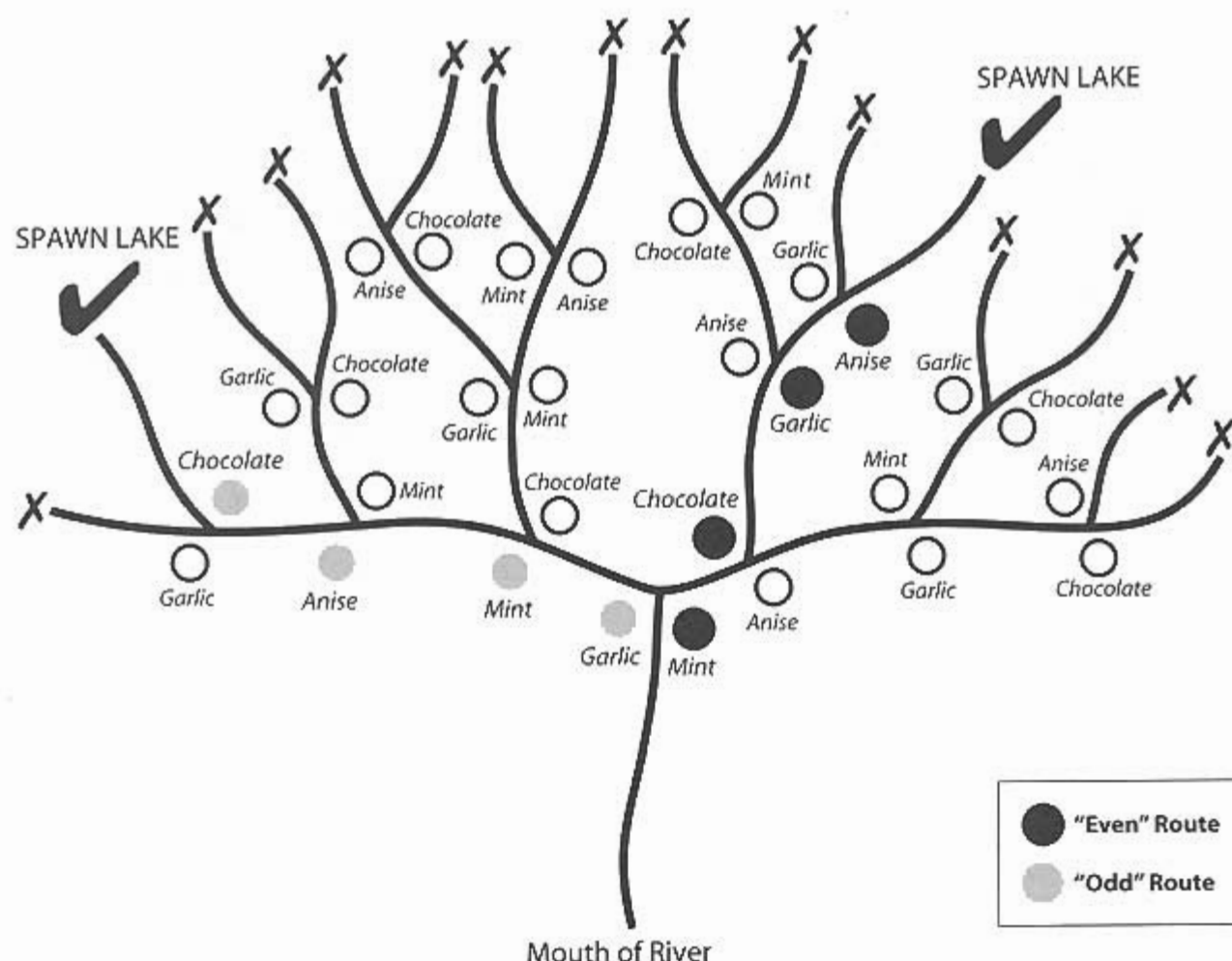


Diagram A

## Procedure

### Before the Activity:

Prepare the scent samples. Choose four scents such as garlic, mint, chocolate, and anise. Place two drops of each scent on two cotton balls, and put each cotton ball in its own cup (eight cups will be used). Cover each cup with a paper towel held in place by a rubber band. Number the cups one through eight, and make a note of which scent is in which numbered cup. Prepare 30 additional cups to be placed on the "river" system shown in Diagram A on this page.

Lay out the river system as shown in Diagram A. Either ribbon or chalk may be used. Establish two correct "spawning routes" by placing scents in the correct order at each fork in the migration

path. (One route follows the odd-numbered order of scents; one route follows the even-numbered order of scents.) Be sure to note the two correct routes.

Mix up the scents for the remaining routes.

1. Ensure that students are familiar with the life cycle of the sockeye salmon, especially the spawning migration. (If time is limited, educators can convey the information through a discussion, guest speaker, or individual reading assignment. If time is available, educators may allow students to construct their own diagram of the life cycle.)
2. Divide the students into groups of four. Give each group a map of the Columbia River drainage system, and ask them to trace the

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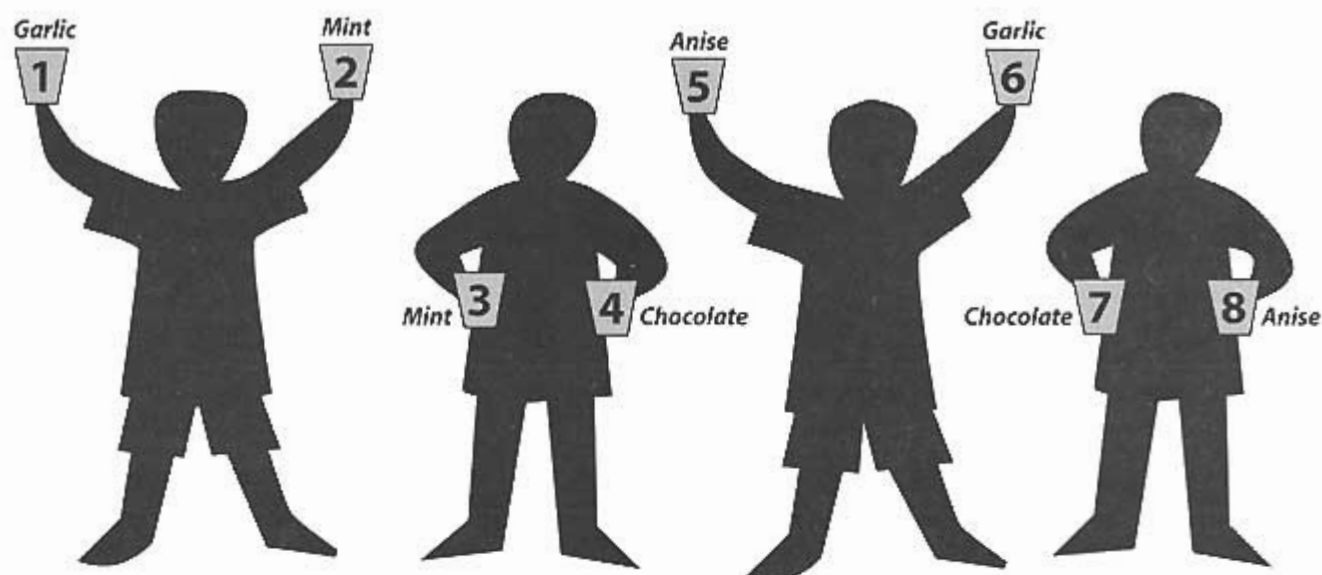


Diagram B

- route of the sockeye salmon from the ocean to a specific spawning lake. They need to locate and label the following: ocean, states, dams, rivers, streams, lakes, and reservoirs.
- Display the maps and discuss each group's findings. Come to consensus on the route and the major features described in Step 2.
  - Enlist four "migration helpers." Give each helper two different scents in paper cups. (See Diagram B.) Line up the four helpers near the exit door for the classroom, facing the students.
  - Ask the remaining students to line up and count off in twos. The "twos" will sniff the even-numbered cup being held by each helper; the "ones" will sniff the odd-numbered cup. Make sure all the students understand that they are to move in a line from left to right (as shown in Diagram B), stopping in front of each helper and sniffing from **just one** of the cups each helper holds. As soon as each student completes sniffing the four cups, he or she can move to the river system.
  - When all the "salmon" have completed their scent imprinting, gather them at the "mouth" of the river system. Explain that they will "migrate" in single file. They must find their way to their spawning site by following the scents they smelled in the same order.
  - Allow the students to proceed. Make sure they do not discuss their decisions with each other and that all students make their decisions based on scent and not just following another student.
  - Once all the salmon have reached what they think are their spawning grounds, reveal the two correct spawning routes. The students who chose the correct migration routes are the successful salmon for this year's spawning run. They will be able to lay eggs to produce young salmon.
  - After students complete the spawning migration, discuss what the students (sockeye salmon) experienced, and brainstorm and discuss the many other obstacles (dams, pollution, fishing pressure, bears, etc.) that salmon encounter along the route to the spawning grounds. Discuss what might happen to the salmon that make mistakes in their return journey. Do they spawn? Would they try to retrace their route? How did the salmon's special abilities (adaptations) help it survive?

## Extensions

1. To increase the challenge and learning opportunity of this activity, educators may wish to have the students choose their method of learning about the life cycle of sockeye. For example, one group could decide to interview a fisheries biologist or to look for information on the Internet. Allow a specific time for this phase, and then set aside a period for the groups to share their information with each other. Have the entire class contribute to a large drawing that shows the life cycle.
2. Ask students to create either visual images or a piece of creative writing that describes the life of the sockeye.
3. Ask each group to choose another species of salmon and investigate its life cycle and migration.

4. Ask each group to choose another animal that migrates (bald eagle, yellow-rumped warbler, monarch butterfly, elk, etc.) and to develop a class presentation (verbal or visual) describing that migration.

## Evaluation

1. Participation in the closing discussion can serve as an evaluation.
2. Have the groups collectively create a spawning migration map for sockeye salmon that shows obstacles they might encounter.
3. Invite another class to participate in the migration maze; have students lead the discussions and the migration.

