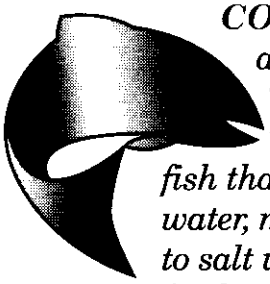
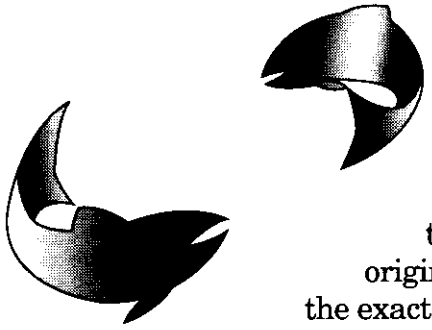
Salmon in the Rivers
(Past and Present Distribution of Anadromous Fish)



CONCEPT: Salmon are known as "anadromous" fish. These are species of fish that are born in fresh water, migrate as juveniles to salt water, and return to fresh water to spawn. For tens or hundreds of thousands of years, the salmon have lived in the Columbia River and migrated to and from the Pacific Ocean.

DIRECTIONS: Students watch the video "Journey of the Kings," produced by the Northwest Power Planning Council. Hand out the river system maps. Have students trace a journey of the salmon from the sea to a place to spawn (salmon may spawn at points along the river's course, not just at the ends). Students can choose any river.

The rivers the students have picked can be identified using the map of "Electric Power Plants in the Pacific Northwest and Adjacent Areas," produced by BPA, August 1, 1986. A copy is included here; it is available in quantities for your students. Have students transfer their worksheets to the map, "Present and Past Distribution of Anadromous Fish." See if the spawning areas the students have selected are or were available to salmon.



INQUIRY: How can the salmon recognize the river and even the exact location of their birth as they return to spawn? How close can they get to their original spawning ground? Do they always make it back to the exact same place? (if so, how would they have gotten there in the first place?) Scientists think salmon are able to smell the chemical "recipe" of their birth water. Why does this matter to them? They have genetic timing mechanisms which time the hatch of their eggs and their return to the sea to coincide with the best water conditions on the stream where they were born. Why don't they pick just any river? Their timing mechanism might cause them to lay their eggs in a stream that floods when the eggs need to be in quiet water.

What happens if the salmon's upriver return is blocked (for example, by landslides or dams)? Some scientists believe the fish can stay in the water at that point or back up to a suitable place to spawn; others contend they die. After salmon hatch, they must migrate to the sea. How do their bodies change from fresh water to salt water? This is a physiological process that is not well understood.

EXPANDED INQUIRY: Research the life cycle and the ecology of the salmon, its role as a food source in food chains (as a consumer/predator), and its relatively unknown habits in the sea. Salmon runs in other parts of the world should also be mentioned.

The life cycle of the salmon is very complex and many things are not known. Challenge students to consider a future career as a biologist trying to understand these aspects of the salmon life cycle and encourage them to consider being one of the scientists who might reverse the salmon's decline.

LAB: To reinforce the complexity of the task of identifying the waters of the salmon's birth, have cups of tap water from different watersheds for students to taste. This is an outside project which requires volunteers to travel to other "drinking water watersheds" to collect samples. Can the students taste any differences? Combine the waters. Can they identify the "blends"? Remind students that all the waters of the entire watershed are present and blended together at the mouth of the Columbia River, and the salmon somehow find their way up the rivers and tributaries to the exact location of their birth.

ACTIVITIES: "Splash!" produced by the U. S. Army Corps of Engineers and the National Park Service is a game students can play. Challenge students to add more of the problems salmon face, such as; the impacts of logged forests, silting over of spawning beds, fishing, or dams without fish screens (where turbines may destroy 15 percent of the young fish passing through), or fish ladders for the upstream journey. Include a loss of turn penalty if they encounter one of these problems. If the players lose a certain number of turns, the salmon could be placed on an endangered species list, and some "extinction or mitigation dice" could be rolled.

READING RESOURCES: Included in this curriculum are student copies of "The World's Biggest Fish Story," a BPA Backgrounder, July 1987; and teacher copies of "Enhancing Our Fish and Wildlife Resources," BPA Backgrounder, March 1987; and BPA Issue Backgrounder, "Downstream Fish Migration: Improving the Odds of Survival." See also current and back issues of "Wana Chinook Tymoo," publication of the Columbia River Inter-Tribal Fish Commission, 729 NE. Oregon St., Portland, OR, 97232.

EXTENSION: A math extension lesson can be formed with a problem such as: If each dam kills 10 percent of the young fish (smolts) passing by, how many fish are left at the end of a journey if 1,000 fish began and their route takes them past seven dams? How about 15 percent losses?

CONCLUSIONS: The Columbia River system has an important salmon population. Much remains to be learned about their behavior, habits and habitat.