Salmon Survival

Objective: Students will understand some of the obstacles to salmon survival.

Summary: Students will play a game that has salmon encountering obstacles while attempting to swim upstream to spawn.

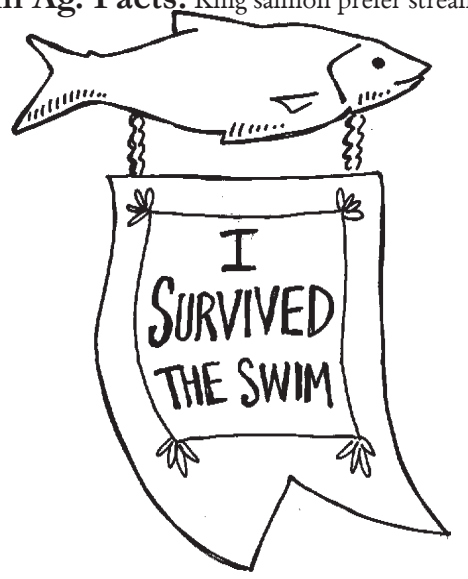
Time: ½ hour

Student Grouping: Whole class. The game works well with an average class size of 25–30. Groups less than 15 or larger than 35 do not work well.

Materials: Nine 5" x 8" cards, 50 3" x 5" cards (10 each of 5 colors is ideal), 10 pairs of dice, red and green marking pens, awards for survivors (optional), such as ribbons or buttons.

Background Information: Salmon are anadromous fish. That means they are born in fresh water streams, migrate to the ocean to grow into adults, then return to fresh water to spawn (find a mate, lay eggs and fertilize them). Most salmon die after spawning. In contrast, steelhead trout, like the ones that swim up the Russian River, can live to spawn for more than one season and typically spend 1–3 years in freshwater streams. Eggs are laid in the gravel of shallow fresh water streams. They hatch, and the fish develop for a year or more in the fresh water streams and rivers before they make their journey to the ocean. In the oceans they eat, grow and mature until they are ready to spawn. It is still a mystery to biologists where these fish spend their time in the ocean. Different species of salmon take different amounts of time to mature. They may spend two to six years in ocean waters before they return to their birthplace to mate.

Marin Ag. Facts: King salmon prefer streams that are snow fed. This type of salmon live off the Marin Coast and migrate up the Sacramento River. Coho salmon look a lot like king salmon, but they prefer coastal streams like Marin's Lagunitas Creek and its tributaries and Paper Mill Creek for spawning. Historically the streams along the California coast were thick with salmon. The abundance was legendary, though these accounts might contain some of the exaggeration we see today in stories about "the one that got away." Steelhead trout and coho salmon were abundant here. Because of logging, commercial overfishing, building development, waste dumping, some farming activities and other human impacts, the watery home of these salmon is in danger. Steelhead and coho Salmon were declared Threatened in 1998. The Sacramento River winter run of king salmon is in danger of extinction.



Some streams have been blocked or diverted. Mud from overgrazed pastures and construction of homes and roads washes into streams, muddying waters and possibly preventing successful spawning. Poachers catch fish illegally, further reducing their populations. The salmon that used to spawn in these streams may be lost forever.

Because so many types of salmon and steelhead trout are threatened, marine biologists are raising fish in Bodega Marine Laboratory. They hope these fish can reestablish a breeding colony in our area. Marin County residents can help by protecting the small streams in our county. Don't foul the water by letting vegetative matter like lawn clippings run into streams. When the plant material breaks down, it robs oxygen from the water that the fish need to breathe. Planting native shade trees over pools that are exposed to the sun also helps. This keeps the water cool enough for the salmon species.

Preparation:

1. Read through the entire preparation and procedure carefully so you are familiar with the game.

2. Make obstacle signs using 5" x 8" cards as illustrated here. (You may want to pin them to younger students, or hole-punch cards and use yarn for necklace style instead of placing them on the table.)
3. Make challenge cards using 3" x 5" cards. Mark them as follows:

Ocean Fisherman:	5 cards with a red dot 5 with a green dot
Gill Net:	3 cards with a red dot 7 with a green dot
Stream Fisherman:	5 cards with a red dot 5 with a green dot
Poacher:	4 cards with a red dot 6 with a green dot
Pollution:	3 cards with a red dot 7 with a green dot

4. Nine students will play the obstacles. Five of the obstacles will have ten challenge cards (be sure they are shuffled) in the proportions indicated above. Four of the obstacles have no challenge cards. Obstacles will sit at a long table or in desks lined up in a row (see illustration). They will place their signs on the desk or table in front of them so everyone can see them. The signs explain what is necessary to beat this obstacle. The number at the top of the card indicates the order the salmon pass each obstacle, the ocean fisherman going first. The lower left figure, in this case the "?", indicates there are challenge cards for this obstacle. The lower right figure, in this case the "5+" is the "survive number." You may want to write the symbol or put a sample card up on the blackboard and explain what they mean so students are clear.
5. Play proceeds as follows. A student playing the salmon role steps up to the first obstacle, the ocean fisherman. The salmon draws a challenge card. If it has a green dot, then the salmon has passed the challenge and moves on to the next obstacle. If a red dot card is drawn, then the salmon rolls one die and the obstacle rolls the other. If the total on the two die is the same or higher than the survive number, the salmon has survived and moves on to the next obstacle. If the total on the two die is less than the survive number, then the salmon has died and goes back to the end of the salmon line to try again.

   As soon as the first salmon is done at the first obstacle, the next salmon starts so there is a continuous run of salmon through the course.

   Four of the obstacles have no challenge cards. At these obstacles the salmon must roll the die with the obstacle. If the salmon is higher it moves on; if not, it goes to end of line and tries again. These obstacles are very common on the California north coast.

   Note: the game typically allows for a 10 percent survival, which is approximately 10 times greater than in real life!

Procedure:

1. Assign roles to students, nine obstacles and the rest fish.
2. Describe the game to the students and discuss expected outcomes. How many salmon will make it to the spawning grounds? How many salmon will be caught? Die?
3. Have students play. (Small point: Kids are crazy about dice.)
4. Compare what actually happened to what was predicted in the pre-game discussion.

Questions for Discussion:

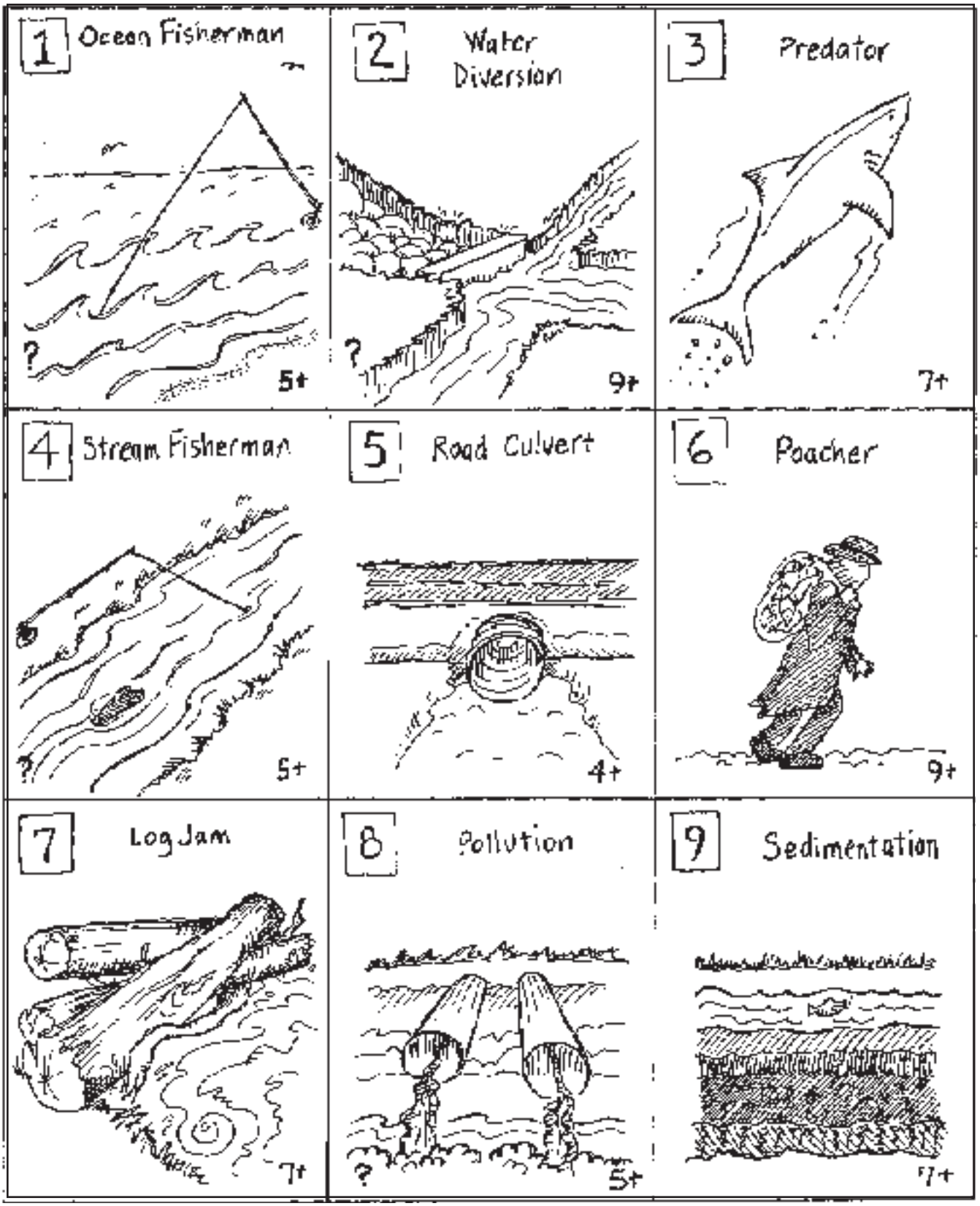
- Did the game turn out as you expected?
- How can salmon get past an angler?
- Will the anglers survive without salmon?
- Will the salmon survive without anglers?
- Will the salmon survive if they don't spawn?

Extensions:

- Add more fish and think of other obstacles. See how the outcomes differ.
- Take a field trip to a fish market and have students ask about the items sold and where they come from.
- Call the Department of Fish and Game for a demonstration in your classroom. In Yountville the number is 707-944-5500.

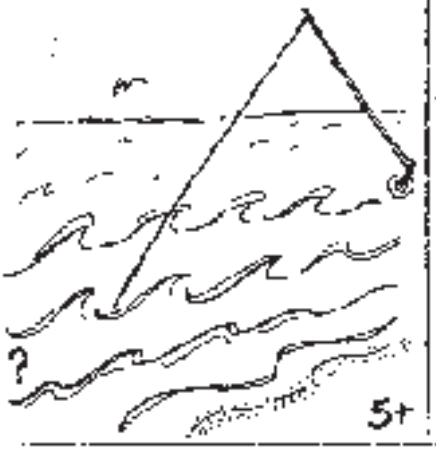
Activity provided by Redwood National Park and changed slightly to accommodate local conditions.

Obstacles to Salmon Survival



Obstáculos para la Supervivencia del Salmón

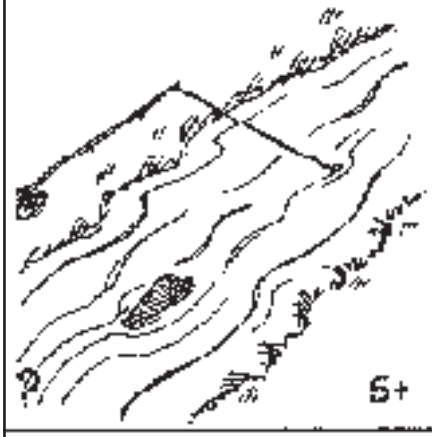
1 Pescador de Mar



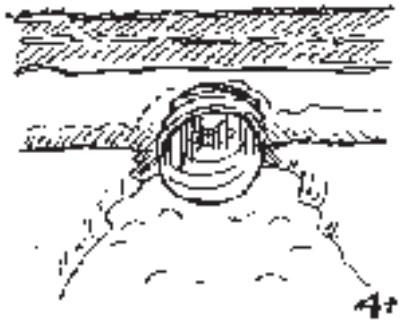
2 Desviación en el agua

3 Predador

4 Pescador de Río



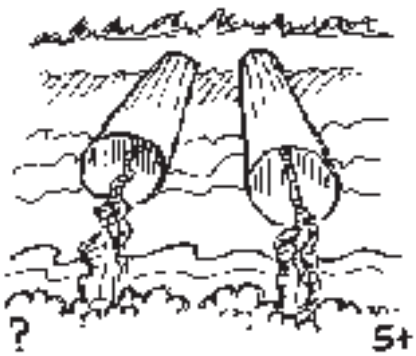
5 Alcantarrilla



6 Cazador Furtivo

7 Estancamiento en el río

8 Polución



9 Sedimentación