BioS.I.T.E **Kit Materials Card**

Salmon Survival

2 Sets of station signs

Challenge cards

Challenge hexagons

Tally sheets

36 Dice

2 Salmon capes

Wooden sticks

1 Salmon Facts and Photos packet

1 Extra Information and Masters folder

Salmon Survival

Adult salmon face many dangers, obstacles and barriers on their migration upstream to spawn and reproduce. The Salmon Survival Game is a social, interactive simulation game which gives students the opportunity to experience the natural and human made obstacles that the spawning salmon faces in its return journey up its home river to spawn. Ranger Lester Hodgens created The Salmon Survival Game at Redwood National Park in 1985.

Content

Salmonids, like all aquatic organisms, depend for their survival on the quality of the water in which they live. Many natural and human made obstacles threaten their survival. Human obstacles threatening their survival include logging, dam construction, pollution, and over fishing. It is obvious that development must take place; that logging and industrialization will both continue. Logjams and brush have blocked many spawning streams.

Some watersheds have been stripped bare of vegetation, causing erosion and siltation of the stream's spawning gravels. Industrialization too often has meant careless use of river systems. Mines, factories and cities have caused pollution that has done much damage. Streams have been carelessly diverted for irrigation or other purposes. Dams have been built without making provisions for ascending and descending salmon. Over fishing, gill nets and non- selective fishing have had a detrimental effect on the salmon's survival. Control must be maintained on the number, size and species of fish caught. Natural obstacles such as waterfalls, log jams, low flow stream conditions, and braided stream sections all pose threats to survival.

Introduction

Use the poster to explain the salmon life cycle to your students.

Playing the Game

Set up the materials as the game directions describe. Explain the rules and instruct students to begin playing the game.

Game Play Options:

Original Version – from the STEP curriculum, this game teaches students how to use tallying to count and how to analyze the results using equations to find percentages and ratios.

Simplified Version – plays similarly, but can be adapted to be played outside using the heavy station signs and the challenge hexagons instead of challenge cards. There is no tallying or mathematical results analysis.

Extension Activities

Use the Species Info sheets to learn about the differences between different species of salmon. For example, pass out a different sheet to each group and have them share interesting facts about the salmon with the class.

Share the information in the Salmon Facts and Photos packet using the document camera or by having students share the information.

Salmon Survival Game Directions

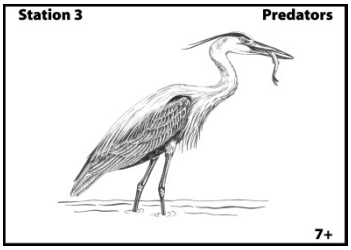
(Original Version)

Introduction/Motivation:

Tell students: “You will get a chance to be a salmon today. If you survive all the obstacles, you will live and be able to spawn.” Brainstorm the various obstacles that the salmonids face in their journey to spawn. Next, have students rank the hazards in order of most to least harmful on the spawning population. Keep this information for review after playing the game.

Set Up:

 Make a river by placing the station signs on tables around the room in order starting with the Mouth of the River, numbers 1 through 9, and ending with the Spawning Ground.



Males Pass	Females Pass
𝍸	𝍸 ‖
Males Fail	**Females Fail**

 Place tally sheets and pencils at each station.

 Place two die each at stations 1 through 9.

 Place a stack of challenge cards blank-side up at the stations which have a “?” on the lower left corner of the station sign. The title on the challenge card should match the station sign title.

Game Play:

Assign one student per station (total 11 students). They will be obstacles. The rest of the students will be salmon trying to make it up river to the Spawning Ground.

1. Each salmon will be male or female. You can have the boys be males and the girls be females, or assign the roles randomly.

2. Salmon will begin at the Mouth of the River where the student at this station will tally salmon as they pass through marking males and females separately.

3. The salmon will move through the obstacles in number order. The salmon roles **one die** and the obstacle roles **the other die**. Students must have the **sum of the two die** equal or greater than the number on the lower right corner of the station sign for the Salmon to move on to the next station.

> If the sum of the dice is lower than the number, the salmon must go back to the mouth of the river and start again as a new salmon. The obstacle tallies a Males Fail or Female Fail on the paper.
>
> If the sum of the dice is higher than the number, the salmon moves ahead. The obstacle tallies a Male Pass or Female Pass on the paper.

4. When a salmon makes it all the way to the Spawning Ground, he/she gets to wear the salmon cape and switches places with an obstacle student so everyone gets a chance to be a salmon. Each new student who makes it to the Spawning Ground gets to wear the cape, so the capes will be passed around each time a new salmon wins.

5. End the game when everyone has had a chance to be a salmon or at a specified time.

Challenge Cards:

Every salmon must draw a challenge card at stations that have them. If the challenge card has dice on it, they roll the dice as usual. If the challenge card has crossed-out dice on it, the salmon passes the station without having to roll.

Processing

 Using the tally sheets, determine the percent of fish that actually make it to the spawning grounds.

(Total Spawners ÷ Total Starting) x 100 = Percent of Salmon Survivors

 Determine the percentage for each obstacle as well.

Total Pass ÷ (Total Pass + Total Fail) = Percent of Passing Salmon

 Determine the ratio of female to male salmon who survived.

Female Spawners ÷ Total Spawners = Percent of Female Spawners
Male Spawners ÷ Total Spawners = Percent of Male Spawners

 Ask students which were the hardest and easiest to get by. Why do some obstacles have challenge cards and others do not?

(Fish can successfully maneuver natural obstacles. It is man-made obstacles that cause the most problems.)

 Brainstorm solutions to every obstacle in the game in small groups and share back to the class. Decide if there are any of these obstacles locally, and if there is some course of action students could take to remedy the situation.

Salmon Survival Game Directions

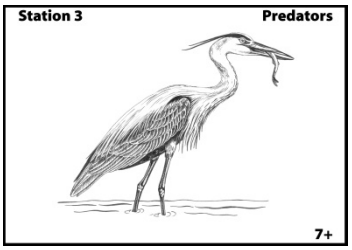
(Simplified Version)

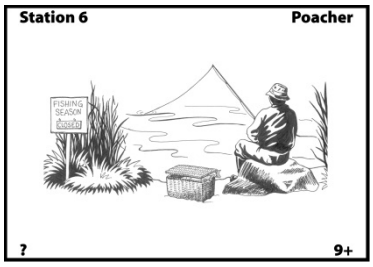
Introduction/Motivation:

Tell students: “You will get a chance to be a salmon today. If you survive all the obstacles, you will live and be able to spawn.” Brainstorm the various obstacles that the salmonids face in their journey to spawn. Next, have students rank the hazards in order of most to least harmful on the spawning population. Keep this information for review after playing the game.

Set up game area by making a river:

- Place the station signs on tables around the room in order starting with the Mouth of the River, numbers 1 through 9, and ending with the Spawning Ground. Use the heavy signs if playing the game outdoors.
- Place two die each at stations 1 through 9.
- Place one challenge hexagon at each station that has a “?” on the lower left corner of the station sign.





Game Play:

1. Each student will become a salmon trying to get to the Spawning Ground from the Mouth of the River. Give each student a wooden stick which will represent themselves as a salmon.

2. Salmon will begin at the Mouth of the River and move through the obstacles in number order. The salmon rolls the dice at each station. The **sum of the two die** must be equal or greater than the number on the lower right corner of the station sign for the Salmon to move on to the next station.

   If the sum of the dice is lower than the number, the salmon must **leave their stick at that station**, go back to the mouth of the river, get a new stick, and start again as a new salmon.

   If the sum of the dice is higher than the number, the salmon moves ahead.

3. When a salmon makes it all the way to the Spawning Ground, he/she **leaves their stick there and gets to wear the salmon cape**. Each new student who makes it to the Spawning Ground gets to wear the cape, so the capes will be passed around each time a new salmon wins.

4. End the game when everyone has had a chance to be a salmon or at a specified time.

Challenge Hexagons:

Every salmon must toss the challenge hexagon at stations that have one. If it lands with, “Roll the Dice” face-up, they roll the dice as usual. If it lands with, “Move Ahead” face-up, the salmon passes the station without having to roll.

Processing

 Look at how many sticks were left at each station and ask students which were the hardest and easiest to get by. Discuss the distribution of sticks. Why do some obstacles have challenge cards and others do not?

(Fish can successfully maneuver natural obstacles. It is man-made obstacles that cause the most problems. Only 2 of the 3,000 eggs which are deposited grow into a salmon who makes it back to spawn!)

 Brainstorm solutions to every obstacle in the game. Decide if there are any of these obstacles locally, and if there is some course of action students could take to remedy the situation.