

HOOKS AND LADDERS

Salmon Migration

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Hooks and Ladders

Salmon Migration

Skill Level

Beginner, 4th and 5th Grade

Learner Outcomes

The learner will be able to:

- Describe limiting factors that affect Atlantic salmon as they complete their life cycles
- Generalize that limiting factors affect all populations of animals
- Create a plan for how people could help endangered animals overcome limiting factors

Educational Standard(s) Supported

4.LS2.2

4.LS2.3

Success Indicator

Learners will be successful if they:

- Explain how the rainbow water activity is dependent upon density

Time Needed

30-45 Minutes

Materials List

Each group of 4 needs the following:

- Large playing area (100 feet x 50 feet)
- Traffic cones for marking boundaries (at least 4)
- 2 cardboard boxes
- 100 tokens (index cards, poker chips, macaroni, etc.)
- Jump rope
- Hooks and Ladders Game Instructions
- Hooks and Ladders Layout

Introduction to Content

Salmon are a nutritious food source and an important part of the food chain, but the Gulf of Maine population is endangered due to dams and overfishing. They used to migrate in large numbers from the Atlantic Ocean to North American rivers, but only a few still return to North America now. People can help salmon reach their spawning grounds by removing or modifying dams.

Introduction to Methodology

Students will learn about salmon migration by playing a game where they represent either a salmon or a limiting factor to migration. They will then learn about limiting factors and create a plan for how humans could help endangered animals overcome limiting factors. Before the activity, set up a playing field as shown in the Hooks and Ladders Layout supplementary page.

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Terms and Concepts Introduction

Migrate = to move from one place to another

People and animals migrate. People might move to another city or country to find work or better living conditions. Some animals migrate to another place during certain seasons to find food or reproduce.

Setting the Stage and Opening Questions

Begin by students the following questions:

“What does the word ‘migration’ mean?”

“What are some reasons that people migrate?”

“Why might salmon migrate?”

Tell students that to help them understand these questions, they will act out the amazing journey of the salmon migration from the spawning ground to the ocean and back again, including some of the obstacles that salmon face along the way.

Say, **“Today, you will describe limiting factors that affect Atlantic salmon as they complete their life cycles, understand that limiting factors affect all populations of animals, and create a plan for how people could help endangered animals overcome limiting factors**

Experience

Choose 10 students to represent potential limiting factors to the salmon.

Predatory Wildlife (6)- The predators must catch the salmon with two hands; tagging is not enough to catch a salmon. When a predator catches a salmon, they must escort the dead salmon to the fish ladder. Later, the salmon that survive life in the open ocean will pass through the fish ladder to return to the spawning ground.

- 2 predators will be stationed in the reservoir above the turbines to catch the salmon as they move downstream.
- Another pair will be below the turbines where they catch salmon heading downstream.
- Two more predators will patrol the area above the “broad jump” waterfalls. They are bears who feed on salmon just before they enter the spawning ground.

Humans in Commercial Fishing Boats (2)

- 2 students in their cardboard box boat will try to catch salmon in the open sea. They must keep one foot in their cardboard box boat to reduce their speed and maneuverability.

Turbines in the Hydroelectric Dam (2)

- 2 students will operate the jump rope and judge the waterfall broad jump.

All the remaining students are salmon. Any salmon that “dies” at any time in this activity must immediately become part of the fish ladder. The student is no longer a fish, but becomes part of the physical structure of the human-made fish ladders now by migrating salmon to get past barriers such as dams. The students who are the fish ladders kneel on the ground with space between them.

Lead students through the game instructions as shown in the Hooks and Leaders Game Instructions.

Tips for Engagement

This activity works best with other adult or teen leaders who can help guide students through the game.

Consider playing the game in a field outside or in a gymnasium.

The predators and the people fishing in the open ocean must take the dead salmon to the fish ladder site. This action moves predators and fishing boats off the field regularly, helping to provide a more realistic survival ratio.

Share

Divide students into small groups and ask them to discuss the following questions:

- What were two structural barriers in the game?
- How did the predatory wildlife affect the salmon?
- How did the humans impact the salmon?

Process

Tell students that limiting factors are things that keep populations from expanding. Ask each group to write one sentence about limiting factors that affect salmon. Give the groups an opportunity to share with the entire class.

Generalize

Tell students that all animals – not just Atlantic salmon – are affected by limiting factors. Ask the students to list examples of limiting factors.

They might mention the availability of suitable food, water, shelter and space, disease, weather, predation and changes in land use and other human activities.

Apply

Divide students into groups of three or four and brainstorm ways that humans could help endangered species overcome limiting factors.

Life Skills from TIPP for 4-H

4th Grade

Participate in 4-H club meetings by saying pledges, completing activities, and being engaged. (Head)

Actively listen to what others are saying; be able to restate or summarize what has been said. (Heart)

Follow instructions. (Heart)

Communicate information effectively about a given topic. (Hands)

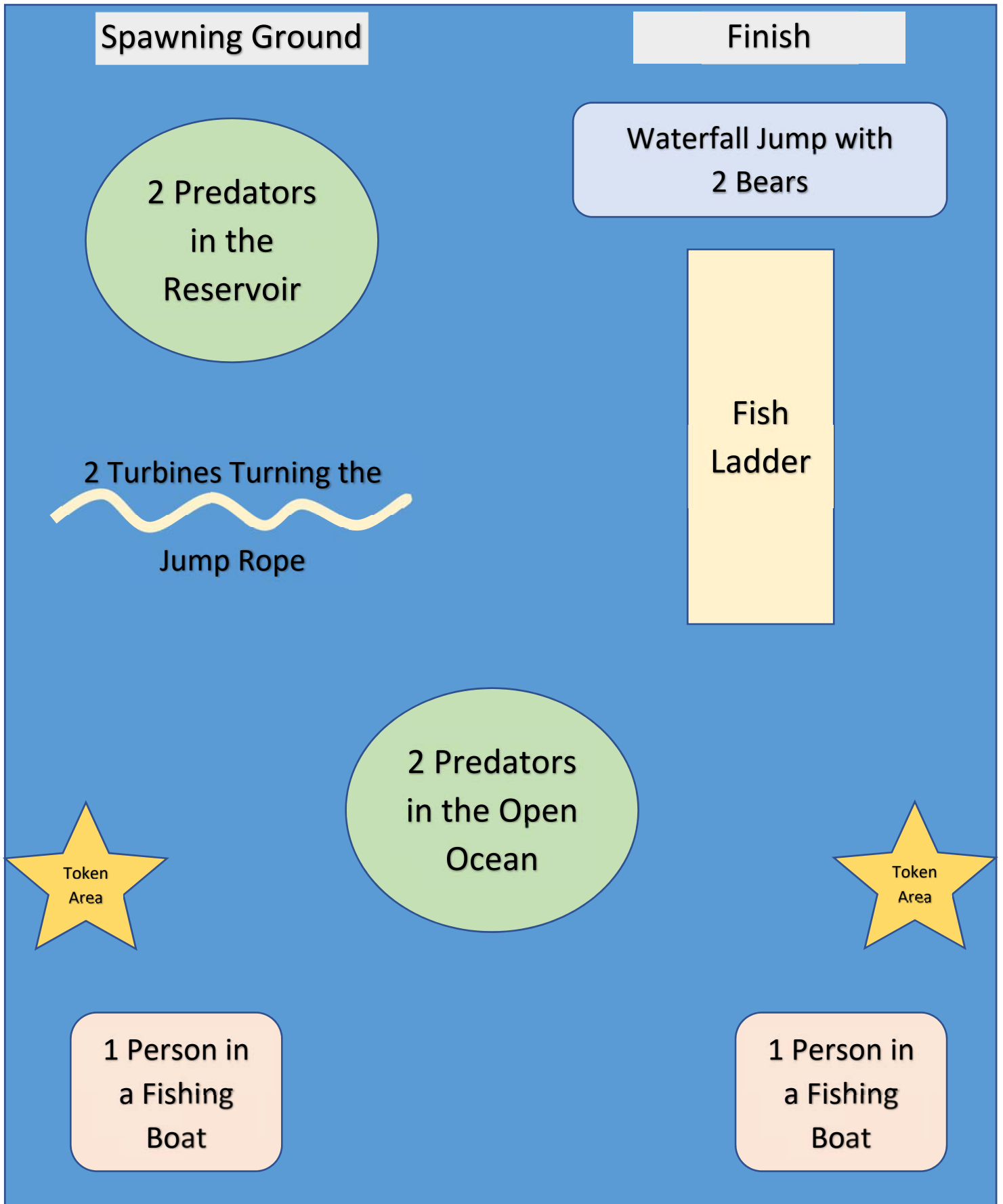
Supplemental Information

Educational Standards Met

4.LS2.2: Develop models of terrestrial and aquatic food chains to describe the movement of energy among producers, herbivores, carnivores, omnivores, and decomposers.

4.LS2.3: Using information about the roles of organisms (producers, consumers, decomposers), evaluate how those roles in food chains are interconnected in a food web, and communicate how the organisms are continuously able to meet their needs in a stable food web.

Hooks and Ladders Layout



Hooks and Ladders Game Instructions

1. Begin with all the salmon in the spawning ground. Then, salmon move into the reservoir above the dam. They must stay in the reservoir for 30 seconds. This pause simulates the disorientation that salmon face because of a lack of current in the lake to direct them on their journey. During this time, the predators may catch the salmon and escort them one at a time, to become part of the fish ladder.
2. The salmon then start their journey downstream. The first major limiting factor that the salmon encounter is the turbines at the dam. At most dams, escape weirs guide migrating salmon past the turbines. The student salmon cannot go around the jump-rope swingers, but they can slip under the jump-rope swingers' arms if they do not get touched while doing so. If the jump rope turbine hits a salmon, then it dies.
3. Once past the turbines, the salmon must pass the predatory wildlife.
4. Once in the open ocean, the salmon can be caught by fishing boats. The salmon must move back and forth across the ocean area to gather four tokens. Each token represents $\frac{1}{2}$ year of growth that the fish needs before it can begin migration upstream. The year tokens can be picked up only one at a time on each crossing. The salmon must cross the entire open ocean area to get a token. *The "two years" that these trips take, make the salmon more vulnerable, so they are more easily caught by the fishing boats. For this simulation, this limiting factor creates a more realistic survival ratio on the population before the salmon begin the return migration upstream.*
5. After collecting four tokens, the salmon can start upstream. The salmon must walk through the entire pattern of the fish ladder. This enforced trip through the fish ladder gives the students a hint of how restricting and tedious the upstream journey can be. In the fish ladder, predators may not harm the salmon.
6. Once through the ladder, the salmon must jump through the waterfall. The waterfall represents one of the natural barriers salmon face going upstream. Make sure the jumping distance is challenging, yet realistic. The salmon must jump the entire width of the waterfall to be able to continue. If the salmon fails to make the jump, then it must return to the bottom of the fish ladder and try again.
7. Above the waterfall, the two students acting as bears are the last set of limiting factors.
8. The activity is finished when all the salmon are gone before the spawning ground is reached, or when all surviving salmon reach the spawning ground.