# Hooks and Ladders

(Adapted from: "Hooks and Ladders" in Project WILD Aquatic. Council for Environmental Education, 2002 )

**Purpose:** Students model salmon and make their journey from the spawning ground to the ocean and back, facing challenges and discussing limiting factors.

**Time Required:** 30-45 minutes
**Appropriate grades:** 4th-8th
**NGSS and Common Core Standards:**

**5-ESS3-1**: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

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## Objectives:

Students will identify limiting factors within a Salmon's life cycle by role-playing and discussion.

Students will decide which limiting factors are naturally occurring and which factors are a result of human activities.

Students will propose possible solutions to human created limiting factors in order to increase the salmon population.

## Materials:

Provided:

- Large jump rope
- Tokens (poker chips)

Not Provided:

- Field or gym area
- Two small cones or boundary markers
- Rope or masking tape to mark the boundaries
- Signs to mark each area
- Optional: picture of a turbine/ hydroelectric plant

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# Activity:

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| **Introduction** | *Set up the playing field or gym boundaries (see diagram at end of lesson)*<br><br>1. Select 2 students to be fisherman in the ocean. The Oregon coast has a very successful fishing industry bringing in thousands of pounds of salmon catch each year.<br>2. Select 2 students to be predators in the river. Some animals that feed on smolts in this area are small mouth bass, squawfish, and cormorants.<br>3. Salmon start out at the spawning ground in the freshwater streams and tributaries. (what creeks are close to your school? Do you have salmon spawning there in the fall?)<br>4. Select 2 students to whirl the jump-rope. If this were the Columbia river, the jump rope would represent a large turbine that uses large volumes of water to produce electricity for our homes, schools, and stores. (Show picture of turbine) On the Rogue River, the jump rope represents boats with motors. The fish must make it through the turbine or recreational boating area, then past the predators (must be tagged with two hands) that eat them in the river habitat.<br>5. If anyone gets tagged, they must go to the culvert area. Students get on all fours and create diversions that the salmon still alive must navigate. (on the Columbia river, this would be the fish ladder)<br>6. When the salmon arrive in the ocean, they have to run back and forth across the playing area 4 times to represent 4 years of maturity and growth in the ocean. They can only collect one "year token" on each trip across. Meanwhile, fisherman can tag the salmon and they have to go contribute to the culvert/fish ladder area.<br>7. After 4 life tokens are collected, the salmon must begin migrating back upstream to the spawning ground. However, there is urban development happening and the stream is being channelized and forced through culverts under roads (like I-5). This makes the water flow very fast and makes it hard for salmon to leap up into the current and swim up without having pools to rest in. Hopping over the students in the culvert area represents the many attempts by salmon to make it |

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| | through these diversions and culverts. Exhausting!<br>8. Last the tired salmon must make it up the big waterfall on the creek. (The waterfall jump must be totally cleared- have this area policed by the students working the jump rope. If not totally cleared, they must go back through the culvert obstacles)<br>9. The activity ends when either all the salmon have died or some have made it to the spawning ground |
| **Body** | After running through the activity once, engage in discussion. After asking questions and discussion, do the activity again and experiment with adding limiting factors or enacting solutions to mitigate limiting factors and see what happens to the population!<br><br>1. In this activity you experienced a lot of *limiting factors*. What is a limiting factor?<br><br>2. What are some of the limiting factors you experienced?<br><br>3. Think of the rivers and creeks close to us. Can you think of other limiting factors? (see Appendix for things affecting local salmon populations, ex. Agricultural runoff, sedimentation from building or logging, warm temperatures from riparian zones being destroyed, dried up creeks due to diverted water for irrigation, predators in the ocean like whales or sea lions, etc.)<br><br>4. What limiting factors are a result of human activity? Which ones are a naturally occurring part of the ecosystem?<br><br>5. Why do you think it is important to the ecosystem that salmon are able to return to their spawning grounds?<br>a. Salmon must lay eggs for a successful next generation<br>b. It is estimated that 95% of the nutrients that nourish young salmon fry are from the decomposition of the adult carcasses. It is also estimated that 137 plant and animal species benefit from salmon returning, dying, and decomposing to add nutrients to the stream.<br><br>6. Sections of the Rogue (80.3 miles) and the Illinois (50.4 miles of wild, scenic or recreational) are designated Wild and Scenic. How do |

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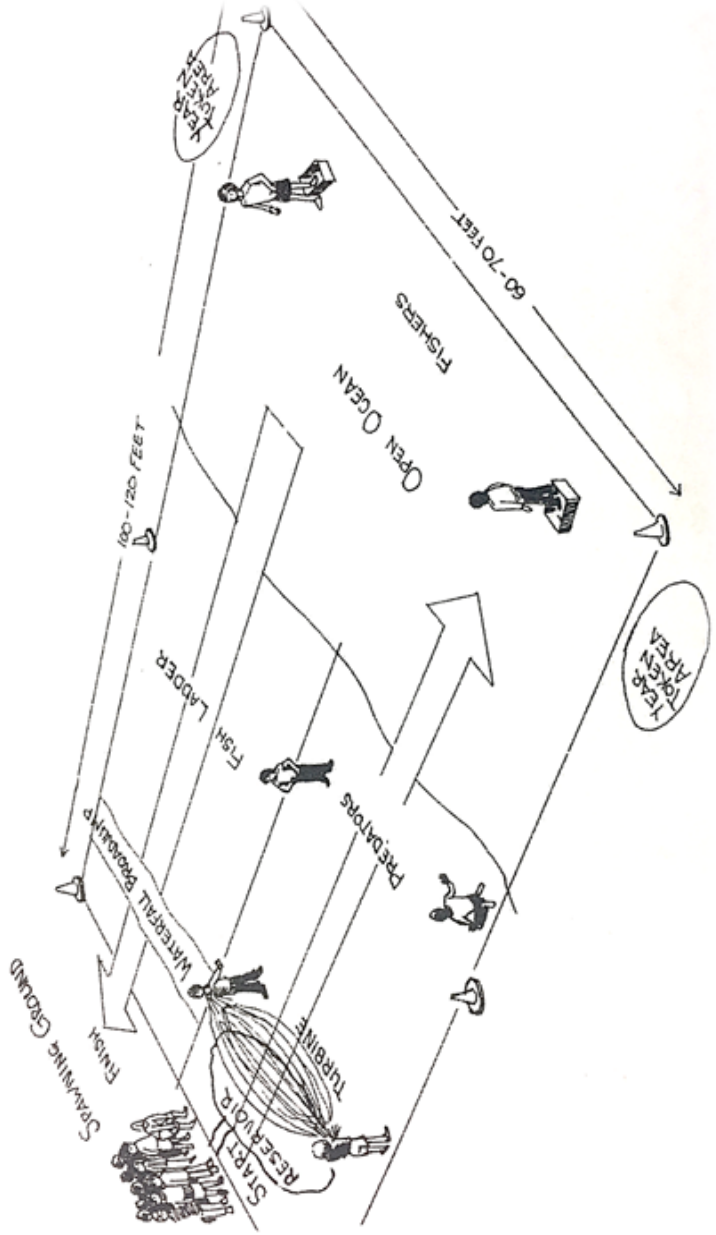
| | you think this mitigates some of the limiting factors that salmon might face on rivers that are not designated or protected?<br><br>7. Why do you think we have fishing regulations for individuals and fishing companies? What would happen if we added more fisherman in the ocean and river? What will happen if we gave the fisherman a 1 salmon limit? |
| **Closure** | 1. Ask students to name limiting factors to salmon population?<br><br>2. Ask students to create solutions in order to increase the number of salmon that successfully make it back to the spawning ground.<br><br>3. Ask students to name limiting factors to other species besides salmon. What would be a limiting factor for migrating Canadian Geese or Monarch Butterflies? |

# Modifications:

- **Elementary:**
  - Create a mural showing the life cycle of an anadromous species
  - Design a fish ladder.
  - Research and illustrate the life cycle of any local fish.

- **Middle/High School:**
  - Write a report on the life history of one species of anadromous species
  - Visit fish hatcheries that work with migratory species and investigate how they function
  - Explore ways that dams can be modified to let fish safely pass downstream and upstream
  - Research out about laws protecting migratory species, including fish.

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