Fish & Ladders

Goals:
Students will be able to explain developmental and migration patterns of salmon and apply that understanding to other migratory species.

Objectives:
- Students will understand what migration patterns are.
- Students will explain their role in the simulation including their positive and negative impacts.
- Students will develop their own vehicle for demonstrating the importance of migration patterns regarding the Chinook salmon.

Grade Level: 9-12

Subject Areas:
science, reading and writing

Materials Needed:
- science notebook
- jump rope
- tokens
- two cardboard boxes

Time to Complete:
40-50 minutes

Background

Chinook is the largest of five species of Pacific salmon. All Pacific salmon are "anadromous," hatching and living in fresh water for the first part of their lives, migrating to the ocean, and coming back to the stream where they hatched to lay their eggs. Salmon need cold, clear, free-flowing rivers and streams free of pollutants and with deep pools and eddies to hide from predators and to find food. Wild salmon face numerous hazards, including hydroelectric dams (which block fish from migrating or shred them in turbines), overfishing, and competition from hatchery produced fish. Logging, grazing, mining, urban development, and water pollution from things like motor oil and pesticides all contribute to the loss and degradation of salmon habitats. These habitats include estuaries, salt marshes, and upland streams. Wild Chinook salmon as well as several other salmon species have been listed as endangered or threatened. Some salmon species have already become extinct.

Recovery

Populations of many salmon species, including the Chinook, continue to decline. Dam removal and bans on fishing have been suggested but are very controversial. Projects to clean up pollution and related conditions in the watersheds that salmon inhabit are underway, but so far have had little impact. Until an integrated plan is developed and implemented, the plight of the salmon will continue to worsen.

Stewards of the Earth

Students of Riverdale Grade School in Riverdale, Oregon, developed and maintain a web site on salmon. On their web site they have gathered an index of web links for everything from organizations working to save salmon to those offering recipes for cooking salmon.

http://gs.riverdale.k12.or.us/salmon/

Preparation

1. Set up an outdoor field as shown in the diagram (below). The area should be about 100 ft. long and 50 ft. wide. You will need to set up (a) spawning grounds, (b) reservoir, (c) downstream, (d) upstream, and (e) ocean areas.
2. Read through the procedures carefully and thoroughly.

Procedure

1. Students will be either salmon or salmon hazards:
   - Two students will be the downstream "turbine team." They will hold the jump rope across the width of the field to

Fish & Ladders

simulate dam turbines. Once all the salmon have passed the turbines, the turbine team will move upstream where they will become "waterfall monitors" when the salmon return from the ocean.

- Two students will be predatory wildlife. At the start of the activity, station the predators in the reservoir above the turbines where they will try to catch salmon headed downstream. Once the salmon are past the turbines, this team will move downstream where they will try to catch more salmon. Once the salmon are at sea, the team will patrol the area above the waterfalls where they will feed on salmon as they return to the reservoir.
- Two students will be humans in ocean-going fishing boats. To limit their maneuverability, each student on this team must keep one foot in a cardboard box.
- Remaining students are salmon. This is based on a class size of 25 -30. If the group is larger or smaller, adjust the fishermen and predators accordingly.

2. Begin the activity with all the salmon in the spawning ground. They then move downstream to the reservoir, where they must remain for 30 seconds to simulate the confusion of the salmon when they enter a lake with no current to guide them. While the salmon are in the reservoir trying to find their way downstream the waiting predators can catch them one at a time, but they must escort each dead salmon to the fish ladder before they can catch another.
3. Next, the salmon must maneuver through the turbines. They must go over or under the swinging jump rope and not around the "turbine team." A salmon dies if it touches the rope or one of the "turbine team." Salmon that “die" become part of the fish ladder by crouching on their hands and knees, making the still migrating salmon walk over all of them.
4. Once past the turbines, salmon must evade more predatory wildlife. The predators must catch the salmon with both hands and escort them to the fish ladder. The fishermen in the ocean also escort salmon they catch to the ladder.
5. In the ocean the salmon must avoid the fishermen as they try to pick up a token by swimming back and forth. Each trip across the ocean exposes the salmon to tagging by the fishermen. Tagged salmon become part of the fish ladder. Each token represents a year of growth and once a salmon has collected four tokens it can move upstream.
6. By this point, there should be quite a few salmon that have died and become part of the fish ladder. The still migrating salmon must walk over every student in the ladder in their arduous upstream journey.
7. Once past the ladder, the salmon face the broad jump as they try to swim upstream and over a waterfall. To proceed, the salmon must jump a minimum distance. Make the distance realistic and challenging. The "turbine team" students will monitor the waterfall broad jump. Salmon who fail to jump over the waterfall must return to the bottom of the fish ladder and try again, just as real salmon must do.
8. Above the waterfall, the predators now represent bears. The bears must catch the salmon with both hands. Again, the salmon they catch die and become part of the fish ladder.
9. The activity ends when all the salmon have either died or reached the spawning ground.
10. Students will then write about their experience from the role in which they played, in their science notebook. Encourage students to use scientific and key vocabulary as they write as well as sketches of the experience, i.e. upstream, spawning ground, migration (and forms of the word), fisherman, predatory wildlife, etc.

Assessment

1. Using the Multi-Flow Thinking Map® have students place the Chinook salmon in the center box. In the left 3 boxes students will place a cause and in the right three boxes they will write the effect. Check link for picture of this Thinking Map®. http://www.thinkingmaps.com/products.php
2. Using their notes and sketches from their science notebooks students will write a story from the perspective of the role they played. Be sure to include knowledge

Fish & Ladders

of what migration patterns are as well as cause and effect scenarios. Also critical, is the explanation of the importance of the Chinook salmon to "you" and your ideas on how "you" would be affected if this species no longer existed.

Extension: Career Study

Allow students to explore careers in wildlife conservation and management. Engage students by asking them to locate applicable high schools courses needed, post high school skills and education, amount of money earned, etc.

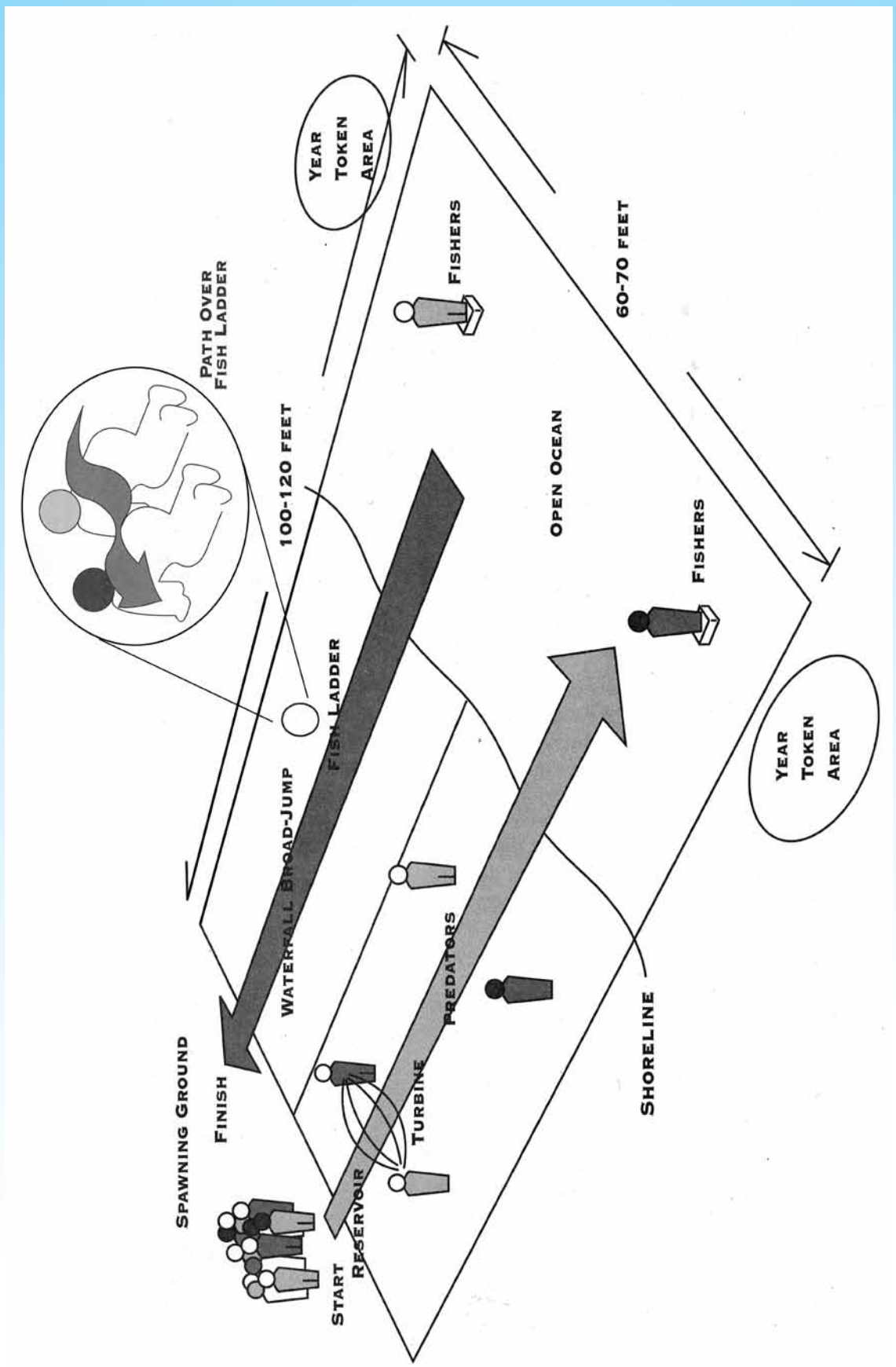
- **Careers in Fish and Wildlfie Conservation:** http://www.dgif.virginia.gov/jobs/careers.asp
- **Careers in Fish and Wildlfie Law Enforcement:** http://wdfw.wa.gov/enforcement/careers/
- **Fish Biologist** http://calfish.ucdavis.edu/Careers_in_Fish_Biology/
- **US Fish and Wildlife Service – What We Do: Sciences Positions** http://www.fws.gov/jobs/wwd_sciences.html
- **US Fish and Wildlife Service – What We Do: Student Positions** http://www.fws.gov/jobs/wwd_student.html

Resources

- **NOAA Fisheries – Office of Protected Resources:** http://www.nmfs.noaa.gov/pr/species/fish/chinook-salmon.htm
- **NWF Wildlife Library – Chinook salmon:** http://www.nwf.org/en/Wildlife/Wildlife-Library/Amphibians-Reptiles-and-Fish/Chinook-Salmon.aspx
- **USFWS Sacramento Fish and Wildlife Office:** http://www.fws.gov/sacramento/es/animal_spp_acct/chinook_kf.htm

Adapted from Project Wild Aquatic and Adopt-A-Stream Foundation Field Guide to the Pacific Salmon.

Fish & Ladders



From Keep the Wild Alive National WIldife Week Educators Guide, National Wildlife Federation 1999
www.nwf.org/nationalwildlifeweek email: educators@nwf.org