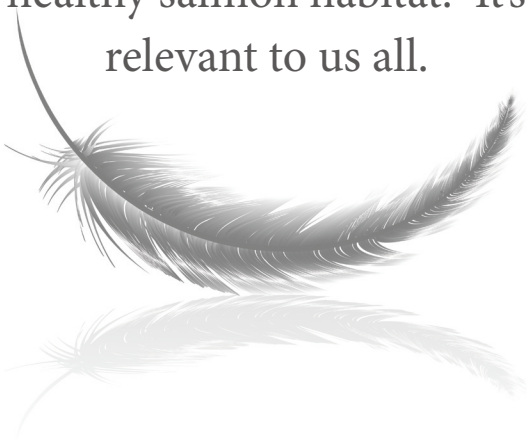
. . . in Alaska, our families and our future depend on a healthy salmon habitat. It's relevant to us all.



The Salmon Game

Why do kids from kindergarten through high school respond to this crazy predator/prey tag game?

High school students are sometimes hard to motivate in a boxed-in classroom. However, take them out to a sunny, wide-open beach on Kodiak and they'll surprise you with their boundless enthusiasm.

Having been asked to be the keynote speaker for Envirothon, a national environmental science competition, I initially experienced a great deal of anxiety when asked to make a presentation at a remote ranch to over one hundred high school students stuffed into a cramped building. What on earth would I say to Alaska's best and brightest students, individuals who will go on to create new knowledge in fields of scientific research, public lands policy and natural resource careers? The minute before I hopped on a plane bound for Kodiak Island, the coordinator of the Envirothon program gave me a call.

“Kay, we’re going to have to move you to Abercrombie State Park for your presentation. The ranch idea fell through. Is that ok?”

Abercrombie. The jewel of state parks in Alaska. This glorious stretch of old-growth forest, pristine beaches and abandoned WWII bunkers is one place that I could teach in for eternity. The park’s collective masses of moss are a teaching tool in their own right.

“I adore that place!” I responded. “All right if I use the beach?”

Thanks to good friends on Kodiak who lead extraordinary Girl Scout programs, I had been able to take an exploratory hike at Abercrombie and knew that the beach, nearby trail and visual panorama of the watershed would offer me the opportunity to teach one of the best educational activities ever: The Salmon Game!

Why do kids from kindergarten through high school respond to this crazy predator/prey tag game that stories the salmon life cycle and challenges they face in their diverse habitats, from mountain streams to estuaries to the open ocean? Because acting like a sea lion is fun. Because tagging your peers with a bear or eagle puppet is ridiculous and brings heaps of laughter to the activity. Because running through the salmon life cycle and avoiding being turned into “sushi” by a dam’s turbines is challenging, to say the least. Because, in Alaska, our families and our future depend on a healthy salmon habitat. It’s relevant to us all.

Grade Level: 2-4
Setting: Playground, Beach, Park

The Salmon Game!

Overview

Students investigate salmon life cycle stages and their relationship to parts of the watershed. They mimic salmon to "story" predator/prey relationships and to generate inquiry based learning while working cooperatively to research the salmon's life journey through a watershed. As their questions are answered through experiential learning, students gather evidence for their claims. They share and reflect on their findings with the class, and demonstrate their knowledge by making a poster, a presentation, a mural, or a habitat for a salmon.

Objectives

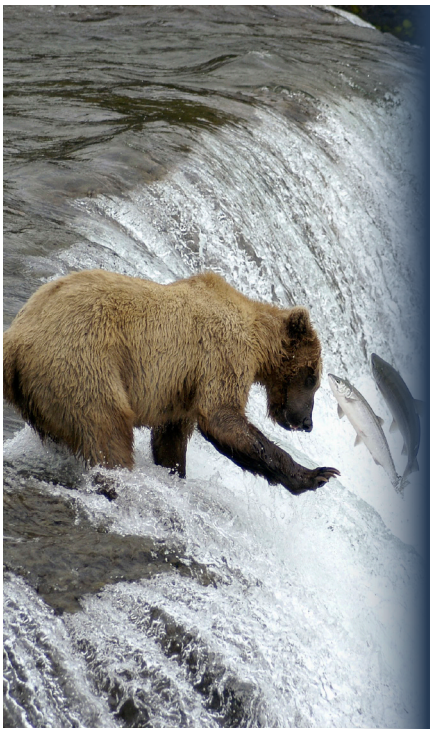
Students will be able to describe and demonstrate:

- The salmon's life journey through the mountain streams, wetlands, rivers, estuary, and the sea
- The salmon life cycle stages and where each takes place within the watershed
- Predator/Prey relationships throughout the salmon's lifecycle
- Human Impact on salmon populations and habitat

Activities

1. Students investigate the salmon life cycle, researching their local salmon streams, rivers, wetlands, estuaries, and where the salmon reach the sea. Working in small teams, students create a poster, chalk board art, community or school mural, or a model of the salmon life cycle. **(60 minutes or more)**

2. Using their salmon life cycle knowledge, students split into two groups and play a game mimicking the salmon's story. One half of the students start out as baby salmon on a "mountain" hillside and must run along the stream (trail or 10' wide path marked out by cones) to the ocean (large area with a toy boat) where they run around the boat four times to represent their four years out at sea. They then have to return to their home on the mountain, walking backward to represent the tough current. If they are tagged by the other half of students (playing the roles listed below), they have to trade roles with the person who tagged them. The goal is to avoid predators and challenges, returning to the starting point to spawn.



Essential Questions

- How are we connected to glaciers, rivers and the ocean?
- What is the salmon's life journey through the wetlands, rivers and the ocean?
- What predators, geographic features, and human impacts make the salmon's journey challenging?

Enduring Understandings

- Watersheds, rivers, wetlands, and the one big ocean of the world are an interconnected system.
- Salmon depend on the rivers and the ocean during parts of their life cycle.
- Science is a way to answer questions about the world around us.

Along the way, they face many challenges (played by other students):

- Predators (bear, eagle, fox, salmon, orca, sea lion puppets or stuffed animals)
- Recreational Fisherman-noodle "fishing pole" along river and Commercial Seiner- foot in bucket "boat" holding hula hoop in ocean area
- Dam-two responsible students or adults swinging long jump rope "blade" of hydroelectric turbine
- Pollution-orange jacket-wearing student crawling downstream

These students have to be 15 feet apart, plant and keep one foot on the outside of the stream, and may tag the young salmon as they go by. The recreational fisherman may tag with the noodle. The commercial fisherman in the ocean may "catch" salmon inside his hula hoop "net" as he scoots around the "ocean" with his foot on the bucket. The dam is created across the "stream" with a spinning jump rope, and explained to students as the spinning blades of the turbines that convert water flow into hydroelectric power. Students soon figure out that there is an area between the edge of the "stream" and where the person is holding the rope that they may use to crawl through. This represents a fish ladder. If students can hop the rope or run through unscathed, then they're free to continue out to sea. Pollution starts below the hill and can only move downstream slowly, for they have to crawl. They can tag salmon in the stream.

The game is played for 20-40 minutes, and then students reflect on their experience being salmon. The facilitator needs to check to make sure every student has had the chance to be a salmon before the

game ends. Ask students: Is it hard being a salmon? How many salmon made it to their spawning stream up on the mountain? Why do you think so few salmon get to be adults? How many salmon in real life get to spawn as adults? (1 in 1,000) Did people make their lives harder? How did we do that? What can we do now to help them out? (Fish ladders, limiting catch numbers, protecting habitat, reducing and eliminating sources of pollution) What is one thing you could do this year to help salmon survive?

Adaptations

Given more than 90 minutes, or by breaking the model project up with the game on different days, it may be meaningful to students to play one 20 minute round of the game without human interactions (remove the dam, pollution, and fishermen), and then play another round after that for 20 minutes adding in the trials of human impact. Students may understand the added challenges humans have made to salmon habitat.

Tie in the water cycle with a poster or other visual demonstration of the salmon life cycle. This helps to broaden students' understanding and inquiry into point-source pollution. They can see the salmon's habitat and how water is cycled within it. When pollution is introduced (use a watershed model and food dye to demonstrate), the watershed that the salmon lives in is affected.

Salmon in the Trees by Amy Gulick, 2010, records in gorgeous visual detail the connection of salmon to the whole ecosystem. Trees have salmon DNA in them, for the bits of dying salmon feed many organisms in their habitat. Use this book or another salmon story to develop an inquiry-based scavenger hunt: Have students scavenge around a salmon stream for parts of the ecosystem that are affected by salmon. Have them place them in a circle (or draw pictures of what they couldn't find) and describe how they are interrelated to the salmon life cycle. Ask students, "What isn't connected to salmon in Alaska?" How do we know that?

Science GLEs Addressed

2nd grade:
SA1, SA2, SA3, SB2, SC2, SC3, SD1

3rd grade:
SA1.1, SA1.2, SA2.1, SA3.1, SC1.2, SC3.2, SD2.1, SG4.1

4th grade:
SA1.1, SA1.2, SA2.1, SA3.1, SC1.1, SC2.2, SC3.1, SC3.2

Other GLEs Addressed

Reading, Writing, Math

Evaluation

Create a checklist of desired interactions and inquiry-based actions. While students are playing the game or developing their

model projects, check off progress on communication, sharing, offering assistance, teamwork, etc. Journals can detail learning progress and allow for artwork and description.

Materials

Prepare students for the outdoors with warm layers and safety boundaries.

- Rope (at least 15 feet long)
- Hula Hoop
- Buckets (2-3)
- Noodle (5' insulation tube)
- Predator puppets, suffed animals or name tags
- Orange jacket
- Student-made salmon lifecycle poster
- Cones or frisbees to mark river boundries if you don't have a trail
- First Aid Kit

Vocabulary

Alevin
Commercial Fishermen
Fry
Human Impact
Hydroelectric Dam
Life Cycle
Point-source Pollution
Predator
Prey
Redd
Smolt
Spawn
Watershed

Favorite Resources

Enhance and reinforce student research by reading aloud about salmon, their life cycle, and their habitat from one of the following books:

- ***Life Cycle of a Salmon*** by Bobbie Kalman.
- ***Life Cycle of a Salmon*** by Angela Royston.
- ***Salmon Forest*** by David Suzuki.
- ***Salmon Stream*** by Carol Reed-Jones.
- ***A Salmon for Simon*** by Betty Waterton.
- ***Swimmer*** by Shelly Gill.
- ***Red Tag Comes Back*** by Fred Phleger.
- ***Salmon in the Trees*** by Amy Gulick
  www.salmoninthetrees.org
- ***Salmon in the Creek*** by Annette LeBox

Salmon Curriculum Support: Kay W. Shoemaker, UAF Assistant Professor,
School of Natural Resources and Extension, 4-H Youth Development Education
Salmon Homewaters Environmental Education & Community Stewardship Program
Connect with curricula and community resources for support statewide:
www.salmonintheclassroom.org or contact kwshoemaker@alaska.edu

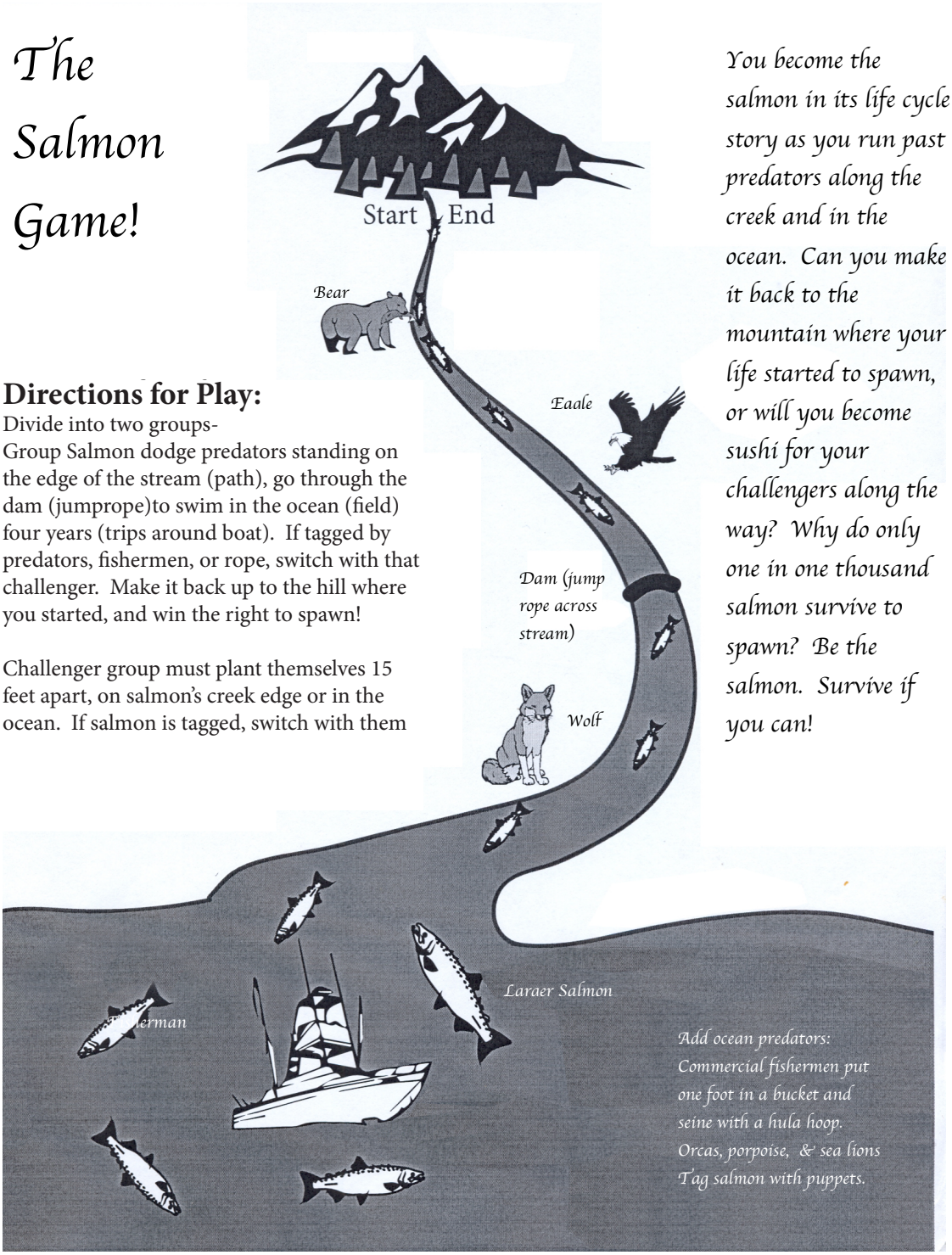
Project Wet:
www.projectwet.org
Alaska Department of Fish and Game: Resources and curriculum for educators
http://www.adfg.alaska.gov/index.cfm?
adfg=educators.teacherresources

Rivers to Seas Curriculum:
SeaGrant, NOAA, UAF partnership. https://seagrant.uaf.edu/marine-ed/curriculum/

The Salmon Migration Game. Board game may be purchased for $10

"Trees to Seas: Journey of the Wild Salmon Board Game" may be printed and laminated for future use.

The Salmon Game!



You become the salmon in its life cycle story as you run past predators along the creek and in the ocean. Can you make it back to the mountain where your life started to spawn, or will you become sushi for your challengers along the way? Why do only one in one thousand salmon survive to spawn? Be the salmon. Survive if you can!

Directions for Play:

Divide into two groups-
Group Salmon dodge predators standing on the edge of the stream (path), go through the dam (jumprope)to swim in the ocean (field) four years (trips around boat). If tagged by predators, fishermen, or rope, switch with that challenger. Make it back up to the hill where you started, and win the right to spawn!

Challenger group must plant themselves 15 feet apart, on salmon's creek edge or in the ocean. If salmon is tagged, switch with them

Accumulated Temperature Units (ATU's) required to reach important embryonic developmental stages in commonly cultured salmonids in Alaska

Species	Stage	ATU's in °C	ATU's in °F
Chinook salmon	To eyed stage	280	504
	To hatch	480-540	864-972
	To emergence	900-1000	1620-1800
Chum salmon	To eyed stage	300-350	540-630
	To hatch	475-525	855-945
	To emergence	900-1000	1620-1800
Coho salmon	To eyed stage	220	396
	To hatch	400-500	720-900
	To emergence	700-800	1260-1440
Pink salmon	To eyed stage	350-400	630-720
	To hatch	550-650	990-1170
	To emergence	900-950	1620-1710
Sockeye salmon	To eyed stage	230	414
	To hatch	500-550	900-990
	To emergence	900-1000	1620-1800
Arctic char	To eyed stage	200	360
	To hatch	475	855
	To emergence	700	1260
Rainbow trout	To eyed stage	210-240	378-432
	To hatch	300-320	540-576
	To emergence	500-580	900-1044
Steelhead	To eyed stage	250-270	450-486
	To hatch	360	648
	To emergence	600	1080

What else does temperature affect?