

TTCD Lesson Plan (16): Invasive Pike Game

Unit: Invasive Pike	Grade(s): 3-12	Class Size: 15-25	Lesson Duration: 60 minutes	Location: Gym
Topic(s):	Salmon, invasive pike, population dynamics			
Student Prerequisites:	Intended to follow Invasive Pike Video Lesson			
Essential Questions:	How do invasive pike impact existing salmon populations? What impact could invasive pike have on commercial and subsistence fisheries?			
Student Objectives:	Students will learn how invasive northern pike impact freshwater salmon habitat in southcentral Alaska. Students will understand how the pike life cycle encourages faster population growth than the salmon life cycle and what this means for the native salmon population.			
Standards:	Supports Cultural Standards: E-2: Culturally-knowledgeable students demonstrate an awareness and appreciation of the relationships and processes of interaction of all elements in the world around them. Students who meet this cultural standard are able to: understand the ecology and geography of the bioregion they inhabit.			
Local Context:	Salmon hold cultural and economic significance in the community. Invasive pike threaten commercial and subsistence harvest.			
Vocabulary:	Population dynamics Predation Breeding cycle			
Dena'ina language words:	<i>Added by TTCD or community partners</i>			
Materials:	Plastic basins 40 orange ping-pong balls 2 bags or buckets to hold ping pong balls at either end of the gym			
Instructor Prep:	- Place the two basins on the floor or table in the center of the space, about 10 feet apart. One basin will represent pike, and the other salmon. - Fill the salmon basin with as many ping pong balls as there are “salmon” students, and leave the pike basin empty. - Identify which students will start out as the two “pike”			
Introduction:	<i>Pair and Share:</i> Ask students to recall what they remember from the previous lesson by discussing the following questions with a partner. Give students 1-3 minutes to discuss each question, then have several pairs share their ideas with the whole group. What are the life stages of a salmon?			

	• What life stages are most impacted by pike? • How is the pike life cycle different from the salmon life cycle? (reproduce more frequently and produce more eggs) • If pike enter the food system, what will happen to the salmon they rely on for food? • If pike impact salmon, how might they impact subsistence and commercial fishing?
Directions:	Explain that the following activity will help us understand highlight pike and salmon population dynamics. To start the activity, designate two students as “pike”; all other students are “salmon” students. Have salmon students stand by the wall at one end of the gym and pike at the other. Choose two instructors or helpers to stand at either end of the gym and give out ping-pong balls to the students when they require them. These are the egg-holders. Two basins are on the floor or table in the center, about 10 feet apart. Explain to the students that one basin represents pike, and the other salmon. The basin representing pike will start off empty to represent the start of pike invasion. The pool representing salmon will start off with as many ping pong balls as there are “salmon” students. The ping pong balls represent eggs. “Pike” are to do one jumping jack to represent their annual breeding cycle. “Salmon” are to do three jumping jacks to represent their average breeding cycle (the average of 1-6 years spent in the ocean). Point out that for salmon, breeding cycle and life cycle are the salmon, but pike can live to breed multiple times. Once each salmon student completes their “life cycle,” the egg-holder will give them 1 ping pong ball to throw into the salmon pool. If they miss, encourage the student to pick it up and try again until they get their ball in the basin. Once each pike student completes their “life cycle,” the egg-holder will give them 2 ping pong balls. This represents how pike are more fecund (lay more eggs) than salmon. Each student tries to throw their balls into the pike pool. Once each “pike” student throws their eggs in the basin, they get to run to the center and remove a ball from the salmon pool to represent pike predation on salmon eggs. Then, they run to tag a “salmon” student and run back to the wall and give their egg to the egg-holder. After each pike life cycle, the one “salmon” student that is tagged becomes a “pike” instead. This represents that with increased predation pressure, fewer salmon survive to spawn. You may choose to assign one student or instructor to record pike and salmon populations (number of students) on a data sheet throughout the game (see example below).

Repeat this cycle until no salmon eggs are left. Depending on the number of students in class, this will occur at different points on a 3 year rotation. For 15 students, it will occur in 6 years. For 20 students, it will occur in 9 years.

Year	Salmon Population	Pike Population
0	18	2
3	16	4
6	12	8
9	4	16

Wrap Up:

Have students *think-pair-share* and discuss the following questions:

- What happened to the salmon population why?
- Why happened to the pike population and why?
- How would what you learned from this activity impact future salmon populations?
- What would fewer salmon mean for you and your family?

Lesson Adaptations:

Have younger students start closer to the basins, instead of at the wall. This will make it easier for them to toss their eggs into the basins.

Expand upon prompts to guide students' thinking:

- Did the salmon population increase or decrease? (Decrease)
- What factors caused the salmon population to decrease? (Pike predation, salmon did not reproduce as quickly as pike)

Extensions:

Have students record egg and population status on a data sheet. Students will graph the data and compare the two graphs.

Reflections:

How did it go? What did students understand most/least? What could change about instruction or lesson plan?

Resources Used:

Internet links, articles, organizations, and books that informed this lesson and background information.