Trout Food Web

Grade	4th (could be scaffolded for all grades, K-12)
Time	35-45 minutes
Overview	Students act as organisms in a trout stream food web and compare survival rates of living things when habitats are degraded as well as restored.
Objectives	<u>Understanding:</u> Students understand life needs of trout and the impacts of changes in habitat to functioning food webs.
	<u>Skills & Processes:</u> Students work in cooperative groups as they engage in the food web game and practice critical thinking when they examine the outcomes of the game to determine some of the characteristics of a healthy habitat for brook trout.
	<u>Values:</u> Humans impact organisms in their environments and can positively affect *healthy food webs.*
Essential Question	How do changes in habitat affect organisms is a trout stream?
Primary VA SOL	Science (2018): 4.2, 4.3, 4.8

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<u>Materials</u>
- Trout Life Cycle Diagram
- Stream Critter Team Cards (Have enough cards for each student, divide class evenly among organisms.)
  - Caddisfly (Microscopic Insects [Zooplankton], Aquatic Plants & Algae)
  - Gilled Snail (Aquatic Plants, Dead Leaves & animals)
  - Brook Trout (Microscopic Insects [Zooplankton], Aquatic Larvae, Small Fish, Snails)
  - Crayfish (Microscopic Insects [Zooplankton], Aquatic Plants & Algae, Dead Leaves & animals, Aquatic Larvae, Small Fish)
  - Small Fish (Microscopic Insects [Zooplankton], Aquatic Larvae, Small Fish)
- Stream Creatures Food Cards (for group of 30)
  - Aquatic plants & algae (10)
  - Microscopic Insects (Zooplankton) (15)
  - Dead leaves and animals (detritus) (20)
  - Aquatic Larvae (macroinvertebrates) (10)
  - Small fish (10)
  - Snails (15)

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<u>Special Safety</u>

Scout instruction area to look for holes in ground and other potential safety hazards.

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Set Up
Gather necessary materials. Print and laminate enough Critter Team Cards and Food Cards for the class. Copy this "Who eats What" table onto a white board.

			Who Eats What?: Preferred Food			
Organism	Aquatic plants & algae	Microscopic insects (Zooplankton)	Decaying plants & animals (Detritus)	Aquatic larvae (macroinvertebrates)	Small fish	Snails
Crayfish	X	X	X	X	X	
Brook Trout		X		X	X	X
Small fish		X		X	X	
Snails	X		X			
Caddisfly	X	X				

Instructional Strategy

Recommended Grouping/Instructional style	Large group, movement-based
Steps	1. **Engage:** *Ask the students*: What do all organism need to be able to live and survive? (Food, water, shelter, and suitable space). a) Introduce the term "habitat" or review it with the class if the students are already familiar with what it means. If helpful to promote learning, show the students pictures of several types of habitats and compare/contrast them. b) Explain that animals live in a habitat where their needs are met for food, water, shelter, and space. There are many types of habitats including forests, wetlands, and deserts. Each of these habitats provides what is necessary for various organisms to survive. 2. **Introduce game:** Explain to the students that they are going to participate in a game that illustrates the food webs associated with brook trout. a) Ask if they have been raising trout in the classroom and assess what they know about the trout they are raising. Tell students that they are each going to receive a card that will tell them what organism they are going to be in the game; the card describes what the organism eats. b) Tell the students that their organism identity is a secret only known to them and they should not share it with their fellow classmates. c) Distribute the Stream Creature Cards.

3. **Implement:** Once students have received their Creature Cards scatter the Food Cards face down in a large open space (ideally outside).

   a) Describe the ideal trout habitat (many trees with lots of shade with clear, cold water and nice rocks that create tiny rapids in the stream). This is the perfect place for trout and the animals that they eat to live.

   b) Give directions on how to collect the food cards when the signal is given and what to do when "Time" is called. Explain to the students that they can only pick one card up at a time and if they pick something up that they cannot eat they must return it face down on the ground. Once the students understand the directions and are ready, give the signal to begin. After two minutes, give the signal to stop. [*It may be helpful to try a practice round.*]

   c) Gather the students together and explain that each animal needed at least three food cards to survive. Count the number of animals who "survived" and those that "died" and record and/or graph them for the students to view. Tell the students that they are going to round 2. "Dead" animals can either exit/wait out the game or return as new "young animals." Return the food cards face down in the designated playing area.

   d) Describe Scenario 1: Explain to the students that some of the trees around the stream have been cut down. Removal of the trees increases rainwater run-off; higher run-off levels increase the sediment levels in the stream. High sediment levels reduce the number of aquatic plants in the stream because the sediment particles block sunlight necessary for photosynthesis. Increased run-off also washes away dead leaves (detritus) that serve as food for some organisms. As you are describing this scenario, remove 5 aquatic plants & algae cards and 10 detritus cards. Start the next round. When time is up, discuss which animals survived. Record/graph the results.

   e) Scenario 2: A big flood occurs, and **all** the dead leaves get washed away; the plants get ripped out of the ground and carried downstream; and many of the aquatic zooplankton and macroinvertebrates get smothered with sediment which makes it difficult for them to breathe. Remove half of the zooplankton, a quarter of the aquatic macroinvertebrates, and 5 more detritus cards. Place the cards (or ask an adult to do this as you describe the scenario.) and they have the students "feed." Discuss how the survival rate changed from Round 1

	f) <u>Scenario 3</u>: Next, a housing development with stream front property is created. All the trees are cut down and the land is cleared. Because there is no shade, the stream water gets hot quickly. Lack of trees causes less detritus to be washed into the stream. Remove all the detritus cards as well as the aquatic macroinvertebrate cards. g) Record the number of survivors for each round and graph the results. Discuss the results with the class at the end of the activity. 4. **Wrap-Up/Conclusion:** Review the different habitat conditions in the scenarios and the different results from each round. Which scenario was the most ideal for the trout and a healthy system? Explain your reasoning. What are the impacts of less trees around streams? What are effects of too much sediment? How can housing developments impact the survival of brook trout and other stream organisms? What can we do to reduce housing development impacts on stream health? What have you learned to help you raise your fish and to promote a healthy habitat for the brook trout and the water downstream in the Chesapeake Bay watershed?

Caddisfly

Eats

Microscopic Insects (Zooplankton)
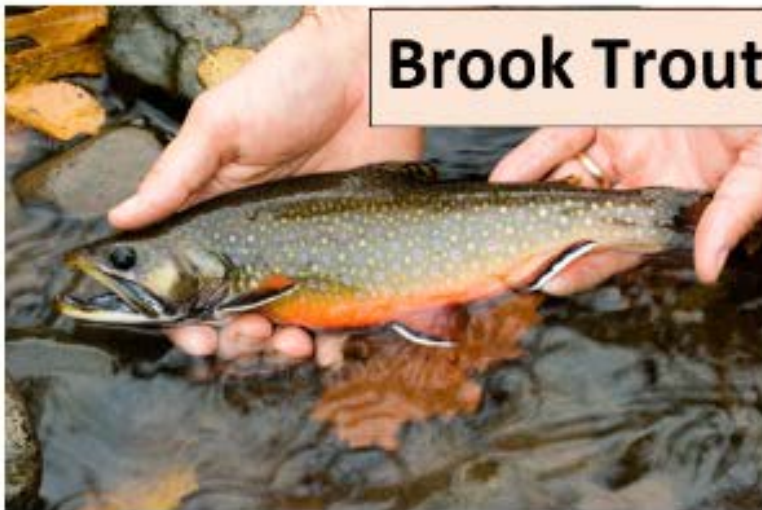
Aquatic Plants and Algae

Gilled Snail (Right-Handed)

Eats

Decaying Plants and Animals (Detritus)

Aquatic Plants and Algae

Appalachian Brook Crayfish

Hazel Galloway, 2012

Eats

Microscopic Insects (Zooplankton)

Aquatic Plants and Algae

Aquatic Larvae (macroinvertebrates)

Snails

Decaying Plants and Animals (Detritus)

Brook Trout

Eats

Microscopic Insects (Zooplankton)

Aquatic Larvae (macroinvertebrates)

Aquatic Plants and Algae

Snails

Small Fish

Clinch Dace – photo by Rebecca Bourquin.

Eats

Microscopic Insects (Zooplankton)

Aquatic Larvae (macroinvertebrates)

Small fish

Microscopic Insects (Zooplankton)

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Microscopic Insects (Zooplankton)

Microscopic Insects (Zooplankton)

Microscopic Insects (Zooplankton)

Stream Creature: Trout Food Web Game

Decaying Plants and Animals (Detritus)

Decaying Plants and Animals (Detritus)

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Decaying Plants and Animals (Detritus)

Decaying Plants and Animals (Detritus)