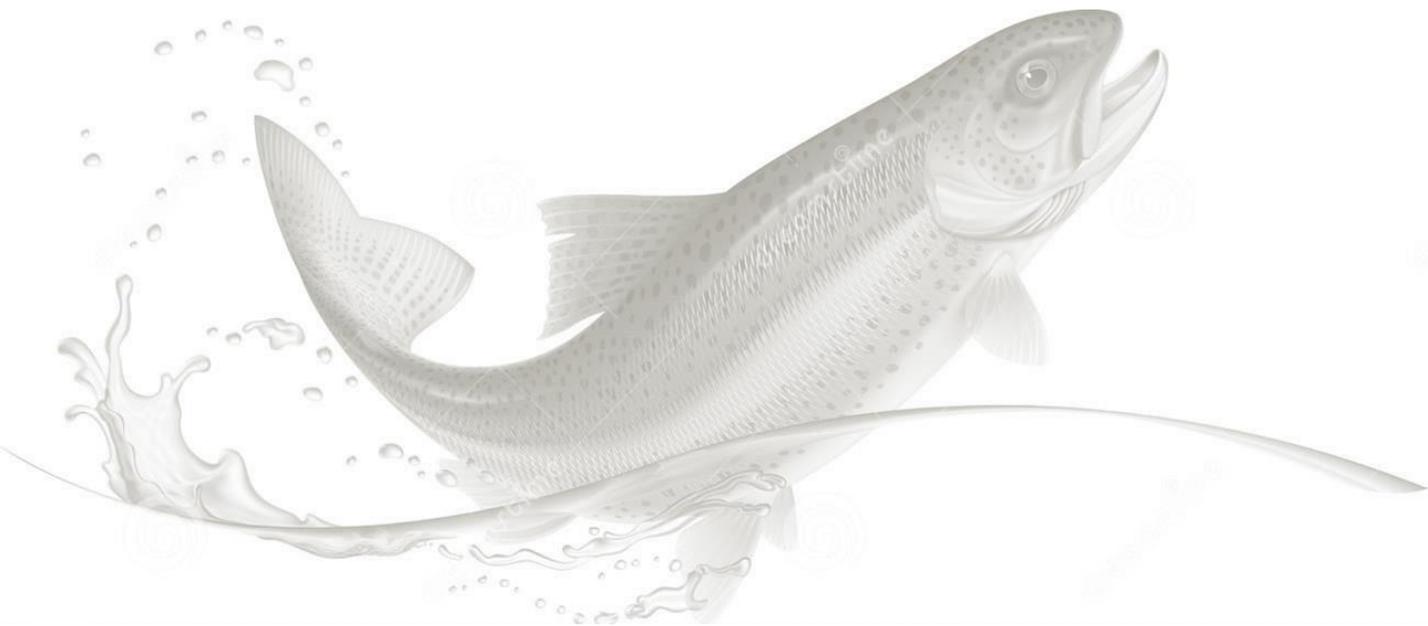


# *Trout Grow on Trees*®

*Activity Guide*



**STROUD**<sup>™</sup>

WATER RESEARCH CENTER

[www.stroudcenter.org](http://www.stroudcenter.org)

# **Stroud Water Research Center**

## **Freshwater Knowledge and Stewardship**

Stroud Water Research Center (1967), located in Avondale, Pennsylvania, seeks to advance knowledge and stewardship of freshwater systems through global research, education, and restoration. The Stroud Center's education department has been leading freshwater educational boots-in-the-water experiences for over twenty years and was awarded the 2015 Pennsylvania Association of Environmental Educators award for Outstanding Environmental Education Program. Be sure to visit us at <https://stroudcenter.org/education>

## **What is Trout Grow on Trees?**

Trout Grow on Trees® (TGOT) is an integrated set of activities designed to educate children of all ages on the important interconnections of healthy forests, healthy streams, and healthy trout populations. TGOT was created by Stroud Center Executive Director Dr. Bernard Sweeney in 2013. First launched at a trout release day at Pocopson Elementary School in Chester County, Pennsylvania, the activities received much interest and enthusiasm from teachers and students. TGOT activities complement ongoing Trout in the Classroom (<https://www.patrouinthe classroom.org/>) programs, tree planting activities, macroinvertebrate monitoring, or can stand alone. Please contact the Stroud Center's Education Department for questions or to share your experiences with Trout Grow on Trees activities!



# Trout Grow on Trees®

## Grade Level

4-12

## Subject Areas

Life Science,  
Environmental Education

## Duration

Preparation time: 10 minutes

Activity time: 20 minutes

## Group Size

1 group of 30 students

## Setting/Season

Optimal time is during or  
at trout release day, and  
when trees are leafed out.

Indoors or outdoors

## Key Terms

Stream health, trout, trees,  
riparian zone, nutrients,  
macroinvertebrates,  
food web, watershed tea

## Skills

Organizing, interpreting,  
identifying relationships,  
applying learned  
information, presenting

## Objectives

At the conclusion of the activity, students will be able to:

- State three reasons why trees are important for stream health
- Explain how trout, leaves, aquatic insects, and trees are connected
- Describe what trout need in order to live in the wild

## Materials

- Fingerling trout in a small aquarium with aeration OR an image of brook trout (or your native trout species)
- Live tree seedling OR an image of a tree
- Small pile of tree leaves
- Live aquatic macroinvertebrates in a pan with stream water OR macroinvertebrate images (<https://stroudcenter.org/macros/gallery/>)

## Making Connections

A discussion linking trees, leaves, insects, and trout will make a connection to students about the importance of trees near streams. Many have understood one part of the equation but not the entire picture. Some will know the importance of trees to streams, the food web, and that leaves provide food for a stream. Students will learn why and how trout grow on, or rather grow from, trees!

## Background

Brook trout once inhabited every coldwater stream in the mid-Atlantic and northeast region of the United States but populations have dramatically declined during the past 200 years. The removal of streamside forests has greatly contributed to this decline and habitat loss for the brook trout. Hence, the restoration of streamside forests is a way to improve water and habitat quality of streams and a necessary prerequisite to help restore healthy trout populations.

Many streams within the U.S. are in poor condition due to changing land-use practices that add soil, toxic substances, or nutrients. The quality of habitat within streams is also degraded, and when this happens, affects all aquatic life including trout and aquatic insects.

**What do trout need in order to live?** Wild trout need cold, clean fresh water, which you would find in a shaded stream, a stream that has many trees growing right by it. They also need a food source, aquatic insects (aquatic macroinvertebrates). Aquatic insects can live in a variety of locations in the stream (pools, riffles, runs, leaves, between rocks) and they need food too. Where do they get most of their food? From leaves that fall from trees, algae, and other aquatic organisms.

**How do trees keep streams healthy?** Studies show that trees planted along stream banks, called streamside forest buffers, help filter pollutants, prevent bank erosion, keep stream channels wide, normalize temperatures, and provide a variety of food in the form of leaves, shade loving algae, and dissolved substances (i.e nutrients and minerals). Streamside forests help streams regain enough of their natural characteristics to once again support native communities of aquatic plants and animals, including trout. There are many benefits from streamside trees! See Appendix A for more benefits.

## Procedure

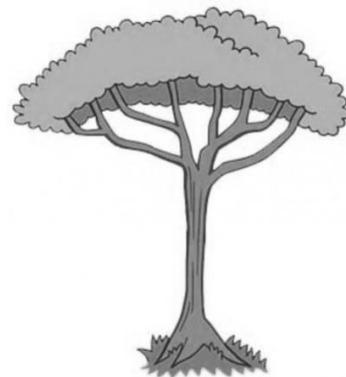
### WARM UP

1. Ask students, did you know 'trout grow on trees?'
2. Get feedback on what they think this means, any images in their minds, etc.
3. Confirm that by the end of our time, they will be convinced of this and will want to tell others this is true too, trout do grow on trees! And here's how!

### ACTIVITY

1. In a classroom or outside along a creek, set up an area/table with the following:  
TROUT>>AQUATIC INSECTS>>LEAVES>>TREE
2. Lead a discussion on how these four topics relate to each other. First, **begin with the importance of trees.** You may want to have out the 'bucket of benefits' to help (see Appendix A).
3. Taking the idea that streamside trees contribute leaves to the ground and stream, discuss with students the **importance of leaves as food** for stream critters. You may want to add another activity, 'watershed tea,' to your discussion (see Appendix B).
4. Next, **ask students 'who eats the leaves in the stream?'** (aquatic insects). Show the live insects, especially a crane fly which is called a 'shredder' and loves to eat leaves! (or show image — see resources section for image).
5. Lastly, **ask students, 'who in the stream eats the insects?'** (Fish/trout).
6. Ask students if they now understand how 'Trout Grow on Trees,' bringing in the idea 'you are what you eat' and the food web.

7. Then to drive in the message, have them repeat this rhyme:  
The FISH (have them repeat each line after you at first)  
Eat the INSECTS  
On the LEAVES  
That come from TREES!
8. Repeat rhyme together two more times. Go through the visual props with each line.



The FISH... eat the INSECTS... on the LEAVES.... that come from TREES!

### **WRAP UP**

- Engage students in a standup show contest and tell them they are now tasked with going home to convince their friends or families that 'Trout Grow on Trees.' Let's see who is the most convincing! Ask if any of the students wish to come up in front of the class to tell the story of how 'Trout Grow on Trees and have the audience rate each one on how convincing they are (via applauses or fish faces).

### **Assessment**

- Review the following questions with students:
  - State three reasons why trees are important for stream health
  - Explain how trout, leaves, aquatic insects, and trees are connected
  - Describe what trout need in order to live in the wild

### **Extensions**

- ART: Have students draw before and after images of what they envision when hearing 'Trout Grow on Trees.' Show the drawings to the whole class and talk about the differences. Have an art gallery showing off the drawings at school!
- LEAF PACK NETWORK: This is a great program which introduces aquatic macroinvertebrates as indicators of stream health. Learn more at <https://leafpacknetwork.org/>!
- TREE PLANTING: If you have a trout-approved stream nearby or on your school's property, evaluate its buffer by walking along the creek or virtually via Google Earth. If it is in need of a buffer, consider looking into a tree planting opportunity. You can contact the Stroud Center for guidance.
- TROUT IN THE CLASSROOM : If you have a nearby trout-approved stream, consider joining the Trout in the Classroom program. Find out more at <https://www.patrouintheclassroom.org/>!

# Appendix A: Bucket o' Benefits

## *15 Reasons Why Streams Need Trees!*

**With a 5-gal bucket, put in symbols representing why trees might be important to maintain the health of streams, wildlife, and more!**

**Symbols include:** bottle of water (purify water), sea salt (keep pollution out of streams), ice tray (keep temperatures cool), sardines (fresh water for fisheries), sunblock (UV protection), battery/leaves/tea bag (food source, habitat for aquatic insects), sponge (absorb pollutants), filter mask (improve air quality, oxygen), fly swatter (control insect pests), stick/wood (habitat within streams for fish), broom (clean water), rubber duck(not pictured — habitat, shelter, food for wildlife), toilet paper (wastewater treatment).



# Appendix B: Watershed Tea

*Did you know a stream makes its own tea?*

Stroud Water Research Center scientists discovered that when rain water enters a stream, it carries with it a special blend of dissolved organic matter (DOM), which is then dispersed in the water much like tea from a tea bag. So specific is each watershed's "tea" that migrating salmon use it to find their way home at spawning time because it has a certain taste and smell. The tea also provides food for bacteria, and studies at the Stroud Center indicate that each watershed produces a community of bacterial species which are uniquely fitted to the local supply of watershed tea.

## **Make your own tea!**

Gather sticks, lichen, roots, soil, rocks, leaves, and anything else you can from the forest floor and within a nearby stream to demonstrate how a stream makes its own tea. With a clear container, get water from the stream and discuss what might be in this water. Pass around a cup of this water for students to smell and look at — does it smell natural, fishy, smell like rotten eggs? Does it look clear or have a milky haze to it? Then take out a tea bag. Ask students what it contains (plant parts like roots, bark, flowers, leaves). Watershed/stream tea is similar, but it has other things like soil, turtle scat, fish slime, bacteria, and other good things in it! Then have students make their own tea using the clear container with stream water and the pile of forest floor/streambed components you gathered earlier. Discuss how this tea might be important for migratory fishes like salmon and American shad (born in fresh water, they retain the sign of the tea flavor/smell to find their way back to that stream to reproduce/die).



# Resources

## TROUT

- Pennsylvania Trout in the Classroom (<https://www.patrouintheclassroom.org/>)
- Pennsylvania Council of Trout Unlimited (<http://www.patrou.org/>)
- Pennsylvania Fish and Boat Commission (<https://www.fishandboat.com/>)
- Habitat needs (<https://www.fishandboat.com/Transact/AnglerBoater/AnglerBoater2000/MarchApril/Documents/habtrout.pdf>)

## TREES

- The importance of trees to streams (<https://leafpacknetwork.org/learn/linking-trees-streams/>)
- Streamside reforestation (<https://stroudcenter.org/research/landmarks/streamside-reforestation/>)
- Stroud Center Watershed Restoration Program (<https://www.stroudcenter.org/restoration/>)

## AQUATIC MACROINVERTEBRATES

- Stroud Center macroinvertebrate image gallery (<https://stroudcenter.org/macros/gallery/>)
- Stroud Center macroinvertebrate identification key (<https://stroudcenter.org/macros/key/>)
- Other Stroud Center macroinvertebrate resources (<http://www.stroudcenter.org/macros/>)

## LEAVES

- The Leaf Pack Network® (<https://leafpacknetwork.org/>)