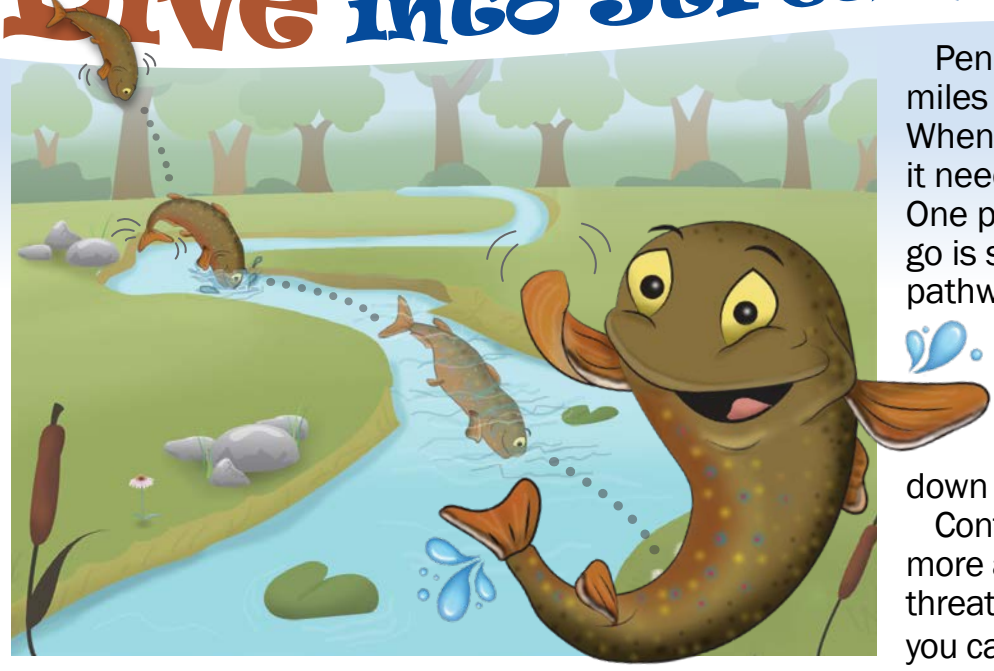
PLAY

Spring 2021

Pennsylvania • League • of • Angling • Youth

Dive into Stream Ecology



Pennsylvania has 86,000 miles of flowing waters. When **precipitation** occurs, it needs to go somewhere. One place for precipitation to go is streams. Streams are pathways for water to flow. Flowing fresh waters are known as **lotic** systems. Streams begin water's journey down the **river continuum**.

Continue reading to learn more about **stream ecology**, threats to streams, and how you can help.

Vocabulary (Watch for these words!)

- **Aquatic macroinvertebrates** – animals that spend part or all of its life living in water, lack a backbone, and are large enough in size to be seen with your eyes
- **Ephemeral streams** – temporary streams that flow when precipitation occurs
- **Headwater streams** – a stream that is small, steep, fast-flowing, cold, and has a high dissolved oxygen level
- **Intermittent streams** – streams that flow during certain times of the year
- **Lotic** – flowing fresh waters
- **Microbes** – includes microorganisms like bacteria, protozoa, fungi, and algae
- **Perennial streams** – streams that flow year-round
- **Precipitation** – water that falls from the clouds in the form of rain, snow, sleet, or freezing rain
- **River Continuum** – transition from headwater streams to larger rivers
- **Riparian Zone** – vegetated or forested area along a stream
- **Stream ecology** – study of how aquatic species interact with living and non-living parts of stream
- **Turbidity** - measure of water cloudiness

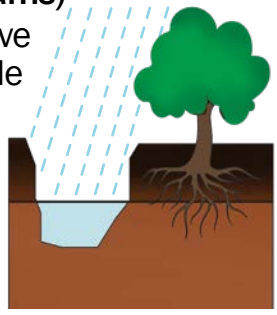
Stream Types—Look a Little Deeper!

Streams are essential to our ecosystem. Streams supply land, animals, and people with vital resources. Streams are classified into three types. Each stream type has unique characteristics.

Ephemeral Streams

(Rain-dependent streams)

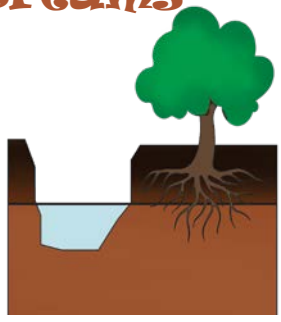
- Streambeds are above the groundwater table
- **Ephemeral streams** briefly flow after a precipitation event
- Provide pathways for water to flow to other waterways



Perennial Streams

(Year-round streams)

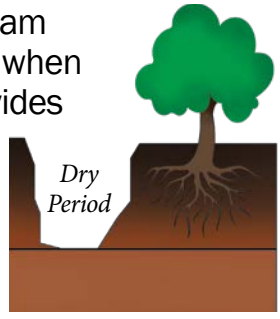
- Streambed is below the water table
- Do not rely only on precipitation for water
- **Perennial streams** flow year-round



Intermittent Streams

(Seasonal streams)

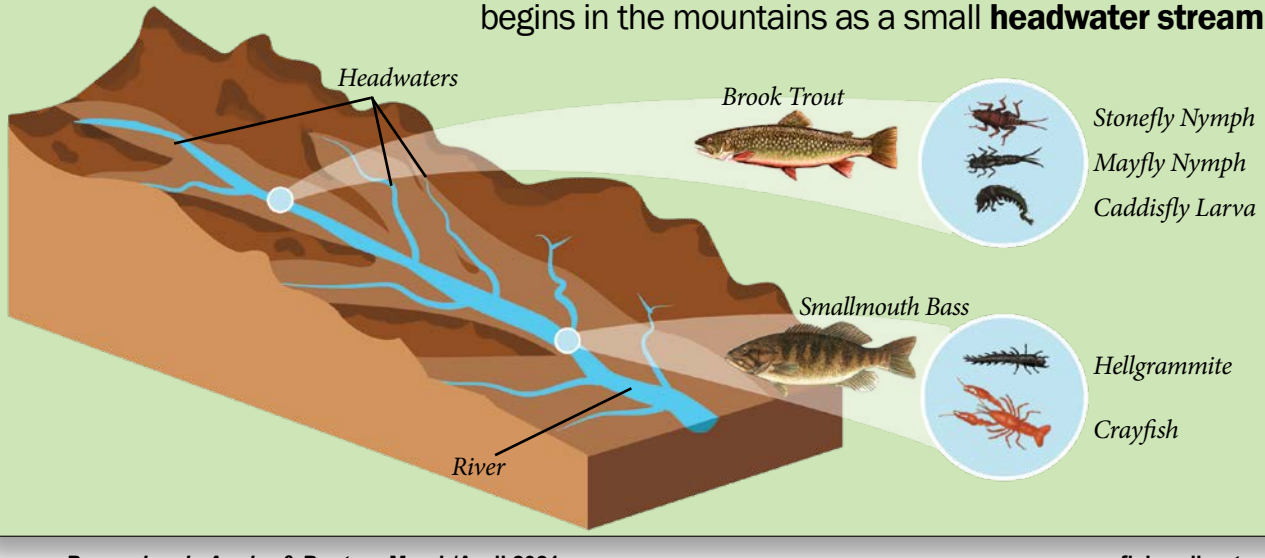
- Streambed is closer to the water table
- Flow during certain times of the year when upstream waters are flowing or when the groundwater provides enough water flow
- During dry periods, **intermittent streams** may dry up completely



Learn more about stream orders and the **river continuum** at **www.fishandboat.com/LearningCenter/ActivitiesAndEducationPortal/AquaticHabitat/Pages/default.aspx**.

River Continuum

A stream's size, gradient, and type of habitat changes as it flows downstream. The **river continuum** begins in the mountains as a small **headwater stream**.



Ingredients of a Healthy Stream

Diverse habitat and aquatic life in a stream provide clues to the health of the stream. Below are healthy stream "recipe cards":

Water Quality

- Cold water with lots of dissolved oxygen
- Low **turbidity**
- Good water chemistry

Learn more about water quality: **www.fishandboat.com/LearningCenter/ActivitiesAndEducationPortal/Pages/default.aspx**.

Pennsylvania Fish and Boat Commission (PFBC) Fisheries Biologist Steve Kepler (retired) taking water quality measurements in a stream.

Diverse Habitat

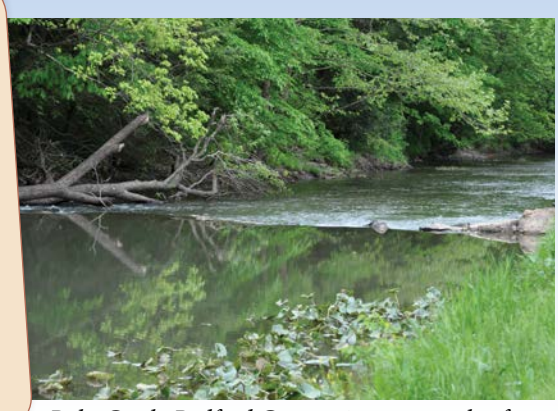
- Various sizes of rock and woody debris for shelter
- Silt-free gravel bottom for fish eggs and aquatic insects
- Mix of riffles, runs, and pools

Learn more about riffles, runs, and pools: **www.fishandboat.com/LearningCenter/ActivitiesAndEducationPortal/Pages/default.aspx**.

A healthy Brook Trout in a diverse habitat.

Riparian Zone

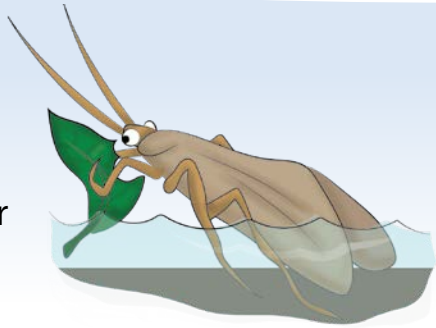
- Native trees and shrubs cool the water and protect streambanks in a **riparian zone**
- Native grasses and other plants filter out sediment from upland areas
- Leaves and woody debris provide shelter and food
- Wetlands store water and reduce downstream flooding and erosion

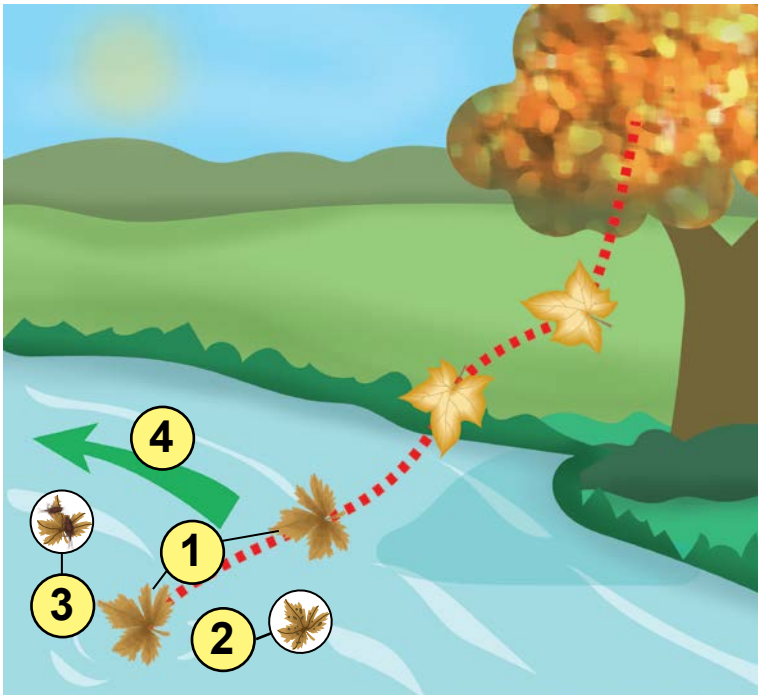


Bobs Creek, Bedford County, is an example of a riparian zone.

A "Tree-ific" Coldwater Stream Food Chain

Trees help begin the food chain in a stream. Leaves and woody debris provide food and nutrients for aquatic organisms.



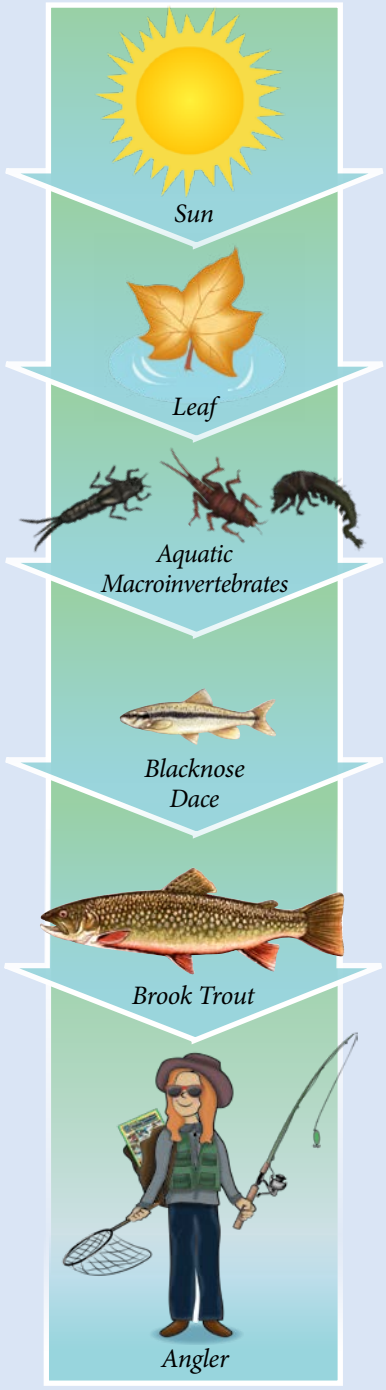


1. Leaves enter stream
2. **Microbes** attach to leaves and soften leaves
3. Shredders break down leaves
4. Waste from shredders washes downstream and becomes available to other **aquatic macroinvertebrates** like collectors and grazers

Learn more about aquatic macroinvertebrate feeding groups like shredders and collectors at **www.fishandboat.com/LearningCenter/ActivitiesAndEducationPortal/Pages/default.aspx**.

Food Chain

Here is an example of how energy flows through a coldwater stream food chain.

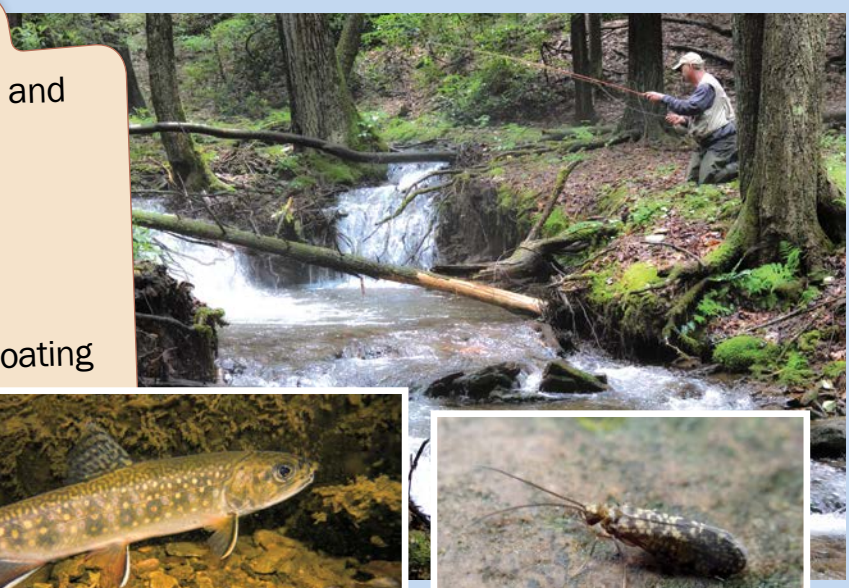


Benefits and Threats

Stream of Life

Streams provide many values and functions such as:

- Health benefits to society
- Drinking water
- Irrigation
- Fish and wildlife habitat
- Recreation like fishing and boating
- Transportation
- Floodwater transport
- Hydroelectricity



Brook Trout

Caddisfly (adult)

Threats to Streams

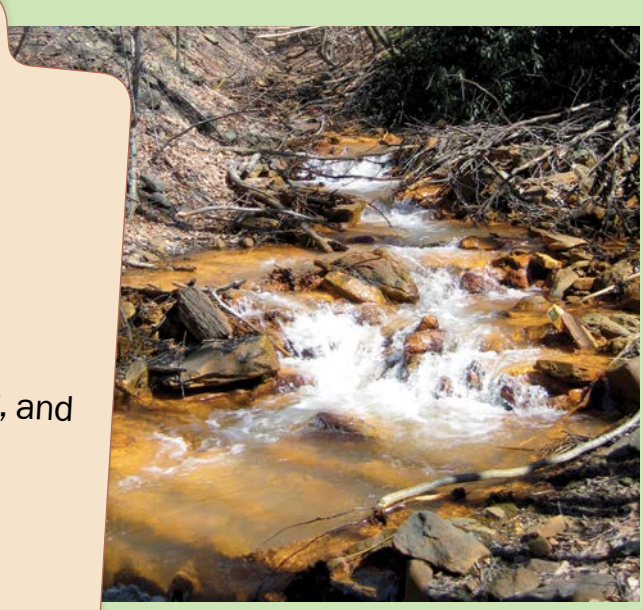
- People can impact stream health
- Stream channel changes
- Removal of riparian buffer
- Aquatic Invasive Species (AIS)
- Climate Change

Nonpoint source pollution

- Acid mine drainage
- Surface runoff from development, logging, and agriculture
- Acid rain

Point source pollution

- Factories
- Oil or chemical spills



This stream is affected by acid mine drainage.

Learn more about nonpoint and point source pollution at **www.fishandboat.com/Transact/AnglerBoater/AnglerBoater2019/Documents/play-04-fall-watercycle.pdf**.

How Can You Help?

Stream Helper

At home

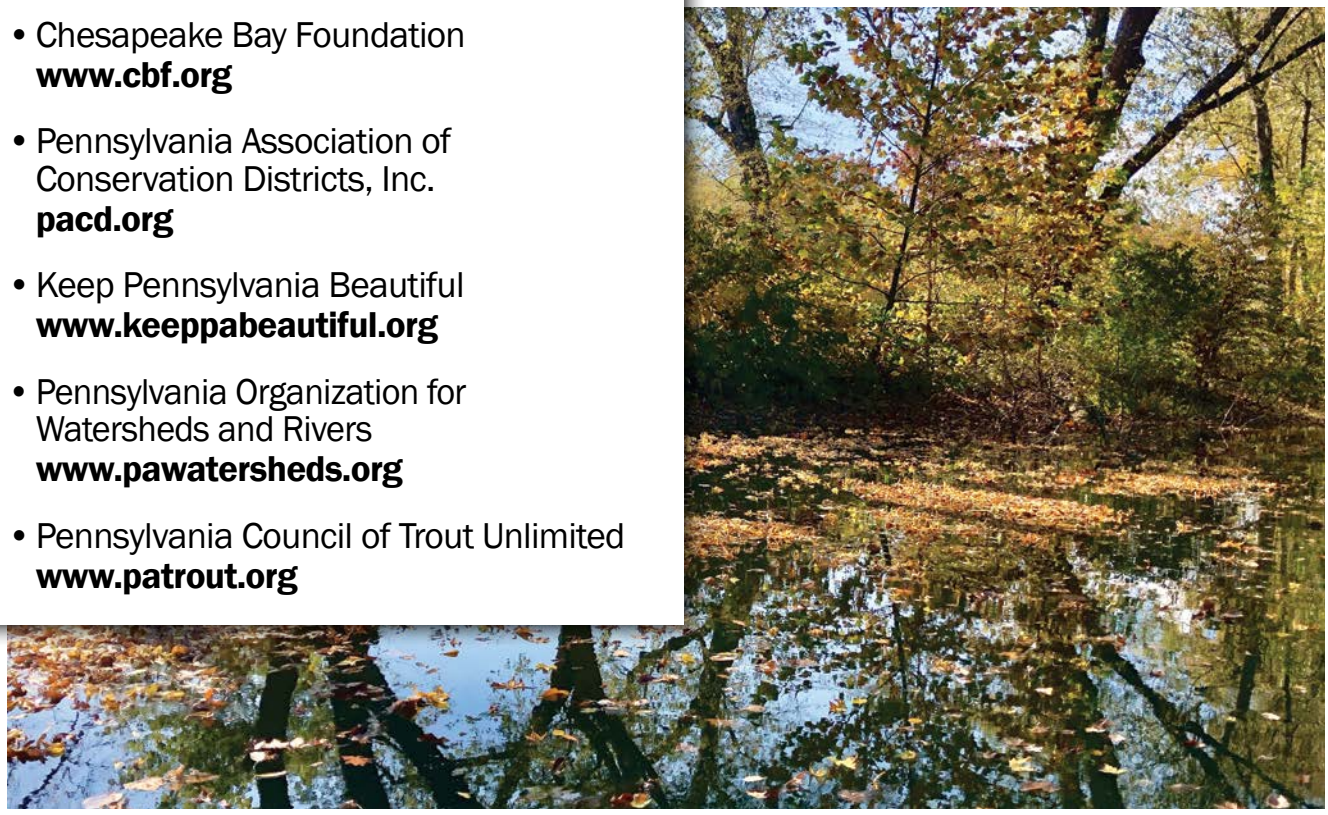
- Purchase a fishing license
- Follow fishing regulations
- Protect or plant new riparian areas
- Decrease water use
- Prevent AIS, clean your gear
- Limit pesticides and herbicides

Community volunteer

- Help with tree plantings, habitat projects, cleanups, and watershed monitoring.

Community Connections

- Chesapeake Bay Foundation
  www.cbf.org
- Pennsylvania Association of Conservation Districts, Inc.
  pacd.org
- Keep Pennsylvania Beautiful
  www.keeppabeautiful.org
- Pennsylvania Organization for Watersheds and Rivers
  www.pawatersheds.org
- Pennsylvania Council of Trout Unlimited
  www.patrout.org



Healthy Streams FISHING ACTIVITY

After learning the importance of stream ecology, healthy streams, and food chains, help this angler determine if this stream is a healthy stream to fish by circling the components of a coldwater stream food chain.

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Answer Key

- Sun
- Leaves
- Aquatic Macroinvertebrates
- Blacknose Dace
- Brook Trout
- Angler