

# Connecting the Trout Life Cycle

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## Description:

This lesson is designed to have students work through their communication and problem-solving skills to complete a trout life cycle puzzle, thereby learning about the life cycle of a trout.

## Objectives:

- Determine the order of the trout life cycle
- Develop communication techniques to solve a problem
- Understand the connection between trout and humans

## Vocabulary:

Alevin, biodiversity, ecosystem, embryo, eyed egg, fingerling, indicator species, life cycle, redd, spawning, trout, watershed

## Materials:

- Three sets of the trout life cycle illustrations, labels, and arrows for each life stage – print and laminate
- Trout life cycle poster (optional)
- "A Trout's Life Cycle" PowerPoint

## Background Information:

Brook trout are a species of freshwater fish in the char family native to New York State. They live in spring fed streams and ponds with a sandy or gravel bottom and aquatic plants.

As juveniles, they feed on plankton and insects. Adults feed on a variety of prey, such as worms, leeches, crustaceans, other fish species, and more. They spawn in gravel in streams or lakes in late summer or fall depending on the temperature. Females can detect preferred spawning grounds, which include upwelling springs or other groundwater flow.

Brook trout typically reach maturity at the age of two and spawn annually. The females fan their caudal fin to clear away any debris and silt to create a trout nest, called a redd. The redd resembles a pit that is about 4-12 inches deep and is where the eggs are deposited and fertilized after the males compete for the female. The female covers the fertilized eggs with gravel with the help of the stream's current. The incubation time is dependent on temperature and oxygen. After hatching, the alevin (or sac fry) then remain under the gravel until the yolk sac is absorbed.<sup>1</sup> At this point, the trout enter the fry or fingerling stage, eventually developing into adult trout. Understanding and identifying each stage in the life cycle is important as students follow the trout's development in their tank.

## Method:

- Pre-activity: Prepare printouts for each group including illustrations, labels, and arrows. If possible, it helps to have all items laminated.

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<sup>1</sup> <https://www.fws.gov/species/brook-trout-salvelinus-fontinalis>

- Explain to students that trout are a type of fish that can be found in New York. With the help of NYS Department of Environmental Conservation (NYS DEC) fish hatcheries, there are brook trout, brown trout, and rainbow trout in many freshwater streams, ponds, and lakes in New York State. Brook trout are the only species native to New York.
- Tell students that just like all living things, trout have a life cycle. Provide an example of another life cycle and discuss.
- Students will work in groups of 3-6 to put a trout life cycle together in the right order.
- They must put the cycle in order including the labels and arrows. Students in middle and high school should complete the activity **WITHOUT** talking/writing things down.
- Ask students how they might communicate if they can't use spoken language.
- Observe how the students are working together to solve the problem. Assist the groups or add in hints if there has been no progress in the first couple of minutes.
- After the students are satisfied with their solution have everyone sit or stand by their solutions and ask members of the group to explain the process.
- Share the correct answers with the group and go through the PowerPoint.

## Discussion:

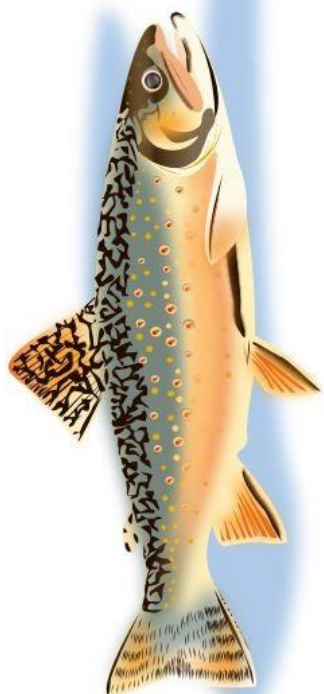
- What was challenging about this activity? How were you able to overcome the communication challenge? What techniques or methods did you use?
- What would have helped your team complete this challenge faster?
- If you had to complete another puzzle with your same group, how would you prepare for the next puzzle?
- How do humans play a role in the trout life cycle? How do trout help us understand our watershed?
- How is the trout life cycle different than and similar to the human life cycle?

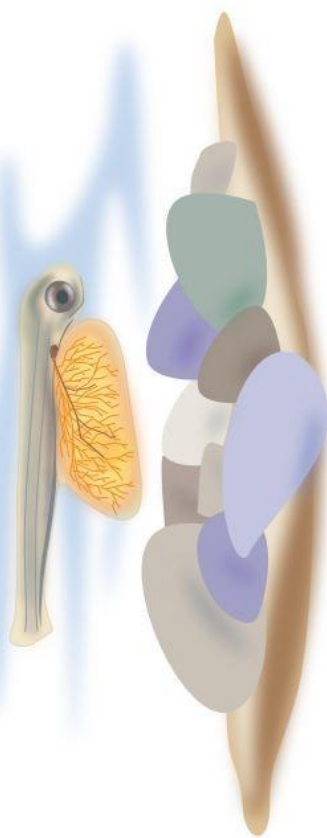
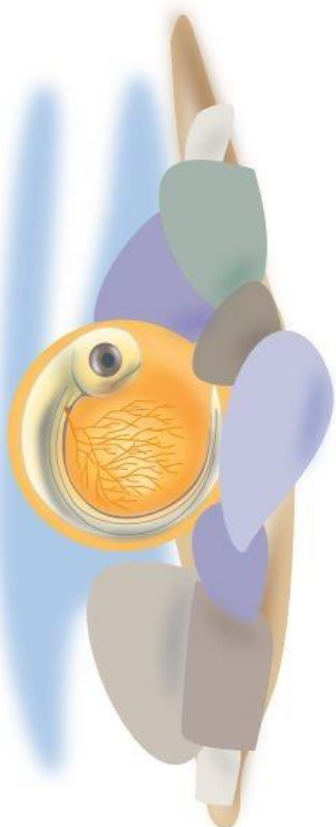
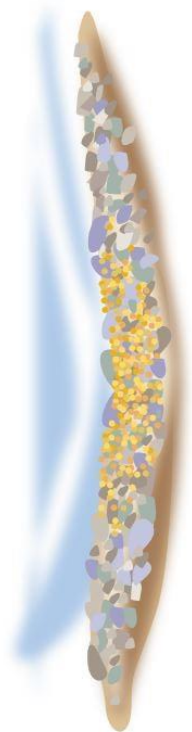
## Extension:

- Visit a trout hatchery to see trout in the different stages of their life cycle. Contact [NYS DEC](#) or the [Cold Spring Harbor Fish Hatchery](#).
- Have students make a calendar or growth chart to keep track of each life cycle stage from when the trout entered the classroom to release day.
- Consider life cycles for other connected organisms, such as the macroinvertebrates trout eat (e.g. mayfly or dragonfly larvae), or their predators (e.g. birds or bears).

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For more information visit [www.nyc.gov/dep](http://www.nyc.gov/dep)









**ADULT FEMALE  
BUILDING A NEST**

**EGG DEVELOPMENT**

**FINGERLING**

**SPAWNING**

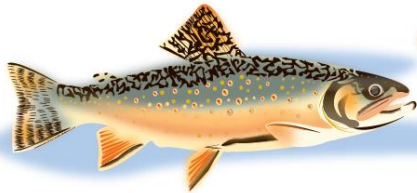
**EYED EGG**

**EMBRYO**

**ADULT MALE**

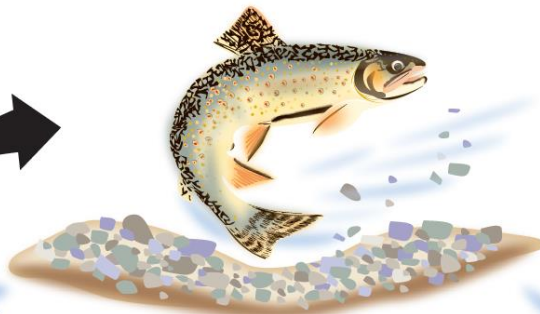
**ALEVIN**





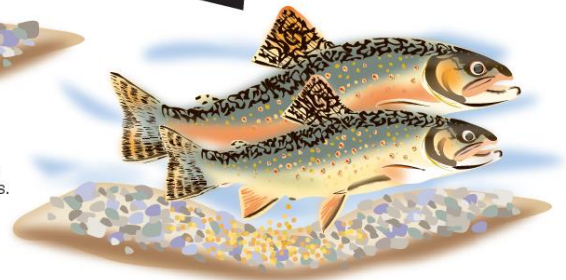
#### ADULT MALE

It takes two to three years for a trout to reach adult size. The temperature of the water, the habitat, and the amount and type of food affect how fast the fish will grow.



#### ADULT FEMALE BUILDING A NEST

The female digs a nest called a redd. Using her tail, she clears an area in the gravel for her eggs.



#### SPAWNING

Spawning generally occurs in autumn. The adult female lays her eggs while the adult male fertilizes them. The female will lay between 500 to 1,000 eggs depending on her size, age, and the environment (including the photoperiod and the water temperature). The fertilized eggs settle into the spaces around the gravel.



#### EGG DEVELOPMENT

Fertilized eggs grow and develop in the loose gravel. Flowing water moves over the eggs and provides oxygen. Water temperature must stay between 35 and 55 degrees Fahrenheit for brook trout eggs to survive. Trout are especially sensitive to changes in water temperature and water quality.



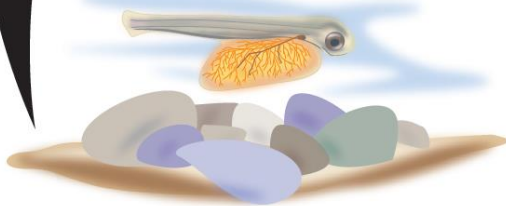
#### EYED EGG

In about two weeks the fertilized egg develops eyes. Through the transparent walls of the egg we see the fish's eye.



#### EMBRYO

Here we see the eye and the whole body of the unhatched fish called the embryo. It is nourished by the yolk of the egg. It gets oxygen from the water around it. In about eight weeks a little fish wriggles out of the egg.



#### ALEVIN

The trout is also called a sac fry at this stage. For the next few weeks the alevin does not need to eat. It gets its nourishment from the yolk sac. Oxygen comes in from the water through its skin. As the sac gets smaller the alevin begins to move about. The sac fry remains in or near the redd until its yolk sac is absorbed. Then it swims to the surface to feed on aquatic insects and plankton.



#### FINGERLING

At this stage the fish without a sac is called a fry. The growing fry develops vertical lines along the length of its body called parr marks. These up-and-down bars help it hide in grasses. This protects it from predators. When the fish has parr marks it is called a fingerling or parr.

## LIFE CYCLE of the BROOK TROUT (*Salvelinus fontinalis*)