

# Chapter 3: The Life Cycle of Trout

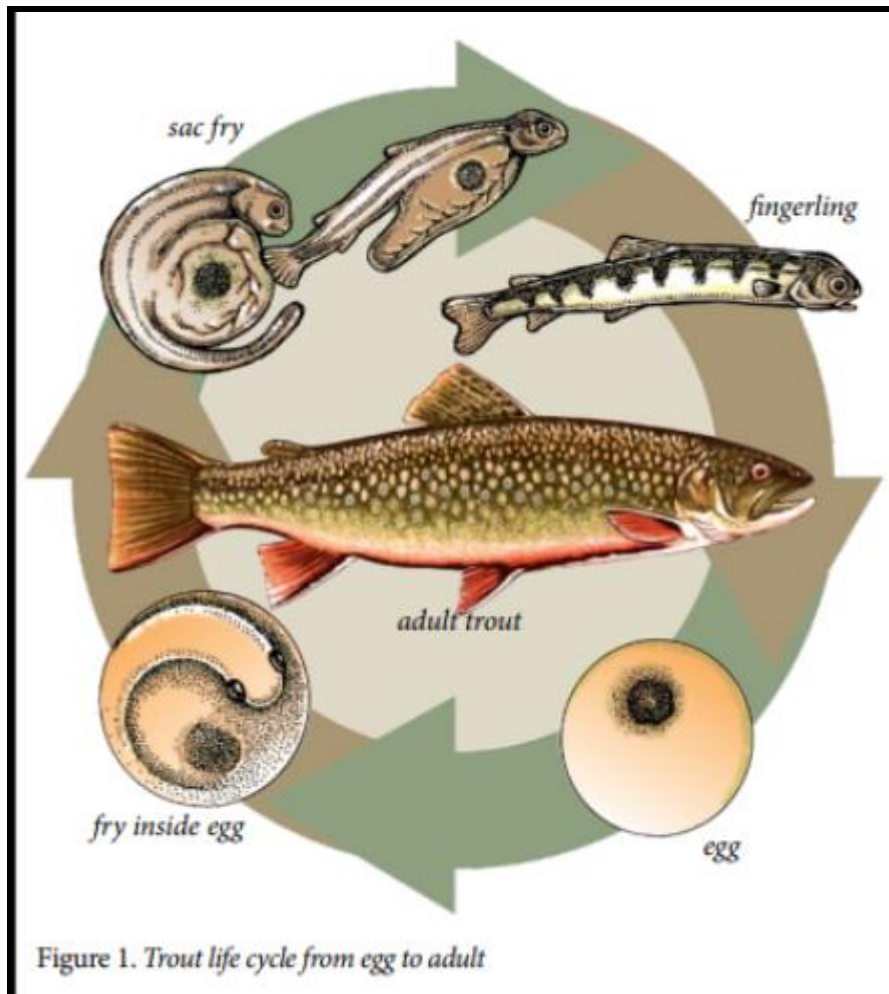
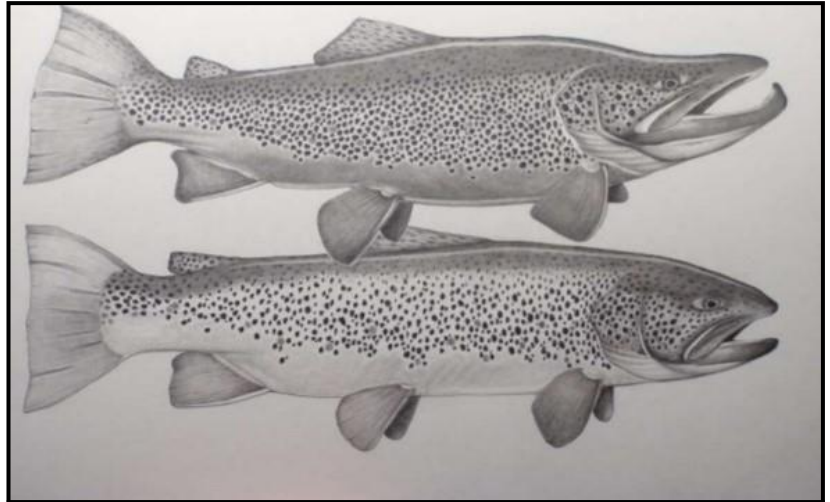


Illustration – Ted Walke

[\(back to table of contents\)](#)

### Life History of Salmonids in Pennsylvania

Fishes within the trout and salmon family (Salmonidae) live either in fresh water all their lives, or migrate to the sea and return to fresh water to spawn. Fishes that live primarily in a marine environment that migrate to a freshwater environment to spawn are known as anadromous species. Fishes that live primarily in a freshwater environment however, migrate to a marine environment to spawn are known as catadromous species. Trout and salmon spawn either in spring or fall, according to the species, over gravelly shoals, usually in small streams. During spawning, it is easiest to tell the difference between male and female salmonids based on physical characteristics that develop during this time. Older, larger males can develop a hooked lower jaw known as a kype. Conversely, female trout typically have a more rounded snout. The body shape of the male will also typically be laterally compressed compared to the female whom will characteristically have a more rounded body shape. During the spawning period, the males may also develop brighter coloration when compared to the females.



Comparison between physical characteristics that may be observed in spawning salmonids. The male (top fish) has developed a hooked lower jaw known as a kype. The female (bottom fish) has a more rounded snout. (Photo from PFBC presentation)

During spawning, the female digs a shallow dish nest in the gravel by lying on her side against the bottom and swimming forward energetically. Her body and fins flush out the stones. This nest created by the female is known as a redd. The eggs fall into the spaces between the now loose gravel within the redd,

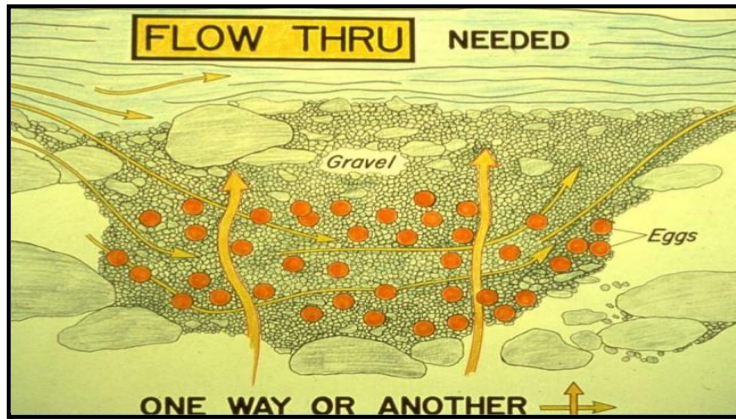


Diagram depicting how water flows through a redd to ensure the constant delivery of dissolved oxygen. (Photo from PFBC presentation)

which allows for cold, clean oxygenated water to filter through. Redds may be covered slightly with more gravel by the female before she leaves which will help to protect the eggs from both predators and sunlight. Eggs hatch in 4 to 10 weeks, depending on water temperature. Young trout stay in the gravel until the yolk sac is absorbed. Then they move out into the stream. The presence of reproducing populations of trout has been used as an indicator of high-quality, well-oxygenated, unpolluted water. Natural reproduction of salmonids does occur throughout the state of Pennsylvania however, only in our highest quality streams.

[\(back to table of contents\)](#)

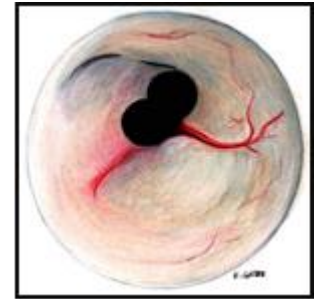
## Stages of the Salmonid Life Cycle

### A. Eyed Eggs

**Definition:**

Once eggs have been fertilized within the redd they are called “green eggs”, one of the most vulnerable life stages of salmonids. As they develop, eyes will become visible. They are still fragile at this stage but are a bit more stable than green eggs.

*Note: This is the egg stage you will receive for your classroom.*



**Description:**

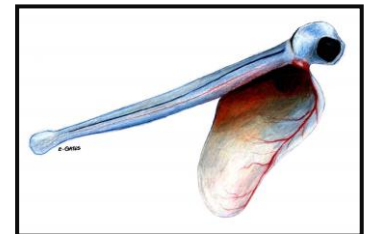
As eggs develop, they get oxygen from steady water flow and nutrition from the egg yolk. Water temperature is an important factor if the eggs are to remain viable. Different salmonids have varying temperature thresholds for the successful development of eggs.

In nature 1-2% (10 to 20) of the 100 -1000 eggs will survive to spawning age depending on the health of the watershed, food availability and stamina of the trout.

### B. Alevins (*pronounced Al-a-vin*) (also known as “sac fry”)

**Definition:**

A newly hatched trout still attached to and utilizing the yolk sac as food. This sac contains protein, carbohydrates, vitamins and minerals. The yolk sac serves as a “mini-lunch bag” that feeds the trout until it is completely absorbed. Once the yolk sac is absorbed, called the “button up” stage, trout emerge from the gravel and begin searching for food as a “swim-up fry”.



**Description:**

Alevins begin breathing through their gills when they hatch from the egg. The rate of respiration can be observed by watching the number of gill movements. As cold-blooded animals, their metabolic rate depends on the surrounding environment temperature. Temperature controls the rate of respiration. As a result, they breathe and grow slower in cold temperatures. Trout grow rapidly in warmer temperatures; however, their overall body growth is reduced because of inefficient digestion and respiration processes.

When eggs hatch, the alevins stay nestled at bottom of the stream. They will remain there until their yolk sac is fully absorbed. Their yolk sac shrinks as they begin to develop teeth, digestive system and a respiration system. It takes about a week or two for the yolk sac to be completely absorbed.

At this stage alevin are extremely fragile and susceptible to predators, siltation, pollution, floods or any disturbance in the water.

[\(back to table of contents\)](#)

Stages of the Salmonid Life Cycle (Cont...)

**C. Fry**

**Definition:**

*Swim-up Fry:* Trout reach this stage once they have fully consumed their yolk sacs. Once the yolk sac is consumed, trout will emerge from the gravel and begin to search for food.



**1 Inch or Less**

*Fry/Parr:* A hatched trout, previously a swim-up fry, that is less than one inch in length and has learned to search for food and begin eating. At this stage, you will begin to see a series of dark vertical lines on their sides called parr marks.

**Description:**

When the alevins become swim-up fry, they must be fed immediately (Note: For feeding instructions refer to “Trout Care”). Some trout never learn to feed and will die. These non-feeding fish are called “pinheads” (*big heads, small bodies*) and should be removed as they will not develop. It is very normal to see a mortality spike with pinheads. After learning to feed, the fish are deemed “Fry.”

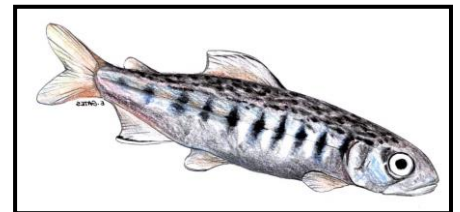
**D. Fingerling**

**Definition:**

A young fish 1 to 3 inches in length.

**Description:**

If you keep your aquarium clean and feed your fish the appropriate amount, they will become healthy fingerlings by spring. In the wild, fingerlings have strategies to avoid predators. Young trout spend time in shallow water, hiding under and around rocks as well as vegetation. They consume mainly small insects and plankton at this stage.



**1 to 3 Inches**

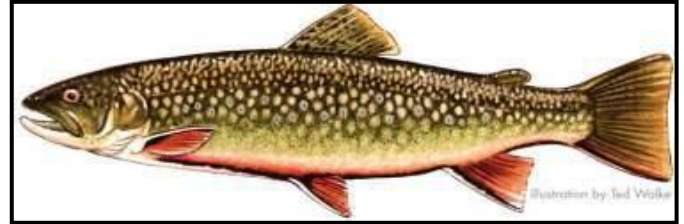
[\(back to table of contents\)](#)

**Stages of the Salmonid Life Cycle (Cont...)**

**E. Adult Trout**

**Definition:**

Adult trout can range in size based both on species and the environment in which they live.



**Description:**

At this stage trout are ready to initiate the reproductive cycle. Age at first reproduction and time of year varies between species. Adult trout feed on aquatic and terrestrial macroinvertebrates, other fishes and even some small mammals.

*(back to table of contents)*

# The Life Cycle of Trout



## SMART Angler's Notebook



by Carl Richardson  
illustrated by Ted Walke

### Seasons of a Trout

Natural reproduction occurs in many streams, including those stocked with hatchery fish. On most of these waters stream productivity, habitat and water quality limit reproduction and growth. Few wild fish reach adulthood in these waters,

so they are stocked with hatchery fish. There are a few streams where conditions are suitable for reproduction and growth. These waters are not stocked with hatchery trout.

#### SPRING

Developing eggs, still in redd, hatch anytime from February to March. Hatch date depends on stream temperature.

Fry, still living in bottom gravel, live off yolk sac. When this sac is used up, the fry emerge from the gravel. This usually happens in April through early May.

Fry eat plankton, the microscopic animals in the stream. Fry are 1 1/2 inches long when they emerge.



#### SUMMER

To hide from predators, young trout spend time in shallow water hiding under and around rocks. They eat small insects and plankton. Depending on the stream, young trout may be three to four inches long by the end of the summer. In the wild, fewer than 10 percent of these fry survive the first year.

Three-year-old fish are getting ready to spawn for the first time. The eggs develop in the female and grow larger each day.



#### WINTER

Fertilized eggs develop. Oxygen comes from the steady flow of water. Nutrition for the eggs comes from the egg yolk. Temperatures must stay within the 35-degree to 55-degree range for brook and brown trout eggs to hatch. Rainbow trout eggs don't survive when temperatures drop below 40 degrees.



#### FALL

Females select a spot for the nest, called a redd. Gravel bottoms with a steady flow are ideal. Using her tail she clears a spot for the eggs. A three-year-old fish, about 10 to 12 inches long, will release 500 to 1000 eggs. Fertilized eggs, about 1/4-inch round, sink into the spaces between the gravel.

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[\(back to table of contents\)](#)

# Wild Trout Life Cycle

From Nevada TIC Guide

## WILD TROUT LIFE CYCLE

**Spawning trout** lay eggs in redds in gravel stream bottoms. Trout often spawn several times in their lives.

**Eggs** develop in the gravel and hatch into alevins.

**Alevins** stay in the gravel. They get food from their yolk sacs and grow bigger.

After the yolk sac is used up, the tiny fish are **fry**. They swim out of the gravel to find food. They live in gentle water near the stream bank until they get bigger.

As the fry grow stronger, they take up positions in the main current of the stream. They eat insects and other small animals that live in, or fall into, the stream.

**Adults** often eat other fish, even smaller trout. Although they may live longer, trout usually do not grow as large as their salmon and steelhead relatives because they don't benefit from the ocean's abundant food supply.

Some trout live in lakes. They may live there all their lives, but often spawn in streams.

Adapted from original artwork by Gary Bloomfield, Salmon and Trout Go To School, An Instruction Manual For Hatching Salmon and Trout Eggs In Classroom Aquarium-Incubators by Diane Higgins, California Department of Fish and Game and American Fisheries Society, Humboldt Chapter, 1996.

[\(back to table of contents\)](#)