Chapter 3:

The Life Cycle of Trout

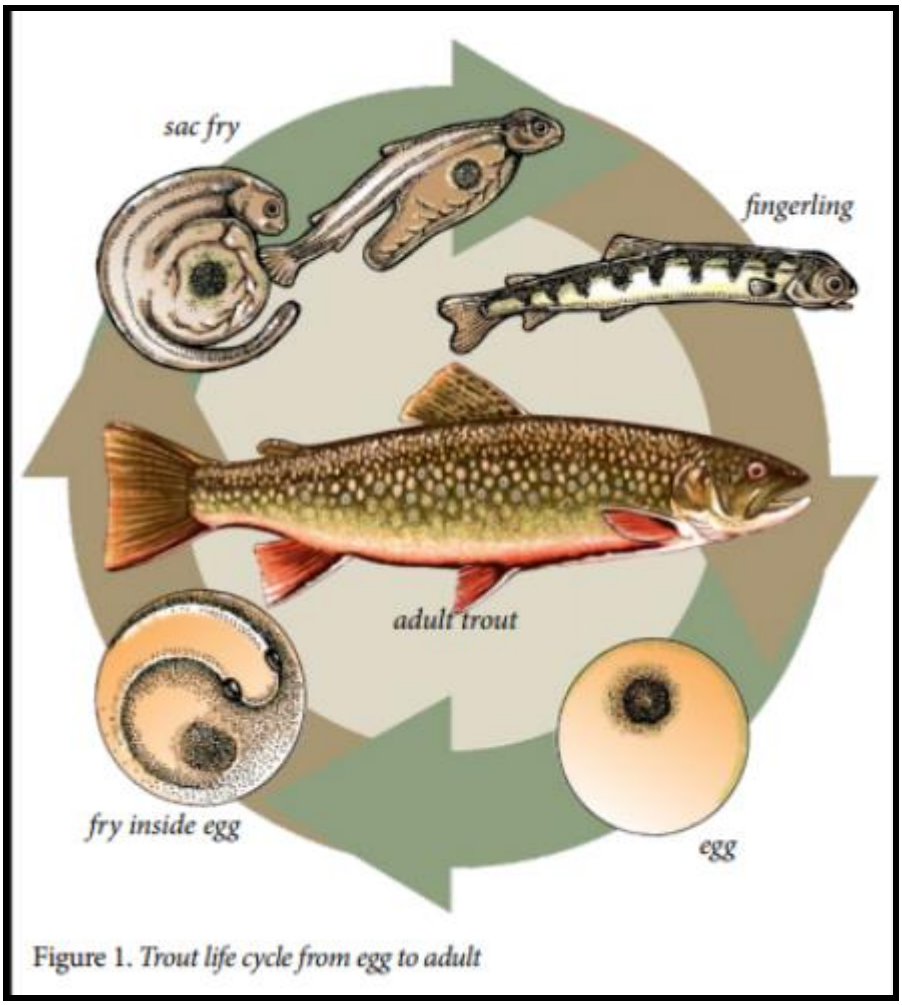

Figure 1. *Trout life cycle from egg to adult*

Illustration – Ted Walke

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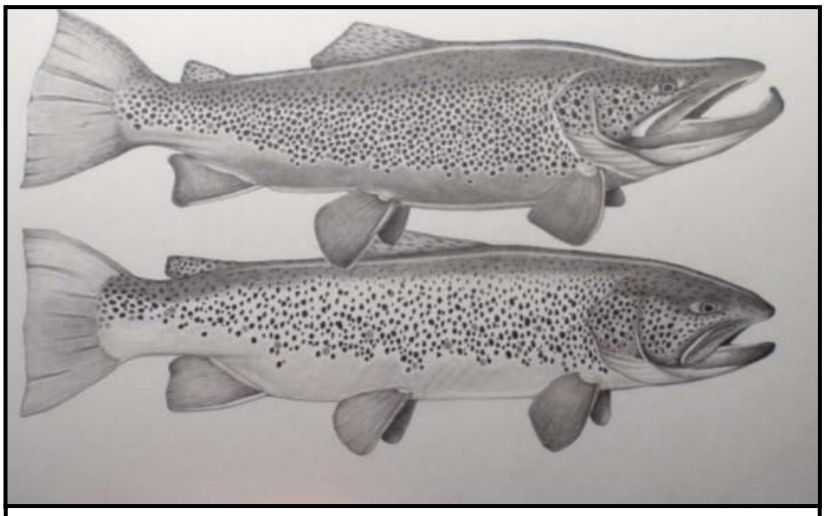
Life History of Salmonids in Pennsylvania



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)

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.

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, 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.

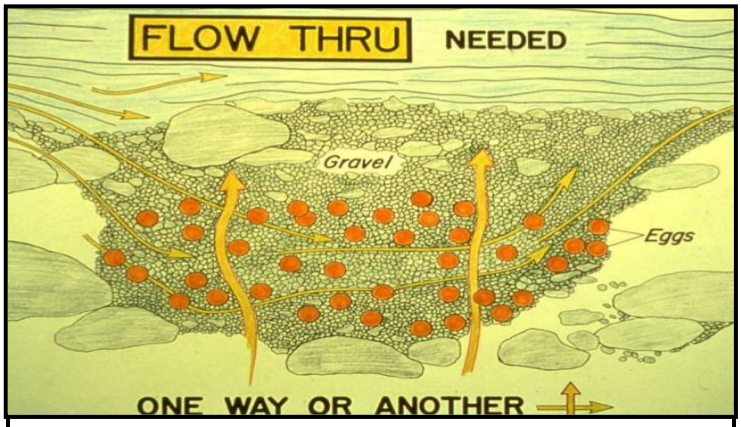


Diagram depicting how water flows through a redd to ensure the constant delivery of dissolved oxygen. (Photo from PFBC presentation)

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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.

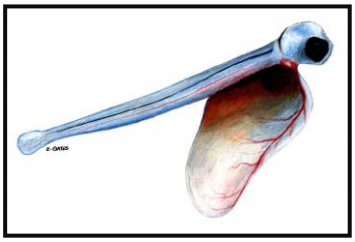
Description:

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.

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Stages of the Salmonid Life Cycle (Cont…)

C. Fry

1 Inch or Less

Definition:

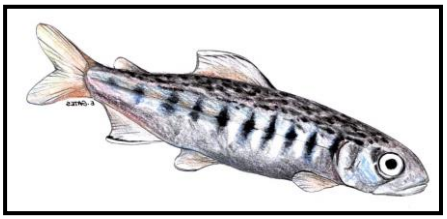
Swim-up Fry: Trout reach this stage once they have fully consumed their yolk sacs. Once the yolk sac is consumed, trout will emerge from the gravel and begin to search for food.

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



1 to 3 Inches

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.

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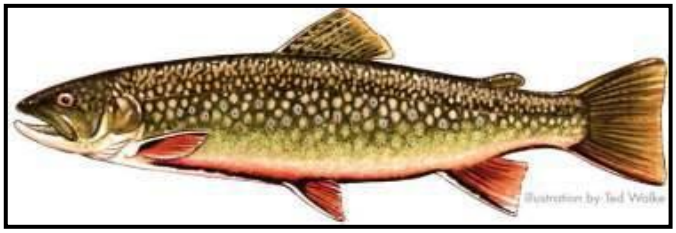
Stages of the Salmonid Life Cycle (Cont…)

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.

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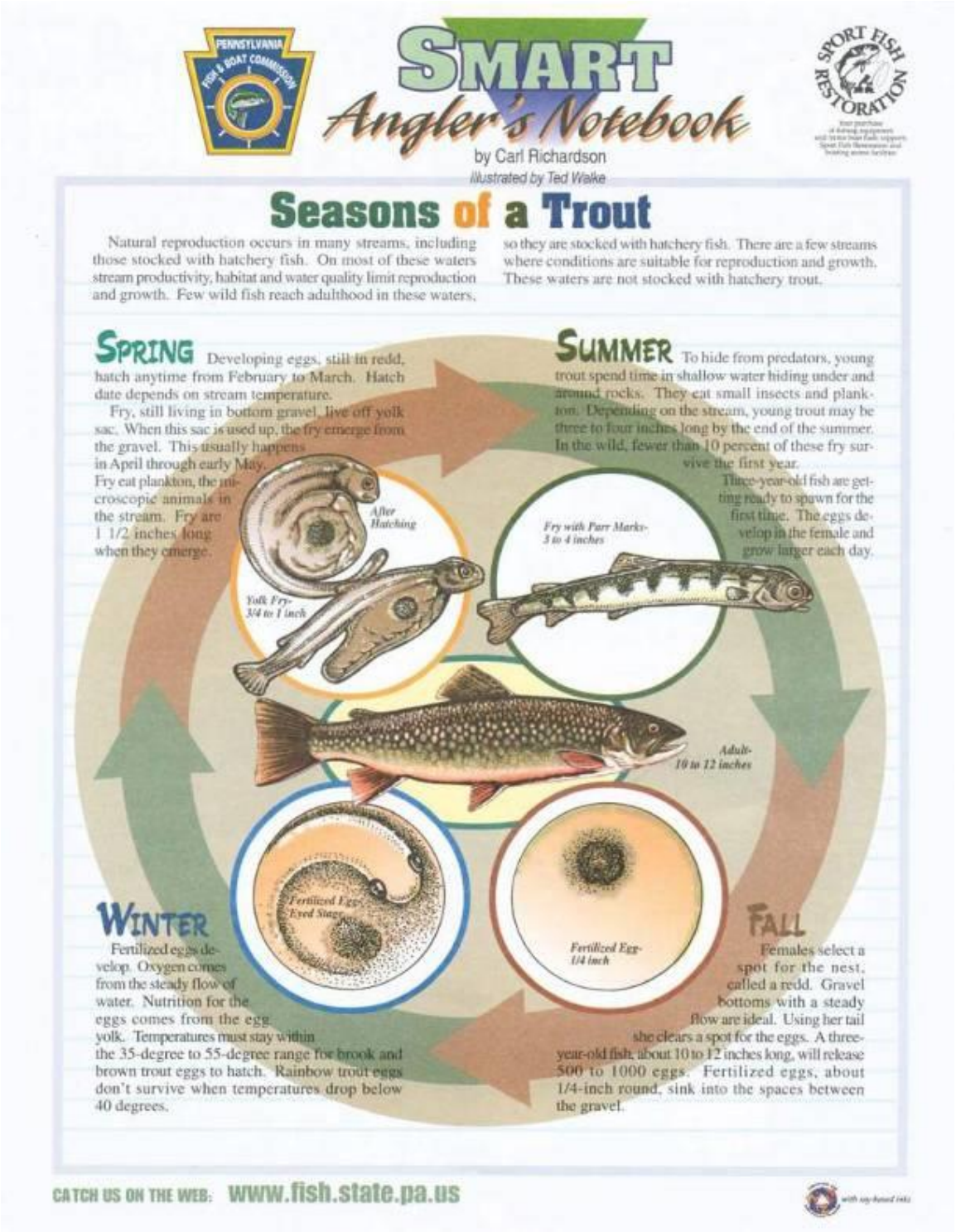
The Life Cycle of Trout



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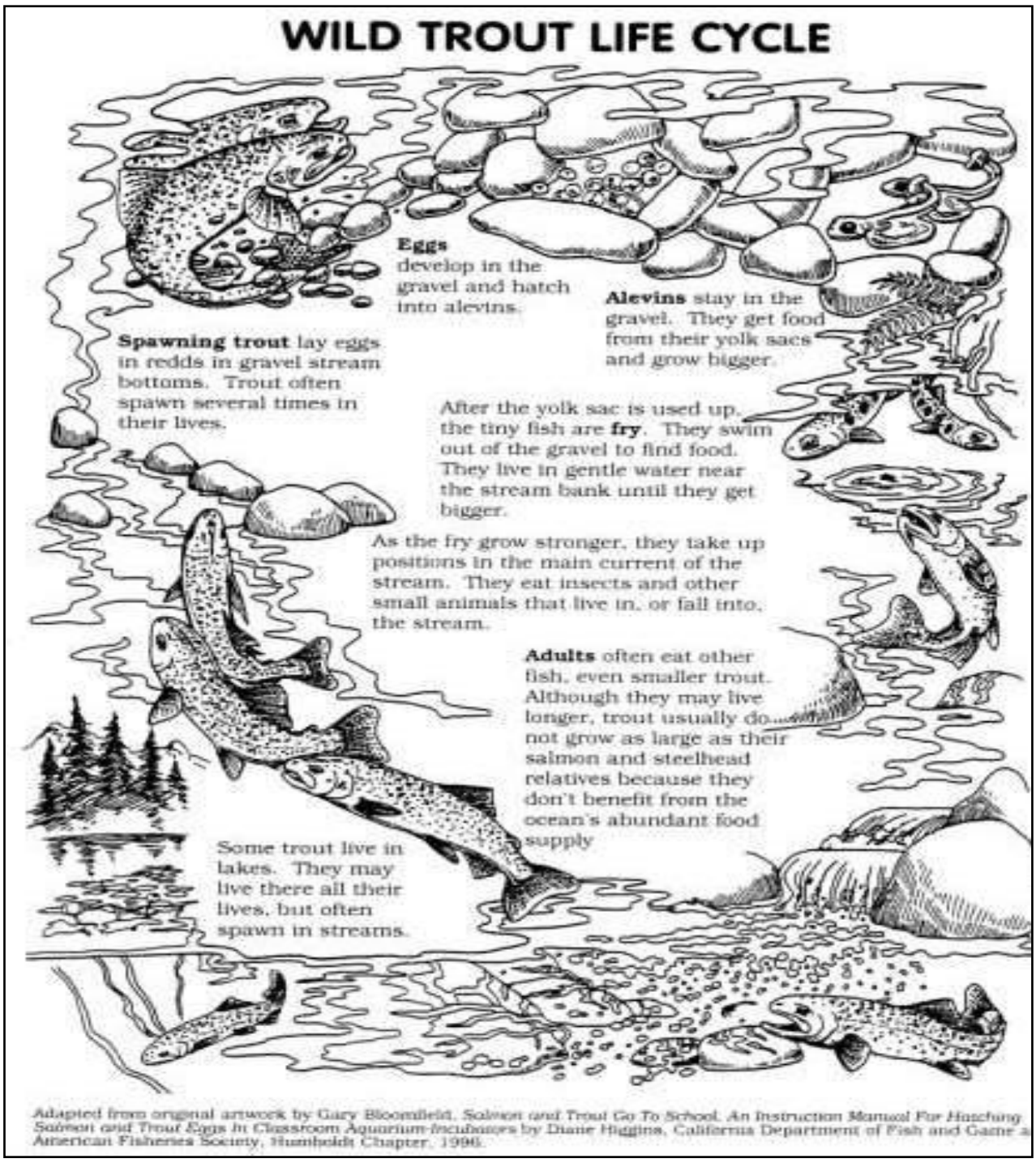
Wild Trout Life Cycle

From Nevada TIC Guide



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