

Life Stage Cheat Sheet



Life Stage Cheat Sheet for Pacific Salmon

Egg Stage

Physical Appearance

- Eggs, also known as roe, can range in size from $\frac{1}{4}$ inch (Sockeye Salmon) to $\frac{1}{2}$ inch (Chum Salmon)
- The red color in eggs come from carotenoids, a class of pigment compounds, that female salmon get from their diet.

Development

- Eyed eggs are fertilized eggs that have developed to the stage where the eyes and early nervous system of the fish can easily be seen through the translucent egg shell.
- Eggs hatch after 6-20 weeks. The timeline is dependent upon water temperature, dissolved oxygen and carbon dioxide levels, and species. Chinook eggs hatch around 12 weeks after fertilization; Sockeye after 8-20 weeks, Chum and Pink after 8-16 weeks; Coho after 7-6 weeks.
- During spawning, females use their tails to create depression in the gravel, called a redd. The redd acts as a nest for their eggs to incubate in.
- The female will use her tail to cover and protect the eggs with gravel after they are fertilized by a male.
- Female salmon can lay between 1,000 to 17,000 eggs, but only around 15% will survive long enough to hatch.

Ecology

- Only about 1% of eggs live to adulthood.
- Eggs are an important food source for other fish, birds and insects.

Alevin Stage

Physical Appearance

- 70% of the weight from Chinook Salmon alevins comes from the yolk sac, the other 30% comes from the embryo.
- Alevins are sometimes referred to as sac fry due to the yolk sac on their abdomen.



Development

- The growth and development of alevins are temperature and species dependent. Alevins in warmer water grow and develop faster than alevins in colder water. Chum spend around 8 weeks as alevins; Sockeye around 3-5 weeks, Chinook and Coho around 2-3 weeks, Pink around 4-8 weeks.
- The yolk sacs attached to the abdomen of alevin contain protein, sugar, minerals and vitamins that sustain the alevin as they learn to swim and navigate their aquatic environment.

Ecology

- Only about 1% of eggs live to adulthood.
- Alevins remain in the redd until they absorb their yolk sac. The gravel provides protection from predators.
- Alevins are fragile and their orange bellies stand out in the gravel. As a result, they avoid light and are generally more active at night.

Fry Stage

Physical Appearance

- Pacific salmon fry average 1-2 inches in length.
- Parr are salmon between the fry and smolt stage. They are named for the vertical marks on their sides called “parr” marks. Parr markings vary between fry of different species.

Development

- Pink and chum salmon head directly to estuaries once they are strong enough to swim. While Chinook fry spend a few months in freshwater streams and rivers; Coho fry spend around 1-2 years; and Sockeye spend around two years but sometimes up to 3 or 4.

Ecology

- Fry eat larvae, plankton, insects, small bits of organic matter and even other fish eggs
- Many salmon fry are eaten by predators such as birds and larger fish.
- Fry may form schools to help protect them from predators. They also utilize rocks, logs and other aquatic features to hide from predators.

Smolt Stage

Physical Appearance

- Smolts develop a silver color to help camouflage themselves from predators



Development

- The time a smolt spends in an estuary adapting to saltwater depends on the species. Sockeye head directly to the ocean while Chum spend several months in estuaries; Chinook and Coho around 3 months; Pink salmon around 5 months.
- Smoltification is a series of physiological and morphological changes that allow juvenile salmon to transition from living in a freshwater to a saltwater environment

Ecology

- Smolts feed on small fish, insects, crustaceans, and mollusks found in estuaries and tidal creeks.

Adult (Ocean) Stage

Physical Appearance

- Ocean phase salmon are primarily silver in color

Development

- Salmon spend 1-8 years at sea growing and maturing, depending on the species. Chinook mature between 3-8 years old; Sockeye between 4-5 years; Chum between 3-5 years; Coho around 4 years; Pink around 2 years.
- Adults grown much faster in the ocean than in freshwater due to the increased abundance of food.

Ecology

- Adults travel an estimated 18 miles a day for food, but they can maintain an average of 34 miles per day over long distances.
- Adult salmon primarily feed on other fish, invertebrates, and crustaceans
- Chinook Salmon can be found in the Pacific Ocean from southern California up to Alaska; Sockeye from Alaska to Oregon or California; Coho and Chum from Alaska to as far south as California but most abundant between Alaska and central Oregon; Pink from Alaska to Washington State.

Adult (Spawning) Stage

Physical Appearance

- Spawning adults undergo morphological changes when they return to fresh water. Depending on species, their body color changes from silver to shades of brown, green or red. The males of some species develop a hooded snout, humped back, and elongated teeth.



- Pink Salmon are the smallest species of Pacific Salmon in North America. They grow up to 30 inches long and average 3 to 5 pounds, although they can grow up to 12 pounds
- Chinook Salmon are the largest species of Pacific Salmon in North America. They have been reported to grow as long as 58 inches and weigh 126 pounds
- The red/pink color of salmon flesh is a result of carotenoids, the same class of pigment compounds that give carrots an orange color. Carotenoids are naturally found in the marine organisms that salmon feed on.

Development

- Salmon do not feed once they leave the ocean and begin the migration to their freshwater spawning grounds. They spend all their energy navigating back to their natal streams to spawn.

Ecology

- Salmon can migrate more than 1800 miles upstream through freshwater rivers and streams to spawn
- The majority of Sockeye Salmon spawn in areas adjacent to lakes.
- There are 5 species of Pacific salmon in North America.
 - Sockeye (*Oncorhynchus nerka*). Nickname: Red Salmon
 - Chinook (*Oncorhynchus tshawytscha*). Nickname: King Salmon
 - Coho (*Oncorhynchus kisutch*). Nickname: Silver Salmon
 - Pink (*Oncorhynchus gorbuscha*). Nickname: Humpback Salmon
 - Chum (*Oncorhynchus keta*). Nickname: Dog Salmon
- All Pacific salmon die after spawning. Their decaying carcasses fertilize aquatic and terrestrial plant life and provide food for animals
- Most adults travel to spawning grounds in their natal streams (birthplace) to reproduce. A small percentage will spawn in non-natal streams, a behavior known as straying.
- Smells and memories of their journey to the ocean as a juvenile are thought to help guide spawning adults back to their natal streams
- Salmon can “jump” over obstacles in rivers. While Chum and Pink Salmon usually don’t jump higher than three feet, Chinook, Coho and Sockeye can jump as high as eight feet.

