



Life Cycle of the White Sturgeon

1. Egg (fertilization)

Spawning occurs when the female sturgeon releases **eggs** and the male sturgeon **fertilizes** them. In order to spawn successfully, white sturgeon must find a part of the river that is the correct **depth** and has proper flow. Also, the water temperature must be between 14 and 18 degrees Celsius. Without proper depth, flow, or temperature, success of spawning is greatly reduced. A female sturgeon that is 2 meters in length can release 400,000 eggs, whereas larger females can release upwards of 4 million



Photograph courtesy of the Upper Columbia White Sturgeon Recover Initiative

eggs. Unlike most salmon species, sturgeon do not build a nest or “**redd**” in the gravel to receive the eggs. Instead, sturgeon release eggs and **milt** directly into the flowing current of the river. During spawning, one (or more) male sturgeon will swim beside the female and release milt as the female releases eggs. Fertilization occurs when a sperm successfully meets up with an egg, breaks through the outer shell, and enters the egg. You can imagine that the chance of eggs and sperm meeting up in the fast flow of the river may be very low! Even under ideal conditions, only a small percentage of eggs may become fertilized. Once released, the sticky eggs float downstream and start to sink as tiny bits of sand and **sediment** attach to their surface. Eventually, the eggs contact and stick to solid objects such as rocks, logs, sticks, or gravel on the floor of the river.

2. Egg (incubation)

The period of time between fertilization and **hatching** is called **incubation**. At 15 degrees Celsius, the **incubation period** for white sturgeon eggs is about 7 days; colder water may result in a longer incubation period. During incubation, many eggs will not survive to the stage of hatching due to: poor water conditions; **suffocation** by sand/silt at the bottom of the river; lack of a rocky bed or other surface for the eggs to stick to; and/or **predation** by several species of fish. Eggs that survive go through a process of **cellular division** that results in the formation of sturgeon **larvae**. Hatching occurs when the tiny sturgeon larvae break out of the egg and swim freely.





3. Larvae

The first free or “**motile**” stage of life for sturgeon is called the larval stage. When the larva hatch from the egg, they are less than 1 cm in length. The larvae are free swimming, but very weak, and have a **yolk sac** attached to their belly. The yolk sac provides complete nourishment for the small sturgeon for its first 12-14 days of life. During this time, the larvae will swim up off the floor of the river and allow the current to take them downstream. This will ensure that all of the sturgeon larvae are spread out over a large area and not all at one place in the river. This will increase the chance of survival in two ways:

- as the sturgeon larvae start to grow and feed, there is less competition for food
- there is a better chance that some of the tiny fish end up in optimal **habitats**.

Larval sturgeon may continue this “swim-up” behavior for several days and, eventually, end up many kilometers downstream from where they originally hatched. However, when they spread out like this, sturgeon larvae are more prone to predation by other fish. Once the larvae completely absorb their yolk sac, they start to feed on tiny **aquatic** animals and plants.



Photograph courtesy of the Upper Columbia White Sturgeon Recover Initiative



4. Fry

About 20-30 days after hatching, sturgeon larvae **metamorphose** (change) into “**fry**” or “young-of-the-year.” Sturgeon fry look like tiny replicas of larger sturgeon, with a head, fins, and tail. About 50 days after hatching, sturgeon fry are about 3-5 cm in length, and have developed features such as barbells (whisker-like sensors in front of their mouth) and scutes (bony plates) along their back and

sides. As they grow and become stronger, they become more mobile, swimming into the current and seeking out prey items as they go. Sturgeon fry tend to hide in the cracks and crevices of the river bottom during the day to avoid predators, but they swim up from their hiding spots into the **water column** during the night when they are harder to see and are moved by surface currents to new locations. White sturgeon in the lower Fraser River may be carried downstream as far as the **estuary**, the region where the fresh water of the river meets and mixes with the salt water of the ocean. Not all white sturgeon fry enter the estuary, but those that do are able to survive in these waters with mixed and variable **salinities**; not many aquatic species can tolerate these conditions, and thus white sturgeon have an **ecological advantage** in this regard.



5. Juvenile

Juvenile sturgeon are sturgeon that have not developed to the stage where they can spawn. The juvenile stage for white sturgeon starts during the first year of life, after the “fry” stage, at a time when the sturgeon is approximately 10 cm in length. At this size, a juvenile white sturgeon is able to swim well and is actively feeding on a range of small prey items. At the end of their first year of life,



juvenile white sturgeon are between 15 and 30 cm in length. The larger 1-year-old sturgeon may have had better feeding conditions; more abundant and nutritious prey; and/or they may have spent their first year in warmer water conditions. Juvenile sturgeon in the lower Fraser River grow at a rate of approximately 7 cm per year until they reach about 120 cm in length. After this they grow a bit less each year (about 5 cm per year to a size of 150 cm, and about 3 cm per year from 150 to 170 cm). Juvenile sturgeon are very mobile and will

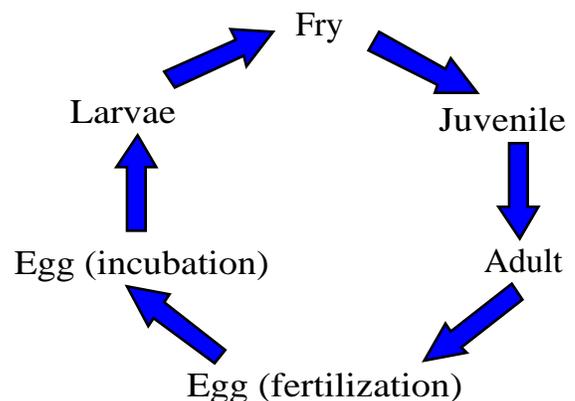
migrate great distances within, and sometimes outside, the lower Fraser River. Some may enter the marine waters of the Strait of Georgia and swim to Puget Sound, which is in the United States.



Photograph courtesy of the Upper Columbia White Sturgeon Recover Initiative

6. Adult

White sturgeon are considered to be adults (also called “mature”) when they are able to spawn. Male sturgeon are the first to reach maturity, typically at sizes from 90 to 120 cm in length (about 12-18 years of age). Females take longer to reach maturity and will remain juveniles until approximately 160-170 cm in length, which is about 25-30 years of age. The first spawning event for both males and females changes the annual patterns of movement and migration in the river that many juvenile sturgeon may have followed for the first 20 years of their life. For





sturgeon that live in the lower Fraser River, spawning locations are located in the middle and upper Fraser Valley (upstream of Chilliwack) and in the Fraser Canyon (upstream of Hope). Spawning occurs in the late spring and early summer (typically in June). Sturgeon migrate to upstream spawning locations in years when they spawn. Male sturgeon may spawn every year, but there is little information on how often they do spawn. Female sturgeon spawn infrequently, with as many as 9-12 years between spawning events for older fish. Younger females may spawn more frequently (perhaps 3-6 years between events), but again little is known in this regard. We do know that old female sturgeon can grow many eggs (over 4 million eggs in a single spawning), and that young females will grow only a fraction of this (perhaps only a few hundred thousand eggs). Large adult female sturgeon are the most important white sturgeon for population growth; unfortunately, there are very few of these old females left in the Fraser River **watershed**.



Did You Know?

The sturgeon is one of the only animal species that continues to grow throughout its entire life. Most animal species reach a maximum size during their adult life (e.g. humans).

