



Big Idea: Beginning life as an egg about 1/4 the size of a pea and growing to be a 6 metre long fish is what legends are made of. During each stage of its life, the sturgeon overcomes incredible odds to develop from an egg into an adult sturgeon. In this lesson, students will learn about the life cycle of the white sturgeon and its challenge to survive during each stage.

Objectives: Students will...

- identify the important facts for the six stages of the sturgeon's life cycle
- organize and illustrate the facts to create a life cycle diagram
- reflect on which stage of the life cycle provides the biggest challenge in terms of survival

Curricula Links: Language Arts, Science, Art

Suggested Grade Levels: 4-6

Materials:

- information sheet on the life cycle of the white sturgeon (class set)
- small (10 X 12 cm) rectangles of blank white paper (6 per student)
- small (12 X 15 cm) rectangles of construction paper (10 per student)
- 50 X 90 cm pieces of roll paper (class set)
- scissors, glue, pencil crayons

Lesson 3 - Life Cycle

Opening Motivator:

Write the word 'cycle' on the board and ask students to provide examples of things that go in cycles (e.g. seasons, dishwasher, blood travelling through the body, months of the year) . Ask students to explain briefly how their example is a cycle. Through your discussions, elicit the idea that cycles begin and end near the same point.

Classroom Activity:

1) Hand out one copy of the white sturgeon life cycle information page to each student. Inform students that they will need to read each section and find the key facts that help describe each stage of the life cycle. Before they begin, let the students know you are going to do one section that they can use as an example. In front of the class, model the process of finding the key facts within non-fiction text. Use one of the six life cycle stages as your example.

Teaching tip: Teachers can use the think-aloud strategy to model this process. You need to put one paragraph of information on an overhead (or chart paper) and underline the key ideas/facts. As you go through the process of underlining key facts, speak aloud to explain your thinking and/or decision making. Thinking aloud provides the students with examples of the thinking and decision making they will need to use .

2) You may be able to instruct students to work individually for the remaining five sections. However,

if more teacher support is necessary, use the gradual release of responsibility process. To find the important facts in the second stage of the life cycle, the students and teacher (who is guiding the discussion and recording the information) can work together to identify key ideas/facts. For the third stage of the life cycle, students can work in groups. Finally, the remaining three stages can be completed independently. These three stages can be evaluated when the students submit their work.

Teaching tip: Some of the words on the student information sheet are in bold. This indicates that the word is in the glossary. Point out this text feature to students as a way for them to help their understanding of non-fiction reading material. See the extension activities for more information on text features.

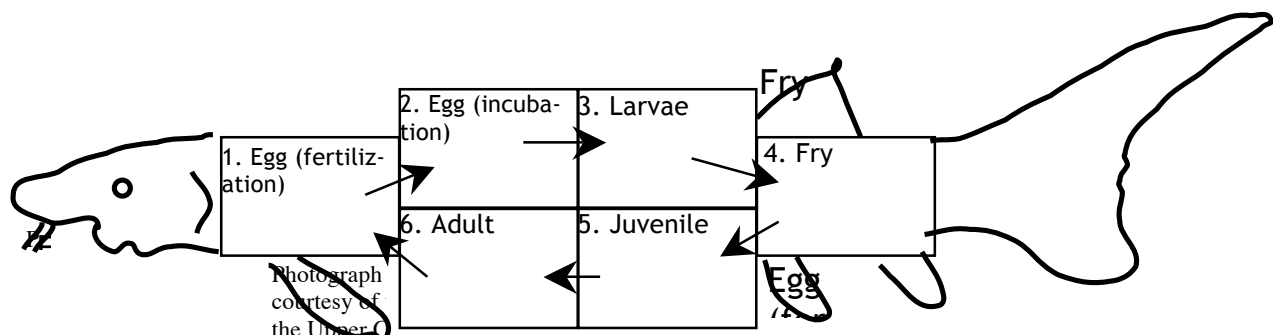
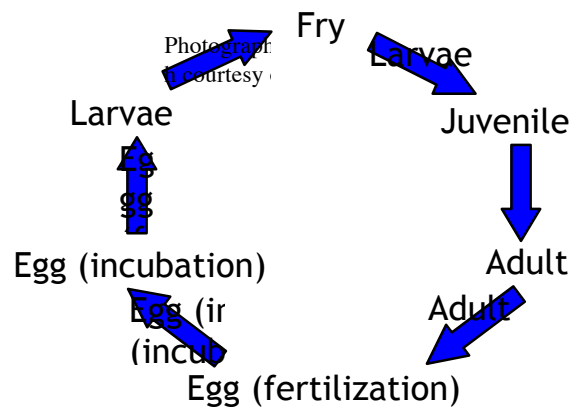
3) Once the key ideas/facts are identified, instruct the students to write the title of each stage on separate pieces of white paper, then record the important facts that were underlined or highlighted on the information page. Students will need to know how many facts (3 facts work well) to include and whether to use complete sentences or point form.

4) After copying down the facts, instruct your students to illustrate one important part of that particular stage (e.g. draw the yolk sac on the sturgeon larva for the larva stage). Drawings should be coloured and labelled. Use the pictures on the information sheet as models for the student drawings.

5) When all life cycle stages have been completed (facts and coloured pictures), provide each student with ten pieces of 12X15 cm construction paper. Instruct your students to glue the white paper on the rectangles of construction paper.

6) Each student should have four extra pieces of construction paper. Have the students draw a sturgeon head, a sturgeon tail, and four small fins on the pieces of construction paper. Then instruct them to cut the shapes and use them to assemble the sturgeon life cycle diagram.

7) To assemble their life cycle diagram, provide each student with a 50 X 90 cm section of roll paper. Instruct students to arrange the life cycle stages, head, tail and fins in the shape of a



sturgeon (remind students to keep the life cycle stages in proper order). An example of one possible way to arrange the pieces is shown above, and can be used to show students the correct arrangement. Once the parts are in place and have been checked carefully, then permit students to glue them onto the roll paper.

Conclusion and Reflections:

With your students, review the different stages of the sturgeon life cycle. Ask students to recall what specific part of that stage was important for the sturgeon’s survival. In their Science notebooks, ask students to respond to the following question, “**What stage of life cycle presents the biggest challenges for white sturgeon to survive?**” You can challenge more capable students to also propose ideas of how to improve the success of sturgeon survival during that particular stage.

Extension Ideas:

- 1) Ask students to make a venn diagram to compare the life cycle of the white sturgeon with other animals (e.g. salmon) or plants (e.g. giant redwood tree).
- 2) Use the student information about the sturgeon’s life cycle to examine the different text features. Text features are alterations to the text that help student read and/or better understand the information. These include titles, headings, glossaries, bold words, italicized words, diagrams, pictures, captions, and information boxes. Students can make a two column chart that lists (a) the different text features and (b) how the text feature helps them. Students can fill in the chart as they encounter other text features during subsequent lessons in the unit.

Text Feature	How This Helps Me To Better Understand The Information
Titles	Titles provide a general view of the information. Knowing the general idea helps me to better understand the specific information.

- 3) Students can create a readers theatre play about the life cycle of the sturgeon and perform it in front of younger children.
- 4) Students can write creative stories using a sturgeon as the main character. The story can begin with the sturgeon in egg form and progress to explain the adventures during the life of the sturgeon (use the movie Finding Nemo as an example).

Web Link:

Upper Columbia White Sturgeon Recovery Initiative - a website, from biologists who study the Columbia River white sturgeon. It has a wide variety of pictures and information on the life cycle of the Columbia River sturgeon. There is also a kids area with puzzles and colouring pages.
<http://uppercolumbiasturgeon.org/Tours/Tour-Biology1.html>

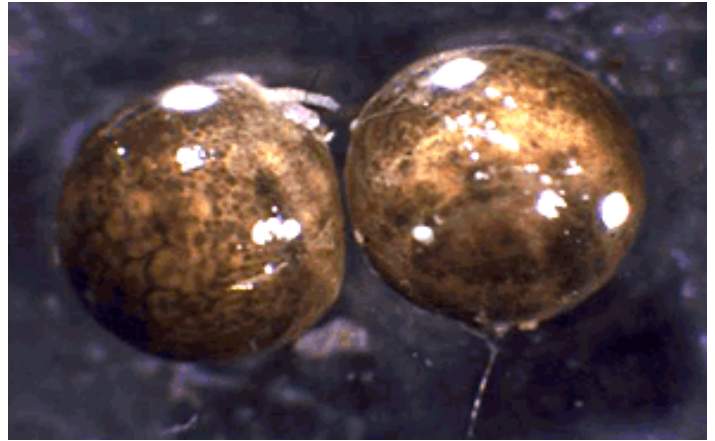
Life Cycle of the White Sturgeon (Appendix 3.1)

1. Egg (fertilization)

The first stage of the white sturgeon life cycle occurs when the female releases **eggs** into the water and the male sturgeon releases milt to **fertilize** them. This activity is also referred to as **spawning**. A female sturgeon can release between 400,000 and 4 million eggs.

The female must release the eggs in water that:

- o is deep enough
- o is moving quite quickly
- o has a temperature between 14 - 18 degrees Celsius.



Photograph courtesy of the Upper Columbia White Sturgeon Recover Initiative

If the water in the river is too cold or too warm, is too shallow, or is not moving quickly enough, fewer eggs will survive.

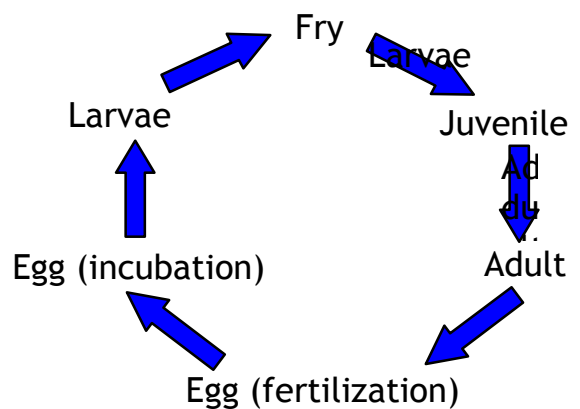
Sturgeon release eggs and **milt** directly into the flowing water of the river. Because of this, sometimes very few eggs become fertilized. Fertilized eggs start to sink and stick to solid objects such as rocks, logs, sticks, or gravel on the floor of the river. They stay attached to these objects until they hatch.

2. Egg (incubation)

The second stage of the white sturgeon life cycle is called **incubation**, which is the time between fertilization (stage 1) and **hatching** of the egg (stage 3). This stage only lasts 7 days.

During incubation, many eggs will not survive due to:

- o poor water conditions
- o **suffocation** by sand/silt at the bottom of the river
- o lack of a rocky bed or other surface for the eggs to stick to
- o being eaten by other species of fish.

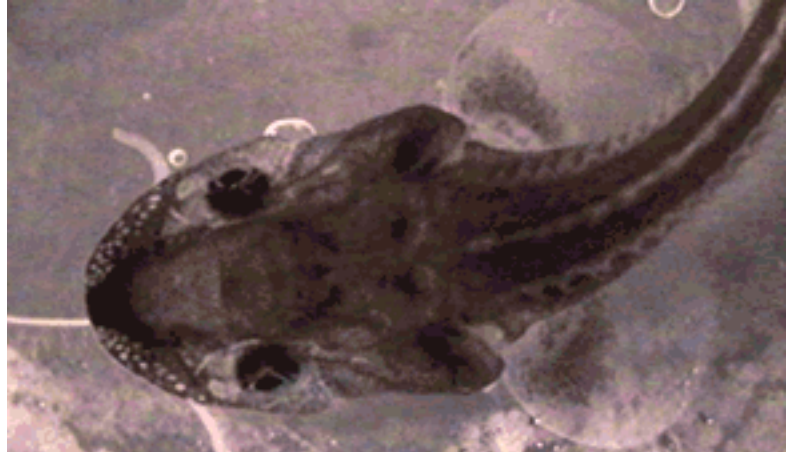


Eggs that survive go through many changes that result in the formation of sturgeon **larvae**, or baby sturgeon. Hatching occurs when the tiny sturgeon larvae break out of the egg and begin to swim.

3. Larvae



The first stage in which sturgeon are able to swim is called the larval stage. When the larvae hatch from the egg, they are less than 1 cm long. The larvae can swim freely, but are very weak. The larvae have a **yolk sac** attached to their belly. The yolk sac provides food for the small sturgeon for the first 12-14 days of life.



Photograph courtesy of the Upper Columbia White Sturgeon Recover Initiative

At night, the larvae will swim up from the bottom of the river and allow the current to take them downstream to different parts of the river. This will cause the sturgeon larvae to spread out along the river. They do this for two reasons:

- o there will be less competition for food when they lose the yolk sac
- o there will be a better chance that they end up in **habitats** that will improve their ability to survive

One problem the sturgeon larvae face when they drift downstream is that there is more chance they will be eaten by predators. This is why they choose to drift mostly at night, when they are less likely to be seen. After 12-14 days, the larvae have absorbed all of their yolk sac and they start to feed on tiny **aquatic** animals and plants.

4. Fry

About 20-30 days after hatching, sturgeon larvae change into "**fry**." Sturgeon fry look like tiny copies 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 tiny **barbels** and **scutes**.



As they grow, sturgeon fry become stronger swimmers and are able to **prey** on tiny aquatic animals. To avoid getting eaten by other **predators**, sturgeon fry hide in the cracks and crevices of the river bottom during the day and do most of their swimming and feeding at night. In the lower Fraser River, some sturgeon fry may drift far downstream to the **estuary**, where the fresh water of the river meets the salt water of the ocean. Since very few fish species can survive in an estuary, there are fewer predators that prey on the sturgeon fry.



Photograph courtesy of the Upper Columbia White Sturgeon Recover Initiative





5. Juvenile

The **juvenile** stage for white sturgeon starts during the first year of life, after the “fry” stage. At this stage, the sturgeon is approximately 10 cm in length. Juvenile white sturgeon are able to swim well and can feed on many different small animals. When they reach one year of age, juvenile white sturgeon can be anywhere between 15 and 30 cm in length. Juvenile sturgeon in the lower Fraser River grow about 7 cm every year until they reach about 120 cm in length. Juvenile sturgeon are very strong swimmers and can **migrate** great distances along the lower Fraser River. Some may leave the Fraser River and enter the marine waters of the Strait of Georgia and swim to Puget Sound in Washington State.



Did you know? The sturgeon is one of the only animal species that continues to grow during its entire life. Most animals reach a maximum size at some point during their adult life (e.g. humans)

6. Adult

White sturgeon are considered to be adults or “mature” when they are able to **spawn**. Male sturgeon can reach maturity when they are 12-18 years of age. At this age, they can be between 90 to 120 cm in length. Females take longer to reach the adult stage; they do not reach maturity until they are 160-170 cm in length, which is about 25-30 years of age.

Female sturgeon do not spawn every year. Younger female adults may spawn every 3-6 years, but older females may wait from 6-12 years between spawning events. Male sturgeon may spawn every year, but scientists are unsure of this. Spawning occurs in the late spring and early summer (typically in June and July)., Older female sturgeon can grow and release over 4 million eggs, whereas younger females may only grow and release a few hundred thousand eggs each time they spawn. Therefore, having healthy, large adult female sturgeon in the population is very important for increasing the numbers in the sturgeon population. Unfortunately, there are very few of these old females left in the Fraser River **watershed**.

