



Lesson Five - Threats to the Fraser River Sturgeon

Opening Motivator:

Place the transparency of Extinct/Endangered Canadian Animals on the overhead. Ask the students if they recognize the names of the animals, have ever seen pictures of the animals, or have seen the animals in real life. Ask students to predict what they all have in common (answer: they are all extinct or endangered Canadian animals). Once the answer is determined, impress on the students that this Canadian list is only a small percentage of extinct / endangered animals throughout the world, and that it does not include plants or other living organisms (protists, monerans, fungi).

Next, ask the students to predict what the headings for each category could be. Some hints may be provided to lead the students to the correct answers. 'Extinct in the Wild' refers to species that are only found in captivity. 'Critically endangered' refers to species that face an extremely high risk of extinction in the immediate future, and 'endangered' refers to species that face a high risk of extinction in the near future.



Leatherback Turtle



Sea Otter



Eskimo Curlew



Blackfin Cisco

Big Idea: Over the last century, humans have managed to create so many problems for the white sturgeon that their 200-million-year-old existence is in peril. Commercial fishing, habitat destruction, pollution, urban development and other human-related activities have contributed to the demise of white sturgeon. In this lesson, students will examine the factors that have contributed to the endangerment of white sturgeon and will construct a concept map that organizes and connects these different concepts.

Objectives: Students will...

- understand the challenges white sturgeon have faced to survive in the Fraser River
- make connections between the different threats and organize these relationships on a concept map

Curricula Links: Social Studies, Science, Language Arts

Suggested Grade Levels: 4 - 6

Materials:

- One copy of Appendix 5.1
- Transparency of Appendix 5.2
- Copies of 'Threats to the Fraser River Sturgeon' (Appendix 5.3)
- Transparency of Appendix 5.4
- One copy of Appendix 5.5
- Many sticky notes per student

Classroom Activity:

1) Give students a copy of the handout entitled “Threats to the White Sturgeon” (Appendix 5.3) and ask them to read the information.

Teaching Tip: *Remind students to use their glossary or a classroom dictionary to look up words they do not understand. The words in the unit glossary are in bold font the first time they appear in the unit, so many glossary words in the ‘Threats’ information may appear in normal font.*

2) Once the students have a solid understanding of the information, they should return to the written information and underline (or circle) all of the key ideas (many of these will be nouns). Students may need a reminder of how to identify key ideas in non-fiction text. Also, inform the students that the key ideas will be the main component of a concept map which illustrates the connections between all aspects of the threats to Fraser River white sturgeon.

3) If students have no previous experience with concept maps, it is recommended that the process of making a concept map is modeled for them.

Teaching Tip: *An effective way to model the creation of a concept map is to write the concepts on recipe cards and tape them on a chalkboard. Clearly explain your thinking as you move the concepts into position and connect them with arrows and words.*

For more information on the creation of concept maps, see Appendix 5.4 and 5.5

4) Instead of using recipe cards, students can use sticky notes for their key ideas. They can arrange the sticky notes on 11X17 paper and group similar ideas. Once their key ideas are arranged in a logical order, the students can connect them with straight lines and describe the relationship between the words with 1-3 words (usually verbs).

5) Encourage students to improve the organization and appearance of their concept map by including colour, small diagrams or pictures, and different shapes. The rubric in Appendix 5.5 can assist the students in working towards the teacher’s expectations.

Conclusion and Reflections:

Ask students to share some of the connections they made between the different aspects of the threats to Fraser River white sturgeon. Afterwards, ask students to respond to the following: “Describe two connections that you found interesting or that surprised you. Why were they interesting or surprising?”

Extension Ideas:

- 1) Research one of the extinct or endangered animals from the introduction. Find out what caused the extinction or what can be done to prevent the extinction of the endangered animals.
- 2) Create a skit or dramatization that incorporates one of the threats to the sturgeon population and a possible solution.
- 3) Examine the issues around fish farms for white sturgeon and make a list of the pros and cons. (see internet links)

Web Links:

This thinkquest site provides a lot of general information on aquaculture (fish farming) with related links. <http://library.thinkquest.org/22403/data/medium/whatis/whatisbody.html>

An interesting article on the topic of sturgeon aquaculture and caviar production can be found at <http://www.agmrc.org/agmrc/commodity/aquaculture/sturgeon/sturgeonprofile.htm>

Some [interesting information](#) on the topic of sturgeon aquaculture and caviar production can be found at http://www.agmrc.org/commodities_products/aquaculture/sturgeon-profile/

For more information on concept maps, refer to the website [Cmap Tools](http://cmap.ihmc.us) <http://cmap.ihmc.us>

The 'Concept Mapping Homepage' has a good example of a concept map. http://users.edte.utwente.nl/lanzing/cm_home.htm

The process for creating a concept map can be found at <http://www.udel.edu/chem/white/teaching/ConceptMap.html>

[Instructional Strategies Online website](#) has basic information on concepts maps and can be found at <http://olc.spsd.sk.ca/de/pd/instr/strats/conceptmap/index.html>

There are many web tools that allow users to make concept maps. Most require you to sign up with an email address, but they are free. A few include [bubbl.us](#), [simple mapper](#), and [popplet](#).

Appendix 5.1 - Extinct / Endangered Canadian Animals

Extinct Animals in Canada	Extinct in the Wild Animals in Canada
Blackfin Cisco (type of fish) Longjaw Cisco (type of fish) Deepwater Cisco (type of fish) Labrador Duck Great Auk	Black-footed Ferret
Critically Endangered Animals in Canada	Endangered Animals in Canada
American Burying Beetle Shortnose Chub (type of fish) Boccacio Rockfish Eskimo Curlew (type of bird) Slender-billed Curlew Eastern Cougar Northern Riffleshell (type of mussel) Tubercle-blossom Pearl Mussel	Shortshine Rockfish Western Toad Whooping Crane Basking Shark Peary Caribou Sea Otter Northern Sealion Black Right Whale Coalfish Whale Blue Whale Fin-backed Whale Vancouver Island Marmot Leatherback Turtle Freshwater Pearl Mussel



Appendix 5.2

Title: _____

Blackfin Cisco (type of fish) Longjaw Cisco (type of fish) Deepwater Cisco (type of fish) Labrador Duck Great Auk	Black-footed Ferret
American Burying Beetle Shortnose Chub (type of fish) Boccacio Rockfish Eskimo Curlew (type of bird) Slender-billed Curlew Eastern Cougar Northern Riffleshell (type of mussel) Tubercle-blossom Pearl Mussel	Shortshine Rockfish Western Toad Whooping Crane Basking Shark Peary Caribou Sea Otter Northern Sealion Black Right Whale Coalfish Whale Blue Whale Fin-backed Whale Vancouver Island Marmot Leatherback Turtle Freshwater Pearl Mussel



Appendix 5.3 - Threats to the White Sturgeon

Habitat

Fully grown sturgeon live in different locations along the Fraser River and are able to survive even when the habitat changes. Unfortunately, adult sturgeon require specific conditions in the river to spawn. Do you remember what they are? To successfully spawn, sturgeon eggs require a specific temperature, depth and flow of water. Humans are affecting these conditions, and are making it difficult for the sturgeon eggs to survive. Even when eggs do survive, the fry and juvenile sturgeon are also finding it difficult to survive in the Fraser River.

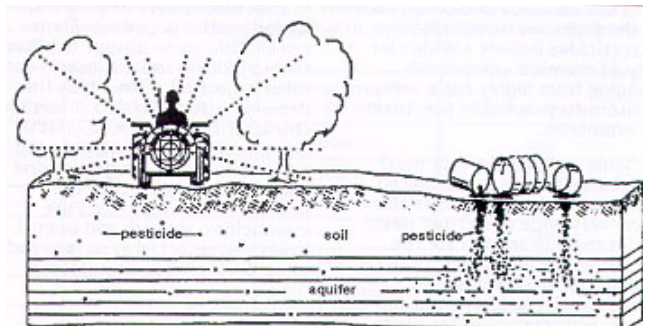


As you already know, food is very important to the survival of any living thing. Changes to habitats in the Fraser River decrease the amount of food (e.g. salmon, eulachon) available for white sturgeon. Therefore, a loss of or change in habitat of salmon, eulachon and other sources of food is also a threat to white sturgeon.

Because many sturgeon spend their entire lives in the Fraser River, habitat loss and habitat degradation in the future is likely the greatest threat to the long-term sustainability of Fraser River white sturgeon.

Pollution

Pollution in the Fraser River can come from various places, including sewage treatment plants, farms (run-off of pesticides and fertilizer), pulp mills, saw mills, and other industrial plants. Each of these sources of pollution has one thing in common - humans. These direct sources are not the only way that humans pollute the Fraser River. Pollution of the environment by individuals (e.g. putting paint or oil on the ground) also reaches the

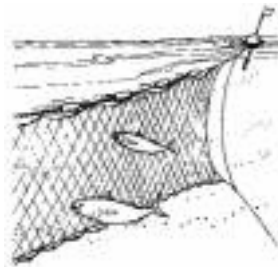




river, either through the sewer system or ground water flow. Direct exposure to some types of pollution can have a huge negative effect on the survival of young sturgeon. Pollutants can build up in the prey items that sturgeon eat (such as eulachon and salmon), and are passed on to sturgeon.

Fishing

There are four different types of fishing activity on the Fraser River that have an impact on



sturgeon: 1) commercial and aboriginal drift gill net fishing; 2) Aboriginal set gill net fishing; 3) recreational fishing; and 4) illegal fishing (poaching). The target of the commercial drift gillnet fishery and Aboriginal drift and set gillnet fishery, is species of Pacific salmon.

However, every year, thousands of white sturgeon are also captured in these nets, and some sturgeon are badly injured or killed (especially in nets that are “set” to fish for several hours



during summer months when water temperatures are high).

For recreational fishing, the law states that all white sturgeon captured must be released back into the river unharmed. Sturgeon released from the recreational fishery survive at a very high rate, but some may be injured or even killed if handled improperly. Lastly, illegal poaching of white sturgeon is done for both personal consumption and sale on the black market. They are caught for their meat and roe (caviar). Sadly, the number of fish that die from poaching is estimated to be several hundred per year.

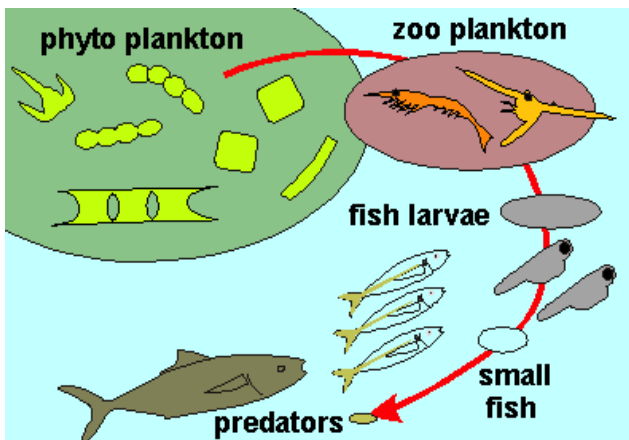
Food Supply

If the food supply of Fraser River white sturgeon decreases or disappears, then the population of white sturgeon will also decrease or disappear. White sturgeon are large animals that require large amounts of food. Mature white sturgeon require even more food during the year before spawning (to grow eggs and milt). Even small juvenile sturgeon require lots of food to grow and stay healthy.





Many of the fish species (e.g. salmon and eulachon) that are eaten by Fraser River white sturgeon are exploited by humans. These important food sources are taken from the ocean in great numbers by humans before they return to the Fraser River (thus, before sturgeon are able to feed on them). Also, water pollution, loss and ruin of habitat, and other changes by humans have caused a decrease in the number of salmon, eulachon, and other food sources for sturgeon. Imagine what would happen to you if suddenly if there was very little food for you to eat?



Temperature

Scientists have warned humans that the climate of the earth is getting warmer. The warming of the earth results in many negative changes for plants and animals. Since climate affects water flow and temperature in many different ways, it may also affect how many white sturgeon survive and where they live. Also, human activities in the Fraser River watershed, such as clear-cut logging and housing developments, can change the flow of water and increase water temperatures. As learned in the life cycle section, successful spawning and growth of Fraser River white sturgeon requires certain water temperatures. If water temperatures are warmer, more sturgeon eggs and larvae will die. Warmer water temperatures also affect adult sturgeon. Higher water temperature makes the sturgeon less capable of surviving stressful events (such as being tangled in a net) and more likely to catch a disease.



Appendix 5.4 - Making Concept Maps

A concept map is a special form of a web that illustrates the relationship between various concepts (ideas, people, places, items etc...). The concepts are written as single words and enclosed by a rectangle (or other shape) to form concept boxes. Related concepts are connected with arrows, and words (usually verbs or short phrases) are written on the arrows to describe the relationship between the two connected concepts.

When arranging the concept map, place related concepts close to each other, and use straight lines to link them. It is preferable that the connecting lines do not cross. Important concepts will have many links, and should first be placed near the center when starting.

Students can demonstrate higher-level thinking by using similar colours or shapes to group the concepts. For example, all animals could be in red ovals and concepts related to industry can be in blue triangles.

For more information on concept maps, refer to the website [Cmap Tools](http://cmap.ihmc.us)
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Appendix 5.5 - Rubric for Evaluating Concept Maps

	Level 1	Level 2	Level 3	Level 4
Concepts	Few important names and concepts	Some names and important concepts	Most important names and concepts	All important concepts
Organization	No sense of organization	Basic level of organization	Logically organized at more than one level (ex. use of colours)	Complex organization at various levels
Links	Few concepts or names are connected with lines	Some names or concepts are connected with lines	Most names or concepts are connected with lines (some with arrows)	All names or concepts are connected with lines and arrows
Linking Words	Linking words are simple and repetitive	Variety of linking words	Linking words are accurate and varied	Linking words are expressive and purposeful
Neatness	Not very neat and there are some spelling errors	Not a polished copy and a few spelling errors	Good copy quality with no spelling errors	Extra effort in presentation with no spelling errors