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NORTHWEST WILDLIFE PRESERVATION SOCIETY

White Sturgeon

Acipenser transmontanus

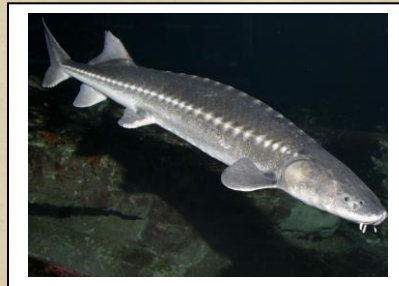


Image from: montereybayaquarium.typepad.com

By Veronica Pagowski

Sturgeons are old fish, in fact in the past 200 million years they have changed little. These living fossils are remarkably different from most bony fish and have been likened to sharks. Instead of scales, these fish have tough body armour and a smooth outer body surface. Sturgeons live to remarkable ages and grow to even more remarkable sizes. However, they have not been studied in depth and most species are endangered or critically endangered. British Columbia is home to the species *Acipenser transmontanus*, or the white sturgeon whose Latin name means “beyond the mountains”.

Characteristics

The white sturgeon is most easily characterized by its scutes, or blades of body armour that run along the animals back. The white sturgeon, contrary to what its name suggests, is a pale grey and has a white belly. The largest reported white sturgeon weighed 816 kg (1800 lbs) and the oldest white sturgeon on record was estimated to be about 104 years old! Unfortunately, the remarkable ages and sizes that these animals can attain also make these animals particularly sensitive to overfishing. Since these fish can live to be over 100 years old, they don't reproduce often and their populations can be quickly depleted if overfished. Ancestrally, the scutes of the sturgeon are thought to have provided the fish with hard external armour that protected it from prehistoric predators. Scutes may also serve as ornamentation that functions in sexual selection. The white sturgeon feeds and lives near the sea floor. Since little light penetrates at these depths, sturgeons have evolved barbels near the mouth in order to sense their prey and their eyes are highly reduced. Sturgeons grow slowly as they age so their size can vary a great deal, depending on the age of the fish. In general, male white sturgeons reach sexual maturity between the ages of 12 and 18. At this age, they are usually just over 1 metre long. White sturgeons around the age of 40 are typically around 2.4 metres (8 feet) in length. Sturgeons don't closely resemble any other family of fish; however, some species can look fairly similar. In particular, the white sturgeon is most often confused with the green sturgeon which has a single row of one to four scutes. In contrast, the white sturgeon has two rows of four to eight scutes. In general, the number of scutes is a good way to

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differentiate between species. This observation supports the idea that scutes may play a role in sexual selection as different species do not typically interbreed. Sturgeons suck up their prey with an extensible mouth which functions somewhat like a vacuum cleaner. Unlike most bony fish, sturgeons' tails have a larger curved upper lobe similar to that of some sharks. Early juvenile stages of the sturgeon life cycle also closely resemble sharks' life cycles. As the sturgeon matures, it develops its characteristic scutes and its body, initially a dark brown/grey, lightens over time.

Life Cycle

White sturgeon typically spawn in fresh water and migrate down-stream as they mature. Juveniles often prefer slow-moving water. Young sturgeon are very sensitive to their environment and, as a result, few survive to sexual maturity. Typically, white sturgeon eggs develop best at temperatures between 14 and 18 degrees Celsius. Spawning usually occurs in May or June and it has been observed that localized flooding can initiate spawning. Female sturgeon can release up to 4 million eggs. Males release milt, containing sperm, which fertilizes the eggs and allows them to stick to the sediment. When the eggs hatch, usually after about a week, the sturgeon fry are approximately 1 cm in length and gain nutrients from a yolk sack for up to 2 weeks. In these early stages of development, the sturgeon are prone to heavy predation and suffocation by sediment. During the day, most fry hide in crevices and only swim in the water column at night when they are less likely to be seen by predators. Over time, the sturgeon will drift with the water current and disperse over a large area. Each year the sturgeon will grow about 7 cm until they reach a length of about 120 cm. After this, the growth rate decreases. Male sturgeon reach sexual maturity between the ages of 12 and 18, while female sturgeon become sexually mature when they are about 25-30 years old. It is important to note that white sturgeon have not been studied in depth and the ages at which sexual maturity is reached are still somewhat disputed among scientists. The age at which sexual maturity is reached may depend of environmental factors. Spawning occurs about every 4 years for younger sturgeon and about every 9-11 years for older sturgeon. Parents do not play a role in raising their young after the eggs have been released. Instead, sturgeon ensure the success of their offspring by producing very large quantities of eggs. Thus, the probability of survival of at least some individuals is increased.

Habitat

The white sturgeon can be found along the west coast of North America from the Aleutian Islands to California. Most commonly, they live in slow-moving waters such as estuaries or slow-moving rivers. Unlike some other species of sturgeon, the white sturgeon does not typically migrate to the ocean as it matures. The most significant populations are found in the Sacramento, Columbia and Fraser rivers. Two of these, the Columbia and the Fraser flow through British Columbia. White sturgeon generally live in dark, muddy waters where sedimentation occurs.

The white sturgeon is one of the few species of sturgeon that is not considered to be endangered worldwide (certain populations however are at risk of extinction in British Columbia)

Behaviour

As white sturgeon are benthic dwellers, they feed mostly on prey found on the sea floor. Typically, this includes dead fish, molluscs, lampreys, or other invertebrates.

White sturgeon are generally slow growing, relatively social, and can most often be found near the shores of estuaries or rivers. Little else is known about sturgeon behavior as they have not been studied in depth. Scientists have observed strange social behavior, particularly in the sturgeon populations in the Columbia River. At certain times, these sturgeon can form balls of about 60,000 fish that gather at the bottom of a river dam. This amounts to around 5-10 percent of all the sturgeon of the lower Columbia River. This behavior is not well understood and warrants further study. However, it is hypothesized that this behavior may serve as a defense mechanism against sea lions since it was observed as sea lions

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appeared in the area. It has also been observed that these bizarre gatherings of sturgeon often occur during winter months. Because of this, some scientists postulate that the grouping of sturgeon can help conserve heat during winter. However, there is not much data that specifically backs either of these hypotheses. During spawning, males have also been observed to vibrate against the female creating a distinct noise. The reason and mechanism behind this this is unknown.

Threats

White sturgeon face many of the same threats that other species of fish do. Over-fishing, pollutions, toxins and debris in their aquatic environment and the building of dams, are main threats. The Columbia and Snake rivers, for example, has resulted in white sturgeon populations being unable to move freely in these rivers. Once threatened due to overfishing, this species is beginning to make a comeback. The white sturgeon remains on British Columbia's conservation red list, and many populations in British Columbia still face significant threats to their populations. Sturgeon are prized, commercially, for caviar which is considered a delicacy in parts of Europe and North America. Caviar is made from sturgeon eggs. Collecting sturgeon eggs directly from the ocean poses an obvious problem for the growth of sturgeon populations since the juvenile populations can be very rapidly depleted. Today, much of the sturgeon egg caviar sold comes from on-land fish farms which are a more sustainable way to harvest caviar. Only larger fish produce marketable caviar and fishing size-restrictions make it unlikely to catch sturgeon capable of producing caviar directly from the ocean. Instead, caviar can be harvested from fish that are usually at least ten years old which are grown from eggs in aquaculture. In recent years, significant advances have been made in order to protect white sturgeon populations. For example, populations that were once threatened by severe vertical drops caused by dams may now be able to overcome these barriers because of a catch-and-release system in which the fish pass through a long tube that allows them to safely transverse these vertical drops. Unfortunately, this solution only partially alleviates the stresses that dams pose on sturgeon populations. Fast-moving water caused by dams can damage sturgeon spawning grounds which require slow-moving water so that the sticky eggs can attach to the substrate. Several populations of sturgeon in British Columbia are threatened with extinction. These include the Nenchack, Columbia, and Kooteney populations. Scientists in British Columbia have been experimenting with artificial spawning during which eggs gathered directly from wild female sturgeon are artificially incubated and juveniles are released directly into their appropriate habitats. Many of these experiments have shown promising results. White sturgeon are also threatened by organic materials produced by humans such as sewage and pesticides that accumulate in the water column. These materials can cause developmental and general health defects in sturgeon. Other than humans, adult white sturgeon have virtually no predators. The young however are heavily preyed upon by other larger fish, cormorants, herons, otters and even seals and sea lions.

What We Can Do To Help

If you reside in British Columbia, there are many resources that allow you to learn about specific populations of white sturgeon and learn about the measures being taken to conserve them. Specifically, the species at risk public ministry website (http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=123) provides many links to learn about the status of various white sturgeon populations. Many status reports and results from various conservation efforts are documented here. On this website, there is a "get involved" link that allows you to learn more about at-risk species in Canada, find out about public consultations, and gain some insight on the funding and support that the ministry receives. Though there are a great deal of resources on this website that refer to the white sturgeon specifically, the website is devoted to all at-risk species and is a great way to get involved and learn about these species.

Sturgeon are threatened by many of the same factors that other aquatic animals are. In general, conserving our local wetlands, estuaries and rivers, following fishing guidelines, and purchasing sustainable seafood are important measures that we can all take in order to create a healthier ecosystem that can harbour larger, healthier populations of aquatic animals. By allowing natural spaces to remain

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intact, we are taking a huge step forward in conservation. The Great Canadian Shoreline Cleanup (<http://www.shorelinecleanup.ca>) offers some great ways anyone can get involved in maintaining the health of our local ecosystems by actively volunteering to help clean them up.

Other Interesting Facts

The oldest sturgeon, on record, was estimated to be 150 years old. The oldest known white sturgeon is estimated to have lived approximately 104 years. Sturgeon reach sexual maturity at a very late age and live for a very long time. These ancient fish that have evolved little over hundreds of millions of years and are thus a very interesting species for biologists who wish to shed some light on the behaviors and physiology of pre-historic aquatic habitats and the animals that lived there.

Sturgeon share many similarities with sharks. In particular, these fish are supported by a skeleton that is composed mostly of cartilage instead of bone like most fish. As sturgeon age, their characteristic scutes begin to wear down.

Some believe that the infamous "loch-ness monster" spotted in Scotland waters may actually be a large Sturgeon that occasionally surfaces above the water column. There is however no scientific evidence for this. The idea remains purely an intriguing conjecture.

Bibliography

The NOAA Fisheries Office of Protected Resources provides general information and population size information on a similar species, the Atlantic sturgeon.

<http://www.nmfs.noaa.gov/pr/species/fish/atlanticsturgeon.htm>

The Species at Risk Public Registry provides detailed general information on many native Canadian species that are considered to be at-risk of extinction. This website is a great way to learn about various species and find information on specific measures being taken to conserve populations and well as the results obtained thus far from many of these conservation efforts

http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=123

This educational pdf provides a detailed description of the life cycle of white sturgeon from egg to adult

<http://hsbc.frasersturgeon.com/rhspsec/Lesson1/Articles/Article1.pdf>

The British Columbia Ministry of Environment website provides great general information on the white sturgeon as well as information on its conservation and some pretty spectacular images.

<http://www.env.gov.bc.ca/wld/fishhabitats/sturgeon/>

This website provides a very quick and general run-down of information about the white sturgeon

http://www.bcadventure.com/adventure/angling/game_fish/sturgeon.phtml

This news article discusses the strange sturgeon behaviors observed at the Bonneville dam in the Columbia River. This fascinating article is definitely worth taking a look at. There are some interesting videos to watch.

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http://blog.oregonlive.com/breakingnews/2008/05/_when_sonar_surveys_spotted.html

This website, part of the University of Michigan Museum of Zoology provides some interesting facts about the white sturgeon and other species

http://animaldiversity.org/accounts/Acipenser_transmontanus

The Fisheries and Oceans site maintained by the government of Canada discusses the Kootenay, Nechako, Upper Columbia, and Upper Fraser River populations of white sturgeon specifically and offers some great suggestions on getting involved in their conservation.

http://www.dfo-mpo.gc.ca/species-especes/species-especes/white_sturgeon-esturgeon_blanc-eng.htm

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