

The Sturgeon or the Egg

Source: <http://www.bcsturgeon.com/article-sturgeon-egg.htm>

My rod twitched slightly, and then I could feel the fish gently pick up the bait. I waited for the fish to take the bait, and then set the hook. Some minor headshakes were felt and then slack line. Here it comes, it's going to jump. The huge twelve and a half foot fish leaped straight out of the water all the way to its dorsal fin and rolled over like a humpback whale. The waves from the landing lapped at the side of the boat. After a sweaty, see-saw battle, we surfed the great fish to shore and pulled out the hook.

Now it was time to work. Three lengths and one girth measurement, a DNA sample, one pectoral fin ray clip for aging, one floy tag and a single PIT tag later, and the fish was ready for surgery. All we had to do was roll the fish over, which seems to have a calming effect for sturgeon. As they lay upside down, even the large fish remain docile and still. For Alexis, this was going to be her biggest fish surgery ever, and probably the largest ever done on a British Columbia sturgeon. The sturgeon's belly was like working on a big white operating table. It looked like it had just swallowed two 45 gallon drums! The quick surgery reveals this fish to be a pre-spawning female, holding possibly hundreds of thousands and maybe even a million or more eggs! Alexis studies the ovaries, and, judging by their size and color, determines that it won't spawn right away, but probably in two years. This fish is not in any rush to spawn as it has been slowly developing this brood of eggs for 6 or 8 years already! Being in the neighborhood of a centurion in age, and probably even older, this upcoming spawning event may be her fifth time. If all goes right during that time, she could very well live to do it again.

Lets fast track to 1998. It's July and it is scorching hot outside. We've been tracking radio-tagged, pre-spawning male sturgeon all over the Fraser, searching for their elusive spawning grounds., We haven't had much luck, as the fish are scattered everywhere, leaving us no clues to pinpoint the search. For the last month we had been placing substrate mats and D-ring collection nets throughout the middle and upper river in the areas where these tagged fish were located and holding, and in any places that looked similar to these areas even if no tagged fish were located there. Substrate mats are 50 x 100 cm angle iron frames with furnace filter sides. The mat is designed to be placed on the river bottom just below suspected spawning areas and is usually done in pairs. The mat's job is to collect any sturgeon eggs rolling downriver before they fall into any one of the little cracks (known as interstitial spaces) between the boulders and cobbles where the eggs will incubate. D-rings are d-shaped frames with 3 meter long, tapered, fine mesh netting with a small collection cup on the end. It looks somewhat like a small trawl net. The objective here is to anchor below spawning areas, hang the net out the back of the boat with 5-8 meters of rope and try to catch hatching sturgeon larvae that are drifting downriver. It may sound like searching for a needle in a haystack. And in reality, that's because it is. However, we've learned a thing or two about working the gear and the river to increase the odds in our favour. And, after some pretty decent successes here and there, we were due to find the "motherlode".

Pulling mats is not an easy job. In fact, it can be downright dangerous due to the amount of debris on the river's bottom that snags our gear, and the sheer speed of the current where mats are placed. There is no room for error and no time for letting your

guard down, even for a second. A simple oversight could mean overboard and, underwater! After pulling a pair of mats out of a real jungle of wood, where the water was only 15 feet deep and really moving, and laying them on the deck of the boat, the usual inspection took place. Our eyes scoured both sides of the frame, looking for something dark grey or black with a diameter of less than 4 mm (smaller than a green pea). The egg could look like a lot of the debris that gets caught in the mat. The mat surface is covered with weeds, insects, the odd eel and loads of fine gravel and sand. When will we find one, and will we ever see it in all this gravel? There! There's one! Up high in the corner between the frame and the filter, lies "black gold". One single, solitary sturgeon egg. The first sturgeon egg ever found on the Fraser river. And then Dave hollers he has one on his mat too! Two needles found in this huge haystack!

The reproductive cycle of the Fraser's white sturgeon is not fully known. The following data will make you appreciate the current regulations on the white sturgeon. Female sturgeon spawn for the first time when they are approximately 11-34 years old and males spawn first between 11-22 years of age (Semakula and Larkin 1968). Subsequent spawning will occur every 4-9 years! Just think back not too long ago when it was legal to keep a fish up to 2 meters in length. That fish would've been a prime reproducing fish as old as 30 years. The sturgeon population, would suffer quickly as a result since it appears that sturgeon are likely to stay in their areas, acting somewhat like "homebodies". If you were to keep that 30 year old sturgeon, it would take 30 years to replace that same sized fish in that area! And anglers were keeping these fish at a rate of one per day! It wasn't until the mysterious deaths of large adult sturgeon in 1993 and 1994 that sturgeon regulations were changed to catch and release only.

The actual spawning event of the white sturgeon in the Fraser is also unknown. There are suggestions that more than one male will spawn with one female. I think it would be pretty difficult to prove this in the Fraser given the river's turbidity, but some simple observations from working with sturgeon on the river play into this train of thought. For example, while spending 4 years of tagging on the river, only one ripe pre-spawning female has been found. We have a couple of female fish that will spawn in a few years or more, and even some that had spawned just a month or two before surgery. However, only one technical pre-spawning female that will spawn the following spring has been captured and identified. However, the number of pre spawning males, and males captured in general, is substantially higher. In fact, it seemed that of the first 20 fish checked during the tagging phase, 19 were male; a very high "buck to doe ratio". Many males to one female during a spawning event would provide extensive genetic mixing, keeping the population very healthy, and could assist in ensuring a higher percentage of eggs being fertilized. Finding such a lop-sided ratio seems

to imply that either the sturgeon population is very heavily male skewed, that the females are somewhere else in the river system, or, that they just do not feed as aggressively as the males. Yet, one would think that to nurture a million eggs, a fish would have to be feeding excessively!

When spring freshet arrives, it sends a signal to spawning fish that its time to move to that magical location. Documentation indicates this area to be a deep, fast moving reach of river that would obviously have large boulders and cobbles as well as bedrock due to the scouring effect of such high velocities. This idea has been proven in the Columbia river, where sturgeon spawning has been observed in the scoured tailraces of hydro-

electric dams. This idea was somewhat accepted as what the sturgeon would prefer in the Fraser. However, as it turns out, this is an incorrect assumption as the Fraser is not a dammed river like the Columbia. The Fraser has a natural freshet and is not held back by dams. The Fraser experiences natural flows that creates the development of gravel bars, side-channels, backwaters and the natural composition of a normal river substrate (bottom). The unaltered flows allow subsequent seasonal temperature fluctuations, and accounts for the turbidity changes. There are many different factors in the Fraser that can cause different spawning behavior and spawning habitat preferences than that of the Columbia.

After the freshet peaks and starts to fall, and the water temperatures reach 10-17 degrees Celsius (PSMFC 1992), the sturgeon are thought to begin spawning. The optimum temperature is thought to be around 15 degrees C. This would occur sometime in late June through July on the lower Fraser river. The female, after finding a suitable location, and somehow finding a mate, or perhaps they find her, will release her eggs, possibly in stages, while a male or more than one male, will release his milt. River current will allow sufficient mixing of the eggs and milt for fertilization to occur. The fertilized egg will fall to the river bottom, and because of the adhesive nature of the egg's outer membrane created by fertilization, will cling to the river substrate in one of the many small pockets between the boulders and cobbles. The egg will then develop, or incubate. The egg's hatching time depends upon the temperature of the water. Sturgeon eggs will hatch in 100 Accumulated Thermal Units (ATU). One ATU is equivalent to 1 degree Celsius per 24 hours. Therefore, if the river is 15 degrees C., a sturgeon egg will hatch in about 6.5 days, give or take. This may sound insignificant until you compare sturgeon to another fish; steelhead for example. In comparison, a steelhead egg will require 320 ATU from fertilization to alevin, a similar stage as that of the sturgeon larvae. Salmon are very similar to steelhead incubation times as well. The grey colored 10 mm. long sturgeon larvae will hatch out, complete with a yolk sac, but with no mouth, eyes and virtually no fins. It will drift helplessly with the strong river current, swimming much like a chironomid, wiggling up and falling down in the water column until it comes to rest in a slow, quiet backwater. The larvae will soon become photophobic, that is, it will not like strong light, and will bury itself in the river substrate or the weedy, grassy littoral zone. From there, the larvae will survive by feeding off its yolk sac. It will fully develop its mouth, eyes, fins and scutes (that sharp armor plate sturgeon are famous for), and within 3 weeks start swimming on its own. It is at this time that it begins searching out and feeding on small insects found in the weedy backwater. At this critical young stage, one would think that this is their most vulnerable time to predation by sculpins and squawfish.

Now, armed with this little bit of information, we are back to the hunt for the great spawning grounds. After finding the eggs on the mats, we could concentrate on working the same area on the day we thought the eggs were expected to hatch. Sure enough, with a little math, and as usual, lots of luck, we hit the jackpot. We collected nearly two dozen larvae in our d-rings that afternoon. We would work the d-rings for an hour and find a larvae or two in nearly every set.

Some of these larvae were alive! It was incomprehensible when I thought back to catching by rod and reel the giant sturgeon, the fish that has been around before WW I, the man on the moon and the world wide web. And now, here is this little sturgeon, looking like a tadpole, wiggling up to the surface and helplessly falling down to the

bottom. Was I looking at the next 12 foot sturgeon? Where will we be when this fish is a giant, and will we have preserved our surroundings to give this incredible fish that very opportunity to become a legendary fish? It was an awe-inspiring feeling to have seen the incredibly opposing life stages of a truly unique British Columbian fish.