Kootenay Lake Fishery Public Meeting

Balfour Community Hall February 23, 2015

Submitted Questions and Answers

At a public meeting in Balfour, in February 2015, Ministry staff presented information about the status of and plans for the Kootenay Lake Fishery and answered questions from the audience directly.

Members of the public submitted additional written questions. In this Q&A document, we provide answers to those written submissions:

"We have seen 3 larger rainbows caught at the south end of the lake but nowhere else do you have any idea why?"

We do not know why three larger rainbows were caught at the south end and nowhere else. None of the data that we collect suggests that there should be more large fish at the south end. Kokanee distribution from trawl and echosounding surveys does not show any kokanee concentration near the south end, and tagged Gerrard trout use the entire lake in a year on average, and don't show a bias to the south end. Large rainbow trout are excellent kokanee hunters and these three trout may have found a local concentration of south end kokanee or other food.

"I realize you don't have much information about the coarse fish in the lake but we are seeing more and more being caught with lures designed for trout, at higher speeds and near the surface. Do we have an overabundance and what is your best guess as to their part in the kokanee decline? They do have their role to play in the ecosystem but should we be targeting them more?" (and similar questions about non-game fish)

We do not have survey or monitoring information regarding abundance and size of non-game or coarse fish in the lake. Some anglers are reporting similar observations. Studies from other lakes suggest that large northern pikeminnow do eat some kokanee (up to 50% of diet for the largest fish). Pikeminnow are clearly part of the fish community that benefits from kokanee; however, they are not as effective predators as bull trout and Gerrard rainbow trout which rely more heavily on kokanee as a food source. This suggests that it is unlikely that pikeminnow or other non-game fish are contributing in a significant way to recent kokanee mortality increases. There is an unlimited daily quota for non-game fish, but we can't definitively say if additional harvest would be beneficial at a full lake scale.

"What happens to fish when they die? Do they sink to the bottom or float to the top? Anglers haven't seen any dead fish and I am sure many have died during this decline and worm infestation of the past."

Dead fish can sink or float, depending on the condition of the swim bladder and fat reserves when they die. In every fish population, fish die every year (annual survival is almost never 100%). We know that natural mortality rates from all causes for rainbow and kokanee can be 20-95% per year in a natural state, but most of these are never observed. So it is likely that most fish that die, which predators and scavengers don't consume, sink to the bottom and are not observed by anglers.

"Is it possible for the gills of the Kokanee to become clogged with algae and kill them?"

We are not aware of any studies that have observed algae clogging gills, or causing mortality. Additionally, kokanee survive and grow very well in many lakes that have significantly higher productivity and algae levels than Kootenay Lake, so there is no direct evidence of algae causing kokanee mortality in BC.

"Monitoring the spawning channels and Lardeau river for both Kokanee and Gerrards is done yearly. When was the imbalance first noticed and why would we not have made regulations changes quicker to protect the kokanee or reduce predators?"

Kokanee and Gerrard rainbow trout numbers have fluctuated significantly over the last 50 years, sometimes high and sometimes low. In fall 2011, kokanee numbers were nearly the highest ever recorded, and in spring 2012, Gerrard numbers were the highest ever recorded at the spawning grounds. At the time, this was good news for anglers and Gerrards which consume kokanee. Kokanee spawner numbers started to decline in 2012, as did Gerrards in 2013. This trend was part of what would be expected given previous cycles in population abundance for both fish. Although declines in abundance were underway in 2012, it was not until 2014 that both data on Gerrard spawner abundance (June 2014), kokanee spawners (October 2014), and in lake kokanee abundance (January 2015) were lower than what would have been expected given previous lows in predator prey cycles.

"What should the anglers do with sick fish? Do you want samples? Does putting fish full of tapeworms back in the lake increase the infestation? I recognize fishing regulations need to be adhered to." (and similar questions about sick fish)

Sick fish that are not retained for consumption should be returned to the water. We have not identified IHN or any other common fish disease in Gerrard rainbows, but worms have been observed in varying frequency. There is often no easy way to identify fish that are sick, those that are weakened from spawning and will recover with time, and those that are thin and growing poorly due to the temporary lack of abundant prey (kokanee). Additionally, removing fish with worms likely would have little impact because anglers only handle 10-20% of the Gerrards in Kootenay Lake every year, and in the host (fish eating mammals or birds) the adult tapeworm can shed one million eggs each day, more or less making any kind of treatment or action impractical. Fish kills should be reported to the Ministry, at which time an assessment of the situation can be undertaken if deemed necessary. Any harvested fish becomes part of an angler's daily quota; if after cleaning it is too unappetizing to consume, you should discard in a manner safe for people and wildlife (e.g. garbage, or into your garden if protected from scavenging bears).

"We hear that the nutrients put into the lake are used up very quickly if that is the case and the fertilizer plant in Kimberly being so far away how did so much get into the Kootenay Lake?"

The nutrients from the Kimberley fertilizer plant made it all the way downstream to Kootenay Lake because the amount exceeded the river's (aquatic plants) capacity to consume it even after increasing the in-river plant community. So, although some fertilizer plant effluent nutrients were absorbed quickly upstream of the lake, the 'excess' made it to the lake. For perspective, as much as 6300 t of phosphorus entered Kootenay Lake during this time, compared to natural inputs of 230 t before, or 30 t after, Libby Dam construction.

"What are the quality control methods for the fertilizer being put in the lake?"

We add liquid agricultural grade fertilizer to Kootenay Lake. In addition to quality standards that the Canadian Food Inspection Agency sets for agricultural fertilizer, we monitor lake water quality monthly, and bi-weekly during the peak growing season to avoid exceeding water quality guidelines for water clarity, water chemistry, and algae, and also adjust nutrient inputs to optimize the algae species for zooplankton grazing.

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"There must be overall goals that you want to achieve i.e.: 35 lb rainbow, average catch rate and size increases, thus the decisions in the overall management of the lake are directed to achieve these objectives. What were the goals that you were trying to achieve that may have contributed to this imbalance?"

The Province's Freshwater Fisheries Program Plan has two strategic goals: conservation and sustainable use for social and economic benefits. For the main body of Kootenay Lake optimizing kokanee abundance to maintain a world class fishery for trophy Gerrard rainbow trout and bull trout are socially and economically important. These are likely not direct contributors to the current situation; however, we are reviewing the data with experts, and this work may allow us to refine targets from the current broad scope and also avoid or reduce declines in performance like we are currently experiencing.

"I have heard that kokanee are in trouble in all the big lakes Okanagan, Arrows, and Kootenay if this is true is there a common denominator?"

Kokanee are currently performing more strongly in Arrow Reservoir, and variably in other large BC Lakes. However, there appear to be links between environmental conditions broadly across the province and associated poor kokanee survival. For example, in 2012, poor survival was noted in many large lakes across the province, likely resulting from a very cool wet summer. In addition, there may be factors affecting kokanee survival that we have yet to understand (e.g. Okanagan Lake has had observations of kokanee mortality events outside of summer months, but disease testing did not turn up anything). It is likely that conditions in 2012 were the "perfect storm" for Kootenay Lake kokanee, with environmental events, disease, and high predation pressure that started the decline, and prolonged predator abundance that solidified this decline.

"Is it possible to introduce a new source of food for all the sport fish?"

Introducing new animals to Kootenay Lake (and other waterbodies with existing fish faunas) has had a very poor record of success; the risks are very high for unintended and unknown consequences. For example, *Mysis* shrimp, introduced to Kootenay Lake in the 1940s as a source of food for smaller rainbow trout, instead compete with kokanee for the zooplankton food that both eat, amplifying the current problem of kokanee survival and in hindsight was well intentioned but unsuccessful. The current mix of animals in the ecosystem forms an excellent basis for a sport fishery, once kokanee survival improves. So, while possible in theory, introducing new species to Kootenay Lake is not an action the Ministry is considering.

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