

# Kootenay Lake Kokanee Recovery Update

October 2019



This bulletin provides an update on the status of key fish populations in Kootenay Lake, and actions to recover kokanee from low abundance observed since 2014.

- Kokanee population status
- Gerrard rainbow and bull trout status
- Kootenay Lake Recovery Actions

## Kokanee

The number of main lake kokanee spawners typically range between 250,000 and 2 million. Low survival rates of kokanee in the main lake have reduced spawner numbers to less than 40,000 in recent years, with ~60,000 counted in 2019. Abundant kokanee predators (Gerrard rainbow and bull trout) are the main factor in kokanee collapse and despite some recent increases in kokanee spawner abundance, they continue to significantly reduce kokanee survival.

Main lake kokanee spawners in the past several years have been some of the largest on record (fewer kokanee are competing for their zooplankton food, and so survivors are growing well). Although larger female kokanee have more eggs, this natural compensation has not yet been sufficient to achieve kokanee recovery.

In-lake hydroacoustic surveys in fall 2018 indicate there were 9 million kokanee in Kootenay Lake (not including spawners). Most (90%) were the youngest age class, while the remaining 1 million older kokanee will represent the next 2 years of spawners. These surveys also estimate that survival rates improved for older kokanee, but not for the youngest kokanee.

## Gerrard Rainbow and Bull Trout

### Gerrard Rainbow Trout

From 1961 – 2019, Gerrard spawner numbers (Figure 1) generally varied between 300 – 800 (average 500) but sustained a large increase during 2009 – 2014 when spawner numbers were the highest in 50 years. Peaking at 1600 in 2012, spawner numbers have since declined to between 150 – 450. A key factor driving the growth and overall number of large Gerrard rainbow trout in Kootenay Lake is the abundance of kokanee, which usually form the majority their diet. Access to kokanee is especially important when Gerrards return to the lake

in a weakened condition after spawning. Therefore, kokanee numbers overall, and the recent kokanee collapse, have had a strong impact on large Gerrard rainbow trout. Kootenay Lake currently has many thousands of immature Gerrard trout feeding on small kokanee, insects, and *Mysis* shrimp. Although current catch rates for larger Gerrard trout are very low due to the reduced abundance of kokanee, catch rates for smaller Gerrard trout (< 2 kg) are very high: higher in the last four years than ever observed.



Figure 1. Gerrard Trout Spawner Numbers 1961 - 2019

### Bull Trout

Bull trout abundance estimates for Kootenay Lake suggest a currently robust and abundant population (Figure 2).

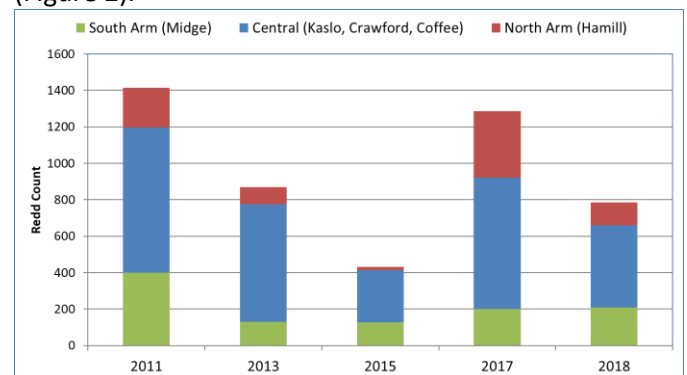


Figure 2. Bull trout nests (redds) – 2 bull trout per redd - in some key Kootenay Lake Tributaries

Kootenay Lake's watershed currently has many thousands of immature bull trout in its tributaries feeding on insects and small fish, and thousands more in the lake feeding primarily on small kokanee and

*Mysis* shrimp. Like Gerrard rainbow trout angling, catch rates for larger bull trout are low due to the reduced abundance of kokanee, but catch rates for smaller bull trout (< 2 kg) are very high.

## Kootenay Lake Recovery Actions

Angler catch rates and other indicators show we have the building blocks for the next generation of Gerrard rainbow and bull trout. However, combined with the current low kokanee numbers, large numbers of kokanee predators – the trout – are eating sufficiently high numbers of kokanee to still limit kokanee recovery.

The Ministry recognizes the significance of the current reduction in kokanee numbers and is currently delivering the Kootenay Lake Action Plan (2016 with annual review), to speed kokanee recovery. The plan outlines the primary recovery tools available to managers and identifies actions and their triggers.

Tools for recovery include:

- **Kokanee Supplementation** – Since fall 2015, we have transplanted more than 20 million eggs into Meadow Creek Spawning Channel from external BC sources. We have used stocks as closely related as possible to Kootenay Lake to mitigate risks related to kokanee stock genetics.
- **Kokanee fishery closure** - Ensures that minimal mortality from angling occurs on the main lake kokanee population during recovery.
- **Rainbow and bull trout fishing opportunities** - Decreasing the abundance of small rainbow and bull trout through harvest is a key step to allow kokanee to recover more quickly and is something that anglers can help with. For example, anglers annually catch between 4,000 and 15,000 small rainbow and harvest only 30%. Recent additions to angling opportunities include a daily quota of 2 bull trout on Kootenay Lake (only 1 > 50cm) and a very high quality angling opportunity on the Duncan River (currently open – daily quota = 2). The Main Lake daily quota for rainbow trout and bull trout combined is now five. The ministry is encouraging anglers to keep their catch.
- **Nutrient Restoration program** – Continues to replace nutrients (phosphorus and nitrogen) lost to

upstream reservoirs, to sustain lake conditions that support zooplankton and hence ensuring kokanee food supply to support quick recovery.

**Monitoring Program** - Monitoring of various levels of the food web continues as a component of the nutrient restoration program. There is also continued monitoring of harvest rates of the fishery in addition to a creel survey on the Duncan River (new in 2019).

Additional work in 2019-20:

- Kokanee spawner estimate in 2019 was ~60,000; higher than recent years, but also low enough to continue egg collection and supplementation efforts in the fall 2019. Kokanee eggs are currently being incubated (collected around the Province for Kootenay Lake) and will be planted in Meadow Creek this fall.
- Indices of abundance for rainbow trout and bull trout indicate that increases in harvest opportunities and directed removal of post-spawner bull trout (October) will continue to benefit kokanee survival in 2019 and 2020.

## In summary

- There will be continued low abundance in kokanee populations for a period of time while actions take effect.
- Taking advantage of high quality current and future harvest opportunities is the key way anglers can directly improve recovery time for Kootenay Lake.
- Recovery is difficult to predict with certainty. Data suggest that predator biomass is now declining, and we are increasing this trend through angling opportunities as well as directed removals. This should allow kokanee survival to increase and along with other actions, drive recovery.

## Find more info:

[www.env.gov.bc.ca/kootenay/fsh/main/mainfish.htm](http://www.env.gov.bc.ca/kootenay/fsh/main/mainfish.htm)