

# Kootenay Lake Kokanee Recovery Update

January 2021



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

- Kokanee population status
- Gerrard rainbow and bull trout status
- 2020-2021 Kootenay Lake recovery actions
- Recreational harvest of kokanee predators
- Other 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 approximately 90,000 counted in 2020 (Table 1).

**Table 1.** Recent main lake kokanee spawner estimates.

Year	Spawner number
2012	1,256,000
2013	450,000
2014	150,000
2015	18,000
2016	41,000
2017	12,000
2018	30,000
2019	65,000
2020	90,000

Abundant kokanee predators (Gerrard rainbow and bull trout) are the main factor in kokanee collapse and continue to significantly reduce kokanee survival.

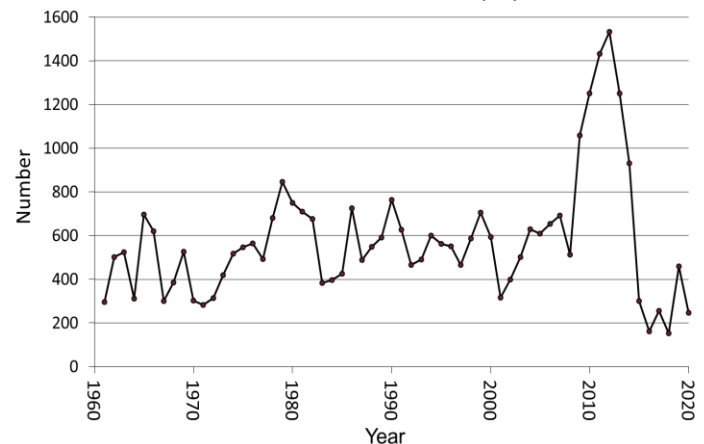
In-lake hydroacoustic surveys in fall 2020 indicate there were approximately 10 million kokanee in Kootenay Lake (excluding spawners). Most were the youngest age class, while the remaining 600,000 older kokanee will be the next 2 years of spawners. Despite the increased spawner counts in the last three years, in-lake hydroacoustic surveys estimate a very low spawner return in 2021, due to the low kokanee spawner returns in 2017 (i.e., the parents of the 2021 spawners), and continued poor in-lake survival of kokanee due to high levels of predation from rainbow and bull trout.

However, these estimates might increase if in-lake kokanee survival improves from continued reductions of rainbow and bull trout in Kootenay Lake (see below; liberalized rainbow trout and bull trout fishing regulations and the Kootenay Lake Angler Incentive Program).

## Gerrard Rainbow and Bull Trout

### Gerrard Rainbow Trout

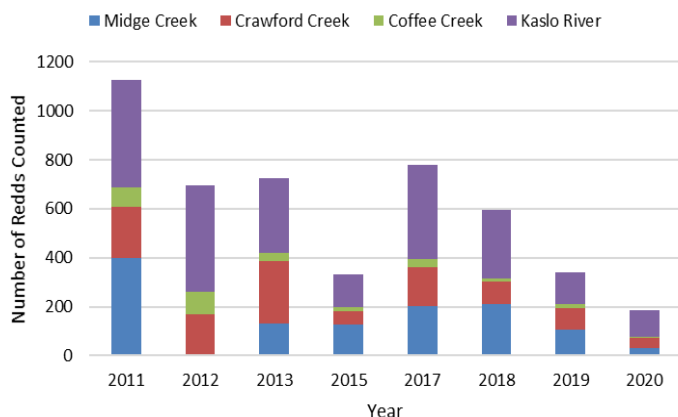
From 1961 – 2020, Gerrard spawner numbers (Figure 1) generally varied between 300 – 800 but sustained a large increase during 2009 – 2014 when spawner numbers were the highest in 50 years. Peaking at 1600 in 2012, spawner numbers have since declined to between 150 – 450, with approximately 250 counted in 2020. 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 of their diet. In recent years, small (< 2 kg) Gerrard trout appear to be abundant in the lake (catch rates are very high), but few appear to be achieving the growth necessary to spawn, and there are very few large fish caught by anglers. Despite the low spawner abundance, it takes relatively few Gerrard eggs to fully saturate the rearing habitat of the Lardeau River, where young Gerrards spend 1-2 years prior to emigrating to the lake. Therefore, despite the low spawner returns, there is little conservation threat to the population.



**Figure 1.** Gerrard Trout Spawner Numbers 1961 - 2020

### Bull Trout

Bull trout spawner abundance estimates for Kootenay Lake suggest a declining population (2017-2020; Figure 2).



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

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. The recent trend in declining spawner numbers, as well as altered size structure of the catch, is likely also a result of increasing harvest on bull trout.

## 2020-21 Kootenay Lake Recovery Actions

The low in-lake survival for kokanee suggests that the kokanee predators – the trout – are still eating sufficiently high numbers of kokanee to limit kokanee recovery, and that now is a critical time to reinforce previous actions around Gerrard rainbow and bull trout reductions.

Decreasing the abundance of 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. The 2020-21 actions to reduce rainbow and bull trout include:

### Liberal rainbow and bull trout fishing regulations:

Recent changes to main lake fishing regulations include a daily quota of 3 bull trout (any size), a separate daily quota of 5 rainbow trout (2 over 50 cm), an annual quota of 10 rainbow trout over 50 cm, and barbed hooks are permitted. The Ministry is encouraging anglers to keep their catch.

**Kootenay Lake Angler Incentive Program:** In a continued effort to decrease the abundance of rainbow and bull trout in Kootenay Lake to allow kokanee to recover more quickly, the Ministry and the BC Wildlife Federation launched the Kootenay Lake Angler Incentive Program this year. The goal of the program is

to increase youngest kokanee survival rates by removing rainbow and bull trout from the lake.

From June to December 2020, the Angler Incentive Program has removed 7,664 rainbow and bull trout from Kootenay Lake, with another six months remaining in the program. The Ministry thanks all anglers for their contributions to the program; the success of the program is the direct result of angler participation and increased harvest levels.

Despite this program being highly effective at removing rainbow and bull trout from Kootenay Lake, we will measure the benefit (i.e., increases in youngest kokanee survival rates) of the program later in 2021. In-lake hydroacoustic surveys occur in Spring and Fall, and these surveys will inform changes in youngest kokanee survival rates.

## Recreational harvest of kokanee predators

The current ecosystem in Kootenay Lake appears to be out of balance, with the balance tilted too far to predators. Unfortunately, we don't know what the tipping point will be where balance returns to the ecosystem and kokanee survival increases. The tipping point is a moving target that shifts as trout and kokanee abundance shift. We need to continue harvesting predators until we hit that tipping point. This may mean harvesting populations down to levels that would be considered undesirable in a trophy fishery (the oldest and largest fish in a population tend to be fished out first).

Does this mean that we will be fishing predators down to levels that are conservation concern? This is unlikely, as both Gerrards and bull trout are resilient to overfishing – that is, it takes relatively few fish to ensure high supply of eggs for future generations. We do have triggers, outlined in the Kootenay Lake Action Plan, that will allow us to determine if we are fishing populations to levels that are concerning, which may result in future changes to our management approach.

If we do see kokanee recovery in a future year, it may take some time for a trophy fishery to develop again for trout. Therefore, there may also need to be reduced harvest for a period to allow the population of large fish to build up again. Bull trout are likely to take longer than Gerrards to grow to trophy sizes, as they grow more slowly and mature later.

Once the Kootenay Lake ecosystem is balanced, a long-term approach to harvesting trout will likely involve some balance between releasing fish and harvest. It is likely that the populations and the trophy fishery are more resilient to overharvest than we had thought before the kokanee collapse happened in 2014.

## Other recovery actions

**Nutrient Restoration Program:** The 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:** We continue to deliver a robust monitoring program on Kootenay Lake that collects data on predator abundance, diet, genetics, size, and age structure. This information helps support current and future Kootenay Lake fisheries management decisions.

## In summary

- There will be continued low abundance in kokanee populations for a period while actions take effect.

- Taking advantage of high quality current and future harvest opportunities is the way anglers can directly improve recovery time for Kootenay Lake now.
- Recovery is difficult to predict with certainty. Data suggest that predator biomass is declining, and we are increasing this trend through angling opportunities as well as the Angler Incentive Program. This should allow kokanee survival to increase and drive quicker recovery.
- Once kokanee survival improves as a result of less predators, kokanee abundance will increase quite rapidly, but it may take some time after for trophy trout populations to follow suit. This may result in future management changes where harvest will need to be reduced for a period.

## Find more info:

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