Meadow Creek Spawning Channel

(COL-F20-F-2009-DCA)

2019-20 (F20) Activity Report

1 April 2019 to 31 March 2020

Prepared for: Fish & Wildlife Compensation Program (FWCP)

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Prepared with financial support from the Fish & Wildlife Compensation Program, on behalf of its program partners BC Hydro, the Province of B.C., Fisheries and Oceans Canada, First Nations and Public Stakeholders

Executive Summary

The Meadow Creek Spawning channel was managed and delivered through Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Nelson with financial support from the Fish and Wildlife Compensation Program.

BC Hydro built the Meadow Creek spawning channel in 1967 to compensate for lost natural Kokanee habitat due to the construction of Duncan Dam. The facility provides spawning for a large proportion of Kootenay Lake Kokanee, which are the primary prey species for both Bull Trout and Gerrard Rainbow Trout.

All required operations were completed for Meadow Creek spawning channel in the 2019-20 fiscal including Kokanee fry counts in the spring, settling pond and gravel cleaning in the summer, and adult Kokanee counts and sampling in the fall. Water monitoring and control to reduce sediment and optimize incubation conditions continued throughout the year. A fish salvage was completed prior to drying the channel in August.

Spring fry production in 2019 was 4.98 million. This includes naturally spawned fry from Kootenay Lake Kokanee, and fry from supplementary eggs planted into the channel (sources outside Kootenay Lake). The egg to fry survival rate was estimated at 61.5% for naturally-spawned eggs with revised expansion factors detailed in Arndt (2019). Higher egg to fry survival in recent years is least partly due to the electric fencing used to protect spawning Kokanee in the channel from bear predation starting in Fall 2016.

The total fall return of adult Kokanee to Meadow Creek was estimated at 32,686 in 2019, roughly six times the record low in 2017 and double 2018. A total of 19,400 adults reached the spawning channel resulting in a potential channel egg deposition of 5.93 million. An additional 2.42 million eyed eggs from other sources were planted into the upper channel later in the fall. Male and female kokanee length averaged 37.0 cm and 35.4 cm respectively. Average fecundity at 697 eggs/female was similar to recent years. Three age classes of Kokanee were present in the 2019 run: age 2 (26%), 3 (56%) and 4 (18%).

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Introduction

Spawning habitat for kokanee was inundated following the construction of Duncan Dam. The operational tasks associated with the spawning channel have been funded by the Fish and Wildlife Compensation Program (FWCP) for a number of years and facility maintenance such as gravel scarification and settling pond cleaning are required annually.

The facility plays a key role in sustaining Kootenay Lake kokanee which are the primary prey species for both bull trout and Gerrard rainbow trout. Kokanee carcass decomposition also benefits the natural nutrient levels in the lake and creek, in addition to providing seasonal forage for other aquatic, terrestrial and avian predators. The facility is recognized for its wildlife viewing potential and has also operated as a provincial source of kokanee eggs for the Freshwater Fish Society of BC.

This project implements and maintains ongoing operations at the MCSC to support kokanee fry production in Kootenay Lake. Operations include spring fry enumeration, scarification of the channel during July and August and fall adult spawner enumeration. Water control occurs annually to minimize sediment inputs and to ensure adequate flows are managed for the various life stages of egg to fry. Facility maintenance is also implemented under this project; vegetation and road management, bridge refurbishing, rip rap replacement, hazardous tree removal and flood protection improvements. in addition to maintaining the on site cabin.

Major maintenance and upgrades are required periodically and can include building maintenance; channel modifications; gravel, weir, bridge refurbishing; rip rap replenishment; hazardous tree removal and flood protection improvements.

Goals and Objectives and Linkage of FWCP Action Plans and specific action:

The work of Meadow Creek Spawning Channel project is focused on producing a targeted number of Kokanee fry that supplements fry production from the Lardeau River and smaller tributaries to maintain the abundance of Kokanee in Kootenay Lake. Kokanee are the primary forage species for Bull Trout and piscivorous Rainbow Trout. The project falls within Habitat Based actions in the Reservoirs and Large Lakes Action Plan; COLRLL.ECO.HB.09.01 Operation of Meadow Creek and Hill Creek Spawning Channels-P1

Work activities completed 2019:

- Fry enumeration – April to June
- Scarification of the gravel in the spawning channel – July and August
- Fry salvage during scarification – July and August
- Water flow maintenance – annual
- Kokanee spawner enumeration – August and September’
- Maintenance of grounds and facility – annual
- Bear safety and management – August – November
- Eyed egg plants - October

Study Area

Meadow Creek Spawning channel is located at the north end of Kootenay Lake.

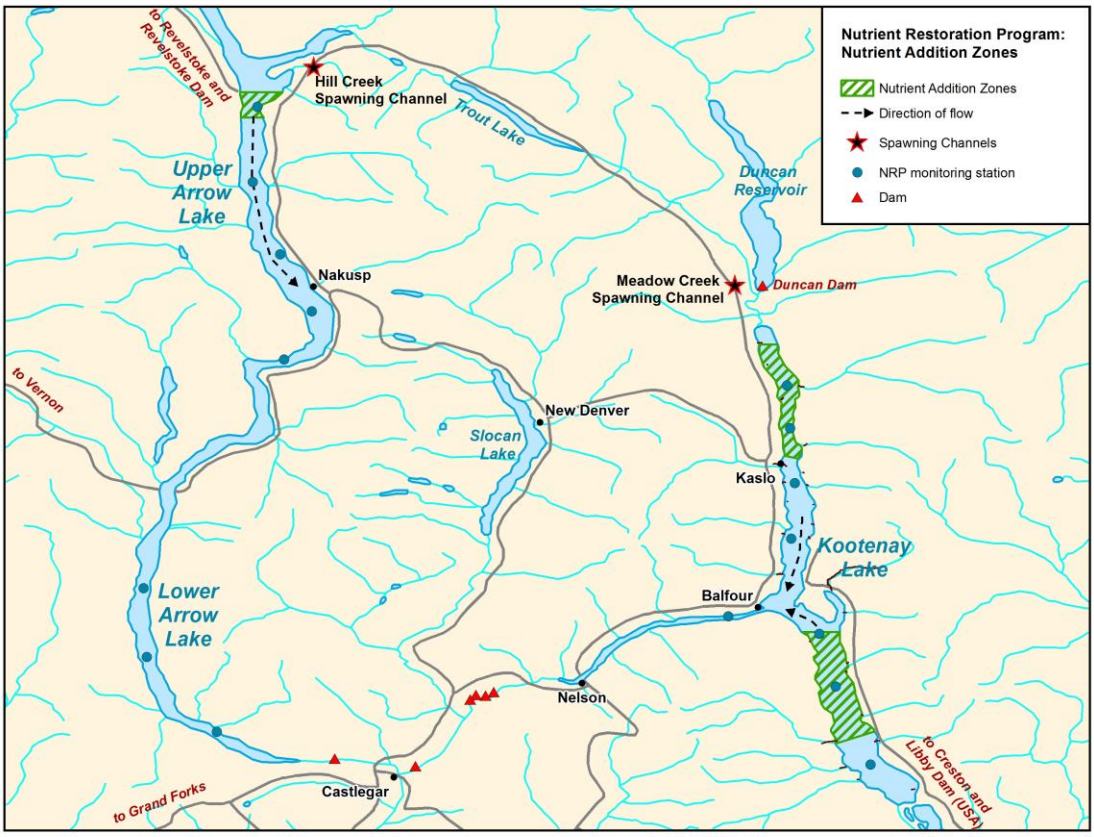

Figure 1. Map of location of Meadow Creek Spawning Channel.

Methods

Spring fry outmigration occurs at an enumeration fence and were counted over 32 nights of sampling between March 27th and June 7th, 2019. Mechanical gravel scarification and drying of the of the spawning channel occurred in July 2019. A fish salvage operation was completed on July 29th by electrofishing just prior to the drying period of the channel. Two crews captured and transferred 103 Bull Trout juveniles and 49 Rainbow Trout juveniles to the creek. A concrete barrier (combined with metal screening) was moved further upstream in 2019 to allow additional spawning habitat for kokanee. The barrier is disassembled prior to gravel scarification and re-assembled prior to kokanee spawner timing. With the anticipation of low numbers of kokanee spawners, an electric fence is installed prior to the escapement timing to provide protection from bear predaton. Note that only a portion of the spawning channel is fenced – bears have access to kokanee in the natural creek. (Fig. 2)

Figure 2. Aerial view of Meadow Creek Spawning Channel with red line outlining the portion of channel surrounded by electric fencing in 2019. This was to protect the low escapement of adult Kokanee from bear predation once they reached the spawning channel.

Kokanee spawners are counted through an enumeration fence and the first date of counted spawners was August 29th, 2019. A public open house occurred on Saturday, September 7th where several FLNRORD staff and FWCP contractors were on site to answer questions about the spawning channel, the nutrient restoration program and other FWCP initiatives. Weekend monitors for the month of September continued to be available during the visitor opening hours of 1000 to 1400 to answer questions from the public.

Standard fish health testing of kokanee spawners at Meadow Creek in 2019, by the Freshwater Fisheries Society of BC, showed 4 of 12 (33%) filtrate pools tested positive for Infectious Haematopoietic Necrosis Virus (IHNv) by qPCR (n=36 carcasses in total), and 4 of 36 (11%) for individual fish kidney tissue tested positive for IHNv (S. Mead, Fish Health Unit Manager, Freshwater Fisheries Society of BC, pers. comm.).

Water level monitoring occured all year at the channel ensuring flows are adequate to optimize egg incubation, to prevent channel bank erosion, reduce stop log scouring, to minimize sediment transport and deposition into spawning gravel and maintain channel habitat for other fish species and aquatic life .

Results:

Fry Production in the spring of 2019 was estimated at 4.98 million for the spawning channel including the stocked eggs, and 5.05 million total for Meadow Creek assuming 5% egg-fry survival below the channel.

Egg to fry survival of wild eggs in the channel was estimated at 61.5% for naturally-spawned eggs using revised expansion factors detailed in Arndt (2019). 11 days of extra fry sampling till dawn were completed between 30-April and 27-May to provide data for a revised expansion factor at Fence 4 (below the eyed eggs). This is to provide better information on the relative contribution of wild-spawning Kokanee and stocked eyed eggs to the fry production.

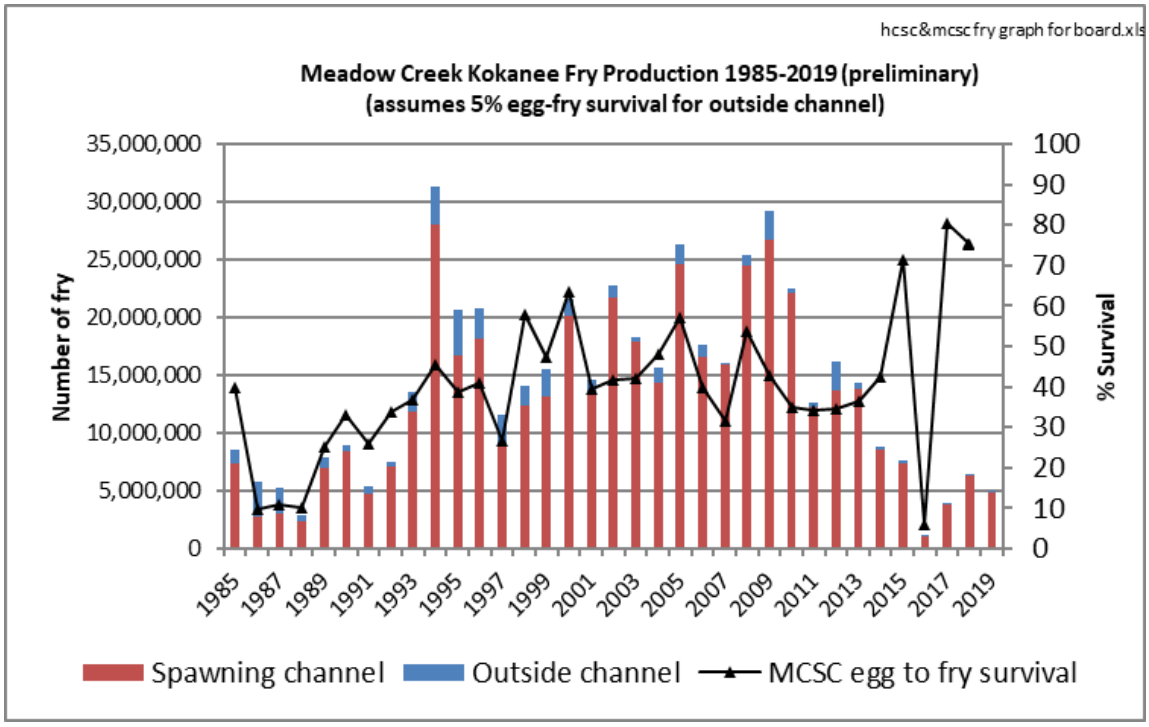

Figure 3. Meadow Creek Kokanee fry production, 1985 – 2019.

The Meadow Creek Kokanee run in Fall 2019 was estimated at 32,686, of which 19,400 came into the channel and 13,286 spawned downstream of the channel (Fig.4).

Potential egg deposition from natural spawning was estimated at 5.9 million in the channel, 10 million total including below the channel in Meadow Creek (Fig.4).

Another 2.4 million eyed eggs from Hill Creek and Whatshan Lake were planted in the upper part of the channel, therefore the total number of eggs in the system was approximately 12.4 million.

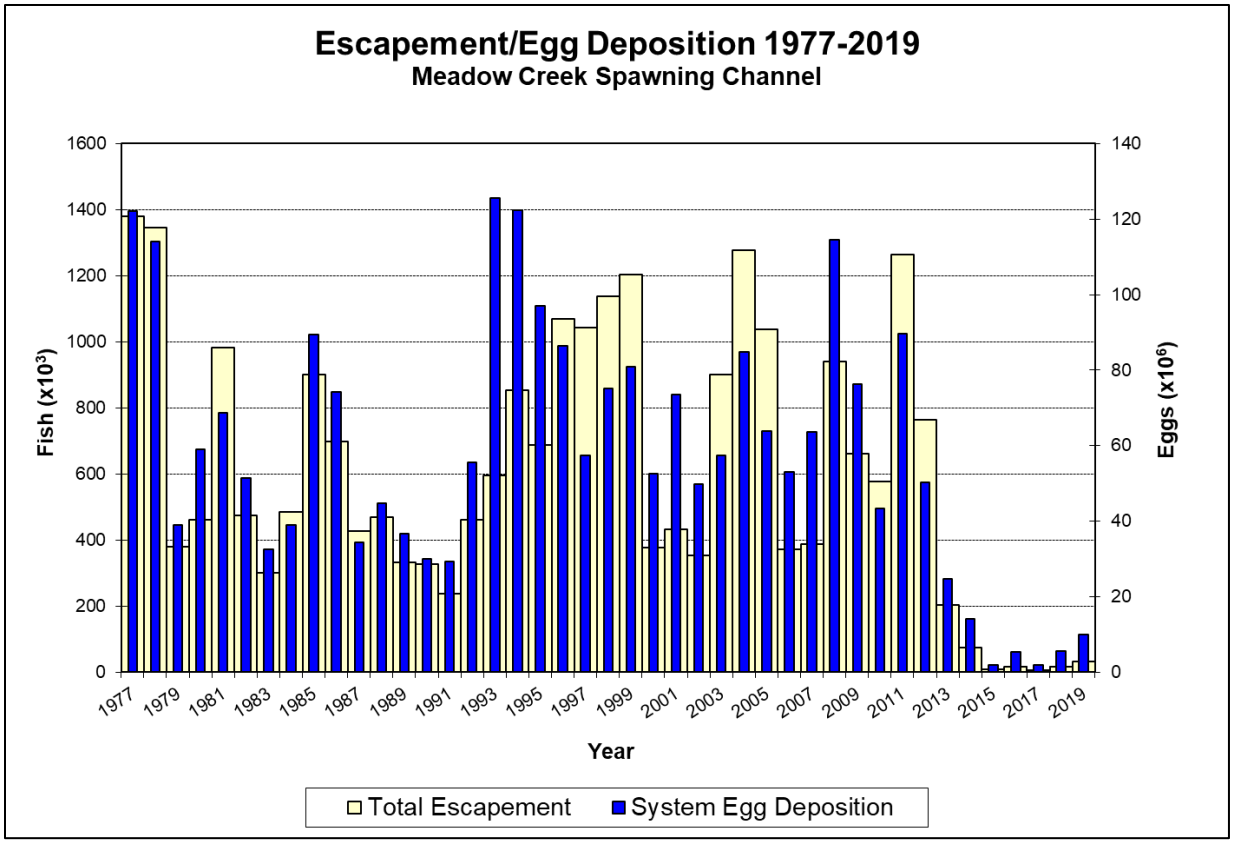

Figure 4. Kokanee spawner number (escapement) and estimated egg deposition in Meadow Creek spawning channel, 1977 – 2019.

Average size (36 cm) and fecundity (697 eggs) of kokanee spawners was similar to the last 3 years; fish are very large with high fecundity; this is an expected density-dependent response with the very low densities of Kokanee in the lake (Fig. 5)

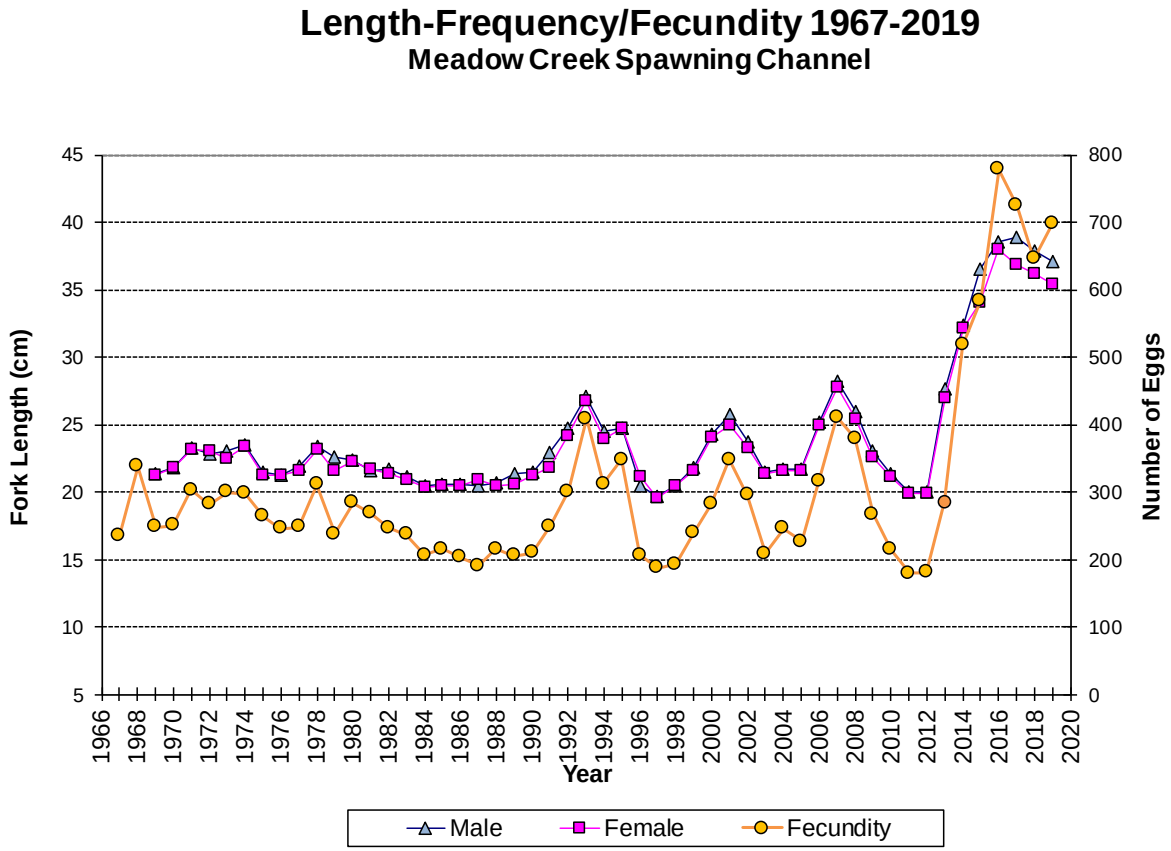

Figure 5. Average fork length for males and females, and average number of eggs (fecundity) for Kokanee spawning in Meadow Creek spawning channel, 1967 - 2019.

Discussion and recommendations

Spring kokanee Egg to fry survival was high for both natural spawning and planted eggs. Lower than average spawner returns limited the egg deposition under the current Kootenay Lake population status. The requirements to protect the lower number of spawners from bear predation required daily checks to ensure the electric fencing was in place and working properly. Continue to maintain electric fencing until spawner returns increase as is outlined in the Kootenay Lake Action Plan. Allow all spawners into the channel in the fall of 2020 as the current prediction is a lower than average return.

Acknowledgements

This project was prepared with financial support Fish & Wildlife Compensation Program on behalf of its partners, BC Hydro, the Province of B.C., Fisheries and Oceans Canada, First Nations, and Public Stakeholders to conserve and enhance fish and wildlife in watersheds impacted by BC Hydro dams. We would especially like to thank our long-term Fisheries Technician, Murray Pearson for his dedication towards all work objectives at the channel. We would also like to thank the following individuals for their contributions: Jeff Burrows, Matt Neufeld, Marley Bassett (FLNRORD), Stan Baker, Gillian Sanders, Peter Jonker, Gord Hutchings, Angus Glass, Eric Sargeant, Ada Bull, Tracy Remple and Nicol Ward.

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Kootenay Lake Action Plan
http://www.env.gov.bc.ca/kootenay/fsh/main/pdf/KLAP%20Kootenay%20Lake%20Action%20PLan%20final%209_May_2016.pdf