2023-2024 Funded Projects

This table summarizes approved 2023-2024 funding allocations for technical committee projects.

Supporting Committee: Large Lakes

of Projects: 14

Status	Project #	Title	Delivery Region	Allocated $
Delivered	L2003	Assessment of Cowichan Lake Cutthroat Trout	1 - West Coast	2,500
Delivered	L2103	Chilliwack Bull Trout Assessment - HRT	2 - South Coast	3,300
Underway	L2105	Quesnel Lake Exploitation High Reward Tags	5 - Cariboo	5,000
Underway	L2203	Koocanusa Kokanee Enumeration (split with SL total=$15,000)	4 - Kootenay	7,500
Delivered	L2204	Omineca Burbot Fisheries Study	7a - Omineca	10,000
Delivered	L2205	Omineca Angler and Non-Angler Preference and Diversity Survey (shared by all committees total = $10,000)	7a - Omineca	3,333
Underway	L2209	Sugar Lake High Reward Tags	8 - Okanagan	4,000
Underway	L2210	Penticton Creek Restoration	8 - Okanagan	28,000
Underway	L2304	Horsefly River Stock Evaluation	5 - Cariboo	11,300
Underway	L2305	Moberly Lake Trout Assessment	7b - Peace	2,500
Delivered	L2401	MCRI- Restoration Implementation and Monitoring	8 - Okanagan	28,585
Underway	L2402	Kootenay Lake Recovery	4 - Kootenay	85,050
Delivered	L2403	Determination of Kaslo Bull Trout Productivity at Low Abundance	4 - Kootenay	34,024
Delivered	L2405	Thompson-Shuswap Wild Stock Guardian (Split with Rivers total $35,000)	3 - Thompson	17,500
				242,592

Delivery Region Locations

1. Region 1 West Coast
2. Region 2 South Coast
3. Region 3 Thompson
4. Region 4 Kootenay Boundary
5. Region 5 Cariboo
6. Region 6 Skeena
7. Region 7a Omineca
8. Region 8 Okanagan
9. Region 8 Okanagan

image credit: frontcounterbc.com

Large Lakes Funded Project Categories	Allocated $
Stock Recovery & Enhancement	$85,050
Stock Assessment	$67,824
Research & Development	$3,333
Habitat Maintenance, Restoration & Enhancement	$56,585
Guardian Programs	$17,500
Angler Effort, Catch & Satisfaction	$12,300
	$242,592

2023-2024
Project Summaries

The following section provides a summary of activities of each project delivered for this fiscal year.

Assessment of Cowichan Lake Cutthroat Trout

Status: **Delivered** **Tracking #** **L2003** **Year** **5** **of** **5**

Executive Summary:

This multi-year study (six years total) uses acoustic telemetry and high reward tags to estimate fishing and natural mortality of wild coastal cutthroat trout in one of Vancouver Island's most popular freshwater fishing destinations, Cowichan Lake. In each of the years from 2019 to 2022, approximately 45 cutthroat trout were implanted with acoustic transmitters and tracked for up to two and a half years or until death or capture by anglers. These results will provide information on the utilization of the lake by sub-adult and adult fish including spatial and temporal distribution, and mortality estimates will be used to support an evaluation of the regulations currently in place as well as alternative approaches. Partnership funding for this project from HCTF is supporting the continued collection of acoustic tag detections through the summer of 2024, after which final analysis and reporting will be completed.

Chilliwack Bull Trout Assessment

Status: **Delivered** **Tracking #** **L2103** **Year** **4** **of** **5**

Executive Summary:

Bull trout (Salvelinus confluentus) are an endemic species of char widely distributed within BC. "Conservation and management of bull trout in BC has been hindered by the lack of a systematic, province-wide assessment of distribution, abundance, trends in abundance, and threats to the species' long-term persistence" (Hagen and Decker 2011). Obtaining information on the distribution and abundance of bull trout has become a provincial priority, critical to the conservation and management of the species. Chilliwack Lake supports a modest recreational fishery (>10,000 rod hours) that is proximate to a large mobile angling population in the lower mainland. Due to their life history type and behaviour, they are highly susceptible to over-harvest. The project was designed to address data gaps for the conservation and management of Bull Trout within BC, especially within the core area of Lower Fraser Ecological Drainage Unit (EDU). The purpose is to achieve a desired outcome that supports increased angler opportunity and long-term stock conservation. The MFLNRO Fisheries Program Plan (in draft) and Provincial Bull Trout Management Plan (2015) both identify that managers are expected to evaluate trade-offs between fisheries values and socio-economic objectives. Managers can potentially make better decisions if they have access to reliable, quantitative assessment information which is often lacking for many Bull Trout fisheries in BC. The study is intended to assess the recreational fishery and whether the current fishery for Bull Trout is sustainable. The study uses a two-prong approach of tagging and census information from the fishery to better understand if the recreational fishery for Bull tout on the lake is operating sustainably. Overall, based on tag-return information, the relative exploitation rates for Bull Trout are seemingly moderate to low (10-15%). Overall effort for the lake is also considered to be moderate given the proximity the large urban area of Chilliwack. These factors combined suggest the recreational fishery is operating within a sustainable range. In 2021, regulation changes further supported the sustainability by implementing the provincially recommended minimum size limit (MSL).

Quesnel Lake Exploitation Study High Reward Tags

Status: **Underway** **Tracking #** **L2105** **Year** **4** **of** **5**

Executive Summary:

The large rainbow trout, bull trout and lake trout of Quesnel Lake support an economically important sport fishery but little is known about the proportion of the populations annually captured by anglers. In response to declining size of rainbow trout, very restrictive regulations were implemented for the Quesnel Lake fishery in 2002. Research conducted since that time suggests the decline in size of rainbow trout was largely due to a reduction in kokanee numbers, which is the primary prey species for Quesnel Lake trout. However, the kokanee population has increased substantially over the last decade and anecdotal reports from the angling public indicate trout densities have also increased in recent years. Given increasing trout populations, there may be an opportunity to increase angling opportunity in Quesnel Lake. This project was initiated in 2015 to support the ongoing Quesnel Lake exploitation study, through the administration of high rewards (i.e., $100) to anglers who captured marked rainbow trout, lake trout, or bull trout in Quesnel Lake. The objective of this component of the study is to evaluate current exploitation rates for each species, which will be used to inform development of sustainable angling regulations. The use of high reward tags provides an incentive for anglers to report recaptured fish as well as improve public interest and participation in the study. High rewards were administered to 4 anglers in 2023. An additional 95 high reward tags are planned to be distributed over each of the next 2 seasons to improve sample size. It is anticipated that tagged rainbow trout will remain within the system for 1-2 years, which will result in recaptures being submitted throughout the full term of this specific project (i.e., Project L21-05). Exploitation rates for each species will be evaluated over a total period of 8 years, which accounts for two full sockeye cycles, to improve our understanding of exploitation rates and associated variability.

Koocanusa Kokanee Enumeration

Status: **Underway** **Tracking #** **L2203** **Year** **3** **of** **5**

Executive Summary:

Kokanee are a keystone species in the novel upper Kootenay ecosystem, recently colonizing the Koocanusa Reservoir, and spawning throughout the upper Kootenay watershed. This population supports a popular kokanee fishery, Bull Trout fishery, and egg collections for the provincial stocking program of kokanee. At the inception of this study in 1996, an aerial enumeration was completed throughout the Upper Kootenay River watershed to identify the streams supporting the highest numbers of spawning Kokanee. A total of 7 streams were selected for long-term monitoring, including the Lussier River, which is often the most important spawning stream, and a major collection egg collection area for the Freshwater Fisheries Society of BC. This project will continue the long-term monitoring of the Koocanusa kokanee spawning population. The overall objectives of this project are to continue monitoring of Koocanusa spawners in the Lussier River and up to six other index sites according to long-term methods. Data will be used to determine the sustainability of the current and future FFSBC egg collection practices to inform future egg collection guidance.

Omineca Burbot Fisheries Study

Status: Delivered **Tracking #** L2204 **Year** 3 **of** 3

Executive Summary:

Burbot (Lota lota) provides for important recreational and food fisheries in the Omineca Region (7A) of British Columbia. Burbot populations in this region are generally thought to be stable, while population data are limited; a daily limit of 5 burbot is currently in place, and set-lining is permitted in lakes for this species (with some exceptions). However, burbot are difficult to study using traditional stock assessment methods, leading to a deficit of baseline knowledge about their population structure and exploitation rates. This study sought to establish methods for capturing and tagging burbot, gather data on burbot biology, and estimate fishing exploitation rate at three lakes in the Omineca Region - Carp Lake, Fraser Lake, and Cluculz Lake. We used a high-reward tagging study to assess exploitation rates for burbot at Carp Lake (2022-2023), and attempted to use the same approach at Fraser Lake (2021-2023) and Cluculz Lake (2022). We were able to estimate exploitation rates at Carp Lake, with sufficient capture rates and tag-returns at this site; additionally, we gathered information about burbot fishing at Carp Lake through creel surveys. At Fraser Lake, we were unsuccessful in estimating fishing exploitation due to a lack of tag-returns from anglers to date, despite tagging burbot throughout 2021-2023. At Cluculz Lake, our trapping efforts did not yield sufficient captures to gather any population-level information or assess the recreational fishery. At both Carp Lake and Fraser Lake, we mapped burbot capture locations from trap set data and analyzed capture success in relation to season and location. We also measured total length and weight of the tagged burbot at Carp Lake and Fraser Lake, and constructed size distributions to provide information on the size classes of burbot present at these lakes. At Cluculz Lake, we mapped and report the unsuccessful trapping locations here for future reference.

Omineca Angler and Non-Angler Preference and Diversity Study

Status: Delivered **Tracking #** L2205 **Year** 3 **of** 3

Executive Summary:

Omineca fisheries managers sought to a) understand current fishers' preferences and b) understand nonparticipation in fishing through conversations with non-fisher and marginalized fishing communities (e.g., women, 2SLGBTQIA+ persons, and racialized persons). The project team collected data from fisher, non-fisher and marginalized fishing communities regarding their perceptions and experiences of fishing with the goal of improving management of the Omineca Region's public fisheries and increasing overall participation rates. The project team completed an intersectional and social constructionist, mixed-method study to reach fishers and non-fishers from diverse backgrounds (focusing on race, gender, and sexuality) to understand the inclusionary and exclusionary practices occurring within the recreational fishery in the Omineca Region. The project team conducted six focus groups and four semi-structured interviews and distributed an online survey. The project team found various factors that contribute to non-participation of non-fishers from various backgrounds not limited to the commonly cited constraints to participation such as lack of time, limited resources, insufficient socialization into the activity, and lack of motivation to participate. To reduce these constraints and increase the number of new fishers, the project team recommends increasing access to required fishing resources, developing partnerships with affinity groups, and creating opportunities for social connection in recreational fishing.

Sugar Lake Bull Trout Assessment – High Reward Tags

Status: Underway Tracking # L2209 Year 4 of 5

Executive Summary:

This project will assess the status of the bull trout population in the Upper Shuswap drainage and identify appropriate management options and angling regulations to address conservation concerns and maintain a sustainable quality fishery. Project objectives are to: 1) Determine the status of bull trout and implement a long-term strategy to detect changes in relative abundance 2) Identify, map and evaluate spawning habitat characteristics, potential limitations and disturbances 3) Determine angler exploitation 4) Evaluate the meta-population structure within the Thompson EDU 5) Assess the current angling regulations and identify appropriate management actions to conserve native bull trout stocks and sustain a quality char fishery Project objectives will be achieved through a combination of stock assessment, high reward tagging (mark-recapture), habitat assessment, redd surveys, creel census, genetic sampling, and education & outreach over 5 years. This project will help answer provincial uncertainties needed for the conservation and management of Bull trout within the core area of the Thompson Ecological Drainage Unit (EDU). It will also provide critical information required for the regional management of the Sugar Lake fishery and bull trout population. 2023-24 FFSBC funding supported the high reward tagging component of this project. Since 2020, 230 bull trout have been tagged beneath this project and fifty-one fish re-captured by anglers and high reward tags paid out. Harvest exploitation = 7.6%. Nine high reward tags were paid out in 2023.

Penticton Creek Restoration

Status: Underway Tracking # L2210 Year 3 of 5

Executive Summary:

The restoration of Penticton Creek has been ongoing for over a decade in order to restore and protect an important fish-bearing tributary to Okanagan Lake, while simultaneously ensuring flood protection. Penticton Creek has been severely altered and degraded due to historical flood control works but offers exceptional potential for increased fish production based on water availability and historical fish use. This large-lakes project is building on the restoration work of a city restoration committee (funded through partners) and measures the effectiveness of different restoration approaches during works implemented in the summers of 2021 to 2023. This project will provide critical information on how to best design future restoration to ensure maximum possible long term fish production from the stream. Specifically, this project will: -Complete large-scale habitat restoration of 266 m of concrete flume and impassable drop structure, including the creation of 11 pool/riffle combinations (with 2 pools exceeding 1m in depth), and complete removal of a bridge. -Monitor the effectiveness and stability of the restored features for a period after at least two freshet flows. -Understand the microhabitat use patterns by Kokanee in riffle-pool habitat restoration and how that varies with engineered design specs. -Understand micro features that enhance gravel retention in high gradient, low width systems (boulder clusters, pool design specifics, diverting thalweg)

Horsefly River Stock Evaluation

Status: Underway **Tracking # L2304** **Year 2 of 3**

Executive Summary:

This project serves to enhance information collected and increase confidence levels on the currently HCTF funded Horsefly River enumeration study. The Horsefly enumeration study is giving the first recorded escapement estimates of Quesnel Lake spawner abundance of 600-800 fish above 50 cm. The study uses the mark-recapture relationship between marked (acoustic tagged) and unmarked fish being recaptured at the mouth of the Horsefly River. The HCTF funded project has other objectives such as identifying habitat use and spawner distributions within a designate fisheries sensitive watershed (Horsefly watershed). FFSBC funding, however, focuses on increasing the confidence of spawner estimates by increasing effort on tag recovery. Run timing of the Horsefly spawning population has been found to be more variable than previously though making tag recovery more challenging than thought. Peak run timing has varied from late March to late April making it difficult to predict optimum netting (tag recovery times). Extending the sampling period by 10 calendar days will significantly increase the ability to get tag returns and increase the confidence in the population estimate. This can only be completed in the next 2 years as a significant number of acoustically tagged fish are available that in future will no longer exist.

Moberly Lake Trout Assessment

Status: Underway **Tracking # L2305** **Year 2 of 3**

Executive Summary:

The objective of this project was to assess if spawning Lake trout in Moberly lake are limited to the three main spawning shoals identified in 2006. This question was revisited as no telemetry research had been conducted in the Lake since Brendan Anderson's 2006 study. Targeted Spring sampling was completed in 2022, where only 2 Lake trout were captured and implanted with transmitters. No telemetry relocation surveys were completed in 2021 due to boat mechanical issues. In 2023, 12 transmitters were surgically implanted into Lake trout comprising of 6 hatchery fish and 8 wild fish. During the Fall spawner mark-recapture survey in October 2023, opportunistic telemetry relocation efforts were completed. 4 frequencies were relocated during the week long survey, and 3 frequencies were observed on previously identified spawning shoals. One fish was located in the South basin of the lake, however, no evident habitat features were observed near the fish's vicinity, and netting efforts only produced lake whitefish and Northern Pike. It was assumed that this Lake trout was feeding and not in a spawning location. A total of 4 fish with radio transmitters were physically captured in the mark-recapture event. The surgery incisions were healing well and no signs of infection or deterioration were observed. From these current results, it appears that the three principal spawning shoals "X", "Y" and "Z" are the prevalent shoals within Moberly Lake. "X" appears to be the most prominent of the three shoals with the majority of the spawning Lake trout being captured on this shoal.

Mission Creek Restoration Initiative – Restoration Implementation and Effectiveness Monitoring

Status: Delivered **Tracking #** L2401 **Year** 1 **of** 3

Executive Summary:

The Mission Creek Restoration Initiative (MCRI) was formed in 2002 to address declining kokanee stocks and habitat degradation concerns in Mission Creek. This Okanagan Lake tributary is considered the lake's most important kokanee producing stream, and recovery of the kokanee stream spawning population, via the Okanagan Lake Action Plan (OLAP) has been considered a top priority for the Region 8 Fisheries Program for close to 2 decades. Sections of Mission Creek were channelized and diked in the 1950s resulting in the loss of more than 60% of the creeks length, 80% of the spawning and rearing habitat and 75% of its wetland and riparian areas. Habitat loss, along with poor water management were identified as two of the top contributing factors to the kokanee population decline. In 2016, Phase 1 of a large-scale restoration project intended to help recover Okanagan Lake kokanee stocks and improve the quality and economic value of the recreational fishery was completed. In 2017, MCRI Phase 2 was launched. The 2023 FFSBC funds supported: 1) continuation of Phase 1 fish utilization and fish habitat effectiveness monitoring, which will include pre-construction assessment of the 2023/24 restoration project area 2). the engineered design & construction oversight by a P. Eng (partially funded by FFSBC). Project Outcomes to date: To date, engineered designs have and habitat effectiveness monitoring have been completed. In-stream construction was postponed to 2024.

Kootenay Lake Kokanee Recovery

Status: Underway **Tracking #** L2402 **Year** 1 **of** 1

Executive Summary:

Kokanee populations in Kootenay Lake have collapsed in the past nine years. As part of the approach to recovering kokanee stocks, the Ministry formed an advisory team that provided action recommendations to recover kokanee populations and produced the Kootenay Lake Action Plan, which lays out actions and triggers for implementation for both kokanee and predator populations. In an annual program review in fall 2022, the advisory team agreed that the Kootenay Lake Angler Incentive Program (KLAIP) is an important tool to reduce in-lake predation pressure on kokanee immediately in order to support juvenile kokanee survival and should be continued in 2023-2024. The team also agreed that the KLAIP should be coupled with ongoing predator monitoring and an exploitation study aimed to provide the key data and analysis necessary to guide timely implementation of effective actions to accelerate short-term recovery of kokanee stocks in Kootenay Lake. The objective of this project was to recover kokanee and large piscivore populations in Kootenay Lake. Specifically, reduce bull trout and rainbow trout in-lake abundance by an additional harvest that is similar, or higher, to that of the 2022-2023 KLAIP. Additional project objectives include conducting piscivore monitoring through the collection of bull trout and rainbow trout samples to analyse lake-wide changes in Gerrard abundance indices as well as diet, and age structure, and estimate exploitation rates.

Determination of Kaslo Bull Trout Productivity at Low Abundance

Status: **Delivered** **Tracking #** **L2403** **Year** **1** **of** **2**

Executive Summary:

Following the unprecedented collapse of Kootenay Lakes' Kokanee (Oncorhynchus nerka) population in 2012, the current recreational fishery has been severely degraded from its once renowned "world class" status. In its former state, the intensive fishery generated > 200,000 rod hours but the current fishery has seen a 63% decline in angling effort to date. The decline in the fishery has left a cascading negative impact to the local economy, eroding the publics confidence in management of the lake. The proposal required funding to utilize a fence, in combination with directed removals using tangle nets and angling, to prohibit Bull Trout adults from spawning in Kaslo River and thus reduce future recruitment to below 30-50% of the historical carry capacity. The intent was to reduce future predation pressure on Kokanee and supporting recovery initiatives on Kootenay Lake. KLAT recently identified predator removal of Bull Trout as a key recovery action for Kokanee on the lake . In 2018 and 2019, a fence was successfully installed on the Kaslo River, demonstrating the effectiveness of this method. In 2018, a total of 257 Bull Trout were captured with approximately 2/3 being euthanized. The removal of ~175 kelts (~1.5 kg) was predicted to protect a significant proportion of Kokanee by age class from predation based established bio-standards. Implementation of the fence was a success and removed a large portion of the spawning biomass in 2023. The effectiveness of this year's work will be provided in the monitoring of the juvenile production associated with the 2023 spawn. The removal of 384 adult Bull trout, using bioenergetics data, indicates that ~70,000 age 1 Kokanee would have been utilized if this fish returned to Kootenay Lake, greatly assisting with recovery efforts.

Thompson Shuswap Wild Stock Guardian Project

Status: **Delivered** **Tracking #** **L2405** **Year** **1** **of** **1**

Executive Summary:

The 2023 Thompson-Shuswap Wild Stock Guardian project was an extension to the Thompson Region Wild Stock Guardian project completed in 2022, to focus more specifically on the Shuswap system fisheries and Thompson River. Information collected from the 2022 guardian project indicated high angler effort on both Shuswap Lake and Thompson River fisheries, targeting rainbow trout, lake trout, bull trout, and kokanee with indications of growing popularity on the Shuswap char species, lake trout in particular. Maintaining diversity of angling opportunity for BC residents is a priority for the Thompson Region Fish and Wildlife Branch, the information collected through the guardian project will not only help evaluate the current status of these fisheries through angler surveys, helping identify where or if there is a need for possible regulatory changes or potential management actions on targeted wild stocks, but also help identify potential need for additional enforcement support. The degree to which quality and diversity of opportunity is achieved is conditional to the state of the fishery and whether the fish size and success rates are attractive enough to anglers. For example, the Shuswap Lake fishery in the non-retention areas around the Adams River and Little River provides anglers with an opportunity to target wild, large bodied rainbow trout and bull trout that concentrate to predate on various life stages of salmon. In the fall trout congregate near spawning salmon to feed on eggs and flesh, in the spring the trout target emerging fry and/or emigrating smolts. Although 2023 was a dismal sub-dominant year for sockeye, the Thompson-Shuswap chinook run was reported to be at a historical high, supplementing the absence of sockeye and the Shuswap system fishery.