

## 2023-2024 Funded Projects



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

### Supporting Committee: Rivers

# of Projects: 19

Status	Project #	Title	Delivery Region	Allocated \$
Delivered	L2205	Omineca Angler and non-Angler Preference and Diversity Survey ( \$4,000 from 3 committees)	7a - Omineca	3,333
Delivered	L2405	Thompson-Shuswap Wild Stock Guardian (Split with Large Lakes total \$35,000)	3 - Thompson	17,500
Delivered	R2001	West Coast Steelhead Index Stream Monitoring	1 - West Coast	25,311
Delivered	R2103	Horsefly River Juvenile Assessment	5 - Cariboo	10,000
Underway	R2104	Kitwanga and Nass Rivers Char Exploitation Assessments (combined with R2105 from F23)	6 - Skeena	5,000
Underway	R2106	Cariboo Region Bull Trout Acoustics	5 - Cariboo	6,000
Delivered	R2203	Angler Surveys - Fraser Valley Hatchery-Augmented Steelhead Streams	2 - South Coast	19,400
Delivered	R2204	Stave River Net Pen Imprinting and Adult Return Assessment	2 - South Coast	17,016
Underway	R2205	Evaluation of the Upper St. Mary River Bull Trout Population	4 - Kootenay	20,000
Cancelled	R2301	Elk River Fishing Access Improvement Project	4 - Kootenay	50,000
Underway	R2302	Elk River - Westslope Cutthroat Trout Population Inventory	4 - Kootenay	27,500
Delivered	R2303	Upper Kootenay River Seasonal Bull Trout Fishery Assessment	4 - Kootenay	40,000
Delivered	R2305	Squamish River Bull Trout Risk Assessment HRT	2 - South Coast	5,000
Underway	R2307	Kettle River Snorkel Surveys	8 - Okanagan	8,220
Cancelled	R2401	Parsnip River Watershed Arctic Grayling Conservation	7a - Omineca	35,078
Underway	R2402	Kootenay River Guardian Program (non-classified waters)	7a - Omineca	20,000
Cancelled	R2403	Fisheries Access Management Plan and Support- Rivers	Provincial	17,025
Delivered	R2404	Coquihalla and Chilliwack River Juvneile Density Index Surveys	2 - South Coast	8,310
Delivered	R2406	Brem River Adult Summer ST Survey	2 - South Coast	14,900
				349,593

## 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 7b North East (Peace)
9. Region 8 Okanagan

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Rivers Funded Project Categories	Allocated \$
Stock Assessment	\$212,335
Research & Development	\$3,333
Guardian Programs	\$37,500
Angler Effort, Catch & Satisfaction	\$29,400
Angler Access & Infrastructure	\$67,025
	\$349,593

## **2023-2024 Project Summaries**

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

## 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.

## 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 a 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.

## West Coast Steelhead Index Stream Monitoring

Status: Delivered Tracking # R2001 Year 5 of 5

### Executive Summary:

This project continues long-term steelhead stock assessment data collection on key Vancouver Island streams. A combination of methods including direct underwater observation (snorkel survey) and electrofishing assessment were used to determine relative abundance, habitat saturation and an estimate of absolute steelhead abundance in some watersheds. Winter steelhead snorkel surveys were completed, and results were contrasted against historic indices of abundance on the Englishman (1998–2023), Gold (1998–2023) and Salmon (1999 – 2022) Rivers. Summer steelhead snorkel surveys are summarized for the Tsitika (1976–2023), Heber (1975–2023) and Gordon (1985–2023) rivers. This year’s results indicate relatively low steelhead abundance across their range for both summer and winter stocks with a recent upswing from some of the lowest adult and juvenile densities documented. Electrofishing data are summarised for the Cowichan (1999-2023) and Englishman (1998-2023) rivers. Steelhead fry density on the Cowichan River continues to be similar to most densities documented in the last decade but are significantly better than densities measured in 2022, and may be near the minimum abundance required to saturate available parr habitat. Notably, a large-scale fish mortality event caused by degraded water quality was documented in the Upper Cowichan River. This finding has created a multi-phased BC Fisheries response that will continue with enhanced monitoring and mitigation actions to come in future years. Steelhead density on the Englishman River is consistent with the small estimated adult population and are likely below minimum abundance required to saturate parr habitat. Englishman River peak counts of 60 steelhead in the spring of 2023 yielded a population estimate of 83 steelhead and is below the lower quartile value within the intensively monitored period between 2002 – 2023. This level of abundance places the Englishman River in the Extreme Conservation Concern Zone based on both the absolute population size and our understanding of this stock. These data have stimulated the development of an active management approach on the Heber River using an abundance-based framework to maximise protection during cyclical downturns in survival and maximise benefits when sustainable fisheries may occur.

## Horsefly River Juvenile Assessment

Status: Delivered Tracking # R2103 Year 4 of 5

### Executive Summary:

Quesnel Lake in the eastern portion of the Cariboo region supports the highest use wild stock rainbow trout (*Oncorhynchus mykiss*) fishery in the region. With several game species targeted by anglers, the late-maturing, large-bodied rainbow trout within the lake are the prize of most anglers. Angling for rainbow trout also occurs in many of the rivers and creeks that flow into Quesnel Lake (Mitchell, Horsefly, Quesnel). Through acoustic telemetry, tagged large-bodied rainbow trout have nearly all been tracked in the Horsefly River during spawning periods. With very little recruitment from other surrounding rivers, enumerating the densities of juvenile rainbow trout in the Horsefly River is valuable and can later be tied into a concurrent mark-recapture project of adult Horsefly rainbow trout. This can lead to a long-term index to support management decisions around rainbow trout on Quesnel Lake and the Horsefly River. Resuming in 2020, funded by FFSBC, up to 8 sites were completed by staff using two-pass, closed-site electrofishing to gain fry abundances in suitable habitat. Depending on conditions, as little as 4 sites were completed in certain years. Sites were chosen based on historical sites used in past surveys done intermittently since early 1990's. Site size was made as close to 100 m<sup>2</sup> as possible. Juvenile densities were adjusted in analysis to be exactly 100 m<sup>2</sup> (standard unit) and finally adjusted based on habitat probability of use. From 2020 to 2023, adjusted fish/unit densities ranged from sites of zero catch to 237 fish/100m<sup>2</sup> unit. On average, 2022 had the highest site-wide fry/adjusted unit at 75.25. 2023 had the lowest density at 21.33 fish/unit per sites sampled. The option to continue the project was halted in 2023 in year 4 of 5 with funds being transferred over to Horsefly River Brood Collection. For the final year of the study, the project will be completed by Cariboo regional ministry staff to ensure densities are combined with the mark recapture of adult Quesnel Lake rainbows. The long-term indexing of juvenile rainbow trout densities in the Horsefly River will be important to the continued success of the recreational fishery and conservation of this unique strain of rainbow trout. When linked to adult mark recapture estimates, one can also make informed management decisions around adult fish in Quesnel Lake to ensure that juvenile habitat is fully seeded into the future.

## Skeena-Nass Fluvial Char Exploitation Assessment

Status: Underway Tracking # R2104 Year 4 of 5

### Executive Summary:

This project seeks to determine the spatial, temporal and quantitative exposure of fluvial char (BT & DV) to multiple and varied fisheries in the middle Skeena and lower Nass watersheds. A Precautionary Management Strategy for Trout and Char in Streams of the Skeena Region – Risk Assessment and Recommended Management Framework (Hagen et al 2017) outlines a recommended approach for research, monitoring and management of chars in the Skeena Region. A key missing link specific to fluvial chars is baseline distribution and exploitation information for high-use fisheries. Middle Skeena (Kitwanga) This project seeks to address these data gaps by partnering with the Gitanyow Fisheries Authority to floy tag, genetically and biologically sample all char enumerated at the Kitwanga Smolt Fence (2008-2023 avg n = 339, range 80-615). A subset of these fish will be high-reward tagged and recaptured by anglers in several fisheries throughout the Skeena watershed. In addition to determining exploitation rates, preliminary work suggests multiple avenues of study which may evolve as the project progresses (abundance, size or age-at maturity, genetic species and/or stock discrimination). All these possible avenues will help inform future assessments of risk to populations of fluvial char in the Skeena Region and help ensure that fluvial char provide their maximum benefit to recreational anglers in the Skeena region. This project was successfully completed in 2023 and will continue. The total number of fish enumerated in 2023 was again below average (n=120). In total, 72 fluvial char were bio-sampled and tagged at the Kitwanga smolt fence. The majority of recaptures were again from Gitanyow (formerly Kitwancool) Lake. Lower Nass River (Zolzap Creek & Nass Fishwheels) This project seeks to address these data gaps by partnering with the Nisga'a Fisheries Program to floy tag, genetically and biologically sample all char enumerated at the Nass River fishwheels and Zolzap Creek Smolt Fence. A subset of these fish will be high-reward tagged and recaptured by anglers in several fisheries throughout the Nass watershed. In addition to determining exploitation rates, preliminary work suggests multiple avenues of study which may evolve as the project progresses (abundance, size or age-at maturity, genetic species and/or stock discrimination). All these possible avenues will help inform future assessments of risk to populations of fluvial char in the Skeena Region and help ensure that fluvial char provide their maximum benefit to recreational anglers in the Skeena region. This project was successfully completed in 2023 and will continue. In total, 323 Dolly Varden were enumerated at the Zolzap Creek smolt fence, 67 of which were biosampled and tagged. 114 Dolly Varden were tagged and bio-sampled at the Nass River fishwheels. One tag was reported recaptured in 2023. We continue to refine our knowledge of how, where and why DV contribute to Nass River fisheries. A number of factors have influenced the availability of and participation in Nass valley salmon fisheries by anglers in the past four seasons. Additional effort by the Skeena Fisheries team will be put toward recapturing DV in recreational fisheries this year in order to reduce uncertainty about the lack of recaptures. Dolly Varden migratory patterns may include significant ocean residency time (May-Nov) which appears to reduce the exposure of DV to freshwater angling. Increased effort will be put toward the collection of age data in 2024 to improve our understanding of DV population dynamics and the relative contribution of various life histories to the various fisheries.

## Cariboo Region Bull Trout Acoustic Assessments

Status: Underway Tracking # R2106 Year 3 of 4

### Executive Summary:

The proposal seeks to address data gaps for the conservation and management of Bull Trout within BC, especially within the core area of Middle Fraser Ecological Drainage Unit (EDU). The purpose is to achieve desired outcomes that support increased sustainable opportunity (angling) and long-term stock conservation. Consistent with the Provincial Bull Trout Management Plan (MFLNRO 2016), habitat degradation, climate changes and over-exploitation were identified as some of the highest threats to Bull Trout in BC. Unfortunately, information on Bull Trout abundance trends in abundance and distribution in the Middle Fraser EDU is limited. This project will develop a coordinated population monitoring plan within the Cariboo core area which is severely lacking. Obtaining a better understanding of which tributaries are utilized by these fish, their relative abundance and their general distribution is a priority for the Cariboo watershed as identified in Middle and Upper Fraser Bull Trout Management Plan (2017). The Objectives of the program are to 1) develop a better understanding of the distribution of Cariboo core area bull trout, 2) develop population indices and 3) assess the metapopulation structure. A total of 79 bull trout over 50cm have been implanted with V13-1L acoustic transmitters to date. Ancillary data such as length, weight and capture conditions were also recorded at time of capture. This information will prove useful in the future to provide support for assessing population status. Genetic samples were taken from all fish captured and sent to Dr. Taylor's lab at UBC for analysis. The bull trout population in Spanish creek appears to be an adfluvial population limited to the Spanish system. No bull trout tagged in the Spanish system were recorded on mainstem receivers, and no bull trout tagged outside of the Spanish system were recorded on receivers within the Spanish watershed. It was expected that fish in the Spanish system were utilizing the upper Spanish creek for spawning based on historical information. However, none of the d on receivers in upper and lower Spanish creek to date. However, 7 tagged fish were detected in the unnamed tributary on the north side of Spanish lake in the fall of 2022 at a time that corresponds with a spawning migration. Spanish creek was walked in the fall of 2023 when water temperatures indicated spawning would occur, but no spawners were identified. Access to the unammed tribubutary appeared to have been limited due to extremely low water levels at the time of the survey. Fall receiver downloads showed 5 tags detected within cabin creek 2 weeks after the reconnaissance survey at a time that coincided with a rain event which may have facilitated fish passage into the stream. Multiple surveys will be completed on Cabin creek in the fall of 2024 to confirm spawner presence and refine survey timing. Reconnaissance of access to the Seller watershed and Spanish watershed was completed in 2020. Seller Creek has previously documented bull trout spawning, and the upper fish passage barrier in the watershed was confirmed by a ground crew in 2020. reconnaissance survey was completed on seller creek in the fall of 2022 to determine redd survey timing. A full redd survey was completed in 2023.



## Angler Surveys – Fraser Valley Hatchery Augmented Steelhead Streams

Status: Delivered Tracking # R2203 Year 3 of 3

### Executive Summary:

The Ministry of Water, Land, and Resource Stewardship (WLRS) completed creel surveys on three hatchery-augmented steelhead streams in the Lower Mainland to collect recreational fishery information for the Fraser Valley hatchery-augmented streams and provide angling education. All three systems rank in the top 5 in angler days for the South Coast Region based on STQ (Steelhead Questionnaire) estimates. The Chilliwack River supports the largest populations of wild and hatchery steelhead in the South Coast Region and the most intensive recreational winter steelhead fishery in the province. The Alouette River ranks second, and the Chehalis Rivers ranks fifth, superseded only by the Squamish and Cheakamus Rivers but these are not augmented systems. The primary purpose was to provide information to regional fishery managers to inform decisions relating to angling regulations and the steelhead stocking program. An additional objective for the Chilliwack River in particular, was to evaluate the effectiveness of regulation changes that were implemented April 1, 2021 to provide additional spawning protection to fish in the upper river and an increase in the hatchery steelhead daily quota. The project goals were to design, conduct, and refine a standardized angler survey project to collect basic fishery data (i.e., angler demographics, catch, and effort) and information on angler knowledge of regulations, best fish handling practices, attitudes towards hatchery steelhead programs, and general angler satisfaction levels. Chilliwack River angler survey results were compared to previous years whereas Chehalis and Alouette angler survey results were compared to each other. The creel surveys conducted on the Chehalis (2021-22) and Alouette Rivers (2022-23) provided insights into angler effort and catch across various time strata. Of the Chehalis anglers surveyed in 2021-22, 37.5% reported routinely releasing hatchery fish, primarily citing reasons related to fish size and quality, and 55% were unfamiliar with safe handling practices. Similarly, 37.5% of respondents on the Alouette River indicated they routinely released hatchery fish primarily for conservation reasons or to continue fishing, with 32% lacking knowledge of safe handling practices. These findings suggest a pressing need for educational initiatives targeting the angling community regarding the purpose of hatchery augmented systems and safe handling practices. Despite the challenges faced, the total estimated catch for both the Chehalis and Alouette Rivers aligns reasonably well with STQ estimates from the past five years, averaging 145 fish per year for the Chehalis and 339 for the Alouette. Although catch rates from the creel survey were insufficient to provide reliable insights into hatchery-wild catch proportions, STQ data indicate these proportions are 26% for the Chehalis and 22% for the Alouette suggesting that any changes to pose an unacceptable risk to wild fish populations. The 2023-24 creel survey of the Chilliwack River aimed to assess angler knowledge regarding hatchery regulations and purposes. Results indicated that 70% of respondents understood the hatchery's role in providing a harvest fishery, while 30% believed it to be for conservation purposes. Notably, 22% of anglers reported releasing hatchery fish, highlighting a need for further education. The survey recorded an estimated 24,227 angler-days, with an average fishing duration of 5.5 hours, resulting in 4,112 steelhead caught—25% of which were hatchery origin. The catch per hour (CPUE) was calculated at 0.027, consistent with previous years. Overall, angler presence remained stable, particularly during winter months, and fishing success appeared to be higher on weekends and in spring.

## Stave River Net Pen Imprinting and Adult Return Assessment

Status: Delivered Tracking # R2204 Year 3 of 3

### Executive Summary:

The Stave River, a tributary of the Fraser River, supports a winter steelhead trout population that offers angling opportunities for the public. Since 1986, a hatchery program has been in place to augment this steelhead population, aiming to enhance fishing opportunities. Despite these efforts, the program has faced challenges in recent years, including poor hatchery steelhead returns to the Stave River and the potential straying of these fish into nearby wild systems. This issue is compounded by the necessity to raise smolts in water outside of the Stave River, reducing the effectiveness of the hatchery program and increasing the potential negative impacts on nearby wild fish populations. From 2009 to 2013, a net-pen program was trialed, allowing smolts six weeks of rearing time in the reservoir to provide olfactory imprinting before their release into the Stave River. Early results were promising, showing increased hatchery return rates, but the experiment was paused due to upgrades to the Ruskin Dam. The early findings were insufficient to prompt permanent changes to the hatchery program at that time. In response, a new three-year program (2021-2024) was launched to continue evaluating the effectiveness of the net-pen rearing approach. The project aimed to determine whether this method increases hatchery steelhead adult returns and reduces the rate of straying to nearby wild systems. This program incorporated a winter creel survey of anglers to assess whether the net-pen rearing significantly improved hatchery steelhead returns to the Stave River. Over the three years, catch rates remained consistently low, and high variance in angler effort made it challenging to draw definitive conclusions. Despite notable effort across all strata, particularly on weekends, catch rates were minimal. Furthermore, no maxillary-clipped fish were reported during the surveys, limiting the ability to assess stray rates of hatchery-origin steelhead in nearby systems. These factors introduce significant uncertainty into the data, complicating efforts to evaluate the success of the net-pen rearing approach. The results from this three-year evaluation suggest that while the net-pen program shows potential, additional monitoring and refinement are necessary to determine its long-term viability. More robust data collection and improved reporting of biological markers are needed to fully understand whether this method can be implemented permanently to enhance steelhead returns and mitigate the impacts on nearby wild systems.

## Evaluation of the Upper St. Mary River Bull Trout Population

Status: Underway Tracking # R2205 Year 2 of 3

### Executive Summary:

Objectives and Outcomes: 1. Identify/confirm critical habitats for bull trout (BT) in the upper St. Mary watershed to inform management decisions around regulation strategies. Gather vital information related to the identification and protection of habitats critical to BT for spawning and/or rearing - Fisheries staff spent significant time during the 2023-24 field season conducting basin reconnaissance work to identify and confirm critical BT habitat and use in primary upper St. Mary River tributaries. 2. Determine migration timing and distribution of bull trout spawning and identify primary spawner indexes within the upper St. Mary River system - Fisheries staff spend significant time conducting spawner counts, evaluating run timing/distribution in various systems, confirming redd indexes and conducting redd counts in the upper St. Mary River. 3. Collect baseline inventory data through an enumeration fence/trap and redd counts in three known primary spawning tributaries (Redding, Dewar and White Creeks) to establish and/or quantify use by BT (and westslope cutthroat trout through bycatch) in the upper St. Mary River system and provide data vital to population management 4. Mark (floy and PIT), weigh, measure, collect genetic samples and additional biological data for all enumerated BT (weights, lengths, fecundity (mortality only), sex ratio, etc.). This data will enable analysis of population dynamics, condition, use, movement, migration timing, sub-population mixing, fluvial/adfluvial life history, and population estimates for the watershed 5. Collect genetic samples for analysis of bull trout population within the overall upper Kootenay watershed metapopulation Objectives 3-5 were completed in 2023-24. Fisheries staff installed an enumeration fence/traps on Redding Creek and maintained for approximately 5 weeks from the beginning of Sept to mid October. Approximately 110 post spawn Bull Trout were enumerated, tagged, weighed, sexed, etc. achieving the objectives as identified above. 6. Utilize all data to inform management decisions/evaluate current regulatory strategies in the watershed. Project could lead to increased angler opportunities and layered approach to population management in the watershed - Fisheries Staff are currently evaluating the data from this project to directly inform upcoming regulation cycle discussions (May 2024) and evaluation of current regulation strategies for the upper St. Mary River system and St. Mary Lake.

## Westslope Cutthroat Trout Population Inventory

Status: Underway Tracking # R2302 Year 2 of 3

### Executive Summary:

(The Elk River is one of BC's premier fly fishing rivers for wild Westslope Cutthroat Trout (WCT), and a key core area population in remaining BC WCT populations identified in the Provincial Management Plan. The Elk River WCT population has no robust abundance estimate, and prior estimates of fishery exploitation and vital rates have only been indirectly estimated from limited creels. The river is a classified water and sees significant angling activity, that results in catch rates that may be many times the population abundance of mature adults (A previous study estimated each adult is captured an average of 5.7 times annually). In addition to high exploitation, additional significant population stressors upstream include significant forestry activities and some of the worlds' largest metallurgical coal mine operations. There is major interest from the public, from the guiding and angling community to protect this fishery and have a strong monitoring program designed to detect changes in population abundance or productivity. Such a program would form a conservation baseline measure of population abundance to help set population objectives and weigh future development approvals against. A robust population estimate will also allow continued support for existing fisheries, which result in 10-15,000 angler days annually. There has been significant interest in the Kootenay region to implement a state-of-the-art population monitoring program for WCT in the Elk River. Fisheries stock assessments in medium to large sized rivers are notoriously difficult to undertake. Possible methods include having a crew of biologists and technicians electrofishing to capture WCT; alternatively, guides with clients could capture fish. Both of these methods could then be used to tag fish and recapture previously tagged fish in a mark-recapture program to monitor the population and estimate abundance. In 2021, an initial pilot was conducted, with FLNRORD contracting Nupqu Resource Ltd to coordinate fish capture and marking by guide angling, as well as conduct an initial year of boat electrofishing. 2021 efforts were successful as a pilot; 231 fish were tagged by guides with angling clients, and 242 fish were tagged by boat electrofishing in 5 days of effort. Data analysis through the winter of 2021 resulted in recommendations for refining a scaled-up assessment in 2022 and 2023. 2023 efforts resulted in capture of an additional 1391 fish (1115 by electrofishing; 276 by guide assisted tagging). The total number of fish tagged and recaptured allowed an initial estimate of 30,956 fish (22,016 - 44,779 95% credible intervals) to be calculated in 2022. With additional effort of 2023, a full mark-recapture estimate of the population will be conducted in 2024.

## Upper Kootenay River Seasonal Bull Trout Fishery Assessment

Status: Delivered Tracking # R2303 Year 2 of 2

### Executive Summary:

final report to be provided still

## Squamish River Bull Trout Assessment

**Status:** Delivered      **Tracking #** R2305      **Year** 2      **of** 2

### Executive Summary:

Bull Trout in the Squamish River provide a unique recreational angling opportunity on a large river in BC. The Squamish River appears to be a stronghold for the species with important cold water inputs buffered by Coastal Mountain Range icefield and/or glaciers. The river represents another popular large river angling opportunity that is proximal to Greater Vancouver and the Lower Mainland and meets a host of angler satisfaction criteria (i.e., success, aesthetics). The tagging component of this study deployed high reward tags (\$100 +\$10) in angler captured fish from 2022 to 2024. A total of 90 fish were uniquely tagged over the 3 year period. Recaptured and returned tags provided relative exploitation rate information within the catch and release fishery over the three-year period. While the relative rates of exploitation appear to be higher than expected, overall impacts of this fishery would be considered low given the low post-release mortality for this species. Most Bull trout were intercepted (May-June) as they migrated in Squamish River prior to spawning in October. Captured and tagged fish ranged from 48-85 cm in size, with median size of 56 cm. Direct assessment of tag-returns provides a cost-effective alternative to assess the relative exploitation in these fisheries. On the Squamish River, moderate levels of effort and low levels of post-release mortality for this species provide a substantial buffer for concerns associated with the recreational fishery and demonstrate the use of catch release as an important regulation tool for conservation and management of this species.

## Kettle River Snorkel Surveys

**Status:** Underway      **Tracking #** R2307      **Year** 2      **of** 3

### Executive Summary:

The purpose of this project is to evaluate the impacts of recent flood, fire and drought events on native fish stocks and determine if regional management objectives for the Kettle River Sport Fishery are being achieved. As the only fly-fishing river in Region 8, the Kettle River is currently managed as a quality fishery. Fluvial rainbow stocks have not been evaluated since 2016. The overall goal is to maintain a quality wildstock fishery for fluvial rainbow trout in the Kettle River Watershed. This will be achieved through the following objectives:

- Assessing the status of rainbow trout stocks in the Kettle, West Kettle & Granby river basins in order to evaluate the impact of recent flood, fire and drought events on wild stocks and guide future management decisions.
- Determining the effectiveness of current regulations and implement regulation changes, if required.
- Conservation of wild fish stocks and recreational opportunities for future generations to come

Outcomes to date:

- Year 1: Snorkel surveys were cancelled in 2022 due to unseasonably high stream flows.(ie. stream flow >P95 levels).
- Year 2: Snorkel surveys were completed in July 2023. Data is currently being analyzed, however evidence of low flow/droughted related impacts on stock abundance were evident.

## Kootenay River Guardian Program (non-classified waters)

Status: Underway Tracking # R2402 Year 1 of 2

### Executive Summary:

The 2023 Kootenay River Guardian Program (KRGP - non-classified waters) was conducted from March 2023 through November 2023. River Guardians interviewed 190 anglers over this time period on two non-classified systems (Slocan River and Lower Kootenay River). Of the 190 anglers interviewed, 93% were Canadian. Most Canadian anglers were from British Columbia (75%) and Alberta (24%), while only 2 (1%) anglers were from other Canadian provinces/territories and 14 (7%) anglers were from the United States. A total of 360 fish were caught, with a catch composition of 43% bull trout, 29% mountain whitefish, 27% Westslope cutthroat trout, and 1% rainbow trout. The overall catch success or catch per unit effort (CPUE) for the 2021 season was 0.74 fish per rod hour. Most anglers interviewed on the non-classified systems during the 2023 season indicated that they were targeting bull trout during their angling trips (79%), with 7% targeting Westslope cutthroat trout, 2% rainbow trout and 1% mountain whitefish. There were also 20 anglers, or 11% of all anglers interviewed, that were not targeting any specific species. A total of 10 anglers (5%) on the 3 systems were guided. All guided anglers were interviewed on the upper Kootenay River during the fall fishery. There were more fly anglers (83%) than gear anglers (17%), and no anglers were found using both methods. Of the 190 anglers interviewed, 93% were Canadian. Most Canadian anglers were from British Columbia (75%) and Alberta (24%), while only 2 (1%) anglers were from other Canadian provinces/territories and 14 (7%) anglers were from the United States. During the interviews, anglers were asked to rate their quality of experience on a scale of 1-5. Anglers were then provided a list of factors to choose from to gauge experience satisfaction. Not every angler responded to these questions. Of the 174 anglers who answered these questions (92% of total angler interviews), 70% of anglers considered the quality of their angling experience “good-excellent”, while 30% indicated that their experience was “poor-fair”. The main contributing positive experience were quality and quantity of fish caught, surrounding scenery, and quality of access. The main factors contributing to negative experience were quantity of fish caught, and number of boats on the water. Crowding, or the perception of crowding, was of little issue for most anglers interviewed as 70% of anglers indicated they saw 5 or fewer anglers during their trip, while 30% observed >6 anglers on their trip. Additionally, 84% of anglers indicated that the systems fished were “not at all - slightly crowded”, while 16% of anglers felt that they were “moderately - extremely crowded”.

## Coquihalla and Chilliwack River Juvenile Density Index Surveys

Status: Delivered Tracking # R2404 Year 1 of 1

### Executive Summary:

Provincial government biologists completed electrofishing surveys targeting juvenile steelhead (*Oncorhynchus mykiss*) on the Chilliwack River and Coquihalla River during fall of 2023. The project added to the long-term monitoring record for both streams (40+ years). The main objectives were to continue the monitoring of trends in juvenile steelhead densities as a) an index of general stock status, and b) to monitor the recovery from the November 2021 atmospheric river event floods. Eleven sites were surveyed on the Chilliwack River and 12 sites were surveyed on the Coquihalla River. The survey methodology duplicated what has been done in previous years: a section of stream was partially isolated using a downstream stop net and specific patterns were used to remove juvenile steelhead by electrofishing. Fish were enumerated, identified to species, and measured. Habitat data were collected and input into a habitat suitability index to produce standardized steelhead fry densities in preferred habitat. Observed juvenile steelhead densities in both rivers rebounded significantly from depressed levels observed in 2022 to levels at or near long-term averages, providing optimism for a successful recovery from the 2021 floods. Continued monitoring of juvenile steelhead in these two systems will provide a better understanding of the impacts of 2021 floods and associated habitat restoration efforts, contribute to the understanding of steelhead stock status and trends in Region 2, and inform potential management actions and alterations to fishing regulations.

## 2023 Brem River Adult Summer ST Survey

Status: Delivered Tracking # R2406 Year 1 of 1

### Executive Summary:

The Brem River is one of many remote coastal steelhead streams in Region 2, and very little information is available on these stocks. Recent reports from the public indicating increased fishing pressure on the Brem River provided the impetus for a stock assessment, for two major reasons: 1) to collect updated stock status information to support evidence-based fisheries management decisions, and 2) to evaluate the feasibility of establishing the Brem River as an index monitoring stream to help better understand steelhead stock trends in the more remote coastal drainages of Region 2 (e.g., north of Powell River). Three provincial biologists and one contract biologist completed one uncalibrated snorkel survey on the Brem River (Toba Inlet) on October 5, 2023 to obtain an estimated peak abundance index count of the adult summer-run steelhead (*Oncorhynchus mykiss*) escapement. Thirty-five adult steelhead were observed in approximately 8.4 km of surveyed stream length (i.e., 4.2 spawners/km), resulting in an estimated total escapement of 60 to 87 spawners. Applying the abundance-based framework described in the BC Provincial Framework for Steelhead Management, this equates to >30% of estimated carrying capacity which places it in the “routine management zone” category (MFLNRO 2016). Regular (e.g., biennial) monitoring of the Brem River steelhead is recommended to implement temporal and/or spatial angling closures to protect the stock as/when necessary.