2022-2023 Funded Projects

This table summarizes approved 2022-2023 funding allocations for technical committee projects.

Supporting Committee: Rivers

of Projects: 19

Status	Project #	Title	Delivery Region	Allocated $
Delivered	R2001	West Coast Steelhead Index Stream Monitoring	1- West Coast	25,311
Delivered	R2201	Mowachaht/Muchalat First Nations Engagement in Gold River Steelhead Stewardship	1- West Coast	16,344
Delivered	R2204	Stave River Net Pen Imprinting and Adult Return Assessment	2 - South Coast	15,637
Delivered	R2203	2022 Angler Surveys – Fraser Valley Hatchery-Augmented Steelhead Streams	2 - South Coast	18,000
Delivered	R2305	Squamish River bull Trout Assessment - HRT	2 - South Coast	5,000
Delivered	R2306	Coquihalla & Chilliwack River Juvenile Steelhead Density Index Surveys	2 - South Coast	7,500
Delivered	R2310	Thompson Region Wild Stock Guardian Program (shared with LL)	3 - Thompson	20,000
Delivered	R2301	Elk River Fishing Access Improvement Project	4 - Kootenay	50,000
Delivered	R2206	Kootenay River Guardian Program (non-classified waters)	4 - Kootenay	20,000
Delivered	R2302	Elk River - Westslope Cutthroat Trout Population Inventory	4 - Kootenay	30,000
Delivered	R2303	Upper Kootenay River Seasonal Bull Trout Fishery Assessment	4 - Kootenay	40,000
Delivered	R2106	Cariboo Region Bull Trout Acoustics	5 - Cariboo	6,000
Delivered	R2103	Horsefly River Juvenile Assessment	5 - Cariboo	10,000
Delivered	R2304	Dean River Steelhead Fry/Parr Survey	5 - Cariboo	20,000
Delivered	R2104	Nass River Char Exploitation - HRT	6 - Skeena	5,000
Delivered	R2105	Kitwanga River Char Exploitation - HRT	6 - Skeena	5,000
Delivered	L2205	Omineca Angler and non-Angler Preference and Diversity Survey (shared with LL)	7a - Omineca	5,833
Delivered	R2308	Region 7a Parsnip Watershed River Guardians	7a - Omineca	62,456
Delivered	R2307	Kettle River Snorkel Surveys	8 - Okanagan	7,590
				369,671

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

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Rivers Funded Project Categories	Allocated $
Angler Access & Infrastructure	$50,000
Angler Effort, Catch & Satisfaction	$33,000
Guardian Programs	$102,456
Research & Development	$5,833
Stock Assessment	$162,038
Other	$16,344
	$369,671

2022-2023

Project Summaries

The following section provides a summary of activities of each project delivered for this fiscal year. In addition, the total expenditure to date is provided for all years of project delivery.

West Coast Steelhead Index Stream Monitoring

Status: Delivered Tracking # R2001 Year 4 of 5

Executive Summary:

Steelhead abundance is highly variable between years and watersheds. During periods of reduced marine and freshwater survival, steelhead stock sizes routinely decline to levels that warrant fishery management actions including fishery closure. Rates of decline or recovery appear to be different between Ecoregions and ecotypes due to stream and stock specific productivity and harvest pressures. Assessing steelhead stock strength and prescribing appropriate management strategies demands an active monitoring approach informed by local data. A number of steelhead fisheries on Vancouver Island have been closed or severely curtailed using a combination of time and area closures, starting in the late 1990's concurrent with a precipitous decline in adult steelhead abundance. The West Coast Region is interested in monitoring the necessity of these continued closures and collecting data across key streams to inform broader management actions. Due to the very large number of steelhead stocks within the West Coast Region a sub-sample have been selected for long-term monitoring and assessment. Summer steelhead index streams include the Heber and Tsitika rivers while winter steelhead streams include the Englishman and Cowichan rivers. Study intensity varies from a single snorkel survey on both the Heber and Tsitika and up to three (or more) comprehensive surveys on the Englishman River. Additional opportunistic surveys have been completed in sites where long-termdata exist and results can help to inform local abundance trends or identify specific management actions. These activities occurred in conjunction with Regional, First Nations and Federal partnerships.

Standardized, closed site electrofishing occurredon the Englishman and Cowichan Rivers. The electrofishing data is used to corroborate snorkel survey counts of steelhead spawners in the Englishman River and as the primary index informationfor Cowichan River steelhead. The Cowichan River fry census includes a component of stream resident and adfluvial rainbow progeny. Historical otolith microchemistry informs the contribution of adfluvial and resident rainbow trout to trout fry to steelhead fry assessments. The key objectives of this project included:

• Collect standardized steelhead fry density data from eight to ten index sites on two winter steelhead streams (Englishman and Cowichan Rivers).

• Estimate Englishman River steelhead population from repeated snorkel surveys to determine stock status using AUC or MLE methods, integrating prior knowledge from intensive surveys completed between 2011 –2014.

• Survey the Heber River population and the Tsitika river index of abundance using snorkel surveys to continue the 47 year time series of adult abundance.

• Additional key streams including the Salmon and Gordon werecompleted to inform if localtrends of abundance and address local migrationand fishery management actions using a combination of partner funds and internal staff and resources.

Mowachaht/Muchalat First Nations Engagement in Gold River Steelhead Stewardship

Status: Delivered Tracking # R2201 Year 2 of 2

Executive Summary:

Vancouver Island's Gold Riverhas historically supported one of the West Coast Region's most prolific winter steelhead populations and fisheries. However, recent steelhead stock assessment activities show a precipitous decline in winter steelhead abundance to near indetectable levels. Recent winter steelhead surveys suggest this population is at imminent risk of local extirpation and is unlikely to recover without intervention. Additionally, summer steelhead populations in the Gold River saw their lowest return on record as of 2022 monitoring.

Recent evidence from the Salish Sea Marine Survival Project has shown extensive predation of steelhead smolts and adults by harbour seals (Melnychuk et al., 2007) at levels that can supress steelhead populations. By working with the Mowachaht/Muchalaht First Nations (MMFN) to restructure the temporal and spatial elements of their Food Social and Ceremonial (FSC) allocation of pinnipeds, authorized to them by Fisheries and Oceans Canada, it's possible these restructured harvest efforts may yield an increase in winter steelhead escapement.

The objectives of this program are to promote stewardship by the MMFN with respect to steelhead conservation, management of bycatch and habitat stewardship activities by:
•Meeting with MMFNFisheries staff and community to discuss current steelhead stock status and increase awareness of the challenges facing steelhead populations.
•Augment current steelhead stock assessment activities by including MMFN technicians in assessment programs within the watershed.
•Identify opportunities to work together to meet shared conservation outcomes including the potential to incorporate steelhead conservation considerations into their FSC allocation decisions.
•Collect stomach samples from seals harvested within the existing FSC allocation, particularly those from the lower Gold Riverto complete stomach analysis.
•Collect samples from steelhead intercepted in FSC sockeye fisheries and promote best practices while handling to improve survival outcomes.The primary methods for achieving these objectives takethe form of relationship building, communication and knowledge sharing. Through meeting and dialogue the Ministry of Forests (MOF), together with MMFN was able to build a strong relationship and work effectively toward the shared goal of steelhead stewardship. To date, this hasresulted in ove 20 virtual and in person meetings, 1 community fisheries meeting to discuss steelhead interception and handling best-practices, 8 collaborative field-days, 1 inter-agency and stakeholder workshop, the procurement of multiple pinniped biological samples for analysis,the creation and implementation of a pinniped monitoring program.The objectives met as part of this program have the potential to reduce in-river predation by pinnipeds and increase winter and summer steelhead escapement. Sustained efforts such as these may be the best and last hope for the recovery of the Gold River's winter steelhead, the preservation and enhancement of the summer steelhead population and a return to what was once a vibrant fishery.

2022 Angler Surveys – Fraser Valley Hatchery-Augmented Steelhead Streams

Status: Delivered Tracking # R2203 Year 2 of 3

Executive Summary:

Region 2 relies primarily on the results of the annual steelhead license mailout questionnaire (STQ), reports on brood-stock collection activities,and anecdotal angler and hatchery staff reports to direct management of hatchery-augmented systems.The high dependency on the STQ is concerning given the low number of angler responses received in recent years, which has increased the uncertainty with STQ-derived estimates of angler effort and wild steelhead population trends. To address this, creel and angler count surveys were initiated to provide more accurate and detailed information on a selection of Region 2 hatchery-augmented steelhead streams (Chehalis, Alouette, and Chilliwack). In addition to enhanced data collection, conducting field-based surveys increases the provincial presence on Fraser Valley streams which will assist with fishery implementation by way of improved awareness and education of hatchery programs, increased compliance with angling regulations, and by promoting best handling practicesfor wild steelhead releases.

This project involves the collection of basic fishery data (e.g., effort, catch), and information on angler satisfaction levels and their understanding of the purpose of steelhead hatchery programs. Data collected will provide spatial and temporal information of the distributionof catch and effort, which is lacking in the STQ. Field-based methods are also hoped to increase the total amount of data collected, as opposed to using only the STQ which yields relatively few responses for individual streams.Project results will offer regional managers improved steelhead fishery information for three Fraser Valley hatchery-augmented streams. This will help maintain sustainable angling opportunities for the public while minimizing risks to wild, indigenous steelhead. The 2022/23 season represents Year 2 of this project and consisted of angler count and creel surveys on the Alouette River(Figure 1), a hatchery-augmented winter steelhead fishery that runs from approximately December to April. The Alouette River flow is regulated bya BC Hydro dam at the outlet of Alouette Lake that has been in operation since 1926.

In the 2021/22 season (year prior to study), 46 anglers responded to the STQ as having fished the Alouette River out of an estimated 234 total anglers. This is marginally lower than the previous year (56 responses; estimated 292 anglers), but within the general range of numbers reported after the period duringthe 1980s when the fishery saw considerably more effort.

An estimated 258 steelhead were caught in the 2021/22 season, of which 196 (76%) were wild. In addition to the mandatory release of wild fish, anglers reported releasing 21 of 62 hatchery-origin fish (34%).The number of steelhead caught in the Alouette system has varied since detailed data collection began in 1982.The 2021/2022 season had the 5th lowest number of estimated wild steelhead caught over the past 40 years. Steelhead returns appear to show somewhat ofa cyclical pattern with peaks every 15 yearsor so.

Objectives:
•Gain a better understanding of current angler use and success, demographics of anglers, and the quality of the fishery/angling experience.
•Compare field survey results to the STQ estimates, potentially leading to improvements in future STQ-derived estimates of overall angler effort and steelhead population trends.
•Provide a provincial presence to assist with fishery implementation by way of improved awareness of and compliance with angling regulations. This will assist fishery managers with identifying potential needs for adjustments to angling regulations and steelhead hatchery programs.
•Promote angler knowledge and best handling practices for fish being caught and released and educate anglers about the objectives of the hatchery steelhead harvest fishery.
•Collect general feedback from anglers about management of the fishery.

Outcomes:
•Improved understanding of angler catch and effort, and angler experience.
•Field-based information to compare with and improve estimates from the STQ.
•Steelhead population trend data to informfishery management decisions.
•Potential increase in compliance rates through interactions with creel surveyors.

•Improved quality of the angling experience through education of anglers regarding hatchery-augmentation programs.
•Identification ofissues of concern for anglers on the Alouette River.

Stave River Net Pen Imprinting and Adult Return Assessment

Status: Delivered Tracking # R2204 Year 2 of 3

Executive Summary:

Annually since 2018 the BC Provincial Government, in conjunction with Freshwater Fisheries Society of BC,have added a net-pen rearing stage to the Stave River steelhead augmentation program. The objective of the net-pen program is to determine if rearing juvenile steelhead in Hayward Lake for ~six weeks prior to release increases therate of adult returns (via reduced stray rates), compared to conventional off-site rearing. Net-pen and conventionally reared fish were differentially marked by left and right maxillary clips, respectively, in addition to adipose clips. Some adult returns were expected in the winter of 2020/2021 with the first notable return anticipated in the winter of 2021/2022. This project was a continuation of a similar project that ran from 2009 to 2013 that was suspended due to seismic upgrades at the Ruskin Dam. In 2023, from January 04 to April 23, angler surveys were conducted along the Stave River to collect steelhead catch and effort data to evaluate the effectiveness of the net-pen rearing program. We are specifically interested in comparing the number of left-maxillaryclipped fish caught (i.e., steelhead that received a 6-week net-pen rearing component) with right-maxillaryclipped fish caught (fish reared entirely offsite), to see if more net-pen raised fish are caught by anglers. In addition, the main goal of the program is to improve the recreational fishery so increasing the overall hatchery catch and effort is considered a key metric of success. Creel surveyors also asked anglers questions regarding gear type, species targeted, satisfaction levels, and reasons for releasing hatchery fish.

Survey days were randomly distributed across the survey period and stratified by weekend and weekday, morning and afternoon, to capture the range of angler types. Instantaneous angler counts were also conducted each day at either the start or end of the surveys. In total, creel surveyors conducted 109 interviews of 72 anglers (some were interviewed multiple times) over 25 survey days. Preliminary results indicate that 50% of anglers were targeting steelhead. Overall effort measured by instantaneous counts was low: only 28 anglers were counted, compared to 47 the previous year (2021-2022). Effort was highest in January and March but was consistently low throughout the sampling period. Of the anglers interviewed, only four steelhead were hooked and one was landed. The landed steelhead was an ~ 8 lb right-maxillary clipped hatchery fish (reared off-site)and was retained by the angler.

Future analysis will expand the interview and instantaneous count results to provide an overall estimation of steelhead catch and effort in the Stave River. However, preliminary results suggest that the potential improvements in adult steelhead returns are not high enough to result in increased catch and effort. Additionally, not enough steelhead were captured by surveyed anglers in 2023 to provide insight into whether the net-pen reared fish returned in higher numbers that those reared off-site. The lack of angler effort on the Stave River makes drawing conclusions from the collected data challenging.

Squamish River bull Trout Assessment - HRT

Status: **Delivered** **Tracking #** **R2305** **Year** **1** **of** **3**

Executive Summary:

The Squamish River provides a unique opportunity and significant recreational fishery in the lower mainland, primarily directed at steelhead and Bull trout. Current data suggest supports a substantial increase in angling pressure (Big River Analytics 2020); however, exploitation from recreational anglers is not well understood (D. Jessom, pers. comm. 2021). Bull Trout are designated as species of concern and are part of Lower Fraser EDU and COSEWIC Southcoast DU structure. Provincial Bull Trout Management Plan 2021 identifies the Squamish as a provincial priority within the DU and/or EDU. Bull trout in the Squamish core area inhabit streams subject to high angling pressure and there are concerns about the impact (First Nations and stakeholders). South Coastal Squamish River ranked at risk (Hagen and Decker 2011).

This work is considered to be a high priority by the Province of BC and information will facilitate effective management (i.e.fishery closure) and conservation (i.e. status) of Bull Trout. For example, managers can determine whether current and future levels of effort and exploitation are sustainable, or whether closures, educational campaigns, or additional actions are necessary to support conservation measures.

Coquihalla & Chilliwack River Juvenile Steelhead Density Index Surveys

Status: **Delivered** **Tracking #** **R2306** **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 2022. The surveys added to 25 years of data collection on these streams. The objectives were to continue the monitoring of long-term trends in juvenile densities as an index of general stock status and to monitor habitat restoration and recovery efforts resulting from the November 2021 floods. Thirteen sites were surveyed on the Chilliwack River and 11 sites were surveyed on the Coquihalla River.

The survey approach repeated the methodology used in previous years. A section of stream was surveyed using a downstream stop net and electro-fisherto remove the total population of juvenile fish within the sampled area. Fish were identified to species, measured, and visually assessed for physical condition prior to release. Habitat data were collected and input into ahabitat suitability index curve that was used to standardize the observed densities.

Juvenile steelhead densities were among the lowest observed in 26 years of monitoring efforts on the Coquihalla and Chilliwack Rivers. Low abundance was expected given the severity of flooding that impacted both rivers in 2021. Captured fry were large sized and in good condition, and parr were observed indicating some degree of overwinter survival, providing optimism for the post-flood recovery of Coquihalla and Chilliwack River steelhead populations.

Continued monitoring of juvenile steelhead in these two systems will provide a better understanding of impacts from the 2021 floods and associated habitat restoration efforts and contribute to the general understanding of long-term steelhead population trends in Region 2 (South Coast). These data will inform future management actions and fishing regulations.

Thompson Region Wild Stock Guardian Program (shared with LL)

Status: **Delivered** **Tracking #** **R2310** **Year** **1** **of** **2**

Executive Summary:

No report provided

Kootenay River Guardian Program (non-classified waters)

Status: Delivered Tracking # R2206 Year 2 of 2

Executive Summary:

An identified priority for the Kootenay River Guardian Program (KRGP) is to focus efforts, where funding facilitates, on key non-classified streams in Kootenay Region, all of which have vulnerable populations of BT, WCT and/or RB and are significant fisheries. Specific non-classified waters are considered priority for multiple reasons; including lack of baseline information pertaining to populations and fisheries, antiquated regulations due to inadequate stock and angler use information, concerns of declining listed sport fish populations, and lack of a compliance presence to ensure licence compliance, mitigate illegal harvest, illegal gear and other non-compliance potentially influencing species health.

Baseline data specific to angler effort, catch, harvest, quality of experience, methods, target species, demographics, etc. are necessary to establish the current status of the identified fisheries. These data inform management targets and proactive regulatory strategies to ensure sustainable, quality angler opportunities and species conservation. Additionally, baseline population data and identification of critical habitats (where needed) further inform applied management strategies. Lastly, the presence of River Guardians to conduct compliance patrols is needed to evaluate the current status of compliance in these systems, identify specific areas of concern, and mitigate impacts to wild stock populations within these systems by improving compliance over time.

Based on this rationale and enabled via funding through FFSBC, the Kootenay River Guardian Program (KRGP - non-classified waters) was conducted over a two-year period (2021-2022) from March through November of each year on the Duncan, Flathead and Slocan Rivers. River Guardians interviewed 138 anglers on the three systems over this time period.

River Guardians conducted compliance checks on each angler interviewed. Of all anglers, 14 were non-compliant with regulations (10% non-compliance rate), with a total of 18 violations (13% violation rate). The majority of infractions were licence violations (combined 45% of violations). Where required, anglers and other river users contacted by River Guardians were educated on regulations, management rationale and information on species conservation and importance.

Anglers fished for a total of 450 hours and caught 393 fish, with a catch composition of 50% rainbow trout, 27% westslope cutthroat trout, and 24% bull trout. The overall catch success or catch per unit effort (CPUE) over the two-year project term was 0.87 fish per angler rod hour.

The majority of anglers interviewed on these systems indicated that they were targeting bull trout during their angling trips (45%), with 19% targeting rainbow trout, 17% westslope cutthroat trout, and 6% mountain whitefish. There were also 13% of all anglers interviewed that were not targeting any specific species.

During this two-year project term, River Guardians also conducted population inventory components in the Flathead River watershed. Activities included inventory planning, system reconnaissance and a preliminary inventory/population assessment for WCT. This inventory was focused on non-adfluvial non-migratory populations, with the intent of identifying resident populations and critical overwintering habitats. Preliminary results indicate a significant resident WCT population within the upper Flathead River and provided valuable data identifying staging and overwintering habitats which may be subject to late season angling efforts.

This two-year KRGP project, including all components, has provided invaluable information to regional fisheries management in order to evaluate angler use, catch, angler preference, fishery timing, compliance issues and population dynamics within these specific systems. Results from this project have already served to inform upcoming regulation changes which will increase angler opportunity on the Slocan River, inform delivery priorities of the KRGP (2023-24) and assist regional stream inventory priority planning.

Elk River Fishing Access Improvement Project

Status: Delivered **Tracking # R2301** **Year 1 of 2**

Executive Summary:

The Elk River is a classic freestone river with some of the most productive dry fly fishing experiences in the world. Critical access points along the river are in acute need of improvement to address increased users and demand.

This project addresses the increasing need for safe and reliable river access, by developing and improving infrastructure and amenities at identified priority access points along the Elk River, that will support high angler usage. As well as improving angler education and stewardship through educational signage and kiosks.

In 2022, project work completed included developing safe parking by widening the road shoulder on both sides of road access as well as signage at Morrisey launch site in partnership with the Regional District of East Kootenays. As well as completed engineered drawings for re-opening the decommissioned parking area at Morrisey boat launch. Completed consultation with BC Parks, BC Hydro, Ministry of Transportation Infrastructure, Regional District of East Kootenays for the various sites with authorizations pending for remaining work in 2023/24 (year 2 of 2) Land Surveys and conceptual designs completed for Morrisey, Elko, and Olson Pit access sites. The AmbassadorWiLD program launched summer of 2022 to engage with visitors and anglers, clean up, and monitor/document. Ambassadors visited the various access sites including Morissey, Elko, and Olson Pit sites.

Elk River - Westslope Cutthroat Trout Population Inventory

Status: Delivered Tracking # R2302 Year 1 of 2

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 pubic, 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. 2022 efforts resulted in capture of an additional 1237 fish (936 by electrofishing; 301 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. Additional biological data on fish size, movement and fishery exploitation continue to be collected. Fish capture and tagging will continue at least into 2023, and will allow a more precise estimate of fish abundance.

Upper Kootenay River Seasonal Bull Trout Fishery Assessment

Status: Delivered Tracking # R2303 Year 1 of 2

Executive Summary:

The upper Kootenay River bull trout seasonal fisheries have seen continual increases in angler effort, including significant use by angling guides, over the past several years. This is especially evident in the year-over-year increase in jet-boat use on this system to target more remote reaches inaccessible to shore anglers. While there is fishing effort year-round on the system; during March-May (spring fishery) and September-November (fall fishery), angler effort targeting bull trout can be similar to effort on primary classified waters summer-fall fisheries. This is particularly evident in the observed continual increase of angler effort during the fall fishery. The non-classified portion of the upper Kootenay River is the primary wintering system for a significant portion of the bull trout (BT) population within the watershed. These fish are especially vulnerable during their post-spawn and pre-spawn staging cycles and are being heavily targeted, especially by boat anglers, during this time period. The last regulatory changes in this system were implemented in the 2013 regulation cycle following the last angler survey completed in 2012. Quantifiable data is needed to gauge current effort and associated impacts on population sustainability, fishery quality and regulation effectiveness.

Given this rationale, FFSBC funded a two-year project on the Upper Kootenay River with the following objectives:
-Estimate angler effort on targeted spring (March-May) and fall (Sept-Nov) seasonal bull trout fisheries
-Estimate angler catch rate (CPUE), release and harvest on targeted spring and fall seasonal bull trout fisheries
-Evaluate angler class use, demographics, and additional social science data to gauge impacts of regulations on the fishery
-Estimate westslope cutthroat trout by-catch during seasonal bull trout fisheries
-Public and angler education/outreach through increased presence of River Guardians on these fisheries
-Increased compliance/enforcement presence in critical bull trout overwintering and staging habitats via the presence of River Guardians during these fisheries

Year 1 (April 1, 2022 – March 31, 2023) had now been completed with all of the above objectives met for the first project year, including:

-Angler counts (instantaneaous) completed via truck, jet boat and helicopter in both the 2022 and 2023 (March only) spring and 2022 fall fisheries
-Angler survey data collected from approximately 250 anglers (spring and fall fisheries)
-RG compliance presence during peak seasonal fisheries
-Catch/harvest data collected from all anglers interviewed
-Angler survey data entered into RG spreadsheets and compliance files completed
-Angler count data entered into effort spreadsheet and year 1 effort estimates complete

Horsefly River Juvenile Assessment

Status: Delivered Tracking # R2103 Year 3 of 5

Executive Summary:

Project Objective(s):
-Assess density and distribution of juvenile rainbow trout across the Horsefly River using closed site electrofishing.
-Complete 8 electrofishing sites in the fall during each year of the project.
-Aid in development of cost-effective, long-term index for assessing rainbow trout stock status.

Methods:
Sites are completed using closed site electrofishing in crews of two. Sites utilized were historically done to compare year-to-year. Sites sampled in 2022 were the following:
-Horsefly Townsite – 10U 607963 5799170
-Dairy – 10U 608980 5798225
-6 Kilometer Board – 10U 612205 5797385
-Horsefly River Flats – 10U 606140 5809837
-Horsefly River Rec Site – 10U 632549 5795423
-McKinley Creek Crossing – 10U 636095 5794103
-Horsefly River Upstream McKinley Bridge – 10U 632063 5795375
-Moffat – 10U 608520 5797281

Each site was completed using “two-catch” removal estimates (Seber and LeCren. 1967) with analysis done by Ptolmey WUP HSI curves (Feb 12, 2001). 8 sites were completed in fall 2022. 7 of 8 sites resulted in catches of juvenile horsefly rainbow trout (McKinley Creek Crossing had zero catch). Average standardized density across all sites was 86 fish/unit. Range of standardize density was a minimum of 7 and maximum of 237 fish/unit. A total of 212 juvenile rainbow trout were captured across sites. A total of 15 parr were captured during assessment.

Cariboo Region Bull Trout Acoustics

Status: Delivered Tracking # R2106 Year 2 of 4

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. Following the listing of the species in 1994 by the provincial government, a strategic plan for conservation and management of char in BC was developed (BC Environment 1994). More recently, a provincial plan was developed to assess the status and health and identify data gaps for Bull Trout throughout BC (Hagen and Decker 2011).

In 2017, a Middle and Upper Fraser Bull Trout Management Plan was completed that identified priority systems within the Upper Fraser and Cariboo Region. The plan identified key watersheds within the Cariboo core area that could improve our understanding of the status and health of Bull trout. Moreover, the Cariboo core area ranked as some of the most at-risk populations in the Middle Fraser EDU (Hagen et al. 2017). Key watersheds including the Horsefly, Quesnel and Cariboo rivers were identified as most impacted by road density from linear development, associated impacts related to climate change (flow & temperature; Porter and Nelitz 2009) and overexploitation related mainly to non-compliance concerns (Hagen et al. 2017).

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.

All project activities identified for year 2 have been completed. A total of 62 bull trout over 50 cm were acoustically tagged to date. Genetic samples were taken from all fish captured.

The receiver network was deployed and maintained throughout the Cariboo, Quesnel and Horsefly watersheds to monitor fish movement assist in identifying critical tributaries. Initial results indicate that the Spanish watershed bull trout are limited to the Spanish watershed, utilizing tributaries to Spanish lake for spawning. An unammed tributary on the north side of Spanish lake was identified as a key spawning tributary for the Spanish system population in 2022.There is no indication that large bodied adfluvial bull trout tagged in the Quesnel River narrows and the Horsefly River enter the Spanish system. Only one of the 62 tagged bull trout was identified on the receivers located in and above Cariboo Lake in 2021, indicating that there is limited use of the upper Cariboo watershed by bull trout tagged the Quesnel and Horsefly systems.

A crew walked Seller creek in the fall of 2022 to confirm survey timing. Dozens of mature bull trout were observed, and active spawning was occurring. Completion of a full redd survey on Seller creek with experienced observer will be prioritized for 2023. To date, Seller Creek appears to be the only spawning location for the Quesnel/lower Cariboo larged bodied bull trout population.

Dean River Steelhead Fry/Parr Survey

Status: Delivered **Tracking #** R2304 **Year** 1 **of** 2

Executive Summary:

Assessments were conducted on the Dean River to evaluate abundance of juvenile steelhead to help interpret stock status and corroborate adult run size estimated through new a mark-recapture program initiated in 2021. Sixteen sites were sampled and habitat-corrected fry densities were estimated to be 101 fry per unit which is approaching the conservation concern threshold of 80 fry/unit. These densities suggest 1,410 adult steelhead spawned the prior spring which is similar to the 1,143 adults estimated to have returned using mark-recapture.

Nass River Char Exploitation - HRT

Status: Delivered **Tracking #** R2104 **Year** 3 **of** 5

Executive Summary:

This project seeks to determine the spatial and temporal distribution and exposure of fluvial char (BT & DV) to multiple and varied fisheries in the lower Nass watershed. 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. 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 fluvialchar provide their maximum benefit to recreational anglers in the Skeena region.

This project was successfully completed in 2022 and will continue. In total, 1,172 Dolly Varden were enumeratedat the Zolzap Creek smolt fence, 182 of which were >150 mm and tagged. 20 fish were sacrificed for age analysis and the remainder were released un-tagged. 71 Dolly Varden were bio-sampled at the Nass River fishwheels, with 67 being tagged with high-reward tags. To date, no tags have been reported recaptured. A number of factors have influenced the availability of and participation in Nass valley salmon fisheriesby anglersin the past three 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.

Kitwanga River Char Exploitation - HRT

Status: **Delivered** **Tracking #** **R2105** **Year** **3** **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 Skeena watershed, specifically in middle Skeena near Kitwanga. 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. 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 (2008-2022 avg n = 353, 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 2022 and will continue. The total number of fish enumeratedin 2022 was again below average (n=182). In total, 174 fluvial char were bio-sampled at the Kitwanga smolt fence, 137 of which were tagged. 11 recaptures were reported in FY 22-23, the majority of which were again collected from Gitanyow (Kitwancool) Lake.

Omineca Angler and non-Angler Preference and Diversity Survey (shared with LL)

Status: Delivered Tracking # L2205 Year 2 of 3

Executive Summary:

The purpose of my study is threefold: to assess anglers' satisfaction with their recreational fishing experiences; to understand anglers' and non-anglers' perceptions and experiences of drivers and constraints to recreational fishing participation; and to provide insight for fisheries management about creating inclusive recreational spaces based on non-angler responses, current angler preferences, and their levels of satisfaction. To address these aims, I have conducted 3 out of the 6 proposed focus group interviews with anglers and non-anglers and have conducted 4 individual interviews with Community Champions. Community Champions are avid anglers and/or have additional expert insight into the topics of gender, race, and sexuality. Once the interviews are completed, transcribed, and analyzed, I will circulate a digital survey to the Omineca Region to assess anglers' and non-anglers' fishing preferences, drivers of participation, leisure constraints, and barriers to access, equity, and inclusion.

Objective 1: Contextualize drivers of participation as well as inclusionary and exclusionary practices (i.e., language and discourse, social groups, gatekeeping, gear and equipment) in recreational fishery in the region.

Completed in June 2022 with writeup of Literature Review.

Objective 2: Characterize the current demographic and angler satisfaction in the region.

This is ongoing as I conduct the interviews and survey.

Objective 3: Identify inclusionary and exclusionary practices as well as constraints and opportunities to encourage current non-anglers (and/or non-avid anglers) participation in regional recreational fisheries.

Data collection through interviews and focus groups to date have begun to highlight: a desire among fishers to be welcoming, the possibility of asymmetrical perception of the problem, specific constraints and opportunities facing identity groups, expressions of racism and sexism among fishers, as well as general perceptions of fishing among non-fishers.

Ongoing: Ethics Review Board (ERB) approval was received in December 2022 and recruiting for interviews and focus groups began at that time. The recruitment poster was sent to 16 local groups/organizations and was hung at UNBC and local shops in Prince George, and it has been shared repeatedly and broadly via social media. I recruited in person at the 2023 BHA & TWS Ice Fishing Derby at Eena Lake, and at a Spruce City Wildlife Society meeting. I have organized and conducted four interviews with Community Champions and held three focus groups. Interviews have been approximately 45 minutes and focus groups have been approximately 1.5 hours in duration. In total, I have engaged 14 people, and have transcribed all interviews and focus groups, resulting in roughly 8 hours of recording and 123 pages of narrative data so far. Thematic analysis of transcripts has begun to compile and track recurring themes and examine them in relation to the literature reviewed.

Region 7a Parsnip Watershed River Guardians

Status: **Delivered** **Tracking #** **R2308** **Year** **1** **of** **1**

Executive Summary:

The Anzac, Table, Missinka, and Hominka Rivers are tributaries of the Parsnip River and are home to fish species such as Mountain Whitefish, Rainbow trout, Arctic Grayling, and Bull Trout. Through the 2022 season, the Parsnip Watershed Fisheries Ambassadors' (PWFA's) goals were to engage with anglers utilizing the fishery, to provide a current understanding of the fishery use due to recent access changes from industry presence, to gain feedback from the angling community, and to gather key angler demographics. The PWFA's engaged with 76 anglers during creel surveys and gathered key metrics related to the fishery that can be later utilized as baseline creel data. Local anglers made up a higher proportion of creel participants (n=52) who also achieve a better CPUE compared to other participant categories ('industry' or 'visitors'). The results further suggest the Parsnip Watershed is a popular location for anglers to target specifically Bull Trout and Arctic Grayling (non-retention fishery). Survey and image data analysis suggests the Anzac River is more frequented for angling compared to the Table, Missinka and Hominka Rivers with 230 confirmed anglers through image analysis and 58 survey participants. Arctic Grayling were caught most frequently on the Anzac River with 212 reported through the creel survey. Local anglers were encountered frequently on the Anzac River and reported the highest catch amount along with the increased average angling time of greater than 4 hours. There was a pattern of anglers to frequent the fishery during the weekends, however, during August the Anzac River had high angler numbers during weekdays as well at one specific fishing location. Anglers were encouraged by PWFA presence and survey engagement was positive throughout the project. Anglers were forthcoming with feedback regarding fishery use and show a vested interest in the future of the fishery and the species present. This report summarizes the data collected through the PWFA project and makes recommendations based on observations in 2022.

Kettle River Snorkel Surveys

Status: **Delivered** **Tracking #** **R2307** **Year** **1** **of** **3**

Executive Summary:

The purpose of this proposal 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 of this project 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

Stock assessment work was not completed on the Kettle River Watershed in 2022. Snorkel surveys were cancelled in July 2022 due to unseasonably high stream flows.(ie. stream flow >P95 levels). Work was rescheduled to August 2022, however stream flows remained at >P85 levels. Logistical constraints and personnel availability precluded rescheduling of work later in the field season.