

2023-2024 Funded Projects



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

Supporting Committee: Small Lakes

of Projects: 16

Status	Project #	Title	Delivery Region	Allocated \$
Underway	L2203	Koocanusa Kokanee Enumeration (split with LL total=\$15,000)	4 - Kootenay	7,500
Delivered	L2205	Omineca Angler and non-Angler Preference and Diversity Survey (\$4,000 from 3 committees)	7a - Omineca	3,333
Underway	S2201	West Coast Region Small Lake Fertilization Program	1 - West Coast	18,645
Delivered	S2210	Snow Removal - Cariboo Winter Access Improvement	5 - Cariboo	5,000
Delivered	S2302	West Coast Region Lakes Angler Questionnaire Survey	1 - West Coast	10,500
Delivered	S2304	Kootenay Region Aerial Angler Survey (Upper Columbia) FLIGHTLINE	4 - Kootenay	16,000
Delivered	S2306	Okanagan FLIGHTLINE	8 - Okanagan	25,000
Underway	S2401	Cariboo FLIGHTLINE	5 - Cariboo	40,000
Delivered	S2402	Thompson Small Lakes Stock Assessment	3 - Thompson	15,120
Delivered	S2403	West Coast Small Lakes Assessments	1 - West Coast	15,255
Delivered	S2404	Kootenay Small Lake Assessments	4 - Kootenay	21,600
Delivered	S2405	Cariboo Region Small Lakes Assessments	5 - Cariboo	17,250
Delivered	S2406	Okanagan Small Lakes Stock Assessment	8 - Okanagan	13,000
Delivered	S2407	Omineca Small Lake Assessments	7a - Omineca	18,200
Delivered	S2408	Northeast Small Lakes Stock Assessments	7b - Peace	3,300
Underway	S2409	Small Lake Camera Survey	4 - Kootenay	20,000
				249,703

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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Small Lakes Funded Project Categories	Allocated \$
Stock Recovery & Enhancement	\$18,645
Stock Assessment	\$111,225
Research & Development	\$3,333
Angler Effort, Catch & Satisfaction	\$111,500
Angler Access & Infrastructure	\$5,000
	\$249,703

2023-2024 Project Summaries

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

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. By comparing the stock and recruitment data for control streams and the historic dataset to the Lussier River, we will be able to determine if there are recruitment effects of the current egg collection protocols, and make recommendations for future egg collection guidance specific to the Lussier River and a more generic assessment of how current egg collection guidance impacts recruitment and future egg supply in wild, feral large lake kokanee populations in general. The data will also be useful in more generic monitoring of the Koocanusa kokanee population, which may help with management of Bull Trout or kokanee in the future. In 2023, flights were completed on September 26 and 27. The 6 index streams were flown, for a total count of 82,190 kokanee spawners. This spawner abundance is 69% of the pre-study 10-year average spawner abundance (119,857), and 84% of the median spawner abundance (98,170). The Lussier River spawner abundance was 32% of the total watershed spawner abundance, which is lower than the pre-study 10 year average (49%).

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.

West Coast Region Small Lake Fertilization Program

Status: Underway Tracking # S2201 Year 3 of 5

Executive Summary:

Year three of the current five-year cycle of the Small Lake Nutrient Enrichment Program on Vancouver Island was successful. With some volunteer involvement, four lakes were enriched in 2023 including Rowbotham, Nimnim, Reginald and Shelton lakes. In an effort to better examine the results of the nutrient enrichment work, Hawthorn Lake was added as a control lake in 2023 to use as a comparison to the enriched lakes. Like previous years, liquid nutrients were added to each treated lake using established fertilization techniques to enhance trophy fisheries for rainbow trout and Kokanee (Ashley 2011). Over 23 weeks between late April and September, 4,000 L of liquid nutrients were added to the four lakes, with each lake being treated 8-10 times over the season. Water quality sampling was conducted every four weeks to monitor water quality conditions and nutrient response at each lake. Additionally, automated time-lapse cameras were used to assess angler effort at all lakes. In 2023, stocking occurred at two treated lakes, with 500 Blackwater AF3N yearling rainbow trout stocked into Reginald Lake and 1800 AF3N Kokanee stocked into Shelton Lake. Stocking of Blackwater AF3N rainbow trout at Nimnim Lake and Rowbotham Lake occurred in June of 2022 and will occur again in 2024 as these lakes are stocked in even years only. Stocked fish are differentially marked by release group to confirm fish age. The recent stocking of Kokanee in Shelton Lake in conjunction with nutrient applications is aimed to produce a new Kokanee fishery for anglers on Vancouver Island (Damborg 2021). The upcoming fishing season in 2024 should provide the first year of catchable sized Kokanee in Shelton Lake. Fish growth monitoring in the fall of 2023 occurred at Reginald Lake. Thirty-one fish were captured in two nets (1 sinking and 1 floating) over approximately 24 hours. Though some fish require age confirmation from the BC ageing Lab, overall fish size was encouraging with 20 of the 31 fish over 400 mm (~750 g) and five fish over 1000 g. These results qualify Reginald Lake as meeting the classification as a quality type fishery for Vancouver Island. None of the fish captured were over 500mm in length, however some changes have been made to the stocking program in the last few years, moving away from FV3N catchables to Blackwater AF3N yearlings. As a result, younger age fish will be smaller for a given age, however the Blackwater AF3N strain should live longer and achieve an overall larger size. There have also been some continued reports of poaching (retention) at this location. Water quality results from the treated lakes show slightly elevated N and P levels from previous years, likely the result of adjusting N:P ratios in-season based on initial water quality results. Secchi readings also show benefits in primary productivity in treated lakes when compared to the control lake. Time-lapse camera data from all the lakes are showing increased use year over year at all the treated lakes, with the largest increases in effort at Reginald and Rowbotham lakes. In addition to the funding from the small lakes committee, \$45,949 of grant funding from HCTF was also acquired. Substantial in-kind support was also received, including approximately \$5,000 from the Ministry of Water, Land and Resource Stewardship, as well as volunteer time from a few local fish and game members (~\$2,000). Total project value for 2023-24 was over \$72,000.

Snow Removal – Cariboo Winter Access Improvement

Status: Delivered Tracking # S2210 Year 3 of 3

Executive Summary:

This project aims to secure funding for snow removal at ice fishing parking areas. The intent is to provide consistent snow removal for three years to help establish ice fisheries than pass the responsibility off to Recreation Sites and Trails or BC Parks. Getting these partners to process the invoices and recognize the importance of winter use should help them request and set aside a budget for snow removal in the future. In the interim, BC Parks and Rec Sites and Trails say they do not have a budget for snow removal for most of these sites. During years 1 and 2 of this project, funds were used to remove snow from parking areas at Beaverdam, Crystal, Tye, Chimney, and McIntyre Lakes. In Year 3, snow removal costs were relatively minor but covered by Recreation Sites and Trails, BC.

West Coast Region Lakes Angler Questionnaire Survey

Status: Delivered Tracking # S2302 Year 2 of 2

Executive Summary:

In January 2023, the Ministry of Water, Lands and Resource Stewardship (WLRS) implemented an online electronic email-based survey of West Coast Region (Vancouver Island, Gulf Islands, Knight Inlet, and Haida Gwaii) lake anglers. The survey is the primary tool used to document trends in angling effort, catch, and harvest on lakes within the region. Angler surveys prior to 2011 were mail based, with the last two (2011 and 2017) being mixed mode surveys using both online and mail formats, to confirm data was comparable between survey types.

For the first time, in 2022 an online only model was used for the survey, which was electronically mailed to 21,430 annual West Coast Region resident licensees on January 18, 2023. Reminder notices were sent out March 3-5, 2023. A total of 8,817 surveys (41%) were returned by April 30, 2023, a similar response rate to what was achieved in previous survey years. Overall, it was estimated that 21.5% of all licensees sold in 2022 were sampled in the 2022 questionnaire. Annual West Coast Region resident license sales for the region were the highest in any of the previous survey years (since 1986) with 36,867 sold within the region, and an additional 240 in Haida Gwaii. Total angling effort for the region was estimated at 171,773 angler days spread over 214 lakes. Though total angler effort was slightly higher than 2017, overall effort is still trending down over the last 20 years. Effort per angler was also less in 2022 than in previous surveys. Notably, of the 8,817 respondents, 4,780 (54%) said they did not fish any lakes in 2022.

The average reported angling effort was 9.33 days/year for active anglers (anglers that fished at least one day in 2022), with an average of 1.8 lakes fished. Consistent with all other surveys, the Nanaimo-Cowichan Planning Unit experienced the highest angler effort across all planning units, at an estimated 64,541 angler days. A total of 214 lakes were identified as having been angled in the region, the lowest on record, with (1) Cowichan, (2) Elk, (3) Langford, (4) Shawnigan, (5) Prospect, (6) Fuller, (7) Durrance, (8) Long, (9) Spider, and (10) Campbell (Lower) lakes showing the highest effort. These ten lakes received 47% of all regional lake-fishing effort. Reported catch (RB, CT, DV and SMB combined) in 2022 was 88,781 fish, which, when expanded to all licensed anglers, corresponded to an estimated catch of 385,487 fish on Vancouver Island, the Gulf Islands, and Knight Inlet, including 373 fish on Haida Gwaii. Total estimated catch was highest in the Nanaimo-Cowichan Planning Unit, followed by Campbell-Oyster, Victoria-Gulf Islands, West Coast, Knight Inlet, and Nimpkish planning units.

Rainbow trout comprised 51% of all regional catch, followed by smallmouth bass (27%), cutthroat trout 22% and Dolly Varden char (<1%). Additional fish reported as being caught included carp, brown trout, largemouth bass, and pumpkinseed sunfish. The regional harvest was the lowest on record, with an estimated 51,797 fish kept of the four main species. Harvest generally followed catch trends, with most harvest occurring in the Nanaimo-Cowichan Planning Unit and targeting rainbow trout. Overall, catch was higher and harvest lower than 2017, indicating an increase in catch and release type fishing. When compared to previous survey years, CPUE was higher than any other survey year, suggesting that overall reductions in catch and harvest are a consequence of declining effort and not fishing quality.

Based on comments provided by respondents, issues of note include access to private lands, specifically on the South Island, as well as the state of some public facilities (docks, launches, etc.) on many urban lakes. Furthermore, many anglers were supportive, happy and/or encouraged more stocking of local lakes, and many expressed concerns about overall fish habitat and/or invasive species within the region.

Upper Columbia Flightline

Status: Delivered **Tracking # S2304** **Year 2 of 2**

Executive Summary:

Aerial boat counts were conducted at 38 lakes on the Upper Columbia flight line (CFL) in the East Kootenay over a two-year period. Within the Kootenay Region there are two flight lines; the Kootenay Flight Line (KFL) covers lakes from the BC border to Canal Flats area and the CFL covers small lakes in the northern portion of the East Kootenays. The southern extent of this flight line includes lakes near Canal Flats and extends north to the Golden area. The flight line is bordered on the east by the Rocky Mountains and on the west by the Purcell Range. Most of the surveyed lakes are in the Rocky Mountain Trench, a steep, linear, faulted valley. Aerial angler counts have been previously conducted on lakes on the CFL in 1989, 1990, 1991, 2002, 2003, 2004, 2008, 2009, 2010, 2017, 2018 and 2019. These periods allow comparisons of trends in angler effort over time. Averaging effort over periods increases certainty of efforts over that time by reducing impacts of years with terrible weather, fire events or other variables that might affect effort.

Okanagan Flight Line

Status: Delivered **Tracking # S2306** **Year 2 of 2**

Executive Summary:

From 2003 to 2019, angling effort estimates for Okanagan small lakes fisheries were based on aerial boat count data collected from three distinct survey lines. Each line was flown 20 times per year, for three consecutive years, generating an effort estimate every nine years for each fishery included in the survey lines. In order to reduce the annual provincial cost of small lakes flight lines, and increase the frequency of effort estimates, a number of methodological changes have been implemented. These include reducing the survey period from three to two years and extending the period between surveys from three to four years. Most significantly, the three Okanagan survey lines have been condensed to a single line, reducing the total number of lakes surveyed from 243 to 87. The provincial small lakes flight line effort estimate model is supported by a robust data set; the noted changes in methodology should not negatively impact the ability to estimate angling effort at the provincial and regional scale. Estimates for individual fisheries, not included in the survey line, are still possible given that the relationship between an individual fisheries level of effort, and regional effort, is consistent over time. The new Okanagan survey line is based on three considerations: - Removal of geographic outliers, to minimize total survey line distance. - Adequate representation of sub-regional angling areas (ie. Aberdeen Plateau, Pike Mountain). - Adequate representation of lakes by effort level, assigned to quartile ranges.

Cariboo Flightline

Status: Underway **Tracking #** S2401 **Year** 1 **of** 2

Executive Summary:

Recreational fishing is a valuable way of life for the people of British Columbia and an important contributor to local and provincial economies. British Columbia's freshwater fisheries are managed with the overarching goal of balancing the need to conserve wild stocks while optimizing recreational opportunities. The current small lakes stocking program provides an excellent opportunity to pursue this goal given the popularity of these fisheries, the ability to develop high quality fisheries, and the indirect benefit of diverting fishing pressure away from more sensitive wild populations. Stocked lakes in the Cariboo Region are typically assessed in two ways, by evaluating fish communities through lake assessments and by tracking angler use through aerial effort surveys. This approach allows adaptive management whereby changes in angler use or the fish population associated with management actions (changes to stocking regime, angling regulations, or lake access can be evaluated) can be evaluated. The action can be retained if it had the desired effect such as increased fish size or increase angler use, or canceled if the effect is undesirable. Through time the value of the resource can be enhanced by applying effective management actions. This study evaluated levels of angler use during the open water fishery on 58 small lakes in the Cariboo Region. Surveys were completed as planned and within budget. Data has been entered and submitted for entry into the provincial small lakes database. Estimates of angler effort on each lake are pending but are planned to be available after year 2 of the survey is completed and before April 2025. Results will be used to prioritize actions such as assessments of the fish community, or changes to angling regulations, lake access/facilities, or stocking regime.

Thompson Small Lakes Stock Assessment

Status: Delivered **Tracking #** S2402 **Year** 1 **of** 1

Executive Summary:

The goal of the small lakes stock assessment is to help fisheries managers maintain healthy fish populations and sustainable recreational angling opportunities. Annual fall surveys follow standardized RISC (Resource Inventory Standards Committee, 1997) methodology and give biologists the ability to determine if current stocking rates, species, strains, ploidy and/or regulations are achieving fishery management goals on any given small lake. While anecdotal information is considered, data collected during the fall stock assessment project is the primary information biologists use to inform management decisions on small lakes in the Thompson region. Fifteen lakes were assessed in the Thompson Region during the fall of 2023. Data collected during the project resulted in stocking changes on eight lakes, and no changes on seven lakes. In fact, stocking was discontinued completely on two lakes: Windy Lake (01256LNTH) and Nomans Lake (00086BONP). These changes reflect ongoing efforts to deliver diverse angling opportunities to British Columbian's as laid out in the 2007 Provincial Freshwater Fisheries Program Plan. The stock assessment project is the key tool managers use to inform management decisions and help make sure fishery goals are being achieved. This is especially important in the Thompson region where small lake fisheries provide the majority of the angling opportunity.

2023-24 West Coast Region Small Lake Stock Assessments

Status: Delivered Tracking # S2403 Year 1 of 1

Executive Summary:

This project assessed eight small lakes in the West Coast Region in 2023-24, where the priority for assessment was determined as high. Lake assessments were completed following standardized RISC assessment techniques for small lake stock assessments. Lake assessments provide important information to allow management changes to be made, to better optimize recreational opportunities (i.e., stocked lakes), and to ensure conservation concerns are being addressed, such as in wild stock lakes. Collected information allows for the determination of important metrics such as population structure/status, growth and survival rates, strain performance, etc. The information collected will allow for refinements to the stocking program, so that lake classification targets can be achieved. The information collected may also provide justification for regulation changes to protect populations at risk, or to liberalize regulations where additional opportunities exist. Results from these assessments will also be used as baseline performance indicators for future reference, should changes occur to the fish stocking program, such as stocking density changes or species/strain replacement. The list of lakes assessed in 2023-24 represents a mix of lake types, including hatchery stocked lakes such as Boot Lake, as well as lakes that were previously stocked but cancelled including Gooseneck and Larry lakes. The rest of the list represents wild stock lakes, or lakes that have not been stocked for decades, including Healy, Mirror, Nina, Santa Maria, and Tlowils lakes. Only basic results and preliminary management outcomes for this project are discussed below as fish aging is still pending analysis. Once the aging data has been received, results and management actions will be more formally determined.

Kootenay 2023 Small Lake Assessments

Status: Delivered Tracking # S2404 Year 1 of 1

Executive Summary:

Resource Inventory Committee (RIC) standard small Lake assessments were conducted on nine Kootenay Region small lakes in 2023 to determine fish communities and evaluate stocked fish performance. RIC standard floating and sinking nets were set overnight to capture fish for measurements of length and weight, identification of sex and maturity and for otolith removal. Otoliths were sent to the FFSSBC ageing lab for ageing of each fish and results are pending. Data was entered into the FFSSBC database and once ages are returned the database will be submitted to FFSSBC.

Cariboo Region Small Lake Assessments

Status: Delivered Tracking # S2405 Year 1 of 1

Executive Summary:

Awarded funds were used to assess priority stocked lakes in the Cariboo Region in 2023. Provincial standard overnight gillnetting was conducted on Skulow, Howes, Lorin, Donnelly, French, Rail, and Greeny lakes. Smaller sample sizes were collected from Dewar and Chimney lakes by angling. Mature kokanee were sampled at 10 Mile, Puntchesakut, Green, and Timothy lakes. Length, weight, sex, and maturity were assessed for captured fish. Age structures were collected for age estimation. Once age data is available, a technical report will be drafted which will include estimates of growth, mortality, and abundance which will be used to recommend corrective actions if size-based objectives were not being met at each lake. Management actions may include changes in stocking regime or angling regulations. Recommended management actions may also aim to improve cost effectiveness of hatchery resources.

Okanagan Small Lakes Stock Assessment

Status: Delivered Tracking # S2406 Year 1 of 1

Executive Summary:

Beginning in 2019, the Okanagan Region implemented a significant number of changes to its small lakes stocking program. In 2023, the primary objective was to assess fisheries where stocking had been suspended, based on assumed or confirmed natural recruitment. After three years, it should be apparent if renewed stocking is required to support a fishery. The proposed list also represents fisheries that have never been assessed, have been the subject of persistent poor angling reports, or have been subject to stocking changes in the last 5 years. Additionally, 2 lakes within the Okanagan region were assessed to identify Kokanee stock endemics.

Region 7A Omineca Small Lakes Assessments

Status: Delivered Tracking # S2407 Year 1 of 1

Executive Summary:

From September 7th to October 6th, 2023, resource technologists from the BC Conservation Foundation (BCCF) and biologists from the ministry of Water, Land and Resource Stewardship (WLRS) performed a series of gillnet surveys on eight small lakes in the Omineca region (7A). The purpose of these assessments was to determine the status of select small lake fisheries to inform management and maintain recreational angling values. Five of the sampled lakes are stocked annually (Boot, Crystal, Gantahaz, Grizzly East, Trapping), and two are not stocked (Nadsilnich Lake [also referred to as West Lake] and Saddle 3 Lake); Chubb Lake was stocked and assessed for research purposes by the Freshwater Fisheries Society of BC (FFSBC) during this time. From the stocked lakes, Boot, Gantahaz, Grizzly East, and Trapping lakes were successful in meeting their management objectives; Crystal Lake did not meet its objective based on the minimum stock density required (quality proportional stock density [PSD] required = 0.15). Chubb Lake was managed as a research lake (FFSBC research), and Nadsilnich and Saddle 3 lakes were managed as wild fisheries. Two lakes (Little Lost Lake and Saddle 2 Lake) were not assessed due to access challenges. Sampling procedures were modeled from the Resource Inventory Committee (RIC) small lakes assessment standard (FFSBC, 2007). Biological data from captured fish was collected and a portion of aging structures from game fish were sampled and submitted to the BC Provincial Aging Laboratory (BC PAL). Limnological data was collected from each sampled body of water, including temperature and dissolved oxygen. Catch data was analyzed to inform future management recommendations.

Northeast Small Lakes Assessments

Status: Delivered Tracking # S2408 Year 1 of 1

Executive Summary:

Freshwater Fisheries Society of British Columbia stocked lakes within the Northeast Region are limited to 17 lakes, however, the region also contains many naturalized and wild fisheries. In 2023, the focus was on stocked lake assessments, targeting Heart Lake, Sundance lake, One Island Lake, Beattie Lake, Moose Lake, Stewart Lake and Simpson Lake. The main objective of these surveys was to determine if stocking prescriptions are currently satisfying the regional objectives for each lake. Additionally, these surveys also assist with the management of fishing regulations in the region to allow for harvest where objectives are satisfied. Originally only 4 lakes were proposed for the 2023 field season, but due to an additional co-op biologist being hired for the field season, three additional lakes were able to be sampled. All lakes that were sampled appear to be meeting their objective.

Kootenay Small Lake Camera Surveys 2023

Status: Underway Tracking # S2409 Year 1 of 3

Executive Summary:

This project aims to support the modelling of angling effort at a provincial level. One of the main goals of this project is to collect winter effort data, which currently has limited modelling capacity within the province of British Columbia. In the 2023 - 2024 fiscal year, new cameras were set up at select small lakes across the Kootenay region, and several cameras that were already in the field have been further maintained. The objectives completed over the past year involve setting up cameras, historic image analysis using Timelapse software, and trialing a cellular camera to determine if it harboured any new and efficient opportunities for data collection. Next fiscal, instantaneous ground counts will be conducted so that expansion factors can be created to model angling effort at the selected small lakes. To create these expansion factors, 10-20 non-zero counts must be completed at the same time that the camera is scheduled to capture an image.