2020-2021 Funded Projects

This table summarizes approved 2020-2021 funding allocations for technical committee projects.

Supporting Committee: Small Lakes

of Projects: 19

Status	Project #	Title	Delivery Region	Allocated $
Completed	S1801	West Coast Region Small Lake Fertilization Program	1- West Coast	20,441
Completed	S2103	West Coast Small Lakes Assessments	1- West Coast	17,088
Completed	S2104	Region 2 Priority Lakes Stock Assessment	2 - South Coast	11,906
Completed	S2105	Thompson Small Lakes Assessment	3 - Thompson	25,000
Completed	S2012	Paul Lake Shiner Reduction Project	3 - Thompson	3,000
Ongoing	S2106	Thompson Aerial Boat Count	3 - Thompson	26,775
Completed	S2010	Whiteswan Lake Park Creel	4 - Kootenay	5,000
Completed	S2107	Kootenay Region Small Lake Assessments	4 - Kootenay	20,000
Ongoing	S2109	Kootenay Flightline	4 - Kootenay	16,500
Completed	S2111	Cariboo Region Small Lakes Assessments	5 - Cariboo	20,000
Ongoing	S1907	Horse Lake Reward Tags	5 - Cariboo	3,300
Ongoing	S2112	Dragon Lake Goldfish Control and Assessment	5 - Cariboo	15,000
Completed	S2113	Region 7A Small Lakes Stock Assessments	7a - Omineca	21,775
Completed	S2114	Okanagan Small Lakes Stock Assessment	8 - Okanagan	21,775
Completed	S2115	Northeast Small Lakes Stock Assessments	7b - Peace	10,000
Ongoing	S2003	Northeast Angler Effort	7b - Peace	4,000
Completed	S2101	Regulations Data Table	Provincial	2,000
Ongoing	S2001	Interior Plateau Supply-Demand Analysis	Provincial	23,000
Ongoing	S2102	Conservation of Wild Stocks of Rainbow Trout	Provincial	30,000
				296,560

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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Project Categories	Allocated $
Angler Effort, Catch & Satisfaction	$55,575
Aquatic Invasive Species	$18,000
Data Standards, Tools & Management	$25,000
Stock Assessment	$147,544
Stock Recovery & Enhancement	$50,441
	$296,560

2020 - 2021
Project Summaries

The following section provides a summary of activities of each project delivered in 2020-2021. In addition, the total expenditure to date is provided for all years of project delivery.

West Coast Region Small Lake Fertilization Program

Status: Completed

Year Five of the Small Lake Enrichment Program on Vancouver Island was another successful year. Despite some early delays and logistical challenges due to COVID 19, four lakes were enriched in 2020, including Rowbotham, Nimnim, Reginald and Shelton. Merrill Lake enrichment was discontinued in 2020 after post enrichment fish sampling showed no positive effect on growth and overall fish size.

As in previous years, liquid nutrients were added to lakes using established fertilization techniques with the same objective(s): to enhance or produce trophy fisheries for Rainbow and Cutthroat Trout. Over the course of 16 weeks in the summer of 2020, approximately 5000 L of liquid nutrients were added to the four lakes. Over the same period, monthly water sampling occurred at all lakes to ensure water quality remained acceptable. Unfortunately due to COVID 19, the volunteer component in 2020 was cancelled to ensure project staff (BBCF) followed Worksafe BC and Provincial guidelines.

Angler effort monitoring using automated cameras continued at Reginald, Rowbotham and Shelton Lakes. Stocking occurred at all enriched lakes in April-May 2020 and nutrient applications began in May/June. All stocked fish are now being differentially marked by release group to reduce/eliminate the necessity for otolith/scale ageing during efficacy monitoring.

A significant increase in fish size after 2-3 years of enrichment is apparent at Reginald, Nimnim and Rowbotham lakes and, as desired sport fisheries are achieved at the target lakes. Kokanee stocked in Shelton Lake will be sampled in 2022 and success of the Kokanee program will be determined then.

Tracking No. S1801 **Year 5 of 5** **Total Spent to Date $59,577**

West Coast Small Lakes Assessments

Status: Completed

This project assessed eight small lakes in the West Coast Region in 2020-21, where the priority for assessment was determined as high. Lake assessments were completed following standardized Resource Inventory Standards Committee (RISC) methods for small lake stock assessments. Lake assessments provide important information to allow management changes to be made, to better optimize recreational opportunities (e.g., stocked lakes), and to ensure conservation concerns are being addressed, such as in wild stock lakes. Lake stock assessments allows for the determination of important metrics such as population structure/status, growth and survival rates, and strain performance. The information collected will allow for refinements to the stocking program so that lake classification targets can be achieved. The information will 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 to reference should changes occur to the fish stocking program (e.g. stocking density changes or species/strain replacement).

Lakes assessed in 2020 included: Croteau, Farewell, McNair, Blackwater, Higgens, Helldiver, Quamichan, and Kemp lakes. This list represents lakes that are currently stocked, have been stocked historically, or lakes with wild fish stocks. In Helldiver, Quamichan, and Kemp lakes the objective was optimization of the stocking program. The objective in assessing Croteau Lake was to determine if cancelling the stocking program in 2006 was the correct decision and to provide an update on current fish values. The other lakes assessed in 2020 were Farewell, Blackwater and Higgens lakes, all considered to be wild stock lakes as they have not been stocked previously, except for Farewell Lake that was stocked only once in 1951.

Preliminary results and management outcomes for this project are discussed. Complete stock assessment reports and final management recommendations will be completed in the coming months once the age structure analysis has been received and reviewed.

Tracking No. S2103 **Year 1 of 1** **Total Spent to Date $14,250**

Region 2 Priority Lakes Stock Assessment

Status: Completed

Standard stock assessments were completed in the fall of 2020 on eight small lakes in Region 2: Devils lake, Elbow lake, Deer lake, Hicks lake, Lost lake, Nita lake, Edith lake, and Browning lake. These lakes were assessed to determine the current state of native and stocked trout (size, condition, density), while also monitoring for the presence of invasive species, such as bass, pumpkinseed sunfish, and goldfish. The assessments were conducted under specific collection protocols, following provincial Standard Resource Inventory Standards Committee (RISC) methods. Ageing structures were sent to the FFSBC ageing lab and results are pending at the time of reporting. Invasive species were found in 3 of the 8 lakes which were assessed. Invasive species pose a direct risk to the value of lakes in British Columbia, as they compete with native species and stocked trout for food and habitat and will decrease the overall value of the lake as a sport fishery

Tracking No. S2104 **Year 1 of 1** **Total Spent to Date $10,794**

Paul Lake Shiner Reduction Project

Status: Completed

The objective of this project was to help expedite the restoration of the high-quality trout fishery on Paul Lake by reducing the Redside Shiner (Richardsonius balteatus (RSC)) population using boat electroshocking treatments. A significant reduction in RSC abundance should lead to less competition for food and increased growth, condition and size at age for Rainbow Trout (Oncorhynchus mykiss).

Four seasons of treatment (coincides with RSC life cycle) have effectively reduced the population of larger, mature RSC at the 13 known spawning aggregate locations around Paul Lake. (Note the entire perimeter of the lake is shocked in one event, but the 13 locations are enumerated for depletion modelling purposes). Using a simple depletion model, the initial estimated population of mature RSC at these locations (>200,000 fish in 2017) has been reduced to less than 20,000 fish, a ten-fold reduction, over the course of the treatments. Overall, the electrofishing treatments have been extremely effective at reducing the population of RSC (>50 mm FL) in Paul Lake. The impact to the RB population, however, remains unknown. Despite some credible anecdotal reports such as the return of red flesh colour in younger RB, the return of a larger number of insectivorous birds (like swallows) and the odd RB >500 mm being caught in the fishery, the RB population in Paul remains abundant and stunted. In fact, mean fork length and condition factor (CF) fell from 283 mm and 1.1 (n=74) in 2016 to 266 mm and 1.0 (n=181) in 2019. With a measured mean fork length of 269 mm and a mean CF of 1.0 (n=78), 2020 sampling yielded similar results. It is acknowledged that it may take a lot more time before seeing any effect on the RB population resulting from the treatment of the RSC population. Monitoring at Paul Lake will continue into the near future to help assess any changes in the RB fishery. Correlating direct impacts will be difficult given several confounding variables associated with the fishery: 1. Stocking was reduced to zero in 2018; 2. Natural recruitment for both RSC and RB is known to occur from Paul Creek; 3. Drop down of both RSC and RB from Pinantan Lake is known to occur; and 3. Kokanee (Oncorhynchus nerka) stocking into Paul Lake began in 2013.

Given the lakes history as a destination for quality RB angling, its proximity to Kamloops, excellent access and significant residential development, it is recommended that fishery management remain intensive. Further management may include: 1. Stock assessment monitoring; 2. Paul Creek natural recruitment assessment/mitigation; 3. Assessment/mitigation of the drop-down effect (RSC and RB) from Pinantan; and 4. Further electrofishing treatments for RSC (refine technique, exploring effectiveness of longer interval between shocking events. One final recommendation may be to experiment with the electrofishing treatment for RSC at lakes with less confounding variables. There are several lakes in the Kane Valley that might be suitable candidates for further experimentation with electrofishing treatment for RSC.

Tracking No. S2012 **Year 2 of 2** **Total Spent to Date $6,000**

Thompson Small Lakes Assessment

Status: Completed

The primary function of the small lakes stock assessment is to help fisheies managers maintain or enhance the appeal of individual lakes to the angling public. Annual fall surveys follow standardized RISC (Resource Inventory Standards Committee) methodology and give biologists the ability to determine if current stocking rates, strains, ploidy and/or regulations are achieving fishery management goals for any given lake. The stock assessment project is the primary tool biologists use to help inform management decisions on small lake fisheries in the Thompson region.

Seventeen lakes were surveyed in the Thompson region during the fall of 2020. Data collected during the project resulted in stocking changes on five lakes and the identification of potential new stocking opportunities at Lac Des Roches and Willard Lake. The study also recommends the development of a new catchable product to help combat poor stocking performance of RB in multi-species lakes. For example, lakes such as Phinetta and Harmon would be good candidates to test the performance of a Blackwater strain catchable sized fish.

We believe the outcomes and recommendations from this project will result in higher angler satisfaction and participation in small lake fisheries around the Thompson region.

Tracking No. S2105 **Year 1 of 1** **Total Spent to Date $19,072**

Thompson Aerial Boat Count

Status: Ongoing

The Flightlines project is designed to inform and support fishery management decisions for small lakes in the Thompson region. Trends in angler effort help ensure mangers are achieving fishery management goals and continuing to offer diverse and quality public angling opportunities across the region. Used along with stocking and stock assessment data, effort trends can help identify the potential need for regulatory, stocking and/or access changes.

Angler effort was estimated by counting the number of anglers on 89 regional lakes during 20 fixed wing flights from May thru September 2020. Overall, angling effort on these lakes has increased by 16% since 2015. Notable increases occurred on lakes stocked with Kokanee (Paul, Monte and Stump), and on lakes with excellent angling access and infrastructure (Edith, Logan and Pass). The top five small lake fisheries that received the most angling pressure in the Thompson region in 2020 were: 1. Tunkwa (20479 anglerdays); 2. White (13555 anglerdays); 3. Roche (13452 anglerdays); 4. Paul (8555 anglerdays); and 5. Stump (8334 anglerdays).

Tracking No. S2106 **Year 1 of 2** **Total Spent to Date $25,000**

Whiteswan Lake Park Creel

Status: Completed

During the Whiteswan Lake winter fishery, we conducted a total of 196 angler interviews between Dec 11, 2020, and Feb 21, 2021. The average catch per unit of effort (CPUE) was 0.39 fish / hr with an average harvest rate of 81%. When possible, we recorded lengths, weights, and fin clip observations from harvested RB. Fin clipped observations were of stocked triploid RB with clipped adipose fins from brood year 2014, 2015, or 2016.

Average Fulton's Condition Factor (K) of RB measured during the winter fishery at Whiteswan Lake was 0.98, indicating successful management of WS fish health. Average K did increase from .90 the previous winter. This trend of increasing fish quality coincided with positive angler feedback, where anglers expressed noticeable improvement in fish quality over the last year. The Alces Lake winter creel survey totalled 44 angler interviews between December 11, 2020 and February 21, 2021. The average CPUE was 0.18 fish / hr, with a 90% harvest rate. The average K of RB in Alces Lake was 1.12.The creel data we collect informs stocking prescriptions and is directly related to angler use and satisfaction. It is recommended to keep in place the recent changes in regulation (catch limit of 5/ day, single barbless hook), and to keep monitoring fish health until K values rise to 1.1 or higher.

Rainbow spawner counts in Outlet Creek have been conducted since 1989 and are an index of the population at Whiteswan Lake. Counts were not conducted this year. Between May 7 and June 4, 2019. The peak count of 2,760 spawners occurred on May 28 and represents one of the lowest counts in the past 10 years. Lower spawner counts in 2019 correlate with low CPUE observed this winter creel, suggesting that populations have continued to decrease since last year and that management practice to reduce numbers and increase fish health have been successful.

Tracking No. S2010 **Year 2 of 2** **Total Spent to Date $21,790**

Kootenay Region Small Lake Assessments

Status: Completed

Resource Inventory Committee (RIC) standard small Lake assessments were conducted on Kootenay Region small lakes in 2020 to evaluate stocked fish performance. RIC standard floating and sinking nets were set overnight to capture fish that were measured, weighed, dissected for ageing structures, sex and maturity. Ageing structures were sent to the FFSBC ageing lab and results are pending. Data was entered into the FFSBC database and once ages are returned the database will be submitted to FFSBC. Reports for each lake will be published on Ecocat once age data is analysed.

Tracking No. S2107 **Year 1 of 1** **Total Spent to Date $15,195**

Kootenay Flightline

Status: Ongoing

Year 1 of 3 of the Small Lake Index Monitoring (SLIM) project was conducted in 2020 on the Kootenay Flight Line (KFL). Aerial angler counts were conducted at 50 lakes over 20 days during the spring and summer of 2020. The objective of the survey is to estimate annual angling effort for 50 lakes on the KFL. Three years of data is collected and averaged across years to best present current angling effort on lakes.
The 2020 angling season presented uncertainty surrounding continuing the flights due to Covid19. Surveys were run as planned but the 2020 results will need to be examined to determine if they are representative of current angling effort. Comparing data to 2021 and 2022 surveys will determine if the 2019 season was an outlier in general, at a landscape level or if anglers did not respond significantly to the Covid19 pandemic.

Tracking No. S2109 **Year 1 of 3** **Total Spent to Date $15,476**

Cariboo Region Small Lakes Assessments

Status: Completed

Twenty-six small lakes in the Cariboo Region were assessed in 2020. Data has been submitted for input into the Provincial Small Lakes Database. Otoliths have been sent and age estimates are expected by January 2022. Once age data is available, a technical report will be drafted which will include estimates of growth, mortality, and abundance which will be used recommend corrective actions if size-based objectives were not being met such as changes in stocking regime or angling regulations. Recommended management actions may also aim to improve cost effectiveness of hatchery resources.

Tracking No. S2111 **Year 1 of 1** **Total Spent to Date $16,214**

Horse Lake Reward Tags

Status: Ongoing

This project proposal fulfills a component of a multi-year HCTF/FLNRO funded exploitation and movement study of lake trout in Horse Lake in the Cariboo Region. Funding from the Freshwater Fisheries Society of BC is being used for payment of high reward tags returned by anglers. Reliable reporting of angler captured tagged fish is a critical component of the study. High reward tags are used as an incentive to ensure anglers report the capture of tagged fish. In 2020, 38 lake trout with high reward tags were recaptured from Horse Lake resulting the payment of $3,800 to anglers. Information collected through this study is being used directly to inform development of sustainable angling regulations and habitat protection measures. More liberal lake trout harvest regulations may result in increased angler participation and satisfaction either directly by increasing lake trout harvest opportunity or indirectly by reducing lake trout density and resultant competition and/or predation on kokanee and/or rainbow trout. However, detailed assessment is required to evaluate if stocks can sustainably withstand increased angler harvest. Horse Lake is among the most productive lakes with native lake trout in the province. Sustainable harvest rates may be considerably higher than more typical lake trout systems which are colder, clearer and generally less productive.
- 63 lake trout were tagged with high reward tags (one $100, one $10) in 2020
- 43 reward tagged lake trout were recaptured by anglers in 2020 resulting in the payment of $4200 to anglers.

Tracking No. S1907 **Year 3 of 4** **Total Spent to Date $10,738**

Dragon Lake Goldfish Control and Assessment

Status: Ongoing

The first of three years of this project occurred in 2020. A contract crew of three staff operated an electrofishing boat for four, 10-hour days on Dragon Lake. In total 2,629 goldfish were captured and killed, of which 246 were sampled to collect biological data (length, weight, sex, maturity, age). Age estimates have been provided and preliminary analysis was conducted to evaluate maturity schedules, growth rates, and presence of age classes. Data has been shared with Brett Van Poorten to parameterize a population viability model which will estimate population growth rates and effect of suppression efforts such as depletion rates and response when removals stop.

Tracking No. S2112 **Year 1 of 3** **Total Spent to Date $15,000**

Region 7A Small Lakes Stock Assessments

Status: Completed

Seven Omineca Region lakes received RISC standard stock assessments in the fall of 2020. With funding secured through the Provincial small lakes committee, FLNRORD acquired the services of David Breault and Emily Gavey of the British Columbia Conservation Foundation (BCCF) to complete fieldwork from September 22nd to October 14th, 2020. Regionally important lakes with >10 years since prior assessments were targeted, including one wild lake (Fishhook Lake) and six stocked lakes (Clear Lake, Crystal Lake, Emerald Lake, Vivian Lake, and urban Shane and Ferguson Lakes). These assessments provide current stock information and support regional small lakes management planning (Region 7a SLMP in progress).

Tracking No. S2113 **Year 1 of 1** **Total Spent to Date $16,087**

Okanagan Small Lakes Stock Assessment

Status: Completed

In 2019, the Okanagan region implemented a significant number of changes to its small lakes stocking program. This was in response to complaints around decreased fish size and overall angling quality on many of the Okanagan's small lakes. In 2020, regional biologists collected stock assessment data to monitor the stocking changes and fill data gaps, while continuing to address reports of declining angling quality.

Tracking No. S2114 **Year 1 of 1** **Total Spent to Date $14,114**

Northeast Small Lakes Stock Assessments

Status: Completed

FFSBC stocked fisheries in the Northeast are limited with only 17 regularly stocked lakes and many more wild or naturalized fisheries. In addition to stocked lake assessments, in 2020 we surveyed some accessible Northern Pike fisheries and a Lake Trout fishery. We successfully completed surveys on Wright Lake, Stony Lake, Big Lake and Carbon Lake, and gained additional information from Boot Lake, Sundance Lake and Iver Lake in 2020. Overall, these surveys showed that there is some room for improvement or increased engagement with anglers in the region to improve stocked fisheries, advertise Northern Pike fisheries and assess our management objectives for the Lake Trout fishery in Carbon Lake.

Tracking No. S2115 **Year 1 of 1** **Total Spent to Date $8,956**

Northeast Angler Effort

Status: Ongoing

Project objectives included establishing a multi-year angling effort index on small lakes over a range of fisheries experiences and popularity, increase capacity and collaboration with Recreation Sites and Trails, BC Parks and other volunteers, and derive up-to-date estimates of angling days in both summer and winter on Northeast waterbodies.

In year 1 of this project, we largely failed to deliver this project due to staffing issues (Fish Bio position vacant for 6 months, insufficient technician support) and returned the majority of the budget because of that. In year 2, however, despite staffing issues related to covid-19 (cancelled fisheries co-op position) and loss of a technician, we managed to conduct this project more or less as intended with the generous help of volunteers. In year 2 we monitored six lakes in the Peace watershed (Inga, Stewart, Sundance, Moose, One Island and Big Lake), which cover a range of fisheries experiences and opportunities. We increased collaboration with Rec. Sites and Trails staff, their contractors, BC Parks contractors, and cabin owners, who conducted the majority of the instantaneous counts. We are currently analysing results and matching up instant counts with camera pics to generate estimates of open water and ice fishing effort on these lakes.

Tracking No. S2003 **Year 2 of 3** **Total Spent to Date $4,821**

Regulations Data Table

Status: Completed

Angling regulations are not well tracked by the province of BC, and to date have not been put into a functional database. However, fishing regulations have an important impact on use and interpretation of many aspects of fish and fisheries data. In order to fill this gap, the FFSBC has put some effort towards entering regulations in the past. That effort led to a data table containing approximately 12,000 records spanning 1990 to 2013. This data table was not transferred into the new Small Lakes Database.

The goal of this project was to continue to build up the historical database and bring the regulations data up to date. Immediate application of this data would be to update Shiny app lake reports, so that each year of gillnet assessment is associated with a regulation set, and forecasts of the predicted outcome from alternative regulations could also be implemented.In the summer of 2020, an opportunity existed to support a temporary staff through federal grant provided a contribution from the applicant agency. Through this grant and the SLC fund we were able to support a staff member to manually enter data from old pdf copies of fishing synopses.

Regulations data was entered into a standard template for 7 missing synopses in the period of 2005 to 2021. All of these data are saved to a Teams site for uploadinto the database. Near the completion of our data entry the FFSBC data specialist moved on, and that position was left unfilled for some time. We now have a new staff member in place, and the data should be integrated with previous data, cleaned, standardized, formatted and entered into the SLD before summer.

Tracking No. S2101 **Year 1 of 1** **Total Spent to Date $2,000**

Interior Plateau Supply-Demand Analysis

Status: Ongoing

no report available - end date extended

Tracking No. S2001 **Year 0 of 0** **Total Spent to Date $15,110**

Conservation of Wild Stocks of Rainbow Trout

Status: Ongoing

This project aims to update the Spatial Social-Ecological Systems model (SSES) to provide management predictions across a broader suite of BC small lakes. The model is currently fit to stocked rainbow trout fisheries in the province; our intention is to update the model with findings from Cantin (2020), which allows prediction of equilibrium wild recruitment. Extending the SSES model to include wild rainbow trout populations allows for an evaluation of how management of stocked lake may affect wild populations, providing more up-front trade-off analysis and resulting in more sustainable management of potentially at-risk populations.

Tracking No. S2102 **Year 1 of 1** **Total Spent to Date $30,000**