



## DESCRIPTION:

### PROJECT SUMMARY:

#### Details of your company and staff experience

Busy Bee Environmental Consulting is lead by Paige Skofteby (M.Sc in Ecosystem Reclamation, B.NRSc) who is the Senior Environmental Scientist and Restoration Coordinator. Jane Doe is the Environmental

#### Project Title

Louis Creek Habitat Enhancement

#### Project Summary Statement

Provide a succinct project summary statement that describes your proposed project. This is the project description that will be used in future communications about this project. It should be plain language and communicate what the project is about and what outcomes are expected. 150 word max.

The goal of the Louis Creek Habitat Enhancement is to re-establish structure and stability of the eroding stream bank and create an instream riffle, in order to provide proper salmon rearing habitat. By doing this, further erosion of the bank will be prevented, shade will become available from vegetation, and the riffles will incorporate oxygen, food and shelter required by salmon. The site is located on Heffley-Louis Creek road, approximately 24 km south of Barriere and the main source of funding for this project is from the NRSc Restoration Fund. Simpcw First Nations and Secwepemc Fisheries Commission are working in conjunction with Busy Bee Consulting to complete this project, with a focus on having the on-site work completed between June 21<sup>st</sup> to September 30<sup>th</sup> 2023.

#### Details of your company, and of your staff experience and rolls

Busy Bee Environmental Consulting		
Paige Skofteby (M.Sc., B.NRSc) Project Manager	20 years experience in terrestrial and aquatic restoration, project manager on various habitat enhancement projects.	Design and planning, budget, reports, overseeing construction, safety, grant applications.
Jane Doe Environmental Technician	15 years of habitat quality and assessment, numerous restoration projects completed	Reporting, planning and design, safety, permit applications,
Contractors:		



Hydraulic Engineer	Experience with in stream and bank stabilization for habitat restoration.	Design recommendations with site and approval
Fisheries Technician	Experience with in stream and bank stabilization for habitat restoration.	Habitat assessment, approval of design
Equipment Operators	Experiences with habitat restoration	Construction using equipment
<b>Volunteers:</b>		
Cattle Association Kamloops Fly Fishers Kamloops Naturalist Club TRU NRS Students Kamloops & District Fish & Game Association	Volunteer community members from various associations.	Planting riparian vegetation, establishing livestock and fish exclusion fence, live fascine construction, collection of native live clippings from site.

## What is the urgency of your proposal project?

Please describe and justify the urgency of your proposal project. 250 word max.

Salmon hold a high importance both culturally and commercial. They also incorporate a large amount of nutrients and energy into their ecosystems. Coho are an economically important species that contribute to commercial, recreational and indigenous catches in the Pacific coast of North America, but their populations have been in a steady decline since 1988 (Bradford and Irvine). It was found that among individual watersheds, rates of decline in adult Coho salmon abundance were correlated with agricultural land use, road density and a qualitative measure of stream habitat (Bradford and Irvine). With a high density of agricultural practices along the North and South Thompson River, eroding banks that drop fine sediments into the water is commonly seen. In addition to this, the lack of vegetation along the stream banks exacerbates the rising temperature of the water, and eliminates shaded areas for salmon. It is crucial to ensure that spawning habitat and passage is available for all species that inhabit this area. The portion of Louis Creek we are restoring is on agricultural land, with the land owner giving permission to complete the project as they are aware of the aquatic and terrestrial benefits to the restoration.

## PROJECT DETAILS:

### Species this project will primarily impact

List common and scientific names of the main species this project will be impacting, either positively or negatively. If they are listed (federal or provincial) species within the suggested work area, please acknowledge status.

In the Louis Creek watershed, there is a wide array of both aquatic and terrestrial species that inhabit the area. Coho salmon (*Oncorhynchus kisutch*), Chinook salmon (*Oncorhynchus tshawytscha*), and Rainbow trout (*Oncorhynchus mykiss*) are important fish found in this area (Government of BC, 2011). However, due to



climate change and human activity, the population numbers been in a consistence dwindle for decades. Part of this is due to the lack of habitat or living conditions available for salmon. Interior Fraser Coho are known to spawn in small creeks and tributaries with lots of cover (Earle, A.). This project aims to ensure proper spawning habitat for salmonids.

In addition to this, the vegetative riprap that is used to stabilize the stream bank is crucial for terrestrial invertebrates as well. Some species in the Louis Creek area that are the Burrowing owl (*Athene cunicularia*), Swainson's hawk (*Bufo swainsoni*), and the Monarch butterfly (*Danaus plexippus*).

### Detailed Project Description:

Describe your project activities in detail. Include your goals and your proposed approach including specific techniques, how you plan to apply said techniques. Include references for techniques and procedures. Two pages max per activity (i.e. 2 pages for spawning habitat activities, 2 pages for instream habitat activities). One page allotted at the end for literature cited (5 page maximum). Please also include 2 sketches (one per activity) of the proposed work and attach as separate files during submission or physical copies.

### Bank Stabilization:

In order to stabilize the 50 m long stream bank at the Louis Creek site, we will be using a combination of hard and soft rip rap. The hard rip rap will consist of a variety of boulders, with the largest being at the toe to act as an anchor support. In addition to the boulders, we will be securing large woody debris to anchoring boulders to integrate more cover, shade and food for the fish. With the means of preventing future erosion of fine sediments from the bank, we will be adding in tiers of vegetative rip rap in between the boulders of the stream bank. To allow the plants access to deeper, available soil for their root expansion, we will be placing a layer of plywood on top of them, which will also protect them from the boulders. The growth of the vegetative rip rap will provide increased shade, nutrients, and cover to the fish whilst simultaneously stabilizing the bank.

The first step of the construction process involves positioning and erecting the fish exclusion fence upstream from the work site and monitoring that there are no other species in the area that could be disturbed, including the landowners cattle. From there, the spider excavator will start by taking out the top portion of the bankside, in order to give the slope more of a gradual angle to work with, rather than a cliff effect. Next, the spider excavator will be placing three-man sized boulders along the length of the bank to establish the toe. Afterwards, approximately 10 Douglas Fir stumps will be placed horizontally into the bank (1 every 5 m), with the root wads sticking out into the stream. Their placement will protrude out into the thalweg of the stream flow and during low water flow events, the stumps will be low enough to create pools in the stream. They will be anchored to the boulders using galvanized cables with rebar and to ensure their stability, two-man rocks will be placed on top and round the Douglas Fir stumps, which acts as the next layer of the rock rip rap.

From there, live-clippings of willow, red-osier dogwood, and black cottonwood will be planted diagonally on the stream bank. The clippings have been collected to in 2 meter lengths in order to establish roots prior to planting. To obtain best chance of survival for the cuttings, we will harvest them during their dormant season and plant within days of collecting (Donat, M.). The various vegetative species will be placed into small 1 m

long pits that are hand dug by volunteers, then covered with roughly 10 cm of top soil that was taken out by the spider excavator during the redesigning stage of the streambank slope. A small sheet of plywood is then placed on top of the plant root to protect it from the weight of the rocks that will be placed upon them. The process of the vegetative planting is done in a bottom-up method, to get the full tier effect of the plants over the 6.95 m wide bank. This cordon construction method provides good water retention capacity in dry climates, increased root aeration from plywood placement, and high sliding resistance (Donat, M.) A layer of smaller cobbles will first be placed on top the vegetation, then larger one-man and half-man sized boulders will be stacked on top. As an additional method to provide protection from the floods, a berm will be created approximately 3 feet back from the streambank to adapt for future high water events due to climate change. After this part of the project with heavy construction is complete and then heavy equipment is no longer required, the fish fence will be taken down before the work window is over.

In the first week of September, the remaining vegetation along the top of the stream bank will be planted with the help of volunteers. This gives the plants an opportunity to establish their roots and start growths during the mildly warm fall. The majority of the vegetation will consist of Red Alder (*Albus rubra*) and Black Cottonwood (*Populus trichocarpa*), planted about 1 m back from the stream bank, to allow deeper root webs further back in the stream bank. Red-osier dogwood (*Cornus stolonifera*) and Willow (*Salix spp.*) will also be planted along the banks edge, allowing enough light available for the tiered vegetation below. For a method of plant protection from ungulates and the farmer's cattle, a live fascine will be built and planted on the far side of the berm, using vegetation collected by NRS student volunteers from the landowners property that they have offered. A pump irrigation system will temporarily be used to help the vegetation get established.

#### Instream Riffle:

The instream habitat enhancement will involve a 13 m long riffle section created using stumps and various sizes of boulders. The riffle will be accompanied by a pool upstream, which will ensure that there is cover and cooler temperatures available in the area during both high and low water events. The purpose of this instream design is to integrate shade and cover for salmonids, provide more aquatic invertebrates for diets and add more oxygen into the water.

The riffle will be constructed into a coffin shape using angular rock since it has a stronger ability to lock tightly together and less ability to roll during high water events like round rocks (Cramer, 2012). In the middle of the riffles slope, there will be a V shaped indentation, which will guide the water through and provide fish passage (Heise, 2023). The downstream slope ratio will be approximately 20:1 and the face of the riffle will be 4:1 with the highest point at the start of the flow being roughly 2.5 ft (0.8 m) in height. The height of the riffle face will create a pool during low water events. Boulders will be placed approximately 25 cm apart and stumps will be placed on the outer edges of the head of the coffin shape, with the root wad sticking out of the water and anchored to the largest boulders using galvanized cables and pinned with rebar. These stumps will incorporate more shade and cover to the area, and expand the pooling effect from the face of the riffle.



On the streambanks adjacent to the riffle, there will be a higher concentration of riprap in level with the floodplain for erosion prevention and sediment control, due to the water being forced in that direction and taking the path of least resistance (Heise, 2023). Using the boulder cluster-log complex, pools will be established on both sides of the stream using the same galvanized cables with rebar to anchor the pools in position.

#### References for Techniques and Procedures:

Donat, M. Bioengineering Techniques for Streambank Restoration: A Review of Central European Practices. Ministry of Environment, Lands and Parks and Ministry of Forests. 1995. Watershed Restoration Project Report. Vol 2. Pp 25-28. Accessed February 12<sup>th</sup> 2023

[https://www.for.gov.bc.ca/hfd/library/ffip/Donat\\_M1995.pdf](https://www.for.gov.bc.ca/hfd/library/ffip/Donat_M1995.pdf)

Cramer, M. Stream Habitat Restoration Guidelines. 2012. Co-published by the Washington Departments of Fish and Wildlife, Natural Resources, Transportation and Ecology, Washington State Recreation and Conservation Office, Puget Sound Partnership, and the U.S. Fish and Wildlife Service. Olympia, Washington. Accessed February 18<sup>th</sup> 2023

<https://wdfw.wa.gov/sites/default/files/publications/01374/wdfw01374.pdf>

Heise, B. Streambank Stabilization. 2023. Thompson Rivers University. PowerPoint presentation. Accessed February 10<sup>th</sup> 2023.

Heise, B. Restoration of Instream Structures. 2023. Thompson Rivers University. PowerPoint presentation. Accessed February 10<sup>th</sup> 2023

## Project Support:

### Project Supporters

Please specify details about any project supporters that may be involved or support your proposal project. A project supporter is an organization that either provides financial or in-kind support, provides support in principle and/or is actively involved in the project. Describe what type of support you will be receiving and clearly list the monetary and/or time (in hours or working days) value you expect to receive. 500 word max.

The Louis Creek Habitat Enhancement project is being supported through the generosity of the Habitat Conservation Trust Foundation and the Pacific Salmon Foundation grant programs. The Habitat Conservation Trust Foundation is donating \$5,000.00 from their Enhancement and Restoration Proposal seed grant. This enables the project to get a head start in the material preparation and deposits for contractors. A grant of \$2,500.00 is being donated by the Pacific Salmon Foundation from their community salmon program which aims to protect, conserve and rebuild the wild salmon populations. The Busy Bee Environmental Consulting team feels confident that these monetary supports donated from the two foundations will enable the project to have the best outcome available for habitat enhancement at Louis Creek.

## Project Volunteers

Please provide details about volunteers that may be involved in your proposal project. A volunteer is someone who will work on the project but will not be paid in full or in part for their services. List the number of volunteer hours you hope to solicit and potential volunteer pools you hope to access. 300 words max.

<b>Association</b>	<b>Number of Volunteers</b>	<b>Total Number of Hours</b>	<b>Role in Project</b>
<b>Cattle Association</b>	4	36	<ul style="list-style-type: none"> <li>- Constructing a temporary cattle exclusion fence and assist in the take down.</li> <li>- Assisting the spider excavator operator with the placement and fill of the boulders during the streambank construction.</li> <li>- Assisting with the construction of the berm.</li> </ul>
<b>Kamloops Naturalist Club</b>	5	24	<ul style="list-style-type: none"> <li>- Proper collection and storage of live cuttings for streambank vegetation.</li> <li>- Assisting in the planting of the cuttings into the streambank.</li> <li>- Support the construction of the live-fascine.</li> </ul>
<b>TRU NRS Volunteers</b>	9	48	<ul style="list-style-type: none"> <li>- Assisting with the collection and planting of the live cuttings.</li> <li>- Constructing the live-fascine with live-stakes and clipping collected.</li> <li>- Assist with the site clean up</li> </ul>
<b>Kamloops &amp; District Fish &amp; Game Association</b>	2	16	<ul style="list-style-type: none"> <li>- Assist with the set-up of the fish exclusion fence.</li> <li>- Support the construction of the streambank stabilization with the Douglas Fir stumps and boulders.</li> <li>- Assist with the instream riffle construction.</li> </ul>
<b>Kamloops Fly Fishers</b>	3	12	<ul style="list-style-type: none"> <li>- Support the construction of the instream riffle.</li> <li>- Assist with the take down of the fish exclusion fence.</li> </ul>

## Project Location Information

### Map Information

Please include a map on the following page which clearly indicates that project location (the reach where work will occur) and other areas outside of immediate work zone that may be affected. Please also indicate any features of note within the watershed including, but not limited to: dams, communities, transmission lines, highways, waterways, recreational use, etc. The page is allotted for more detailed description of any map features or comments. Please provide latitude and longitude for the centre of the proposed project site/location.

The Louis Creek Habitat Enhancement project is located in an area that is surrounded by ample amounts of agricultural practices. It is also a popular recreational area for activities such as camping, hiking, mountain biking and recreational fishing. The Louis Creek stream runs from Barriere, through the Louis Creek town and flows into the North Thompson River.



Figure 1. The Louis Creek Habitat Enhancement Project is located roughly 24 kms south of Barriere.

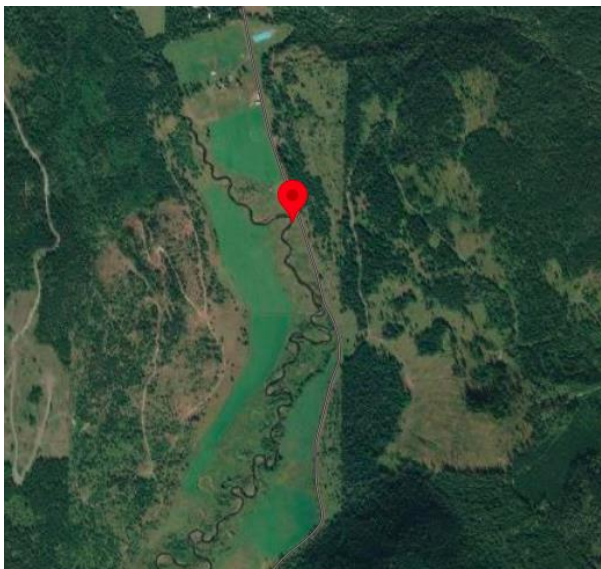


Figure 2. The red pin indicates the project site at Louis Creek.

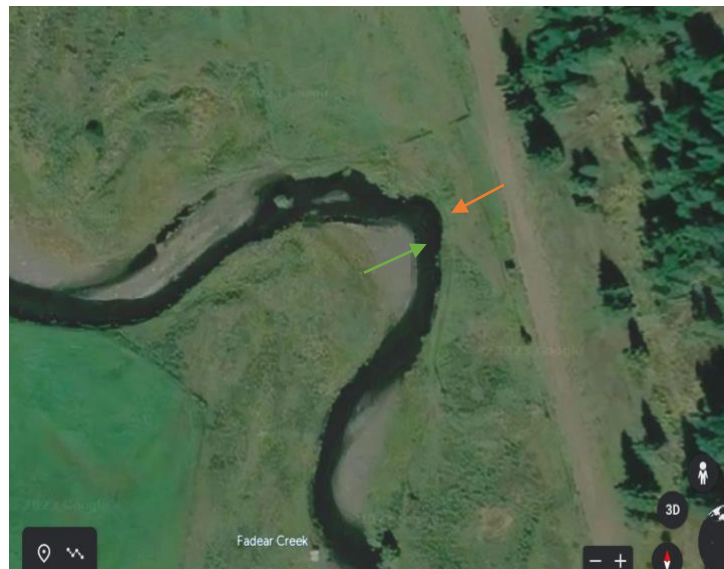


Figure 3. The orange arrow indicates where the streambank stabilization will take place and the green arrow shows where the instream riffle will be placed.

### Project Phases:

Please provide information about each of the key phases of your proposed project for this year of funding only. If a phase is not applicable, set the start and end dates of the phases to the state date of the project and provide an explanation in the description field of why the phase is not applicable.

<b>Project Phase</b>	<b>Phase Start Date</b>	<b>Phase End Date</b>	<b>Description of Activities</b> <i>Short description of activities (be careful not to alter formatting)</i>
<b>Planning and Designing</b>	March 15 <sup>th</sup> 2023	June 20 <sup>th</sup> 2023	<ul style="list-style-type: none"> <li>- Permit applications</li> <li>- Grant applications</li> <li>- Sourcing and confirming contractors</li> <li>- Securing volunteers</li> <li>- Site assessments and approvals</li> </ul>
<b>Preparation for Construction</b>	June 21 <sup>st</sup> 2023	July 21 <sup>st</sup> 2023	<ul style="list-style-type: none"> <li>- Ensuring all items required for construction are on site.</li> <li>- Consult with landowner to confirm cattle deterring plan while construction happens</li> <li>- Set up fish exclusion fence the day before work window begins.</li> </ul>
<b>Work Window for Instream Construction</b>	July 22 <sup>nd</sup> 2023	August 15 <sup>th</sup> 2023	<ul style="list-style-type: none"> <li>- Begin and complete the construction of the instream riffles and stream bank rip rap using rocks and large woody debris.</li> </ul>
<b>Finish up Construction</b>	August 20 <sup>th</sup> 2023	September 30 <sup>th</sup> 2023	<ul style="list-style-type: none"> <li>- Complete the planting of vegetation in the rip rap and ensure stability.</li> <li>- Create and stabilize the live fascine to act as a cattle deterrer.</li> <li>- Remove all equipment remaining and clean up the site.</li> </ul>
<b>Complete Reporting</b>	November 15 <sup>th</sup> 2023	December 20 <sup>th</sup> 2023	<ul style="list-style-type: none"> <li>- Summarize the project into a report to including the final outcome and detailed final budget.</li> </ul>

An examination of the site will be required during the spring of 2024, once high flow has begun. It is recommended that possibly two additional inspection of the site are complete to observe the state of the vegetation and the project during low water events. As well as during the spawning season to see if the habitat is thriving. These check ins can be done by the Busy Bee Environmental Consulting team or with the help of the TRU NRS Volunteer students, with an opportunity for them to assist in aquatic invertebrate counts.

## Benefits

Please detail the expected ecological and socio-economic benefits as a result of this project (habitat enhancement, community engagement, conservation of species, etc.) Please provide a description detailing exactly how this project will lead to the anticipated benefits. Careful for formatting.

<b>Benefit</b>	<b>Description of Benefit</b>
<b>Habitat Enhancement</b>	<u>Bankside Stabilization</u> – reduced erosion through root webs and heavy rock material, incorporate more food and nutrients into the ecosystem through

	<p>leave litter and terrestrial invertebrates falling off vegetation, integrate more shade availability into the stream which results in cooler waters.</p> <p><u>Newbury Riffles</u> – adds more oxygen into the water, acts as protection for fish during high water events to rest and cover, reduces flooding due to the dissipation of the river’s energy, used to create pools, creates spawning and rearing habitat, and increases food availability with aquatic invertebrates and access for fish to eat whilst resting (Heise, 2023).</p> <p><u>Pools</u> – aid as a resting location for fish, cover, deep pools maintain cooler water temperatures which is preferred by many fish species (Heise, 2023).</p> <p><u>Terrestrial</u> – the addition of riparian vegetation acts as habitat for various species of invertebrates and birds. The salmon also incorporate larger predators in the food web such as bears, eagles, wolves, etc.</p>
<b>Species Conservation</b>	Restoration of the aquatic habitat with the addition of the riparian vegetation allows the site to act as a functioning habitat for salmon, who are a species at risk. Since salmon are a keystone species, their presence indicates that the ecosystem is in good health.
<b>Decreased Erosion</b>	The high concentration of root webs along the streambank acts as an anchor to stabilize the soil and prevent erosion during high water events, cattle traffic, heavy rainfall, etc.
<b>Decreased Flood Risk</b>	The addition of the riffles dissipates the rivers energy and the berm acts as a barrier for potential high water events.
<b>Adapting to Climate Change</b>	With increasing water temperatures, it is extremely crucial that shade is available to order to keep water temperatures cooler species that inhabit it. In our situation, the salmon populations prefer cool waters, which makes the need for shade through vegetation and large woody debris very important.
<b>Community Involvement and Experience</b>	The projects poses as an opportunity to learn more about salmon habitat, restoration processes, riparian vegetation and is a fantastic way to get community involvement. With the help of the various clubs, establishments, and students, everyone is able to learn something from each other whilst networking for potential future restoration projects.
<b>Recreational Activities</b>	The increase in salmon populations to the area will result in an increase in recreational fishing.

## Is ongoing monitoring and maintenance required to sustain the benefits to fish and/or wildlife?

For example, maintaining a spawning channel intake structure. 500 words max.



Our goal for the Louis Creek Habitat Enhancement project is to construct a habitat that is fully functioning and does not require annual maintenance. To do this, we will use the process-based restoration approach to target the root cause of the problem and match our solution to the local potential and scale of the ecosystem on site (Heise, 2023). We will be doing assessments of the site prior to the construction in order to establish the problem areas such as erosion, oxygen levels, lack of cover and shade, aquatic and terrestrial invertebrates, river velocity, etc. From those results, we will base our project designs on the highest problem areas with the main focus on the overall habitat enhancement for salmon. We will be creating the streambank and riffles to be structurally sound through anchoring and reinforcing the toe of the slopes.

In 2024, we would like to complete a minimum of 3 visits to the site at various times including peak flow, low flow and spawning times. During one of the visits in 2024, we will complete the same set of assessments that was done prior to the start of construction, which will give us an indication of the success of the project. We will continue to complete annual check-ups over the following 9 years with the set of assessments done every second year as it is predicted that the ecosystem functioning will increase more once the site is more established.

The possibility for maintenance required on site is for the health of the riparian vegetation. To ensure the plants are well established, especially during their first hot summer, they could potentially require some watering to prevent mortality. In this case, Busy Bee Environmental Consulting would work directly with the landowner to establish a plan to irrigate the plants as needed. Other possibilities for maintenance requirement is in the case that there is a hydraulic or geotechnical failure from either heavy water flows pushing the bank toe or gravitational forces pushing on the bank soils (Heise, 2023). Our regular check-ups during the first year is crucial to monitor the strength and resilience of the project under various conditions, as well as inspect for any potential problems.

Describe the benefits of this project to local First Nations, stakeholders and/or communities, including any proposed opportunities for community engagement, education and outreach. 900 words max.

\*If this were a real project, you'd be asked to report on the progress of these benefits.

The main benefiter of this project is the salmon, because their habitat and populations have dwindled as a result of human activity. Nevertheless, their presence in our ecosystems provides countless abiotic and biotic benefits to the environment and us as well. Other species of wildlife such as bears and eagles will also be favored by the completion of the project as it integrates more nutrients into their food web. In addition to this, terrestrial species will have an advantage from this project as it provides increased habitat for birds, small mammals and insects in the vegetation and the boulders on the streambank. One of the partners to this project that will also be benefitted from it is the Secwepemc Fisheries Commission, since Louis Creek is within



the area they operate. The SFC works to maintain traditional fisheries rights in a co-management framework, their knowledge and support is fundamental to the success of this project (Shuswap Nation, 2023).

The Louis Creek Habitat Enhancement project is also located on Simpcw Territory, which covers approximately 5,000,000 Ha of land (Simpchw First Nation, 2023). Simpcw First Nation is another one of the partners that is helping to complete this project, and salmon hold a cultural significance to them. Historically, salmon runs helped sustain Simpcw nutritional needs and provide enough surpluses for preserving and trading, and it was done in a way that allowed only a small percentage of fish to be caught, which enabled the balance for the others to make it to the spawning grounds and begin the new cycle (Simpchw First Nation Land Study, 2014). However, salmon are now a species at risk, and face tremendous challenges including commercial fishing, diseases and warming waters, which has decreased their presence and numbers in the Simpcw Territory. Thus, the project aims to regenerate the population of salmonids in the watershed and sustain a healthy, functioning ecosystem for the species.

The landowner and those adjacent to the location of the site will benefit from this project as it aids as a flood prevention with the river's energy dissipated and the berm added for further support during high water events. This will help to protect their agricultural land, animals and livestock and houses or buildings on site. Another group that benefits from this project is the recreational fishers due to the habitat enhancement attracting a larger population of salmonids to the area, and providing spawning and rearing habitat to increase the population size. The volunteers that assist with the project will benefit from the knowledge and experience of contributing to the process of habitat restoration. Having the opportunity to learn and interact with others that are dedicated to helping the salmon populations and networking with them is a huge asset.

## Permits and Approvals

Permit Requirements – Are permits required for your project? If yes, please indicate which permits you will need to apply for.

The provincial permits and approvals required to complete this project include a Water License, a Notice of Application under section 11 in the Water Sustainability Act, as well as a Change Approval and Authorization.

The federally permits and approvals required include a Projects Near Water Approval from the Department of Fisheries and Oceans.

## First Nations Outreach

Please attach a draft letter seeking permission to operate to local First Nations groups within the project area detailing, in plain and understandable language, your project goals, main activities, and the potential positive and negative impacts to indigenous lands/territories. Key things to include are benefits/repercussions for Indigenous communities, hiring plans for Indigenous workers, etc. Attach letter to the end of this document or as a separate file in the same submission. One page max.



Murray Ross – Director of Secwepemc Fisheries Commission

680 West Athabasca Street  
Kamloops, British Columbia  
V2H 1C4

Dear Murray,

My name is Paige Skofteby and I am the project manager at Busy Bee Environmental Consulting (BBEC). I am reaching out with the hopes of obtaining permission to operate and work on the traditional lands of the Secwepemc First Nations. The goal of our work is to enhance the habitat of salmon in the Louis Creek area by stabilizing a 50 m stretch of streambank using various vegetation, boulders and large Douglas Fir stumps. In addition to this, we would also be adding an artificial riffle into the system using a combination of boulders and large woody stumps. This project aims to reduce streambank erosion, minimize the floodplain on the land, increase the health and function of the habitat for salmon and help meet their required needs.

The Louis Creek Habitat Enhancement project is planned and designed by assessing the current state of the ecosystem, and identifying the main points that are limiting it's potential. Some examples of this include the number of aquatic and terrestrial invertebrates present that salmon feed on, the level of oxygen in the water, the amount of fine sediments that are falling from the bank and into spawning habitat, as well as shade availability. All of these measures are crucial requirements for the optimal ecosystem that salmon need. From these results, we design our restoration project in a way that brings the ecosystem to it's highest potential, and creates habitat for numerous species that are native to the area. Due to the scarcity of salmon populations, BBEC has a high priority to help re-establish the ecosystem health for salmon. As a keystone species that provide countless benefits to ecosystems, we acknowledge the cultural and economic importance that salmon bring to your traditional land.

Another benefit to this project is creating a larger sense of awareness to the well-being of salmon populations in the area and how their habitat stability and function is vital in order to re-establish the species. To complete the project, volunteers from TRU Natural Resource Science program, the Cattle Association, Kamloops Naturalist Club, Kamloops Fly Fishers and Kamloops & District Fish & Game Society will be donating their time to help restore the habitat and learn more about the requirements.

Thank you for your time and consideration of our project. I look forward to hearing from you.

Kind regards,  
Paige Skofteby  
Busy Bee Environmental Consulting



Tina Donald – Fisheries & Wildlife Coordinator

7555 Dunn Lake Road  
Little Fort, British Columbia  
VOE 2C0

Dear Tina,

My name is Paige Skofteby and I am the project manager at Busy Bee Environmental Consulting (BBEC). I am reaching out with the hopes of obtaining permission to operate and work on the traditional lands of the Simpcw First Nations. The goal of our work is to enhance the habitat of salmon in the Louis Creek area by stabilizing a 50 m stretch of streambank using various vegetation, boulders and large Douglas Fir stumps. In addition to this, we would also be adding an artificial riffle into the system using a combination of boulders and large woody stumps. This project aims to reduce streambank erosion, minimize the floodplain on the land, increase the health and function of the habitat for salmon and help meet their required needs.

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Thank you for your time and consideration of our project. I look forward to hearing from you.

Kind regards,  
Paige Skofteby  
Busy Bee Environmental Consulting

## Budget Information

### Project Budget

#### A) Labour Expenses (Salaries/Wages – project management, fieldwork, data entry, etc.)

Service	Daily Rate	Total Days	Total Costs	NRSc Fund Cont.
<b>Project Manager</b>	\$380.00	52	\$19,760.00	\$19,760.00
<b>Environmental Technician</b>	\$350.00	40	\$14,000.00	\$14,000.00
<b>LOA for Machine Operator</b>	\$225.00	6	\$1,350.00	\$1,350.00
<b>Hydraulic Engineer</b>	\$1000.00	3	\$3000.00	\$3000.00
<b>Fisheries Biologist</b>	\$1000.00	4	\$4,000.00	\$4,000.00
<b>Volunteers</b>	\$160.00	20	\$3,200.00	\$0
		<b>Sub Total A</b>	<b>\$45,310.00</b>	<b>\$42,110.00</b>

#### B) Material, Equipment, Transportation and Field Expenses:

Item	Number Units	Unit Cost	Total Cost	NRSc Fund Cont.
<b>Spider Excavator Travel</b>	8 hrs	\$185.00/hr	\$1480.00	\$1480.00
<b>Spider Excavator Use and Operator</b>	6 days	\$2,400.00	\$14,400.00	\$14,400.00
<b>Vehicles</b>	30 units	\$350.00	\$10,500.00	\$10,500.00
<b>Dump Truck</b>	16 hrs	\$150.00/hr	\$2,400.00	\$2,400.00
<b>Boulders (1-4 m<sup>3</sup>)</b>	65 units	\$150.00	\$9,750.00	\$9,750.00
<b>Riprap Quarry Rock (3 – 6")</b>	5 units	\$450.00	\$2,250.00	\$2,250.00
<b>Top Soil</b>	2 units	\$45.00	\$90.00	\$90.00
<b>Live Cuttings</b>	1,200 units	\$7.00	\$8,400.00	\$0
<b>Nursery Potted Plants</b>	40 units	\$36.00	\$1,440.00	\$1,440.00
<b>Mobile Pump Irrigation System</b>	2 days	\$1,200.00	\$2,400.00	\$2,400.00
<b>Log stumps</b>	12 units	\$120.00	\$1440.00	\$720.00
<b>Cattle Exclusion Fence</b>	30 days	\$45.00	\$1,350.00	\$1,350.00
<b>Fish Exclusion Fence</b>	14 days	\$100.00	\$1,400.00	\$1,400.00
<b>Safety Equipment</b>	20 units	\$50.00	\$1,000.00	\$1,000.00



<b>Landscaping Tools</b>	35 units	\$75.00	\$2,625.00	\$2,625.00
<b>Cases of Water Bottles</b>	35 units	\$20.00	\$700.00	\$700.00
		<b>Subtotal</b>	\$61,625.00	\$52,505.00

### C) Project Administration Costs (Typically about 13% of Monetary Funding)

<b>Expenses = \$106,935.00</b>	<b>Administration Cost = \$20,475.00</b>
<b>Total Expenses = \$127,410.00</b>	

### D) In-Kind Support

Source	Cash	In-Kind	Volunteer	Total
<b>Habitat Conservation Trust Foundation</b>	\$5,000.00			\$5,000.00
<b>Pacific Salmon Foundation</b>	\$2,500.00			\$2,500.00
<b>Cattle Association</b>			\$720.00	
<b>Kamloops Naturalist Club</b>			\$480.00	
<b>TRU NRS Students</b>			\$960.00	
<b>Kamloops &amp; District Fish &amp; Game Association</b>			\$575.00	
<b>Kamloops Fly Fishers</b>			\$400.00	
		<b>Subtotal</b>	\$3,200.00	\$7,500.00

**Total Project Cost = \$127,410.00**

**Total of NRS Reclamation Fund Amount = \$115,090.00**

### Letters of Support:

You must attach letters of support. Please attach a short (600 words or less) letter seeking a support letter for your project to an appropriate party (government scientists, fisheries biologist, hydrologist, engineers, etc.) The letter should be addressed to a REAL person you have identified as someone whose support would help your project. Please attach at the end of this document or as a separate file in your submission.



Barry Brady  
Heffley-Louis Creek Road  
Louis Creek, BC  
V1E 3D5

Dear Barry,

My name is Paige Skofteby and I am the project manager at Busy Bee Environmental Consulting (BBEC). I am reaching out with the hopes of pursuing an aquatic habitat restoration project on your property. The goal of our work is to enhance the habitat of salmon in the Louis Creek area by stabilizing a 50 m stretch of streambank using various vegetation, boulders and large Douglas Fir stumps. In addition to this, we would also be adding an artificial riffle into the system using a combination of boulders and large woody stumps. This project aims to reduce streambank erosion, minimize the floodplain on the land, increase the health and function of the habitat for salmon and help meet their required needs.

The Louis Creek Habitat Enhancement project is planned and designed by assessing the current state of the ecosystem, and identifying the main points that are limiting it's potential. Some examples of this include the number of aquatic and terrestrial invertebrates present that salmon feed on, the level of oxygen in the water, the amount of fine sediments that are falling from the bank and into spawning habitat, as well as shade availability. All of these measures are crucial requirements for the optimal ecosystem that salmon need. From these results, we design our restoration project in a way that brings the ecosystem to it's highest potential, and creates habitat for numerous species that are native to the area. Due to the scarcity of salmon populations, BBEC has a high priority to help re-establish the ecosystem health for salmon. The completion of the site is projected to take approximately 8 weeks, with set up and clean up included. We will provide a cattle excursion fence for your livestock for the duration of our construction, and a live fascine will be created to deter the cattle from consuming the vegetation we plant to stabilize the streambank. Volunteers from various associations would be assisting the completion of this project.

This project would incorporate countless benefits to the ecosystem and your land, including flood prevent, reduce erosion and sediment control in your water, increased organic material from the riparian vegetation and spawning habitat for salmonids.

I appreciate your time and consideration, please let me know if any additional information is required. I look forward to hearing from you.

Kind regards,  
Paige Skofteby  
Busy Bee Environmental Consulting



Herb Tepper - Fish Habitat Biologist  
Front Counter BC  
1902 Theatre Road  
Cranbrook, British Columbia  
V1C 7G1

Dear Herb,

My name is Paige Skofteby and I am the project manager at Busy Bee Environmental Consulting (BBEC). I am reaching out with the hopes of obtaining a letter of support for an aquatic habitat restoration project in Louis Creek, BC. The goal of our work is to enhance the habitat of salmon in the Louis Creek area by stabilizing a 50 m stretch of streambank using various vegetation, boulders and large Douglas Fir stumps. In addition to this, we would also be adding an artificial riffle into the system using a combination of boulders and large woody stumps. This project aims to reduce streambank erosion, minimize the floodplain on the land, increase the health and function of the habitat for salmon and help meet their required needs.

The Louis Creek Habitat Enhancement project is planned and designed by assessing the current state of the ecosystem, and identifying the main points that are limiting it's potential. Some examples of this include the number of aquatic and terrestrial invertebrates present that salmon feed on, the level of oxygen in the water, the amount of fine sediments that are falling from the bank and into spawning habitat, as well as shade availability. All of these measures are crucial requirements for the optimal ecosystem that salmon need. From these results, we design our restoration project in a way that brings the ecosystem to it's highest potential, and creates habitat for numerous species that are native to the area. Due to the scarcity of salmon populations, BBEC has a high priority to help re-establish the ecosystem health for salmon. The completion of the site is projected to take approximately 8 weeks, with set up and clean up included. With a hard and soft riprap approach to stabilize the bank using various vegetation including Red-osier dogwood, Black cottonwood and willow, as well as a variety of boulder sizes. A Newbury riffle will also be constructed using boulders and stumps to act as an anchor, creating spawning habitat and cover for the salmon.

Additional benefits of this project aside from establishing new habitat, is creating a larger sense of awareness to the well-being of salmon populations in the area and how their habitat stability and function is vital in order to re-establish the species. To complete the project, volunteers from TRU Natural Resource Science program, the Cattle Association, Kamloops Naturalist Club, Kamloops Fly Fishers and Kamloops & District Fish & Game Society will be donating their time to help restore the habitat and learn more about the requirements.

Thank you for your time and consideration of our project. I look forward to hearing from you.

Kind regards,

Paige Skofteby

Busy Bee Environmental Consulting



NRS Restoration

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### Work Window

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