Pacific Salmon Strategy Initiative | Initiative de la Stratégie relative au saumon du Pacifique

Operational Fund Year-End Report
2024-25

Salmon Habitat Restoration Centre of Expertise

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Executive Summary

This document summarizes project activities and outcomes in year 2 of the Salmon Habitat Restoration Centre of Expertise (RCOE) Operational Fund for 2024-25. This 3-yr internal fund through Pacific Salmon Strategy Initiative (PSSI) supports region-wide projects that are of high urgency, demonstrate meaningful advancements in innovative restoration design, and support emerging restoration practices for salmon conservation and recovery. In administering the fund, the RCOE recognizes the importance of adequately characterizing natural processes and filling critical data gaps as precursors to effective restoration design and implementation. As such, 71% of projects this year focused on assessment and planning/coordination outcomes to advance priority projects towards readiness for targeted and effective restoration actions in 2025-26 or in the future.

All of the projects in this report are led by Fisheries and Oceans Canada's RCOE team and 79% were implemented with partners leveraging resources and capacity to complete restoration activities. The 48 implementing partners in 2024-25 were comprised of Indigenous groups (38%), community and stewardship groups (30%), government agencies (20%), private organizations (8%), and academic institutions (4%).

A total of $458,500 was spent under the Operational Fund in 2024-25 supporting 24 projects with varied project activities and targeted outcomes, ,specifically

- restoration assessment and monitoring (63%)
- strategic project planning and coordination (25%)
- maintenance of priority restoration infrastructure (8%)
- restoration implementation (4%)

Innovations and emerging practices piloted under the Operational Fund in 2024-25 have contributed to technical capacity building and strong program outcomes. Key outcomes contributing to the programming for salmon habitat restoration include

- 15 projects focused on filling critical data gaps to support future restoration projects
- 3 restoration plans developed, 1 Technical Bulletin published, and 3 workshops hosted
- 7 emerging practices and technologies piloted for broader implementation
- 6,222 m^2 of habitat restored and 16,500 m^2 of improved access to off-channel habitat

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Introduction

Restoring healthy and productive fish habitat is essential to maintaining and rebuilding Pacific salmon stocks. The Salmon Enhancement Program in Pacific Region has supported habitat restoration for more than 40 years to benefit salmon populations. Historically, restoration efforts focused on increasing the amount of habitat believed to be limiting in a specific area or stream reach. These efforts commonly involved the construction of engineered habitats and infrastructure that require ongoing maintenance and repair. With the notable shift among restoration practitioners toward process-based restoration solutions, the Salmon Habitat Restoration Centre of Expertise (RCOE), developed under the Pacific Salmon Strategy Initiative (PSSI), has increased the capacity and technical expertise in Pacific Region to support a broader range of restoration approaches and programming.

The RCOE is comprised of a diverse group of experts in habitat restoration and this internal expertise, with the support of programs such as the Operational Fund, is enabling DFO to expand restoration actions and advance innovative tools and approaches to effective restoration. This includes piloting novel techniques, designing innovative solutions to reduce maintenance of existing engineered habitats and infrastructure, and conducting baseline assessments to support the development of process-based restoration actions. Understanding the processes affecting fish and fish habitat and identifying appropriate restoration actions requires considerable engagement with partners, project planning, site assessment, and data collection. Carrying out these critical initial steps leads to restoration interventions that are resilient to environmental change and human impact, require less ongoing maintenance, and have the potential to yield longer-term outcomes. The Operational Fund is a key mechanism by which the RCOE is carrying out these critical steps to achieving these outcomes.

The Operational Fund is a 3-year annual commitment of $500,000 to fund RCOE-led habitat restoration initiatives. This fund enables the RCOE to advance restoration activities on key priorities, demonstrate new techniques and innovations, and develop tools to meet restoration goals across a diverse and rapidly changing landscape. External partners are integral to successful restoration planning and implementation, and the Operational Fund catalyzes action and improves collaboration. It enables the RCOE to work closely with partners, leveraging capacity and resources, to achieve restoration objectives across the Pacific Region.

This report summarizes project activities, advancements, and innovations supported by the Operational Fund in year 2, 2024-2025.

Year-Two Highlights

A total of $458,500 was spent across 24 projects in year 2 of the Operational Fund, averaging $21,000 per project. The projects were widely distributed across the Pacific Region and reflect the region's diversity of watershed characteristics and landscapes (Map 1). RCOE staff oversaw project delivery across regional and area teams and 79% of the projects were implemented alongside partners leveraging resources and capacity to achieve outcomes. Projects were diverse in scope, ranging from assessment (46%), planning and coordination (25%), monitoring (17%), innovative maintenance of restoration infrastructure (8%), and restoration implementation (4%).

Particular focus in year 2 was on assessment activities at priority sites across Pacific Region to address data gaps that will assist with developing site-specific, process-based restoration solutions. Evaluation of system-specific physical processes and dynamics is a critical step to developing effective restoration solutions. Assessment activities supported in 2024-25 will progress projects towards favourable outcomes for salmon in 2025-26 and beyond.

Year 2 Operational Fund highlights include:

- implemented a multi-disciplinary team approach to achieve restoration goals with 80% of RCOE staff engaged directly in project delivery
- strengthened collaboration through 48 partnerships including First Nations, non-government, government, private organizations, and academic institutions
- established several long-term data monitoring stations to inform restoration planning
- deployed new equipment and applied innovative techniques to enhance effectiveness of restoration initiatives
- advanced priority restoration projects by leveraging funding, specialized resources, and technical expertise in all 4 operational areas
- upgraded legacy restoration infrastructure to adapt to changing climate conditions

Key outcomes from the Operational Fund contributing to the Salmon Habitat Restoration Program include:

- 15 projects filled critical data gaps to support future restoration projects
- 3 large-scale restoration plans were developed
- 1 technical bulletin was published on eelgrass seeding methods

- 3 technical and community workshops hosted to advance collaborative restoration planning and projects
- 6,222 m^2 habitat restored across 3 projects supporting essential spawning and rearing habitat for salmon
- improved access to 16,500 m^2 off-channel habitat through legacy infrastructure upgrades
- piloted 7 novel practices and technologies for broader implementation, including:
    - using satellite imagery for salmon habitat assessments
    - utilizing trail cameras for monitoring drought conditions in remote areas
    - trialing backwatering techniques for climate emergency response
    - testing eelgrass seeding methods for nearshore restoration
    - piloting a siphon system for drought response
    - designing an innovative off-channel intake to reduce ongoing maintenance
    - applying ground penetrating radar to survey shallow water habitats

The 24 Operational Fund projects supported in 2024-25 reflect both the diverse geography and the scope of restoration challenges each area experiences. With internal funding to support innovative approaches for project assessment, design and implementation, the Operational Fund has advanced key projects in all areas of the Pacific Region (Map 1). Four projects with potential broad applications are:

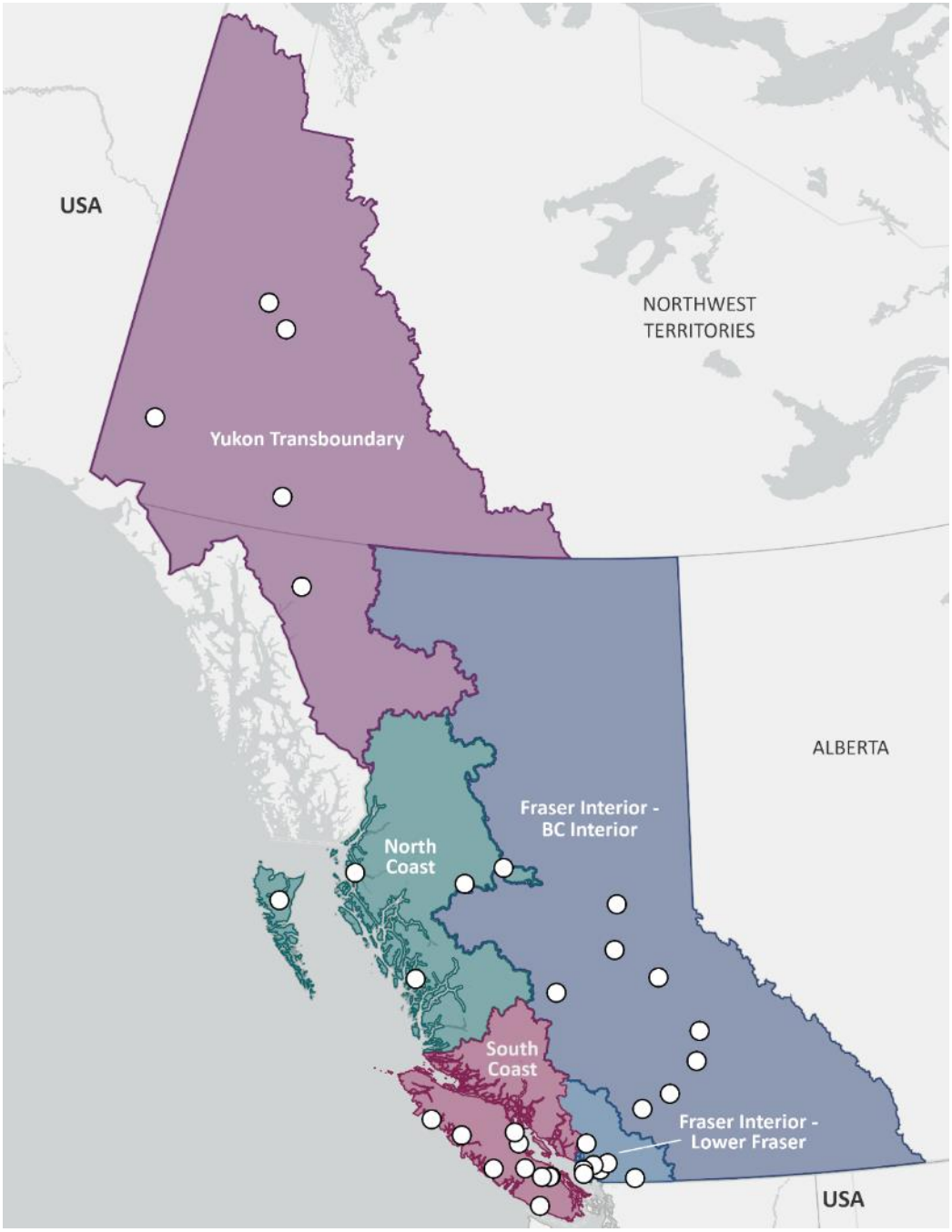
- Deer Creek Intake Replacement (Fraser Interior Area - Lower Fraser): This project successfully restored consistent surface water flow for coho to a 500 m^2 spawning channel and 5,000 m^2 of rearing habitat. The previous intake system was prone to clogging due to high natural sediment loads and required frequent maintenance and repair. The new intake is an example of innovative engineering to address chronic sedimentation problems. It is aligned with natural flow patterns to allow fine sediment to pass over rather than enter the intake, and its downward-facing, fine-grated design minimizes sediment buildup and maintenance needs. The innovative design is expected to provide long-term, sediment-free flow and the engineering design of this project can be replicated for other high-bedload streams.
- Nanaimo River Summer Chinook Rebuilding (South Coast Area): In response to the endangered status of Nanaimo River Spring and Summer Chinook Salmon, a series of early action projects were initiated to address key habitat and watershed threats to improve flow dynamics, sediment transport, and habitat quality. Equipment and supplies were secured for all initiatives, collaborative planning proceeded for several

projects, and a riparian planting project was fully implemented, with 887 live willow stakes planted over a 122 m^2 area to enhance sediment storage and protect critical Chinook holding habitat.

- Lake Babine Access Management (North Coast Area): This project tested innovative methods to monitor habitat connectivity as drought conditions increasingly impact fish passage in tributaries to Lake Babine. A remote camera was installed to track water levels and connectivity during low-flow periods. These real-time images enabled timely responses by DFO and Lake Babine Nation when the creek became disconnected twice during summer 2024. Additional monitoring included bathymetric surveys and analysis of high-resolution satellite imagery to assess flow conditions at other key tributaries. The project advanced the use of remote sensing tools in salmon habitat monitoring and informed future drought-related mitigation planning.
- Estuary Circulation Study – Year 2 (Fraser Interior Area - Lower Fraser): This project assessed the hydrodynamic and sediment transport effects of jetty breaches in 3 estuaries to better understand their role in estuary resilience and juvenile salmon habitat restoration. Unlike traditional monitoring that focuses on species presence, this process-based approach examined freshwater and sediment circulation following breach construction. Preliminary findings indicate that breaches deliver meaningful freshwater pulses during high tides that play a key role in supporting estuarine function under changing climate conditions. Although data did not show breaches contribute significant sediment to the estuaries outside of freshet, this may be due to the timing of data collection not corresponding to the episodic nature of events outside of freshet. Results provide early insights into the broader ecological impacts of jetty breach restoration strategies.

The RCOE's ability to lead these restoration projects in collaboration with partners has been paramount to filling critical data gaps and turning novel restoration concepts into real outcomes across the Pacific Region. The investment of these funds has supported the development of internal and external capacity and implemented innovative methodologies and technologies to advance restoration techniques. By applying the RCOE's expertise and capacity, considerable progress has been made advancing data collection and project implementation for a relatively low cost. Table 1 summarizes the 24 projects funded in 2024-25. Subsequent pages provide detailed overviews of each project, many of which are part of multi-year plans to advance restoration initiatives in the Pacific Region.

Map 1. Location of 2024-25 Operational Fund Projects in Pacific Region*.



*Separate teams in BC Interior and Lower Fraser operate within the Fraser Interior Area

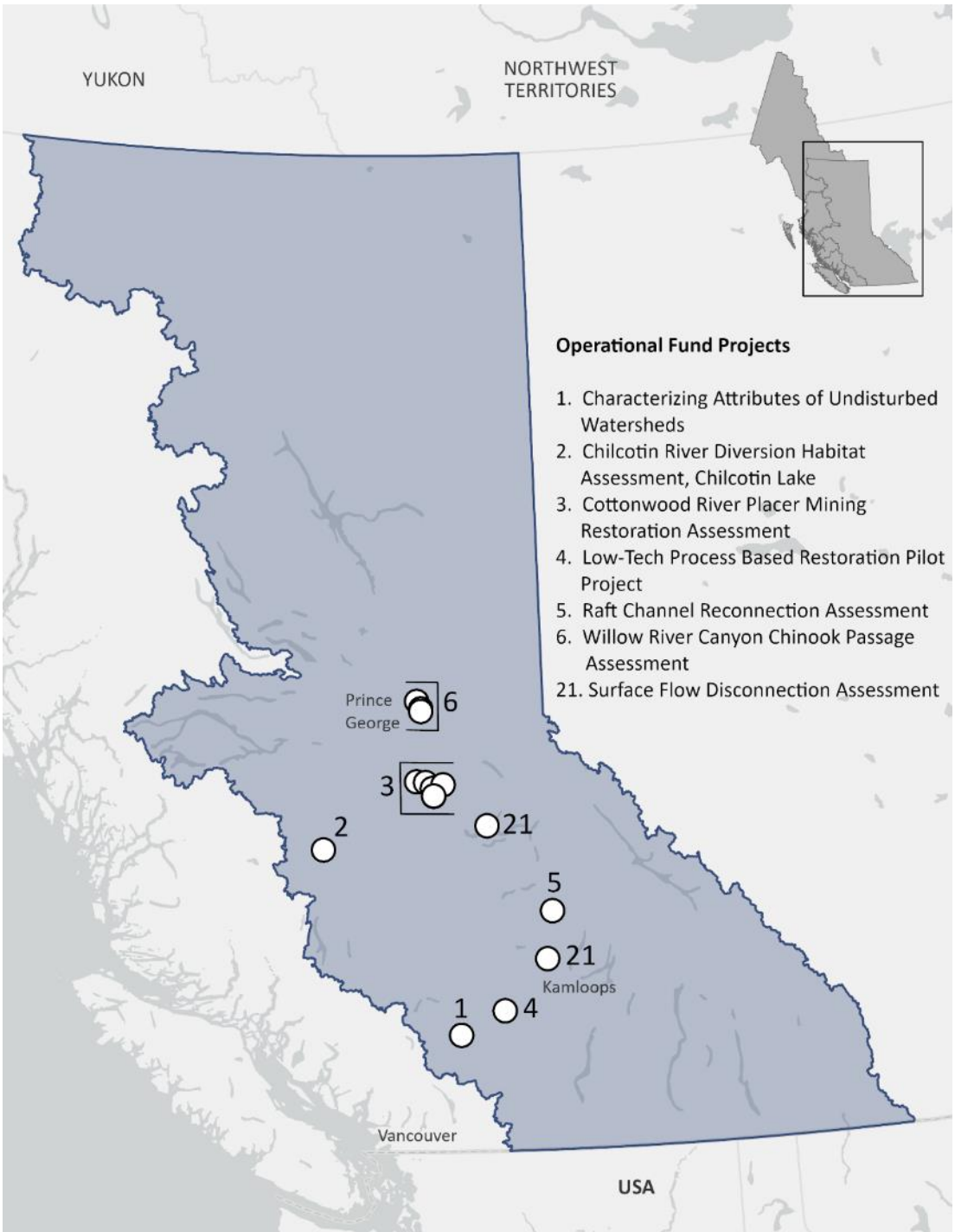
Table 1. List of the 24 Operational Fund projects for 2024-25.

Project No.	Area[1]	Location	Activity	Habitat – project focus
1. Characterizing Attributes of Undisturbed Watersheds	BC Interior	Stein River watershed	Monitoring	Freshwater – water quality and quantity
2. Chilcotin River Diversion Habitat Assessment, Chilcotin Lake	BC Interior	Chilcotin Lake	Assessment	Freshwater – lacustrine water quality, channel complexity
3. Cottonwood River Placer Mining Restoration Assessment	BC Interior	Cottonwood River and associated tributaries	Assessment	Freshwater – water quality, invertebrates, and fish utilization
4. Low -Tech Process-Based Restoration Pilot Project	BC Interior	Nicola River	Planning and Coordination	Freshwater – riparian and floodplain connectivity
5. Raft Channel Reconnection Assessment	BC Interior	Raft River	Assessment	Freshwater – channel connectivity
6. Willow River Canyon Chinook Passage Assessment	BC Interior	Willow River	Assessment	Freshwater – fish passage past obstruction/barrier
7. Deer Creek Intake Replacement - Year 2	Lower Fraser	Deer Creek	Maintenance	Freshwater – channel reconnection
8. Estuarine Circulation Study - Year 2	Lower Fraser	Fraser River, Squamish River	Monitoring	Estuary – sediment and freshwater movement
9. Or Creek Intake Structure Maintenance and Flow Restoration	Lower Fraser	Or Creek	Maintenance	Freshwater – off-channel reconnection
10. Large-Scale Floodplain Reconnection Planning for Katzie (Pitt-Addington) Marsh - Year 2	Lower Fraser	Pitt River	Assessment	Freshwater – floodplain connectivity
11. Bii Wenii Kwa Watershed Restoration – Year 2	North Coast	Bii Wenii Kwa (Owen Creek)	Assessment	Freshwater – channel reconnection and water quantity
12. Kloiya Fishway Passage Monitoring	North Coast	Kloiya River	Assessment	Freshwater – fish passage past obstruction/barrier

[1] Separate teams in BC Interior and Lower Fraser operate within the Fraser Interior Area

Project No.	Area[1]	Location	Activity	Habitat – project focus
13. Lake Babine Access Management	North Coast	Lake Babine	Monitoring	Freshwater – flow disconnection on lake tributaries
14. Neekas Creek Drought Mitigation	North Coast	Neekas Creek	Monitoring	Freshwater – water quality and quantity
15. Eelgrass Restoration by Seeding	South Coast	Gordon River, Kyuquot Sound, Burrard Inlet, Juus Kaahlii	Implementation	Estuary, Marine – nearshore sub-tidal
16. Fishculvert Fishway Pilot Project	South Coast	Piercy Creek	Planning and Coordination	Freshwater – fish passage past obstruction/barrier
17. Nanaimo River Summer Chinook Rebuilding	South Coast	Nanaimo River	Planning and Coordination	Freshwater – water/ sediment quality and quantity, riparian
18. River Styles Pilot Project - Tranquil Creek Watershed	South Coast	Tranquil Creek	Assessment	Freshwater – channel complexity
19. Side Channel Intake Removal	South Coast	Oyster River	Planning and Coordination	Freshwater – channel connectivity
20. Somass Estuary Action Plan	South Coast	Somass River watershed	Planning and Coordination	Estuary – nearshore connectivity, Freshwater – water quantity
21. Surface Flow Disconnection Assessment	South Coast	Coldwater River, North Thompson River, Quesnel Lake, Nootka Sound, Barkley Sound	Assessment	Freshwater – water quantity, habitat availability
22. Fraser Falls Passage Assessment	Yukon Transboundary	Stewart River watershed	Assessment	Freshwater – fish passage past obstruction/barrier
23. Silver Salmon River (Gaat Héeni) Obstruction	Yukon Transboundary	Silver Salmon River	Assessment	Freshwater – fish passage past obstruction/barrier
24. Yukon Chinook Overwintering Assessment	Yukon Transboundary	Haggart Creek, Takhini River	Assessment	Freshwater – habitat availability

Map 2. Fraser Interior Area – BC Interior Operational Fund Project Locations.



1. Characterizing Attributes of Undisturbed Watersheds

Project Lead

Dave Reid

DFO Area

BC Interior

Stream/Watershed

Stein River

Location

50.28664, -121.63102

Introduction

Restoration effectiveness is often difficult to assess in part due to a lack of “undisturbed”, reference systems that are comparatively intact yet responsive to landscape-scale factors such as climate change. Previous discussions with BC Ministry of Environment and Water Survey of Canada led to a joint goal of instrumenting one or more undisturbed watersheds in BC to serve as reference sites to monitor and measure background environmental change.

The Stein River (Figure 1) was selected as a proxy watershed for BC interior systems that are snowmelt dominated and semi-arid. The Stein watershed is relatively intact (a small area was burned in 2022 but the majority of the catchment was unaffected), and it has not undergone forestry or other major industrial activities that may alter watershed function.

Figure 1: Stein River, looking downstream of the proposed hydrometric station site.

Objectives

The overall project objective is to develop a long-term record of watershed attributes including hydrology, climate, water quality, and ecological values to help understand how landscape-scale environmental changes may affect these watershed variables. By establishing this relation, the effects of landscape-scale factors may be isolated from assessments of watershed response and recovery due to restoration activities to ascertain overall restoration effectiveness.

The objectives for 2024-25 were to:

- identify appropriate sites for data collection
- procure and install the equipment at the site

Project Summary

Collaboration with BC Ministry of Environment and Water Survey of Canada (WSC) led to plans for WSC to install and operate a permanent hydrometric station on the Sten River. RCOE regional staff

committed to installing a real-time climate station at a mid-elevation site within the watershed to complement the hydrometric data. An example climate station is shown in Figure 2. Collectively, these stations provide long-term monitoring of landscape-scale metrics in the Stein watershed.

Figure 2. Example of a climate station equipped with real-time transmitting capability (Russel Creek, BC). A similar station will be installed in the Stein watershed to track climate variables alongside hydrological attributes.

For year 1 of this long-term project, work included climate station siting in the watershed and procuring equipment for the hydrometric and climate stations. The station is expected to yield continuous data beginning in mid-2025.

Implementing Partners

- BC Ministry of Environment
- Water Survey of Canada
- Heiltsuk Nation

Pacific Salmon – Conservation Units

- Chinook – Middle Fraser
- Coho – Interior Fraser
- Pink – Fraser River

Cost Summary

Supplies	$ 2,110
Equipment	$15,600
Total Cost	$17,710

Outputs

An appropriate climate station site was located and all equipment and supplies necessary for installation were procured. This included solar panels, batteries, a snow depth senor and rain gauge, water level and conductivity loggers, climate sensors, and logger for telemetry communication.

Due to operational constraints, installation of most equipment was deferred to the low flow period in summer 2025.

Future Work

In 2025-26, the climate station will be installed and coordination with WSC will continue to install a hydrological station at the mouth of the Stein River. Work will continue to develop stage-discharge rating curves at this site and collect relevant hydro-meteorological data.

Further Information

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2. Chilcotin River Diversion Habitat Assessment, Chilcotin Lake

Project Lead

Kirstin Jorgensen

DFO Area

BC Interior

Stream/Watershed

Chežich'ed Biny (Chilcotin Lake) and Chilcotin River

Location

52.340111, -124.055581

Introduction

Prior to a 1975 river diversion, the upper Chilcotin River featured extensive delta and marsh habitat extending 3 km into Chilcotin Lake. The 100-m long diversion cut off a 2.5-km length of channel and established a new river outlet directly into Chilcotin Lake, much closer to the lake outlet (Figure 1). The diversion altered migratory and rearing habitat for Chinook and coho salmon. It also reduced water circulation to the east end of the lake, thereby reducing the lake's overall life span and impacting water quality.

The RCOE has recently begun work to support a feasibility assessment by Tsilhqot'in National Government to identify potential restoration actions that benefit fish and fish habitat.

Figure 1. Chilcotin Lake prior to the 1975 diversion (top photo) and post diversion (bottom photo).

Objectives

This is expected to be a multi-year project with the first year focusing on the data collection related to the biological, physical and chemical conditions of upper Chilcotin River and Lake to inform potential restoration actions in the region.

Project Summary

Monitoring stations were identified for water quality equipment and loggers to assess daily and

seasonal fluctuations in water temperature and dissolved oxygen within the lake. Water quality equipment necessary to complete the data collection was procured with intention to install in summer 2024 but due to the Chilcotin landslide that occurred on July 31, 2024, it was delayed until October. Planned lake bathymetry was also delayed until the fall.

Early fall ice conditions on Chilcotin Lake interfered with October field work, preventing data logger installation (Figure 2). Completed field work included confirming site and boat access locations, fish habitat assessment following provincial reconnaissance inventory protocols in the relic channel and Chilcotin River immediately upstream of the lake, and drone imagery including LiDAR collected by the RCOE.

Figure 2. Lake ice conditions during the October 2024 field visit.

Implementing Partners

- Tsilhqot'in National Government

Pacific Salmon – Conservation Units

- Chinook – Middle Fraser River
- Coho – Interior Fraser

Cost Summary

Supplies	$ 1,259
Equipment	$24,003
Total Cost	$25,262

Outputs

Baseline fish habitat data were recorded on Reconnaissance (1:20,000) Fish and Fish Habitat site cards. An ortho-mosaic of the project area will be produced from the drone imagery collected. LiDAR data were collected for the area, but preliminary data processing highlighted some data challenges that the RCOE team is currently trying to resolve.

Future Work

A site visit is planned for early summer of 2025, once ice cover is reduced and lake levels are elevated, to complete outstanding field tasks. Work will include collecting lake bathymetry data and installing water quality monitoring stations to record water temperature and dissolved oxygen through the critical summer period. If existing LiDAR data processing is unsuccessful and the project partners deem the data essential, then new LiDAR data will be collected and processed.

Further Information

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3. Cottonwood River Placer Mining Restoration Assessment

Project Leads

Natalie Mahara & Kirstin Jorgensen

DFO Area

BC Interior

Stream/Watershed

Cottonwood River

Location

Site Name*	Coordinates
Cottonwood River	53.09616, -122.3658
John Boyd Creek	53.08503, -122.2051
Lightning Creek at Rec Site	53.01789, -122.0803
Lightning Creek at Peter Cr Rd	53.06013, -121.8862
Victoria Creek	52.93322, -122.0515
Swift River	52.93687 -122.0547

*all sites are accessed via Forest Service Roads

Introduction

The Cottonwood watershed has been impacted by forestry, wildfire, forest insect infestations, and historic gold mining activities. Placer gold mining remains active throughout the watershed and mineral claims adjacent to the mainstem appear fully subscribed. Chinook salmon returns to the Cottonwood River are low relative to nearby comparable systems (e.g., Willow River). Limited data exist related to water quality conditions and juvenile Chinook life history in the watershed, making it difficult to identify factors limiting productivity and to determine effective restoration actions for this system.

Objectives

The 2024-25 objective of this multi-year project was to collect relevant data to support the planning and coordination of effective habitat restoration strategies for the Cottonwood watershed where impacts from placer mining have occurred. The long-term goal is to identify specific restoration sites, actions, and partners for a targeted restoration approach for this watershed.

Project Summary

A two-day field visit was conducted in October 2024 to determine site access and collect preliminary fish and fish habitat data. The team accessed 6 sites within the Cottonwood watershed (on the mainstem and tributaries) that have been impacted to various degrees by current and historic mining activities. At each site, habitat assessments were conducted and benthic invertebrate samples were collected using a kicknet for taxonomic identification. At select sites, minnow traps were deployed overnight and temperature loggers were installed.

Temperature loggers remained deployed through the fall and winter, and data will be downloaded and analysed in summer 2025. Minnow trapping identified juvenile Chinook salmon, rainbow trout, and bull trout utilizing the watershed (Figure 1). Benthic invertebrate samples were preserved and later analysed by certified taxonomists; over 100 unique taxa were identified across all samples. Data analysis is ongoing and results will be used in conjunction with the habitat assessments to

identify key differences among tributaries within the watershed.

Figure 1. Juvenile Chinook salmon collected in minnow traps in the Cottonwood watershed.

Pacific Salmon – Conservation Units

- Chinook – Middle Fraser River

Cost Summary

Professional Services	$4,350
Supplies	$ 710
Equipment	$5,337
Total Cost	$10,397

Outputs

Baseline fish habitat data (i.e., habitat type, substrate class, cover, wetted and bankfull widths, water quality measurements) were collected at 6 sites impacted by placer mining. Juvenile Chinook were present at 3 of 4 trapping locations, ranging in fork length from 55 mm to 120 mm (Figure 1). At each site, invertebrate taxonomic composition contained a minimum 65% representation by the taxonomic orders Ephemeroptera, Plecoptera, and Trichoptera (EPT), which are pollution intolerant taxa sensitive to habitat disturbance (Figure 2).

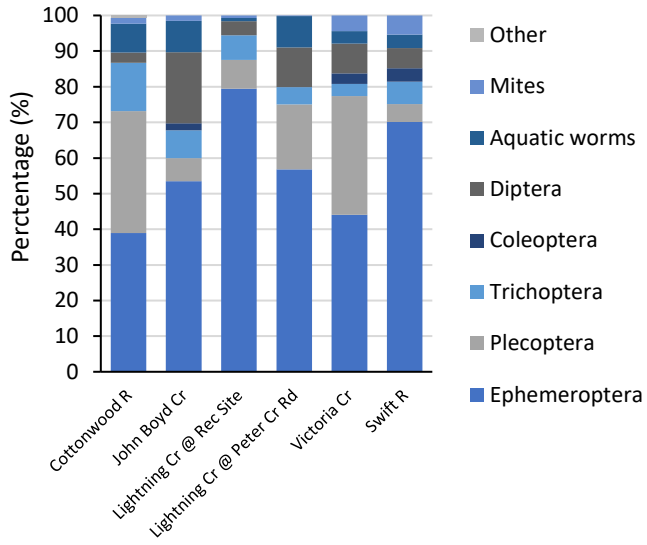

Figure 2. Percent representation of benthic invertebrate taxa in samples collected from placer mining sites in the Cottonwood watershed in October 2024.

Future Work

Continued data collection will occur in 2025 to repeat juvenile Chinook surveys during various seasons and to install in-situ water quality monitoring equipment (i.e., turbidity, conductivity, and temperature loggers). Engagement with local First Nations and other stakeholders will continue, along with data sharing and collaboration on monitoring activities.

Further Information

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4. Low Tech Process Based Restoration Pilot Project

Project Lead

Dave Pehl

DFO Area

Pacific Region

Stream/Watershed

Various – piloting in Nicola River watershed

Location

Various – potential area for pilot works near 50.54713, -120.86723

Introduction

Low tech process-based restoration (LTPBR) emphasizes re-establishing natural rates and magnitudes of physical processes within a system to restore ecological function and productivity. Techniques include the installation of beaver dam analogues (BDAs) and post-assisted log structures (PALs), which are being widely applied in areas of the United States but not yet broadly applied in Pacific Region.

The RCOE has opportunity to play a pivotal role in promoting and advancing LTPBR techniques to support Pacific salmon recovery. This project is intended to acquire the necessary resources to implement LTPBR projects throughout Pacific Region. The planning and coordination of LTPBR projects led by RCOE staff will build applied experience in Pacific Region and these projects can serve as demonstration projects for restoration partners.

Objectives

Procure equipment and construct a mobile trailer that is available to RCOE staff for LTPBR training and project construction activities.

Complete site assessments to identify priority projects for LTPBR implementation.

Project Summary

Although LTPBR activities are primarily conducted without the use of heavy machinery, specialized equipment and skills are required. This project focused on assembling the necessary equipment to implement LTPBR projects in Pacific Region.

An enclosed trailer was purchased and modified to store the necessary field equipment for LTPBR projects (Figures 1, 2). The field equipment includes hand tools, specialized power tools (e.g., chainsaw, Capstan rope winch, gas- and hydraulic-powered post pounders), and safety gear, all of which are stored securely within the trailer. The trailer and its equipment can be towed to project sites across Pacific Region to implement a variety of low-tech restoration techniques including the BDAs, PALs, and riparian planting. Having all the necessary equipment assembled and securely housed in a mobile trailer enables rapid deployment to project sites throughout Pacific Region for both project implementation and training needs, while minimizing mobilization time and effort.

Figure 1. Enclosed trailer securely housing equipment to complete LTPBR projects in Pacific Region.

Figure 2. The interior of the trailer displaying equipment and supplies needed to construct LTPBR projects at sites across the Pacific Region.

Several locations in the Nicola watershed have been assessed for LTPBR project implementation. Regional RCOE staff are currently working with the BC Interior team to complete prescriptions for project implementation and training opportunities.

Pacific Salmon – Conservation Units

LTPBR activities will be applied at multiple sites across Pacific Region with initial Nicola pilot sites supporting the following CUs:

- Chinook – Lower Thompson
- Coho – Lower Thompson
- Pink – Fraser River

Cost Summary

Equipment	$ 36,080
Total Cost	$ 36,080

Outputs

This project enables the RCOE to expand LTPBR activities and project implementation across Pacific Region. The initial project scope aimed to implement LTPBR projects in March 2025, however winter conditions and delays in equipment delivery slowed project timelines. Field assessments have identified sites where restoration will be implemented in 2025-26.

Future Work

The Regional RCOE is working with partners to identify and implement LTPBR projects in 2025-26. The Regional team is also collaborating with Provincial staff on a project, in addition to scoping provincial regulations that may pertain to LTPBR projects, particularly BDAs. An internal training session is planned for fall of 2025 and a second training opportunity is being scoped for the Salmon River watershed.

Further Information

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5. Raft Channel Lidar Data Collection Project

Project Leads

Matteo Saletti & Herb Tepper

DFO Area

BC Interior

Stream/Watershed

Raft Channel and River, North Thompson River

Location

51.6336055, -119.9779167

Introduction

The Raft River off-channel project began in 1995 to improve spawning and rearing habitat for coho salmon. Initial groundwater flow to the channel was insufficient, leading to modifications in 1996 that included a channel extension and river intake structure. Over time, the intake structure rusted and failed due to lack of maintenance. Additionally, the outlet of the channel became disconnected from the Raft River due to channel changes, trapping juvenile salmonids seasonally in unfavorable conditions of high water temperature and low dissolved oxygen.

Objectives

To goal of this project was to gather necessary ground elevation data to help determine restoration options to re-connect the historic off-channel habitat with the Raft River to secure a reliable water supply to the channel.

Project Summary

LiDAR and orthophotos were collected by Rekon Solutions Inc in the fall of 2024. The LiDAR data confirmed that the main operational deficiency of the Raft enhancement channel was lack of connectivity between the channel and Raft River resulting from morphological changes in the Raft River. Specifically, a historic meander cutoff reduced channel length, resulting in river down cutting.

Implementing Partners

- Simpcw First Nation
- Private landowner (owns the historic meander cutoff area of the Raft River)

Pacific Salmon – Conservation Units

- Chinook – North Thompson
- Coho – North Thompson
- Sockeye – Kamloops Early Summer

Cost Summary

Professional Services	$ 6,271
Total Cost	$ 6,271

Outputs

Project outputs were a LiDAR point cloud, an ortho-mosaic, and a digital elevation model of the project area (approximately 0.3 km^2), which included the channel and the Raft River (Figure 1).

Figure 1. LIDAR acquired in November 2024 for the Raft Channel restoration project.

Future Work

The LiDAR data collected is supporting the implementation of Raft River channel improvements in 2025-26. Next year's work objective is establishing reliable downstream connectivity between the off-channel habitat and Raft River, allowing salmonids to escape seasonally unfavorable conditions.

This objective will be achieved by:

- excavating 300 m at the downstream end of the channel to the confluence with the Raft River, and
- constructing a natural log jam using 16-18 locally sourced trees with root wads to maintain a scour pool at the channel and river confluence.

Further Information

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Herb Tepper, *Area Restoration Biologist*
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6. Assessment of Chinook Passage Through Willow River Canyon

Project Lead

Stew Pearce

DFO Area

BC Interior

Stream/Watershed

Willow River

Location

Site	Coordinates
Lower Sonar Site	53.9801, -122.3556
Canyon Obstruction	53.9003, -122.2827
Upper Sonar Site	53.8720, -122.2835

Introduction

A boulder feature in the 4-km long Willow River canyon is suspected to greatly restrict Chinook salmon passage to the upper Willow River, which offers >100 km of quality mainstem habitat. Neighboring river systems (e.g., Bowron River, Slim Creek) have unimpeded access to headwater reaches and produce a much greater number of Chinook. Intervention to improve fish passage through the canyon has long been considered to increase productivity of the Willow River Chinook population. However, there is a lack of data and assessment to understand to what extent the canyon and boulder obstruction impede migration and the potential benefits of removing the obstruction.

Objectives

Assess Chinook passage past Willow River canyon during the summer migration period.

Establish a baseline of fish passage for comparison if canyon modifications proceed.

Collect water temperature data at sites above and below the canyon to assess if thermal conditions are favorable above the canyon to support increased fish production.

Project Summary

To assess fish passage through Willow canyon and in collaboration with DFO Stock Assessment, an Adaptive Resolution Imaging Sonar (ARIS) was deployed on July 9, 2024, 18.5 km below the obstruction. A Dual Frequency Identification Sonar (DIDSON) was deployed 3.8 km above the obstruction on July 17, 2024.

An estimated 997 Chinook passed the lower river site between July 9-31. The ARIS was removed from the lower site early to replace the DIDSON at the upper river site, which experienced constant technical issues. An estimated 16 Chinook passed the upper river site between July 31-Aug 9 and August 13-22, 2024 (Figure 1). The arrival of Chinook at the upper site on the falling hydrograph after a significant rainfall suggests that passage may be restricted above a threshold discharge. However, this relationship remains unclear as factors including equipment problems and fish life history may have also influenced these data.

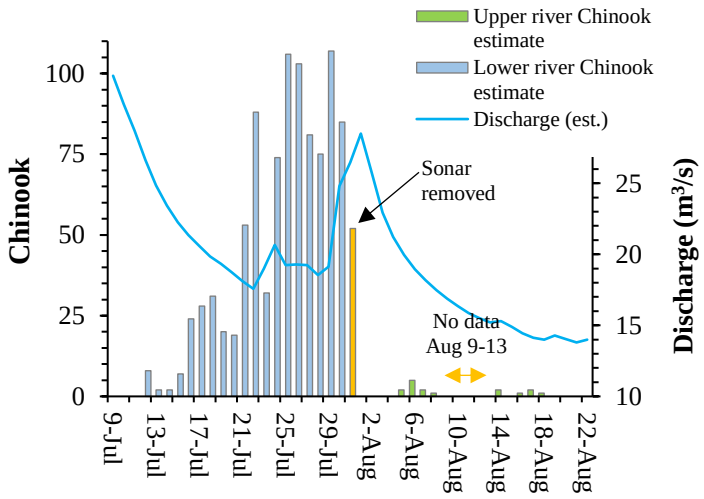

Figure 1. Daily Chinook estimate at the lower (yellow) and upper (green) Willow River sonar sites.

Four Hobo MX2203 Tidbit temperature loggers were deployed in August 2024 to collect baseline temperature data along the Willow River. This data is important with respect to climate change, as access to cool water is important to adult and juvenile Chinook. Average temperature decreased incrementally with increased distance from the Willow-Fraser confluence (Figure 2).

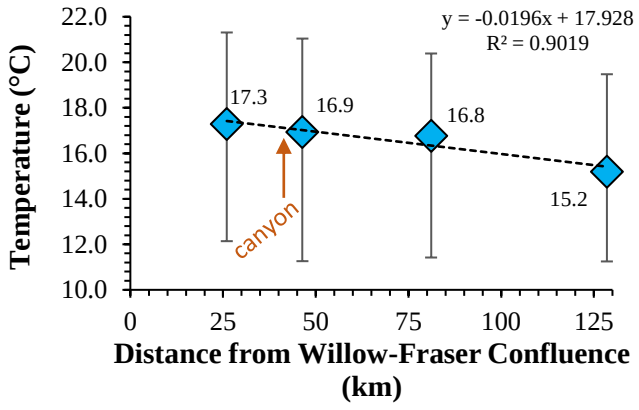

Figure 2. Average Willow River water temperature with distance from the Fraser River confluence (August 2024). Error bars represent maximum and minimum temperature.

Large-Scale Particle Image Velocimetry (LSPIV) analysis was planned as part of the canyon assessment. However, control points at ground level were not successfully established due to the highly incised nature of the canyon and thus the analysis was not carried out.

Implementing Partners

- Lheidli T'enneh Nation
- Upper Fraser Fisheries Conservation Alliance

Pacific Salmon – Conservation Units

- Chinook – Upper Fraser

Cost Summary

Equipment	$10,597
Total Cost	$10,597

Outputs

Project work improved understanding of fish passage through Willow River canyon and established a water temperature baseline. A detailed report is being developed to share with partners to support next steps.

Future Work

Replicate 2024 monitoring to reaffirm results and strengthen baseline data.

Expand temperature monitoring to better understand the Willow River thermal regime.

Replicate habitat assessments from the 1990s to assess quality and availability of upper river habitat.

Further Information

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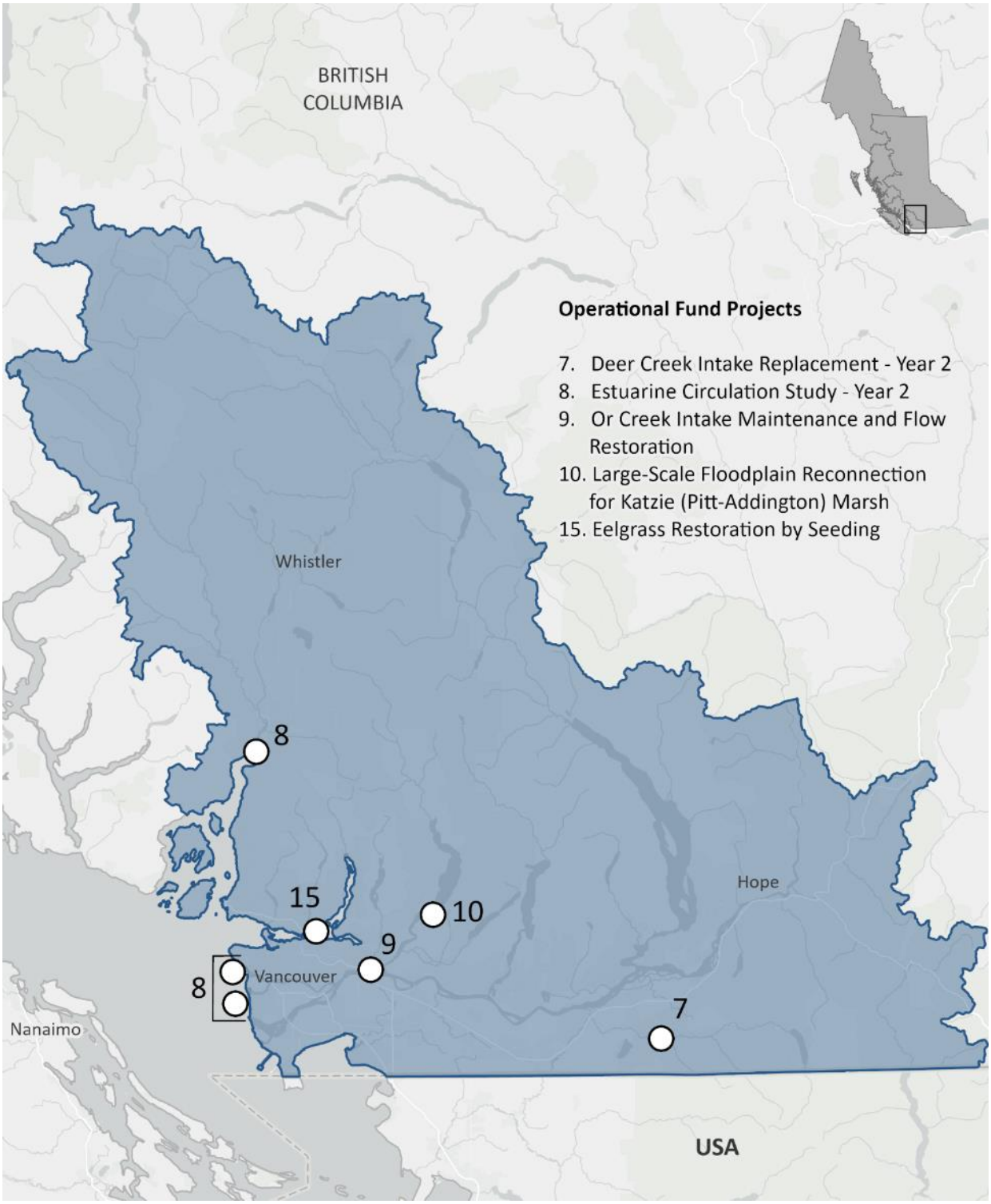
Map 3. Fraser Interior Area – Lower Fraser Operational Fund Project Locations.



7. Deer Creek Intake Replacement – Year 2

Project Lead

Jan Bielenberg

DFO Area

Lower Fraser

Stream/Watershed

Deer Creek, Chilliwack River

Location

49.07530, -121.86920 (access via Tamihi Forest Liumchen Service Road)

Introduction

In 1996, the Steelhead Society of BC, Forest Renewal BC, the Province of BC, and DFO constructed the Deer Creek off-channel spawning and rearing habitat complex as part of the Watershed Restoration Program. In 2000, an intake on Deer Creek was added to convey surface flows into the system. Deer Creek is a steep tributary to the Chilliwack River with high sediment bedload; the original intake was prone to clogging and required substantial, regular maintenance to provide consistent flows to the constructed spawning channel and rearing pond complex.

Objectives

The project objective was to replace the non-functional intake on Deer Creek with a new intake that requires less maintenance to mitigate sedimentation and will provide consistent flows to the habitat complex.

Project Summary

Deer Creek transports a high volume of coarse, angular bedload and fine sediment. The new intake was designed to bypass a wide range of the sediment gradations. Its alignment with the main flow allows coarse bedload to pass naturally over it, preventing sediment from entering the side channel where it could degrade habitat or accumulate at the upstream end and potentially obstruct flow. The downward-facing angle of the intake, combined with a fine grating pattern, encourages fine sediments to pass over rather than enter the intake chamber. These features should greatly reduce maintenance demands and ensure reliable, sediment-free water delivery to off-channel habitat, even under high sediment load conditions.

An innovative feature of the intake is its custom self-cleaning Coanda-styled intake grates. Unlike traditional wing or bank intakes, which often struggle with sediment exclusion, this intake features self-cleaning grates and is aligned with the flow of Deer Creek.

The steel intake box was designed and fabricated in 2023 (Operational Fund Year 1) and the intake was constructed in summer 2024 as follows. After fish exclusion and flow bypass setup were complete, a lock block water retention structure was built on a gravel foundation. The intake box was placed and hooked up to an existing culvert that diverts flow to the existing spawning channel. Refer to Figure 1 for the dewatering setup and intake foundation preparation, and Figure 2 shows the final intake arrangement.

Figure 1. Preparation of the intake foundation, looking upstream.

Figure 2. Final intake configuration, looking upstream.

Implementing Partners

- The WaterWealth Project

Pacific Salmon – Conservation Units

- Coho – Lower Fraser

Cost Summary

Supplies	$1,278
Construction & Machinery	$5,300
Total Cost	$6,578

Outputs

The replacement of the intake has re-established surface flows to 500 m^2 of coho spawning habitat and 5,000 m^2 of rearing habitat. The new intake design could potentially be adapted for use in similar steep, high bedload creeks.

Adaptive Management

During construction, a cast-in-place weir structure was initially planned. However, stream flows were higher than anticipated during the late summer construction period. The design was adapted in-situ to a lock block structure to ensure site dewatering to allow for concrete curing.

Future Work

The new intake is being closely monitored for flow performance. Gauges have been installed by WaterWealth Project volunteers and flow performance will be evaluated by RCOE staff.

RCOE staff will monitor the self-cleaning performance of the new intake grates and results will inform future intake designs. A potential design change is to replace the perforated plate intake grates with wedge wire grates, which bypass fine particles more efficiently.

Further Information

Jan Bielenberg, *Area Restoration Engineer*
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8. Estuarine Circulation Study – Year 2

Project Lead

Morgan Tidd

DFO Area

Lower Fraser

Watershed/Stream

Fraser River and Squamish River

Location

Site	Coordinates
Squamish River Jetty	49.68753, -123.17718
North Arm Jetty	49.22113, -123.25146
Steveston Jetty	49.15469, -123.24206

Introduction

Several recently-implemented and large-scale restoration projects in BC have constructed breaches in coastal jetties to restore connectivity in nearshore environments. Three such breaches have occurred in the Lower Mainland and were designed to provide access to productive estuarine habitats for out-migrating juvenile salmon. This is the second year of this efficacy monitoring project that is intended to look specifically at the circulation of freshwater and sediment being delivered to estuaries where breaches have occurred.

Objectives

The main objective of this ongoing study is to develop a greater understanding of freshwater and sediment delivery to estuaries by detailed current measurements and conductivity-temperature-dissolved oxygen (CTD) profiling at 3 breach sites. These data will help determine the efficacy of the 3 breaches in improving estuary habitat conditions and contributing to resilience to climate change.

Project Summary

Project activities in 2024-25 focused on repeating data collection that was initiated the previous year at 3 breach sites[2]. Vessel-based current measurements and CTD profiles were collected on 3 separate occasions to capture a variety of flow conditions: June 10 to 13, September 23 to 27 and December 2 to 6, 2024. Example transect, velocity, and CTD data are shown in Figures 1-3.

Implementing Partners

- Raincoast Conservation Organization
- Squamish River Watershed Society

Pacific Salmon – Conservation Units

- Chum – Howe Sound-Burrard Inlet, Lower Fraser
- Chinook – Southern Mainland-Georgia Strait, all Fraser CUs
- Coho – Howe Sound-Burrard Inlet, Lower Fraser, Thompson, Fraser Canyon, Interior Fraser, Lillooet
- Pink – East Howe Sound-Burrard Inlet, Georgia Strait, Fraser River

[2] Fisheries and Oceans Canada. 2024. Operational Fund Year-End Report: 2023/24. Operational Fund Year End Report. 51 p.

Figure 1. Sampling transects at the Squamish River Jetty.

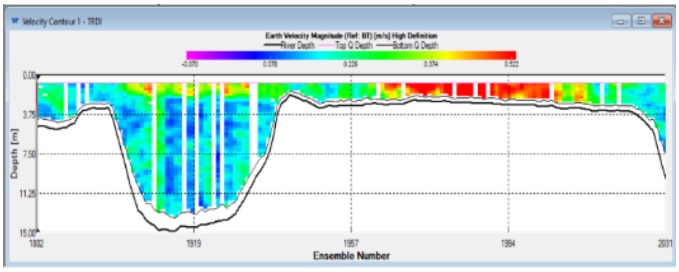

Figure 2. Example of velocity profile from East to West at the Squamish Jetty in June 2024.

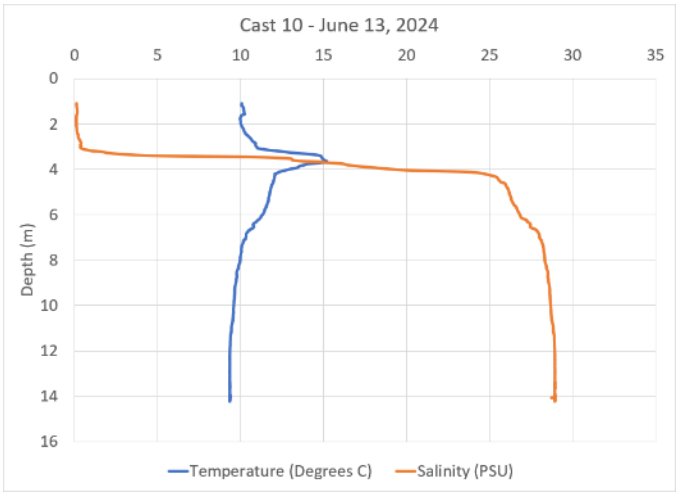

Figure 3. Example of CTD profile showing temperature and salinity readings at the Squamish Jetty in June 2024.

Cost Summary

Supplies	$ 3,410
Total Cost	$ 3,410

Outputs

The outputs for 2024-25 include a summary of preliminary results for North Arm Jetty, Steveston North Jetty and Squamish River Jetty and a high-level comparison to last year's data where available. Preliminary data suggest that the 3 breaches are not significant contributors of sediment to the estuaries, but do deliver notable freshwater pulses during higher tides, likely supporting estuarine function under changing climate conditions. Results provide early insights into the broader ecological impacts of jetty breach restoration strategies.

Adaptive Management

- Identification of alternate equipment in case of malfunction or incompatibility between equipment and logging technologies.
- Flexibility in the timing of field data collection to ensure capture of high flow conditions during freshet and extreme fall/winter events.

Future Work

Monitoring in year 3 in 2025-26 will focus on the ongoing monitoring of circulation and sediment delivery in the Squamish and Fraser River Estuaries, culminating in a final report in March 2026.

Further Information

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9. Or Creek Intake Maintenance and Flow Restoration Project

Project Lead

Garrett Peters

DFO Area

Lower Fraser

Stream/Watershed

Coquitlam River

Location

49.2267, -122.8051 (access gate on Pipeline Road)

Introduction

The Or Creek Pond Complex, constructed in the early 1990s, provides over 16,500 m² of off-channel habitat for coho salmon, representing more than 30% of available off-channel habitat in the Coquitlam River watershed. A wooden intake structure and multiple intake pipelines draw water from the Coquitlam River and distribute it into the pond system. In recent years, root encroachment from surrounding Western redcedar has severely impeded flow through the original intake infrastructure, threatening the function and quality of over 16,500 m² of salmon habitat.

Objectives

This project presented an opportunity to assess long-term maintenance solutions for aging infrastructure and reduce future operational burdens. The objective was to restore continuous flow into Pond B to maintain critical off-channel habitat. The project also identified infrastructure performance issues to inform future upgrade and redesign strategies.

Project Summary

The Lower Fraser RCOE team isolated the site and conducted a full fish salvage prior to works. Crews removed approximately 15-20 ft³ of root material from the interior of the wooden intake structure, which was clogging all three flow pipelines (Figure 1).

Figure 1. Cedar roots (A) in intake box and (B) growing up pipelines, preventing flow convenance.

Key findings included:

- The 2012 twin pipeline had separated downstream of the intake structure and was underperforming.
- The original 1990s intake pipe and infiltration gallery were significantly obstructed.
- Flow was successfully restored through conduits, albeit with noted deficiencies in alignment and intake configuration.

Implementing Partners

- Metro Vancouver (Land Owner)

Pacific Salmon – Conservation Units

- Chum – Lower Fraser
- Coho – Lower Fraser
- Pink – Fraser (odd)
- Sockeye – East Vancouver Island & Georgia Strait

Cost Summary

Equipment	$6,173
Machinery Services	$ 690
Total Cost	$6,863

Outputs

- Cleared root mass and restored flow capacity into Pond B.
- Evaluated intake structure performance and identified structural misalignments.
- Updated record drawings and site documentation to support future retrofit planning.
- Developed a root control and intake access strategy to reduce frequency and intensity of future maintenance.

Future Work

Pipeline Repairs: Assess pipelines and repair separated lengths to maximize flow delivery.

Root Intrusion Mitigation: Explore structural root barriers or intake redesign (e.g., steel intake structure).

Standardized Maintenance Schedule: Develop seasonal inspection and low-flow performance benchmarks to trigger proactive interventions.

Knowledge Transfer: Use this case to build internal guidance for managing legacy wood structures across the Salmon Enhancement Program portfolio.

Further Information

Garrett Peters, *Area Restoration Engineering Technician*
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10. Large-Scale Floodplain Reconnection Planning for Katzie (Pitt-Addington) Marsh – Year 2

Project Leads

Justin Barbati & Laura Weatherly

DFO Area

Lower Fraser

Stream/Watershed

Pitt River, Fraser Watershed

Location

49.34179, -122.60307

Introduction

Katzie Marsh was originally extensive, tidally influenced floodplain of the Pitt River. The contemporary marsh is completely enclosed by dikes and the Province of BC and Ducks Unlimited Canada have shared responsibility for management of the property. Three top-hinged flood gates control drainage and the marsh forms the largest wetland in the Fraser Valley. It holds significant cultural, wildlife, birding, and recreational values.

Objectives

Project objectives were to acquire geospatial data for use in hydraulic modelling and restoration design to reconnect marsh and floodplain to the Pitt River. The objective for 2024-25 was to collect bathymetry data from within the shallow marsh by ground penetrating radar (GPR) to pair with airborne LiDAR data and colour digital imagery collected in the previous year. An additional objective of the project was to test the use of GPR as an emerging technology that may prove useful in shallow wetland environments.

Project Summary

Various methods were explored to obtain water depth data from within Katzie Marsh. These data were necessary to pair with land-based elevation data to construct a digital elevation model to support hydraulic modelling. Conventional approaches such as acoustic doppler current profiler (ADCP) surveys by boat were not feasible because of the shallow water depths, hydrophytic vegetation, and thick organic deposits that would likely generate false depth signals. Ground penetrating radar was chosen to trial as an innovative approach to bathymetry data collection in shallow, freshwater environments.

Ground Radar Inc. was contracted to supply a GPR unit, train RCOE staff on its use, and analyze the data to generate a bathymetry depth model of Katzie Marsh. Data collection entailed mounting the GPR unit and a Real Time Kinematic GPS unit in a Kevlar canoe and completing transects throughout the marsh. Data were collected on 4 dates between March 21 and April 30, 2024 by RCOE staff.

Bathymetry data were processed by Ground Radar Inc. and delivered to DFO with a brief technical report. Data interpolation was required as access and timing constraints prohibited data collection throughout the entire marsh.

Implementing Partners

- Katzie First Nation
- Simon Fraser University

Pacific Salmon – Conservation Units

- Chinook – Lower Fraser River-Upper Pitt River
- Chum – Fraser River
- Sockeye – Widgeon Slough, Pitt-Early Summer

Cost Summary

Professional Services	$5,000
Total Cost	$5,000

Outputs

The project output was bathymetry for Katzie Marsh generated by GPR. Due to accessibility and time constraints, not all of the channels could be surveyed. Ground Radar Inc. provided a technical summary of the data and processing parameters, along with a bathymetry model for the marsh (Figure 1).

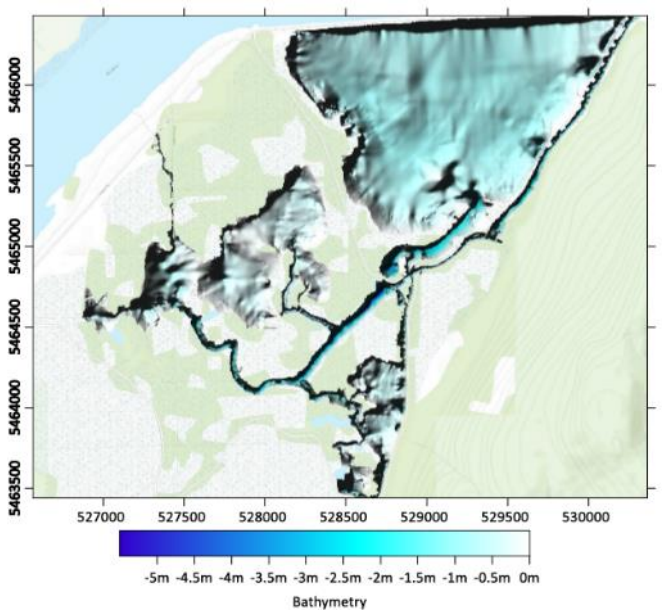

Figure 1. Bathymetry model for Pitt-Addington (Katzie) Marsh generated from ground penetrating radar data.

Future Work

The RCOE will pursue collaborative scoping of restoration opportunities within Katzie Marsh with partners, including Katzie First Nation, Ducks Unlimited Canada, the City of Pitt Meadows, and Resilient Waters.

Further Information

Justin Barbati, Area Restoration Biologist
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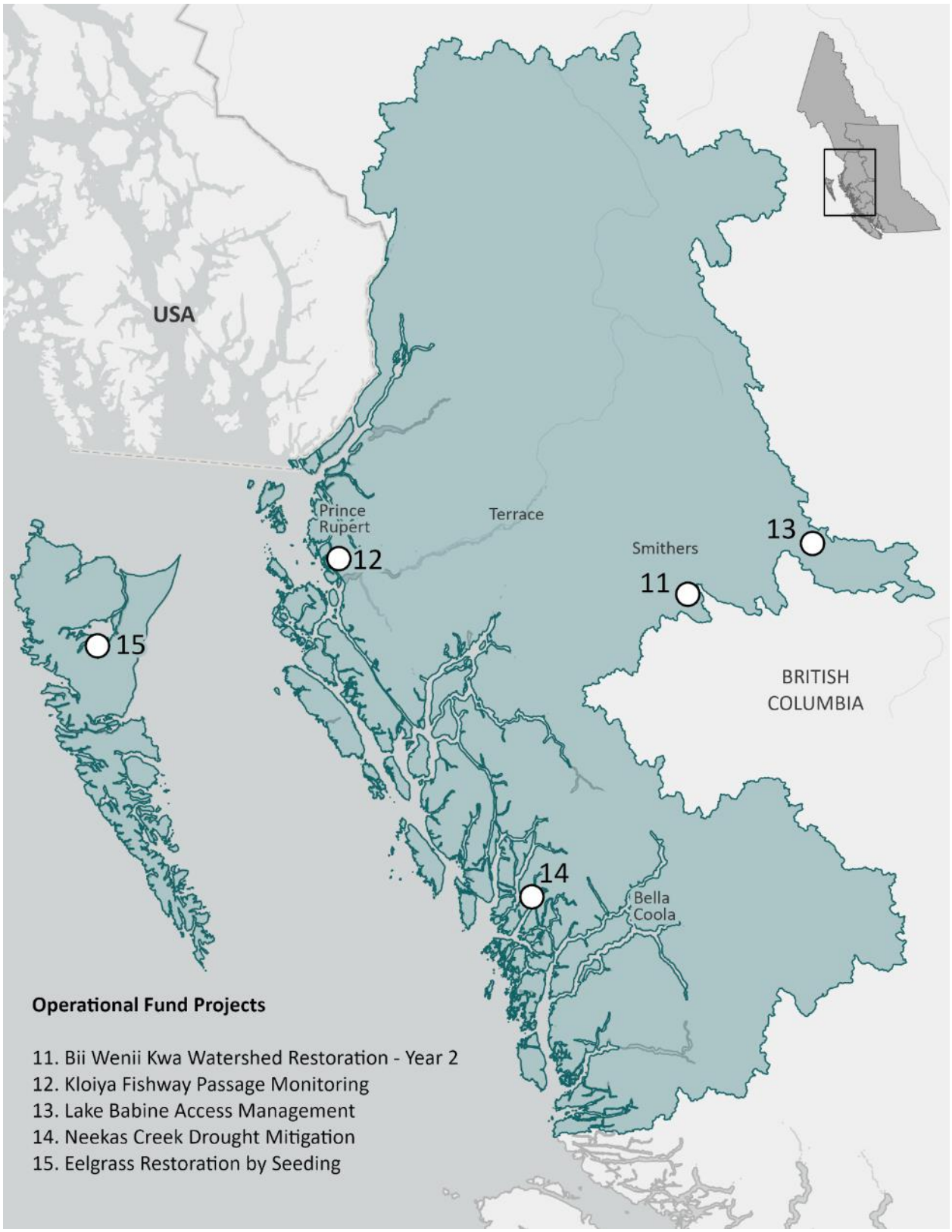
Map 4. North Coast Area Operational Fund Project Locations.



11. Bii Wenii Kwa Watershed Restoration – Year 2

Project Leads

Natalie Newman & Stephen Page

DFO Area

North Coast

Stream/Watershed

Widzin Kwah (Morice)/Bii Wenii Kwa (Owen), Skeena Watershed

Location

54.20231, -126.85908

Introduction

Bii Wenii Kwa is a culturally important watershed for the Wet'suwet'en people. It supports coho and pink salmon, steelhead trout, and historically supported sockeye salmon (now extirpated). The watershed-based fish sustainability plan identified Bii Wenii Kwa as one of the most human-modified watersheds within the greater Widzin Kwah watershed and a candidate Fish Sensitive Watershed. A 2011 prioritization of watersheds in the Upper Bulkley-Morice system identified Bii Wenii Kwa in the top 5 of watersheds for additional conservation and restoration actions. Currently a restoration plan for the watershed is being drafted by partners.

Objectives

Objectives of this multi-year project are:

- Contract and acquire LiDAR data for the Bii Wenii Kwa/Widzin Kwah confluence to support feasibility analysis of restoration options.
- Install a water level logger to monitor flow on Bii Wenii Kwa.
- Conduct 2-4 site visits to support feasibility studies.
- Refine the Bii Wenii Kwa restoration plan.

Project Summary

2024-25 represented year 2 of this 3-year project to initiate partnerships, planning, and restoration in the Bii Wenii Kwa watershed. The project team met twice, developed a draft terms of reference, and completed the following 3 contracts:

1. Wet'suwet'en Treaty Office Society contract for a liaison to provide project-related communications with the appropriate House Territory and House Territory Hereditary Chief, technician site visits with the restoration team, project team meetings, and for document review.
2. Terra Remote Sensing contract for LiDAR data acquisition.
3. Skeena Knowledge Trust contract to refine the watershed restoration plan, incorporating a dashboard with pertinent assessment and restoration information.

Three site visits occurred in 2024-25, including a site survey, geomorphic assessment, and the installation of a level logger in July 2024, with subsequent flow transects in August and October 2024 (Figure 1). LiDAR for Bii Wenii C'eek was acquired in October (Figure 2). Supplemental fish sampling and fish habitat reconnaissance occurred in the summer near the proposed Riddick Crossing replacement.

Figure 1. Flow transect acquired at the time of level logger installation on July 17, 2024.

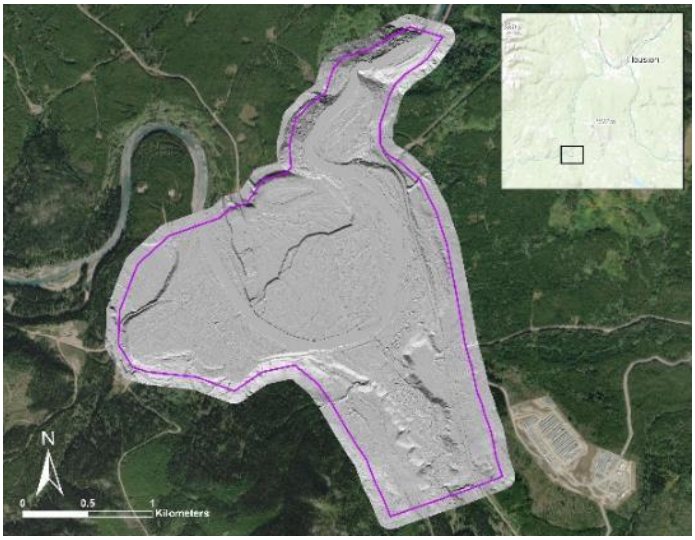


Figure 2. LiDAR hill shade created using data acquired for the project in mid-October 2024.

Implementing Partners

- Wet'suwet'en Treaty Office Society
- BC Ministry of Water Land and Resource Stewardship
- Morice Watershed Monitoring Trust
- Northwest Monitoring and Research

Pacific Salmon – Conservation Units

- Coho – Upper Skeena
- Pink – Middle-Upper Skeena

Cost Summary

Professional Services	$ 33,924
Total Cost	$ 33,924

Outputs

A geomorphic assessment was completed to understand the historical evolution of the creek, factors controlling creek form, and the development of process-based restoration options.

A 2-D hydraulic model was developed to model water levels, velocities, and flows in Bii Wenii C'eek and understand potential benefits and impacts to fish and habitat related to restoration actions.

The Bii Wenii Kwa watershed restoration plan was refined.

Future Work

To explore the feasibility of restoration options, the 2-D hydraulic model will be refined to characterize the effects of restoration options on flow and understand potential benefits to fish and habitat. The water level gauge will be re-installed in spring 2025 and additional flow transects will be conducted through the season to develop a more robust stage-discharge curve. The RCOE plans to conduct a drone flight in lower Riddick Creek to assess the presence of beaver dams.

Further Information

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Natalie Newman, Area Restoration Biologist
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12. Kloiya Fishway Passage Monitoring

Project Leads

Lana Miller & Tyler Winther

DFO Area

North Coast

Stream/Watershed

Kloiya River

Location

54.24836, -130.16544

Introduction

The Kloiya dam and fishway were constructed in the 1940s in a watershed that supports all six species of Pacific salmon (Figure 1). The dam is part of a series of water storage facilities that were built to store and provide water to Skeena Cellulose pulp and paper mill in Port Edward, BC.

The fishway has not been assessed in any detailed way for fish passage effectiveness since its construction in the 1940s, despite annual observations of salmon jumping into the concrete face of the dam unable to find the fishway entrance and sometimes being propelled out of the fishway during high flow events. This project assessed the feasibility of using pit tag technology to assess adult salmon fish passage in the Kloiya fishway.

Figure 1. Photo of the Kloiya dam and fishway.

Objectives

The overall objective of the project was to assess and make recommendations to improve fish passage and minimize impacts to salmon at Kloiya dam.

Project Summary

The 2024-25 project focused on exploring the feasibility of using pit tag technology to assess fish passage at this site by conducting site safety assessments and upgrades, acquiring, installing and testing 2 pit tag antennas, and developing partnerships and seeking sufficient funding for 2025-26.

The feasibility study was successfully executed. Safety assessments were conducted and site upgrades included fencing to address fall hazards and the design/fabrication of a stop log structure to control flows through the fishway during antenna installation. Two Biomark antennas were installed in February 2025 and the equipment was operated for the months of February and March. A water level logger recorder was installed in the

fishway with plans for a river hydrometric station to be installed in the spring.

Implementing Partners

- City of Prince Rupert
- LK Environmental
- Province of British Columbia – Fisheries
- Canadian Wildlife Federation
- Carleton University

Pacific Salmon – Conservation Units

- Chinook – Skeena Estuary
- Coho – Skeena Estuary
- Sockeye – Prudhomme

Cost Summary

Professional Services	$19,014
Equipment	$11,298
Total Cost	$30,312

Outputs

The feasibility study has shown success with a partnership through the Province of BC and LK Environmental who has extensive training and experience using pit tag technology. Provincial fisheries staff pit-tagged over 40 steelhead in February and March and the antenna have been picking up some of the tagged fish in the fishway . The Province also installed their resistivity counter which acts as a secondary detection method to help confirm the pit tag data. As the feasibility study progressed, changes to the original battery configuration have been implemented to minimize field time and downtime during battery changes and data download periods.

Future Work

For the 2025-26 season, monitoring of the fishway will continue with plans to begin tagging sockeye, coho and Chinook populations in the summer and fall months. A hydrometric station will be installed in the river downstream of the fishway and a third antenna will be installed at the downstream entrance to the fishway. The collection of environmental data, such as flows, paired with the tag data will hopefully shed light on fish passage effectiveness at the Kloiya fishway. The program is planning to expand its collaboration with a graduate student from Carleton University, local First Nations engagement and funding from local industry partners such as the Prince Rupert Port Authority.

Further Information

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Tyler Winther, *Area Restoration Biologist*
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13. Lake Babine Access Management

Project Lead

Natalie Newman

DFO Area

North Coast

Stream/Watershed

Multiple tributaries to Babine Lake

Location

54.516575, -125.701264 (Cross Creek, Babine Lake tributary)

Introduction

As drought conditions persist across the landscape, there is an increased need for monitoring and modifying barriers to fish passage. Creeks flowing into Babine Lake can become disconnected from the lake due to sub-gravel flows, preventing or delaying sockeye access to critical spawning habitat. Monitoring barriers have traditionally been assessed by foot, boat, or air which can be infrequent, time consuming and costly. This project explored innovative assessment techniques to supplement traditional monitoring methods.

Objectives

- Advance innovative and effective assessment techniques in remote salmon watersheds using high-resolution satellite images of creek mouths and beaver dams.
- Build expertise in the use of emerging tools including remote camera systems and high resolution satellite images.
- Collect bathymetry data to inform future restoration actions.

Project Summary

A camera was installed at the confluence of Cross Creek and Lake Babine on July 16, 2024 to monitor water level and habitat connectivity during low flow and drought conditions. For a monthly fee, daily photos at a scheduled time were taken and uploaded to a website via satellite (Figure 1). These photos were used to monitor tributary connectivity to the lake and overall lake/creek mouth conditions.

Figure 1. Photo from remote camera system (Aug 28, 2024)

Cross Creek became disconnected from the lake on two occasions in the summer of 2024 due to low creek flows and low lake levels. Having daily access to photos helped quickly inform DFO and Lake Babine Nation when intervention was needed to maintain fish passage. The images picked up some wind trends, wildfire occurrence, and bird predation.

In collaboration and contract with Lake Babine Nation, monitoring efforts for priority creeks in the area were increased using both bathymetric surveys and more novel satellite monitoring methods. Images were examined for flow connectivity or sub-gravel flow at the tributary confluence with Babine Lake. While the imagery was successful at detecting some creek disconnections (Figure 2), drawbacks included a satellite angle/shadow effect, weather, and canopy cover that made some confluences difficult to see.

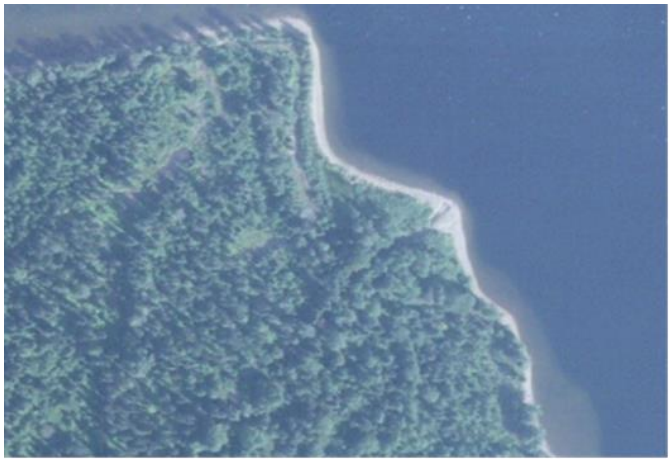

Figure 2. Satellite imagery of Sockeye Creek showing it to be partially disconnected (Aug. 17, 2024)

Implementing Partners

- Lake Babine Nation

Pacific Salmon – Conservation Units

- Chinook – Middle Skeena-Large Lakes
- Coho – Middle Skeena
- Pink Middle – Upper Skeena (even, odd)
- Sockeye – Babine, Skeena River

Cost Summary

Professional Services	$ 16,000
Equipment	$ 13,548
Total Cost	$ 29,548

Outputs

Project outputs were daily photos of the Cross Creek outlet in real time to assess connectivity, and bathymetric survey data to map gravel accumulation and low water issues and evaluate if mitigation measures could be implemented.

Future Work

Since the remote camera system showed promise as a viable drought and stream monitoring tool, additional cameras were purchased by DFO and Lake Babine Nation to be installed at priority wild salmon creeks in 2025. This will expand access to critical real time data on stream conditions at hard-to-access sites in the region.

Further Information

Natalie Newman, Area Restoration Biologist
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14. Neekas Creek Drought Mitigation

Project Lead

Stephen Page

DFO Area

North Coast

Watershed/Stream

Neekas Creek, Neekas Watershed

Location

52.479162, -128.121524 (boat access only)

Introduction

Neekas Creek is a small watershed located in Heiltsuk Nation territory, north of Bella Bella. This system supports several species of Pacific Salmon, including pink, chum and coho. This system flows into Spiller Channel, an area that has historically supported commercial fisheries. Timber harvesting and mineral exploration have not occurred within the Neekas watershed, resulting in minimal human disturbance. Despite its pristine condition, this watershed is experiencing significant climate change impacts.

Neekas Creek summer and fall flows are dependent on rainfall and drainage from several small lakes and wetland complexes. During severe drought conditions, the drainage from at least one of these lakes is reduced significantly and is believed to no longer contribute to the flow of the creek. In some years when a severe drought year coincides with a large pink return, the low flows, warmer water temperatures and higher oxygen demand contribute to a mass mortality event.

In September 2022, approximately 60,000 pink and chum salmon died before spawning when they were stranded in Neekas Creek during drought conditions (Figure 1).

Figure 1. Photo of pink salmon stranded before spawning in Neekas Creek in Sept. 2022.

In the summer of 2024, with a large pink return predicted and persistent drought conditions, Heiltsuk Integrated Resource Management Department (HIRMD) began exploring mitigation options to prevent a similar mortality event. HIRMD connected with RCOE staff, the Pacific Salmon Foundation, and employed Pacificus Biological Services Ltd to support reconnaissance and feasibility work.

Objectives

- Explore the feasibility of augmenting downstream flows in Neekas Creek using a siphon system from a lake in a severe drought and high pink salmon return year.

- Acquire the equipment necessary to set up hydrometric and weather stations in Neekas Creek to better understand current conditions and to monitor proposed flow augmentation projects.

Project Summary

A plastic pipe siphon was proposed as a low-maintenance method to add water to the creek from the lake and provide additional water for spawning pink salmon. The RCOE designed and procured the plastic pipe materials and shipped them to HIRMD in Bella Bella. Siphon installation was scheduled for late September 2024. The weather patterns dramatically changed at the same time and the Neekas watershed changed from drought to repeated atmospheric river events, thus installation plans were cancelled for 2024.

Understanding the Neekas watershed and its hydrology is difficult because precipitation and water flow data have not historically been recorded. The RCOE purchased hydrometric and weather station equipment to record data that can be used in hydrology modelling of this system. This equipment will be installed in 2025 and provide a unique data set from an undisturbed watershed. Monitoring data in disturbed watersheds will be compared to this undisturbed watershed as part of a separate study supported by the Operational Fund (*Characterizing Attributes of Undisturbed Watersheds*) to monitor for environmental changes at the watershed scale related to climate change.

Implementing Partners

- Heiltsuk Nation

Pacific Salmon – Conservation Units

- Chinook – North & Central Coast-Late Timing
- Chum – Spiller-Fitz Hugh-Burke
- Coho – Hecate Strait Mainland
- Pink – Hecate Strait-Fjords (even, odd)

Cost Summary

Equipment	$ 7,190
Total Cost	$ 7,190

Future Work

The hydrometric and weather station installation is planned for July 2025 involving HIRMD and RCOE staff. HIRMD staff will conduct monitoring, data collection, and equipment maintenance.

These data, combined with traditional knowledge, will improve our understanding of the water flow needs of salmon in undisturbed Central Coast watersheds such as Neekas, that are impacted by our changing climate.

Further Information

Lana Miller, Section Head North Coast Restoration
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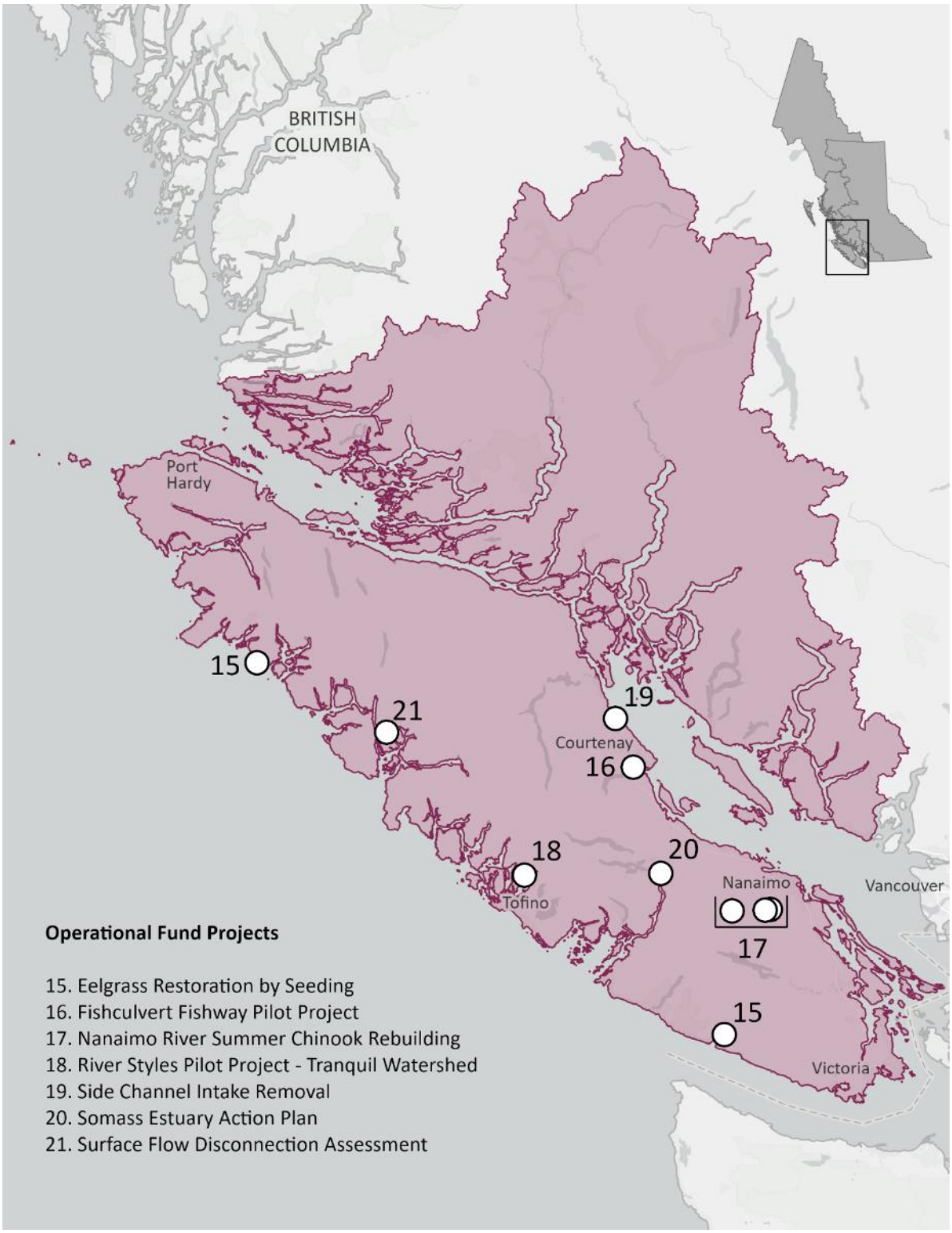
Map 5. South Coast Area Operational Fund Project Locations



15. Eelgrass Restoration by Seeding

Project Lead

Angela Spooner

DFO Area

Lower Fraser, South Coast & North Coast

Stream/Watershed

Multiple nearshore marine sites

Location

Seeding Site	Coordinates
Gordon River	48,58277, -124.40383
Hankin Cove, Kyuquot Sound	50,03125, -127.42034
Juus Kaahlii, Haida Gwaii	53.61661, -132.31271
Taylor Creek, Burrard Inlet	49.30727, -122.98183

Introduction

Eelgrass (*Zostera marina*) beds provide valuable nursery habitat for juvenile Pacific salmon and contribute to marine survival. Significant declines in eelgrass habitat are being reported globally due to climate change and anthropogenic activities. Eelgrass restoration is typically by transplanting shoots from a donor site, capitalizing on the plant's lateral rhizome expansion strategy. Restoration by seeding is less common and is an innovative technique that has the benefit of enhancing genetic diversity at a site, which is positively associated with plant fitness and ecosystem resilience.

Following small eelgrass seeding projects in 2023-24 to trial the Buoy-Deployed Seeding method (BuDS), large-scale seeding projects were planned for 2024-25 at multiple sites connected to current eelgrass and/or saltmarsh restoration projects led by coastal First Nations.

Objectives

Implement restoration eelgrass seeding totaling 1600 m^2 at 4 sites in 3 DFO Areas (South Coast, Fraser Interior - Lower Fraser, and North Coast), implemented with coastal First Nation partners.

Project Summary

This was year 2 of a 2-year project focused on applying eelgrass seeding methodologies to restore eelgrass at coastal sites. The BuDS method was planned for 3 sites whereas submerged burlap bags were planned for Taylor Creek in Burrard Inlet due to a high risk of theft/loss of the BuDS floating equipment. Seeding was completed at 2 sites (Gordon River and Hanking Cove), and site mapping and assessment were completed at Juus Kaahlii and Burrard Inlet sites in 2024-25.

Each BuDS set consists of a weight, line, and floats with a net bag of reproductive shoots (Figure 1). 25 BuDS sets were installed at the Gordon River site and 12 installed at the Hankin Cove site. Sets had 5-m spacing in the subtidal zone where eelgrass transplant restoration has also occurred (Figure 2).

Figure 1. BuDS set: anchor, floating line, and 2 buoys with net bag of reproductive shoots clipped to the line.

Figure 2. BuDS sets with net bags being attached by snorkeler overtop an eelgrass transplant project (Gordon River).

Reproductive shoot collection took place in the second week of seed release (monitored by field crews from partnering Nations). Readiness times varied across sites from early July to late August. Reproductive shoots were collected by snorkel using mesh bags and were snapped off near the substrate without disturbing rhizomes. Shoots were divided into mesh onion-type or clam bags. Boat or snorkel deployment of mesh bags to the pre-set BuDS floats occurred within 24 hours.

Implementing Partners

- Pacheedaht First Nation
- Ka:yu:'k't'h' / Che:k'tles7et'h' First Nations (Kyuquot / Checleseht)
- Council of Haida Nation
- Tsleil-Waututh Nation səlilwətaɬ

Pacific Salmon – Conservation Units

Various CUs (Haida Gwaii, Salish Sea)

Cost Summary

Equipment	$	829
Supplies	$	1,427
Professional Services	$	3,149
Total Cost	$	5,405

Outputs

A total of 600 m^2 of eelgrass habitat was seeded at the Gordon River (400 m^2)and Hankin Cove (200 m^2) sites. Community workshop presentations were made, a written and video version of the seeding methodology will be produced by the Pacific Salmon Foundation in 2025-26, and a Technical Bulletin describing the BuDS seeding method based on the 2023-24 pilot project was published (Spooner, 2025)[3].

Future Work

Monitoring at the Gordon River and Hankin Cove seeding restoration sites will occur in 2025-26. Seeding restoration at Juus Kaahlii will occur in August 2025 and seeding in Burrard Inlet will proceed in July 2025 with burlap bags containing reproductive shoots/seeds and sediment placed on the substrate. The bags will allow the seeds to grow in situ without the need for surface buoys, which draw attention and risk theft/loss. For all projects, each Nation has or will receive RCOE training in order to self-monitor and lead future seeding projects.

Further Information

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[3] Spooner, A. (2025). Eelgrass Restoration Using Buoy Deployed Seeding (BuDS). Salmon Habitat Restoration Centre of Expertise Tech. Bull. 2. 13p.

16. Fishculvert Fishway Pilot Project

Project Leads

Jim Krivanek & Laura Weatherly

DFO Area

South Coast

Streams/Watersheds

- Piercy Creek, Millard Piercy Watershed

Location

Two sites are being considered for this project: Piercy Creek at Arden Road in Courtney, and the second site will be determined in 2025-26.

49.67000, -125.00956 (Piercy Creek)

Introduction

Physical barriers to fish passage are widespread in BC and can have population-level impacts on Pacific salmon stocks. The provincial Fish Passage program is intended to remove barriers, however, progress is slow and extremely costly. The most common fish barrier in BC is road culverts which, either due to improper installation or erosion issues over time, have become perched or hanging, with high outlet drops that fish cannot surmount.

The Fishculvert product (https://fishculvert.com/) is a baffled fishway designed to attach to existing barriers like perched culverts, weirs, and dams in order to restore fish passage and allow access to historic spawning and rearing habitat. The Fishculvert fishway is fabricated in Ontario and is made of corrugated, polymer-coated steel with a 100-yr lifespan; hence it may be installed as an interim measure before culvert replacement or as a permanent structure.

Objectives

Procure 2’ x 12’ sections of the Fishculvert fishway with baffles to pilot the structures as interim solutions at2 culvert sites prioritized for restoration in the South Coast Area.

Project Summary

2024-25 was the first year of this 2-year pilot project to evaluate the feasibility and performance of the Fishculvert fishway to restore fish passage at perched culverts. For 2024-25, the RCOE team procured the 2 x 12’ fishway sections to be installed in 2025. An example fishculvert is shown in Figure 1.

Figure 1. Example polymer-coated steel Fishculvert fishway with baffles installed at a perched culvert to restore fish passage.

A potential installation site has been identified on Piercy Creek in Courtenay at Arden Road. The

Millard Piercy Watershed Stewards have provided background information and resources to assist the DFO-led site assessment to determine the suitability for the Fishculvert fishway product and installation considerations.

Implementing Partners

- Millard Piercy Watershed Stewards

Pacific Salmon – Conservation Units

- Chinook – East Vancouver Island/Georgia Strait
- Chum – Georgia Strait

Cost Summary

Equipment	$ 16,000
Total Cost	$ 16,000

Outputs

- Procurement of 2 x 12’ polymer-coated steel fishways
- List of suitable sites to install the Fishculvert for prioritization.

Future Work

Project work planned for 2025-26 includes:

- Finalize second site to install the Fishculvert fishway.
- Install the fishways, including fish salvage, and environmental monitoring.
- Monitor project sites for fish passage using wildlife trail cameras and regular site visits to inform the future use of the Fishculvert product for other sites where fish passage is impeded.

If monitoring demonstrates its effectiveness, there are wide reaching uses for the Fishculvert product to mitigate fish passage barriers in BC.

Further Information

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17. Nanaimo River Summer Chinook Rebuilding

Project Leads

Hawley Beaugrand & Jennifer Moss

DFO Area

South Coast

Stream/Watershed

Nanaimo River

Location

Project Site	Coordinates
Deadwood Creek	49.09922, -124.12991
First Lake	49.09545, -124.16338
Green Creek[I]	49.09052, -124.36960

[I] requires Mosaic Forest Management permission for weekday access

Introduction

In 2018 and 2020, Nanaimo River Spring and Summer run Chinook salmon were assessed as Endangered by the Committee on the Status of Endangered Wildlife in Canada. In response, DFO initiated a Risk Assessment Method for Salmon (RAMS) process in 2020 to identify and prioritize key threats to Nanaimo River Chinook. Detailed habitat status assessments were completed in 2021 to characterize the current condition of aquatic habitat, watershed characteristics, and upland developments. This work was used to identify a suite of potential early actions to aid in rebuilding, including the following projects supported by the 2024-25 Operational Fund:

- Deadwood Creek low-tech process-based restoration (LTPBR) project
- Deadwood Creek sediment transport study
- First Lake limnological study
- Green Creek riparian planting

Objectives

Specific objectives were developed for each early actions project and are as follows:

Deadwood Creek LTPBR

- attenuate peak flows in the hydrograph to limit scour of critical Summer Chinook spawning gravels downstream
- increase lateral and vertical floodplain connectivity to recharge groundwater/increase baseflow levels, promote drought resilience, and increase geomorphic/habitat complexity

Deadwood Creek Sediment Transport Study

- assess the source and morphodynamics of critical Summer Chinook spawning gravels on the mainstem Nanaimo River downstream of First Lake

First Lake Limnological Study

- assess water quality conditions and seasonal dynamics in First Lake, a key holding, rearing, and overwintering location for Nanaimo River Spring and Summer Chinook

Green Creek Riparian Planting

- bar planting of live stakes at the Nanaimo River/Green Creek confluence to increase sediment storage in Green Creek and prevent

infilling of an important Nanaimo River Spring Chinook holding pool.

Project Summary

All of the projects cited above are multi-year projects. In 2024-25, equipment and supplies to support all projects were acquired. Planning is underway for implementation of the Deadwood Creek LTPBR and sediment transport study, and the First Lake limnological study. The Green Creek riparian planting project was designed, permitted, and implemented in 2024-25 (Figure 1). Implementation was supported by project partners and volunteers from the Island Waters Flyfishers.

Figure 1. Live willow stakes shown in the foreground, planted in river right bar at the confluence of Green Creek and the Nanaimo River (photo taken March 7, 2025).

Implementing Partners*

- Snuneymuxw First Nation (Co-lead)
- Mosaic Forest Management

**The larger Nanaimo River Summer Chinook Rebuilding Plan has several additional partners. Only those involved in projects supported by the Operational Fund are included above.*

Pacific Salmon – Conservation Units

- Chinook – East Vancouver Island-Georgia Strait
- Coho – East Vancouver Island-Georgia Strait

Cost Summary

Equipment	$14,313
Supplies	$7,775
Total Cost	$22,088

Outputs

The Green Creek riparian planting project was successfully implemented and included the harvest and planting of 887 live willow stakes over 122m^2 area at a density of 7 stakes/m^2.

Future Work

Planning for the Deadwood Creek LTPBR and sediment transport study, and the First Lake limnological study is currently underway and implementation is planned for the 2025-26 fiscal year. Watering and effectiveness monitoring will continue for the Green Creek riparian planting project to understand planting success and to inform adaptive management strategies.

Further Information

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18. River Styles Pilot Project – Tranquil Creek Watershed

Project Leads

Peter deKoning & Hawley Beaugrand

DFO Area

South Coast

Stream/Watershed

Tranquil Creek, Clayoquot Sound

Location

49.2146, -125.6719 (site access by boat)

Introduction

BC's geography is highly complex and with a broad diversity of river styles and morphology. For that reason, a geomorphologically-informed approach to watershed management provides a path to effective place-based and nature-based solutions to restore Pacific salmon freshwater habitat. This project pilots the River Styles Framework (https://riverstyles.com/river-styles-framework/), a geomorphologically-informed watershed assessment and management approach, to the Tranquil Creek Watershed on Vancouver Island (Figure 1).

Objectives

Objectives of this multi-year project are to:

1. Produce an exemplary pilot of the River Styles Framework to assess its application for Pacific salmon recovery initiatives.
2. Develop a watershed planning and prioritization template for watersheds as identified in the West Coast Vancouver Island Chinook Rebuilding Plan.
3. Provide geomorphologically-informed advice and support for on-going restoration actions in Tranquil Creek by Redd Fish and the Tla-o-qui-aht First Nation.

Figure 1. Project partners at Tranquil Creek.

Project Summary

Year 1 of the River Styles Pilot Project initiated implementation of the River Styles Framework on Tranquil Creek. A 3-day workshop was hosted in Campbell River to learn about the 4 stages of the River Styles Framework from its co-developers, Dr. Kirstie Fryirs (Macquarie University) and Dr.Gary Brierley (University of Auckland), as well as discuss opportunities for improving river management in BC. The workshop was attended by RCOE staff, Indigenous organizations, non-profit organizations and private consultants.

Work began on implementing the River Styles Framework on Tranquil Creek (Figure 2). Field work and analyses to determine river character and behaviour (River Styles Stage 1), and river condition (River Styles Stage 2) were completed from September 2024 to March 2025 by RCOE staff and a contract with Interfluve.

Figure 2. Field validation for River Styles mapping with Tla-o-qui-aht First Nation, Redd Fish, and RCOE staff (September 2024).

Implementing Partners

- Tla-o-qui-aht First Nation
- Redd Fish Restoration Society
- Macquarie University
- Pacific Salmon Foundation

Pacific Salmon – Conservation Units

- Chinook – West Coast Vancouver Island – South
- Chum – Southwest & West Vancouver Island
- Coho – Clayoquot

Cost Summary

Professional Services	$83,701
Equipment	$ 713
Total Cost	$84,414

Outputs

- What We Heard – River Styles Workshop 2024 Report
- Channel evolutionary sequence – Tranquil Creek

Future Work

Year 2 will focus on completing the analysis of river recovery potential (River Styles Stage 3) and developing a watershed restoration plan (River Styles Stage 4). Outputs will include a Watershed Assessment Report (Stages 1-3 of the River Styles Framework) and a Watershed Restoration Plan (Stage 4). Additionally, work is being finalized on a peer-reviewed publication advocating for renewal of geomorphologically-informed approach to watershed management in BC.

Further Information

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19. Side Channel Intake Removal

Project Lead

Jim Krivanek

DFO Area

South Coast

Stream/Watershed

Oyster River

Location

Arthur Mayse Side Channel access via Highway 19A or Regent Road Bridge:
49.86814, -125.13035

Introduction

The South Coast Area contains over 50 side channels controlled by intake structures, which vary in their functionality and contribution to fish habitat. Maintaining these channels has become increasingly unfeasible due to fiscal, capacity and access limitations. In many cases, the most effective approach to restoration may be to decommission these artificial intakes and associated dikes, thereby allowing natural river processes to re-establish functional floodplains.

Beginning in fall 2023, the function of 12 intake-controlled side channels on the east coast of Vancouver Island was evaluated. This work is ongoing and expected to conclude with a final report by the end of fiscal year 2025-26.

Objectives

This project aims to develop a standardized framework to assess the current functional status of existing intake-controlled side channels. Key evaluation metrics include infrastructure condition, water quality data, and results from rapid habitat assessments. The framework will be used to select a suitable side channel to pilot intake removal. Conceptual designs will be developed following site selection and hydraulic modelling performed to understand resultant flow patterns associated with the design options. A design will be selected based on its potential to provide optimal conditions for fish and fish habitat and in consideration of any associated potential risks. Final design and construction plans will be completed.

Project Summary

Based on 2023 assessments, the Arthur Mayse Side Channel on the Oyster River was selected as the pilot site for decommissioning due to its poor functionality as fish habitat. Funding from the Operational Fund supported the acquisition of water quality monitoring equipment for this site during 2024-25 (Figure 1, 2).

Figure 1: Arthur Mayse side channel, Oyster River. Upper monitoring site for water level, flow temperature.

Figure 2: Arthur Mayse side channel, Oyster River. Lower monitoring site for DO and water temperature.

Additional project efforts included winter 2024 surveys for 2D HECRAS modelling. Initial conceptual designs for dike removal and side channel reconnection were incorporated into the modelling. Further water level validation is required to complete this phase.

A baseline habitat assessment was conducted using protocols developed by RCOE regional staff. Infrastructure inspections at the Arthur Mayse Side Channel have also been finalized.

Pacific Salmon – Conservation Units

- Chum – Georgia Strait
- Coho – East Vancouver Island-Georgia Strait
- Pink – Georgia Strait (even, odd)

Cost Summary

Equipment	$5,775
Total Cost	$5,775

Outputs

Arthur Mayse infrastructure inspections, habitat assessments, and water quality data were completed and are being combined with HECRAS modelling (underway) to make recommendations for the site.

A methodology for assessing intake-controlled side channel functionality has been developed and work is underway to establish a decision-making framework for determining whether a channel should be maintained or decommissioned.

Future Work

In 2025-26, work will continue to finalize HECRAS modelling of the Arthur Mayse Side Channel. Once complete, an informed decision can be made regarding channel reconnection to the mainstem.

Assessing the functional status of all 12 monitored side channels will be completed in 2025-26. This will include a comprehensive report detailing the assessment methodology and the finalized decision-making framework.

Further Information

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20. Somass Estuary Action Plan

Project Lead

Dylan Cunningham

DFO Area

South Coast

Stream/Watershed

Somass Watershed

Location

49.23875, -124.82151

Introduction

Healthy estuaries foster diversity and support unique fish communities through interconnected habitats such as mudflats, brackish marshes, and tidal forests. West Coast Vancouver Island (WCVI) Chinook salmon have declined in abundance since the 1980s and restoring degraded estuary habitats is important for reversing trends in WCVI Chinook populations.

Located adjacent to the Somass River estuary, the community of Port Alberni is going through a process of economic diversification and transitioning away from a largely resourced-based economy. This transition provides an opportunity to promote the significance of the Somass Estuary as an ecological asset. The timing for this project is key as the City has recently purchased the Western Forest Products sawmill lands alongside the estuary and has decommissioned the sewage lagoon infrastructure (improving the water quality in the estuary). Opportunities to implement restoration projects will arise with the redevelopment of the sawmill lands on the east side of the estuary and the rehabilitation and reconnection of the old sewage lagoon on the west side.

Objectives

The primary objective of the 2024-2025 year was to create a Somass Estuary Working Group and develop an Estuary Action Plan that identifies specific restoration, stewardship, and land management actions that can be advanced within the next 5 years.

Project Summary

In the spring of 2024, the RCOE convened a Somass Estuary Working Group and hired a project coordinator to guide the development of the Estuary Action Plan. The working group is composed of representatives from various levels of government, First Nations, community groups, and local knowledge holders. The working group met throughout 2024 to identify restoration projects and land management actions that are informed by the Somass Estuary Symposium and align with the values and priorities of the working group members.

The working group developed and published the *2025 Somass Estuary Restoration Action Plan* to guide restoration and management planning. The Action Plan identifies and prioritizes specific restoration, stewardship, and land management actions. The plan also identifies data gaps that influence decision making. The plan exists as an evergreen document that can be updated as

progress is made, data gaps are addressed, and new opportunities are made available.

In parallel to the development of the action plan, the South Coast area and regional RCOE staff worked to fill data gaps identified by the working group through 3 studies (Figure 1):

1. Bathymetric mapping of the estuary
2. Eelgrass mapping in the estuary
3. Flood channel mapping and flow monitoring

Figure 1. DFO RCOE staff assessing effectiveness of restoration actions at the Somass Estuary in 2024.

Implementing Partners

- Alberni Valley Enhancement Association
- Alberni-Clayoquot Regional District
- City of Port Alberni
- Coleman Meadows Farms
- Hupacasath First Nation
- Mosaic Forest Management
- Port Alberni Port Authority
- Tseshaht First Nation
- West Coast Aquatic

Pacific Salmon – Conservation Units

- Chinook – West Vancouver Island – South
- Chum – Southwest Vancouver Island
- Coho – West Vancouver Island
- Pink – West Vancouver Island (even, odd)
- Sockeye – West Vancouver Island

Cost Summary

Professional Services	$8,400
Total Cost	$8,400

Outputs

The key output of 2024-25 was the *2025 Somass Estuary Restoration Action Plan*, along with strengthened partnerships and advancement in filling data gaps identified by the working group.

Future Work

Work will continue to support projects identified in the *2025 Somass Estuary Restoration Action Plan.*

Further Information

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21. Surface Flow Disconnection Assessment

Project Lead

Dave Reid

DFO Area

South Coast, BC Interior

Watershed/Stream

North Thompson River, Quesnel Lake, and Nootka Sound. Additional sites were visited along Barkley Sound and the Coldwater River.

Location

Site Name	Coordinates
Nootka Sound	51.16179, -120.10307
North Thompson	49.81340, -126.61205
Quesnel Lake	52.59799, -121.10284

Introduction

Severe drought conditions during recent years have revealed significant gaps in our ability to anticipate the location and implications of surface flow disconnection along small and intermediate-sized streams. Surface flow disconnection presents a barrier to spawner migration, can impede movement of rearing juveniles, and can lead to fish stranding and mortality events. As a result, an approach is needed to better understand and predict where flow disconnection is most likely to occur during drought conditions in order to assist with triage and prioritization before significant negative impacts to salmon are realized. Similarly, more information on how different barriers interact with flow level (i.e. at which flow does a barrier appear) is required.

Objectives

- Evaluate the specific flow conditions which lead to surface flow disconnection/migration barriers in select locations.
- Develop an inventory of flow disconnection observations across Pacific Region streams.

Project Summary

From May to October 2024, field activities were undertaken to help characterize flow disconnection across BC with the goal of documenting and characterizing flow disconnection during drought at a range of scales. Ground-based assessments of small stream systems and helicopter-based evaluations of larger systems were conducted. At two locations, dedicated stream gauges were installed to estimate the flow threshold that best corresponds to the onset of stream drying (Carnation Creek and the Oktwanch River, Figure 1). Trail cameras were placed along several systems to develop time-series images of drying streams for the same purpose (South Sarita, Lemieux Creek, Voght Creek, Figure 2), in addition to camera placement at the installed hydrometric stations.

Figure 1. Example hydrometric station installed to document flows associated with stream drying.

Figure 2. Onset of drying captured on Voght Creek near the confluence with the Coldwater River.

To document drying along larger stream systems, 3 helicopter flights were conducted. The first flight occurred on August 28th and covered the North Thompson watershed north of Kamloops as far as Clearwater. The second flight occurred on August 30th and covered most of Nootka Sound including the Conuma River (Figure 3). The final flight occurred on October 8th and covered tributaries of Quesnel Lake. All flights were intended to capture low flow conditions in drought-prone areas previously identified as having flow disconnection issues.

Figure 3. Example helicopter shot of the nearly-disconnected Conuma River, draining into Nootka Sound

In addition to data collected by the RCOE, observations of stream drying were compiled by DFO Stock Assessment and Secwepemc Fisheries Commission.

Data has been compiled for all sites (e.g., Figure 4), and the next phase of the project will involve developing a predictive tool using this information for model validation.

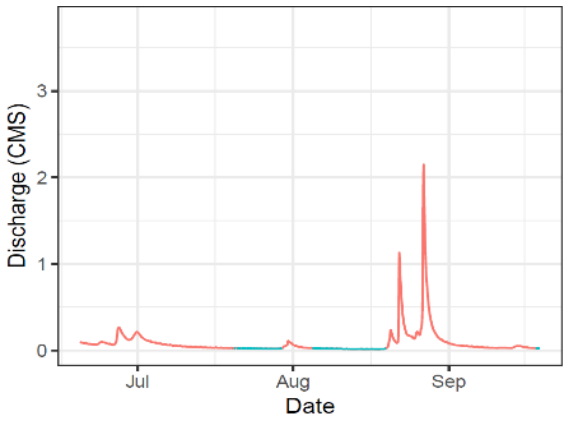

Figure 4. Time series of streamflow in Carnation Creek. Blue line areas correspond to periods when flow disconnection was observed along the channel.

Implementing Partners

- DFO Stock Assessment
- Secwepemc Fisheries Commission

Pacific Salmon – Conservation Units

This project covered a large number of CUs across the Pacific Region. Notable CUs:

- Chinook – North Thompson
- Chinook – West Coast Vancouver Island
- Sockeye – West Coast Vancouver Island
- Sockeye – Quesnel-Summer Timing

Cost Summary

Air Charter Services	$22,168
Total Cost	$22,168

Outputs

The primary output of this work is a database of flow disconnection locations in the regions covered by field investigations. In addition, estimates of the flow thresholds at which disconnection occurs have been generated for select coastal stream systems.

Future Work

While field data collection is completed for this project, the next project phase will involve incorporating this work into a predictive tool capable of providing information on the conditions under which flow disconnection is most likely. In addition, estimates of the spatial scale at which disconnection occurs will be provided, along with approximate disconnection flow values in terms of the percentage of mean annual flow. This work is anticipated to be completed by March 2026.

Further Information

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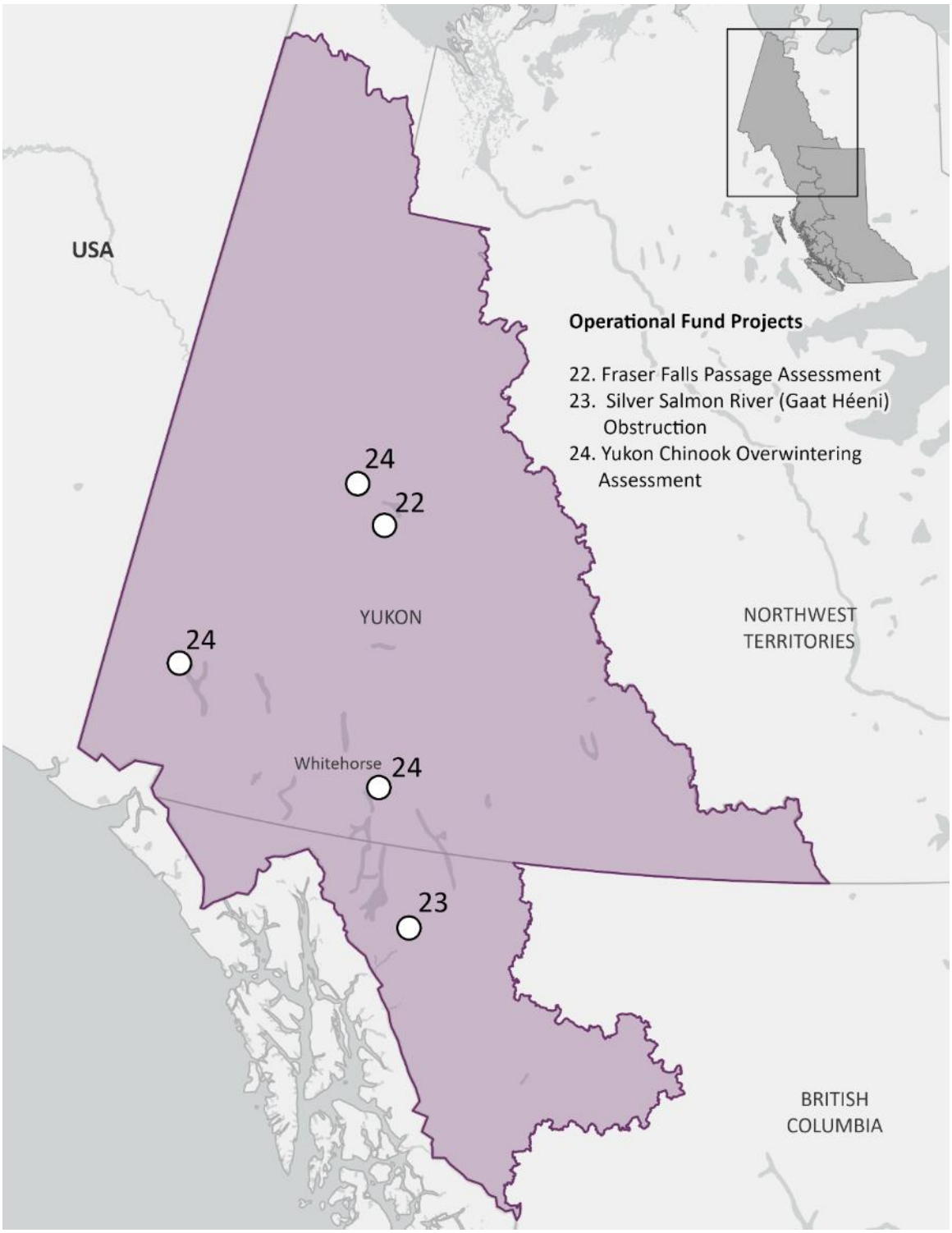
Map 6. Yukon Transboundary Area Operational Fund Project Locations.



22. Fraser Falls Fish Passage Assessment

Project Lead

Robin Brand

DFO Area

Yukon Transboundary

Stream/Watershed

Fraser Falls, Stewart River Watershed

Location

63.51272, -135.15230

Introduction

Fraser Falls forms a natural, partial barrier that may hinder upstream migration of Chinook salmon during certain flow conditions. Fraser Falls also holds long-standing cultural and subsistence significance for First Nation of Nacho Nyak Dun (FNNND) and has traditionally been an important fishing site. For generations community members have questioned whether salmon are able to pass the falls successfully during low water levels. This project represents an important step toward answering that question and strengthening FNNND's role in salmon stewardship within their traditional territory.

Objectives

This project focuses on assessing the extent to which Fraser Falls limits fish passage, with the goal of supporting the First Nation of Nacho Nyak Dun (FNNND) in exploring options to improve access to upstream habitats in the Stewart River. The specific project objective in 2024-25 was to collect drone and LiDAR imagery to support the assessment.

Project Summary

The 2024-2025 work plan focused on spatial data collection with drone imagery (Orthomosaic) and LiDAR data collection. The data has been provided to FNNND to develop a fish passage assessment and site specific passage options for consideration.

Implementing Partners

- First Nation of Nacho Nyak Dun (FNNND)

Pacific Salmon – Conservation Units

- Chinook – Stewart River

Cost Summary

Air Charter Services	$6,600
Total Cost	$6,600

Outputs

Drone and LiDAR imagery were collected at Fraser Falls for this project by RCOE staff (Figure 1). These data were utilized to support a comprehensive fish passage assessment, which was completed by Ecofish Research on behalf of FNNND. The data provided valuable insights into the topography, flow conditions, and potential barriers to fish movement, contributing to the overall evaluation of fish passage feasibility in the river.

Figure 1. Drone Imagery of Fraser Falls. Blue helicopter on far right for scale.

Given the site's remote location and the lack of comprehensive data, this project represents a significant step toward informed decision-making for future management. The collection of drone and LiDAR imagery provides a valuable baseline for ongoing monitoring and adaptive management strategies. As new data become available, the site's conditions can be reassessed, and management approaches can be adjusted to ensure effective fish passage and habitat protection.

Future Work

Future actions will be guided by the priorities and decisions of FNNND.

Further Information

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23. Silver Salmon River (*Gaat Héeni*) Obstruction – Year 2

Project Lead

Robin Brand

DFO Area

Yukon Transboundary Rivers

Stream/Watershed

Silver Salmon River, Taku River Watershed

Location

Site access is via helicopter, approx. 1 hr flight from Atlin, BC.
59.11518, -133.00352

Introduction

Silver Salmon River is a Kuthai Lake sockeye migration corridor in the Taku River watershed. The lower 700 m of Silver Salmon is a steep, narrow canyon reach with boulder obstructions and woody debris that pose challenges for upstream migration.

The canyon site is high priority for DFO as sockeye returns have been low since 2006. With 2024 and 2025 expected to be the last years of strong returns, it is critical to monitor the situation closely. 2024 saw record fish passage at Kuthai Lake with 13,375 individuals passing the weir after a high rainfall event during peak migration. Given the unpredictability of migration conditions, it is essential to have an emergency management plan in place to ensure passage for this population.

Objectives

The project objectives for 2024-25 were:

1. Test an emergency management procedure on McKee Creek and build regional expertise for emergency response.
2. Continue hydrological monitoring to proactively monitor and mitigate fish passage challenges through Silver Salmon Canyon.

Project Summary

RCOE staff led a remote backwatering trial in McKee Creek, a nearby stream in Atlin, BC. With support from Taku River Tlingit First Nation, Atlin Tlingit Economic LP and Discovery Helicopters, the trial included onsite excavator operations and drone-based (LSPIV) analysis (Figure 1, 2). The creek was successfully backwatered using the helicopter to sling bulk-bags into predetermined formations while recording water level and velocity changes with a drone. The use of the helicopter creates a realistic scenario to assess the logistics of placing and removing the bags within a remote narrow canyon. The Emergency Management Plan will only be deployed if necessary to support fish passage, with contingency measures in place for safe and cost-effective demobilization.

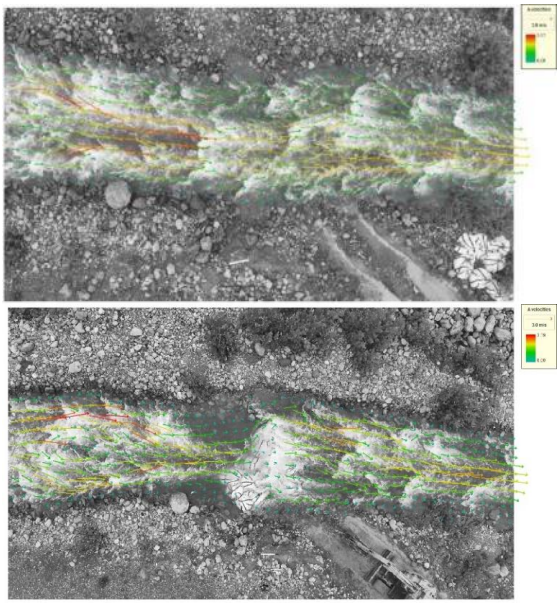

Figure 1. Velocity map of McKee Creek trial before (top) and after (bottom) bulk-bag placement in July 2024.

2024-25 work also focused on continued hydrological monitoring with spring and fall acoustic doppler current profiler (ADCP) and level logger maintenance, drone surveys, and operation and structural upgrades of the Taku River Tlingit First Nation meteorological station (Figure 2).

Figure 2. Operational weather station after structural upgrades in June 2024.

Implementing Partners

- Yukon Transboundary Salmon Enhancement Program
- Taku River Tlingit First Nation

Pacific Salmon – Conservation Units

- Sockeye – Kuthai Lake Sockeye

Cost Summary

Equipment	$4,052
Air Charter Services	$33,778
Total Cost	$37,437

Outputs

The McKee Creek backwatering trial advanced the Emergency Management Plan for Silver Salmon Canyon and enhanced emergency response capacity in the YTRA, thereby contributing to a growing restoration toolkit for northern river systems. The project also advanced hydrological and climate data for Silver Salmon Canyon, which support ongoing canyon passage monitoring.

Future Work

The 2025-26 work plan includes spring and fall discharge transects and level logger maintenance at both upper and mid watershed sites, drone surveys, operation of the Taku River Tlingit First Nation meteorological station, canyon passage monitoring, and Kuthai Lake sockeye enumeration. The new Emergency Management Plan will only be deployed if fish passage is obstructed during migration. If deployed, temporary backwater structures (bulk bags) will be demobilized in the fall to minimize ice damage/debris jamming, and stored remotely to reduce helicopter costs.

Further Information

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24. Yukon River Chinook Overwintering Project

Project Lead

Robin Brand

DFO Area

Yukon Transboundary Rivers

Stream/Watershed

Haggart Creek Watershed
Takhini River Watershed

Location

63.91388, -136.02122 (Haggart Creek)
60.61507, -134.15846 (Takhini River)

Introduction

Canadian-origin Yukon River Chinook salmon have shown record-low returns for many years. In response, federal, territorial, and First Nations governments have identified the delineation and protection of juvenile overwintering habitat as a critical priority for rebuilding efforts. Large gaps remain in our understanding of where these fish overwinter and what habitat features support their survival. A key focus of this project was to fill this gap through the use of high-resolution satellite imagery to inform habitat assessments, support strategic site selection, and lay the groundwork for future on-the-ground research.

Objectives

The project objective was to procure and use *Planet* satellite imagery to identify potential juvenile Chinook salmon overwintering habitat features in the Yukon River watershed. The project supports domestic and international Yukon River Chinook salmon rebuilding efforts.

Project Summary

The 2024-2025 work plan focused on the application of *Planet* satellite imagery to assist juvenile overwintering habitat research for Yukon River Chinook salmon. Using 3-5 m resolution imagery, key hydrological features such as groundwater upwelling zones and aufeis distribution were identified (Figure 1,2).

Figure 1. Takhini River open water habitats (imagery Feb 20, 2025).

Figure 2. Takhini River suspected icing locations (imagery Feb 20, 2025). Aufeis locations to be confirmed with spring imagery.

This new technology and high quality imagery allowed identification of key overwintering habitat features, which were subsequently mapped and analysed. These results will inform and prioritize future field assessments and support salmon recovery efforts. Candidate overwintering eDNA sample sites were identified for future field assessments.

The project demonstrates the value of satellite imagery as an efficient and non-invasive tool to assess landscape conditions across vast, remote regions, helping to fill essential knowledge gaps where field access is limited.

Pacific Salmon – Conservation Units

- Chinook – Stewart Chinook
- Chinook – Upper Yukon River

Cost Summary

Professional Services	$21,000
Total Cost	$21,000

Outputs

This year's work demonstrated how remote sensing can support the identification of overwintering habitat features in remote areas and provide a monitoring baseline for potential future disturbances, such as those related to climate or industrial development.

The integration of *Planet* satellite imagery into salmon habitat research enhances adaptive management by enabling timely, landscape-scale assessments in remote areas without the need for field visits. Areas of concern or interest (e.g., ice conditions, flood conditions, sedimentation, channel de-watering, vegetation loss, or landslides) may be identified for targeted intervention.

Future Work

The next project phase will expand habitat identification and environmental DNA sampling in the Takhini River and Haggart Creek watersheds. Teams will carry out detailed habitat assessments paired with traditional fish trapping to evaluate juvenile chinook overwintering use. A key focus is to examine the relationship between eDNA concentrations, trap counts, and habitat parameters in order to strengthen the ability to detect and map critical overwintering habitats and improve monitoring tools that can be applied across the Yukon River Watershed.

Further Information

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