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# Upper Cheslatta River Fish Stranding Assessment – Year 1 and Year 2

**Prepared for: Cheslatta Carrier Nation and the Nechako Environmental Enhancement Fund**
Attn: Jim D'Andrea, Cody Reid – Natural Resources Manager
Board of Directors – Nechako Environmental Enhancement Fund


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# Signature Page

Noot'senay Consulting LP is pleased to submit this report for your review. This report has been prepared using sound technical and professional judgement, based on our knowledge and experience, applicable regulatory framework, industry best management practices, and current understanding of project conditions, design, and project setting.

Report Title: Cheslatta River Fish Stranding Assessment – Year 1 and Year 2

Prepared For: Cheslatta Carrier Nation and the Nechako Environmental Enhancement Fund

Revision: 2

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# Executive Summary

The goal of the Cheslatta River Fish Stranding Study was to determine the extent of fish stranding caused by the decrease in water levels due to the operation of the Skins Lake Spillway during the Summer Temperature Management Program (STMP). In response to these concerns, the Cheslatta Carrier Nation (CCN) has collaborated with Noot'senay Consulting Limited Partnership (NCLP), and the Nechako Environmental Enhancement Fund (NEEF) to implement a comprehensive assessment to determine the extent of fish stranding events along the river system. The findings from this assessment will facilitate discussions on management strategies and effectively address concerns regarding the potential impacts of fluctuating flow levels on fish populations in the Cheslatta River.

Pre-survey reconnaissance commenced in August 2023, through the utilization of drone and helicopter surveys. These aerial assessments were conducted in order to collect information on potential stranding sites and determine what areas would be sampled to confirm fish presence. Prior to the Summer Temperature Monitoring Program (STMP) ramp down, data loggers were deployed to monitor real-time changes in water levels and temperature within the study area during the termination of the program. To further monitor fluctuations in water levels, two remote timelapse cameras were installed to capture visual data on an hourly basis at each of the data logger sites.

Field crews were deployed to sites along the Cheslatta River study area to sample pools identified as potential stranding habitat. All fish captured were identified by species, and classified by life stage. To enhance stranding site investigations, environmental data was collected and assessments of pool habitats were conducted to document key habitat components closely linked to stranding occurrences. As part of these assessments, sites were selected for potential revisits during a follow-up assessment in September 2023, with the revisits aimed at evaluating further changes in connectivity and water quality, along with gathering additional fish capture data.

In 2024, the program was expanded to include previously unsurveyed areas, including the stretch of river between the Skins Lake Spillway and Skins Lake.

The findings indicate that fish stranding is prevalent in the Cheslatta River Study Area during and after the completion of the STMP, with certain species facing an increased risk. This could significantly affect their movements and migration across different life stages. The study underscores the considerable impact of discharge fluctuations from the Skins Lake Spillway on fish populations.

To address the potential for fish stranding, seven management (2024 – 2 and 2023 – 5) questions were formulated to qualitatively assess the impact of large discharge fluctuations from the Skins Lake Spillway on fish populations along the upper Cheslatta River. The data collected during this assessment was then utilized to answer each of these management questions. A summary of these questions and their corresponding results is presented in Table 1 (Page vi).

Future research should prioritize expanding assessments to include the Cheslatta/Murray Lake floodplains and the Nechako River downstream of Cheslatta Falls. These efforts should combine targeted on-the-ground stranding surveys with the installation of long-term remote cameras at strategic locations to monitor the frequency of stranding events, particularly during annual discharge fluctuations and ramp-down periods. Additionally, future studies should incorporate fisheries population assessments across different seasons to gain a clearer understanding of the abundance, distribution, and life stage composition of fish species at these stranding sites on an annual basis.

**Table 1:** Cheslatta River Stranding Study. Management Questions and Summary of Results

| Management Question (MQ) | Summary of Key Results |
|---|---|
| **2023 Management Questions** | |
| **MQ1:** ***What is the extent of fish stranding as a result of periods of high discharge from the Skins Lake Spillway?*** | ***Summary***<br><br>Stranded fish were observed throughout the Cheslatta River study area, with fish presence confirmed in eight out of the nine assessed reaches. Some reaches were inaccessible to field staff; therefore, no fish presence or absence could be confirmed in these reaches.<br><br>***Uncertainties/Limitations***<br><br>Areas of the study that were not assessed due to the lack of accessibility may limit the understanding of the site's stranding dynamics. Future stranding study assessments could be made possible in areas of difficult access through the use of a boat, or remote sensing technology where applicable. |
| **MQ2:** ***Which areas of the Cheslatta River have the greatest risk of fish stranding and why?*** | ***Summary***<br><br>Three reaches within the study area were observed to have higher potential for fish stranding. These areas were characterized by habitat zones made up of meandering channels and lower gradients. Pools that were determined to have high instances of stranding risk were revisited for a second time to allow for more monitoring of changes in water conditions, connectivity, and fish presence over time.<br><br>***Uncertainties/Limitations***<br><br>The Cheslatta River study area could be expanded in order to ensure a more comprehensive understanding of the entire river system's vulnerability to stranding risk. The addition of individualized pool data collection could offer more insight into the dynamics on pool isolation events. Future research should aim to monitor and characterize just how significantly these events occur and change over time, and could be aided by the use of remote sensing or telemetry technologies. |

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| **MQ3:** ***What percentage of isolated pools contain stranded fish?*** | ***Summary***<br><br>Sampling was completed in a total of 58 isolated pools throughout the study area. Seventy-five percent (n=44) of those pools were found to contain fish. Seventy-four percent (n=35) of the pools that were identified as side channel habitats harbouring stranded fish. Fish occurred in one hundred percent (n=7) of pools that were found to be isolated within mainstream and floodplain habitat, although the low sample size in these categories limits the ability to conclusively identify them as areas of concern.<br><br>***Uncertainties/Limitations***<br><br>Future study efforts should prioritize the use of a larger sample size in the mainstem and floodplain habitat categories. This would ensure a more comprehensive understanding of fish stranding dynamics within the Cheslatta River Study Area. Additionally, the expansion of study efforts to include the Skins Lake, the Nechako River, and the section of the Cheslatta River immediately downstream Skins Lake Spillway would provide the opportunity to assess spatial variations in fish stranding occurrences and identify region-specific areas of concern.<br><br>Furthermore, an annually conducted, multi season, multi-year study would allow for a more in-depth understanding of yearly variations in fish stranding and habitat changes. The findings of this study emphasize the need for management strategies that address the effects of flow regulation on fish stranding events. |
| **MQ4:** ***What fish species and life history stages are potentially most affected by stranding along the upper Cheslatta River?*** | ***Summary***<br><br>The study found that young-of-year (YOY) Largescale Sucker, Longnose Sucker, White Sucker, juvenile Rainbow Trout, and Mountain Whitefish are the most susceptible to stranding. Both juvenile and YOY fish represented 92% of captured fish. Suckers exhibited the highest capture rate (65% of total catch) from isolated pools. Our desktop assessment supported the fieldwork results, as YOY individuals were predicted to be at high risk due to their specific habitat use. Juvenile Rainbow Trout and Mountain Whitefish were also predicted to be at high risk due to their habitat preferences.<br><br>***Uncertainties/Limitations***<br><br>Only shallow, wadable sections of large pools could be effectively sampled. Therefore, areas of deeper water that adult fish inhabit were left relatively unsampled. Integrating additional sampling methods and more advanced technology, such as remote sensing and telemetry, would improve the study's monitoring capabilities and provide more insight into fish movements and their habitat usage prior to and following the completion of STMP. Implementing a long-term monitoring program would enhance the study's ability to draw conclusive insights on fish abundance and composition during stranding occurrences. |

| | |
|---|---|
| **MQ5:** ***Are operational and/or non-operational changes recommended to mitigate or reduce the risk of fish stranding?*** | ***Summary***<br><br>The initial Cheslatta River fish stranding assessment recommends both operational and non-operational changes based on its findings. Operational changes entail modifying water flow management practices, particularly adjusting the ramping rate during the ramp down of the STMP. These adjustments should be accompanied by additional stranding assessments to determine the most effective approaches for minimizing the risk of stranding. Non-operational recommendations focus on habitat restoration and enhancement, aiming to improve fish habitat and restore connectivity between pools and the main stem during low flow periods. These measures are designed to reduce the likelihood of fish becoming stranded in shallow water or isolated pools.<br><br>***Uncertainties/Limitations***<br><br>Expanding the project as a multi-year study would allow a better comprehensive understanding of fish-stranding dynamics. Data collection could be improved with the use of passive tools such as trail cameras to gain important insight on the changes and outcomes of stranding events. A combination of operational and non-operational changes could contribute to the reduction in fish stranding events in the Cheslatta River ecosystem. |
| **2024 Management Questions** | |
| **MQ1:** ***What is the extent of fish stranding between Skins Lake Spillway and Skins Lake during periods of high discharge following the completion of the STMP?*** | ***Summary***<br><br>Fish stranding was observed throughout Reach 1, between the spillway and Skins Lake, but was less frequent in Reach 3, likely due to its steep banks and confined river channel. In Reach 1, several high-density pool areas were identified, which lack natural buffers like Skins Lake or Cheslatta Lake. These pools dry up quickly, causing fish to become stranded on gravel bars and shorelines. Stranding and fish mortality in this reach occur not only at the end of the STMP but also during rapid low-flow fluctuations observed throughout the program.<br><br>***Uncertainties/Limitations***<br><br>Fieldwork in Reach 1 was limited to a single day for most pools due to the rapid flow reduction after the Skins Lake Spillway gate closure, causing many pools to dry within 24 hours. This led to significant fish mortality as pools isolated and dried up. Consequently, additional pools with stranded fish were likely missed. To address this, it is recommended to conduct a second season of sampling with increased effort to assess a greater number of pools, ensuring all stranded fish are identified and evaluated. |
| **MQ2:** ***Are the locations of fish pools consistent between the 2023 and 2024 programs?*** | ***Summary***<br><br>The topographical characteristics of the Cheslatta River corridor led to the hypothesis that pool locations would remain stable following the implementation of the STMP program. This was supported by consistent results between desktop assessments and field validation during the 2023 program. It was further evaluated in 2024 that pool locations would continue to align with those identified in the 2023 survey and the initial desktop reconnaissance. |

| | |
|---|---|
| | ***Uncertainties/Limitations***<br><br>Although the field validation of pool locations between 2023 and 2024 was mainly opportunistic, it was sufficient to confirm the consistency of stranding pools. However, a key limitation was that this approach did not confirm whether high-risk stranding pools were also consistent. To address this, it is recommended that further research be conducted to determine if high-density fish stranding pools occur in similar habitat types or locations across the Cheslatta River. This could be done through a Year 3 stranding assessment or by integrating data from a program like fish salvage. |

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# 1.0 INTRODUCTION

## 1.1 BACKGROUND

Flow regulation through the utilization of dams is a common practice in many of the world's major river systems, serving various purposes such as hydroelectric power generation, irrigation, and flood control (Nilsson and Berggren, 2004). However, the construction of dams and the resultant flooding of upstream sections of target rivers can introduce complex disturbance patterns that significantly alter entire ecosystems. These impacts often extend beyond the immediate operational footprint of the reservoir, affecting downstream habitats by altering the natural hydrological regime. Fluctuating water levels resulting from dam operations can create isolated pools along river channels, where fish and other aquatic species become stranded. The isolation of these pools not only restricts the movement of aquatic organisms, but also increases their vulnerability to physiological stress, predation, desiccation and starvation.

Recognizing the potential for fish stranding along the Cheslatta River downstream of the Skins Lake Spillway, Noot'senay Consulting Limited Partnership (NCLP) partnered with the Cheslatta Carrier Nation (CCN) and the Nechako Environmental Enhancement Fund (NEEF) to complete a comprehensive stranding assessment aimed at evaluating the extent of stranding events along the upper Cheslatta River following periods of high discharge from the Skins Lake Spillway (Figure 1). Th This assessment seeks to provide valuable insights into the impacts of flow regulation on aquatic ecosystems and inform management strategies to mitigate the occurrence of fish stranding in the area.

**Figure 1.** Skins Lake Spillway separating the Nechako Reservoir and the Cheslatta River (Credits: Visit Burns Lake, 2024).

## 1.2 SCOPE OF WORK

The initial Cheslatta River fish stranding assessment in 2023 was designed to include a multidisciplinary approach to assist with understanding and mitigating instances of fish stranding along the upper Cheslatta River between Skins Lake and Cheslatta Lake. As part of this project, comprehensive field surveys were conducted to identify and document areas where fish stranding events have occurred or are likely to occur. In addition to the field surveys, a detailed mapping assessment was completed along the accessible reaches of the Cheslatta River, including an assessment of water depth, flow patterns, substrate composition, and potential high risk stranding sites. Concurrently, water quality assessments were carried out at each of the isolated pools to analyze parameters such as dissolved oxygen levels, temperature, pH, and conductivity, which are crucial indicators of habitat suitability for fish survival.

Upon completing this work and confirming the occurrence of fish stranding along the Cheslatta River corridor, a 2024 program was developed to address data gaps from the previous survey and validate the findings from the prior year.

The results from this survey aim to provide context of the extent of fish stranding occurring after the completion of the Summer Temperature Management Program (STMP), and will assist in developing effective management strategies and implementing measures to reduce stranding occurrences while ensuring the long-term sustainability of the Cheslatta River ecosystem.

## 1.3 Objectives

The key objective of this project is to qualitatively evaluate the extent of fish stranding caused by the annual periods of high discharge from the Skins Lake Spillway, and the subsequent rapid reduction in discharge from the Skins Lake Spillway. In order to meet this objective, the project developed five management questions (MQ) to better understand the extent of fish stranding. These questions were developed using input from the CCN, NEEF, and relevant published literature.

- **MQ1:** What is the extent of fish stranding as a result of periods of high discharge from the Skins Lake Spillway?
- **MQ2:** Which areas of the Cheslatta River have the greatest risk of fish stranding, and why?
- **MQ3:** What percentage of isolated pools contains stranded fish?
- **MQ4:** What fish species and life history stages are potentially most affected by stranding along the upper Cheslatta River?
- **MQ5:** Are operational or non-operational changes recommended to mitigate or to reduce the risk of fish stranding?

### 1.3.1 Year 2 Objectives

In response to data gaps identified during the first year of the study, NCLP expanded the program's scope to address the following objectives and resolve both geographic and content-related questions:

- **MQ1:** What is the extent of fish stranding between Skins Lake Spillway and Skins Lake during periods of high discharge following the completion of the STMP?
- **MQ2:** Are the locations of fish pools consistent between the 2023 and 2024 programs?

## 1.4 Study Area

The study area surveyed during the 2023 stranding assessment is outlined in Figure 2. Prior to the start of fieldwork, the upper Cheslatta River was split up into 11 reaches based on related literature (D'Andrea, 2022), and channel morphology. The purpose of delineating these reaches was to allow NCLP to streamline fieldwork data collection, and ensure consistency across research projects occurring within the Cheslatta watershed. The defined reaches for sampling in the Cheslatta River study area between Skins Lake and Cheslatta Lake are outlined in Table 2 below.

**Table 2.** Reach lengths and breaks in the Upper Cheslatta River Study Area.

| Reach Number | Reach Description | Reach Length | Key Habitat Features |
|---|---|---|---|
| 1 | Cheslatta River | 1.76 km | Low gradient, side channels below the Spillway |
| 3 | Cheslatta River | 2.17 km | Outlet of Skins Lake, Start of the Cheslatta River |
| 4 | Cheslatta River | 1.59 km | Sections of rapids, Castor Lake inflow |
| 5 | Cheslatta River | 1.10 km | Meandering channels, large eddy present |
| 6 | Cheslatta River | 1.98 km | Steep banks and confined channel |
| 7 | Cheslatta River | 5.31 km | Steep banks, minimal river access |
| 8 | Cheslatta River | 1.65 km | Meandering channels, side channels, low gradient |
| 9 | Cheslatta River | 1.42 km | Upper Cheslatta Falls, confluence of Dog Creek |
| 10 | Cheslatta River | 2.76 km | Meandering channels with some steep banks |
| 11 | Cheslatta River | 3.84 km | Confluence with unnamed Watercourse |
| 12 | Cheslatta River | 1.52 km | Steep banks and confined channel |
| 13 | Cheslatta River Delta | 2.27 km | Meandering channels, side channels, low gradient |

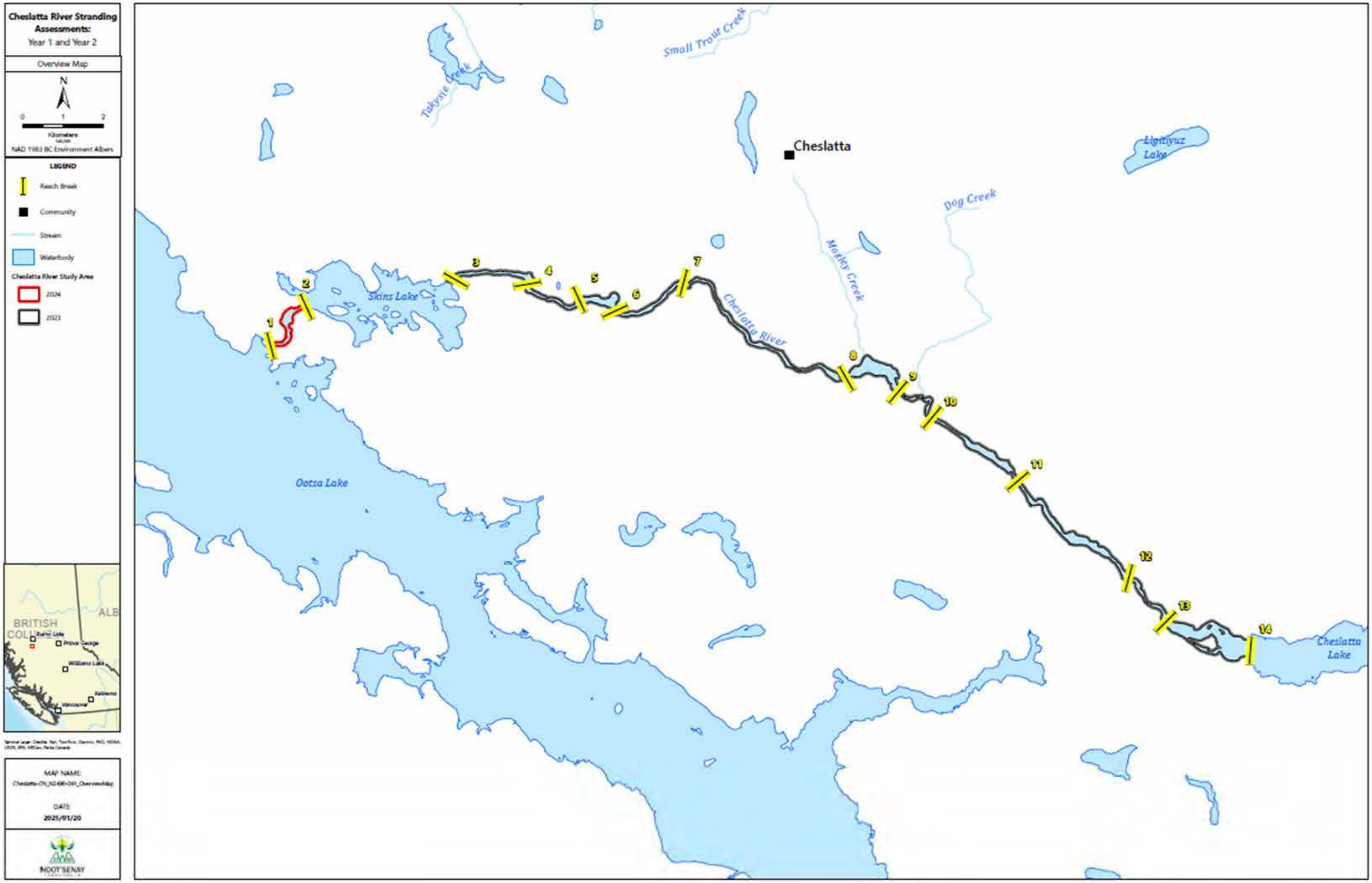


**Figure 2.** Overview of the study area highlighted in red, along with the identified reach breaks marked in yellow. For a detailed map, please refer to Appendix A.

# 2.0 LITERATURE AND DESKTOP REVIEW

## 2.1 METHODS AND SOURCES CONSULTED

The methods employed in the initial Cheslatta River fish stranding assessment were carefully designed to gain a comprehensive understanding of the stranding issues within the system and to provide guidance for future management strategies and restoration projects. Collaboration with members of the NEEF board of directors, and Ecofish Research played an important role in determining the study area and fieldwork objectives. This collaborative approach ensured alignment with the Watershed Engagement Initiative (WEI) interests and incorporated valuable insights into the assessment process.

Drawing upon methodologies adapted from similar studies conducted in reservoir-impacted environments, such as the Kinbasket Reservoir Fish Stranding Assessment (Roias et al. 2020), this study employed a combination of field surveys, mapping assessments, and water quality analyses to comprehensively evaluate the factors contributing to fish stranding events along the Cheslatta River.

By leveraging expertise from both NEEF and Ecofish Research, the assessment methodology was tailored to the specific characteristics of the Cheslatta River ecosystem while benefiting from lessons learned and best practices derived from similar studies including the 2023 stranding surveys. This adaptive approach ensured the robustness and relevance of the assessment findings, thereby facilitating informed decision-making for the management and conservation of the Cheslatta River ecosystem.

## 2.2 FOCAL SPECIES

Focal species for the assessment were selected based on the following criteria:

1. Species identified as having the potential for stranding during the 2023 and 2024 fieldwork; and/or
2. Species with historic distribution upstream or downstream of the 2023 study area.

### 2.2.1 Focal Species Habitat Preferences and Distribution within Study Area

Several focal species identified for this study, exhibit life histories in both lakes and streams. The habitat preferences of each focal species at various life stages, with particular attention to the habitat within the upper Cheslatta River are summarized in Table 3. Consequently, stranding risks were assigned for YOY, juvenile, and adult life stages, considering their habitat preferences and the likelihood of occurrence in stranding zones following the STMP. Table 4 outlines these stranding risks, last updated with the findings from 2024, and includes rationales for the assigned risk levels.

**Table 3.** Focal species habitat preferences at different life stage (McPhail 2007)

| Common Name | Scientific Name | Habitat Use | | | Presence |
|---|---|---|---|---|---|
| | | **Young of the Year** | **Juvenile** | **Adult** | |
| ***Gadidae* (Cod)** | | | | | |
| Burbot | *Lota lota* | - Tributary streams.<br>- Mainstem river near shore areas with coarse gravel, cobble, and/or boulder cover. | - Tributary streams.<br>- Mainstem river near shore areas with coarse gravel, cobble, and/or boulder cover. | -Associated with cold water rivers.<br>- Deep main channels where clear streams meet the turbid main channel.<br>- Behind deposition bars, and in backwater areas.<br>- In rivers, spawning occurs in winter to early spring in low velocity areas. | Nechako Reservoir, Cheslatta System |
| ***Salmonidae* (Salmon, Trout, Char, and Whitefishes)** | | | | | |
| Kokanee | *Oncorhynchus nerka* | - After hatching in streams, they migrate to lakes where they feed in both limnetic and littoral zones. | - Similar habitat use to adults, where they feed in the hypolimnion of lakes during the day.<br>- Occasionally found feeding in littoral areas during the day. | - Spend most of their life in offshore habitat where they exhibit diel vertical migrations to feed.<br>- Some populations shore spawn in lakes, while other populations spawn in streams. Spawning occurs in the fall. | Nechako Reservoir, Cheslatta System |
| Lake Trout | *Salvelinus namaycush* | - Typically found in deep and shallow water in lakes. | - Typically found in deep and shallow water in lakes. | - Typically found in deep and shallow water in lakes.<br>- Spawning occurs in the fall typically over course boulder areas in lakes. | Cheslatta System |
| Rainbow Trout | *Oncorhynchus mykiss* | - Associated with cover in both streams, and mainstem rivers. | - In streams, juveniles prefer riffles and runs, typically occupying shallower waters than adults. | - Fluvial populations tend to occur in deeper, and faster water than juveniles in runs, riffles, glides, and pools.<br>- Spawning occurs in the spring, typically in flowing water. | Nechako Reservoir, Cheslatta System |
| Mountain Whitefish | *Prosopium williamsoni* | - In streams, they are associated with shallow, slow moving water over sand, or silt. | - Associated with glides and runs in streams and tend to avoid riffles and backwaters.<br>- In streams, they show a preference for water around 1 metre (m) deep, with large substrates, and moderate currents. | - Fluvial populations exhibit complex migrations to feeding, spawning, and overwinter sites.<br>- Spawning occurs in the fall typically in flowing water in mainstem rivers, and tributary streams. | Nechako Reservoir, Cheslatta System |

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| ***Catostomidae* (Suckers)** | | | | | |
| Largescale Sucker | *Catostomus macrocheilus* | - Found in shallow side channels, and pools with a variety of substrates, and no vegetation. Seasonal migrations between tributaries and the main river. | - Prefer relatively shallow, slow moving water with sand or silt bottom. | - Evidence suggests that they prefer streams with warmer water. Associated with slower currents, and deep pools in many rivers. In larger rivers they are found mid channel during the day, and tend to move inshore at night.<br>- In streams in the spring, spawning occurs in riffles adjacent to slow moving water. | Nechako Reservoir, Cheslatta System |
| Longnose Sucker | *Catostomus catostomus* | - Found in shallow, slower water, seasonally flooded vegetation, side channels, and areas with sand/soft substrate. | - In larger rivers they prefer shallow, slower water, and are often found in side channels. | - Habitat generalists that are common in both lakes and streams.<br>- Spawning occurs in early spring typically before other sucker species. In streams, spawning occurs over gravel substrates in moderate current. | Nechako Reservoir, Cheslatta System |
| White Sucker | *Catostomus commersonii* | - More common in lakes than streams relative to other sucker species. In streams, they are associated with shallow areas with soft substrates and aquatic vegetation. | - In streams, they are often found in shallow, near shore areas with aquatic vegetation. Also found in slow moving water (side channels) with sand/silt substrate. | - Uncommon in large, swift rivers. More common in streams associated with lakes. Often encountered in depths less than 2 m in side channels, low-gradient and soft substrate sections of mainstem rivers.<br>- Most populations spawn in inlets streams in riffles of gravel substrate. | Nechako Reservoir, Cheslatta System |
| ***Cottidae* (Sculpins)** | | | | | |
| Prickly Sculpin | *Cottus asper* | - In streams, they are often found in areas with seasonally flooded vegetation. | - Often found near shore in areas with slow moving water, vegetation, and woody debris cover. | - In streams, they are often associated with rocky substrates. They are found in both fast- and slow-moving water, and shallow and deep water.<br>- Spawning occurs in the spring. | Nechako Reservoir, Cheslatta System |
| Slimy Sculpin | *Cottus cognatus* | - In streams in the spring, they are often found in areas with seasonally flooded vegetation.<br>- In the summer they are found in slow moving water along stream margins. | - Found in shallower, and slower water than adults in areas with gravel, rocky substrate. | - Found from headwater stream to large mainstem rivers. Associated with coarse gravel substrates in moderate to swift currents.<br>- Spawning occurs in the spring. | Nechako Reservoir, Cheslatta System |

| *Cyprinidae* (Minnows) | | | | | |
|---|---|---|---|---|---|
| Lake Chub | *Couesius plumbeus* | - In the spring they are found in shallow near shore areas with abundant cover.<br>- Later in the summer they form schools that can be found further from shore. | - Found in similar habitat to adults. Often associated with cover during the day, and move into less sheltered littoral areas at night. | - Generalists that are found in a wide variety of lake and stream habitats.<br>- Evidence that they migrate into tributary streams in the spring and out to larger rivers in the fall to overwinter.<br>- Spawning occurs in the spring in lakes and streams over a variety of substrates. | Nechako Reservoir, Cheslatta System |
| Northern Pikeminnow | *Ptychocheilus oregonensis* | - Occur in shallow water near stream margins often with other young cyprinids. | - In streams, they are associated with shallow, slower moving water. | - Associated with slower moving water in larger rivers.<br>- Spawning occurs in the spring, typically in the first 200 m of inlet streams. | Nechako Reservoir, Cheslatta System |
| Redside Shiner | *Richardsonius balteatus* | - Associated with shallow water along stream margins. Often found in areas with aquatic vegetation, slow moving water, fine substrates. | - Associated with nearshore areas with cover. | - In streams, they are often found in slow moving water, 1-2 m deep, over fine substrates.<br>- Spawning occurs in the spring, typically in flowing water over gravel substrate. | Nechako Reservoir, Cheslatta System |

[1] Species information referenced from McPhail (2007)

## 2.3 Desktop Assessment: Focal Species Stranding Risk

**Table 4.** Associated stranding risk for focal species identified within the Cheslatta River Study Area

| Species | Young of Year | Juvenile | Adult | Comment[1] |
|---|---|---|---|---|
| **Burbot** | Moderate | Moderate | Low | • YOY are pelagic, and drift around areas of deeper water before transitioning to benthic habitat. May be at risk for being swept into backwaters/behind gravel bars.<br>• Juveniles can be found at various depths and use a variety of substrate types (mud, sand, silt, gravel). that may be associated with slower moving water.<br>• Adults aren't usually found in water < 2 m. |
| **Kokanee** | Low | Low | Low | • All life-history stages are found to reside in waters of deep lakes, other than when spawning. |
| **Largescale Sucker** | High | Moderate | Moderate | • YOY and juveniles congregate in shallow side channels and pools as seasonal water level drops occur in the summer and fall.<br>• Adults may also use this type of habitat as they generally use shallow littoral zones during the day |
| **Lake Chub** | Moderate | Moderate | Moderate | • All life stages use a variety of habitat and may be found in shallow areas with abundant cover, especially within gravel-bottomed pools. |
| **Lake Trout** | Low | Low | Low | • All life-history stages are found to reside in waters of deep lakes, and would be unlikely to be impacted by water-level changes in the river. |
| **Longnose Sucker** | High | Moderate | Moderate | • YOY and juveniles congregate in slow moving water such as side channels, pools, and backwaters behind gravel bars.<br>• Adults usually inhabit the deeper, cool-water zones of a waterbody. |
| **Mountain Whitefish** | Moderate | High | Moderate | • YOY and juveniles use shallow, low velocity areas including side-channels and backwaters. Older juveniles exhibit diel movements from deep to shallow water to avoid predators and forage.<br>• Adults will loosely congregate to use river runs and pools. |
| **Northern Pikeminnow** | Moderate | Moderate | Low | • YOY and juveniles inhabit quiet backwaters and shallow shorelines < 1 m with silt, sand, and gravel substrates.<br>• Adults typically utilize deeper waters, but can use shallow shorelines if it has the right habitat |
| **Prickly Sculpin** | Moderate | Moderate | Moderate | • YOY tend to seek out quiet river edge sites that contain small woody debris and vegetation.<br>• Adults will seek out fast, shallow water and rocky substrates, mostly within the littoral zones. |
| **Slimy Sculpin** | Moderate | Moderate | Moderate | • YOY are found to inhabit pools and areas of slight current, and seek out fines and sandy substrates.<br>• Adults are typically found in moderate to swift currents with cobble/boulder substrate. |
| **Rainbow Trout** | Moderate | High | Moderate | • YOY and juveniles utilize slow, shallow waters with cover (i.e., upturned roots, logs, overhanging banks, and riffles to allow for foraging opportunities).<br>• Adults are recorded to reside in deeper and faster waters than juveniles, however were captured in 2024. |
| **Redside Shiner** | Moderate | Moderate | Moderate | • YOY are often found in shallow areas of substrate typically dominated by mud and sand, with vegetation associated with shallow, pooling areas.<br>• Adults seem to prefer 1-2 m deep and slow-moving water over fine substrates. |
| **White Sucker** | High | Moderate | Moderate | • YOY and juveniles prefer shallow, littoral habitat<br>• Adults are found in a variety of habitats, ranging from rocky pools to riffles and along shorelines |

[1] Species information referenced from McPhail (2007)

## 2.4 Expansion of 2023 Program

To address data gaps identified during the initial year (2023) of the stranding survey, a second year of surveying was conducted to gain a deeper understanding of stranding occurrences in Reach 1 and Reach 3. This follow-up effort aimed not only to quantify the number of fish affected but also to identify specific stranding locations. By expanding the survey scope beyond 2023, the project sought to ensure comprehensive coverage and reduce the risk of overlooking critical stranding areas upstream of previously identified priority study zones.

Additionally, the project conducted remote data collection along the Cheslatta River corridor, between the Skins Lake Spillway and Cheslatta Lake, using game cameras and temperature/depth monitors. This effort aimed to assess potential fluctuations in flow regimes, improve understanding of environmental conditions in the area, and establish a baseline for comparison with the occurrences documented in 2023.

# 3.0 METHODS

## 3.1 Year 1 (2023)

### 3.1.1 Drone Surveys

Drone surveys were completed by a 2-person crew consisting of a Pilot in Command (PIC) and a secondary observer. Prior to field work, the PIC conducted a preliminary online review and mapping assessment of the study area to identify available airspace and potential flying hazards, as well as take-off and landing zones. Tools utilized during pre-flight planning included Google Earth, the National Research Council of Canada (NRC) Drone Site Selection Tool, the NAV Drone app, and the Instrument Flight Tool (IFR) charts.

The assessment was completed using a DJI Phantom 4 RTK, carrying a built-in camera, with geolocation corrections achieved using a Leica Viva GS15 receiver. Post Processing Kinematics (PPK) corrections were done in RedCatch toolbox, with the final image processing being completed with Pix 4d software. High-definition aerial imagery of the study reaches was captured in conjunction with geo-referencing data. A map showing the overall drone's flight path (where aerial images were taken) is provided in Appendix B.

### 3.1.2 Pre-Survey Reconnaissance

#### 3.1.2.1 Desktop Site Identification

Desktop site identification of stranding pools was completed prior to fieldwork using a combination of satellite imagery and historic aerial photos. Under the direction of the Lead Registered Professional Biologist, NCLP conducted a review of existing and available information to identify potential stranding sites that would undergo field confirmation. Satellite imagery for the upper Cheslatta River was obtained from Google Earth (2014, 2017 and 2019), ArcGIS Aerial, and Sentinel Playground Hub.

A map was created prior to fieldwork that included all of these sites, as well as potential access locations.

#### 3.1.2.2 Helicopter Overflight Survey

A helicopter overflight and aerial digital photograph collection of pre-identified target areas along the Cheslatta River was completed on August 20, 2023 by a field crew composed of two NCLP biologists and two NCLP fisheries technicians. The focus of the survey was to identify additional high-risk stranding locations that were unable to be identified during the review of historic satellite imagery, as well as determine potential access to each of the reaches along the upper Cheslatta River. Flight survey elevation was approximately 300 m altitude at a speed of 50 knots.

#### 3.1.2.3 Data Loggers

On August 8, 2023, prior to the STMP ramp down, two HOBO U20L-01 temperature and depth data loggers were deployed to monitor changes in water levels and temperature during isolated pool creation. To enhance accuracy, a third logger was added along the Cheslatta River corridor to serve as a real-time weather station, providing atmospheric pressure and air temperature data throughout the program.

Each data logger was housed in protective cases and securely fastened to cinder block anchors before deployment at designated sites. As an additional security measure, during deployment at each site, the cinder blocks were tethered to anchor points on the shore. The loggers were positioned horizontally within the water column, as depicted in Figure 3. Depth measurements were recorded at deployment to ensure the integrity of depth conversions as part of quality control measures.

**Figure 3.** Overview of temperature logger anchor configuration (left), upstream view from site 1 (top right), overview of site 1 (middle right), and site 1a (bottom right).

Two sites were selected by the NCLP biologist based of previous data on isolated pool creation, potential access, and comparative measurements. Table 5 outlines the locations and logistics of the loggers installed by the NCLP biologists.

**Table 5.** Logger locations and site information

| Site # | UTM | Deploy. Depth | Deploy. Date | Habitat Type |
|---|---|---|---|---|
| 1 | 10U 317662 5961451 | 0.96m | 08/08/23 | Depth logger was deployed in a deep pool in a side channel, connected upstream to a riffle and downstream to a riffle. Riffle depths upstream and downstream approximately 3-6”. |
| 1a | 10U 317819 5961476 | N/A | 08/08/23 | Real-time atmospheric pressure, and temperature logger installed at mature tree on shoreline at site 1. |
| 2 | 10U 320384 5959111 | 0.82m | 08/08/23 | Depth logger was deployed in a deep pool in a main channel, connected upstream to a riffle and downstream to a riffle. Riffle depths upstream and downstream approximately 2-4”. |

### 3.1.2.4 Game Cameras

Two remote cameras were deployed, each positioned at one of the data logger sites to capture visual data regarding fluctuating water levels. Browning® Strike Force HD Pro cameras (Model BTC-5HDPX) were used, each equipped with a 128 GB SD memory card (SanDisk Extreme Pro®).

The cameras were configured to operate in Timelapse+ mode, enabling users to specify regular time intervals for capturing photos. Additionally, the Timelapse+ function allowed the cameras to be triggered by motion if wildlife activated them outside of the predefined timelapse intervals. The cameras were programmed to capture a single photo every 10 minutes between 8:00 am and 9:00 pm daily.

Installation involved mounting the cameras on mature trees, positioned at least 4 meters above the water surface. To enhance security, each camera was encased within a Browning® Pro X/XD Security Case and securely fastened to the tree using a Python Cable Lock. Additionally, a Universal Security Case Swivel Bracket was affixed to the rear of the security case, allowing flexible angling of the camera up to 45 degrees in any direction. A comprehensive overview of the selected camera deployment sites is depicted in Figure 4.


**Figure 4.** Overview of selected sites for game camera and depth/temperature logger installation. (A) Site 1: side channel within large floodplain during STMP (August 8, 2023), (B) Site 2: mainstem Cheslatta River downstream of riffle-run structure during STMP (August 8, 2023), (C) Site 1: side channel within large floodplain post-STMP (August

26, 2023), and (D) Site 2: mainstem Cheslatta River downstream of riffle-run structure following STMP (August 26, 2023).

### 3.1.3 Ground-Based Stranding Assessments

#### 3.1.3.1 Pool Sampling

Crews were deployed to locations along the Cheslatta River where stranding was anticipated. They identified and classified potential stranding habitats, and then collected data on the fish present as well as various environmental parameters. Assessments and sampling were conducted exclusively in areas where fish became stranded due to the formation of isolated pools. These pools were categorized into two types: wetted and non-wetted. Wetted pools were completely isolated from the mainstem but still contained water, while non-wetted pools were areas or depressions where fish mortality was observed, accompanied by the absence of water. The pools were given a unique point and sampling ID (one crew starting at ID #1 and one crew starting at ID #999), then its location was recorded on a handheld Garmin GPS, and Avenza Maps. To streamline field operations and optimize resource allocation, it was determined that only pools surpassing 1 square meter (estimated in situ) would undergo sampling. This decision stemmed from the project's heightened time sensitivity, given that drawdowns could potentially trigger pool dewatering events within 2 days following the completion of STMP activities.

#### 3.1.3.2 Fish Surveys

Crews conducted a visual inspection for stranded fish at each pool, and employed various sampling methods including: dipnets, beach seines, and backpack electrofishing (Smith-Root LR24). The sampling effort at each pool was documented by time, methods used, and the number of crew members involved. All fish captured during sampling events were classified by life stage (YOY, juvenile, or adult) and identified by species. All fish were classified and recorded as released, dead upon arrival (DUA), and killed fish. Individuals identified as DUA were fish that exhibited mortality due to being beached or stranded, while fish classified as "killed" perished during the sampling process.

To maintain consistency across sample locations, a single-pass method was employed during electrofishing. Crews conducted a single sweep along the longest section of the pool. After completing the sweep, the crew processed the captured fish and assigned an estimate range (1-10, 10-50, 50-100, 100-500, 500-1000, 1000-2000, 2000+) for the number of fish remaining in the pool. This estimation was based on the number of escaped fish identified during sampling, the amount of area inaccessible to the crew, and any other visual observations. Only pools with confirmed fish presence were assigned an estimate of remaining fish.

#### 3.1.3.3 Environmental Data

During the field assessments, survey-specific data, including date and time, was systematically collected alongside comprehensive environmental metrics to assess stranding pool characteristics. Meteorological variables such as weather conditions, air, and water temperatures in both the mainstem river and associated pools were measured. Detailed assessments of pool characteristics, including maximum wetted length, width, and depth at the time of survey, along with distance to the mainstem, were also recorded.

Furthermore, in-situ water quality parameters were evaluated at each stranding sites. This involved collecting pH, dissolved oxygen concentrations, conductivity, and turbidity. Following the completion of the assessments these metrics were used to confirm any changes in water quality following the pool reassessments.

**Table 6.** Instruments used to collect environmental data during surveys

| Parameter | Instrument |
|---|---|
| Air temperature | Hanna HI 98194 Multiparameter Meter |
| Water temperature | Hanna HI 98194 Multiparameter Meter, and HOBO U20L-01 Meter |
| pH | Oakton PCTSTestr™ 50 Waterproof Pocket pH/Cond/TDS/Salinity Tester, Premium 50 Series |
| Dissolved oxygen | Hanna HI98193 Dissolved Oxygen Meter |
| Conductivity | Oakton PCTSTestr™ 50 Waterproof Pocket pH/Cond/TDS/Salinity Tester, Premium 50 Series |
| Turbidity | Visual assessment |

In addition to environmental data, crews also recorded wildlife observation such as sightings, scat, tracks, and beaver dams that were present within the immediate area surrounding the isolated pool.

### 3.1.3.4 Habitat Assessments

As part of the ground-based stranding assessments, thorough habitat evaluations were conducted at each isolated pool. A systematic approach was adopted to document critical habitat components. Crews collected information on substrate composition, identifying dominant and sub-dominant materials, as well as documenting pre-isolation site morphology, such as pool, run, or riffle characteristics. Additionally, detailed assessments of vegetation composition, river sub-section classification (e.g., main channel, side channel, oxbow), and the presence of cover/habitat structures were recorded. Figure 5 illustrates specific examples of common habitat types encountered within the upper Cheslatta River corridor during the surveys.

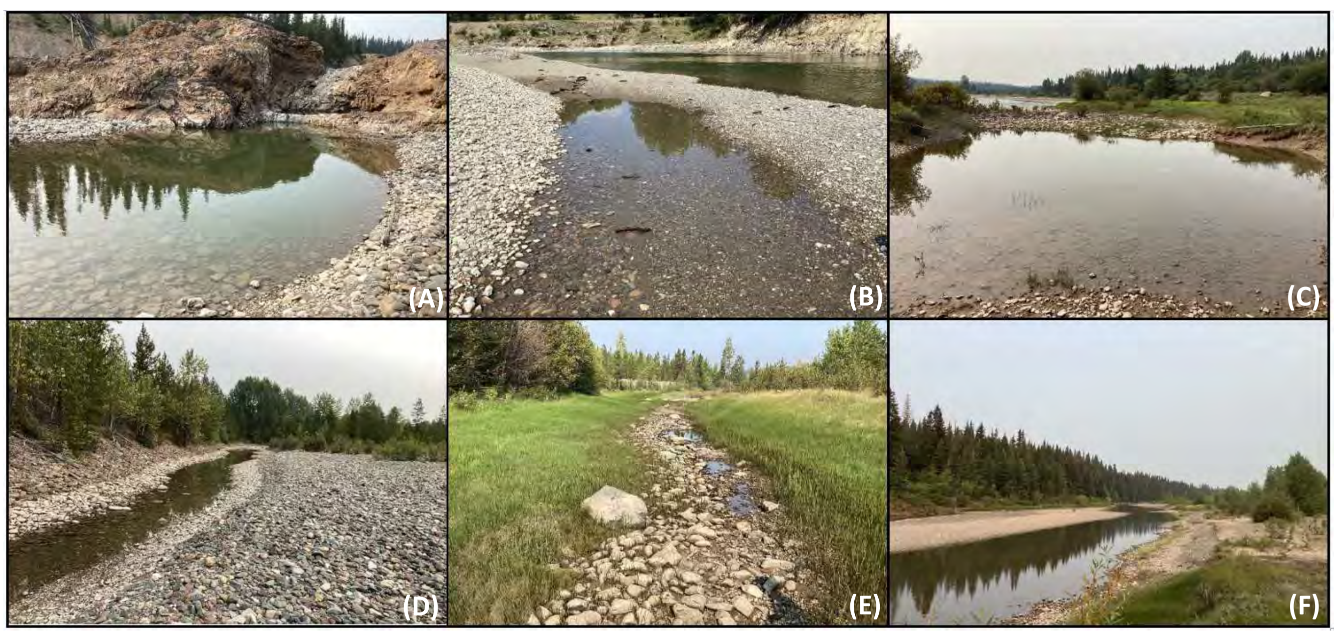



**Figure 5.** Common isolated pool types found along the upper Cheslatta River, including (A) main channel isolated plunge pool, (B) main channel run isolated pool, (C) backwater isolated pool, (D) side channel isolated pool, (E) backwater channel isolated pool, and (F) major side channel isolated pool.

### 3.1.4 Ground-Based Stranding Revisit

During the initial assessments, some pools were selected for potential revisits based on factors such as their distance from the mainstem channel, fish presence, water quality, and the likelihood of reconnecting with the mainstem. The lead biologist subsequently compiled a list of sites to be revisited, factoring in these criteria while also considering accessibility and crew safety, particularly in light of nearby forest fire activities.

## 3.2 YEAR 2 (2024)

### 3.2.1 Pre-Survey Reconnaissance

Before fieldwork commenced, a desktop analysis was conducted to identify potential stranding pools within Reach 1 and Reach 3 using a combination of satellite imagery and historic aerial photos. Satellite imagery for the upper Cheslatta River was sourced from Google Earth (2014, 2017, and 2019), ArcGIS Aerial, and Sentinel Playground Hub. A comprehensive map was created prior to fieldwork, incorporating these identified sites along with potential access points.

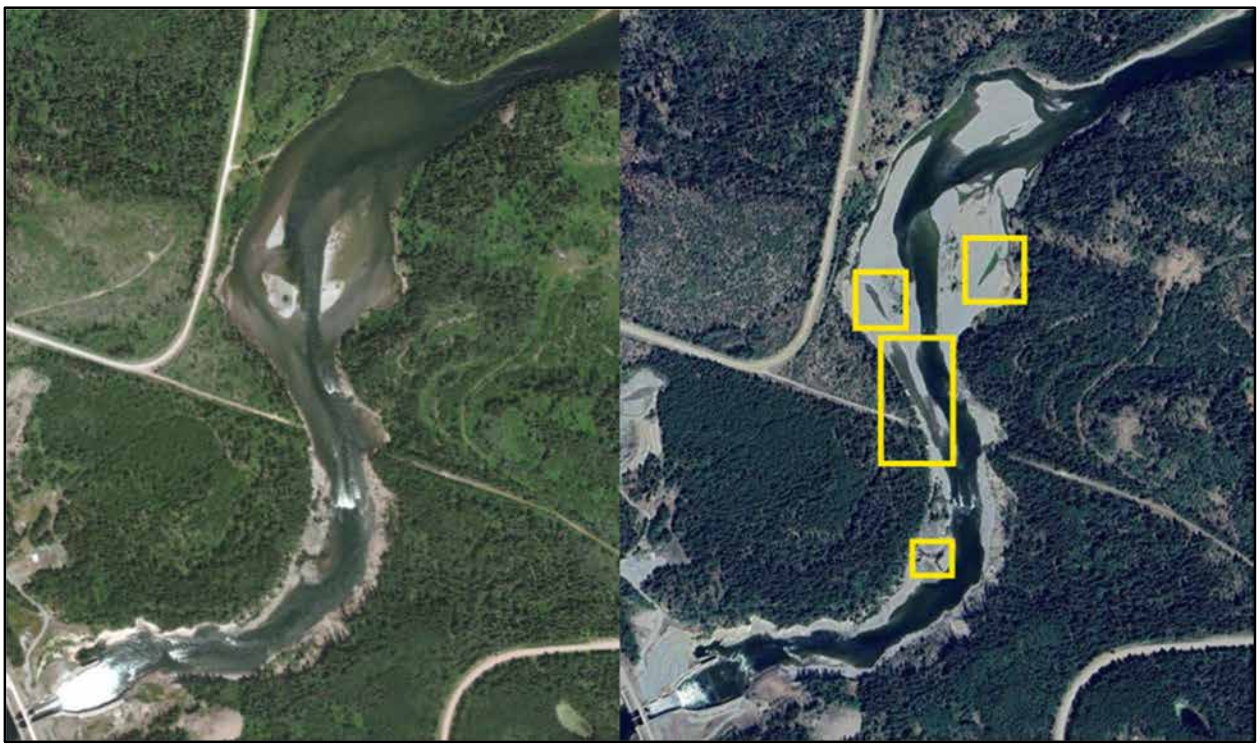


**Figure 6.** Comparison of Mid-STMP and Post-STMP water levels along Reach 1, with stranding pools highlighted in yellow boxes.

#### 3.2.1.1 Data Loggers

Between July 8th and 10th, 2024, prior to the start of STMP, five HOBO U20L-01 temperature and depth data loggers were deployed to monitor changes in water levels and temperature during isolated pool creation. To enhance accuracy, a sixth logger was added along the Cheslatta River corridor to serve as a real-time weather station, providing atmospheric pressure and air temperature data throughout the program.

Each data logger was housed in protective cases and securely fastened to cinder block anchors before deployment at designated sites. As an additional security measure, during deployment at each site, the cinder blocks were tethered to anchor points on the shore. The loggers were positioned horizontally within the water column. Depth measurements were recorded at deployment to ensure the integrity of depth conversions as part of quality control measures. Table 6 outlines the deployment locations and depths for each of the sites.

**Table 7.** Logger locations and site information

| Site # | UTM | Deploy. Depth | Deploy. Date | Habitat Type |
|---|---|---|---|---|
| 1 | 10U 320532 5958834 | 0.14 | 07/08/24 | Previous high-risk stranding zone |
| 2 | 10U 324615 5954650 | 0.12 | 07/09/24 | Largest stranding pool identified in 2023 |
| 3 | 10U 310992 5963204 | 0.05 | 07/09/24 | Previous high-risk stranding zone |
| 4 | 10U 317662 5961450 | 0.08 | 07/10/24 | Side channel pool at previously identified stranding pool |
| 5 | 10U 317340 5961354 | 0.1 | 07/10/24 | Main channel along river cutbank downstream of LWD |
| A1 | 10U 320532 5958834 | N/A | 07/08/24 | Atmospheric Pressure/Air Temperature Station |

#### 3.2.1.2 Game Cameras

Four remote cameras were deployed, each placed at one of the data logger sites to capture visual data on fluctuating water levels. The installation method, camera model, and site preparation procedures adhered to the protocols established during the 2023 survey.

### 3.2.2 Ground Based Stranding Assessments

Ground-based stranding assessments were conducted in accordance with the protocols established during Year 1 of the sampling program. These included pool sampling, fish surveys, environmental data collection, and habitat assessments. No revisits to the pools were recommended, as the drawdown rates in the assessed zones caused most pools to dry up completely within 24 hours.

# 4.0 RESULTS

## 4.1 YEAR 1 (2023)

### 4.1.1 Drone Surveys

The conditions on the river were moderately suited to aerial data collection as the river water levels were low following the completion of STMP and several isolated pools along various habitat features (islands, gravel bars, shorelines) were mapped. Water turbidity was moderately high, which occluded streambed imagery in sections with water depths greater than approximately 1 m. Weather conditions were well suited for the work as the crew experienced mostly sunny weather with low to moderate winds. This allowed for clear imaging but did create some contrast in the imagery and some shadows due to intermittent cloud cover.

The results from the drone surveys, included pool locations and digital elevation model (DEM) are outlined in Appendix B and Appendix C

### 4.1.2 Pre-Survey Reconnaissance

#### 4.1.2.1 Helicopter Overflight Survey

Aerial photographs, and a flight overview video was taken during the pre-survey helicopter reconnaissance flight. Figure 6 shows a sample of the aerial photographs collected during the reconnaissance flights of multiple high-risk stranding sites that were later surveyed during the assessment.

**Figure 7.** Aerial photographs of desktop- identified stranding sites captured during the August 20, 2023 reconnaissance flight.

#### 4.1.2.2 Data Loggers

Loggers were retrieved from the field during the initial stranding assessments completed the week of August 21, and all data was downloaded and processed using the HOBOware software. Following the completion of the download, the total pressure data was used to converted to depth (m) utilizing the following formula:

$$\boldsymbol{d = p/(g * \rho)}$$

Where d is the depth in the fluid where the pressure is measured, $p$ is the pressure in liquid (calculated by subtracting the atmospheric pressure from the pressure recorded by the logger), $g$ is equal to the acceleration of gravity (9.81 m/s$^2$), and $\rho$ is equal to the density of the liquid (for ease of calculation the density of pure water at 15 °C was used (approximately 0.99 g/cm$^3$). Figure 7 shows the depth of logger at site 1 during the STMP ramp down between August 10 to 26, 2023.

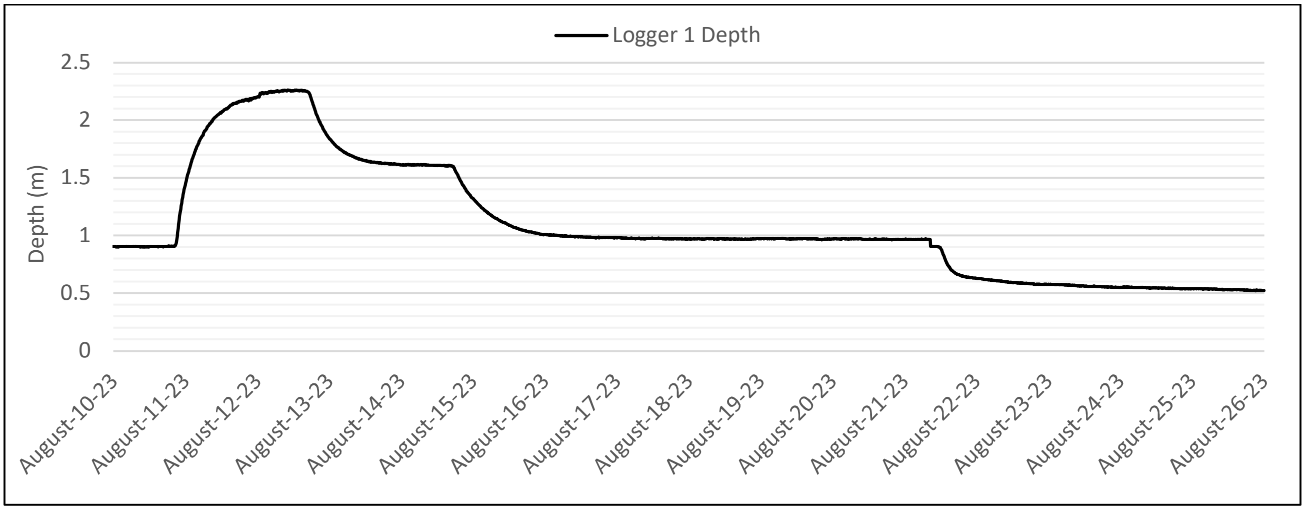



**Figure 8.** Variation in depth observed at the Site 1 logger location

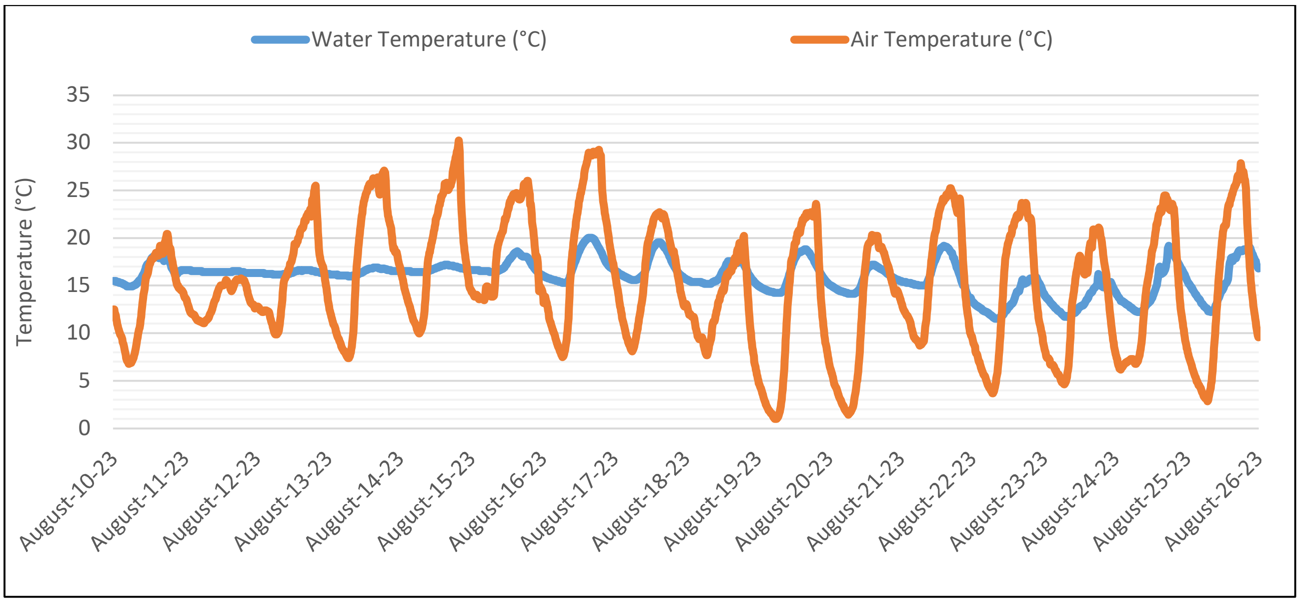



**Figure 9.** Comparison of water and air temperatures recorded by loggers at Site 1 and Site 1a

Due to the movement in the Site 2 anchor, accurate depth could not be calculated. To prevent this occurring on future projects, it is recommended that multiple reinforcing bars are used to secure the cinder blocks to the substrate.

#### 4.1.2.3 Game Cameras

Cameras were used to provide a visual representation of the changing water levels at each of the data logger sites. Images were compiled into a format to show the changes in levels with the fluctuation in discharge from the Skins Lake Spillway. Appendix D provides timelapse overview of water levels at each of the logger sites (Site 1 – side channel habitat, and Site 2 – main channel habitat).

### 4.1.3 Ground-Based Stranding Assessments

#### 4.1.3.1 Water Quality

Dissolved oxygen (mg/l), pH, water temperature (°C), and turbidity (visual) were collected at each sampled pool. The results are summarized in Appendix F: Table F-1. The results from pool revisits are summarized in Appendix F: Table F-2.

#### 4.1.3.2 Fish Habitat Assessment

Substrate composition (dominant and sub-dominant), pre-isolation site morphology, vegetation composition, river sub-section classification, and cover/habitat structures present were collected at each sample pool to assess fish habitat and associated links between stranding density and habitat type. The results are summarized in Appendix F: Table F-3. The results from pool revisits are summarized in Appendix F: Table F-4.

#### 4.1.3.3 Fish Collection

Pool sampling and fish collection were conducted at each of the sampled pools, with the exception of Pool 992 and 993, which were deemed inaccessible due to safety concerns. The results are summarized in Appendix F: Table F-5. The results from pool revisits are summarized in Appendix F: Table F-6.

Due to the high number of fish captured, weight measurements for individual specimens were not recorded during the initial survey. Fish captured in the isolated pools were released back into the Cheslatta River mainstem to prevent recapture during future sampling events.

Individual fish length data is included in Appendix G: Table G-1 and G-2.

### 4.1.4 Management Questions

As part of this project, five management questions were developed to assist with understanding the extent of fish stranding caused by the annual periods of high discharge from the Skins Lake Spillway. The following section outlines the results of the assessment in relation to each management question, as well as provides recommendations for addressing knowledge gaps in future studies.

**Management Question 1:** *What is the extent of fish stranding as a result of periods of high discharge from the Skins Lake Spillway?*

Fish stranding was widespread throughout the study area. Stranding pools containing fish were confirmed in eight out of the nine assessed reaches. No isolated stranding pools were identified in reach 6 likely due to the steep banks and the confined river channel. Furthermore, as reaches 3 and 4 were inaccessible during fieldwork, no ground assessments occurred. The widespread incidence of fish stranding in the study area underscores the impact of discharge reduction following the completion of the STMP.

**Limitations/Recommendations:**
During fieldwork, both reaches 3 and 4 were inaccessible, preventing any ground assessments. Historic aerial imagery suggests that pool formation is likely to occur in these reaches. Consequently, future studies should include detailed stranding surveys of these areas, as well as the section of the Cheslatta River directly downstream of the Skins Lake Spillway.

To enhance future stranding studies, alternative methods such as remote sensing, including Lidar, should be incorporated. Remote sensing techniques like Lidar can produce detailed 3D maps of underwater habitats, cover large areas efficiently, and when combined with multispectral imagery or bathymetric surveys, offer a more comprehensive understanding of aquatic ecosystems and fish populations.

Moreover, improving accessibility by utilizing a boat or helicopter to reach remote areas could facilitate more thorough assessments. Addressing these limitations will contribute to a better understanding of stranding patterns, particularly in areas previously inaccessible to field crews.

**Management Question 2:** *Which areas of the Cheslatta River have the greatest risk of fish stranding and why?*

During the stranding survey, it was observed that reaches 5, 8, and 10 exhibited the highest density of pools, indicating potentially higher vulnerability to fish stranding events in these areas. Areas characterized by meandering channels and lower gradients were ranked as higher risk zones, due to the increased frequency of the formation of isolated pools, which is conducive to stranding. In contrast, areas with rapids, steep banks, and confinement were associated with a lower risk. Five key stranding pools were selected for revisit surveys. Pool revisits were conducted to monitor and evaluate changes in water conditions, connectivity, and fish presence during a 3-week period after the completion of the STMP.

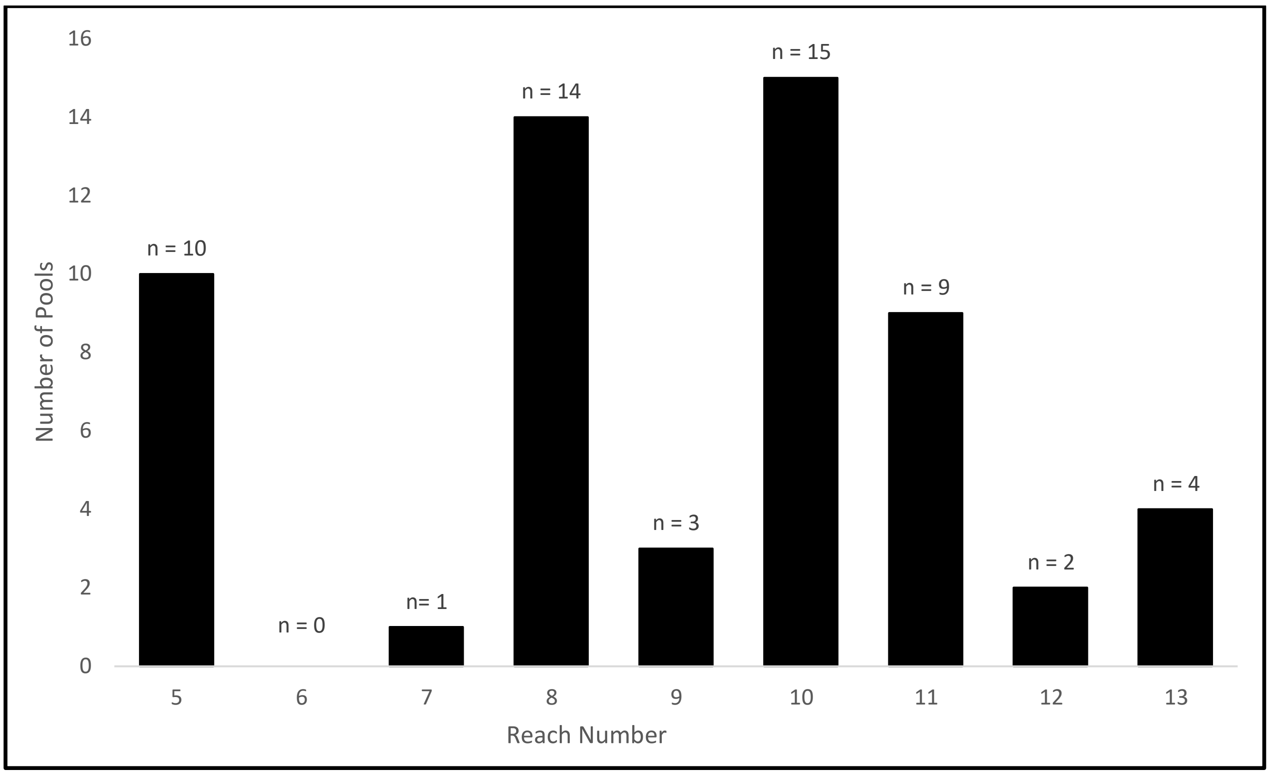



**Figure 10.** Total number of isolated pools per assessed reach.

**Limitations/Recommendations:**

The stranding survey provided valuable insights into pool distribution and fish stranding vulnerability, yet several limitations and recommendations warrant consideration. Firstly, the survey's scope focused on the upper Cheslatta River between Skins Lake and Cheslatta Lake, potentially overlooking other susceptible areas along the watercourse such as the Nechako River and the section of river between Skins

Lake and the Skins Lake Spillway. Future surveys should expand coverage to ensure a comprehensive understanding of stranding susceptibility across the entire watercourse. Moreover, while the survey identified areas with differing stranding risks based on channel characteristics, it lacked a detailed understanding of individual pool dynamics prior to isolation. Further research should aim to characterize temporal and spatial variations prior to the completion of the STMP to better predict and mitigate stranding events.

In addition to the spatial constraints of the study, it's crucial to recognize that the stranding crews likely overlooked stranded areas because the water receded rapidly, causing pools to dry up before sampling could take place. This phenomenon was observed in multiple locations during the assessment, including Pool 1, 2, and 3 (Photos 1-6). To address this issue, future assessments or salvage operations should increase ground crew efforts, enabling assessments to be conducted across the study area within the first few days following the completion of the STMP.

**Management Question 3:** *What percentage of isolated pools contain stranded fish?*

Seventy-five percent (n=44) of isolated pools sampled after the completion of the STMP were found to contain fish. Among the 58 pools surveyed, the majority were classified as being side channel morphology prior isolation (n=51). Within this subset, 74% (n=35) of the pools identified as side channel habitats were found to contain stranded fish. Pools isolated within mainstem habitat (n=3) and floodplain habitat (n=4) both exhibited a 100% occurrence of stranded fish. However, due to the low sample size in these categories, it is not feasible to conclusively identify them as the primary areas of concern.

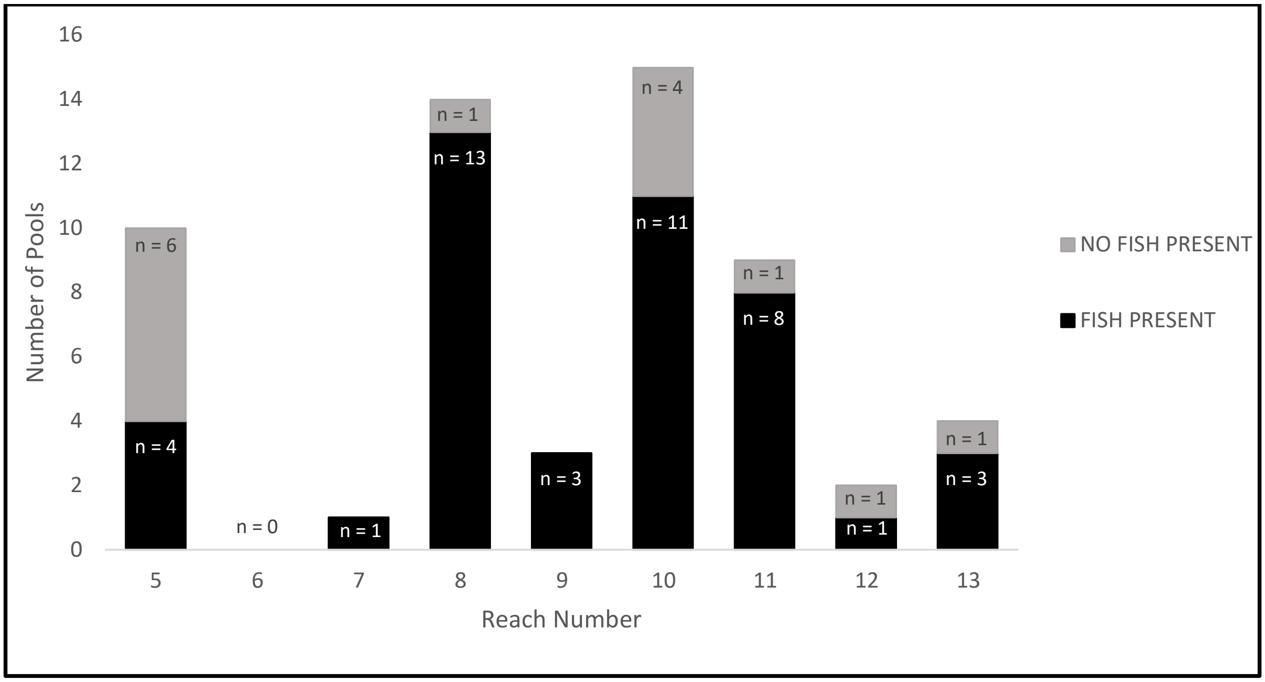



**Figure 11.** Number of pools with fish presence and absence within each assessed reach.

**Limitations/Recommendations:**

While the study offers valuable insights into fish stranding dynamics in isolated pools post-STMP, certain limitations must be recognized. Primarily, the small sample sizes within specific habitat categories, notably mainstem and floodplain habitats (n=3 and n=4, respectively), constrain the broader applicability of our findings to these habitats. Future investigations should prioritize enlarging sample sizes through annual sampling programs in order to provide a more comprehensive understanding of fish stranding dynamics across the upper Cheslatta River corridor. Additionally, as the study focuses on a limited geographic area it may limit the generalizability of our results to other regions. To address this, similar studies should be replicated along the Cheslatta River between the Skins Lake Spillway and Skins Lake as well as the Nechako River to assess spatial variations in fish stranding occurrences and identify region-specific areas of concern. Moreover, the study's singular sampling period precluded the exploration of yearly variations in fish stranding and habitat conditions. Conducting annual studies spanning multiple years would enable a more nuanced understanding of the annual variations in fish stranding along the Cheslatta River.

Despite these limitations, our findings underscore the importance of minimizing the potential for isolated pool creation to mitigate the impacts of fish stranding events. Management strategies should prioritize habitat restoration efforts and consider factors like flow regulation and habitat connectivity to reduce the occurrence of fish stranding events. Addressing the identified limitations in future research endeavors will refine the understanding of fish stranding dynamics and contribute to the development of effective conservation and management strategies.

**Management Question 4:** *What fish species and life history stages are potentially most affected by stranding?*

One major component of the study conducted along the upper Cheslatta River area was focused on identifying species and life stages vulnerable to stranding following post-STMP flow fluctuations. Through a comprehensive desktop assessment and fieldwork, it was determined that young-of-year Largescale Sucker, Longnose Sucker, and White Sucker; and juvenile Rainbow Trout, and Mountain Whitefish were the most susceptible to stranding. Field observations supported the desktop assessment, with combined sucker species exhibiting the highest capture rate (65% of total catch), followed by Rainbow Trout (10%) and Mountain Whitefish (7%). Young-of-year individuals, particularly suckers, were found to be at high risk, often aggregating in shallow side channels, pools, and backwaters, making them vulnerable during low flow periods. Rainbow Trout and Mountain Whitefish, primarily juveniles, were also prone to stranding, due to individuals favouring slow, shallow waters with abundant cover. These findings underscore the heightened vulnerability of juveniles and young-of-year fish to stranding, given that they constituted 92% of the captured fish. Figure 11 provides a summary of the species encountered during sampling as a percentage of the total catch.

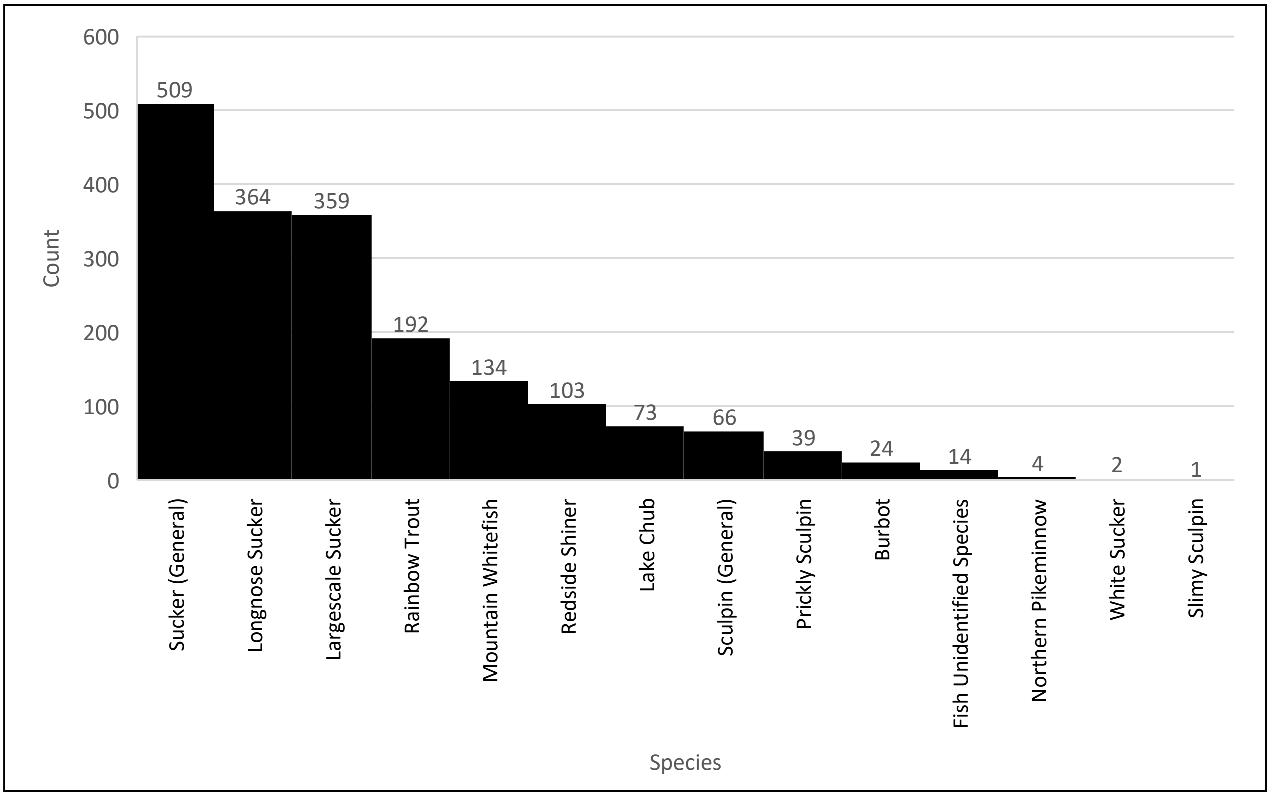



**Figure 12.** Total number of each species caught during sampling.

**Limitations/Recommendations:**

While the study successfully identified vulnerable species and life stages susceptible to stranding in the Cheslatta River area, several limitations and recommendations should be considered. Firstly, the study was only able to effectively sample the shallow sections of the large pools, allowing deep sections where adult specimens inhabit to go relatively unsampled. Future research should aim to broaden the scope of sampling by incorporating sampling mehtods such as minnow traps and beach seines to provide a more comprehensive understanding of stranding vulnerabilities within the ecosystem.

In addition to implementing new sampling methods, it is important to continue with long-term monitoring of stranding impacts. This will offer detailed insights into variations in stranding occurrences and the effectiveness of future mitigation measures. Understanding these broader dynamics is essential for planning future restoration and rehabilitation efforts.

**Management Question 5:** *Are operational and/or non-operational changes recommended to mitigate or reduce the risk of fish stranding?*

Below are recommendations for operational and non-operational changes based on the findings of the initial Cheslatta River fish stranding assessment:

1. **Operational Changes:**
   Adjustments to water flow management practices, particularly the ramping rate within and following the completion of the STMP. Modifying the ramping rate could create opportunities for fish to migrate out of high-risk stranding zones before they become completely isolated. By

carefully managing water flow, especially during critical periods for fish migration, the risk of stranding can be reduced.

2. **Non-Operational Changes:**
   Implementing physical measures, such as constructing defined backwater channels and excavating outlet channels, to prevent pool formation and mitigate the risk of fish stranding may prove effective in expansive floodplain environments typical of areas like Reach 8, 10, and 13 within the study area. Considering that most stranded species were discovered in shallow side channels, it's important to provide accessible refuge habitats that can be utilized during and after the STMP ramp-down. Any connectivity enhancement works should be complemented by establishing riparian vegetation to stabilize banks and improve in-stream habitat complexity, ensuring the functionality and accessibility of created habitats.

3. **Supporting Research:**
   Based on the initial findings of the stranding survey, it is recommended to expand the project into a multi-year study to assess changes in stranding frequency and locations post-STMP. To improve data collection, integrating passive tools such as depth loggers and game cameras, especially in previously identified stranding areas, is advised. These tools can provide valuable insights into stranding duration, water quality fluctuations, and the impacts on fish species. The overarching goal of this extended study is to gain a comprehensive understanding of stranding dynamics and to determine the potential spatial variations related to annual stranding.

   In conjunction with supporting research efforts, it may be necessary to consider initiating fish salvage projects at high-risk stranding sites to mitigate mortality rates until more sustainable solutions can be implemented. These salvage operations should prioritize spreading efforts throughout the entirety of the Cheslatta River corridor, recognizing that pools can rapidly dry up, exacerbating fish mortality rates. By strategically distributing salvage efforts, we can maximize the effectiveness of interventions and minimize the ecological impact of stranding events on local fish populations.

Implementing a combination of operational, non-operational changes and additional research, as outlined above, can contribute to the mitigation and reduction of the risk of fish stranding along the Cheslatta River. These recommendations are tailored to address critical areas where the risk of fish stranding is most pronounced, offering actionable solutions in operational adjustments (such as ramping rate alterations), non-operational enhancements (like connectivity improvements), and targeted research endeavors (including additional stranding assessments and salvage efforts) specific to each location.

## 4.2 Year 2 (2024)

### 4.2.1 Data Loggers

At the start of the STMP program, data loggers were deployed to capture detailed location-specific data on water level fluctuations in high-risk stranding channels. These loggers were retrieved during the final stranding assessments conducted the week of August 20. Upon retrieval, all data was downloaded and processed using HOBOware software. The total pressure data collected was then converted to depth (m) using the formula outlined in Section 4.1.2.2.

The data collected from the loggers revealed two key trends related to fish stranding within the study area:

- **Significant flow fluctuations** are causing pool depths to drop by up to 1 meter in certain locations over a 10-hour period. These rapid, pulsed drops are likely leading to the formation of pools in low-lying areas, which in turn contributes to fish stranding along the river corridor.
- **Additional stranding events may be occurring during the STMP**. While the current program focused only on stranding assessments during the final dropdown at the end of the STMP, it is suspected that additional stranding events are taking place during periods of low discharge from the Skins Lake Spillway. An example of these high-risk periods is shown in Figure 10, specifically July 28th and August 13th, 2024. On both dates, low discharge from the spillway was observed, along with the low depths of reference pool locations.

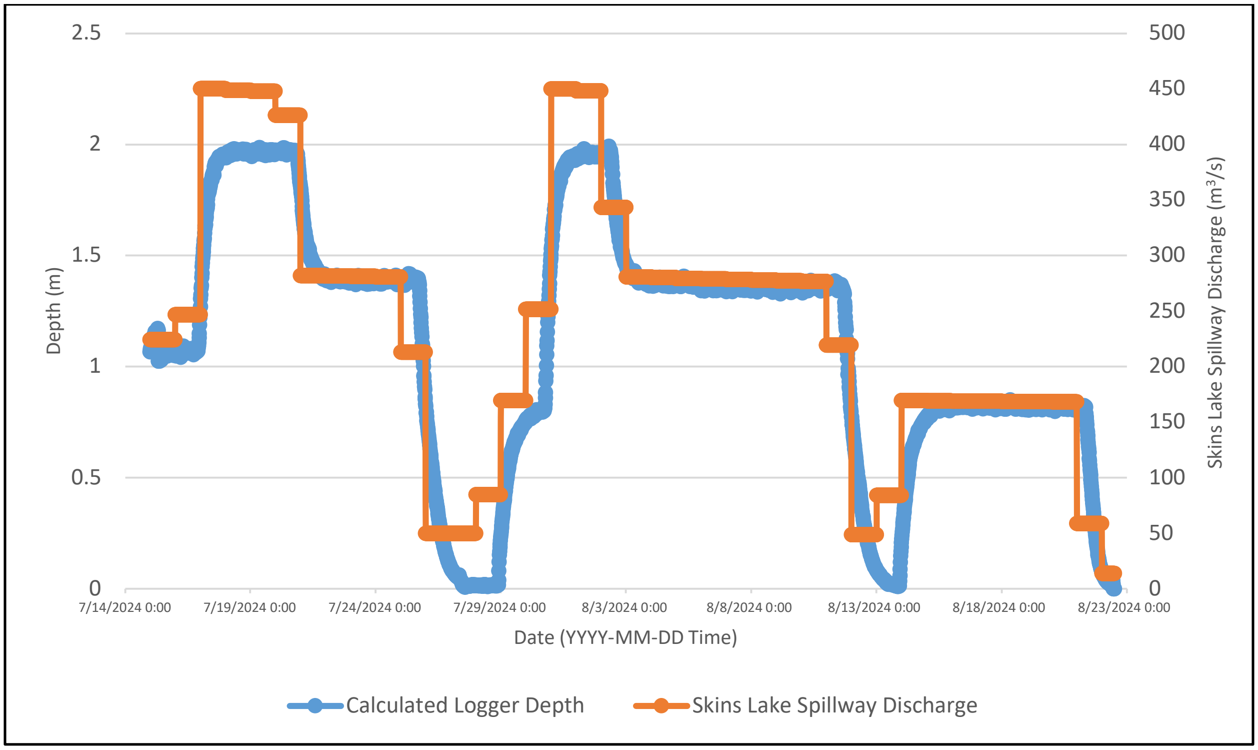



**Figure 13.** The calculated depth data from Logger 1 compared to the Skins Lake Spillway discharge values.

Four of the five depth loggers deployed were successfully retrieved at the end of the program; however, one logger was lost during a period of high discharge. To prevent this in the future, it is recommended that the program use 3/8-inch airline cable or larger to secure the loggers and anchor blocks to shore-based anchor points.

### 4.2.2 Game Cameras

Cameras were used to provide a visual representation of the changing water levels at each of the data logger sites. Images were compiled into a format to show the changes in levels with the fluctuation in discharge from the Skins Lake Spillway.

**Figure 14.** A comparison of water levels between July 25th at 4:15 PM (upper photo) and July 26th at 5:48 AM (lower photo), taken along Reach 8 via Game Camera 4.

### 4.2.3 Ground Based Stranding Assessments

#### 4.2.3.1 Water Quality

Dissolved oxygen (mg/l), pH, water temperature (°C), and turbidity (visual) were collected at each sampled pool sites in Reach 1 and Reach 3. The results are summarized in Appendix F: Table F-7.

#### 4.2.3.2 Fish Habitat Assessment

Substrate composition (dominant and sub-dominant), pre-isolation site morphology, vegetation composition, river sub-section classification, and cover/habitat structures present were collected at each sample pool to assess fish habitat and associated links between stranding density and habitat type. The results are summarized in Appendix F: Table F-8.

#### 4.2.3.3 Fish Collection

Pool sampling and fish collection were conducted at each of the sampled pools, with the exception of Pool 992 and 993, which were deemed inaccessible due to safety concerns. The results are summarized in Appendix F: Table F-5. The results from pool revisits are summarized in Appendix F: Table F-9.

Due to the high number of fish captured, weight measurements for individual specimens were not recorded during the initial survey. Fish captured in the isolated pools were released back into the Cheslatta River mainstem to prevent recapture during future sampling events.

Individual fish length data is included in Appendix G: Table G-3.

### 4.2.4 Management Questions

As part of the 2nd year of the project, two additional management questions were developed to address data gaps in regards to the extent of fish stranding caused by the annual periods of high discharge from the Skins Lake Spillway. The following section outlines the results of the assessment in relation to each management question, as well as outlines and limitations or future recommendations.

**Management Question 1:** *What is the extent of fish stranding between Skins Lake Spillway and Skins Lake during periods of high discharge following the completion of the STMP?*

Fish stranding was observed throughout Reach 1, between the spillway and Skins Lake, though it was less common in Reach 3, likely due to the steep banks and confined river channel. In Reach 1, several high-density pool sections were identified. These pools lack a natural buffer, such as the one provided by Skins Lake or Cheslatta Lake to the rest of the river, and as a result, they dry up quickly, causing fish to become stranded along the gravel bars and shorelines. Consequently, it is believed that beaching and fish mortality in this reach occurs not only at the end of the STMP but also during the rapid low-flow fluctuations historically observed across the program.

**Limitations/Recommendations:**
Fieldwork in Reach 1 was constrained to a single day for most pools, as the rapid decline in flow following the gate closure at the Skins Lake Spillway led to many pools drying up within 24 hours. This resulted in significant beaching, with crews observing high rates of fish mortality as pools became isolated and completely dried out. Consequently, it is likely that additional pools containing stranded fish remain unassessed by the NCLP crews. To address this, it is recommended that a second season of sampling be

conducted with increased effort to allow for a greater number of pools to be assessed, ensuring that additional pools containing stranded fish are identified and evaluated.

**Management Question 2:** *Are the locations of fish pools consistent between the 2023 and 2024 programs?*

Given the topographical characteristics of the Cheslatta River corridor, it was hypothesized that pool locations would exhibit stability following the implementation of the STMP program. This hypothesis was supported by the consistency observed between desktop assessments of pool locations (Section 3.1.2.1) and field validation during the 2024 program. In 2024 it was further evaluated that pool locations would remain consistent with those identified during the 2023field survey, as well as with the initial desktop reconnaissance.

**Figure 15.** Comparison of Stranding Pool (Pool 998) between 2023 (Left) and 2024 (Right). The top images were captured one day after gate closure at the Skins Lake Spillway, while the bottom images were taken two days following gate closure.

**Limitations/Recommendations:**

Although the field validation of pool locations between 2023 and 2024 was primarily opportunistic, it was sufficient, when combined with data from the original study, to confirm the consistent occurrence of stranding pools. However, a key limitation of this approach was that it only established the consistency of pool locations, rather than confirming whether high-risk stranding pools were also consistent. To address this, it is recommended that further research be conducted to determine whether high-density fish stranding pools are occurring at similar habitat types or consistent locations across the Cheslatta River.

This could be achieved through the implementation of a Year 3 stranding assessment or by incorporating data collected through a program such as fish salvage.

# 5.0 CONCLUSION

The first year of the Cheslatta River Fish Stranding Study established that fish stranding is a widespread phenomenon throughout the Upper Cheslatta River. Stranding was documented in pools across eight of the nine reaches assessed, with 75% of the sampled pools containing stranded fish. High-risk stranding areas were predominantly found in meandering channels with low gradients, while low-risk areas were characterized by fast-flowing rapids bounded by steep banks. These findings suggest that stranding risk is spatially heterogeneous, likely influenced by the channel morphology and hydrological dynamics. Furthermore, the data indicated that the risk of fish stranding may be species-dependent and vary according to the life history stage of the fish present during the STMP ramp-down period. Specifically, desktop analysis highlighted that species in the young-of-year and juvenile life stages are particularly vulnerable to stranding in slow-moving, shallow river habitats, where water retention is higher, and flow variability may exacerbate the risk of pool desiccation.

In the second year of the study, fish stranding was found to be particularly extensive in the first reach of the study area. The absence of a lake buffer in this reach contributed significantly to higher stranding occurrences, as the natural hydraulic buffering effect provided by the lake was not present to mitigate rapid flow reductions. Additionally, it was confirmed that the majority of the pools previously identified in the 2023 desktop reconnaissance and field assessments continued to persist into the 2024 program, further emphasizing the stability and recurrence of these stranding-prone habitats.

In light of these findings, it is recommended that the scope of the program be expanded both geographically and operationally. Expanding the study area to include additional river reaches (i.e., Nechako River) and floodplain habitats (i.e., Skins Lake and Cheslatta Lae), as well as incorporating a broader range of environmental factors, will enable a more comprehensive understanding of fish stranding dynamics. Specifically, it is critical to consider the influence of mid-STMP flow fluctuations and their role in exacerbating fish stranding. Understanding how fluctuations in flow, particularly during rapid ramp down periods, influence habitat connectivity and pool persistence will be key to identifying areas at highest risk and quantifying total mortality.

Expanding the program in this manner will allow for a more thorough identification of critical fish stranding areas, particularly those that may not have been adequately assessed in the initial phases. Moreover, this will provide the necessary data to guide the development of targeted management interventions, such as flow regulation adjustments or habitat restoration efforts, aimed at mitigating the long-term impacts of fish mortality. The ultimate goal of this expanded research is to provide scientifically grounded recommendations that can help reduce the ongoing ecological and population-level consequences of fish stranding in the Cheslatta River system.

# 6.0 REFERENCES


D'Andrea, J. 2022. Unpublished Cheslatta River Overview Document. Prepared for the Cheslatta Carrier Nation

McPhail, J.D. 2007. The Freshwater Fishes of British Columbia. University of Alberta Press. Edmonton, Alberta.

Nilsson, C., and K. Berggren. 2004. Alterations of riparian ecosystems caused by river regulation. BioScience 50:783−792.

Roias, S.M., E.M. Plate and T.G. Gerwing. 2020. CLBMON-4. Kinbasket Reservoir: Kinbasket Reservoir Fish Stranding Assessment. Final Report. LGL Report EA3734. Unpublished report by LGL Limited environmental research associates, Sidney, B.C., for BC Hydro Generations, Water License Requirements, Burnaby, B.C. 36 pp. + Appendices.

Visit Burns Lake. 2024. Skins Spillway Recreation Site. Accessed March 7, 2024 from https://visitburnslake.ca/to-do/skins-spillway-recreation-site/

# Appendix A
## Survey Map

Prepared for: **Cheslatta Carrier Nation and the Nechako Environmental Enhancement Fund**
Prepared by: Noot'senay Consulting Limited Partnership

**2023 Cheslatta River Stranding Assessments Study Area**

Overview Map

N

0 1 2

Kilometers

1:80,000

NAD 1983 BC Environment Albers

**LEGEND**

Reach Break

City

Community

Stream

Area of Interest

Waterbody


Service Layer Credits: Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NRCan, Parks Canada

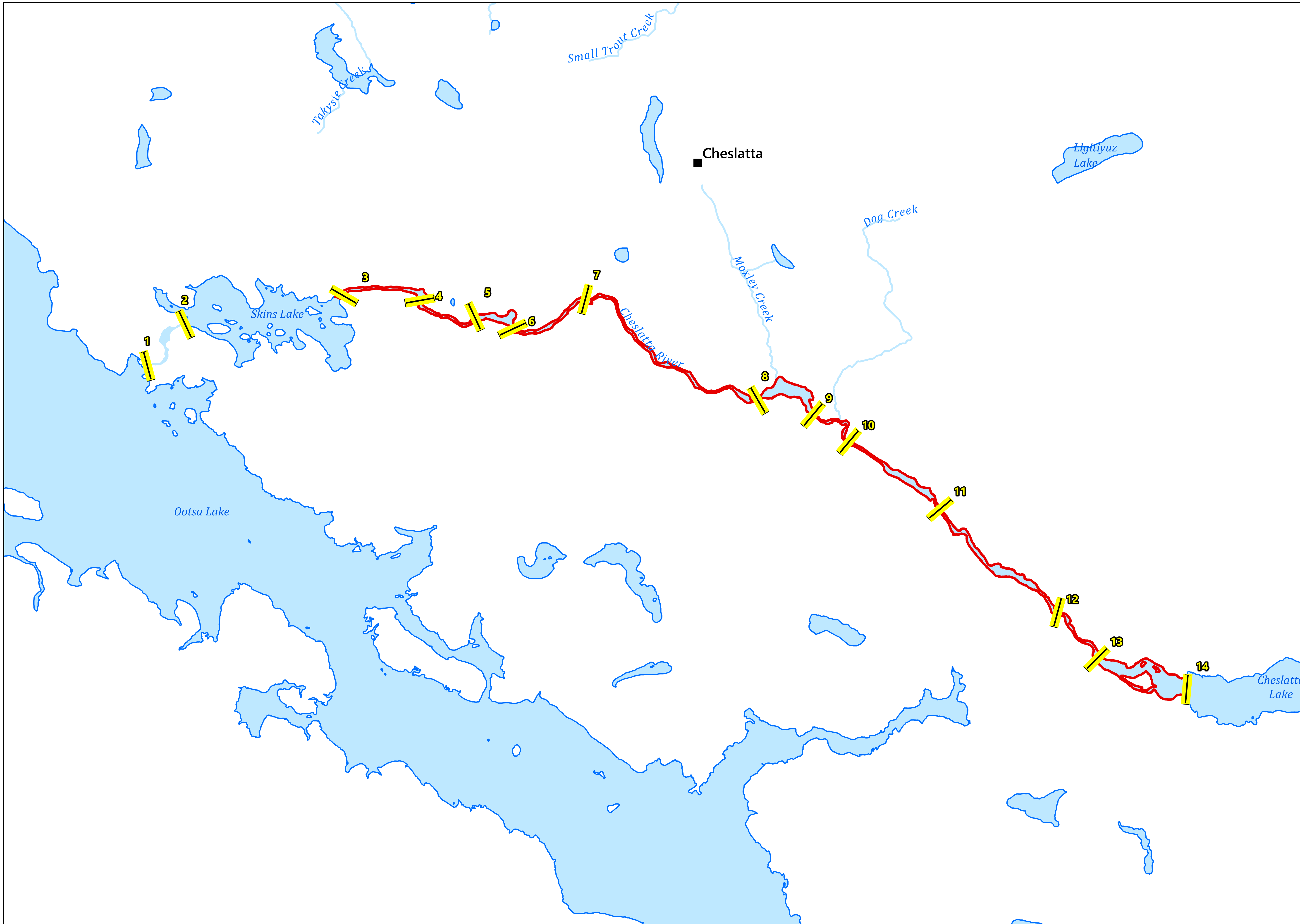
MAP NAME:

Cheslatta-CN_N2390-065_2024_AccessMap17x11

DATE:

**2024/01/25**

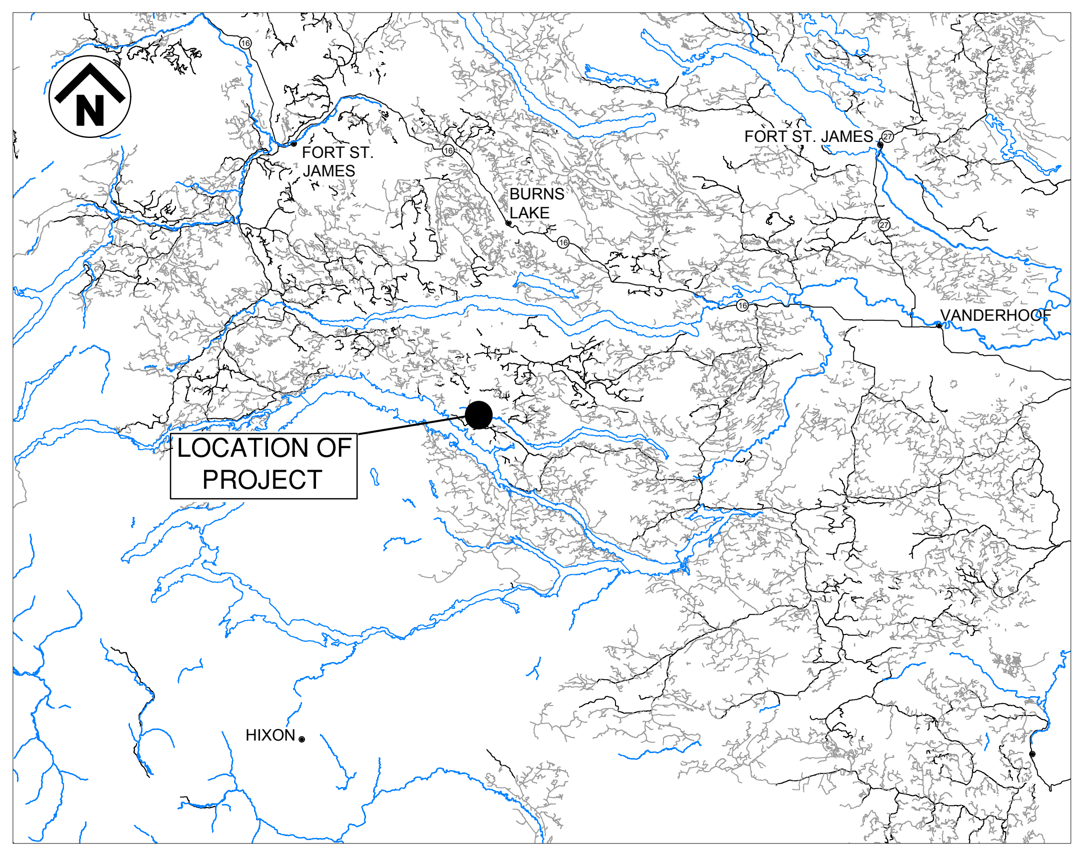
NOOT'SENAY CONSULTING LP



# Appendix B
## Pool Maps

Prepared for: **Cheslatta Carrier Nation and the Nechako Environmental Enhancement Fund**
Prepared by: Noot'senay Consulting Limited Partnership

# CHESLATTA RIVER
# FISH STRANDING STUDY




KEY MAP
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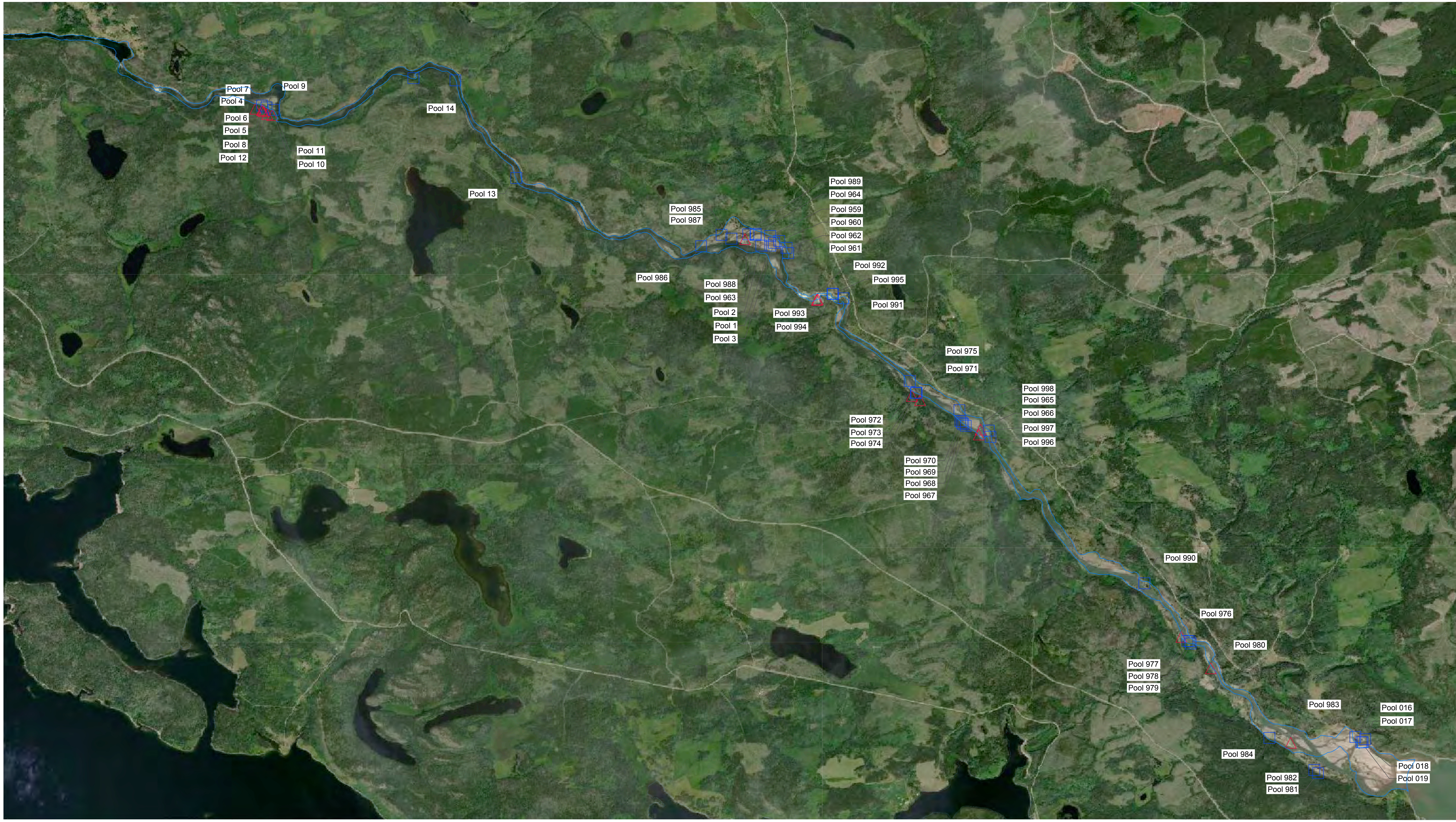


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PREPARED FOR:

CHESLATTA CARRIER NATION

NEEF
Nechako Environmental Enhancement Fund

Permit to Practice# 1000169

# CHESLATTA RIVER

## FISH STRANDING STUDY

OVERALL STUDY AREA

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# CHESLATTA RIVER
## FISH STRANDING STUDY

SITES - POOL 4-11

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# CHESLATTA RIVER

## FISH STRANDING STUDY

SITES - POOL 13-14

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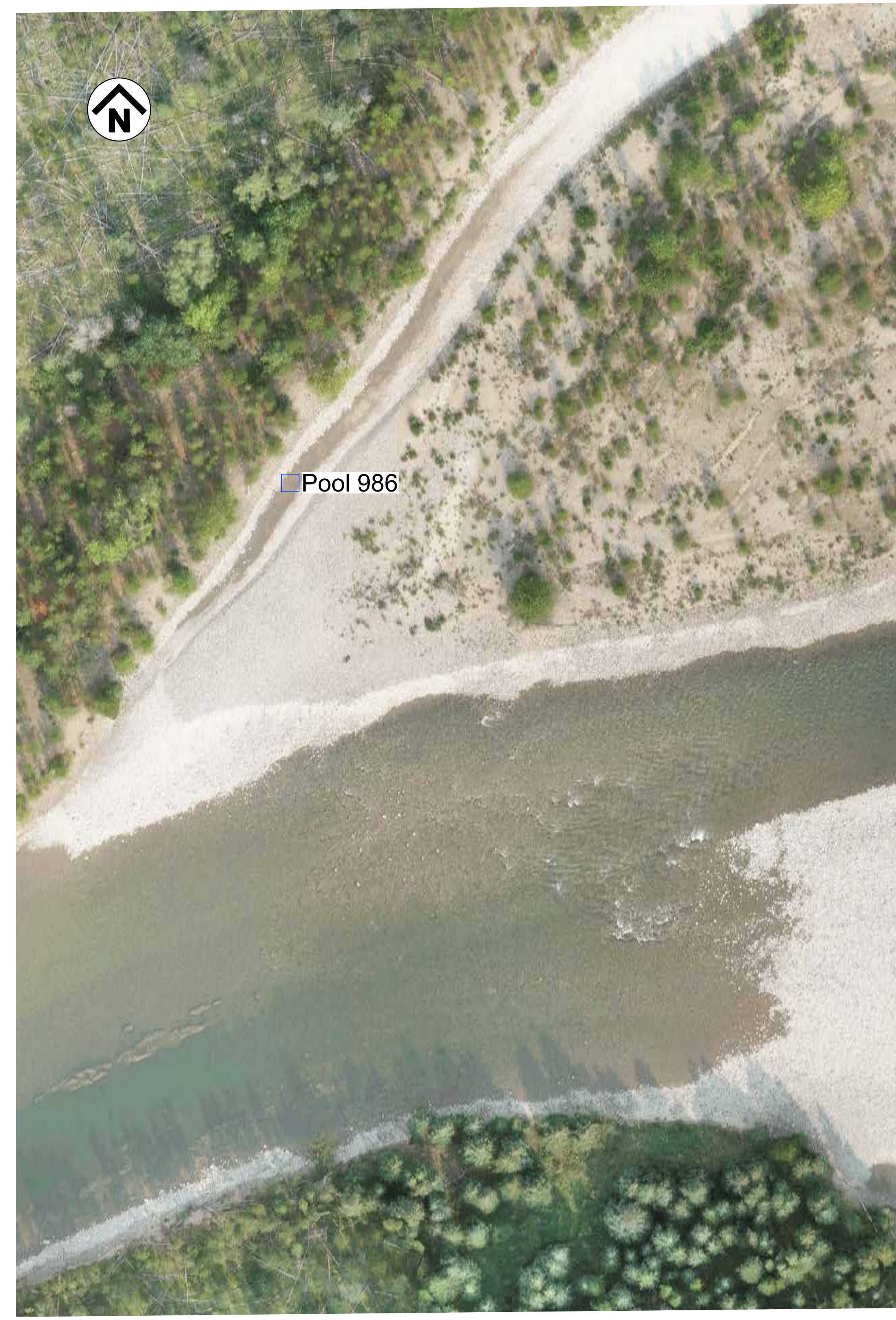


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# CHESLATTA RIVER

## FISH STRANDING STUDY

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# CHESLATTA RIVER

## FISH STRANDING STUDY

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# CHESLATTA RIVER

## FISH STRANDING STUDY

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# CHESLATTA RIVER

FISH STRANDING STUDY

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# CHESLATTA RIVER

## FISH STRANDING STUDY

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# CHESLATTA RIVER

## FISH STRANDING STUDY

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# CHESLATTA RIVER
## FISH STRANDING STUDY

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# CHESLATTA RIVER

## FISH STRANDING STUDY

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| LONGITUDE: | 125° 44' 51.01" | 10U | EASTING: | 318899 | REV: A |

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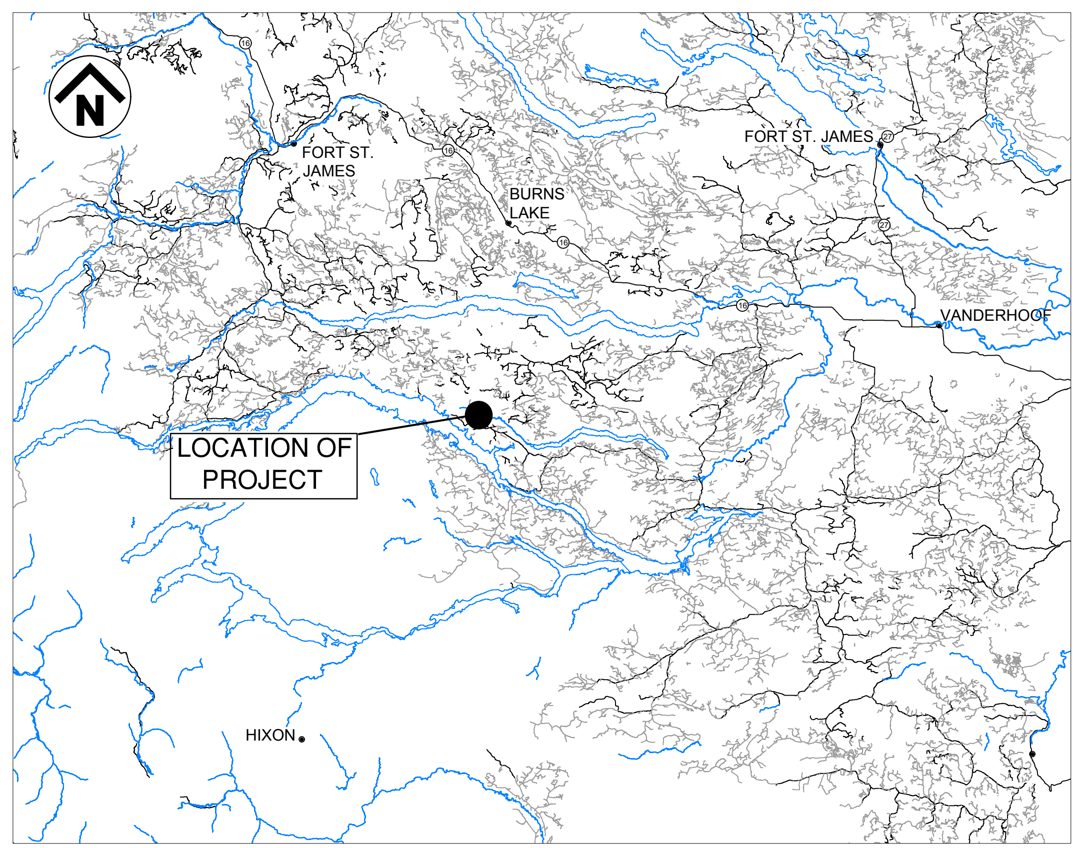
# Appendix C
## Contour Maps

Prepared for: **Cheslatta Carrier Nation and the Nechako Environmental Enhancement Fund**
Prepared by: Noot'senay Consulting Limited Partnership

# CHESLATTA RIVER
## FISH STRANDING STUDY
## CONTOUR MAPS




KEY MAP
NTS

ISSUED FOR REPORT

CHESLATTA RIVER
FISH STRANDING STUDY

Permit to Practice# 1000169

| CLIENT PROJECT CODE | DATE | DRAWING NUMBER | REV |
|---|---|---|---|
| | 2024-03-04 | N2390-065 | A |

**INTENDED TO BE PLOTTED ON 11"x17"**
**ANY COPIES or PDFS MAY NOT BE TO SCALE**

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## NOTES:

1. CONTOURS SHOWN AT 0.5m INTERVALS.

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SCALE: 0 5 1:1000 25m

CAD FILENAME SITES CONTOURS

PLOT DATE 2024-03-25

***INTENDED TO BE PLOTTED ON 11"x17"***
***ANY COPIES or PDFS MAY NOT BE TO SCALE***

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PROFESSIONAL OF RECORD

PREPARED FOR:

CHESLATTA CARRIER NATION

NEEF
Nechako Environmental Enhancement Fund

Permit to Practice# 1000169

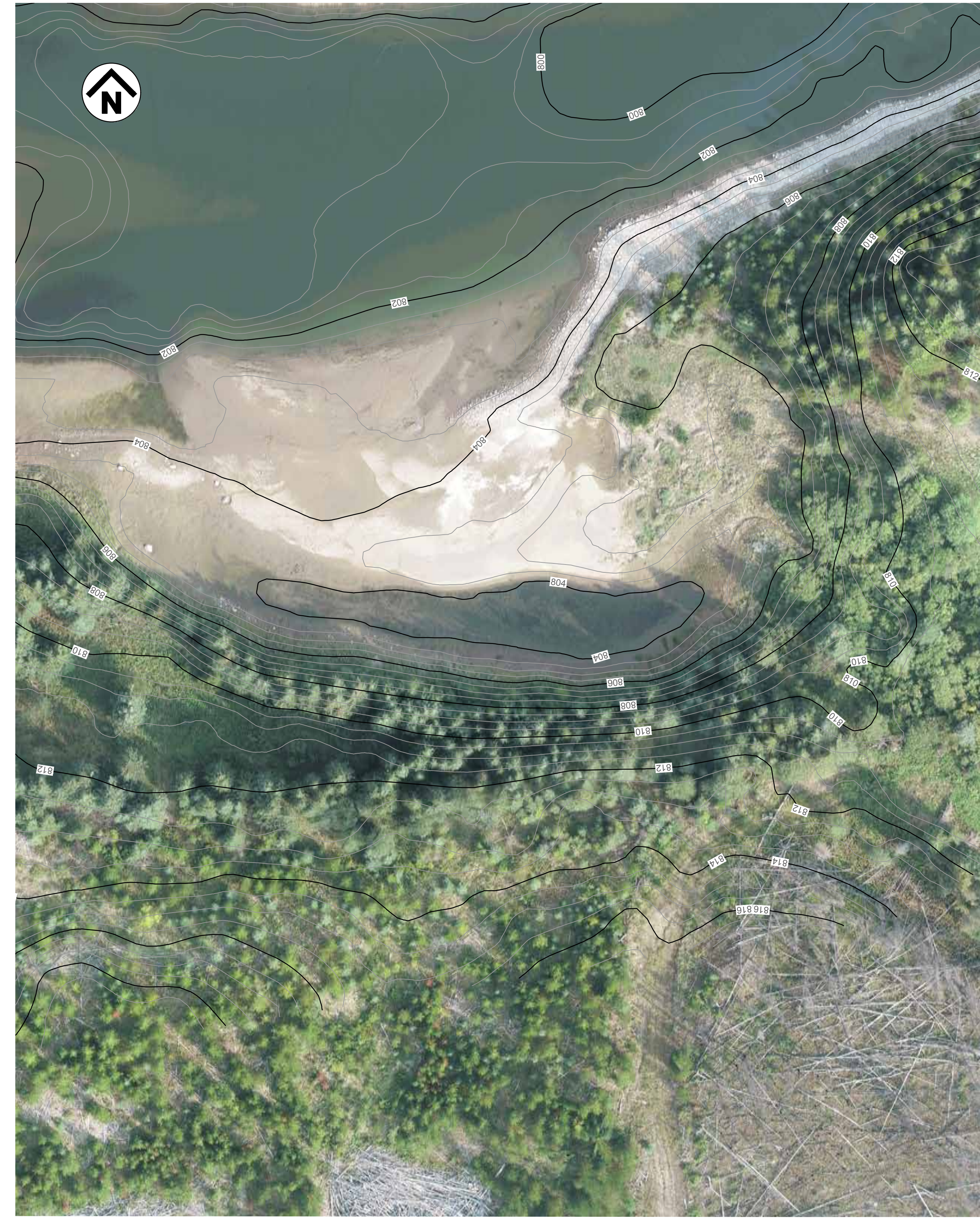
# CHESLATTA RIVER

## FISH STRANDING STUDY

SITES CONTOURS - POOL 4-11

**ISSUED FOR REPORT**

| LATITUDE: | 53° 45' 44.39" | NAD83 | NORTHING: | 5960582 | DRAWING NUMBER | REV |
|---|---|---|---|---|---|---|
| LONGITUDE: | 125° 44' 51.01" | 10U | EASTING: | 318899 | N2390-065-101a | A |


## NOTES:

1. CONTOURS SHOWN AT 0.5m INTERVALS.

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CAD FILENAME SITES CONTOURS

PLOT DATE 2024-03-25

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CHESLATTA CARRIER NATION

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Permit to Practice# 1000169

# CHESLATTA RIVER

## FISH STRANDING STUDY

SITES CONTOURS- POOL 13-14

**ISSUED FOR REPORT**

| LATITUDE: | 53° 45' 44.39" | NAD83 | NORTHING: | 5960582 | DRAWING NUMBER | REV |
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| LONGITUDE: | 125° 44' 51.01" | 10U | EASTING: | 318899 | N2390-065-102a | A |

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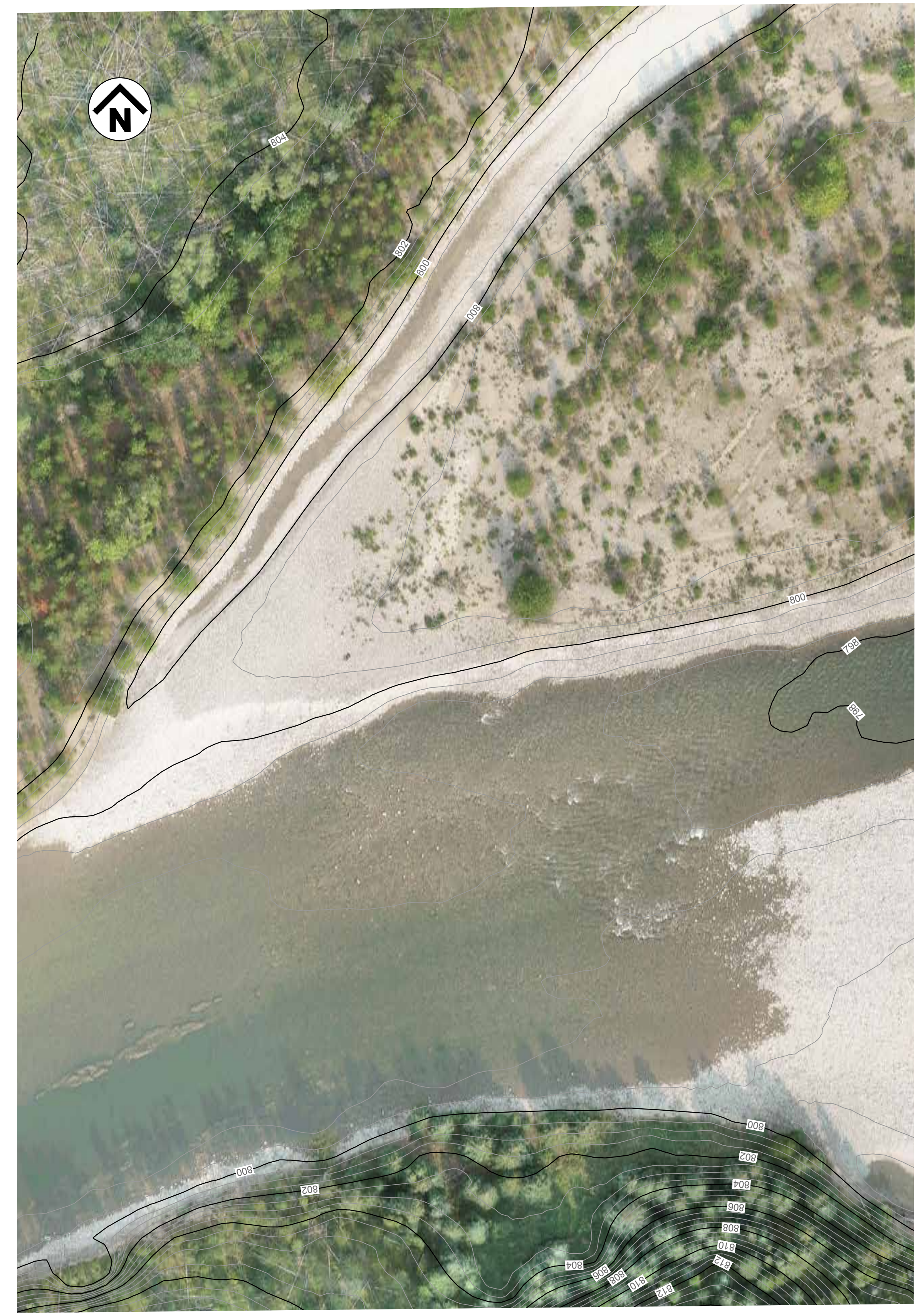


## NOTES:

1. CONTOURS SHOWN AT 0.5m INTERVALS.

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CAD FILENAME SITES CONTOURS

PLOT DATE 2024-03-25

***INTENDED TO BE PLOTTED ON 11"x17"***
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PROFESSIONAL OF RECORD

PREPARED FOR:

CHESLATTA CARRIER NATION

NEEF Nechako Environmental Enhancement Fund

Permit to Practice# 1000169

# CHESLATTA RIVER

## FISH STRANDING STUDY

SITES CONTOURS- EXTRA & 986

**ISSUED FOR REPORT**

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| LATITUDE: | 53° 45' 44.39" | NAD83 | NORTHING: | 5960582 | DRAWING NUMBER | REV |
| LONGITUDE: | 125° 44' 51.01" | 10U | EASTING: | 318899 | N2390-065-103a | A |

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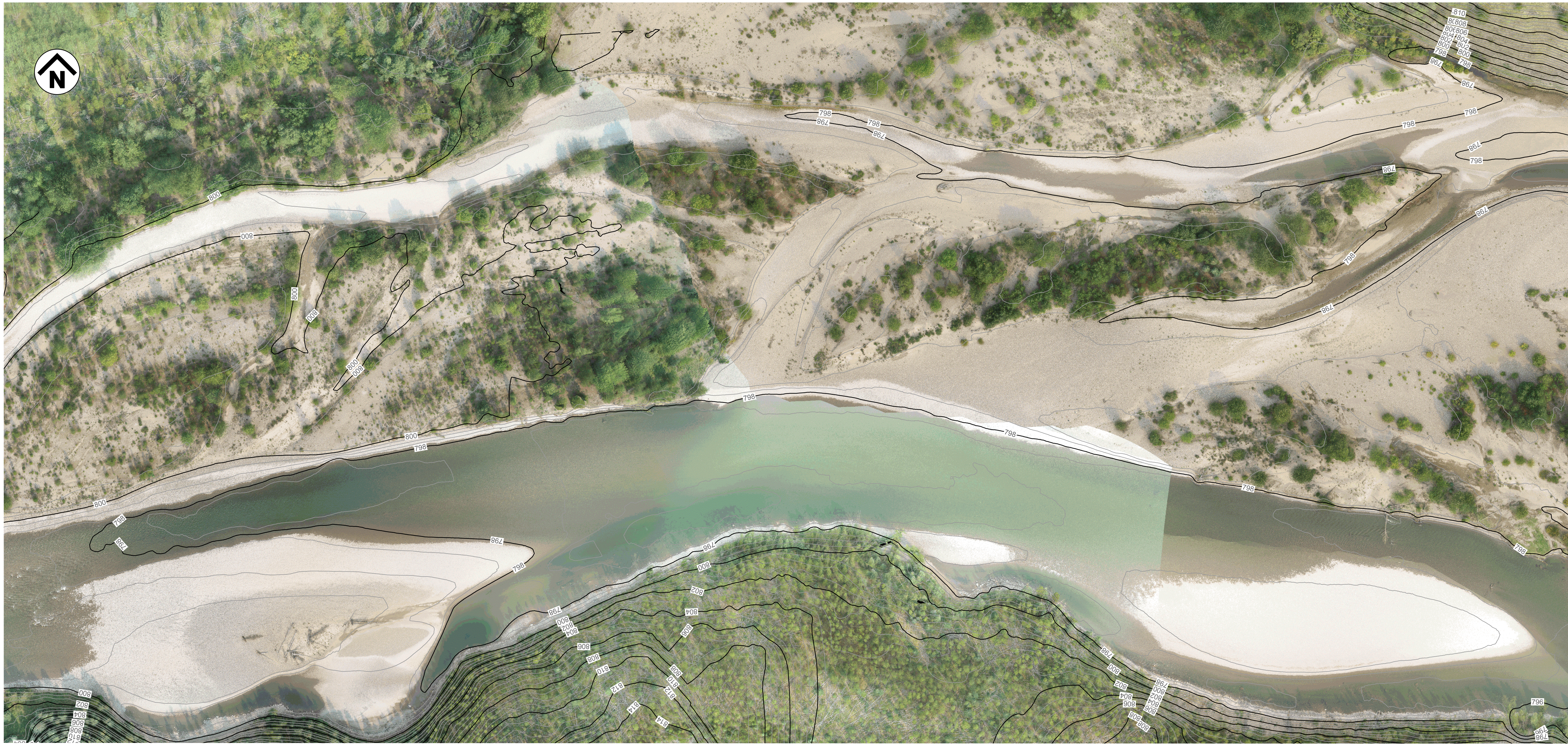


## NOTES:

1. CONTOURS SHOWN AT 0.5m INTERVALS.

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PLOT DATE 2024-03-25

***INTENDED TO BE PLOTTED ON 11"x17"***
***ANY COPIES or PDFS MAY NOT BE TO SCALE***

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PROFESSIONAL OF RECORD

PREPARED FOR:

CHESLATTA CARRIER NATION

NEEF
Nechako Environmental Enhancement Fund

Permit to Practice# 1000169

# CHESLATTA RIVER

## FISH STRANDING STUDY

SITES CONTOURS- 985-989 & 963&964

**ISSUED FOR REPORT**

| LATITUDE: | 53° 45' 44.39" | NAD83 | NORTHING: | 5960582 |
|---|---|---|---|---|
| LONGITUDE: | 125° 44' 51.01" | 10U | EASTING: | 318899 |

DRAWING NUMBER: N2390-065-104a

REV: A

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## NOTES:

1. CONTOURS SHOWN AT 0.5m INTERVALS.

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CAD FILENAME SITES CONTOURS

PLOT DATE 2024-03-25

***INTENDED TO BE PLOTTED ON 11"x17"***
***ANY COPIES or PDFS MAY NOT BE TO SCALE***

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PREPARED FOR:

CHESLATTA CARRIER NATION

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# CHESLATTA RIVER

## FISH STRANDING STUDY

SITES CONTOURS- 1-3 & 959-962

**ISSUED FOR REPORT**

| LATITUDE: | 53° 45' 44.39" | NAD83 | NORTHING: | 5960582 | DRAWING NUMBER | REV |
|---|---|---|---|---|---|---|
| LONGITUDE: | 125° 44' 51.01" | 10U | EASTING: | 318899 | N2390-065-105a | A |

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## NOTES:

1. CONTOURS SHOWN AT 0.5m INTERVALS.

SCALE: 0 5 1:1000 25m

CAD FILENAME SITES CONTOURS

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# CHESLATTA RIVER

## FISH STRANDING STUDY

SITES CONTOURS- 991-995

**ISSUED FOR REPORT**

| LATITUDE: | 53° 45' 44.39" | NAD83 | NORTHING: | 5960582 | DRAWING NUMBER | REV |
|---|---|---|---|---|---|---|
| LONGITUDE: | 125° 44' 51.01" | 10U | EASTING: | 318899 | N2390-065-106a | A |

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## NOTES:

1. CONTOURS SHOWN AT 0.5m INTERVALS.

SCALE: 0 5 1:1000 25m

CAD FILENAME SITES CONTOURS

PLOT DATE 2024-03-25

***INTENDED TO BE PLOTTED ON 11"x17"***
***ANY COPIES or PDFS MAY NOT BE TO SCALE***

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PREPARED FOR:

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# CHESLATTA RIVER

## FISH STRANDING STUDY

SITES CONTOURS- 971-975

**ISSUED FOR REPORT**

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| LATITUDE: | 53° 45' 44.39" | NAD83 | NORTHING: | 5960582 | DRAWING NUMBER: N2390-065-107a |
| LONGITUDE: | 125° 44' 51.01" | 10U | EASTING: | 318899 | REV: A |

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## NOTES:

1. CONTOURS SHOWN AT 0.5m INTERVALS.

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PLOT DATE: 2024-03-25

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PREPARED FOR:

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# CHESLATTA RIVER

## FISH STRANDING STUDY

SITES CONTOURS- 965-970&995-997

**ISSUED FOR REPORT**

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|---|---|---|---|---|---|
| LATITUDE: | 53° 45' 44.39" | NAD83 | NORTHING: | 5960582 | DRAWING NUMBER: N2390-065-108a |
| LONGITUDE: | 125° 44' 51.01" | 10U | EASTING: | 318899 | REV: A |

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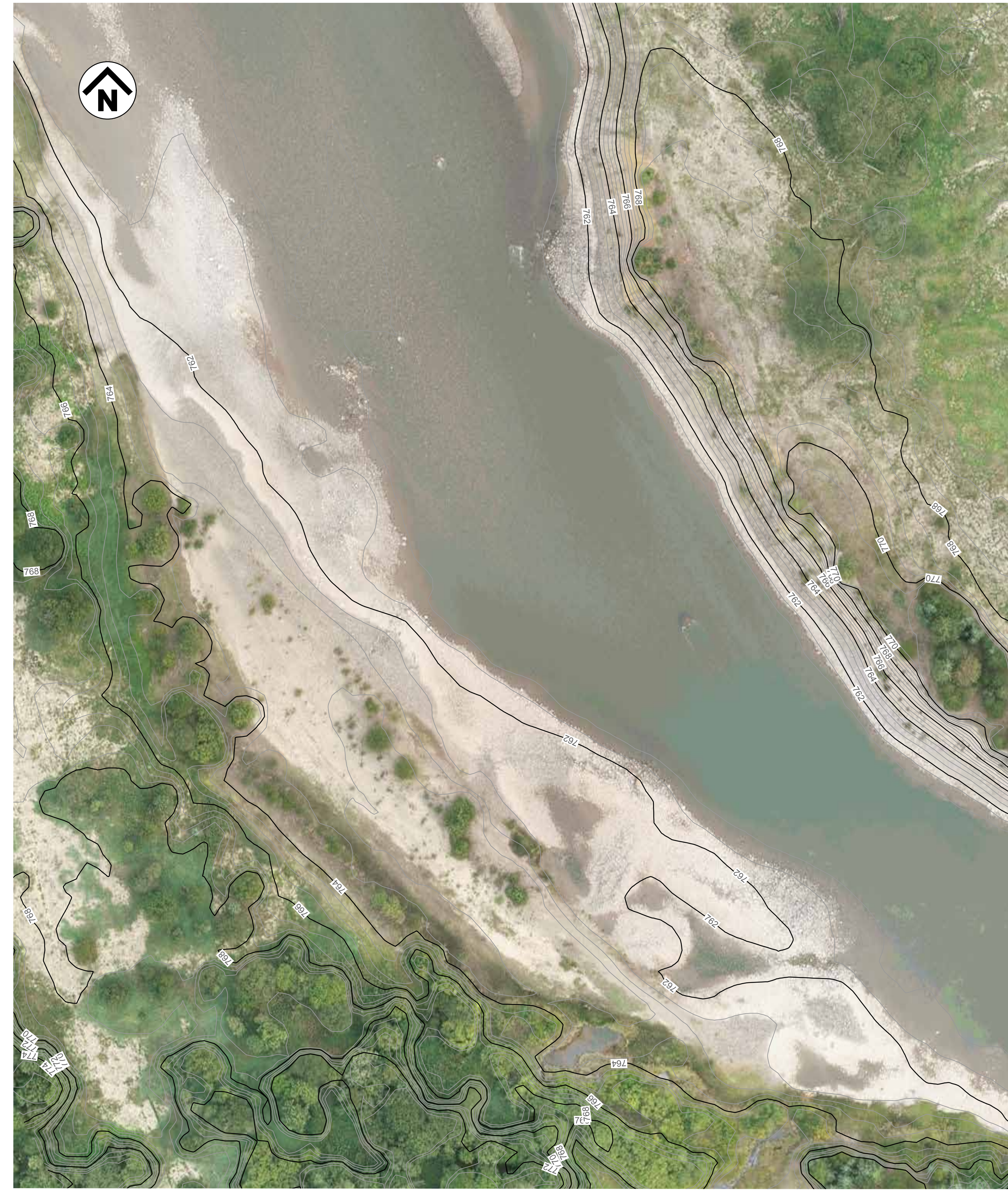


## NOTES:

1. CONTOURS SHOWN AT 0.5m INTERVALS.

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PLOT DATE 2024-03-25

***INTENDED TO BE PLOTTED ON 11"x17"***
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Nechako Environmental Enhancement Fund

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# CHESLATTA RIVER

## FISH STRANDING STUDY

SITES CONTOURS- 990&976-979

**ISSUED FOR REPORT**

| LATITUDE: | 53° 45' 44.39" | NAD83 | NORTHING: | 5960582 | DRAWING NUMBER | REV |
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| LONGITUDE: | 125° 44' 51.01" | 10U | EASTING: | 318899 | N2390-065-109a | A |

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## NOTES:

1. CONTOURS SHOWN AT 0.5m INTERVALS.

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CAD FILENAME: SITES CONTOURS
PLOT DATE: 2024-03-25

| REV | DATE | DESCRIPTION | DRN | CHK | QA | APP |
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PROFESSIONAL OF RECORD

PREPARED FOR:

CHESLATTA CARRIER NATION

NEEF Nechako Environmental Enhancement Fund

Permit to Practice# 1000169

# CHESLATTA RIVER

## FISH STRANDING STUDY

SITES CONTOURS- 980-984

**ISSUED FOR REPORT**

| LATITUDE: | 53° 45' 44.39" | NAD83 | NORTHING: | 5960582 | DRAWING NUMBER | REV |
|---|---|---|---|---|---|---|
| LONGITUDE: | 125° 44' 51.01" | 10U | EASTING: | 318899 | N2390-065-110a | A |

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# Appendix D
## Photos

Prepared for: **Cheslatta Carrier Nation and the Nechako Environmental Enhancement Fund**
Prepared by: Noot'senay Consulting Limited Partnership

# Initial Stranding Assessments

**Photo 1.** Overview of Pool 1 looking west towards the Cheslatta River mainstem (Photo date: August 20, 2023).

**Photo 2.** Overview of Pool 1 following the completion of the STMP program, looking east toward Photo 1 photo point (Photo date: August 23, 2023).

**Photo 3.** Juvenile mountain whitefish captured at Pool 1 (Photo date: August 20, 2023).

**Photo 4.** Overview of Pool 2 looking east away from the Cheslatta mainstem (Photo date: August 20, 2023).

**Photo 5.** Longnose sucker captured at Pool 2 (Photo date: August 20, 2023).

**Photo 6.** Pool 2 looking west toward the STMP mainstem following the completion of the STMP (Photo date: August 23, 2023).

**Photo 7.** Overview of Pool 3 (Photo date: August 20, 2023).

**Photo 8.** Young of year sucker *spp*. captured in Pool 3 (Photo date: August 20, 2023).

**Photo 9.** Overview of Pool 4 (Photo date: August 21, 2023).

**Photo 10.** Overview of the distance of Pool 4 to the mainstem (Photo date: August 21, 2023).

**Photo 11.** Overview of Pool 5 (Photo date: August 21, 2023).

**Photo 12.** Juvenile rainbow trout captured at Pool 5 (Photo date: August 21, 2023).

**Photo 13.** Overview of Pool 6 (Photo date: August 21, 2023).

**Photo 14.** Typical substrate and depth observed during assessment at Pool 6 (Photo date: August 21, 2023).

**Photo 15.** Overview of Pool 7 (Photo date: August 21, 2023).

**Photo 16.** Overview of the distance of Pool 7 to the mainstem (Photo date: August 21, 2023).

**Photo 17.** Overview of Pool 8 (Photo date: August 21, 2023).

**Photo 18.** Overview of the distance of Pool 8 to the mainstem (Photo date: August 21, 2023).

**Photo 19.** Overview of Pool 9 (Photo date: August 21, 2023).

**Photo 20.** Redside shiner captured at Pool 9 (Photo date: August 21, 2023).

**Photo 21.** Overview of Pool 10 (Photo date: August 22, 2023).

**Photo 22.** Overview of small isolated pool to the north of Pool 10 (Photo date: August 22, 2023).

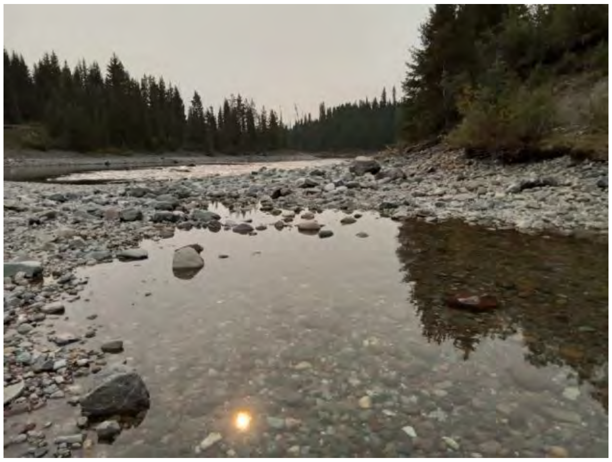

**Photo 23.** Overview of the distance of Pool 11 to the mainstem (Photo date: August 22, 2023).

**Photo 24.** Juvenile rainbow trout captured in Pool 11 (Photo date: August 22, 2023).

**Photo 25.** Overview of Pool 12 (Photo date: August 22, 2023).

**Photo 26.** Overview of the distance of Pool 12 distance to the mainstem (Photo date: August 22, 2023).

**Photo 27.** Overview of the distance of Pool 13 to the mainstem (Photo date: August 22, 2023).

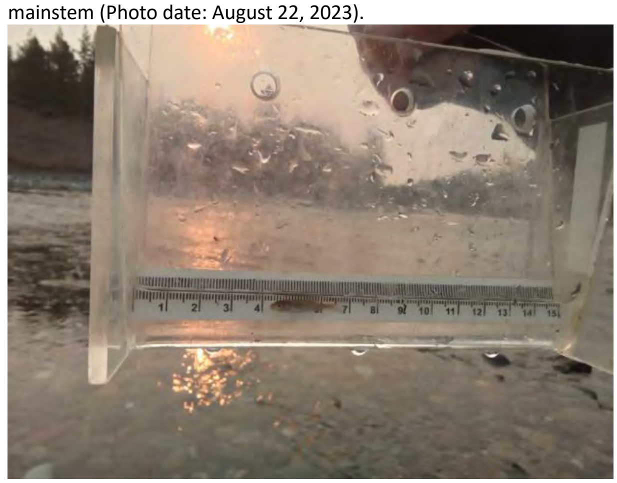

**Photo 28.** Young of year sucker *spp.* captured in Pool 13 (Photo date: August 22, 2023).

**Photo 29.** Overview of Pool 14 (Photo date: August 22, 2023).

**Photo 30.** Juvenile rainbow trout captured in Pool 14 (Photo date: August 22, 2023).

**Photo 31.** Overview of Pool 959 (Photo date: August 26, 2023).

**Photo 31.** Multiple sucker and cyprinid species captured in Pool 959 (Photo date: August 26, 2023).

**Photo 33.** Overview of Pool 960 (Photo date: August 26, 2023).

**Photo 34.** Overview of Pool 961 (Photo date: August 26, 2023).

**Photo 35.** Overview of Pool 962 (Photo date: August 26, 2023).

**Photo 36.** Multiple deceased rainbow trout identified within and surrounding Pool 962 (Photo date: August 26, 2023).


**Photo 37.** Overview of Pool 963 (Photo date: August 26, 2023).


**Photo 38.** Lake chub captured in Pool 963 (Photo date: August 26, 2023).


**Photo 39.** Overview of Pool 964 (Photo date: August 26, 2023).

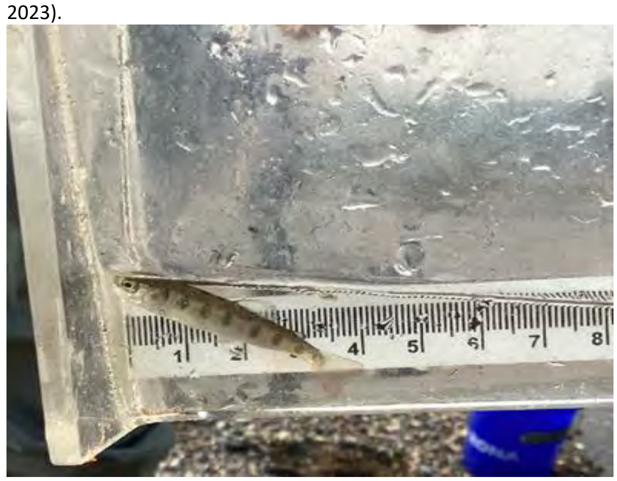
**Photo 40.** Rainbow trout captured in Pool 964 (Photo date: August 26, 2023).


**Photo 41.** Overview of Pool 965 (Photo date: August 25, 2023).


**Photo 42.** Overview of Pool 966 (Photo date: August 25, 2023).

**Photo 43.** Overview of Pool 967. This pool was identified to have highest stranding risk with over 1000 fish estimated to be trapped (Photo date: August 25, 2023).

**Photo 44.** Prickly sculpin captured in Pool 967 (Photo date: August 25, 2023).

**Photo 45.** Sub-adult rainbow trout captured in Pool 967 (Photo date: August 25, 2023).

**Photo 46.** Mountain whitefish captured in Pool 967 (Photo date: August 25, 2023).

**Photo 47.** Overview of Pool 968 (Photo date: August 25, 2023).

**Photo 48.** Rainbow trout and longnose sucker captured in Pool 968 (Photo date: August 25, 2023).

**Photo 49.** Overview of Pool 969 (Photo date: August 25, 2023).


**Photo 50.** Rainbow trout captured in Pool 969 (Photo date: August 25, 2023).

**Photo 51.** Overview of Pool 970 (Photo date: August 25, 2023).


**Photo 52.** Rainbow trout captured in Pool 970 (Photo date: August 25, 2023).

**Photo 53.** Overview of Pool 971 (Photo date: August 25, 2023).

**Photo 54.** Substrate overview of Pool 971 (Photo date: August 25, 2023).

**Photo 55.** Overview of Pool 972 (Photo date: August 25, 2023).

**Photo 56.** Overview of Pool 973 (Photo date: August 25, 2023).

**Photo 57.** Overview of substrate within Pool 973 (Photo date: August 25, 2023).

**Photo 58.** Rainbow trout captured within Pool 973 (Photo date: August 25, 2023).

**Photo 59.** Overview of Pool 974 (Photo date: August 25, 2023).

**Photo 60.** Rainbow trout captured within Pool 974 (Photo date: August 25, 2023).

**Photo 61.** Overview of Pool 975 (Photo date: August 25, 2023).

**Photo 62.** Adult mountain whitefish captured within Pool 975 (Photo date: August 25, 2023).

**Photo 63.** Juvenile burbot captured within Pool 975 (Photo date: August 25, 2023).

**Photo 64.** Juvenile burbot stranded within Pool 975 (Photo date: August 25, 2023).

**Photo 65.** Overview of Pool 976 (Photo date: August 25, 2023).

**Photo 66.** Overview of distance to mainstem from Pool 976 (Photo date: August 25, 2023).

**Photo 67.** Overview of Pool 977 (Photo date: August 24, 2023).

**Photo 68.** Rainbow trout captured within Pool 977 (Photo date: August 24, 2023).

**Photo 69.** Overview of Pool 978 (Photo date: August 24, 2023).

**Photo 70.** Overview of the distance to the mainstem from Pool 978 (Photo date: August 24, 2023).

**Photo 71.** Overview of Pool 979 (Photo date: August 24, 2023).

**Photo 72.** Young of year sucker captured within Pool 979 (Photo date: August 24, 2023).

**Photo 73.** Overview of Pool 980 (Photo date: August 24, 2023).

**Photo 74.** Overview of Pool 980 (Photo date: August 24, 2023).

**Photo 75.** Overview of Pool 981 (Photo date: August 24, 2023).

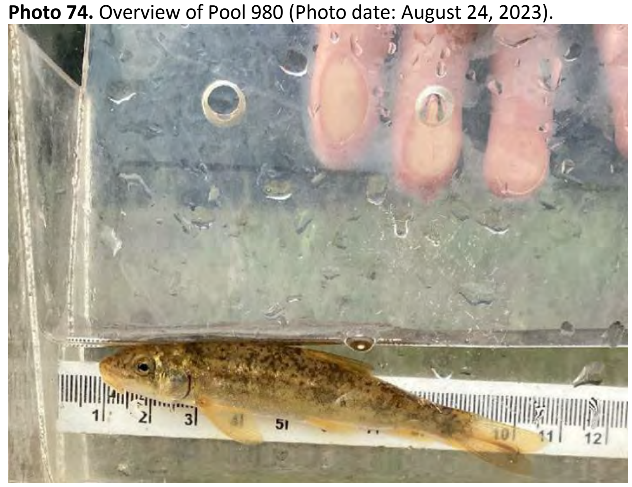

**Photo 76.** Juvenile longnose sucker captured within Pool 981 (Photo date: August 24, 2023).

**Photo 77.** Overview of Pool 982 (Photo date: August 24, 2023).

**Photo 78.** Young of year sucker captured within Pool 982 (Photo date: August 24, 2023).

**Photo 79.** Overview of Pool 983 (Photo date: August 24, 2023).

**Photo 80.** Overview of Pool 983 (Photo date: August 24, 2023).

**Photo 81.** Overview of Pool 984 (Photo date: August 24, 2023).

**Photo 82.** Prickly sculpin captured within Pool 984 (Photo date: August 24, 2023).

**Photo 83.** Overview of Pool 985 (Photo date: August 23, 2023).

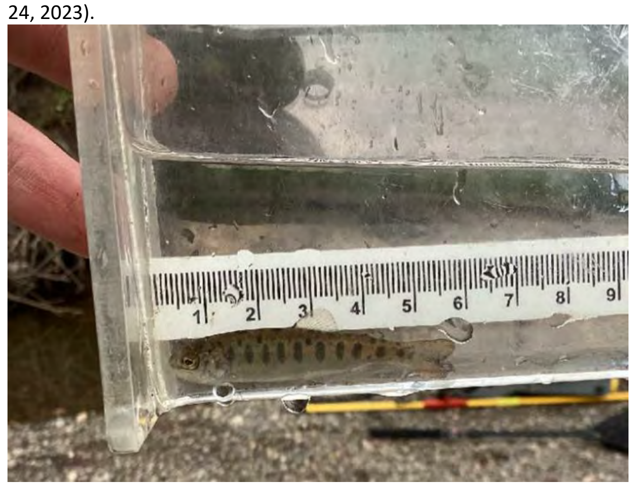

**Photo 84.** Rainbow trout captured within Pool 985 (Photo date: August 23, 2023).

**Photo 85.** Overview of Pool 986 (Photo date: August 23, 2023).

**Photo 86.** Juvenile largescale sucker, longnose sucker and rainbow trout captured within Pool 986 (Photo date: August 23, 2023).

**Photo 87.** Overview of Pool 987 (Photo date: August 23, 2023).

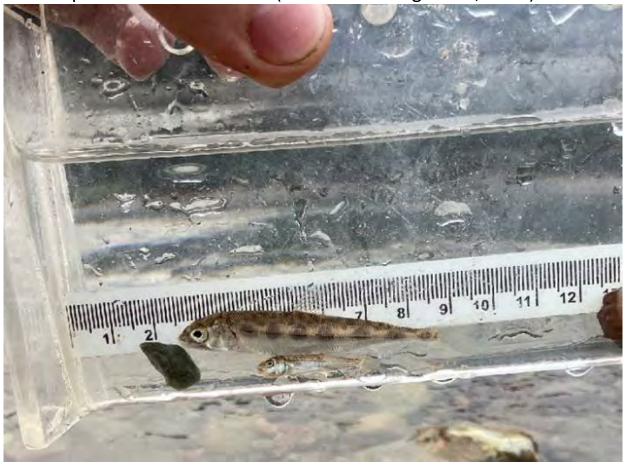

**Photo 88.** Mountain whitefish and young of year sucker captured within Pool 987 (Photo date: August 23, 2023).

**Photo 89.** Overview of Pool 988 (Photo date: August 23, 2023).

**Photo 90.** Rainbow trout captured within Pool 988 (Photo date: August 23, 2023).

**Photo 91.** Overview of Pool 989 (Photo date: August 23, 2023).

**Photo 92.** Substrate overview of Pool 989 (Photo date: August 23, 2023).

**Photo 93.** Overview of Pool 990 (Photo date: August 22, 2023).

**Photo 94.** Largescale sucker captured within Pool 990 (Photo date: August 22, 2023).

**Photo 95.** Overview of Pool 991 (Photo date: August 22, 2023).

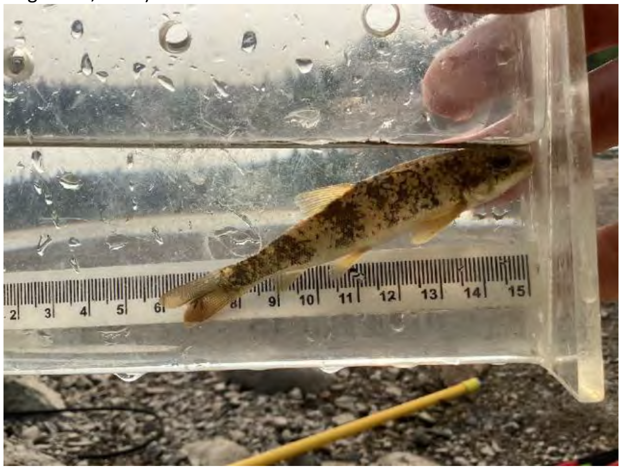

**Photo 96.** White sucker captured within Pool 991 (Photo date: August 22, 2023).

**Photo 97.** Overview of Pool 992. Unable to be sampled due to safety concerns for access (Photo date: August 22, 2023).

**Photo 98.** Overview of Pool 993. Unable to be sampled due to safety concerns for access (Photo date: August 22, 2023).

**Photo 99.** Overview of Pool 994 (Photo date: August 22, 2023).

**Photo 100.** Prickly sculpin captured within Pool 994 (Photo date: August 22, 2023).

**Photo 101.** Overview of Pool 995 (Photo date: August 22, 2023).

**Photo 102.** Prickly sculpin captured within Pool 995 (Photo date: August 22, 2023).

**Photo 103.** Overview of Pool 996 (Photo date: August 22, 2023).

**Photo 104.** Mountain whitefish captured in Pool 996 (Photo date: August 22, 2023).

**Photo 105.** Overview of Pool 997 (Photo date: August 22, 2023).

**Photo 106.** Redside shiner captured within Pool 997 (Photo date: August 22, 2023).

**Photo 107.** Overview of Pool 998 (Photo date: August 22, 2023).

**Photo 108.** Overview of Pool 998 (Photo date: August 26, 2023).

**Photo 109.** Overview of Pool 999 (Photo date: August 22, 2023).

**Photo 110.** Rainbow trout captured within Pool 999 (Photo date: August 22, 2023).

## Revisit Assessments

**Photo 111.** Overview of Pool 959 (Photo date: August 26, 2023).

**Photo 112.** Overview of Pool 959 (Photo date: September 6, 2023).

**Photo 113.** Overview of Pool 963 (Photo date: August 26, 2023).

**Photo 114.** Overview of Pool 963 (Photo date: September 6, 2023).

**Photo 115.** Overview of increased algal growth within Pool 963 (Photo date: September 6, 2023).

**Photo 116.** Overview of Pool 963 looking downgrade towards Pool 959 (Photo date: September 6, 2023).


**Photo 117.** Overview of Pool 996 (Photo date: August 23, 2023).


**Photo 118.** Overview of Pool 996 (Photo date: September 7, 2023).


**Photo 119.** Decreased water quality and visibility noted at Pool 996 (Photo date: September 7, 2023).


**Photo 120.** Overview of the distance to the mainstem from Pool 996. Increased algal growth on boulders noted (Photo date: September 7, 2023).


**Photo 121.** Overview of Pool 997 (Photo date: August 23, 2023).


**Photo 122.** Overview of Pool 997 (Photo date: September 7, 2023).


**Photo 123.** Overview of Pool 999 (Photo date: August 23, 2023).


**Photo 124.** Overview of Pool 999 (Photo date: September 7, 2023).


**Photo 125.** Decreased water quality and visibility noted at Pool 999 (Photo date: September 7, 2023).


**Photo 126.** Additional (not recorded) stranding pool created at Pool 999 site during water level recession (Photo date: September 7, 2023).


**Photo 127.** Additional pool identified in Reach 13 (Pool 16) (Photo date: September 7, 2023).


**Photo 128.** Additional pool identified in Reach 13 (Pool 17) (Photo date: September 7, 2023).

**Photo 129.** Additional pool identified in Reach 13 (Pool 18) (Photo date: September 7, 2023).

**Photo 130.** Additional pool identified in Reach 13 (Pool 19) (Photo date: September 7, 2023).

# Pre- and Post-STMP Photographs

**Photo 131.** Standard photo point (#1) on August 21st showing the pre-STMP flow conditions along the Cheslatta River (Section 8).

**Photo 132.** Standard photo point (#1) on August 23rd showing the post-STMP flow conditions along the Cheslatta River (Section 8).

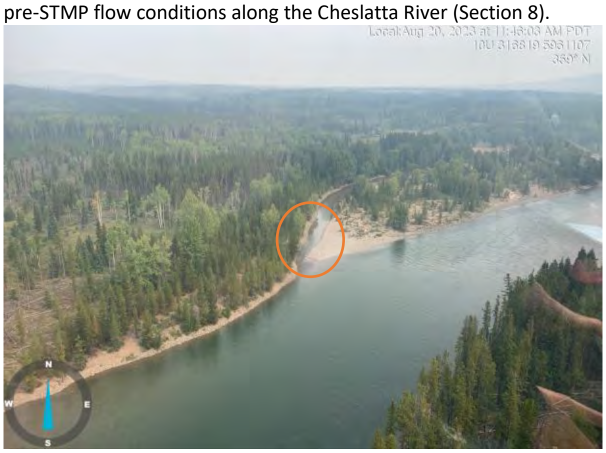

**Photo 133.** Potential isolated pool site identified during the August 20th aerial reconnaissance survey (Section 8). Orange circle outlines the location of the isolated pool shown in Photo 134.

**Photo 134.** Isolated Pool 986 (Circled in Photo 133) sampled on August 23rd following the completion of the aerial reconnaissance survey.

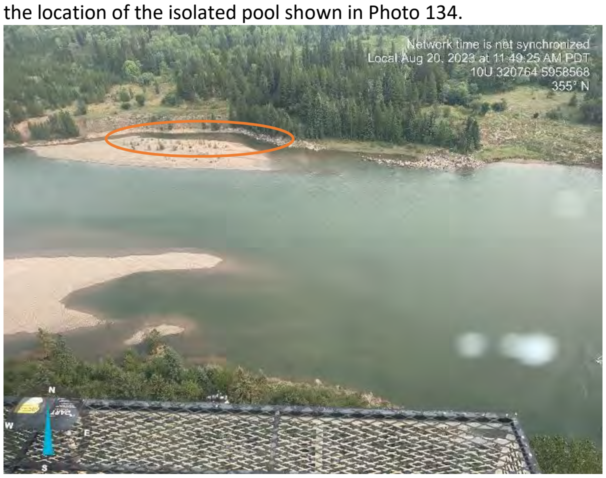



**Photo 135.** Pool 997 and 996 during the August 20th aerial reconnaissance survey (Section 8). Orange circle outlines the approximate location of the isolated pool shown in Photo 136.

**Photo 136.** Isolated Pool 997 (Circled in Photo 135) sampled on August 22[nd] following the completion of the aerial reconnaissance survey.

**Photo 137.** Pool 973 during the August 20th aerial reconnaissance survey (Section 8). Orange circle outlines the approximate location of the isolated pool shown in Photo 138.


**Photo 138.** Isolated Pool 973 (Circled in Photo 137) sampled on August 24th following the completion of the aerial reconnaissance survey.

**Photo 139.** Pool 984 during the August 20th aerial reconnaissance survey (Section 8). Orange circle outlines the approximate location of the isolated pool shown in Photo 140.


**Photo 140.** Isolated Pool 984 (Circled in Photo 139) sampled on August 23rd following the completion of the aerial reconnaissance survey.

# Additional Stranding Photographs

**Photo 141.** Fish stranding identified at the outflow of isolated pool (Photo date: August 22, 2023).

**Photo 142.** Overview of fish stranding identified in Photo 141 (Photo date: August 22, 2023).

**Photo 143.** Mountain whitefish stranding identified at the outflow of isolated Pool 996 (Photo date: August 22, 2023).

**Photo 144.** Overview of deceased mountain whitefish at the outflow of isolated Pool 996 (Photo date: August 22, 2023).

**Photo 145.** Stranded unidentified salmonid. Sign of predation from scavenger present (Photo date: August 26, 2023).

**Photo 146.** Multiple deceased rainbow trout identified surrounding pool. (Photo date: August 26, 2023).

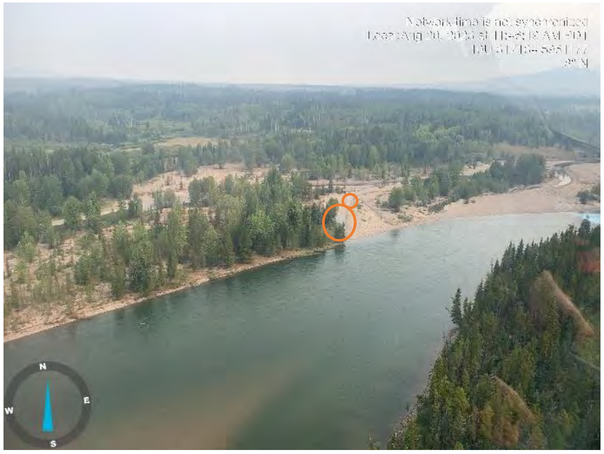

**Photo 147.** Additional isolated pools identified prior to the completion of STMP. Suggests possible mid-STMP stranding events (Photo date: August 20, 2023).

**Photo 148.** Additional isolated pools identified prior to the completion of STMP. Suggests possible mid-STMP stranding events (Photo date: August 20, 2023).

# Appendix E
## Game Camera Overview

Prepared for: **Cheslatta Carrier Nation and the Nechako Environmental Enhancement Fund**
Prepared by: Noot'senay Consulting Limited Partnership


**Game Camera #1, Reach 8 (10U 317669.51 m E 5961457.08 m N)**

**Focused on Pool 959, 963 and 964**


**Game Camera #2, Reach 10 (10U 320382.01 m E 5959120.05 m N)**

**Focused on** Mainstem of upper Cheslatta River

# Appendix F

## Water Quality, Habitat Characteristics, Fish Collection

Prepared for: **Cheslatta Carrier Nation and the Nechako Environmental Enhancement Fund**
Prepared by: Noot'senay Consulting Limited Partnership

**Table F-1. Water Quality- Initial Ground Assessment Summary**

| Pool ID | Date Sampled | Temperature °C (Pool) | Temperature °C (Mainstem) | Temperature °C (Air) | pH | Conductivity (uS/cm) | Dissolved Oxygen (mg/L) | Turbidity | Photo # |
|---|---|---|---|---|---|---|---|---|---|
| **1** | 08/21/23 | 15.9 | nd | 16.1 | nd | 121 | 1.81 | Clear | 1-3 |
| **2** | 08/21/23 | 17.4 | 16.7 | 18.1 | 8.3 | 66 | 4.85 | Clear | 4-6 |
| **3** | 08/21/23 | 17.4 | 16.7 | 18 | 8.7 | 203 | 3.78 | Clear | 7-8 |
| **4** | 08/22/23 | 16 | 16.3 | 12 | 8.08 | 68 | 7% ** | Clear | 9-10 |
| **5** | 08/22/23 | 14.5 | 16.3 | 16 | 7.92 | 64 | 5.8% ** | Clear | 11-12 |
| **6** | 08/22/23 | 18.3 | 16.1 | 16 | 7.75 | 76 | 7.75% ** | Clear | 13-14 |
| **7** | 08/22/23 | 16.2 | 16.1 | 17 | 7.9 | 85 | 4.8% ** | Clear | 15-16 |
| **8** | 08/22/23 | 19 | 16.1 | 18 | 7.8 | 76 | 15% ** | Clear | 17-18 |
| **9** | 08/22/23 | 19.5 | 16.1 | 18 | 8.04 | 76 | 16.2% ** | Clear | 19-20 |
| **10** | 08/23/23 | 13 | 16.1 | 8 | 7.86 | 104 | 16.3% ** | Clear | 21-22 |
| **11** | 08/23/23 | 19.6 | 16.1 | 8 | 7.42 | 109 | 2.22 | Clear | 23-24 |
| **12** | 08/23/23 | 12.6 | 16.1 | 11 | 7.65 | 90 | 1.89 | Clear | 25-26 |
| **13** | 08/24/23 | 10.7 | 15.8 | 9 | 7.74 | 195 | 2.51 | Clear | 27-28 |
| **14** | 08/25/23 | 13.3 | 16.1 | 8 | 9.7 | 112 | 9 | Clear | 29-30 |
| **959** | 08/26/23 | 19.42 | 16.1 | 25 | 7.73 | 106 | 4.2 | Clear | 31-32 |
| **960** | 08/26/23 | 17.6 | 15.3 | 22.1 | 8.7 | 172 | 6.85 | Clear | 33 |
| **961** | 08/26/23 | 18.1 | 15.2 | 21 | nd | nd | nd | Clear | 34 |
| **962** | 08/26/23 | nd | nd | 18 | nd | nd | nd | Turbid | 35-36 |
| **963** | 08/26/23 | 13.9 | 15.2 | 16 | 8.3 | 117 | 6.46 | Clear | 37-38 |
| **964** | 08/26/23 | 14.8 | 15.2 | 12.5 | 7.93 | 178 | 1.37 | Clear | 39-40 |
| **965** | 08/25/23 | 19.1 | 15.1 | 23.9 | 8 | 105 | 4.8 | Clear | 41 |
| **966** | 08/25/23 | 19.1 | 15.1 | 24.2 | 8.1 | 172 | 3.84 | Clear | 42 |
| **967** | 08/25/23 | 19 | 15.1 | 25.6 | 7.9 | 100 | 6.19 | Clear | 43-46 |
| **968** | 08/25/23 | 18 | 15.1 | 20.1 | 8.1 | 127 | 6.17 | Clear | 47-48 |
| **969** | 08/25/23 | 17.5 | 15.1 | 18.7 | 8.7 | 119 | 5.56 | Clear | 49-50 |
| **970** | 08/25/23 | nd | 15.1 | 18.4 | 8 | 176 | 4.46 | Clear | 51-52 |
| **971** | 08/25/23 | 14.8 | 15.1 | 18 | 8.3 | 314 | 7.13 | Clear | 53-54 |
| **972** | 08/25/23 | 13.4 | 15.1 | 19 | nd | nd | nd | Clear | 55 |
| **973** | 08/25/23 | 13.6 | 15.1 | 19 | 8.5 | 295 | 6.92 | Clear | 56-58 |
| **974** | 08/25/23 | 12.6 | 15.1 | 11 | 7.9 | 386 | 5.72 | Clear | 59-60 |
| **975** | 08/25/23 | 9.3 | 15.2 | 11 | 8.2 | 288 | 5.93 | Clear | 61-64 |
| **976** | 08/24/23 | 19.6 | 16.1 | 22.9 | 8.5 | 633 | 5.33 | Clear | 65-66 |
| **977** | 08/24/23 | 18.6 | 16.1 | 20.5 | 8.61 | 298 | 4.27 | Clear | 67-68 |
| **978** | 08/24/23 | 17.4 | 16.1 | 19.7 | 8.2 | 382 | 6.8 | Clear | 69-70 |
| **979** | 08/24/23 | 17.7 | 16.1 | 19.7 | 8.2 | 496 | 7.84 | nd* | 71-72 |
| **980** | 08/24/23 | 14.3 | nd | 17.6 | 9.2 | 234 | 2.43 | Clear | 73-74 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **981** | 08/23/23 | 13.1 | 15.1 | 16 | 8.3 | 308 | 4.84 | Clear | 75-76 |
| **982** | 08/24/23 | 12.4 | 15.1 | 13.5 | 8.9 | 353 | 4.52 | Clear | 77-78 |
| **983** | 08/24/23 | 15.5 | 15.1 | 12 | nd | nd | 3.92 | N/A | 79-80 |
| **984** | 08/24/23 | 13.2 | nd | 11.7 | 9.6 | 149 | 5.85 | Clear | 81-82 |
| **985** | 08/23/23 | 14.4 | 16 | 15.3 | 8.2 | 125 | 4.12 | Clear | 83-84 |
| **986** | 08/23/23 | 13 | 16 | 14.9 | 8.1 | 166 | 5.77 | Clear | 85-86 |
| **987** | 08/23/23 | nd | nd | nd | nd | nd | nd | Clear | 87-88 |
| **988** | 08/23/23 | 11.9 | nd | 11.8 | 9.4 | 212 | 3.99 | Clear | 89-90 |
| **989** | 08/23/23 | nd | nd | 8 | 8.1 | 182 | 4.79 | Clear | 91-92 |
| **990** | 08/22/23 | 19.7 | 15.5 | 21 | 8.3 | 118 | 5.71 | Clear | 93-94 |
| **991** | 08/22/23 | 18.1 | 15.5 | 19.7 | 8.6 | 202 | 3.88 | Clear | 95-96 |
| **992** | 08/22/23 | Pool unable to be sampled (safety concern) | | | | | | | 97 |
| **993** | 08/22/23 | | | | | | | | 98 |
| **994** | 08/21/23 | 17.9 | 15.7 | 17.6 | 8.9 | 66 | 5.23 | Clear | 99-100 |
| **995** | 08/22/23 | 17.2 | 15.5 | 18.8 | 8.1 | 89 | 4.36 | Clear | 101-102 |
| **996** | 08/22/23 | 12 | 15.5 | 14.8 | 8.3 | 150 | 4.02 | Clear | 103-104 |
| **997** | 08/21/23 | 13.7 | 15.5 | nd | 9 | 140 | 5.45 | Clear | 105-106 |
| **998** | 08/22/23 | 15.9 | 15.5 | 12.4 | 7.9 | 206 | 3.83 | Clear | 107-108 |
| **999** | 08/22/23 | 15.8 | 15.5 | 10.5 | 8.2 | 72 | 5.5 | Clear | 109-110 |

* nd = no data

** mg/L unknown, dissolved oxygen recorded as a percentage (%).

**Table F-2. Water Quality – Reassessment Summary**

| Pool ID | Date Sampled | Temperature °C (Pool) | Temperature °C (Mainstem) | Temperature °C (Air) | pH | Conductivity (uS/cm) | Dissolved Oxygen (mg/L) | Turbidity | Photo # |
|---|---|---|---|---|---|---|---|---|---|
| **Pools Resampled** | | | | | | | | | |
| **959** | 09/06/23 | 15.19 | 15.8 | 15 | 8.18 | 221 | 6.05 | Clear | 111-112 |
| **963** | 09/06/23 | 16.29 | 16 | 13 | 8.06 | 140 | 5.73 | Clear | 113-116 |
| **996** | 09/07/23 | 11.52 | 16.9 | 9 | 8.27 | 301 | nd | Low Turbidity | 117-120 |
| **997** | 09/07/23 | 11.79 | 16.8 | 8 | 8.39 | 247 | 9.62 | Low Turbidity | 121-122 |
| **999** | 09/07/23 | 12.05 | 16.1 | 8 | 8.25 | 146 | 10.51 | Turbid | 123-126 |
| **Additional Pools Identified** | | | | | | | | | |
| **16** | 09/07/23 | 14 | 15.9 | 15 | 7.98 | 181 | 6.2 | Low Turbidity | 127 |
| **17** | 09/07/23 | 14.9 | 16 | 15 | 7.79 | 173 | 4.97 | Clear | 128 |
| **18** | 09/07/23 | 15.02 | 15.9 | 15 | 8.06 | 351 | 9.37 | Cloudy | 129 |
| **19** | 09/07/23 | 15.3 | 15.8 | nd | 8.01 | 297 | 7.66 | Cloudy | 130 |

* nd = no data

**Table F-3 Habitat Characteristics - Initial Ground Assessment Summary**

| Pool ID | Date Sampled | Substrate (Dominant) | Substrate (Sub-dominant) | Estimated Pool Length | Estimated Pool Width | Maximum Pool Depth | Photo # |
|---|---|---|---|---|---|---|---|
| **1** | 08/21/23 | Fines | Gravel | 20 | 5.7 | 0.47 | 1-3 |
| **2** | 08/21/23 | Gravel | Fines | 110 | 11.4 | 0.42 | 4-6 |
| **3** | 08/21/23 | Fines | Gravel | 25 | 6.89 | 0.19 | 7-8 |
| **4** | 08/22/23 | Gravel | Cobbles | 35 | 11.3 | 0.32 | 9-10 |
| **5** | 08/22/23 | Cobble | Fines | 35 | 9.5 | 1.29 | 11-12 |
| **6** | 08/22/23 | Cobble | Gravel | 30 | 10 | 0.68 | 13-14 |
| **7** | 08/22/23 | Gravel | Cobble | 25 | 7.9 | 0.98 | 15-16 |
| **8** | 08/22/23 | Gravel | Cobble | 45 | 12 | 0.30 | 17-18 |
| **9** | 08/22/23 | Cobble | Gravel/boulder | 25 | 6.6 | 0.15 | 19-20 |
| **10** | 08/23/23 | Cobble | Gravel | 30 | 5.7 | 0.16 | 21-22 |
| **11** | 08/23/23 | Cobble | Gravel/Boulder | 25 | 6.5 | 0.30 | 23-24 |
| **12** | 08/23/23 | Gravel | Cobble | 15 | 4.5 | 0.42 | 25-26 |
| **13** | 08/24/23 | Gravel | Cobble | 20 | 2.5 | 0.20 | 27-28 |
| **14** | 08/25/23 | Fines | Fines | 60 | 10.2 | 1.10 | 29-30 |
| **959** | 08/26/23 | Cobble | Fines | 200 | 10 | 1.50 | 31-32 |
| **960** | 08/26/23 | Gravel | Cobble | 100 | 2.5 | 1.75 | 33 |
| **961** | 08/26/23 | Gravel | Fines | 2 | 1.5 | 0.25 | 34 |
| **962** | 08/26/23 | Fines | Cobble | 1 | 0.2 | 0.05 | 35-36 |
| **963** | 08/26/23 | Cobble | Gravel | 70 | 4 | 0.15 | 37-38 |
| **964** | 08/26/23 | Cobble | Gravel | 4 | 1.5 | 0.13 | 39-40 |
| **965** | 08/25/23 | Gravel | Fines | 4 | 2 | 0.08 | 41 |
| **966** | 08/25/23 | Cobble | Gravel | 3 | 2.5 | 0.40 | 42 |
| **967** | 08/25/23 | Cobble | Gravel/Fines | 100 | 5 | 0.45 | 43-46 |
| **968** | 08/25/23 | Cobble | Boulder/Fines | 20 | 3.5 | 0.25 | 47-48 |
| **969** | 08/25/23 | Cobble | Gravel/Fines | 15 | 2.2 | 0.15 | 49-50 |
| **970** | 08/25/23 | Cobble | Fines | 4 | 2 | 0.13 | 51-52 |
| **971** | 08/25/23 | Cobble | Fines | 10 | 3.5 | 0.15 | 53-54 |
| **972** | 08/25/23 | Cobble | Fines | 5 | 1 | 0.10 | 55 |
| **973** | 08/25/23 | Cobble | Fines | 30 | 3 | 0.25 | 56-58 |
| **974** | 08/25/23 | Cobble | Fines | 8 | 2.5 | 0.15 | 59-60 |
| **975** | 08/25/23 | Cobble | Fines | 6 | 2.5 | 0.20 | 61-64 |
| **976** | 08/24/23 | Gravel/Fines | Cobbles | 30 | 10 | 0.37 | 65-66 |
| **977** | 08/24/23 | Cobble | Gravel/fines | 10 | 6.9 | 0.29 | 67-68 |
| **978** | 08/24/23 | Cobble | Gravel/Fines | 15 | 12 | 0.38 | 69-70 |
| **979** | 08/24/23 | Cobble | Gravel | 13 | 8.1 | 0.27 | 71-72 |
| **980** | 08/24/23 | Fines | Gravel | 5 | 4.6 | 0.53 | 73-74 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **981** | 08/23/23 | Cobble | Fines | 150 | 8 | 0.5 | 75-76 |
| **982** | 08/24/23 | Cobble | Fines | 8 | 4.5 | 0.45 | 77-78 |
| **983** | 08/24/23 | Cobble | Gravel | 4 | 2.5 | 0.20 | 79-80 |
| **984** | 08/24/23 | Cobble | Gravel/Fines | 400 | 10 | 1.75 | 81-82 |
| **985** | 08/23/23 | Gravel | Cobble | 10 | 2.5 | 0.25 | 83-84 |
| **986** | 08/23/23 | Cobble | Gravel | 70 | 4.5 | 0.22 | 85-86 |
| **987** | 08/23/23 | Fines | Gravel | 6 | 0.35 | 0.10 | 87-88 |
| **988** | 08/23/23 | Cobble | Gravel | 30 | 4.2 | 0.18 | 89-90 |
| **989** | 08/23/23 | Cobble | Gravel/Fines | 75 | 8 | 0.10 | 91-92 |
| **990** | 08/22/23 | Large Cobble | Gravel | 8 | 8 | 0.32 | 93-94 |
| **991** | 08/22/23 | Large Cobble | Boulder | 100 | 11 | 0.65 | 95-96 |
| **992** | 08/22/23 | Pool unable to be sampled (safety concern) | | | | | 97 |
| **993** | 08/22/23 | | | | | | 98 |
| **994** | 08/22/23 | Boulder | Cobble | 8 | 12 | 1.2 | 99-100 |
| **995** | 08/22/23 | Large Cobble | Gravel | 10 | 8 | 2.5 | 101-102 |
| **996** | 08/22/23 | Cobble | Gravel | 45 | 7.5 | 0.91 | 103-104 |
| **997** | 08/21/23 | Cobble | Large Gravel and Fines | 30 | 5.5 | 0.57 | 105-106 |
| **998** | 08/22/23 | Cobble | Gravel | 20 | 4.6 | 0.17 | 107-108 |
| **999** | 08/22/23 | Cobble | Gravel/Fines | 140 | 12 | 2 | 109-110 |

**Table F-4. Habitat Characteristics – Reassessment Summary**

| Pool ID | Date Sampled | Substrate (Dominant) | Substrate (Sub-dominant) | Estimated Pool Length | Estimated Pool Width | Maximum Pool Depth | Photo # |
|---|---|---|---|---|---|---|---|
| **Pools Resampled** | | | | | | | |
| **959** | 09/06/23 | Gravel | Fines/Cobble | 200 | 15 | 0.97 | 111-112 |
| **963** | 09/06/23 | Cobble | Gravel | 70 | 6.78 | 0.22 | 113-116 |
| **996** | 09/07/23 | Gravel | Cobble | 45 | 3.5 | 1.01 | 117-120 |
| **997** | 09/07/23 | Gravel | Cobble | 30 | 3.01 | 0.33 | 121-122 |
| **999** | 09/07/23 | Fines | Gravel | 110 | 6.75 | nd | 123-126 |
| **Additional Pools Identified** | | | | | | | |
| **16** | 09/07/23 | Cobble | Fines | 15 | 1.97 | 0.33 | 127 |
| **17** | 09/07/23 | Fines | Cobble | 15 | 2.86 | 0.18 | 128 |
| **18** | 09/07/23 | Fines | Gravel | 50 | 4.57 | 0.26 | 129 |
| **19** | 09/07/23 | Fines | Cobble | 20 | 11 | 0.33 | 130 |

**Table F-5. Fish Collection - Initial Ground Assessment Summary.**

| Pool ID | Date Sampled | Channel Morphology Pre-isolation | Habitat Features | Species Captured | # of fish captured | # of fish estimated to remain | Photo # |
|---|---|---|---|---|---|---|---|
| **1** | 08/21/23 | Side Channel (Riffle-Pool Structure) | Some overhanging vegetation | MW | 4 | 1-10 | 1-3 |
| **2** | 08/21/23 | Side Channel (Riffle-Pool Structure) | Some overhanging vegetation | LSU | 57 | 50-100 | 4-6 |
| **3** | 08/21/23 | Side Channel (Riffle-Pool Structure) | Shallow sand bar | UNK | 1 | 1-10 | 7-8 |
| **4** | 08/22/23 | Side Channel (Riffle-Pool Structure) | Some cobbles | *No Fish Caught* | | | 9-10 |
| **5** | 08/22/23 | Side Channel (Riffle-Pool Structure) | OV, U, DP, LWD | CO, CSU | 8 | 1-10 | 11-12 |
| **6** | 08/22/23 | Side Channel (Riffle-Pool Structure) | Some instream vegetation | *No Fish Caught* | | | 13-14 |
| **7** | 08/22/23 | Side Channel (Pool Structure) | Some small woody debris | *No Fish Caught* | | | 15-16 |
| **8** | 08/22/23 | Side Channel (Riffle-Pool Structure) | Some small cobbles, pool | *No Fish Caught* | | | 17-18 |
| **9** | 08/22/23 | Side Channel (Run Structure) | Boulders | CSU, LSU, RB, MW, RSC | 36 | 1-10 | 19-20 |
| **10** | 08/23/23 | Side Channel (Riffle-Pool Structure) | Some cobbles and boulders | *No Fish Caught* | | | 21-22 |
| **11** | 08/23/23 | Side Channel (Riffle-Pool Structure) | Some boulders | RB | 2 | 1-10 | 23-24 |
| **12** | 08/23/23 | Side Channel (Pool Structure) | Some boulders, undercut bank, SWD | *No Fish Caught* | | | 25-26 |
| **13** | 08/24/23 | Side Channel (Pool Structure) | Small woody debris | SU | 3 | 1-10 | 27-28 |
| **14** | 08/25/23 | Side Channel (Pool Structure) | Abundant instream vegetation, DP | RB, SU | 8 | 50-100 | 29-30 |
| **959** | 08/26/23 | Side Channel (Run-Pool Structure) | Some cobbles and boulders | RB, SU, CSU, LSU, RSC, LKC, NSC, LNC | 228 | 500-1000 | 31-32 |
| **960** | 08/26/23 | Side Channel (Run Structure) | DP, B, woody debris, instream vegetation | CSU, SU, RB, RSC, LSU, UNK | 56 | 100-500 | 33 |
| **961** | 08/26/23 | Side Channel (Pool-Eddy Structure) | Single piece of large woody debris | CSU, LSU, SU, RSC | 44 | 1-10 | 34 |
| **962** | 08/26/23 | Side Channel (Run Structure) | Some cobbles and boulders | RB, LSU, CSU, SU, UNK | 49 | 1-10 | 35-36 |
| **963** | 08/26/23 | Side Channel (Run Structure) | Some instream vegetation | RB, CSU, LSU, RSC, LKC, NSC, SU | 135 | 50-100 | 37-38 |
| **964** | 08/26/23 | Side Channel (Riffle Structure) | Shallow gravel pool | RB, SU | 3 | 1-10 | 39-40 |
| **965** | 08/25/23 | Main-Side Channel Confluence (Pool Structure) | Shallow gravel pool | *No Fish Caught* | | | 41 |
| **966** | 08/25/23 | Main-Side Channel Confluence (Pool Structure) | Gravel pool | *No Fish Caught* | | | 42 |
| **967** | 08/25/23 | Side Channel (Riffle-Pool Structure) | Large boulders, woody debris, deep pool | CAS, RB, MW, SU, LSU, BB | 77 | 1000-2000 | 43-46 |
| **968** | 08/25/23 | Side Channel (Riffle-Pool Structure) | Some large boulders | RB, MW, LSU | 28 | 10-50 | 47-48 |
| **969** | 08/25/23 | Side Channel (Riffle-Run Structure) | Some boulders | RB | 2 | 1-10 | 49-50 |
| **970** | 08/25/23 | Side Channel (Riffle-Run Structure) | Some boulders | RB | 8 | 1-10 | 51-52 |
| **971** | 08/25/23 | Side-Backwater Channel | Instream vegetation, cobbles, some boulders | *No Fish Caught* | | | 53-54 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **972** | 08/25/23 | Side-Backwater Channel | Instream vegetation, some boulders | *No Fish Caught* | | | 55 |
| **973** | 08/25/23 | Side-Backwater Channel | Instream vegetation, some large boulders | RB, LSU, RSC, SU | 62 | 10-50 | 56-58 |
| **974** | 08/25/23 | Main Channel (Backwater Pool) | Some cobbles | RB, SU | 14 | 1-10 | 59-60 |
| **975** | 08/25/23 | Main Channel (Riffle-Run Structure) | Some cobbles | BB, MW, LSU, RSC, SU, CAS | 32 | 1-10 | 61-64 |
| **976** | 08/24/23 | Side Channel (Pool Structure) | Some cobbles | *No Fish Caught* | | | 65-66 |
| **977** | 08/24/23 | Side Channel (Pool structure) | Undercut, some instream vegetation | RB | 1 | 1-10 | 67-68 |
| **978** | 08/24/23 | Side Channel (Riffle-Pool Structure) | Instream vegetation, some cobbles | SU | 2 | 1-10 | 69-70 |
| **979** | 08/24/23 | Side Channel (Riffle-Pool Structure) | Some cobbles, some instream vegetation | SU | 2 | 1-10 | 71-72 |
| **980** | 08/24/23 | Side Channel (Riffle-Pool Structure) | Shallow gravel and fine pool | *No Fish Caught* | | | 73-74 |
| **981** | 08/23/23 | Side-Backwater Channel (Pool Structure) | LWD, SWD, U, OV, B, and IV | LSU, RSC | 2 | 50-100 | 75-76 |
| **982** | 08/24/23 | Side Channel (Backwater Pool) | Instream vegetation | LSU, SU | 6 | 1-10 | 77-78 |
| **983** | 08/24/23 | Side Channel (Riffle Structure) | Shallow gravel pool | *No Fish Caught* | | | 79-80 |
| **984** | 08/24/23 | Side Channel (Pool Structure) | IV, LWD, SWD, B, DP, U, OV | CAS | 8 | 50-100 | 81-82 |
| **985** | 08/23/23 | Side Channel (Riffle-Pool Structure) | Overhanging vegetation, undercut banks | RB, WSU | 3 | 1-10 | 83-84 |
| **986** | 08/23/23 | Side Channel (Riffle-Pool Structure) | Some cobbles | CAS, CSU, LSU, RB, SU, LKC, RSC | 142 | 100-500 | 85-86 |
| **987** | 08/23/23 | Side Channel (Riffle-Pool Structure) | Small pool (<2m$^2$) beginning to dry up | MW, RB, CSU, LSU, SU | 134 | 10-50 | 87-88 |
| **988** | 08/23/23 | Side Channel (Riffle-Pool Structure) | Gravel pool | RB | 1 | 1-10 | 89-90 |
| **989** | 08/23/23 | Side Channel (Riffle-Run Structure) | Gravel pool | *No Fish Caught* | | | 91-92 |
| **990** | 08/22/23 | Side Channel (Riffle-Pool Structure) | Some instream vegetation, some cobbles | CSU | 1 | 1-10 | 93-94 |
| **991** | 08/22/23 | Main Channel Inlet (Riffle-Pool Structure) | IV, B, SWD, DP | LSU, RSC | 6 | 1-10 | 95-96 |
| **992 & 993** | 08/22/23 | Pool unable to be sampled (safety concern) | | | | | 97 |
| **994** | 08/21/23 | Main Channel (Plunge Pool) | Plunge pool at outlet of dry falls, boulders | CAS | 14 | 50-100 | 99-100 |
| **995** | 08/22/23 | Main Channel (Plunge Pool) | Plunge pool at outlet of dry falls, boulders | CAS | 5 | 50-100 | 101-102 |
| **996** | 08/22/23 | Side Channel (Riffle-Pool Structure) | DP, large boulders present, IV | MW, CSU, LSU, RSC, RB, SU | 45 | 10-50 | 103-104 |
| **997** | 08/21/23 | Side Channel (Riffle Structure) | Some boulders | RSC, UNK, LKC, CSU | 9 | 1-10 | 105-106 |
| **998** | 08/22/23 | Side Channel (Riffle-Pool Structure) | Isolated pool, gravel and fines | RB, SU, LSU | 19 | 1-10 | 107-108 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **999** | 08/22/23 | Side Channel (Riffle-Pool Structure) | U, OV, DP | LSU, LKC, CAS, BB, RB, CSU | 108 | 100-500 | 109-110 |
| **Total** | | | | | **1365** | **2213 - 5630** | |

*OV = overhanging vegetation, *LWD = large woody debris, *U = undercut, *DP = deep pool, *SWD = small woody debris, *B = boulder, *IV = instream vegetation

**Table F-6. Fish Collection – Reassessment Summary**

| Pool ID | Date Sampled | Channel Morphology Pre-isolation | Habitat Features | Species Captured | # of fish captured | # of fish estimated to remain | Photo # |
|---|---|---|---|---|---|---|---|
| **Pools Resampled** | | | | | | | |
| **959** | 09/06/23 | Side Channel (Run Structure) | Some boulders | RB, RSC, LKC, LSU, CSU, SU, DC | 50 | 100-500 (Multiple dead fish observed along perimeter) | 111-112 |
| **963** | 09/06/23 | Side Channel (Run Structure) | Increased instream vegetation | RB, CAS, RSC, LKC, LSU, CSU, SU | 286 | 100-500 | 113-116 |
| **996** | 09/07/23 | Side Channel (Riffle-Pool Structure) | Deep pool with large boulders present | BB, CSU, LKC, LSU, MW, RB, RSC | 54 | 10-50 | 117-120 |
| **997** | 09/07/23 | Side Channel (Riffle-Pool Structure) | Some boulders and cobbles | BB, CAS, CSU, LKC, LSU, RSC, SU | 50 | 10-50 | 121-122 |
| **999** | 09/07/23 | Side Channel (Riffle-Pool Structure) | Deep pool at end of run/riffle | BB, CSU, LSU, RB, RSC, CCG, LKC | 29 | 10-50 | 123-126 |
| **Additional Pools Identified** | | | | | | | |
| **16** | 09/07/23 | River delta/floodplain (Pool Structure) | N/A, fine dominant floodplain | CSU, SU, CC, UNK | 8 | 10-50 | 127 |
| **17** | 09/07/23 | River delta/floodplain (Pool Structure) | N/A, fine dominant floodplain | CC | 6 | 5-10 | 128 |
| **18** | 09/07/23 | River delta/floodplain (Pool Structure) | N/A, fine dominant floodplain | CC | 19 | 10-50 | 129 |
| **19** | 09/07/23 | River delta/floodplain (Pool Structure) | N/A, fine dominant floodplain | CC, SU | 33 | 10-50 | 130 |
| **Total** | | | | | **535** | **265-1310** | |

**Table F-7. Water Quality – 2024 Stranding Assessment**

| Pool ID | Date Sampled | Temperature °C (Pool) | Temperature °C (Mainstem) | Temperature °C (Air) | pH | Conductivity (uS/cm) | Dissolved Oxygen (mg/L) | Turbidity | Photo # |
|---|---|---|---|---|---|---|---|---|---|
| **Pools Resampled** | | | | | | | | | |
| **1** | 08/21/24 | 14.70 | 15.2 | 13.1 | 8.80 | 98 | N/A | Clear | N/A |
| **2** | 08/21/24 | 15.60 | 15.2 | 13.2 | 8.70 | 64 | N/A | Clear | |
| **3** | 08/21/24 | 18.40 | 14.9 | 13.5 | 7.90 | 50 | N/A | Clear | |
| **4** | 08/21/24 | 20.21 | 15.2 | 14.3 | 8.20 | 98 | N/A | Clear | |
| **5** | 08/21/24 | 17.40 | 15.2 | 14.7 | 8.50 | 66 | N/A | Clear | |
| **6** | 08/21/24 | 18.20 | 15.2 | 15.1 | 9.10 | 80 | N/A | Clear | |
| **7** | 08/21/24 | 18.50 | 15.2 | 15.1 | 8.60 | 63 | N/A | Clear | |
| **8** | 08/21/24 | 17.40 | 15.2 | 15.9 | 8.40 | 90 | N/A | Clear | |

**Table F-8. Habitat Characteristics – 2024 Stranding Assessment**

| Pool ID | Date Sampled | Substrate (Dominant) | Substrate (Sub-dominant) | Estimated Pool Length | Estimated Pool Width | Maximum Pool Depth | Photo # |
|---|---|---|---|---|---|---|---|
| **1** | 08/21/24 | Fines | Gravel | 5 | 2 | 0.20 | N/A |
| **2** | 08/21/24 | Cobble | Gravel | 4 | 1.5 | 0.25 | |
| **3** | 08/21/24 | Cobble | Gravel | 40 | 8 | 0.5 | |
| **4** | 08/21/24 | Gravel | Cobbles | 50 | 8 | 0.5 | |
| **5** | 08/21/24 | Cobble | Gravel | 5 | 2 | 0.20 | |
| **6** | 08/21/24 | Bedrock | Cobble | 4 | 4 | 0.35 | |
| **7** | 08/21/24 | Gravel | Cobble | 30 | 7 | 0.35 | |
| **8** | 08/21/24 | Gravel | Cobble | 60 | 3 | 1.25 | |

**Table F-9. Fish Collection – 2024 Stranding Assessment**

| Pool ID | Date Sampled | Channel Morphology Pre-isolation | Habitat Features | Species Captured | # of fish captured | # of fish estimated to remain | Photo # |
|---|---|---|---|---|---|---|---|
| **1** | 08/21/24 | Side Channel (Riffle-Pool Structure) | *Gravel bars located directly below the outflow of the Skins Lake Spillway, featuring sections with large boulders and eroded banks, as well as areas with pronounced scour holes.* | *No Fish Caught* | | | N/A |
| **2** | 08/21/24 | Side Channel (Riffle-Pool Structure) | | *No Fish Caught* | | | |
| **3** | 08/21/24 | Side Channel (Riffle-Pool Structure) | | MW, KO, RB, CSU | 407 | 1-10 | |
| **4** | 08/21/24 | Side Channel (Riffle-Pool Structure) | | LSU | 23 | 1-10 | |
| **5** | 08/21/24 | Side Channel (Riffle-Pool Structure) | | *No Fish Caught* | | | |
| **6** | 08/21/24 | Side Channel (Riffle-Pool Structure) | | CAS | 2 | 1-10 | |
| **7** | 08/21/24 | Side Channel (Riffle-Pool Structure) | | CAS, RB | 3 | 1-10 | |
| **8** | 08/21/24 | Side Channel (Riffle-Pool Structure) | | *No Fish Caught* | | | |

# Appendix G
## Individual Fish Data

Prepared for: **Cheslatta Carrier Nation and the Nechako Environmental Enhancement Fund**
Prepared by: Noot'senay Consulting Limited Partnership

**Table G-1. Individual Fish Data – Initial Ground Assessment Summary**

| Pool ID | Species | Stage | Count | Length Range (mm) |
|---|---|---|---|---|
| 1 | Mountain Whitefish | Juvenile | 4 | 75-82 |
| 2 | Longnose Sucker | Adult | 1 | 175 |
| | Longnose Sucker | Fry | 56 | 15 |
| 3 | Unknown | Fry | 1 | 13 |
| 5 | Largescale Sucker | Juvenile | 1 | 60 |
| | Rainbow Trout | Juvenile | 6 | 70-72 |
| | Unknown | Juvenile | 1 | 58 |
| 9 | Largescale Sucker | Adult | 2 | 95-102 |
| | Largescale Sucker | Juvenile | 3 | 56-76 |
| | Longnose Sucker | Juvenile | 1 | 80 |
| | Mountain Whitefish | Juvenile | 2 | 66-86 |
| | Rainbow Trout | Juvenile | 20 | 40-67 |
| | Redside Shiner | Juvenile | 1 | 39 |
| | Unknown | Fry | 1 | 20 |
| | Unknown | Juvenile | 6 | 48-69 |
| 11 | Rainbow Trout | Juvenile | 2 | 50-66 |
| 13 | Sucker (General) | Fry | 3 | 21-25 |
| 14 | Rainbow Trout | Juvenile | 1 | 54 |
| | Sucker (General) | Fry | 7 | 22-31 |
| 959 | Lake Chub | Juvenile | 9 | 38-67 |
| | Largescale Sucker | Juvenile | 75 | 54-107 |
| | Longnose Sucker | Fry | 43 | - |
| | Longnose Sucker | Juvenile | 25 | 60-61 |
| | Northern Pikeminnow | | 4 | - |
| | Rainbow Trout | Juvenile | 2 | 63-70 |
| | Redside Shiner | Juvenile | 5 | 41-56 |
| | Sucker (General) | Fry | 55 | 23-26 |
| | Sucker (General) | Juvenile | 10 | - |
| 960 | Largescale Sucker | Juvenile | 11 | 34-88 |
| | Longnose Sucker | Juvenile | 20 | 39-102 |
| | Rainbow Trout | Juvenile | 5 | 41-69 |
| | Redside Shiner | Juvenile | 2 | 43-71 |
| | Sucker (General) | Fry | 17 | 19-26 |
| | Unknown | Juvenile | 1 | 67 |
| 961 | Largescale Sucker | Juvenile | 1 | 63 |
| | Longnose Sucker | Juvenile | 3 | 33-38 |
| | Redside Shiner | Fry | 7 | 12-16 |
| | Sucker (General) | Fry | 33 | 20-90 |

| | | | | |
|---|---|---|---|---|
| **962** | Largescale Sucker | Juvenile | 5 | 31-60 |
| | Longnose Sucker | Juvenile | 2 | 35-49 |
| | Rainbow Trout | Juvenile | 22 | 40-72 |
| | Sucker (General) | Fry | 18 | 21-36 |
| | Sucker (General) | Juvenile | 1 | 23 |
| | Unknown | Fry | 1 | 12 |
| **963** | Lake Chub | Adult | 2 | 56-76 |
| | Lake Chub | Juvenile | 2 | 51 |
| | Largescale Sucker | Fry | 1 | 47 |
| | Largescale Sucker | Juvenile | 14 | 57-61 |
| | Longnose Sucker | Juvenile | 10 | 34-37 |
| | Rainbow Trout | Juvenile | 4 | 42-55 |
| | Redside Shiner | Fry | 1 | 20 |
| | Redside Shiner | Juvenile | 2 | - |
| | Sucker (General) | Fry | 96 | 26-33 |
| | Sucker (General) | Juvenile | 3 | - |
| **964** | Rainbow Trout | Juvenile | 1 | 45 |
| | Sucker (General) | Fry | 2 | 29-30 |
| **967** | Burbot | Juvenile | 1 | 250 |
| | Longnose Sucker | Juvenile | 4 | 105-115 |
| | Mountain Whitefish | Adult | 19 | 185-225 |
| | Mountain Whitefish | Juvenile | 45 | 60-80 |
| | Prickly Sculpin | Adult | 2 | 105 |
| | Prickly Sculpin | Juvenile | 6 | 18-70 |
| **968** | Longnose Sucker | Juvenile | 8 | 97-121 |
| | Mountain Whitefish | Juvenile | 12 | 77-83 |
| | Rainbow Trout | Juvenile | 8 | 45-68 |
| **969** | Rainbow Trout | Juvenile | 2 | 58 |
| **970** | Rainbow Trout | Juvenile | 8 | 57-71 |
| **973** | Longnose Sucker | Fry | 4 | 35-59 |
| | Longnose Sucker | Juvenile | 8 | 35-59 |
| | Rainbow Trout | Juvenile | 8 | 45-57 |
| | Redside Shiner | Adult | 2 | 59 |
| | Redside Shiner | Juvenile | 2 | 64 |
| | Sucker (General) | Fry | 38 | 22-30 |
| **974** | Rainbow Trout | Fry | 1 | 55 |
| | Rainbow Trout | Juvenile | 1 | 55 |
| | Sucker (General) | Fry | 12 | 18-24 |
| **975** | Burbot | Juvenile | 10 | 87-230 |
| | Longnose Sucker | Juvenile | 4 | 38-94 |

| | | | | |
|---|---|---|---|---|
| | Mountain Whitefish | Adult | 6 | 210-225 |
| | Prickly Sculpin | Juvenile | 2 | 59 |
| | Redside Shiner | Juvenile | 2 | 51 |
| | Sucker (General) | Fry | 8 | 24-29 |
| **977** | Rainbow Trout | Juvenile | 1 | 51 |
| **978** | Sucker (General) | Fry | 2 | 27-30 |
| **979** | Sucker (General) | Fry | 2 | 24-29 |
| **981** | Longnose Sucker | Juvenile | 1 | 93 |
| | Redside Shiner | Juvenile | 1 | 42 |
| **982** | Longnose Sucker | Juvenile | 2 | 39-45 |
| | Sucker (General) | Fry | 4 | 24-29 |
| **984** | Prickly Sculpin | Adult | 8 | 42-79 |
| **985** | Rainbow Trout | Juvenile | 1 | 53 |
| | White Sucker | Juvenile | 2 | 78-102 |
| **986** | Lake Chub | Adult | 1 | - |
| | Largescale Sucker | Juvenile | 7 | 36-92 |
| | Longnose Sucker | Juvenile | 17 | 59-98 |
| | Prickly Sculpin | Adult | 2 | 64-89 |
| | Rainbow Trout | Juvenile | 39 | 46-68 |
| | Redside Shiner | Juvenile | 2 | - |
| | Sucker (General) | Fry | 74 | 21-76 |
| **987** | Burbot | Juvenile | 3 | 40-58 |
| | Largescale Sucker | Fry | 4 | - |
| | Largescale Sucker | Juvenile | 9 | 49-85 |
| | Longnose Sucker | Juvenile | 4 | 88-91 |
| | Mountain Whitefish | Juvenile | 1 | 69 |
| | Rainbow Trout | Juvenile | 26 | 36-63 |
| | Sucker (General) | Fry | 87 | 19-56 |
| **988** | Rainbow Trout | Juvenile | 1 | 64 |
| **990** | Largescale Sucker | Juvenile | 1 | 67 |
| **991** | Longnose Sucker | Juvenile | 5 | 66-97 |
| | Redside Shiner | Adult | 1 | 100 |
| **994** | Prickly Sculpin | Juvenile | 14 | 36-75 |
| **995** | Prickly Sculpin | Adult | 5 | 59-75 |
| **996** | Largescale Sucker | Juvenile | 1 | 52 |
| | Longnose Sucker | Juvenile | 2 | 42-82 |
| | Mountain Whitefish | Juvenile | 35 | 57-95 |
| | Rainbow Trout | Juvenile | 1 | 54 |
| | Redside Shiner | Adult | 3 | 55-77 |
| | Sucker (General) | Fry | 1 | 23 |

| | | | | |
|---|---|---|---|---|
| | Sucker (General) | Juvenile | 2 | 27-28 |
| **997** | Lake Chub | Adult | 5 | 50-59 |
| | Largescale Sucker | Juvenile | 2 | 59-63 |
| | Redside Shiner | Adult | 1 | 54 |
| | Unknown | Adult | 1 | 59 |
| **998** | Largescale Sucker | Juvenile | 1 | 37 |
| | Rainbow Trout | Juvenile | 6 | 34-56 |
| | Sucker (General) | Fry | 11 | 17-28 |
| | Sucker (General) | Juvenile | 1 | 34 |
| **999** | Burbot | Adult | 3 | - |
| | Burbot | Juvenile | 1 | 185 |
| | Lake Chub | Adult | 9 | 55-84 |
| | Lake Chub | Juvenile | 19 | 47-52 |
| | Largescale Sucker | Juvenile | 14 | - |
| | Longnose Sucker | Fry | 2 | 31-32 |
| | Longnose Sucker | Juvenile | 23 | 39-67 |
| | Prickly Sculpin | Adult | 1 | 92 |
| | Prickly Sculpin | Juvenile | 2 | - |
| | Rainbow Trout | Juvenile | 11 | 37-67 |
| | Redside Shiner | Adult | 1 | 49 |
| | Redside Shiner | Juvenile | 18 | - |
| | Sucker (General) | Fry | 2 | 24-31 |
| | Sucker (General) | Juvenile | 2 | - |
| **Total** | | | **1365** | |

**Table G-2. Individual Fish Data – Reassessment Summary**

| Pool ID | Species | Stage | Count | Length range (mm) |
|---|---|---|---|---|
| **Pools Resampled** | | | | |
| **959** | Lake Chub | Adult | 1 | 79 |
| | Largescale Sucker | Juvenile | 27 | 22-130 |
| | Longnose Sucker | Juvenile | 11 | 20-103 |
| | Rainbow Trout | Adult | 1 | 83 |
| | Redside Shiner | Juvenile | 8 | 30-54 |
| | Unknown | Adult | 2 | 60-72 |
| **963** | Lake Chub | Adult | 1 | 81 |
| | Lake Chub | Juvenile | 6 | - |
| | Largescale Sucker | Juvenile | 159 | 28-66 |
| | Longnose Sucker | Juvenile | 97 | 31-59 |
| | Rainbow Trout | Juvenile | 7 | 48-62 |
| | Redside Shiner | Juvenile | 3 | - |
| | Sculpin (General) | Adult | 6 | - |
| | Sculpin (General) | Juvenile | 1 | 25 |
| | Sucker (General) | Fry | 2 | 20-24 |
| | Sucker (General) | Juvenile | 4 | - |
| **996** | Burbot | Adult | 1 | 224 |
| | Lake Chub | Adult | 4 | 51-86 |
| | Largescale Sucker | Juvenile | 4 | 55-79 |
| | Longnose Sucker | Juvenile | 5 | 43-107 |
| | Mountain Whitefish | Adult | 1 | 73 |
| | Mountain Whitefish | Juvenile | 9 | 71-92 |
| | Rainbow Trout | Juvenile | 4 | 53-75 |
| | Redside Shiner | Adult | 18 | 45-74 |
| | Sucker (General) | Juvenile | 4 | 28-34 |
| | Sucker (General) | Juvenile | 4 | - |
| **997** | Burbot | Juvenile | 3 | 211-267 |
| | Lake Chub | Adult | 10 | 47-68 |
| | Lake Chub | Juvenile | 1 | 35 |
| | Largescale Sucker | Juvenile | 10 | 55-69 |
| | Longnose Sucker | Juvenile | 4 | 92-128 |
| | Prickly Sculpin | Adult | 1 | 103 |
| | Prickly Sculpin | Juvenile | 1 | 61 |
| | Rainbow Trout | Juvenile | 1 | 66 |
| | Redside Shiner | Adult | 17 | 41-70 |
| | Sucker (General) | Fry | 1 | 23 |
| | Sucker (General) | Juvenile | 1 | 29 |

| | | | | |
|---|---|---|---|---|
| **999** | Burbot | Adult | 1 | 213 |
| | Lake Chub | Adult | 8 | 46-87 |
| | Largescale Sucker | Juvenile | 6 | 26-36 |
| | Longnose Sucker | Juvenile | 2 | 33-94 |
| | Rainbow Trout | Juvenile | 4 | 46-64 |
| | Redside Shiner | Adult | 7 | 53-62 |
| | Slimy Sculpin | Adult | 1 | 108 |
| **Additional Pools Identified** | | | | |
| **16** | Largescale Sucker | Juvenile | 4 | 43-58 |
| | Sculpin (General) | Juvenile | 2 | 23-25 |
| | Sucker (General) | Juvenile | 1 | 29 |
| | Unknown | Juvenile | 1 | 31 |
| **17** | Sculpin (General) | Juvenile | 6 | 21-32 |
| **18** | Sculpin (General) | Fry | 2 | 21 |
| | Sculpin (General) | Juvenile | 17 | 25-39 |
| **19** | Sculpin (General) | Juvenile | 33 | 20-34 |
| **Total** | | | **535** | |