

Thompson-Shuswap Watershed Profile

A supplementary document to the
Thompson-Shuswap Salmon Ecosystem Action Plan
2026

Prepared by:

Thompson-Shuswap
Salmon Collaborative

This document was developed collaboratively by Fisheries and Oceans Canada, the Province of BC, and the Secwépemc Fisheries Commission, together as partners in the Thompson-Shuswap Salmon Collaborative.

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Lemieux Creek. Photo credit: DFO, November 2023.

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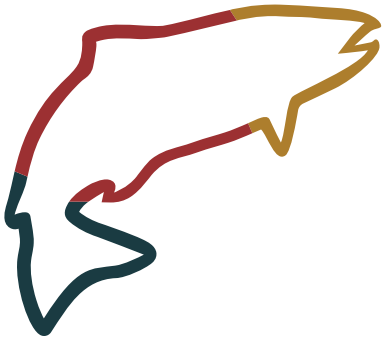
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Cover photo:
Eagle River, Photo credit: DFO, September 2024.



Lemieux Creek. Photo credit: DFO, November 2023.



Executive Summary

The Thompson-Shuswap Watershed Profile provides a comprehensive overview of salmon and their ecosystems in the Thompson-Shuswap region of south-central British Columbia.

Developed by the Thompson-Shuswap Salmon Collaborative (TSSC), the Profile serves as a foundational resource to inform the Thompson-Shuswap Salmon Ecosystem Action Plan (TSSEAP).

The Thompson-Shuswap is home to 4 species of Pacific salmon (Chinook, coho, sockeye, and pink) and steelhead trout, comprising 18 genetically distinct populations. The Profile summarizes their conservation status, life histories, freshwater habitat requirements, and key threats, including climate change, habitat degradation, and cumulative landscape disturbances.

The Profile also details the 3 major watersheds — the Thompson River, South Thompson River, and North Thompson River — along with 14 watershed groups. For each, the Profile outlines salmon populations, key habitat features and stressors such as altered hydrology, riparian loss, barriers to fish passage, and invasive species. Impacts of agriculture, forestry, urban development, and water withdrawals on salmon ecosystems in the Thompson-Shuswap region are examined, alongside climate projections that indicate rising stream temperatures and declining summer flows.

Finally, the Profile highlights recent stewardship and restoration initiatives led by Secwépemc communities, governments, and others, emphasizing collaborative action to conserve salmon ecosystems under increasing environmental pressures.

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Louis Creek. Photo credit: DFO, November 2023.

List of Acronyms

AHI	–	Aquatic Habitat Index
ALR	–	Agricultural Land Reserve
B.C.	–	British Columbia
CEFT	–	Critical Environmental Flow Threshold
CK	–	Chinook salmon
CN	–	Canadian National Railway
CO	–	Coho salmon
COSEWIC	–	The Committee on the Status of Endangered Wildlife in Canada
CP	–	Canadian Pacific Railway
CU	–	Conservation Unit
DFO	–	Fisheries and Oceans Canada
DU	–	Designatable Unit
FIM	–	Foreshore Inventory and Mapping
Ha	–	Hectares
IAAC	–	Impact Assessment Agency of Canada
Km	–	Kilometres
MoF	–	The Province of B.C. Ministry of Forests
MoTT	–	The Province of B.C. Ministry of Transportation and Transit
PKO	–	pink salmon, odd-year
RAPR	–	Riparian Areas Protection Regulation
RCP	–	Representative Concentration Pathway
RPA	–	Recovery Potential Assessments
SEL	–	sockeye, lake-type
SFC	–	Secwépemc Fisheries Commission
SHIM	–	Sensitive Habitat Inventory and Mapping
SP	–	Spring
SU	–	Summer
TPO	–	Temporary Protection Order
TSSC	–	Thompson-Shuswap Salmon Collaborative
WLRS	–	The Province of B.C. Ministry of Water, Land and Resource Stewardship
WSP	–	Wild Salmon Policy

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1 Introduction

This Watershed Profile (the 'Profile') provides a comprehensive overview of salmon and their ecosystems in the Thompson-Shuswap region of south-central British Columbia (B.C.), located within Secwepemcúl'ecw, the traditional and unceded territory of the Secwépemc Nation.

The Profile was written by the Thompson-Shuswap Salmon Collaborative (TSSC) — a non-political, technical collaborative comprised of the Secwépemc Fisheries Commission (SFC), Fisheries and Oceans Canada (DFO), and the Province of B.C. Ministry of Water, Land and Resource Stewardship (WLRS). The Profile was created as a foundational resource to inform and support the Thompson-Shuswap Salmon Ecosystem Action Plan.

The Profile provides information on the Thompson-Shuswap region, local salmon populations, their habitat needs, the main threats they encounter, and examples of salmon stewardship and restoration initiatives. It establishes a shared foundation of knowledge to support the work of the TSSC and serve as a valuable resource for all those engaged in salmon conservation in the Thompson-Shuswap.

1.1 Methodology

The TSSC collected baseline data and information for the Profile from a thorough literature review of all available and relevant sources. Key resources from that review include the following:

- **Recovery Potential Assessments (RPA) for Pacific salmon**
- **Sensitive Habitat Inventory and Mapping (SHIM) reports**
- **Aquatic Habitat Index (AHI) reports**
- **Foreshore Inventory and Mapping (FIM) reports**
- **Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessments**
- **Research documents and science advisory reports**
- **Watershed assessments and consultant reports**
- **Geospatial data records**

From 2022 to 2025, the TSSC held a series of workshops and information sessions that provided opportunities for participants to share additional reports and insights. Individual perspectives and local knowledge contributed meaningfully to these engagements and have been incorporated where appropriate. For an overview of engagement activity, please refer to the TSSC website.



SFC biologists pit tag juvenile coho in the Deadman River. Photo credit: DFO, July 2023.

2 Thompson-Shuswap Overview

2.1 Area Description

The Thompson-Shuswap region includes all areas of the Thompson River watershed upstream of Ashcroft, B.C. It encompasses approximately 47,000 km^2 (**Figure 1**).

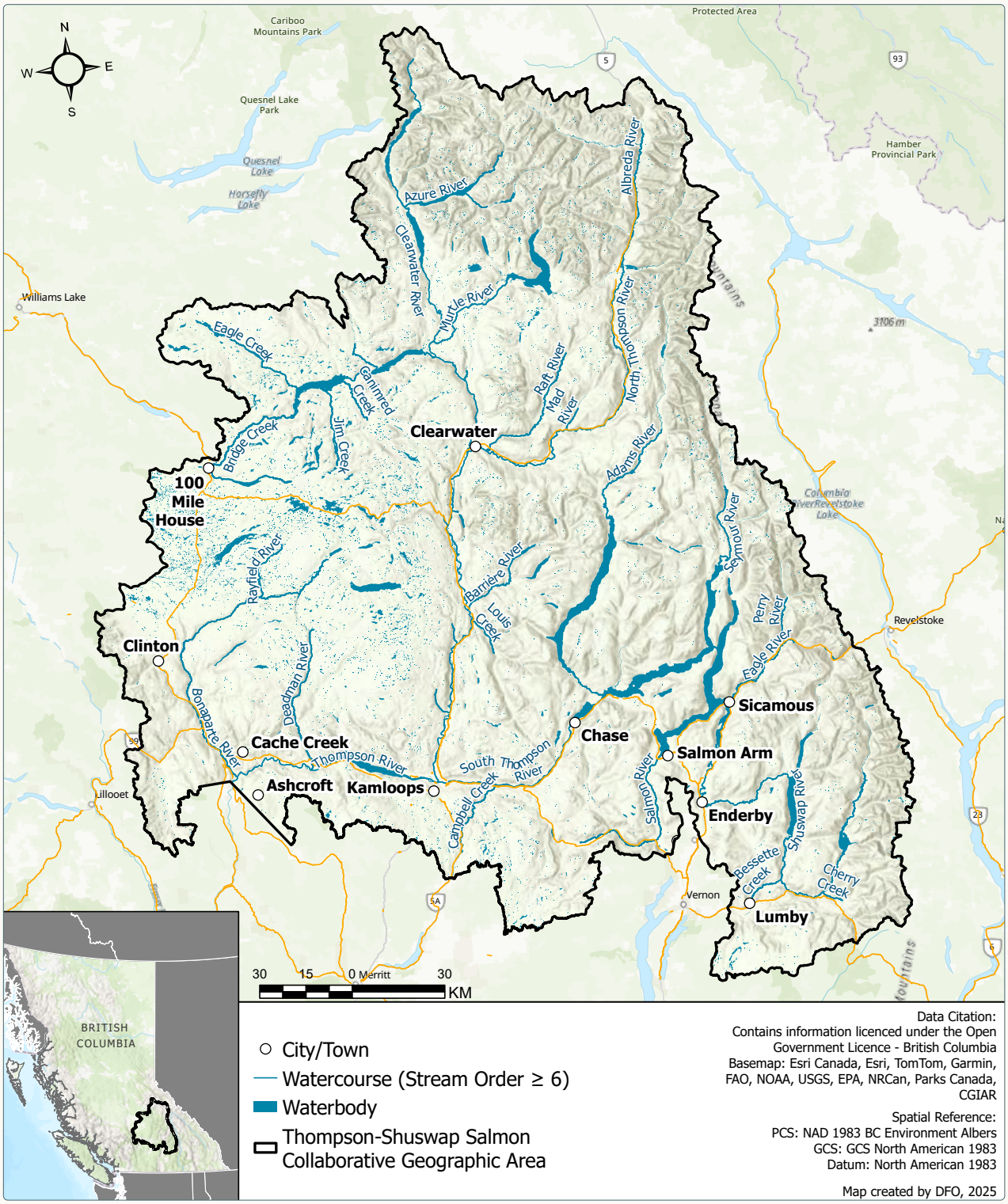


Figure 1. The Thompson-Shuswap (GeoBC Branch 2003, 2024a, 2024b, 2024c, 2024d).

2.2 Hydrography

Watersheds in the Thompson-Shuswap are delineated in the Profile based on provincial standards for mapping B.C.'s hydrological features. The Thompson-Shuswap can be broken down into 3 'major watersheds': South Thompson River, North Thompson River, and Thompson River (GeoBC Branch 2023a). These, in turn, can be divided into 14 'watershed groups' (GeoBC Branch 2024e) ranging from 1,370 to 5,389 km^2. These major watersheds and watershed groups are shown in **Figure 2**.

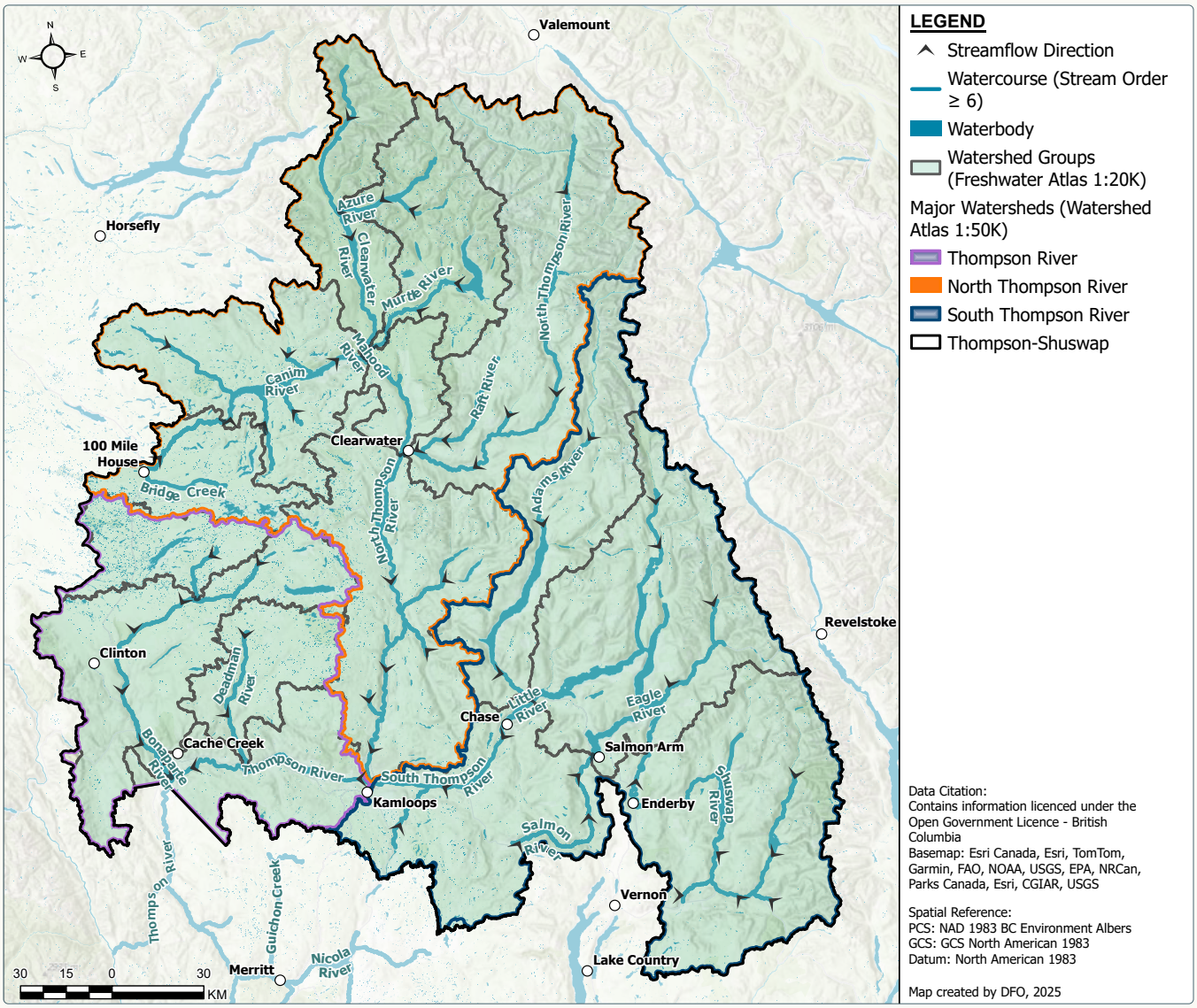


Figure 2. Major watersheds and watershed groups in the Thompson-Shuswap (GeoBC Branch 2023a, 2023b, 2024a, 2024b, 2024c, 2024e).

Hydrology in the Thompson-Shuswap is shaped by its diverse topography, human activities, and regional weather patterns (Pike et al. 2008a; BGC Engineering Inc. 2019). The North Thompson River originates in the glaciated Cariboo Mountains and flows south, while the South Thompson River begins at Little Shuswap Lake — draining the larger Shuswap watershed — and flows southwest (Figure 2). These rivers meet at Kamloops[1] to form the Thompson River, which flows into the Fraser River at Lytton, about 65 km southwest of the Thompson-Shuswap area.

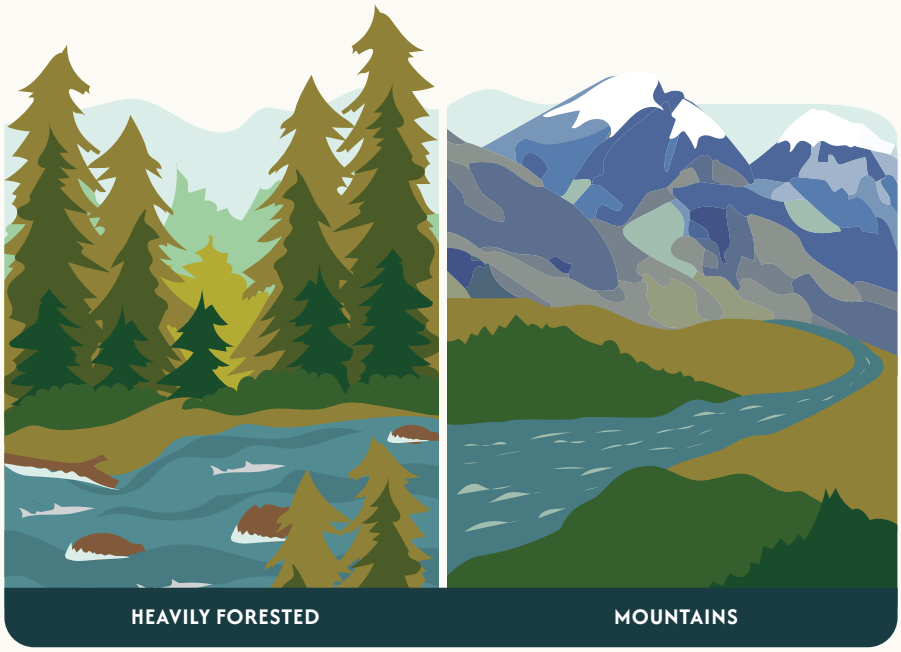
1 The name 'Kamloops' is derived from the Secwépemc word Tk'emlups, meaning 'where the rivers meet'.

Streams in the Thompson-Shuswap have a flow regime driven by snowmelt. Low flows typically occur in winter, late summer, and fall (Eaton and Moore 2010). Spring floods and winter rain-on-snow events are common (BGC Engineering Inc. 2019). However, climate change is shifting these systems from snow-dominated to rain-dominated. Warmer temperatures reduce snowpack and water storage, causing earlier spring freshets and lower summer flows (Pike et al. 2008b).

Annual rainfall varies with climate cycles such as the El Niño–Southern Oscillation and the Pacific Decadal Oscillation, directly affecting streamflows and salmon habitat. When a warm Pacific Decadal Oscillation phase synchronizes with El Niño, the result is warm and dry conditions. Conversely, when a cold Pacific Decadal Oscillation phase synchronizes with La Niña, the result is cooler and wetter weather (Moore et al. 2010).

Mountain tributaries often have steep, V-shaped, straight channels that form alluvial fans where they meet larger streams in flat valleys (BGC Engineering Inc. 2019). Smaller valley systems, like Louis Creek, have U-shaped bottoms and are used for farming, residential development, and forestry (BGC Engineering Inc. 2019). Larger rivers, such as the Bonaparte, Clearwater, North Thompson, South Thompson, and Thompson Rivers, also flow through U-shaped valley bottoms (BGC Engineering Inc. 2019). Their confluence zones often host dense urban development, including Kamloops, Cache Creek, and Clearwater (BGC Engineering Inc. 2019).





2.3 Salmon and Their Ecosystems

2.3.1 Salmon Populations and Their Conservation Status

Four species of Pacific salmon, Chinook (*Oncorhynchus tshawytscha*), coho (*Oncorhynchus kisutch*), sockeye (*Oncorhynchus nerka*) and pink (*Oncorhynchus gorbuscha*) salmon, along with steelhead trout (*Oncorhynchus mykiss*), occur in the Thompson-Shuswap. These species are collectively referred to as 'salmon' throughout this document.

Salmon in the Thompson-Shuswap comprise 18 genetically distinct populations, referred to as Conservation Units (CU)[2] and/or Designatable Units (DU)[3] (**Table 1**). Both terms are used throughout this document, depending on the data source. CUs and DUs generally align, with a few discrepancies:

i. **The South Thompson SU 0.3 and Shuswap River SU 0.3 Chinook CUs are considered distinct, but are assessed as a single DU by The Committee on the Status of Endangered Wildlife in Canada (COSEWIC).**

ii. **Thompson (Summer Run) Steelhead is not included under Canada's Policy for Conservation of Wild Pacific Salmon, and therefore lacks a CU designation, but it has been assessed as a DU by COSEWIC.**

The majority of salmon populations in the region have been assessed under *Canada's Policy for Conservation of Wild Pacific Salmon* (WSP), which assigns a status of red (poor), amber (fair), or green (good) based on biological benchmarks such as spawning abundance and distribution (DFO 2021). Red-status CUs face a high risk of extinction and require urgent management action (DFO 2005). Green-status CUs are considered to have a low risk of extinction and need minimal intervention. Amber-status CUs fall in between, indicating moderate concern (DFO 2005).

Several populations of salmon have also been assessed by COSEWIC, an independent advisory panel that evaluates DUs, assigning a status of Not At Risk, Data Deficient, Special Concern, Threatened, Endangered, Extirpated, or Extinct (COSEWIC 2023). Populations assessed as 'at risk' (Special Concern, Threatened, Endangered, Extirpated) are considered for listing under Schedule 1 of the *Species at Risk Act*.



Sockeye salmon spawning in the Lower Adams River. Photo credit: SFC.

2 A Conservation Unit (CU) forms the basic unit for assessment under the 'Wild Salmon Policy' (WSP) and is defined as "a group of wild salmon sufficiently isolated from other groups that, if extirpated, is very unlikely to re-establish naturally within an acceptable time frame, such as a human lifetime or a specified number of salmon generations" (DFO 2023).

3 A Designatable Unit (DU) is described as a "unit of Canadian biodiversity that is discrete and evolutionarily significant, where discrete means that there is currently very little transmission of heritable (cultural or genetic) information from other such units, and evolutionarily significant means that the unit harbours heritable adaptive traits or an evolutionary history not found elsewhere in Canada" (COSEWIC 2023).

Of the 17 DUs in the Thompson-Shuswap, 12 are considered at risk (Table 1), including:

- 5 Chinook DUs
- 3 coho DUs
- 3 sockeye DUs
- the Thompson steelhead DU

Table 1. Salmon populations in the Thompson-Shuswap, their CUs and equivalent DUs, and their statuses as assessed under the WSP and by COSEWIC. For Chinook conservation units, SU = Summer and SP = Spring.

Species	Conservation Unit	WSP Status	Designatable Unit	COSEWIC Status
Chinook	CK-13 South Thompson SU 0.3	Good	DU12	Not at Risk
Chinook	CK-15 Shuswap River SU 0.3	To be determined		
Chinook	CK-14 South Thompson SU 1.3	Fair / Poor	DU13	Endangered
Chinook	CK-16 South Thompson-Bessette Creek SU 1.2	Poor	DU14	Endangered
Chinook	CK-17 Lower Thompson SP 1.2	Poor	DU15	Endangered
Chinook	CK-18 North Thompson SP 1.3	Poor	DU16	Endangered
Chinook	CK-19 North Thompson SU 1.3	Poor	DU17	Endangered
Chinook	CK-82 Upper Adams River SU x.x	Data Deficient	DU29	Not assessed
Coho	CO-7 Lower Thompson	Fair	DU6	Threatened
Coho	CO-8 South Thompson	Good / Fair	DU7	Threatened
Coho	CO-9 North Thompson	Good / Fair	DU8	Threatened
Pink	PKO-1 Fraser River	Good / Fair	N/A	Not assessed
Sockeye	SEL-10-01 Kamloops - Early Summer Timing	Fair	DU11	Special Concern
Sockeye	SEL-10-03 North Barriere - Early Summer (de novo)	Fair	DU14	Threatened
Sockeye	SEL-09-03 Shuswap Complex - Late	Good / Fair	DU18	Not at Risk
Sockeye	SEL-09-02 Shuswap Complex-Early Summer Timing	Fair	DU19	Not at Risk
Sockeye	SEL-09-05 Momich - Early Summer	Original population extinct, current population not yet assessed under WSP	DU199	Endangered
Steelhead	N/A	Not Assessed under WSP	Thompson (Summer Run)	Endangered

2.3.1.1 Chinook Salmon

There are 8 Chinook salmon CUs, corresponding to 7 DUs, of which 5 DUs have been assessed as Endangered by COSEWIC, and 1 is considered Not At Risk (**Table 1**). **Figure 3** shows the distribution of Chinook CUs in the Thompson-Shuswap.

Life Histories

Chinook (CK) salmon display diverse life history strategies (see **Table 2**). Stream-type Chinook typically spend a year in freshwater before migrating to the ocean and return to freshwater earlier in the year during spring (SP) or summer (SU), while ocean-type Chinook typically migrate to the ocean within a few months of emerging and return later (summer or fall) to spawn (COSEWIC 2018). CK-13 South Thompson SU 0.3 and CK-15 Shuswap River SU 0.3 are both ocean-type Chinook populations. Their earlier outmigration means that they use freshwater habitats for rearing for shorter periods and spend less time exposed to freshwater threats. Fraser River Chinook populations are also classified as spring, summer, or fall populations, depending on whether more than 50 per cent of their population migrates through the lower Fraser River to reach their natal spawning grounds in the spring (by July 15th), summer (between July 15th and August 31st) or fall (after August 31st; DFO 2020b).

Table 2. Estimated timing of 4 key life history stages for CUs of Chinook within the Thompson-Shuswap. Estimated dates calculated from living dataset from Wilson & Peacock (2025).

		Approximate Timing of Life History Stage				Rearing	
Species	Conservation Unit	Upriver Migration	Spawning	Incubation	Rearing	Overwinter in Freshwater	Age at Ocean Entry
Chinook	North Thompson SP 1.3 (CK-18)	June 23 – Aug 11	Aug 11 – Sept 10	Aug 11 – May 21	Jan 1 – Dec 31	Y	1+
	North Thompson SU 1.3 (CK-19)	June 2 – Sept 3	Sept 3 – Oct 2	Sept 3 – June 6	Jan 1 – Dec 31	Y	1+
	Shuswap River SU 0.3 (CK-15)	June 22 – Sept 10	Sept 10 – Oct 27	Sept 10 – May 19	April 4 – May 19	N	0+
	Upper Adams River (CK- 82)	Aug 23 – Sept 6	Sept 6 – Oct 3	Sept 6 – May 20	Jan 1 – Dec 31	Y	1+
	South Thompson-Bessette Creek (CK-16)	June 25 – Sept 9	Sept 9 – Oct 10	Sept 9 – May 19	Jan 1 – Dec 31	Y	1+
	South Thompson SU 0.3 (CK-13)	Aug 2 – Sept 17	Sept 17 – Oct 27	Sept 17 – May 19	April 4 – June 16	N	0+
	South Thompson SU 1.3 (CK-14)	May 24 – Aug 30	Aug 30 – Oct 10	Aug 30 – May 18	Jan 1 – Dec 31	Y	1+
	Lower Thompson SP 1.2 (CK-17)	April 12 – Aug 14	Aug 14 – Sept 20	Aug 14 – June 7	Jan 1 – Dec 31	Y	1+

Freshwater Habitat Requirements

Adult migration:

Chinook salmon migrating into the Thompson-Shuswap need a minimum water depth of 24 cm and a maximum flow rate of 2.44 m/s along their migration route, with optimal water temperatures of 16.3°C (Doutaz et al. 2021). Low flows can create barriers to migration, making tributaries inaccessible (Dionne et al. 2023). High water temperatures, above 18°C, may impair migration and can eventually lead to mortality if temperatures reach 21°C (Fenkes et al. 2016; Doutaz et al. 2021). During migration, adult Chinook are often found in pools of deeper, cooler water, including the mouths of tributaries and areas with groundwater upwelling, where temperatures remain cool while they await better migration conditions (McGrath and Walsh 2012; Dionne et al. 2023).

Spawning and egg incubation:

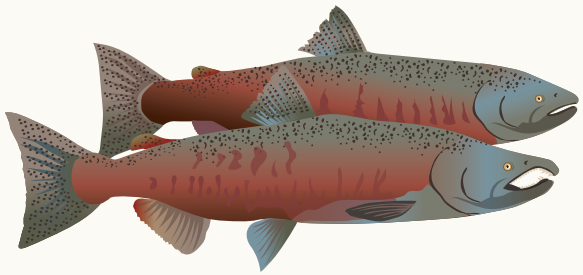
Chinook spawning and egg incubation are most successful in habitats with well-oxygenated water (Healey 1991; Doutaz et al. 2021; Dionne et al. 2023) and a complexity of features like log jams, pool tail-outs, and riffles, although specific habitat attributes for redds may vary depending on spawning location and spawner size (Doutaz et al. 2021). Areas with groundwater upwelling are also commonly selected for spawning (Dionne et al. 2023), as habitats with groundwater inputs and coarse gravel substrates (1.3 to 10.2 cm) are linked to higher egg survival. These conditions help maintain oxygen levels and prevent freezing during winter (Dionne et al. 2023). Furthermore, spawning timing is critical in the Interior Fraser River region; if spawning occurs too early when stream flows are low, the redds may become dewatered, reducing egg survival (Roni et al. 2016).

Rearing:

Chinook juveniles rear in a variety of freshwater habitats. They may remain in their natal streams or migrate to mainstem rivers, side channels, or small tributaries (Doutaz et al. 2021). Habitats frequently selected for rearing include seasonally flooded areas and floodplain habitats, which offer abundant food and refuge (Junk et al. 1989; Gladden and Smock 1990). Optimal rearing conditions also include healthy riparian vegetation, low sediment loads, and high dissolved oxygen levels (Doutaz et al. 2021).

Escapement Estimates

Data for Chinook has been recorded in a variety of ways, and data must be considered as relative abundance rather than absolute number of returning adults. Escapement estimates for Thompson-Shuswap Chinook CUs are presented in **Figures 4 and 5** (data provided by DFO Stock Assessment), except for CK-82 (data were not available). These graphs serve as an indicator of population status over time.



Kekésu7 (Chinook salmon).
Five of the 7 Chinook salmon DUs in the Thompson-Shuswap have been assessed as Endangered by COSEWIC, and 1 has been assessed as Not At Risk.



Thompson River. Photo credit: SFC.

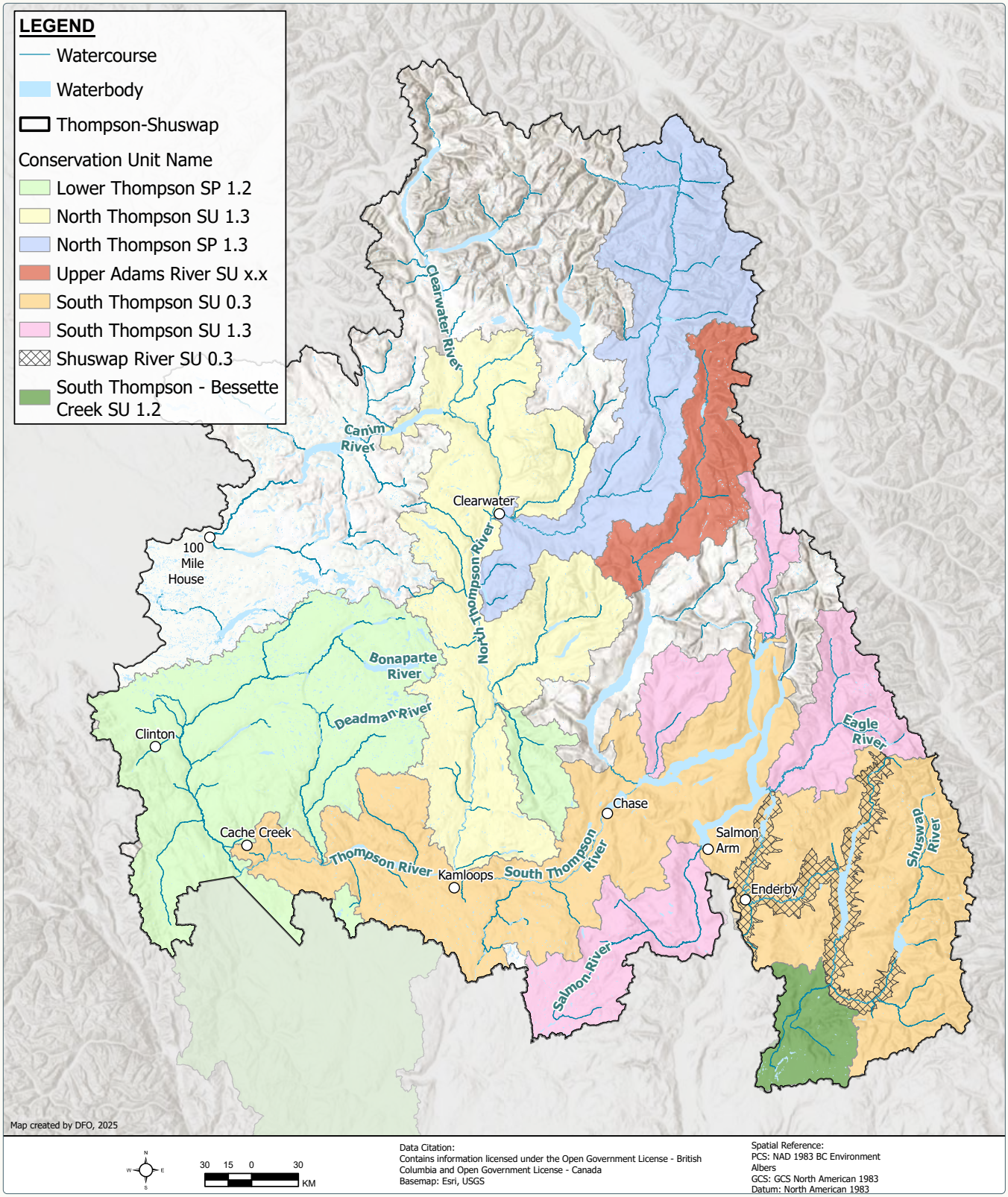


Figure 3. Distribution of Chinook salmon CUs in the Thompson- Shuswap (Baxter and Hamilton 2024).

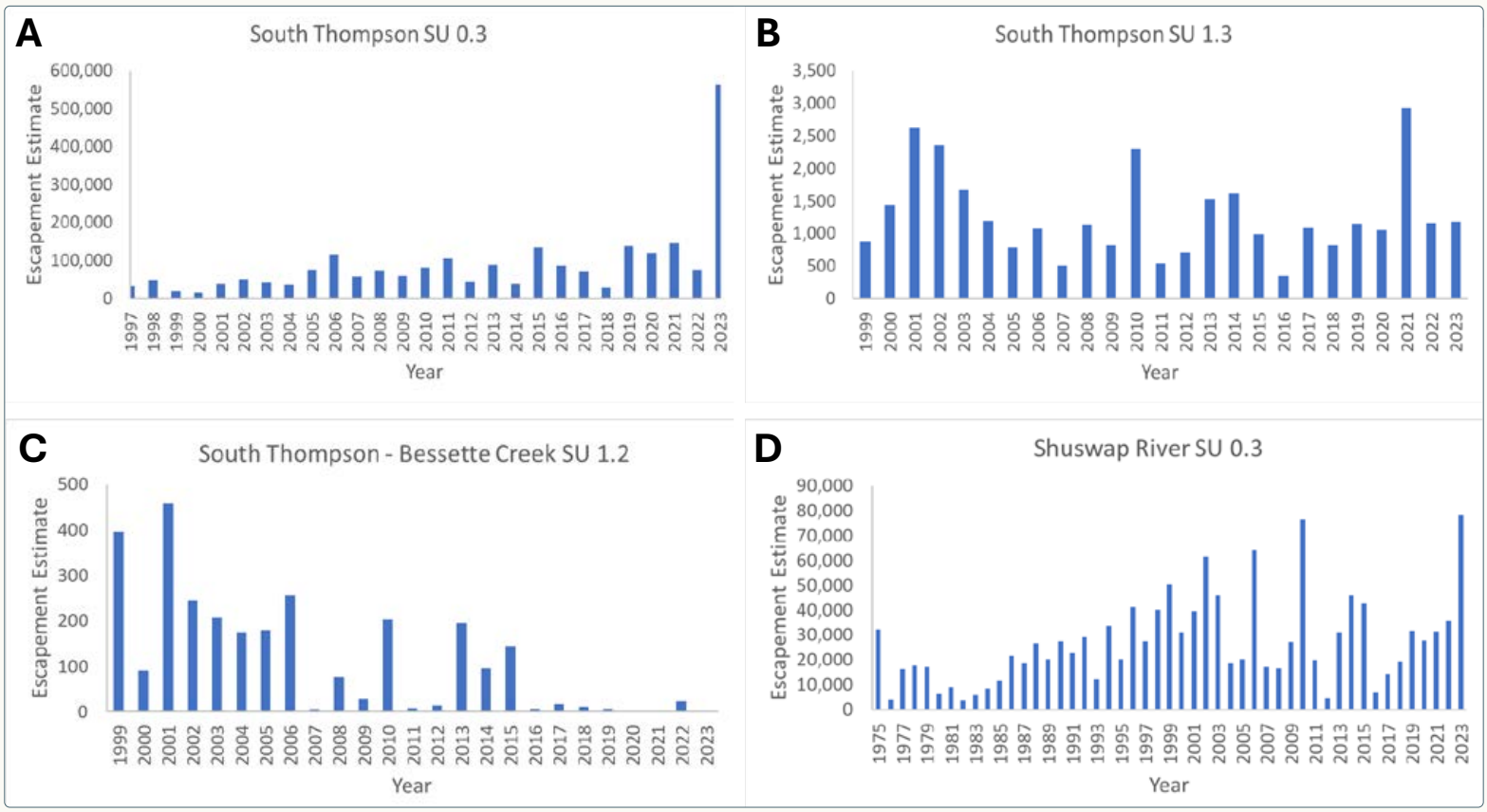


Figure 4. Recent escapement estimates (number of adult spawners that returned to their natal spawning areas) for A) the South Thompson Summer 0.3 (CK-13) Chinook population, assessed as Not At Risk by COSEWIC; B) South Thompson Summer 1.3 (CK-14) Chinook population, assessed as Endangered by COSEWIC; C) South Thompson-Bessette Creek Summer 1.2 (CK-16) Chinook population, assessed as Endangered by COSEWIC[4]; D) Shuswap River Summer 0.3 (CK-15) Chinook population, assessed as Not At Risk by COSEWIC[5].

4 The low/zero escapement estimates may not be accurate as this population is difficult to survey. Earlier timed summer Chinook spawners in Bessette Creek tributaries are challenging to observe at low abundances. Some CK-15 Chinook also spawn in the lower sections of Bessette Creek, making it difficult to delineate between CK-15 and CK-16.

5 This population was consistently surveyed by aerial count since 1975 and therefore has a longer data record than the other Chinook populations. Mark-recapture data is paired with aerial counts to calibrate historic aerial data using a linear regression between aerial peak counts and mark-recapture estimates that is updated annually.

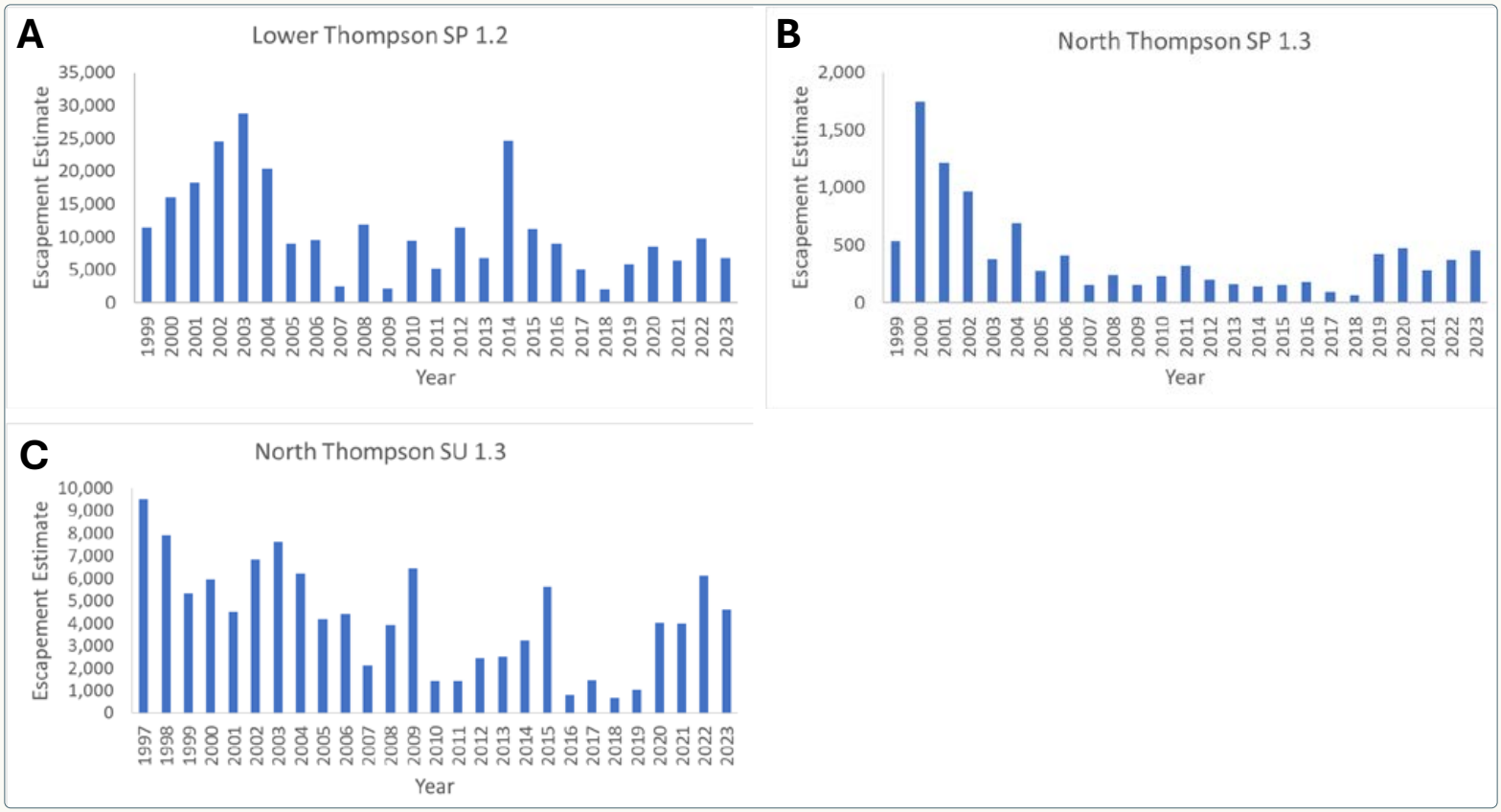


Figure 5. Recent escapement estimates for A) the Lower Thompson Spring 1.2 (CK-17) Chinook population, assessed as Endangered by COSEWIC; B) North Thompson Spring 1.3 (CK-18) Chinook population, assessed as Endangered by COSEWIC; C) the North Thompson Summer 1.3 (CK-19) Chinook population, assessed as Endangered by COSEWIC.

2.3.1.2 Coho Salmon

There are 3 coho (CO) CUs in the Thompson-Shuswap, corresponding to 3 DUs, all of which were assessed as Threatened by COSEWIC (**Table 1**). **Figure 6** shows the distribution of coho CUs in the Thompson-Shuswap.

Life Histories

Coho salmon use habitats in the Thompson-Shuswap for spawning, rearing, and migration (**Table 3**; Arbeider et al. 2020). Spawning typically occurs in late fall and peaks in mid-November (DFO 2019). Fry emerge after 40 to 50 days. Juveniles usually rear in freshwater for 1 year before migrating to the ocean, where they spend about 18 months before returning to spawn, to complete a three-year life cycle. A small proportion may remain at sea for an additional year, resulting in a four-year cycle (DFO 2019).

Table 3. Estimated timing of 4 key life history stages for CUs of coho within the Thompson-Shuswap. Estimated dates calculated from living dataset from Wilson & Peacock (2025).

		Approximate Timing of Life History Stage				Rearing	
Species	Conservation Unit	Upriver Migration	Spawning	Incubation	Rearing	Overwinter in Freshwater	Age at Ocean Entry
Coho	Lower Thompson (CO-7)	Sept 8 – Oct 25	Oct 25 – Dec 6	Oct 25 – June 28	Jan 1 – Dec 31	Y	1+
	South Thompson (CO-8)	Sept 8 – Oct 26	Oct 26 – Dec 1	Oct 26 – May 31	Jan 1 – Dec 31	Y	1+
	North Thompson (CO-9)	Sept 8 – Oct 20	Oct 30 – Dec 1	Oct 30 – June 12	Jan 1 – Dec 31	Y	1+



SFC and DFO biologists, Deadman River, July 2023.

Freshwater Habitat Requirements

Adult migration:

Coho return to their natal watersheds in late fall to spawn. They require streams with adequate flows, holding areas with depths greater than 18 cm, and optimal water temperatures between 7.2°C and 15.6°C (Bjornn and Reiser 1991; Arbeider et al. 2020).

Spawning:

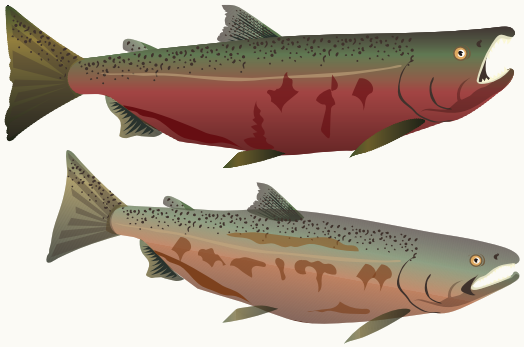
While coho typically return to their natal streams, Interior Fraser coho populations have higher straying rates than other Pacific Salmon (although still only <5 per cent (Arbeider et al. 2020)), meaning they may spawn in nearby tributaries within their CU range (DFO 2019). Spawning usually occurs upstream of small riffles, in side channels of larger streams, and in shallow, well-oxygenated sites with gravel substrate <15 cm diameter (Sandercock n.d.; Bjornn and Reiser 1991; Arbeider et al. 2020). Redds are typically built at depths of 15 to 30 cm and are an average 2.8 m^2 in size (Bjornn and Reiser 1991).

Rearing:

Rearing typically occurs in small tributaries and off-channel habitats (DFO 2019; Arbeider et al. 2020). These habitats often have large woody debris, large substrates, and slow-moving water, and can be located in groundwater-influenced ponds and channels (Solazzi et al. 2000). Fry emerge during spring freshet and move into newly flooded areas (DFO 2019). They prefer pools over riffles, and areas with less than a 3 per cent gradient (Decker et al. 2013). Lake habitats are used less frequently, but when they are, coho tend to rear in areas near natal stream mouths and away from exposed shorelines (DFO 2019; Arbeider et al. 2020).

Escapement Estimates

Escapement estimates for coho DUs from 1985 to 2023 are shown in **Figure 7** (data provided by DFO Stock Assessment). These estimates only reflect natural-origin coho and exclude hatchery-origin fish. It is important to note that pre-1998 escapement data are of lower quality and have a high proportion of infilled estimates, as fewer systems were surveyed during that period.



Sxeyqs (coho salmon).
All 3 of the coho CUs in the Thompson-Shuswap have been assessed as Threatened by COSEWIC.



Louis Creek. Photo credit: DFO, November 2023.

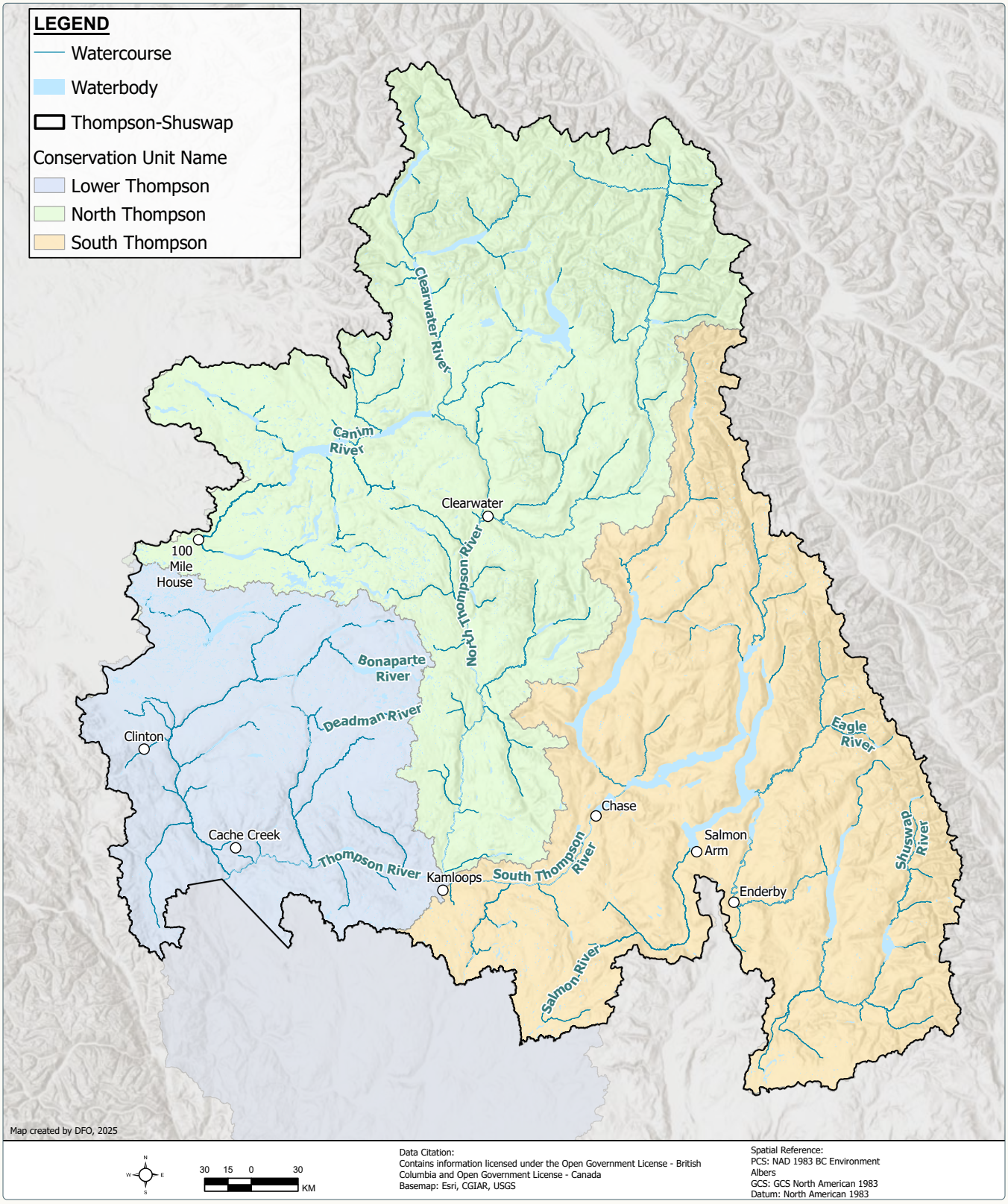


Figure 6. Distribution of coho salmon CUs in the Thompson-Shuswap (Baxter and Hamilton 2024).

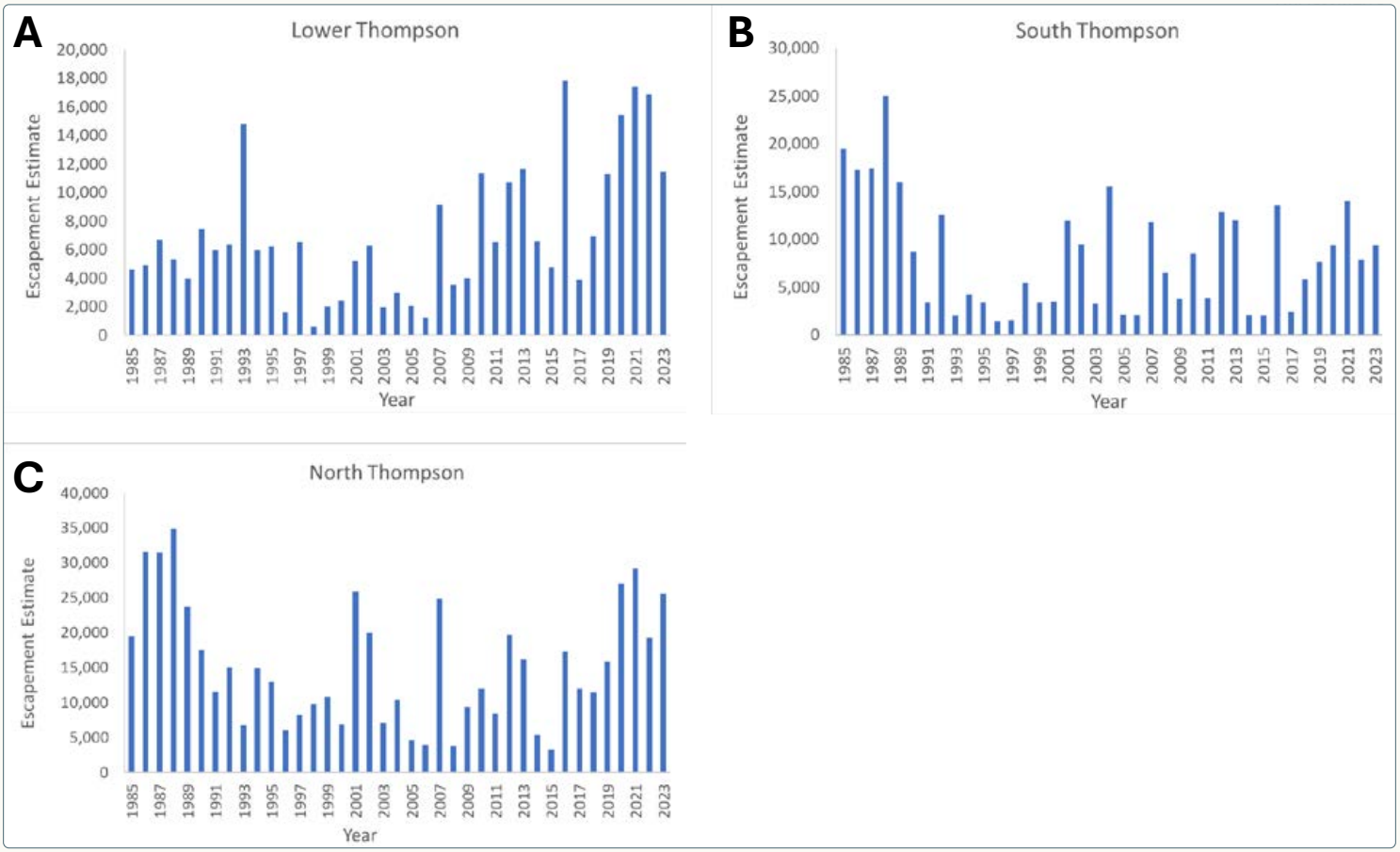


Figure 7. Recent escapement estimates between 1985 and 2023 for the A) Lower Thompson coho (CO-7) population, assessed as Threatened by COSEWIC; B) South Thompson coho (CO-8) population, assessed as Threatened by COSEWIC; C) North Thompson coho (CO-9) population, assessed as Threatened by COSEWIC.

2.3.1.3 Sockeye Salmon

There are 5 sockeye salmon CUs in the Thompson-Shuswap, corresponding to 5 DUs. COSEWIC has assessed 1 DU as Endangered, 1 DU as Threatened, 1 DU as Special Concern, and 2 DUs as Not At Risk (**Table 1**). **Figure 8** shows the distribution of sockeye salmon CUs in the region.

Life Histories

Anadromous sockeye salmon are classified into 3 life history variants: lake-type, river-type, and ocean-type (Holtby and Circuna 2008). Lake-type sockeye rear in lakes for 1 to 3 years before migrating out to the ocean; river-type sockeye rear in riverine habitats for 1 to 2 years before migrating out to the ocean; ocean-type sockeye migrate to the ocean as sub-yearlings (Doutaz et al. 2023). All sockeye populations in the Thompson-Shuswap are lake-type (SEL; **Table 4**; Grant et al. 2011; Doutaz et al. 2023).

Table 4. Estimated timing of 4 key life history stages for CUs of sockeye within the Thompson-Shuswap. Estimated dates calculated from living dataset from Wilson & Peacock (2025).

		Approximate Timing of Life History Stage				Rearing	
Species	Conservation Unit	Upriver Migration	Spawning	Incubation	Rearing	Overwinter in Freshwater	Age at Ocean Entry
Sockeye	Kamloops Early Summer (SEL-10-01)	Aug 4 – Aug 27	Aug 27 – Sept 22	Aug 27 – May 22	Jan 1 – Dec 31	Y	1+
	Momich Early Summer (SEL-09-05)	July 13 – Sept 5	Sept 5 – Oct 5	Sept 5 – May 19	Jan 1 – Dec 31	Y	1+
	North Barriere – Early Summer (SEL-10-03)	July 25 – Aug 16	Aug 16 – Sept 13	Aug 16 – May 22	Jan 1 – Dec 31	Y	1+
	Shuswap Complex Early Summer (SEL-09-02)	July 13 – Aug 25	Aug 25 – Oct 2	Aug 25 – May 19	Jan 1 – Dec 31	Y	1+
	Shuswap Complex Late (SEL-09-03)	Aug 5 – Oct 2	Oct 2 – Nov 5	Oct 2 – May 19	Jan 1 – Dec 31	Y	1+

Freshwater Habitat Requirements

Adult migration:

During migration, sockeye prefer stream temperatures below 18°C. Higher temperatures increase stress and disease risk, and reduce swimming ability (Doutaz et al. 2023). They also require adequate streamflow, with a maximum velocity of 2.13 m/s and a minimum depth of 18 cm, as both low and high flows can limit access to spawning tributaries (Bjornn and Reiser 1991; Doutaz et al. 2023).

Spawning and egg incubation:

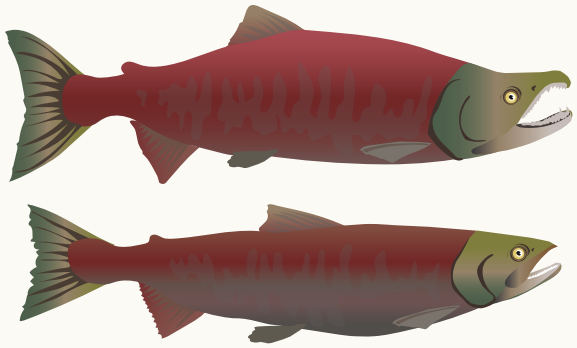
Sockeye spawn between July and October at sites with suitable temperature and substrate conditions, including in streams and rivers, in lake tributaries and outlets, and along lake shorelines (Grant et al. 2011). Females prefer small gravel substrates that can be moved during redd construction (Burgner 1991). Optimal spawning temperatures range from 10.6°C to 12.2°C, while optimal egg incubation temperatures range from 4.4°C to 13.3°C with at least 5.0 mg/L dissolved oxygen (Reiser and Bjornn 1979). Stable temperatures, high oxygen levels, and low sedimentation rates are critical for fry survival and migration.

Rearing:

After emerging, lake-type sockeye fry initially occupy the littoral zone of nursery lakes, feeding and growing for about 6 weeks. They then move to offshore lake habitats, where they remain for 1 to 2 years before migrating to the ocean. Adults typically spend 1 to 4 years in the ocean before returning to spawn (Grant et al. 2011; COSEWIC 2017).

Escapement Estimates

Escapement estimates for sockeye CUs are shown in **Figure 9** (data provided by DFO Stock Assessment). Figure 9A, D, and E are cyclic populations of sockeye, with dominant runs every 4 years (e.g. 2010, 2014, 2018, etc.). Therefore, escapement estimates for the largest run in the 4-year cycle are displayed for these populations.



Sqlelten7úw̓l (sockeye salmon).
Of the 5 sockeye salmon DUs in the Thompson-Shuswap, COSEWIC has assessed 1 as Endangered, 1 as Threatened, 1 as Special Concern, and 2 as Not At Risk.



Sockeye salmon in the Lower Adams River. Photo credit: SFC.

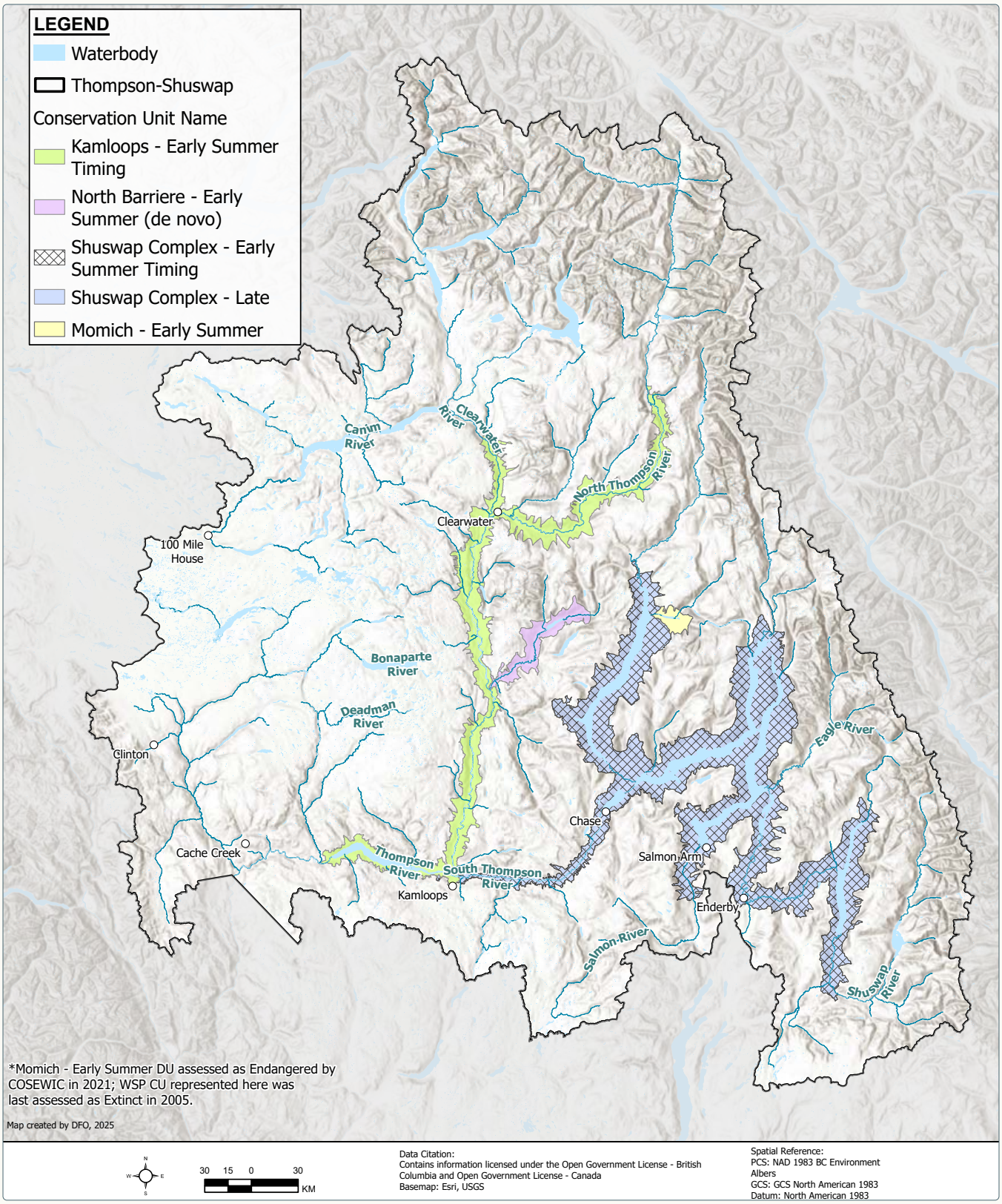


Figure 8. Distribution of sockeye salmon CUs in the Thompson-Shuswap (Baxter and Hamilton 2024).

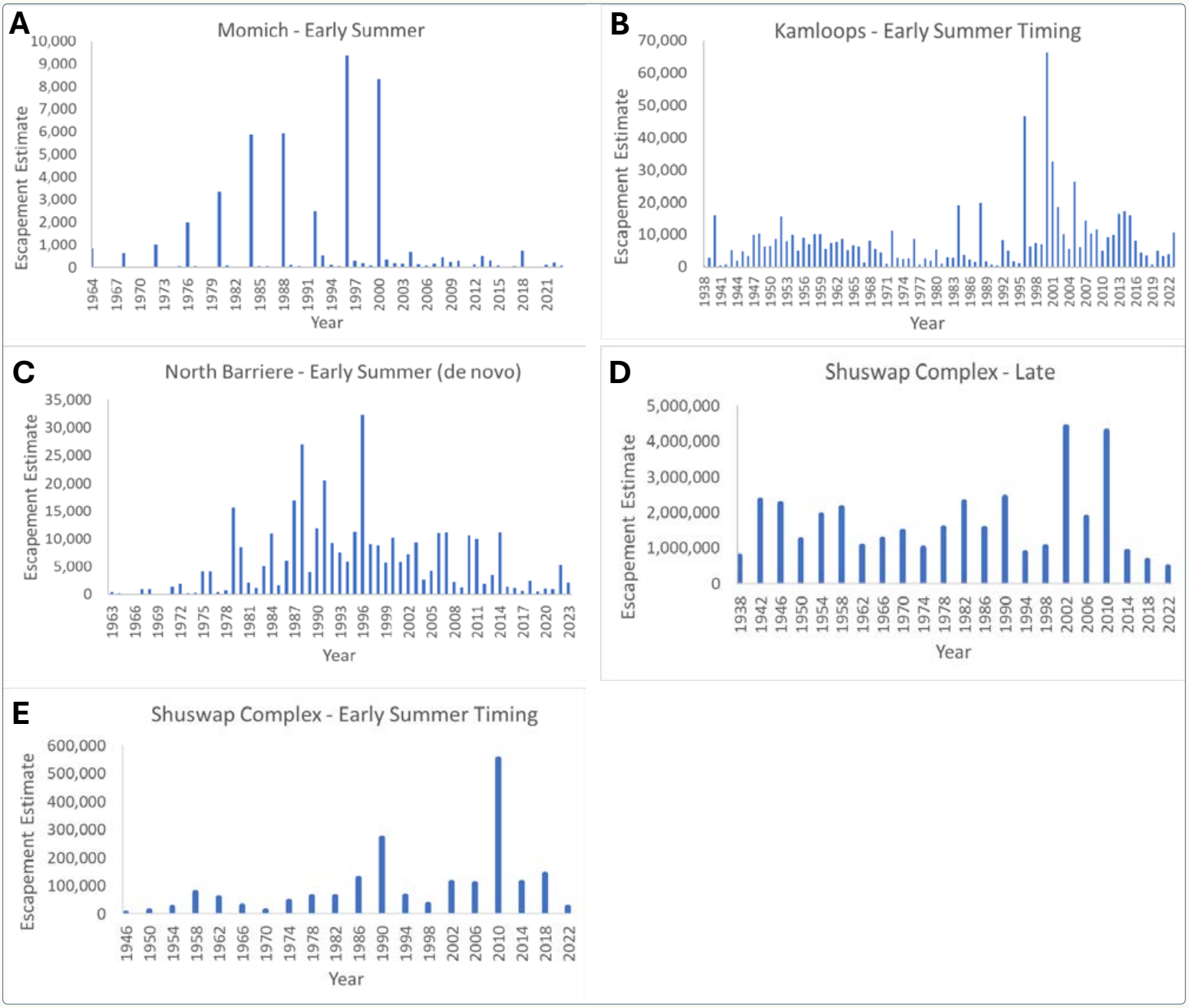


Figure 9. Escapement estimates of the A) Momich Early Summer (SEL-09-05) sockeye population, assessed as ***Endangered*** by COSEWIC. Escapement estimates are combined for Cayenne Creek and Momich River; B) Kamloops Summer (SEL-10-01) sockeye population, assessed as ***Special Concern*** by COSEWIC. Escapement estimates are from the Raft River, which is the indicator stock of this population; C) North Barriere Early Summer (SEL-10-03) sockeye population, assessed as Threatened by COSEWIC. Escapement estimates are from the upper Barriere River, which is the indicator stock of this population; D) Shuswap Late (SEL-09-03) sockeye population, assessed as ***Not At Risk*** by COSEWIC. Escapement estimates are combined from the Adams River and Little River, which are the indicator stocks of the population; E) Shuswap-ES (SEL-09-02) sockeye population, assessed as ***Not At Risk*** by COSEWIC. Escapement estimates are combined from the Seymour River and McNomee Creek, which are the indicator stocks of this population.

2.3.1.4 Pink Salmon

Pink salmon have been increasing in both range and abundance, now accounting for approximately 70 per cent of all Pacific salmon abundance (Ruggerone et al. 2023). They have adapted quickly to a warming climate, reaching peak abundance between 2005 and 2021 (Ruggerone et al. 2023). Pink salmon in the Thompson-Shuswap are part of 1 CU (PKO-1 Fraser River) that extends beyond the boundaries of the Thompson-Shuswap (**Figure 10**). This CU has been assessed as good/fair by WSP and has not been assessed by COSEWIC (**Table 1**).

Life Histories

Pink salmon have a fixed two-year life cycle, which sets them apart from other Pacific salmon species. After spending a year in the ocean, they return to freshwater in the summer to spawn (Ruggerone et al. 2023). Pink salmon have 2 genetically distinct populations categorized as odd-year and even-year, depending on the year in which they return to spawn, and the Fraser River populations are almost exclusively odd-year pink (PKO) salmon (DFO 2025). After emerging, pink salmon in the Thompson-Shuswap spend very little time in freshwater before migrating to the Fraser River estuary (**Table 5**; Ruggerone et al. 2023; Secwépemc Fisheries Commission 2024a).

Table 5. Estimated timing of 4 key life history stages for the pink salmon CU in the Thompson-Shuswap. Estimated dates calculated from living dataset from Wilson & Peacock (2025).

		Approximate Timing of Life History Stage				Rearing	
Species	Conservation Unit	Upriver Migration	Spawning	Incubation	Rearing	Overwinter in Freshwater	Age at Ocean Entry
Pink	Fraser River Odd (PKO-1)	Aug 23 – Sept 28	Sept 28 – Oct 29	Sept 28 – May 13	N/A	N/A	0+



SFC and DFO biologists, Lemieux Creek, November 2023

Freshwater Habitat Requirements

Adult migration:

Migrating pink salmon are limited by high waterfalls and strong currents and have a lower tolerance for fast-moving water compared to other salmon (Bjornn and Reiser 1991). However, their smaller body size allows them to navigate shallower streams than other salmon species (Bjornn and Reiser 1991).

Spawning and egg incubation:

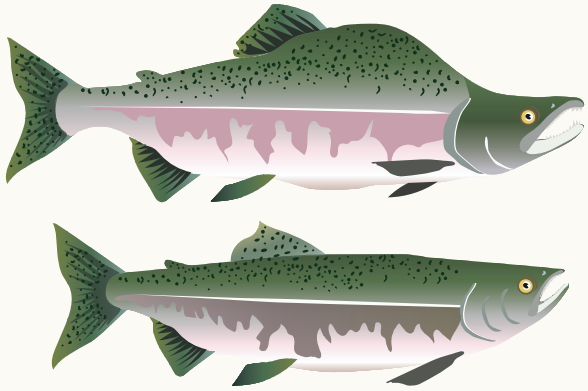
Spawning typically occurs in riffles or shallow areas between riffles and pools with moderate to fast currents (Heard 1991). Preferred spawning depths range from 20 to 60 cm (Scott et al. 1973; Roberge 2002), and water temperatures are usually between 8°C and 15°C (Andrew and Geen 1960). Substrates range from coarse gravel to sand and cobble (Scott et al. 1973; Roberge 2002).

Rearing:

After hatching, alevins remain in the gravel until their yolk is absorbed, then migrate to the ocean shortly after they emerge as fry (Scott et al. 1973). Because of this relatively early outmigration, pink salmon rely on freshwater habitat in the Thompson-Shuswap much less than other species that rear and overwinter in these environments (Secwépemc Fisheries Commission 2024).

Escapement Estimates

Escapement estimates for the pink salmon CU are shown in **Figure 11** (data provided by DFO Stock Assessment (A); data from the Pacific Salmon Commission (B)). Estimates for specific streams in the Thompson River system are provided at the top of the figure (A; Grant et al. 2014), while estimates for the entire Fraser River population are provided at the bottom (B). Region-specific data are only available for the Thompson system from 1957 to 1991 due to subsequent changes in methodology. Since 1993, a single Fraser system mark-recapture method has been used rather than the separate stream-specific methods that were used prior due to budgetary constriants (Grant et al. 2014). In 2009, hydroacoustic methods were implemented following refinements made to an existing hydroacoustic program that allowed it to provide reliable escapement estimates of Fraser River pink salmon (Grant et al. 2014).



Sqewq̓ewíken (pink salmon).
The pink salmon DU in the Thompson-Shuswap has not been assessed by COSEWIC.



Thompson River. Photo credit: SFC.

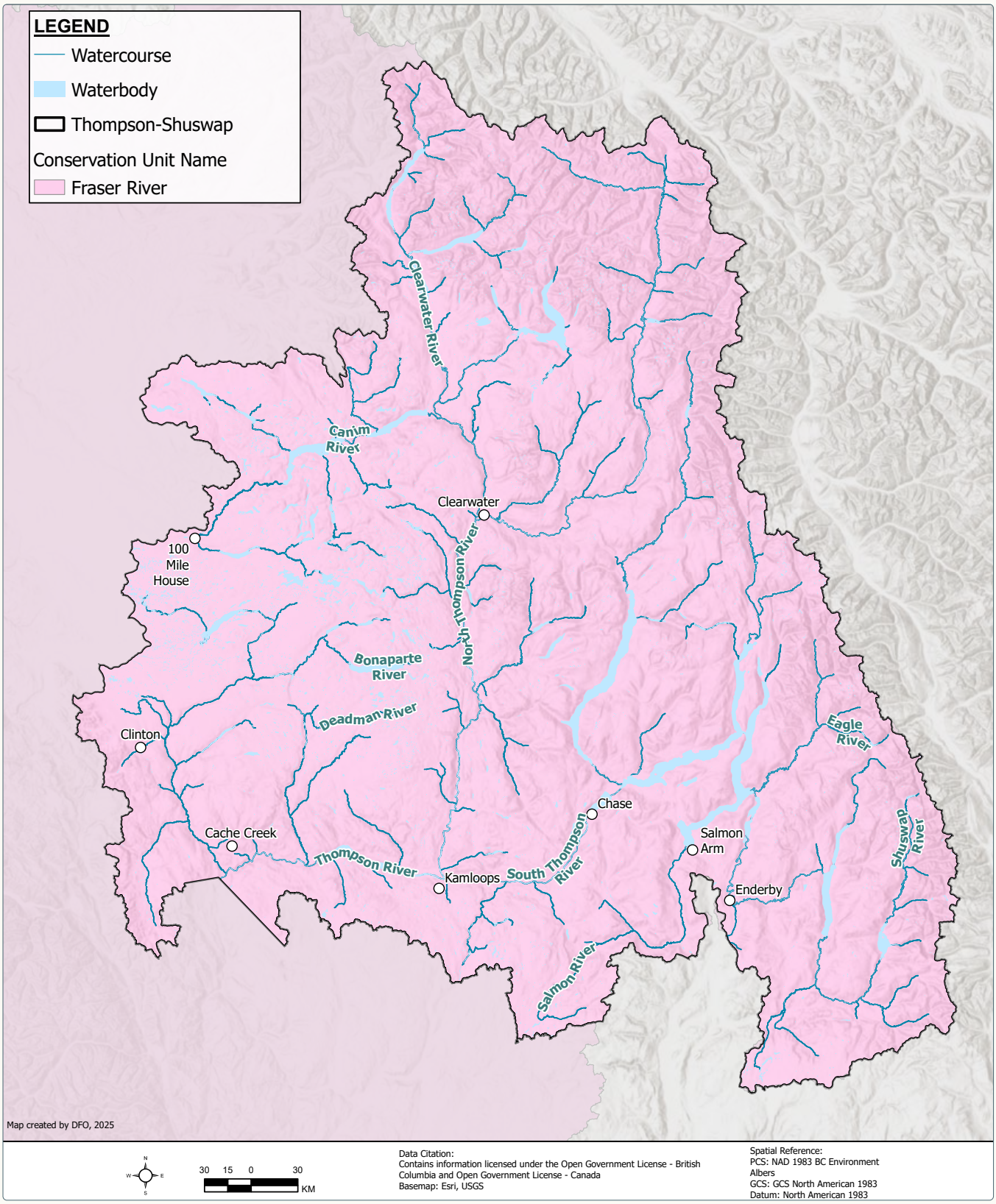


Figure 10. The pink salmon CU extends beyond the Thompson-Shuswap (Baxter and Hamilton 2024); however, their actual distribution within the Thompson-Shuswap is smaller than the full extent of the CU shown.

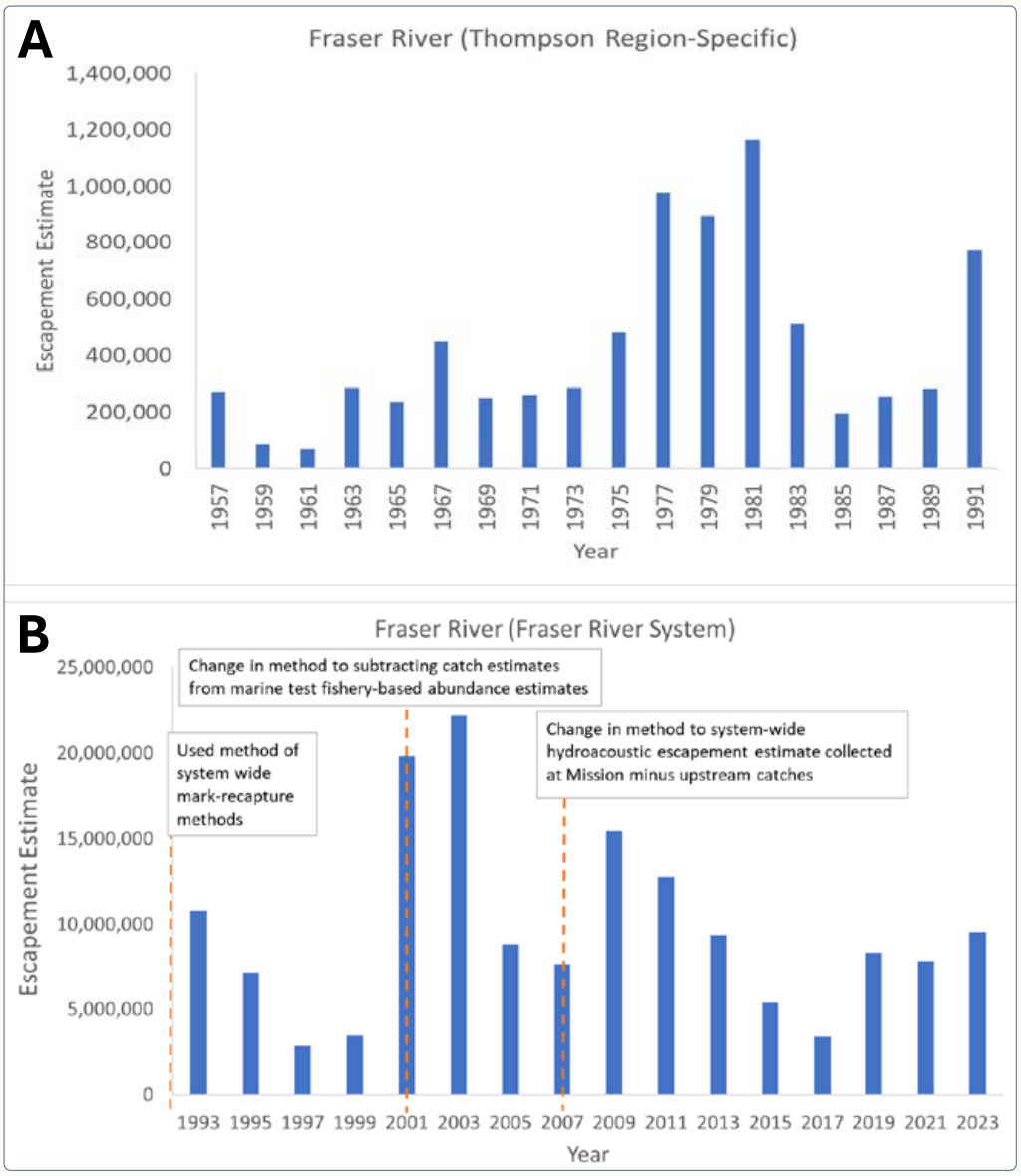


Figure 11. Escapement estimates for the Fraser River pink (PKO-1) salmon population A) between 1957 and 1991 for the Thompson region, and B) between 1993 and 2023 for the full Fraser region. Changes in methodologies for estimating escapement are listed at specified time periods.

2.3.1.5 Steelhead

The Thompson River summer-run steelhead is the only steelhead trout population in the Thompson-Shuswap. It has been assessed as Endangered by COSEWIC. It is also red-listed by the Province of British Columbia, meaning it is considered at risk of extirpation, endangered, or threatened. This status reflects steep declines and extremely low population numbers over the past 2 decades (CDC Data 2019). Steelhead's occupancy range in the Thompson-Shuswap is shown in **Figure 12**.

Steelhead trout spawning abundance estimates from 1978 to 2024, and the projected abundance for 2025, are shown in **Figure 13** (Ministry of Forests Lands and Natural Resource Operations 2016). The preliminary 2025 spawning abundance estimate indicates that the population may now be between the Extreme Conservation Concern and Conservation Concern thresholds; this is the 10th lowest estimate in 48 years of monitoring. Steelhead are classified as of Conservation Concern—meaning below the population level needed for long-term sustainable yields—when spawning abundance is between 430 and 1,200 fish. They are classified as of Extreme Conservation Concern, indicating the population may be at risk of extirpation, when spawning abundance falls below 430 fish (Ministry of Water Land and Resource Stewardship 2024).

Life Histories

Steelhead are the anadromous form of rainbow trout (*Oncorhynchus mykiss*). They spawn in spring, as water temperatures rise (Quinn 2018). Steelhead trout and rainbow trout are iteroparous, meaning they can spawn more than once. About 3 per cent of Thompson River steelhead return to spawn again (DFO 2018). There are 2 life history types: ocean-maturing populations enter freshwater sexually mature and spawn shortly after; stream-maturing populations enter freshwater immature to overwinter, then spawn the following spring (Quinn 2018). Thompson River steelhead are stream-maturing and typically rear in freshwater for 1 to 3 years, then spend 2 to 4 years in the ocean before returning to spawn (**Table 6**; DFO 2018; Ministry of Water Land and Resource Stewardship 2024).

Table 6. Estimated timing of 4 key life history stages for steelhead trout within the Thompson-Shuswap. Estimated dates calculated from living dataset from Wilson & Peacock (2025).

		Approximate Timing of Life History Stage				Rearing	
Species	Designatable Unit	Upriver Migration	Spawning	Incubation	Rearing	Overwinter in Freshwater	Age at Ocean Entry
Steelhead	Thompson Summer Run	Sept 20 – May 1	May 1 – June 2	May 1 – Sept 24	Jan 1 – Dec 31	Y	2+



Thompson River. Photo credit: SFC

Freshwater Habitat Requirements

Adult migration:

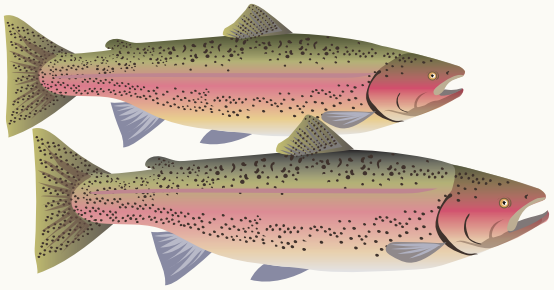
Adults migrate from the ocean to freshwater in late summer through fall and stay in freshwater over winter (DFO 2018). This timing allows adults to avoid 2 areas in the lower Fraser Canyon that become impassable in winter (DFO 2018). Migrating adults are often found in swift water and deep pools (3.6 to 4.6 m) downstream of river eddies (Ignace et al. 2019), and optimal migration water temperatures are between 4°C and 18°C (Raleigh et al. 1984).

Spawning and egg incubation:

After overwintering, Thompson River steelhead move to spawning areas by March, and spawn from March to June (DFO 2018; COSEWIC 2020). Redds are typically constructed in gravel substrate within fast-flowing riffle habitats in tributaries or river mainstems. Spawning occurs at night in water velocities of 0.4 m/s to 1.5 m/s, depths of 0.2 m to 2 m, and temperatures between 3.9°C and 9.4°C (Moore 1985). Eggs incubate for 5 to 8 weeks before fry emerge between mid-June and early July (Scott et al. 1973; COSEWIC 2020).

Rearing:

Juvenile steelhead rear in freshwater for 1 to 3 years before migrating to the ocean. Fry prefer riffles, rapids, and cascades with stream velocities under 0.3 m/s and water temperatures between 13°C and 18°C (Raleigh et al. 1984). Ideal rearing habitats include cobble-boulder substrate, well-vegetated stream banks for shade and cover, and clear, cold water (Raleigh et al. 1984; Ignace et al. 2019). Before migrating downstream from March to June, juveniles require stream temperatures between 4°C and 13°C (Raleigh et al. 1984).



Sgwígwle (steelhead trout).
The steelhead population in the Thompson-Shuswap has been assessed as Endangered by COSEWIC.



Bonaparte River. Photo credit: SFC.

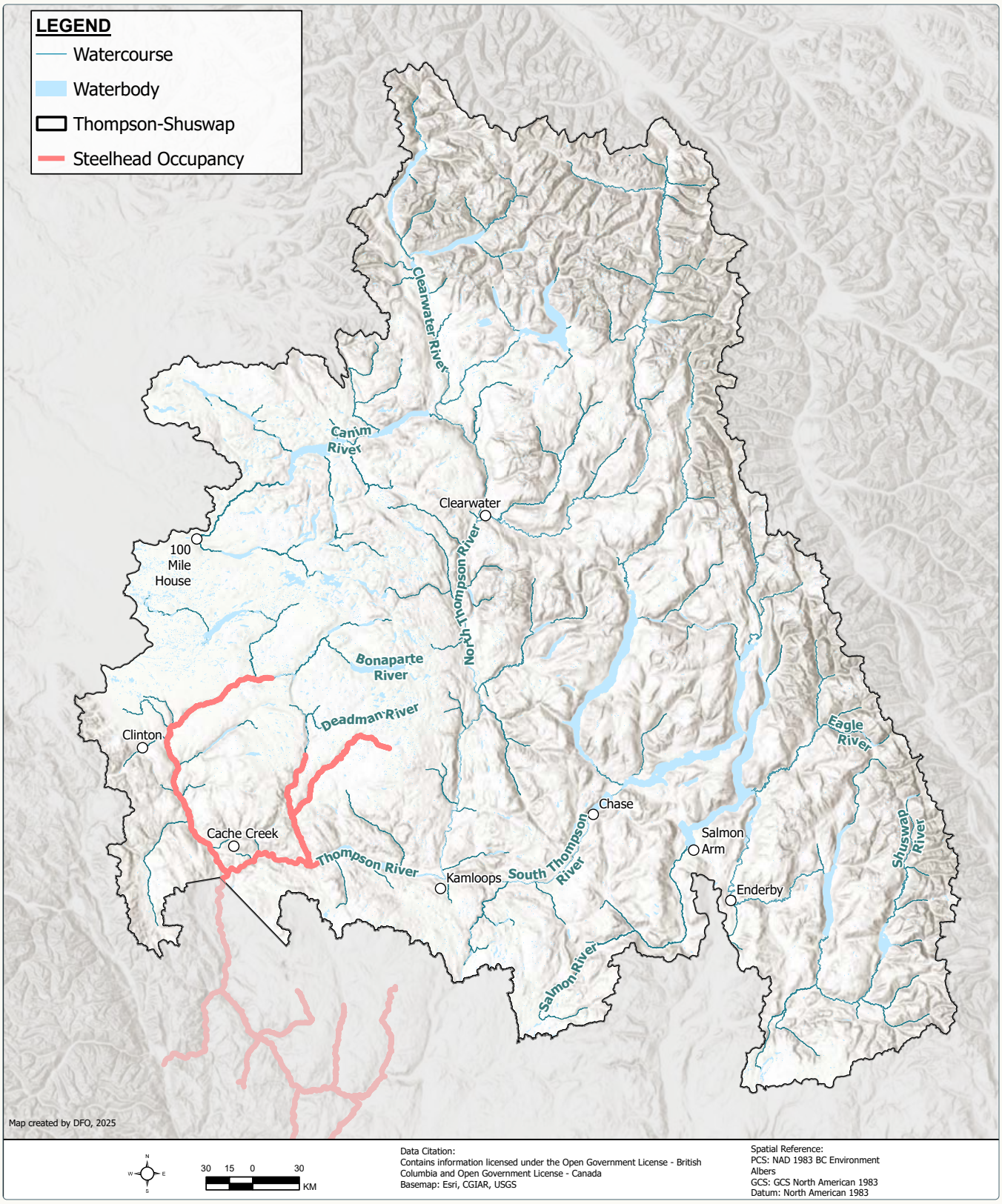


Figure 12. Occupancy range of the Thompson (summer run) steelhead trout population in the Thompson-Shuswap (COSEWIC 2020; GeoBC Branch 2024c).

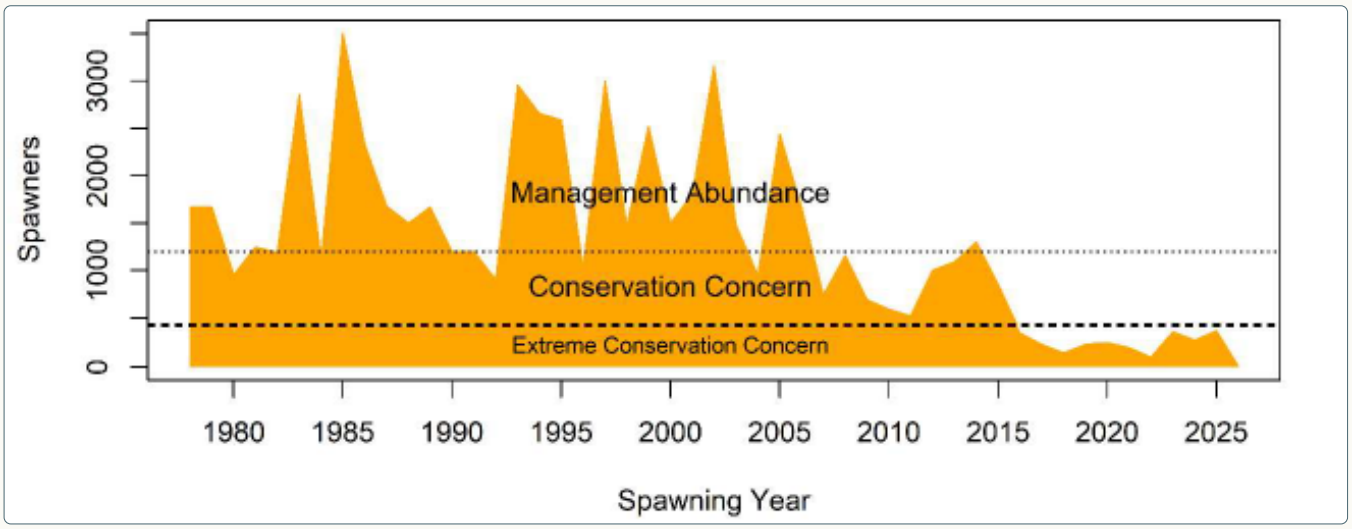


Figure 13. Estimated spawning abundance of Thompson River (summer run) steelhead trout, including the projected 2025 return, as they relate to the B.C. Provincial Framework for Steelhead Management conservation reference points (Ministry of Forests Lands and Natural Resource Operations 2016). Graph from WLRS Status Update for Fraser River Late-Run Summer Steelhead (September 2025).



SFC and DFO biologists survey the Deadman River. Photo credit: SFC and DFO biologists, November 2023.



Adams River. Photo credit: DFO.

2.3.2 Threats to Thompson-Shuswap Salmon Populations

This section outlines threats to salmon populations in the Thompson-Shuswap, as identified in COSEWIC assessments and Recovery Potential Assessments (RPA).

When COSEWIC assesses a salmon population as Threatened, Endangered, or Extirpated, DFO is responsible for developing an RPA. RPAs describe the population's current status, threats to its survival and recovery, and its potential for recovery (Doutaz et al. 2023).

RPAs with threat assessment tables have been completed for the following populations:

- **Chinook DUs 13–17**
- **Sockeye DU 14**
- **Interior Fraser coho DUs 6–8**

Threats and their associated risk levels from the most recent RPAs are listed in **Table 7**. For populations for which full RPA threat assessments have not been completed, threat levels from COSEWIC assessments are provided in **Table 8**. The Momich-Early Summer sockeye population (DU199) has not undergone a threat assessment as part of an RPA or COSEWIC assessment, so it is not included in **Table 7** or **8**. Additional details on major threat categories can be found in the referenced RPA and COSEWIC documents.



Sockeye salmon in the Lower Adams River. Photo credit: SFC.

Table 7. Threats and their associated risk level for several Pacific salmon populations in the Thompson-Shuswap (from threat assessment tables in relevant Recovery Potential Assessments).

THREAT	COHO	SOCKEYE	CHINOOK				
	Interior Fraser (5 CUs; 3 within region - DU6, 7 & 8) (Arbeider et al. 2020)	North Barriere-ES (DU14) (Doutaz et al. 2023)	South Thompson, Stream, Summer 1.3 (DU13) (Dionne et al. 2023)	South Thompson, Stream, Summer 1.2 (DU14) (Doutaz et al. 2021)	Lower Thompson, Stream, Spring (DU15) (Dionne et al. 2023)	North Thompson, Stream, Spring (DU16) (Doutaz et al. 2021)	North Thompson, Stream, Summer (DU17) (Doutaz et al. 2021)
Climate Change & Severe Weather	—	medium-high	high	high-medium	high	high-medium	high-medium
Habitat Shifting & Alteration	—	medium-high	low-high	medium-high	low-high	medium-high	medium-high
Temperature Extremes	—	medium	medium-high	medium	medium-high	unknown	unknown
Droughts	—	—	high	medium	high	unknown	unknown
Storms & Flooding	—	low-medium	low-medium	low-medium	medium	low-medium	low-medium
Geological Events (Avalanches/Landslides, Volcanoes, Earthquakes)	—	N/A	low	unknown	unknown	medium-low	medium-low
Avalanches & Landslides	—	—	low	low-medium	unknown	low-medium	low-medium
Agriculture & Aquaculture	—	low-medium	low-medium	medium-low	low-medium	low	low
Annual & Perennial Nontimber Crops	—	low	low	low	—	low	low
Livestock Farming and Ranching	low	—	low	low-medium	low	—	—
Marine & Freshwater Aquaculture	—	low-medium	low-medium	low	low-medium	low	low
Energy Production & Mining	—	N/A	low-medium	low	low-medium	low	low
Mining & Quarrying	low	—	low-medium	low	low-medium	low	low
Biological Resource Use	—	medium-high	low	high-low	low-medium	high-low	high-low
Logging & Wood Harvesting	—	unknown	low	—	low	low	low
Fishing & Harvesting Aquatic Resources	low-medium	medium-high	low	low-high	low-medium	low-high	low-high
Residential & Commercial Development	—	negligible	low	negligible	low	negligible	negligible
Housing & Urban Areas	—	unknown	unknown	unknown	unknown	unknown	unknown
Commercial & Industrial Areas	—	negligible	low	low	low	low	low
Tourism & Recreation Areas	—	unknown	unknown	unknown	unknown	unknown	unknown

Natural System Modifications	—	medium	medium-high	extreme-high	high	medium-low	medium-low
Fire & Fire Suppression	low	low	low	low	unknown	low	low
Dams & Water Management/Use	low-medium	negligible	medium-high	high-extreme	high	low-medium	low-medium
Other Ecosystem Modifications	—	medium	medium-high	high-extreme	high	low-medium	low-medium
Modifications to Catchment Surfaces	medium-high	—	—	—	—	—	—
Linear Development	medium	—	—	—	—	—	—
Transportation & Service Corridors	—	negligible	low-medium	unknown	low-medium	low	low
Roads & Railroads	low	unknown	low-medium	unknown	low-medium	unknown	—
Utility & Service Lines	low	negligible	low	—	low	low	low
Shipping Lanes	low	unknown	low-medium	unknown	low-medium	unknown	unknown
Human Intrusion & Disturbance	—	negligible	negligible	low	low	low	low
Recreational Activities	unknown	—	low	low	low	low	low
Work & Other Activities (ex. Science Activities)	low	negligible	low	low	low	low	low
Pollution	—	low-medium	medium	medium	high	medium	medium
Domestic & Urban Waste Water	low-medium	low-medium	low-medium	low-medium	low-medium	low-medium	low-medium
Industrial & Military Effluents	low-medium	low-medium	low-medium	low-medium	low-medium	low-medium	low-medium
Agricultural & Forestry Effluents	medium	low-medium	medium	low-medium	high	low-medium	low-medium
Garbage & Solid Waste	—	unknown	unknown	unknown	unknown	unknown	unknown
Airborne Pollutants	—	low-medium	low-medium	low-medium	low-medium	low-medium	low-medium
Invasive Species & Other Problematic species	—	low-medium	low-medium	medium-low	medium-high	low	low
Invasive Non-native/ Alien Species	unknown	—	low-medium	low	low-medium	low	low
Problematic Native Species	—	low-medium	low-medium	low-medium	low-medium	low	low
Introduced Genetic Material (ex. Hatchery Salmon)	low-medium	—	low	—	medium-high	—	—
Plants Modifying Habitat	low	—	—	—	—	—	—
Introduced Pathogens & Viruses	unknown	—	—	—	—	—	—
Overall Threat Risk	very high - high	high-extreme	extreme	extreme	extreme	extreme-high	extreme-high

Table 8. COSEWIC assessment threats and associated threat risk for 3 Pacific salmon and steelhead populations in the Thompson-Shuswap.

THREAT	THOMPSON STEELHEAD (COSEWIC 2020)	SOCKEYE	
		Kamloops-ES (DU11) (COSEWIC 2017)	Shuswap Complex- L (DU18) (COSEWIC 2017)
Climate Change & Severe Weather	unknown	medium	low
Habitat Shifting & Alteration	—	low	negligible
Temperature Extremes	—	medium	low
Storms & Flooding	—	unknown	unknown
Geological Events (Avalanches/Landslides, Volcanoes, Earthquakes)	low	—	negligible
Avalanches & Landslides	low	—	negligible
Agriculture & Aquaculture	negligible	—	negligible
Livestock Farming & Ranching	negligible	—	negligible
Biological Resource Use	high	low	low
Fishing & Harvesting Aquatic Resources	high	low	low
Residential & Commercial Development	—	—	unknown
Housing & Urban Areas	—	—	unknown
Tourism & Recreation Areas	—	—	negligible
Natural System Modifications	high	negligible	low
Fire & Fire Suppression	negligible	not calculated	negligible
Dams & Water Management/Use	low	—	negligible
Other Ecosystem Modifications	high	negligible	low
Transportation & Service Corridors	negligible	negligible	negligible
Roads & Railroads	—	unknown	negligible
Utility & Service Lines	negligible	negligible	—
Shipping Lanes	negligible	—	—
Human Intrusion & Disturbance	negligible	—	—
Recreational Activities	negligible	—	—
Pollution	medium	medium-low	low
Domestic & Urban Waste Water	low	unknown	unknown
Industrial & Military Effluents	low	medium-low	low
Agricultural & Forestry Effluents	medium	unknown	unknown
Invasive Species & Other Problematic species	high-medium	unknown	negligible
Invasive Non-native/Alien Species	not scored	negligible	negligible
Problematic Native Species	high-medium	unknown	unknown
Overall Threat Risk	very high	medium	medium

2.4 People and Land Use in the Thompson-Shuswap

2.4.1 Jurisdictional Summary

Effective watershed planning depends on collaboration between many governing authorities, including First Nations, federal, and provincial governments, among others.

The TSSC was established in 2021 to coordinate strategic actions aimed at conserving and restoring salmon habitat to support productive salmon populations in the Thompson-Shuswap. The TSSC is comprised of 3 parties representing First Nation, federal, and provincial interests; these are SFC, DFO, and WLRS. A brief overview of their roles and responsibilities regarding the protection and conservation of salmon and their habitats in the Thompson-Shuswap is provided below.

2.4.1.1 First Nations and the Secwépemc Fisheries Commission

First Nations have traditional rights and values that guide their jurisdiction in the Thompson-Shuswap. Salmon hold a revered place within Secwepemcúl'ecw, encompassing sacred, spiritual, and cultural values that intertwine with the Secwépemc identity and way of life. In the Secwépemc worldview, salmon are more than a food source; they are kin. This relationship demands respect, care, and the responsibility to protect and nurture their habitats.

SFC is the fisheries department of the Shuswap Nation Tribal Council and is a member of the TSSC representing Secwépemc interests. They promote ecosystem conservation and the sustainable use and harvest of fisheries resources while providing administrative, technical, and policy support to Secwépemc Chiefs and community members. SFC works on behalf of 10 Secwépemc communities:

- **Adams Lake Indian Band**
- **Bonaparte First Nation**
- **Neskonlith Indian Band**
- **Shuswap Indian Band**
- **Simpcw**
- **Skeetchestn Indian Band**
- **Skwlāx te Secwépemcúl'ecw**
- **Splatsin te Secwépemc**
- **Tk'emlúps te Secwépemc**
- **Whispering Pines/Clinton Indian Band**

SFC represents First Nations' interests in the TSSC. To do so, SFC coordinates meetings with Secwépemc communities (and their affiliate organizations) for community members to provide perspectives and guidance to the TSSC.



Sockeye salmon spawning in the Lower Adams River. Photo credit: SFC.

2.4.1.2 Fisheries and Oceans Canada

DFO is the federal government's lead agency for safeguarding Canadian waters and managing Canada's fisheries, oceans, and freshwater resources. DFO is primarily responsible for administering and enforcing the *Fisheries Act*, which includes the fish and fish habitat protection provisions (s. 34-35). Environment and Climate Change Canada administers and enforces the *Fisheries Act* pollution prevention provisions (s. 36). DFO is also responsible for the protection and recovery of aquatic species listed under the *Species at Risk Act*.

2.4.1.3 Provincial Government

The Province of B.C. has the lead responsibility for the stewardship and management of natural resources, including lands, waters, provincial fisheries (including steelhead), and wildlife. WLRS is mandated to protect and restore wild salmon and freshwater fish. WLRS is also responsible for integrated land and natural resource management, including setting objectives for land and marine environments, managing cumulative effects, and advancing reconciliation with Indigenous peoples.

WLRS administers the provisions of key provincial legislation relevant to fish and fish habitat, including the *Riparian Areas Protection Act*, the *Water Sustainability Act*, and the *Wildlife Act*. WLRS also operates the BC Drought Information Portal, which provides real-time and forecasted data on stream flow, precipitation, groundwater, and drought conditions.



TSSC partners visiting the Tranquille River, May 2024. Photo credit: DFO.

2.4.1.4 Regional Districts and Municipalities

In addition to First Nations and the federal and provincial governments, local governments also play a role in the salmon ecosystem and watershed management. The Thompson-Shuswap includes 4 regional districts and 14 municipalities (**Figure 14**). Two additional municipalities, Logan Lake and Coldstream, have small portions of their municipal footprints in the Thompson-Shuswap and are therefore not labelled in Figure 14. Regional districts and municipalities are responsible for enacting the Riparian Areas Protection Regulation (RAPR) under the *Provincial Riparian Areas Protection Act* through zoning designations and land use bylaws. RAPR aims to protect riparian areas when new residential, commercial, and industrial developments are being planned and constructed. Regional districts and municipalities are also responsible for managing stormwater runoff, wastewater discharges, flood risk, and all associated infrastructure.

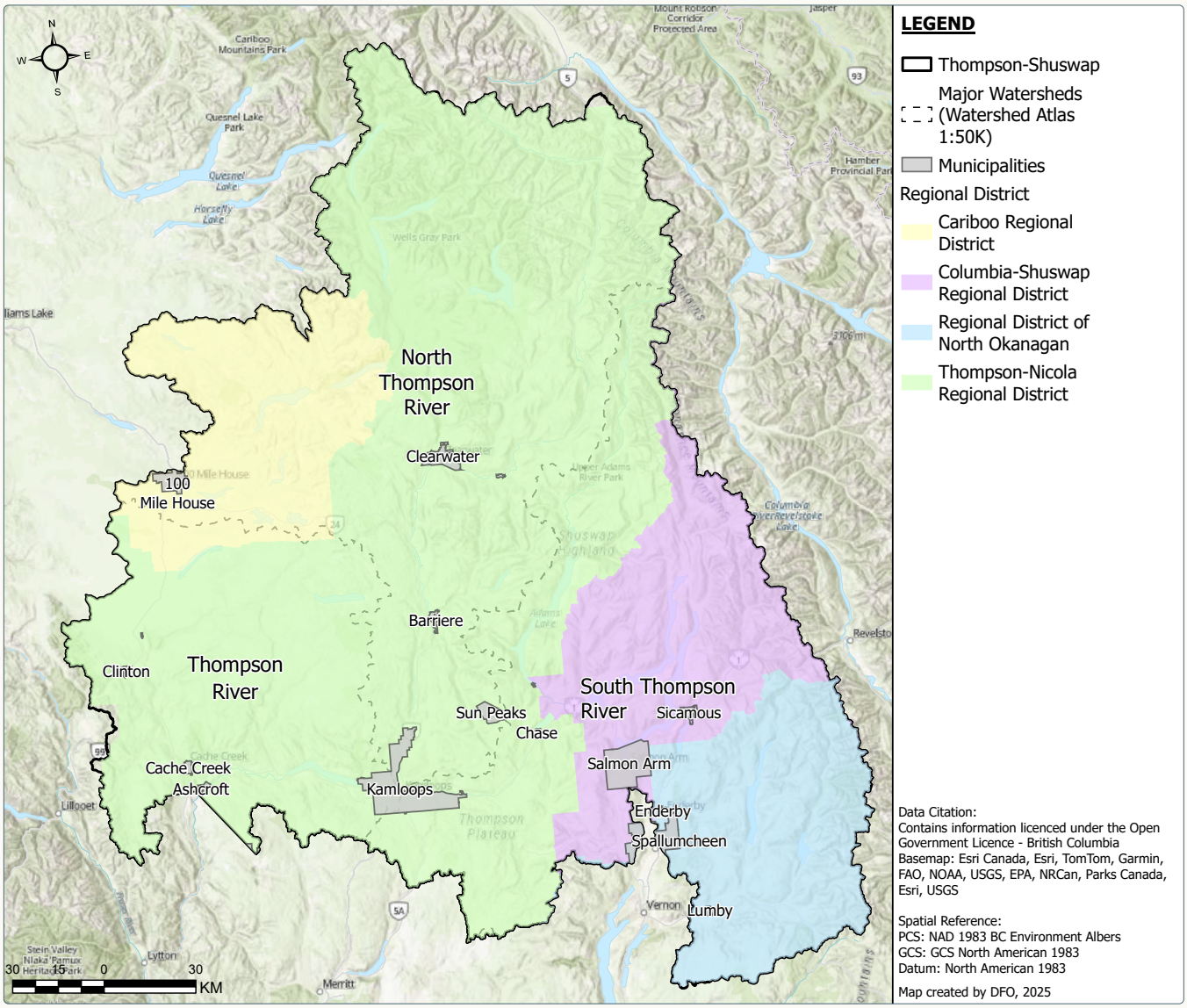


Figure 14. Regional districts and municipalities in the Thompson-Shuswap (GeoBC Branch 2003, 2023a; Governance and Structure 2024a, 2024b).

2.4.2 Human Land Use and Salmon Ecosystem Interactions

Land cover in the Thompson-Shuswap is dominated by trees and rangeland (**Figure 15**). Glaciated, mountainous terrain covered by bare ground, snow, and ice is prevalent along the northern and eastern edges of the region, while urban development and crops are concentrated in the river valleys to the south and west. Human land use in the Thompson-Shuswap is dominated by agriculture, forestry, water use, linear and urban development, and conservation areas (as illustrated below). An overview of the interactions between human land uses and salmon and their ecosystems in the Thompson-Shuswap is provided in the following sections.





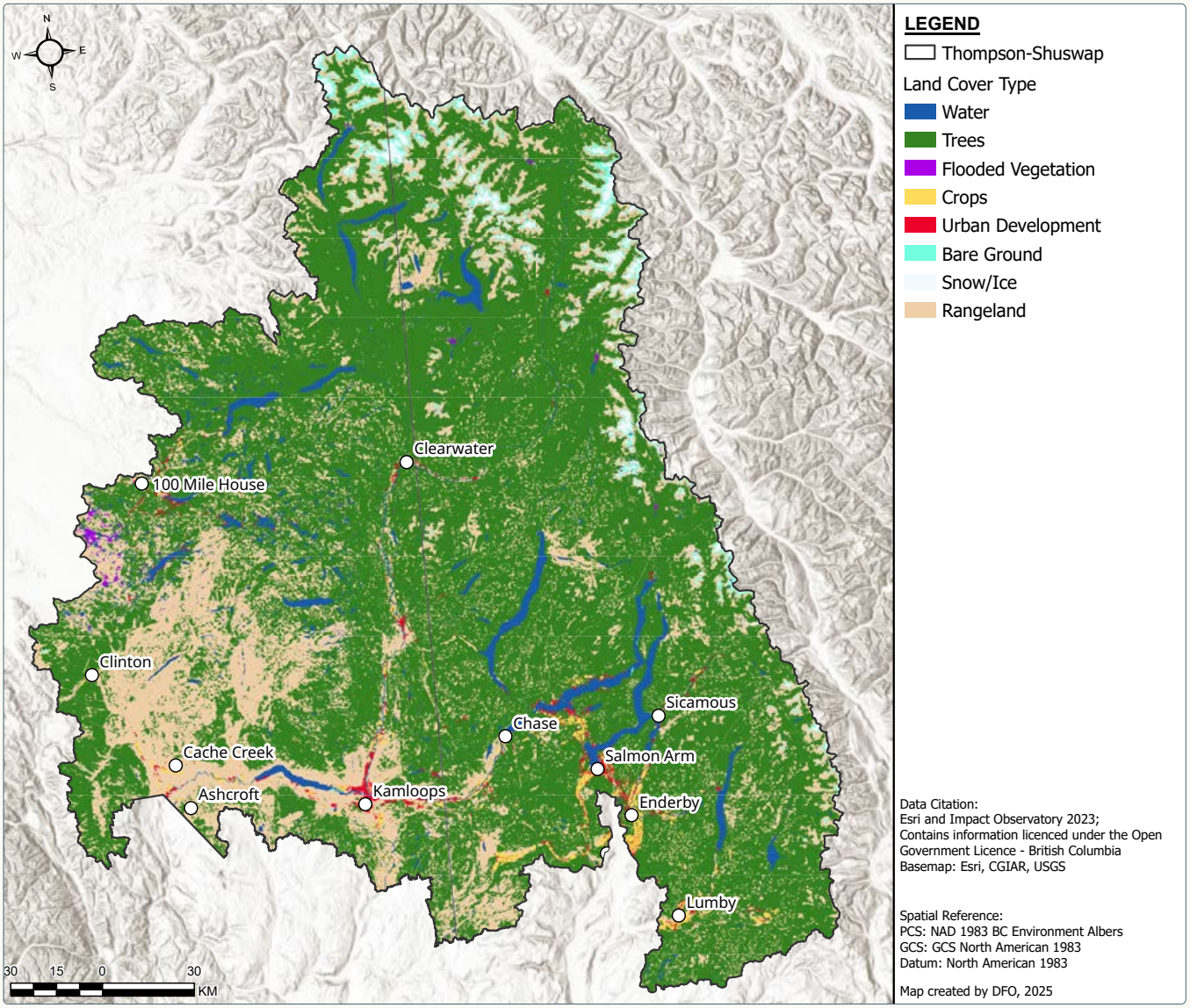


Figure 15. Land cover across the Thompson-Shuswap (Esri 2024).



2.4.2.1 Agriculture

Agriculture is a major industry in the Thompson-Shuswap, involving livestock farming, crop production, and viticulture. It is shown in **Figure 15** as crops and rangeland. In the Thompson River major watershed, agriculture is a dominant land use, with Agricultural Land Reserve (ALR) lands located along the Deadman, Bonaparte, and Thompson Rivers and their tributaries (McGill et al. 2020). In the South Thompson River major watershed, agricultural activity is concentrated near Chase Creek, Eagle River, and Sinmax Creek, and areas south of Shuswap Lake (Fraser Basin Council 2016). Livestock crossings and instream access are common along Bessette, Creighton, and Duteau Creeks (McDonald et al. 2022). Dairy and poultry farms are widespread along the Shuswap, Salmon, and Eagle Rivers (McDonald et al. 2022; Province of British Columbia and Pespesellkwe te Secwépemc 2022), and ranching occurs in the Salmon River watershed. In the North Thompson River watershed, agriculture is present along Louis and Lemieux Creeks (Estsék' Environmental Services LLP. 2017; McDonald and Hawes 2023).

Agricultural activities near streams can negatively impact salmon habitat. Land clearing for crop production, grazing activities, or infrastructure often results in the loss of riparian vegetation (McDonald and Hawes 2023; Secwépemc Fisheries Commission 2023a, 2024b). This leads to wider and shallower streams, reduced channel complexity, increased erosion, altered stream substrates, nutrient changes, higher temperatures, and the spread of invasive species (Fraser Basin Council 2016; Arbeider et al. 2020; McGill et al. 2020). These changes reduce the quality of spawning and rearing habitats (McDonald and Hawes 2023).

Disturbed riparian zones often become hotspots for invasive species, such as Japanese knotweed, reed canary grass, knapweed, and burdock (Secwépemc Fisheries Commission 2023a, 2024a, 2024b). These species displace native vegetation, increase erosion, and have potential cumulative effects (Matte et al. 2022; Mologni et al. 2023). In some areas, hard armouring (like riprap) is used to prevent bank erosion along property edges, but this compromises important habitat features for rearing, such as undercut banks, overhead cover, and woody debris (McDonald and Hawes 2023; Secwépemc Fisheries Commission 2023a).

Other impacts can include worsening low-flow conditions during droughts due to water being used for irrigation (Warkentin et al. 2022; Dionne et al. 2023). Additionally, livestock with instream access during spawning, incubation, and rearing stages can trample redds and increase sedimentation (Dionne et al. 2023). For example, Interior Fraser coho in the lower Thompson River have lost overwintering habitat due to degradation of side channels and backwater areas from agricultural development (Dionne et al. 2023).



2.4.2.2 Forestry

With over 31,640 km^2 of forested land, forestry is a major economic activity in the Thompson-Shuswap (**Figure 16**). In the Thompson River watershed, about 15 per cent of the area was, or may have been, altered by logging between 1979 and 2025, including retired, active, and pending cutblocks (Forest Analysis and Inventory Branch 2025). Much of the Thompson-Shuswap watershed has been impacted by forestry activities, except for protected park lands and areas near Kamloops, Kamloops Lake, and the Thompson River (Forest Analysis and Inventory Branch 2025).

In the South Thompson River, approximately 16 per cent of the watershed has been affected by forestry activities since 1979 (Forest Analysis and Inventory Branch 2025). Logging has been concentrated along the Salmon River, Hiuihill Creek, Chase Creek, and Adams River, where forestry is the dominant natural resource industry (Fraser Basin Council 2016). Timber harvesting also occurs in the Upper Shuswap and Shuswap Lake watershed groups.

In the North Thompson watershed, forestry is the primary type of recorded land use, with 13 per cent of the area altered between 1979 and 2025. Significant activity has occurred in the Lemieux Creek, Louis Creek, Raft River, and Barrière River watersheds (Estsék' Environmental Services LLP. 2017; McDonald and Hawes 2023; Secwépemc Fisheries Commission 2023b, 2024c, 2024d).

Forestry activities can contribute to watershed changes that may affect salmon habitat, including bank erosion, sedimentation, hillslope instability, hydrological changes, riparian vegetation loss, and increased stream temperatures (Anderson 1998; Kreutzweiser et al. 2013; Sweeney and Newbold 2014). For example, in the Deadman River watershed, past clear-cutting practices have altered stream flow patterns, causing spring flows to be higher over a shorter period and late summer and fall flows to be lower (Cirque Resources and BC Extension Services 2013). In the North Thompson watershed, higher stream temperatures

have been observed in areas where riparian harvesting has occurred, which can add stress for salmon during warm periods (Cunningham et al. 2023). In the Upper Shuswap and Shuswap Lake watersheds, some areas affected by historical logging and road construction have experienced slope instability and increased sedimentation, causing reduced water quality and decreasing egg survival. Similar impacts have been observed in the Adams River watershed, where hillslope instability has affected local habitat conditions (Fraser Basin Council 2016).

Historical practices such as log storage and transport in streams have also impacted salmon populations. A splash dam built at the outlet of Adams Lake in 1907 raised water levels for log storage but impeded upstream fish migration during its period of operation. The dam operated until 1921, which led to the extinction of the Adams-Early Summer sockeye population and occasionally caused the Adams River to run dry downstream, impacting populations in the lower river during that time (Fraser Basin Council 2016).

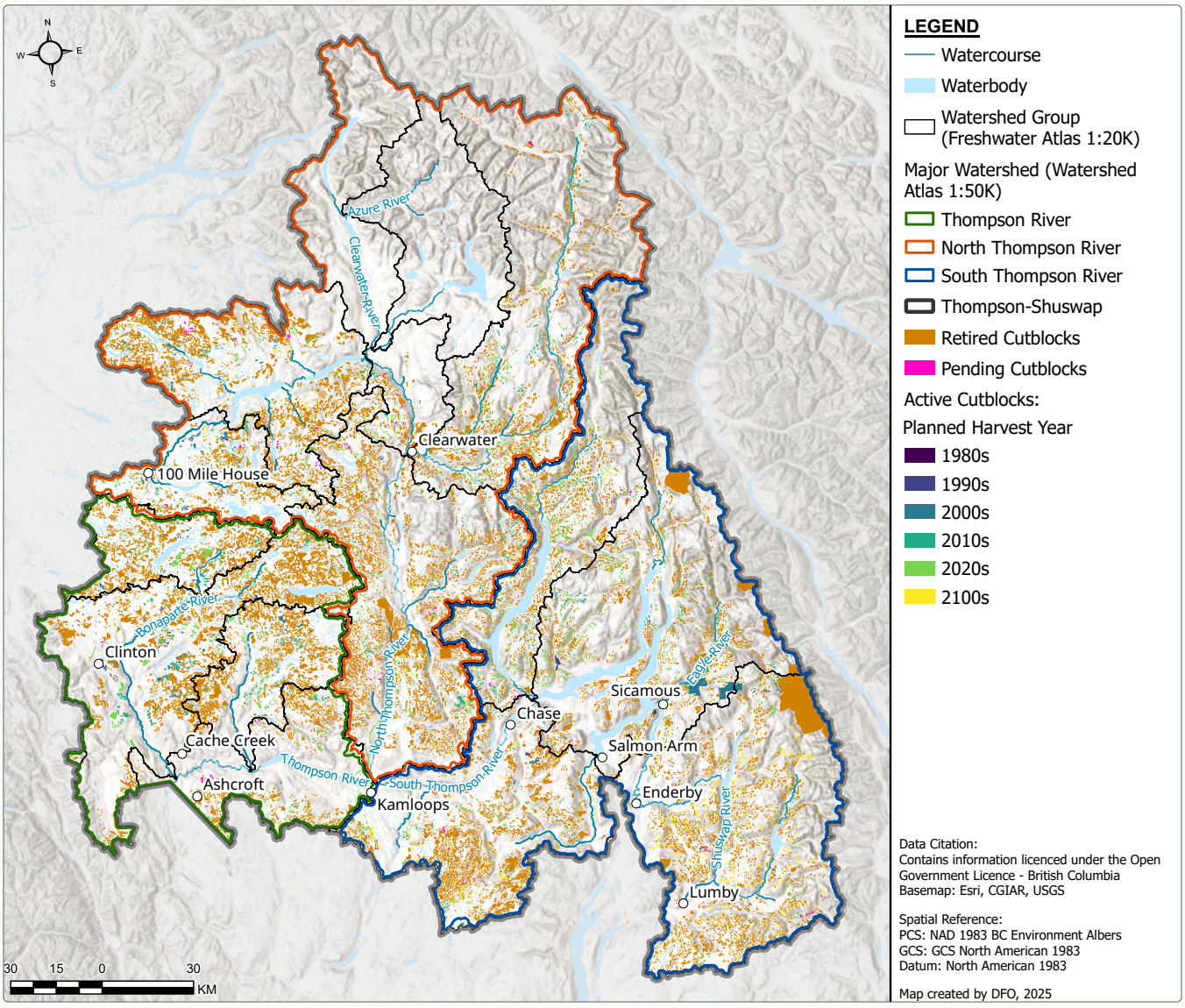


Figure 16. Retired, pending, and active cutblocks in the Thompson-Shuswap (GeoBC Branch 2023a, 2024a, 2024b, 2024c, 2024e; Forest Analysis and Inventory Branch 2025).



2.4.2.3 Water Use

Water withdrawals occur throughout the Thompson-Shuswap, with most licences held in the Thompson and South Thompson major watersheds (**Figure 17**; Water Management 2025). These licences are primarily issued for water storage (for power generation, non-power, and conservation purposes), irrigation (by private and local providers), and waterworks. **Table 9** shows approximately how much water is allocated to each licensed purpose. While licences establish allocation volumes, actual water use is not consistently measured across all licence types. As a result, the volumes shown represent licensed allocation, not actual usage.

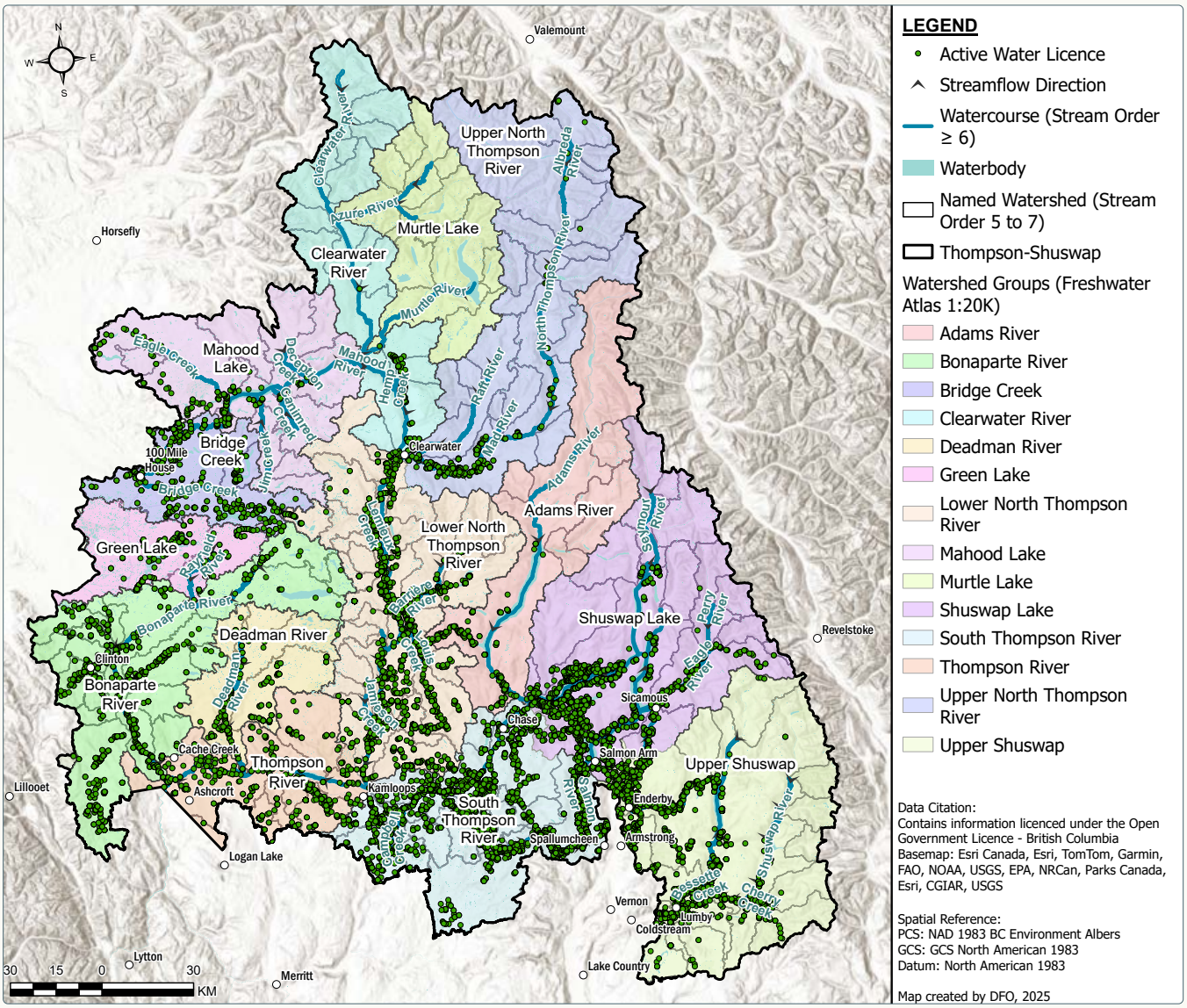


Figure 17. Locations of currently active water rights licences issued from 1918 to 2024 in the Thompson-Shuswap (Water Management 2025).

Table 9. Active water licence annual allocations and their associated purposes in the Thompson-Shuswap (Water Management 2025).

Licence Purpose[6]	Total Number of Active Licences	% of Total Active Licences	Approximate Amount of Water Allocated (m^3/year)	% of Total Amount of Water Allocated
Power	113	1%	1,377,911,000	39%
Conservation	322	2%	889,489,000	25%
Irrigation	5,665	33%	619,739,000	18%
Storage	1,134	7%	236,199,000	7%
Waterworks	275	2%	159,144,000	5%
Industrial	2,549	15%	151,656,000	4%
Land Improvement	146	1%	76,052,000	2%
Domestic	6,791	40%	7,242,000	<1%
Mining	5	<1%	6,256,000	<1%
Mineralized Water	2	<1%	35,000	<1%
TOTAL	**17,002**		**3,523,723,000**	

6 B.C. WSA Definitions for Water Use Purposes and Categories of Water Use Purposes

Water availability in the Thompson-Shuswap varies annually due to weather, climate change, and water demand. The timing of water withdrawals, especially during the summer months, can significantly affect fish and fish habitat. High water demand during low flow periods, particularly for irrigation, can add pressure to already dry conditions, leading to fish strandings, mortality, loss of spawning and rearing habitat, and increased stream temperatures (McDonald et al. 2022; Mohoruk et al. 2022).

Low flows have impacted salmon in several rivers and creeks across the region, including Bessette Creek, Duteau Creek, Creighton Creek, Salmon River, Bonaparte River, Tranquille River, Louis Creek, and Lemieux Creek (Estsék' Environmental Services LLP. 2017; McGill et al. 2020; McDonald et al. 2022; Mohoruk et al. 2022; McDonald and Hawes 2023; Secwépemc Fisheries Commission 2023b). To protect fish populations during late summer droughts, 6 Temporary Protection Orders (TPO) have been issued under Section 88 of the *Water Sustainability Act* to curtail water users during times of water scarcity. These regulatory measures protect critical environmental flows needs of aquatic ecosystems and the survival of fish populations by requesting water licence holders reduce their water use or by temporarily suspending the rights of some licensees (Government of British Columbia 2025). These orders were applied to Bessette Creek and Salmon River in 2021, 2023, and 2025.

Water storage or diversion infrastructure is widespread across the Thompson-Shuswap. The Canadian Aquatic Barriers Database identifies 390 dams in the region as barriers to fish passage. These are built (or were built in the past) for flood control, hydroelectricity, irrigation, and other purposes. Most are in the Thompson (164) and South Thompson (162) major watersheds (Canadian Wildlife Federation n.d.).

These structures can significantly impact salmon in the following ways (Arbeider et al. 2020; Dionne et al. 2023; Doutaz et al. 2023):

- **Blocking access to upstream, off-channel, and floodplain habitats**
- **Altering flow regimes and gravel/sediment transport**
- **Disturbing redds downstream of structures**
- **Increasing mortality risk for migrating smolts**

The Wilsey Dam, built in 1928 on the Shuswap River near Lumby, is the largest dam in the region (McGrath and Laubman 2018). It has blocked access to approximately 32 km of historical upstream habitat once used by Chinook, coho, and sockeye salmon (McGrath and Laubman 2018).

Upstream habitats are now occupied by resident fish such as rainbow trout, mountain whitefish, and bull trout.

BC Hydro announced plans to decommission the Wilsey Dam and Shuswap Falls Powerhouse in September 2021 (BC Hydro 2021). This action is expected to benefit CK-15 Chinook, which spawn within 3.5 km of the dam in the Shuswap River mainstem, as well as CK-16 Chinook, which spawn 2 km downstream in Bessette Creek. Decommissioning the dam will support the recovery of these populations by restoring access to upstream spawning and rearing habitat (McGrath and Laubman 2018).



2.4.2.4 Linear and Urban Development

Linear and urban development in the Thompson-Shuswap includes energy and resource transportation (like transmission lines and pipelines), roads, and municipal and residential infrastructure.

Kamloops is the largest municipality in the Thompson-Shuswap and is located at the intersection of the 3 major watersheds. Within the Thompson River major watershed, municipalities include Cache Creek, Clinton (near the Bonaparte River), and Ashcroft (near the Thompson River). In the South Thompson major watershed, municipalities include Chase (near Little Shuswap Lake), Salmon Arm and Sicamous (on Shuswap Lake), Enderby, and Lumby (in Upper Shuswap). Municipalities in the North Thompson major watershed include Barriere, Clearwater, 100 Mile House, and Sun Peaks (**Figure 14**).

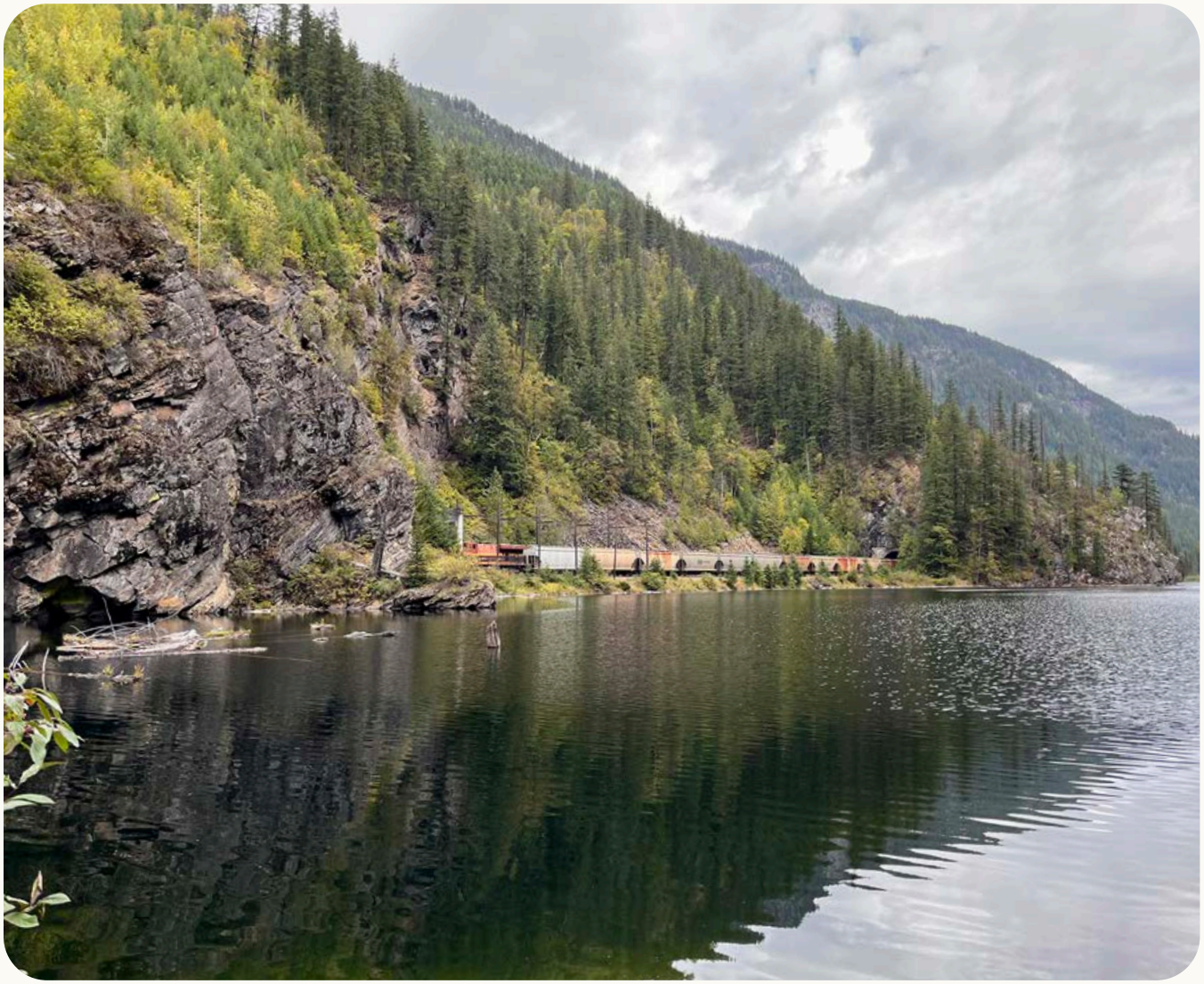
The region contains 3,533 km of pipelines and transmission lines, many of which cross or run adjacent to major rivers and tributaries (**Figure 18**). The Trans Mountain Pipeline crosses the Thompson River and parallels the North Thompson River.

Rail infrastructure includes 1,304 km of Canadian Pacific (CP) and Canadian National (CN) lines (GeoBC Branch 2024f). These are often located in valley bottoms and floodplains, potentially obstructing fish passage (Rebellato et al. 2022). CP and CN lines run along Kamloops Lake, the Thompson River, and through the Green Lake and Bonaparte River watersheds. In the South Thompson, CP lines follow the Eagle River, Shuswap Lake, and South Thompson River, and CN lines follow the Salmon and South Thompson Rivers.

In the North Thompson major watershed, CN lines traverse both Upper North Thompson and Lower North Thompson watershed groups.

Road networks include highways, municipal roads, and forest service roads (GeoBC Branch 2024d; Forest Tenures Branch 2025). Highway 1 parallels Shuswap Lake and the Thompson River; Highways 97 and 99 cross the Green Lake and Bonaparte watersheds; Highway 97A crosses Upper Shuswap; and Highway 5 parallels the North Thompson River. Forest service roads are widespread but poorly mapped. Roads and railways are densest near urban areas, increasing disturbance to nearby streams such as Bridge Creek, Salmon River, Shuswap River, and the Thompson and North Thompson Rivers. Urban and linear development affects fish habitat in the Thompson-Shuswap through riparian clearing, channelization, and infrastructure encroachment (Fraser Basin Council 2016; Province of British Columbia and Pespesellkwe te Secwepemc 2022). Increased impervious surfaces alter hydrology, increase runoff, and reduce water quality. Roads pose risks of spills, sedimentation, and stormwater pollution, while pipelines may cause oil spills and groundwater contamination (Dionne et al. 2023). In the Thompson watershed, coho declines have been linked to road density (Bradford and Irvine 2000).

Culverts at stream crossings associated with roads, rail lines, and pipelines can block salmon passage and disrupt sediment transport (Lachance et al. 2008). Of 939 assessed stream crossings in the region, 344 are passable, 59 are potential barriers, 476 are confirmed barriers, and 60 have an unknown status (Knowledge Management 2025a).



The Canadian Pacific railway runs along the Eagle River before continuing westward and beyond the Thompson-Shuswap. Photo credit: DFO, September 2024.

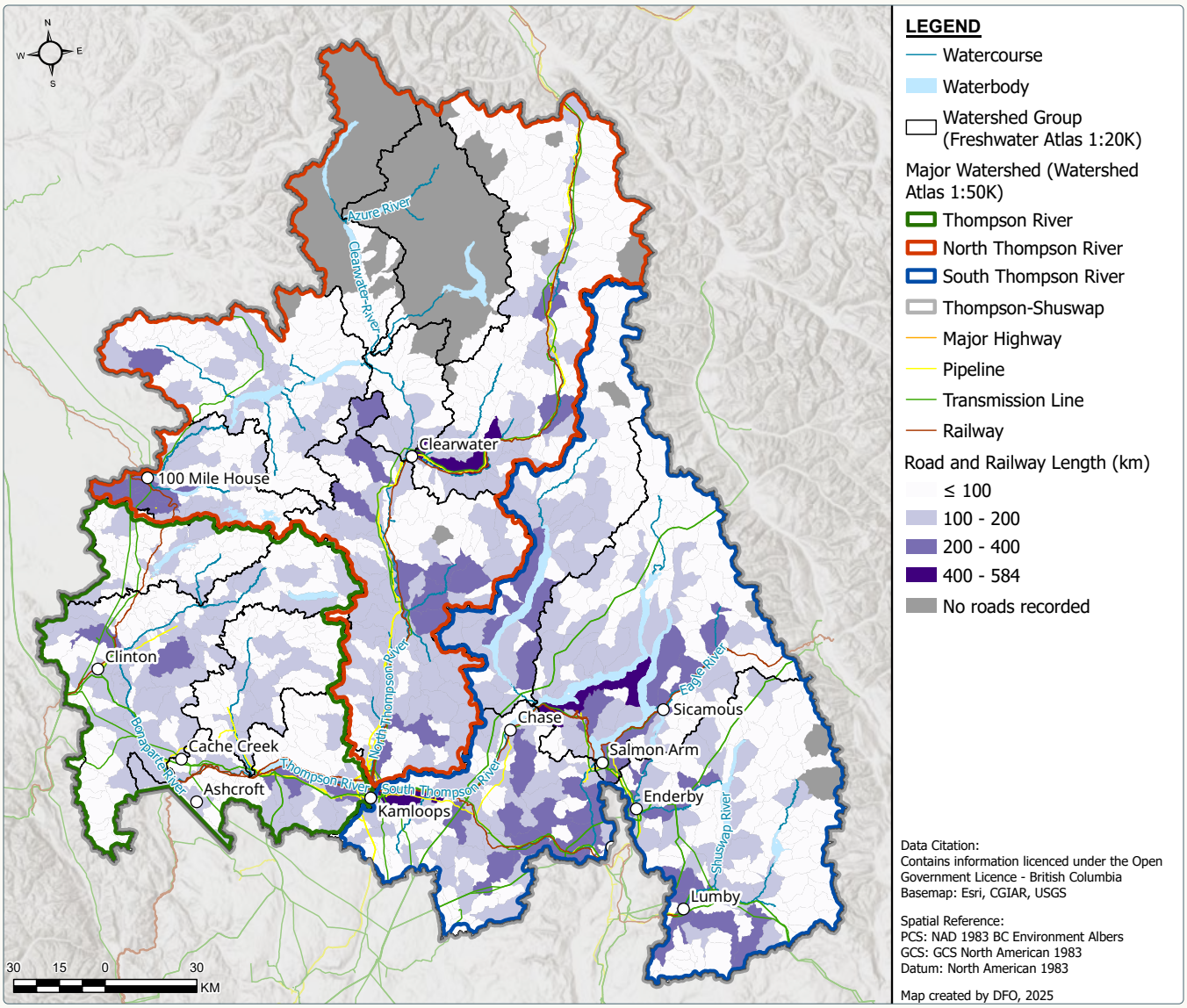


Figure 18. Total length of roads and railways, excluding forest service roads, in each Freshwater Atlas Assessment Watershed in the Thompson-Shuswap from 1979 to 2024 (British Columbia Energy Regulator 2016; GeoBC Branch 2017, 2023a, 2024a, 2024b, 2024c, 2024d, 2024e, 2024f).



2.4.2.5 Conservation Areas

Recreation and Provincial Parks

Popular recreational activities in the Thompson-Shuswap include hiking, boating, camping, fishing, swimming, canoeing, horseback riding, hunting, mountain biking, snowmobiling, skiing, and snowshoeing (Government of British Columbia n.d.; Speed and Henderson 1998; Cirque Resources and BC Extension Services 2013).

Many recreational activities occur in provincial parks and recreation sites, especially around lakes in the South Thompson watershed: Adams, Shuswap, Little Shuswap, Mabel, and Mara Lakes (Fraser Basin Council 2016). The Thompson-Shuswap contains 94 Class A[7] provincial parks, 356 recreation sites, and 288 recreation reserves (**Figure 19**).

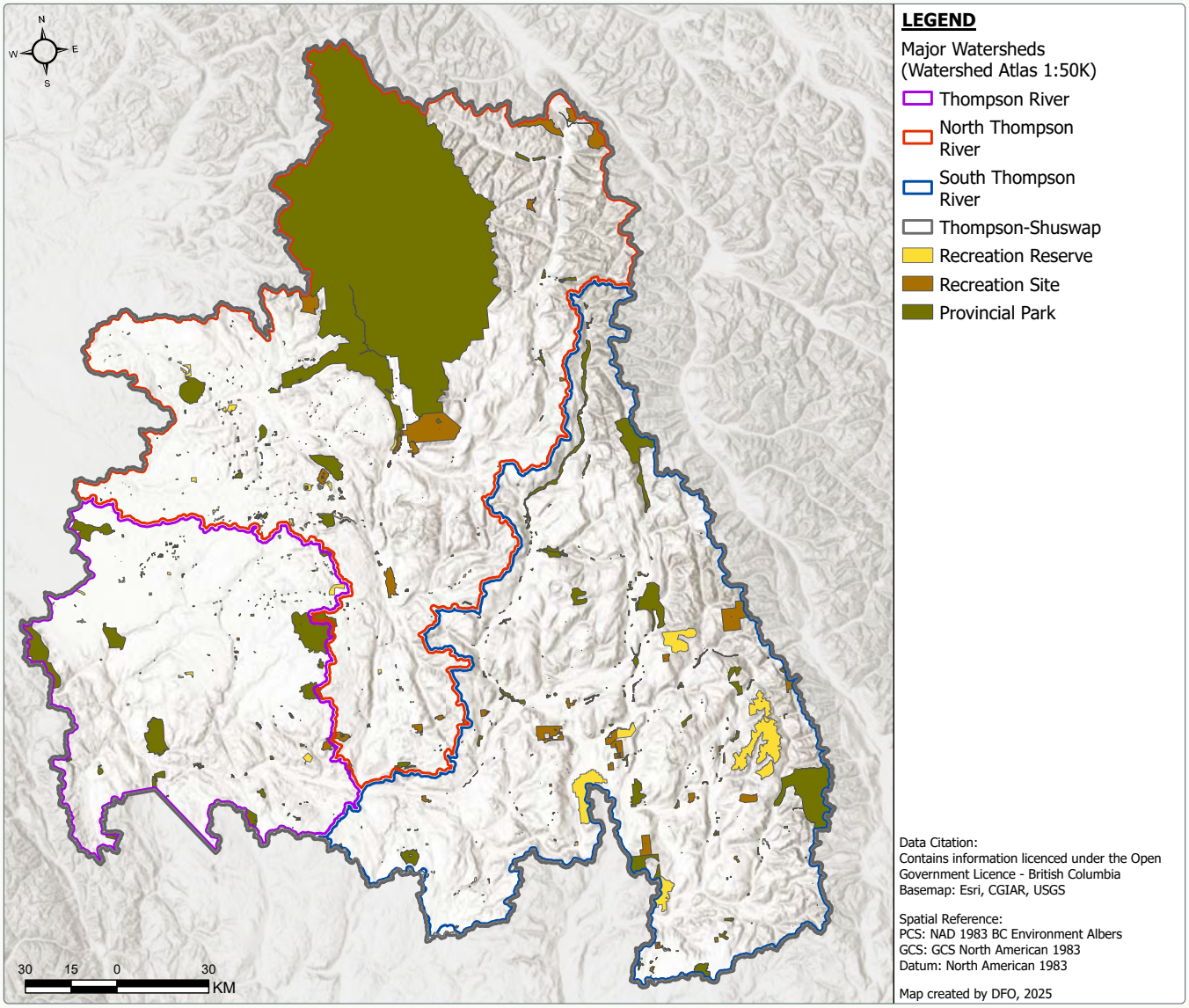


Figure 19. Provincial parks, recreation reserves, and recreation sites in the Thompson-Shuswap (Recreation Sites and Trails BC 2008; GeoBC Branch 2023a; BC Parks 2025).

7 Class A parks have limited allowable development and are committed to the preservation of the natural environment. Some activities that were occurring at the time of park establishment may be permitted to continue (like cattle grazing or hay cutting). Commercial logging, mining, and hydroelectric development are not permitted.

Summer tourism also includes houseboating, water skiing, paddling, rafting, and fishing. Infrastructure built for lake recreation (including retaining walls, docks, boat launches, groynes, and marinas) can degrade salmon habitat by reducing complexity and causing habitat loss. These structures and associated activities may remove riparian vegetation, increase pollution and sedimentation, lower dissolved oxygen levels, increase turbidity, and reduce fish foraging areas (Ecoscape Environmental Consultants Ltd. 2009, 2010). Foreshore and in-water development in Sicamous Narrows is of particular concern for Splatsin te Secwépemc. Cumulative effects modelling is currently being conducted to understand the pressures that ongoing shoreline development, invasive plant species, and channel dredging are exerting on juvenile salmon rearing habitat (R. Laubman pers. comm. 2025).

Other Protected Areas and Area-based Conservation Measures

Several provincial land designation programs in the Thompson-Shuswap provide direct or indirect protection for salmon (**Figure 20**).

- **Conservation Lands Program**
  This program conserves important habitats for vulnerable species, including fish spawning and rearing areas, migration routes, and biodiversity hotspots. These lands also support hiking, hunting, fishing, education, research, and traditional First Nations activities. There are 31 designated sites in the region, covering 162 km^2 across the 3 major watersheds and mostly adjacent to streams and waterbodies (Wildlife 2025).
- **Fisheries Sensitive Watersheds**
  Fisheries Sensitive Watersheds are designated under the *Forest & Range Practices Act*, and are recognized for their fisheries values and watershed sensitivity. *Forest Act* agreement holders must uphold management objectives through Forest Stewardship Plans to protect streambed dynamics, channel integrity, water flow, and hydrological conditions in Fisheries Sensitive Watersheds. The Thompson-Shuswap contains 72 Fisheries Sensitive Watersheds, covering 9,974 km^2 (Aquatic Ecosystems 2025a).
- **Community Watershed Program**
  This program protects surface water sources used for human consumption, with management focused on maintaining water quality, quantity, and timing. Though primarily for drinking water, it also benefits salmon habitat. There are 46 community watersheds in the region, mostly in the south, ranging from <1 to 601 km^2, and covering a total of 1,543 km^2 (Aquatic Ecosystems 2025b).
- **Protected Areas**
  Established under the *Environment and Land Use Act*, these areas have specific conditions governing permitted activities, also guided by the *Park Act* and related regulations. The Thompson-Shuswap has 6 protected areas covering a total area of 383 km^2 (BC Parks 2025).
- **Ecological Reserves**
  These highly protected Crown lands are reserved for ecological research, education, and the preservation of rare or endangered species. Resource extraction is prohibited. The region contains 10 ecological reserves covering 37 km^2 (BC Parks 2025).



The Upper Adams River provincial park protects 65 km of large river floodplain. Photo credit: SFC.

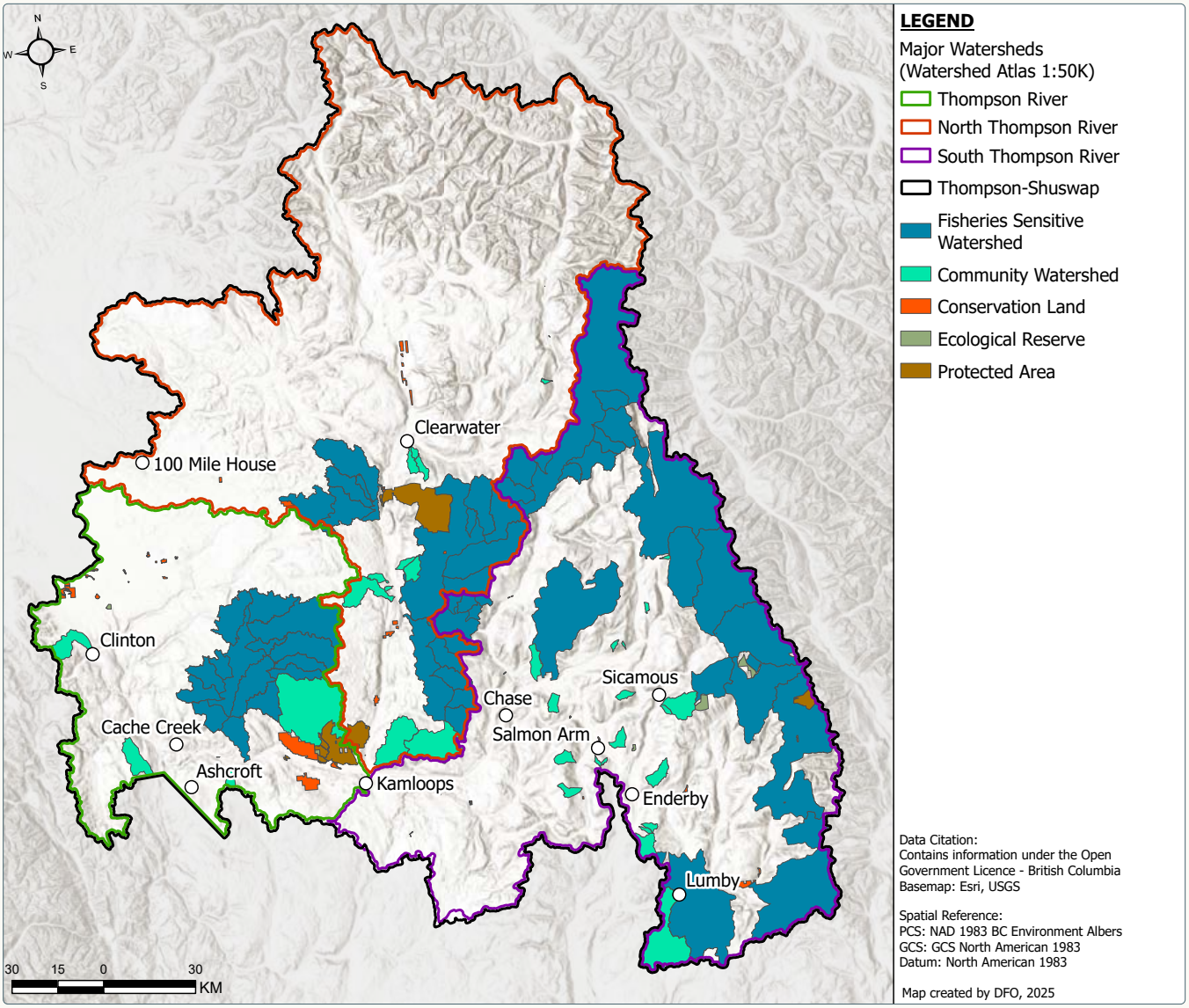


Figure 20. Conservation lands, Fisheries Sensitive Watersheds, community watersheds, protected areas, and ecological reserves in the Thompson-Shuswap (Aquatic Ecosystems 2025a, 2025b; BC Parks 2025; Wildlife 2025).

2.4.3 Landscape Disturbances

Wildfires, droughts, floods, and pest outbreaks such as mountain pine beetle infestations have significantly impacted the Thompson-Shuswap region. These disturbances can degrade fish habitat by reducing riparian vegetation, altering channel morphology and hydrology, increasing stream temperatures and sedimentation, and limiting habitat accessibility. The following sections provide details on how these landscape disturbances (as illustrated below) have affected salmon and their ecosystems in the Thompson-Shuswap.







2.4.3.1 Wildfires

Historically, there have been widespread wildfires in the Thompson-Shuswap. The total burned area from historical fires (1919 to 2023) is greatest in the Bonaparte River, Shuswap Lake, Deadman River, South Thompson River, and Adams River watersheds. Several large wildfires (>300 km^2) have occurred between 2015 and 2023 in the Thompson-Shuswap (*selected wildfire perimeters* in **Figure 21**).

Wildfires can create cascading impacts on salmon habitat. Regular, low intensity fires rejuvenate soils, promote nutrient cycling, introduce new instream woody debris, and open up the forest canopy for new plant growth. Severe vegetation loss and heat exposure can degrade salmon habitat by increasing stream temperatures, altering flow regimes, forming hydrophobic soils, and reducing water quality (Beakes et al. 2014; Pacific Salmon Foundation 2024). These hydrophobic soils raise the risk of erosion and landslides, further altering flow and reducing water quality (Rengers et al. 2020; Palmer 2022). Riparian vegetation loss can disrupt both riparian and in-stream food webs, shifting nutrient sources from terrestrial organic debris to in-stream materials (Minshall et al. 1997; Pacific Salmon Foundation 2024). For example, the Sparks Lake fire increased the Deadman River watershed's vulnerability to flooding and altered flow patterns. Coarse sediment and large woody debris have temporarily modified channel morphology in the lower Deadman River and Criss Creek, reducing habitat complexity and connectivity (Palmer 2022). Similarly, the Tremont Creek fire reduced canopy cover and snowpack retention, likely affecting hydrology and increasing flood risk (Giles 2022).

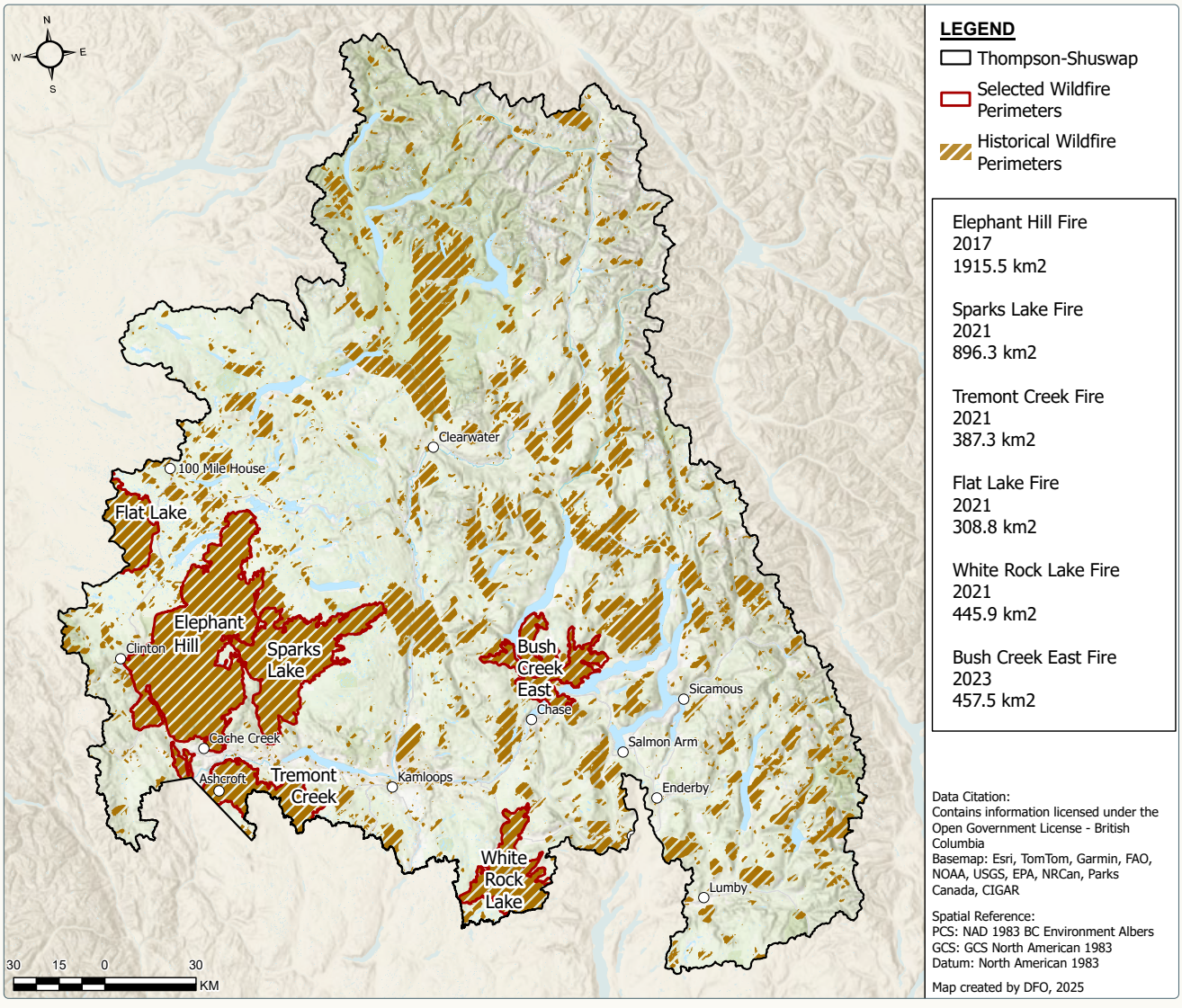


Figure 21. Historical wildfires in the Thompson-Shuswap between 1919 and 2023, highlighting the 6 largest wildfires during that period, all of which occurred from 2017 onward (BC Wildfire Service 2025). Total area burned within the Thompson-Shuswap area is included for each of the 6 largest fires.



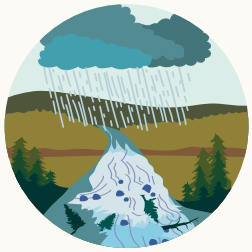
2.4.3.2 Drought

Drought poses multiple threats to salmon, including elevated water temperatures, habitat fragmentation, migration barriers, stranding, loss of spawning and rearing habitat, and increased risk of disease and predation (Dionne et al. 2023).

Droughts in the Thompson-Shuswap are becoming more frequent and severe, driven by climate change and human activities (Dionne et al. 2023; Doutaz et al. 2023). Climate change has led to rising summer temperatures and reduced snowfall, which together have lowered snowpack contributions during low-flow periods (Leith and Whitfield 1998; Philip et al. 2022). Water withdrawals for agriculture, industry, and residential use further reduce streamflow, intensifying drought impacts on salmon habitat (Dionne et al. 2023). In 2021, severe drought conditions led to TPOs for Salmon River and Bessette Creek watersheds from August 19 until September 30, with the Bessette Creek TPO lifted early after Chinook completed their migration (Ministry of Forests Lands Natural Resource Operations and Rural Development 2021). In 2023, drought severity reached 'level 5', indicating near-certain socio-economic and ecological impacts across all 3 major watersheds (Government of British Columbia 2023). TPOs were issued again for Salmon River and Bessette Creek watersheds from August 16 to September 30, 2023 (Dionne et al. 2023). Drought levels in 2025 again reached 'level 5' and TPOs were issued for both Salmon River and Bessette Creek from September 8 to September 30, 2025.



Sandbags were used at the mouth of Lemieux Creek to redirect flows, allowing for upstream salmon migration in the fall of 2024 as an emergency response to low stream flow. Photo credit: SFC.



2.4.3.3 Flooding

Spring and summer flooding in the Thompson-Shuswap is often driven by snowmelt combined with rainfall (Déry et al. 2016; Richards-Thomas et al. 2024). Wildfires have increased flood risk by reducing forest cover (Palmer 2022), and climate change is expected to intensify flooding, with a 10 per cent increase in extreme flood events by mid-century predicted for the Clearwater, Eagle, Salmon, and Bonaparte Rivers (BGC Engineering Inc. 2023).

Historical floods from the 1920s to 1990s caused major infrastructure damage and landslide risks (Septer 2007; BGC Engineering Inc. 2021). More recent events include rain-on-snow flooding in Sicamous (2012) and in the Shuswap region (2017; Richards-Thomas et al. 2024). Flooding can harm salmon habitat through stream channel scouring, which may alter stream hydrology and can kill eggs and juveniles, and by transporting sediment that degrades water quality, diminishes spawning habitat, and can bury redds (Dionne et al. 2023).



Wildfires can increase flood risk. The Momich River was impacted by a large fire in 2023. Photo credit: SFC.



2.4.3.4 Mountain Pine Beetle Defoliation

The mountain pine beetle (*Dendroctonus ponderosae*) is an insect native to western North America that targets lodgepole pine trees in B.C., often causing widespread forest loss during outbreaks (Government of Canada 2024). Beetles burrow into the inner bark to lay eggs, and larvae feed on tree tissues, typically killing the tree within a year (Dhar et al. 2016). Infestations have led to defoliation across B.C., including in the Thompson-Shuswap (Government of Canada 2024).

Defoliation can alter watershed hydrology by deepening snowpacks, hastening snow melt, increasing flash flooding, and prolonging summer droughts due to reduced canopy cover. These effects are often intensified by salvage logging, which has occurred in several affected watersheds, including Bonaparte River, Shuswap Lake, Upper Shuswap, and South Thompson (Fraser Basin Council 2016; Community Mapping Network 2018). Salvage logging can further degrade salmon habitat, especially when vegetation near streams is removed, as observed in the Salmon Arm of Shuswap Lake (Dionne et al. 2023). The most severe pest defoliation in the Thompson River watershed occurred between 2008 and 2018 (DFO 2024; Iacarella et al. 2025). **Figure 22** illustrates areas of severe defoliation from 2004 to 2022.

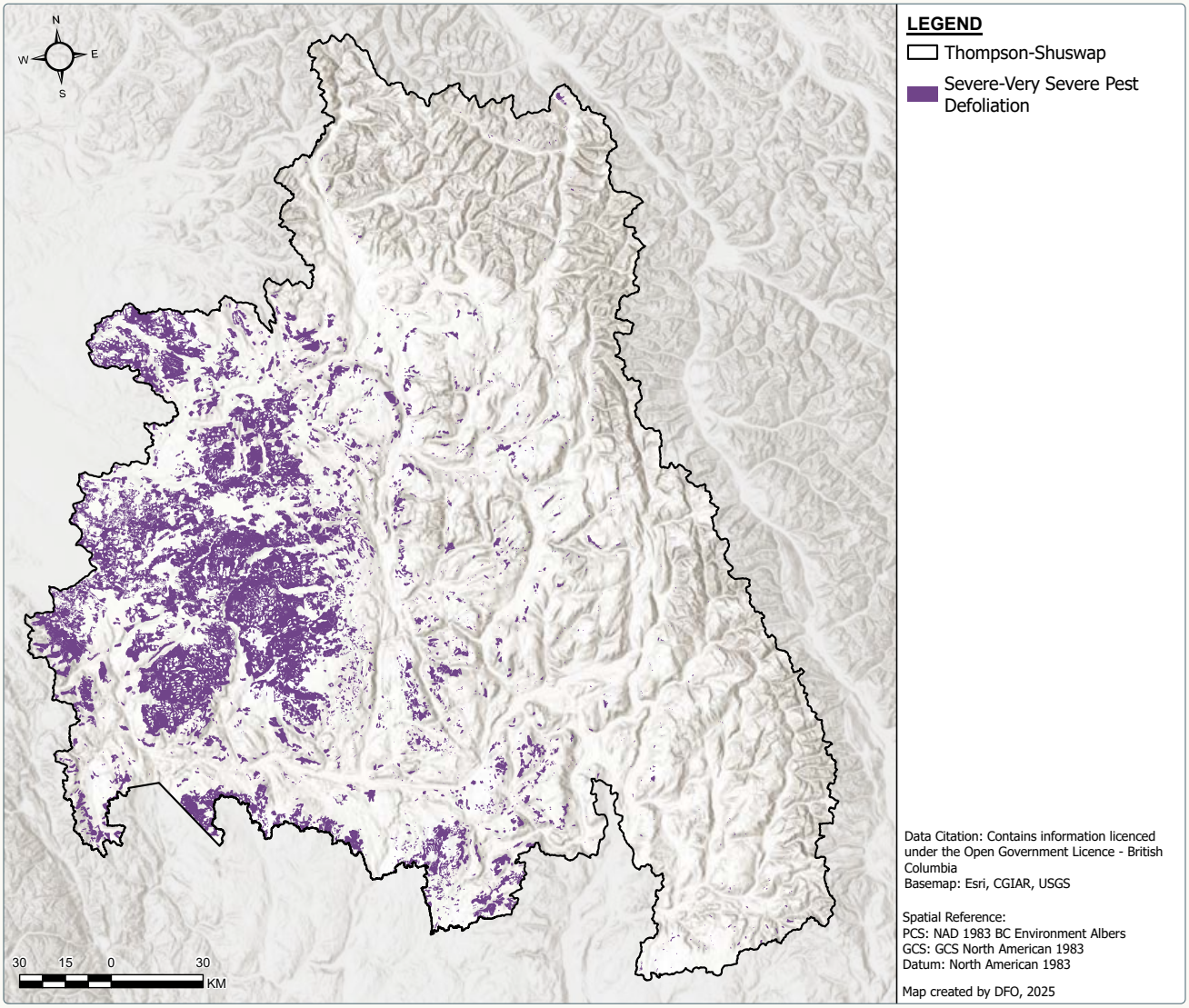


Figure 22. Severe and very severe forest defoliation by mountain pine beetle in the Thompson-Shuswap between 2004 and 2022 (Forest Science Planning and Practices Branch 2021). The total time period queried ranged from 2004 to 2024, however, no severe or very severe forest defoliation activities by mountain pine beetle were listed in years 2023 and 2024.



2.4.4 Cumulative Threats

Salmon and their ecosystems are impacted by multiple interrelated stressors that interact in complex ways, making them difficult to isolate. When combined, these cumulative effects result in greater overall harm. Iacarella et al. (2025) compiled cumulative threat scores for the Thompson-Shuswap under current climate conditions (2001 to 2020), incorporating modelled anthropogenic and landscape-based threats. Modelled threats included aquatic invasive species, large woody debris loss, latitudinal and longitudinal fragmentation, in-stream habitat destruction, altered water velocity and quantity, sediment and nutrient loading, and pollution. The analysis highlights locations where salmon ecosystems face the greatest overall pressure from human activity and landscape disturbance (**Figure 23**). Watersheds with the highest cumulative threat scores in the Thompson-Shuswap include Bonaparte River, Deadman River, and Salmon River.

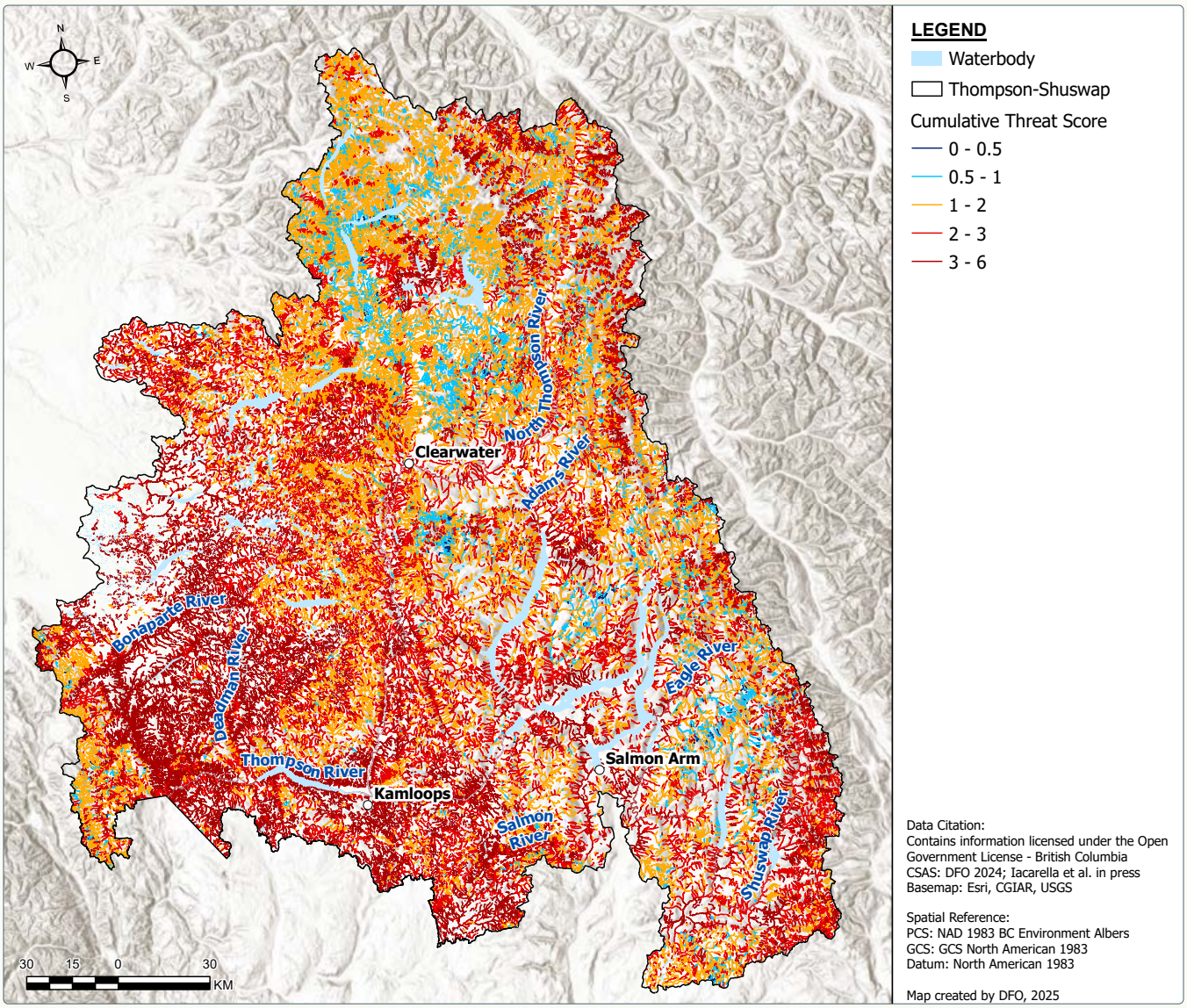


Figure 23. Cumulative threat scores, measured for stream reaches in the Thompson-Shuswap, indicate the level of human activity and landscape disturbance-based threats that may be impacting salmon habitat. Higher cumulative threat scores indicate higher levels of estimated threats combined (DFO 2024; Iacarella et al. 2025).

2.5 Climate Change: Current Impacts & Future Predictions

The Thompson-Shuswap has faced numerous environmental challenges in recent years, including flooding, wildfires, drought, and pest-related impacts (DFO 2024; Iacarella et al. 2025).

These events are intensifying due to human-driven climate change, highlighting the urgent need to build climate resiliency in the region.

Iacarella et al. (2025) calculated cumulative climate change threat scores to understand changes to stream flows, stream temperatures, and flood risk under future climate change scenarios, up to the year 2100. This analysis predicts that Chinook salmon in the upper North Thompson River, pink salmon in the Bonaparte River, and sockeye salmon in the Deadman River will face the most significant increases in cumulative climate change threats over the next 50 to 60 years. Additionally, the Adams River and the Deadman River watershed groups have the highest current and future cumulative climate change threats across all salmon species. Although steelhead was not included in the analysis, all watersheds where this species is found (i.e., Bonaparte, Deadman, and lower Thompson) show elevated current and projected cumulative climate change threats.

Stream temperature and flow, key indicators of water quality and quantity, are the most critical climate-related variables affecting fish and their habitats. Iacarella et al. 2025 modelled future summer stream temperatures and low flows through 2100 under 2 climate scenarios: Representative Concentration Pathway (RCP) 4.5 (moderate emissions) and RCP 8.5 (high emissions). The next sections provide an overview of Iacarella et al. (2025) predictions in relation to stream temperature and flow to provide insight into how salmon habitat may be impacted over time.

2.5.1 Stream Temperature

Climate projections show rising stream temperatures across the Thompson-Shuswap, with the warmest conditions expected in lower-elevation streams (**Figure 24**). Climate models predict that under a moderate global emission (RCP 4.5) scenario, stream temperatures in the Thompson-Shuswap will increase by an average of approximately 2.6°C by 2041 to 2060, and 3.2°C by 2061 to 2080 during the hottest summer months. By 2080, stream reaches with August temperatures between 20°C and 24°C are projected to expand significantly. Stream temperature impacts are even more profound under the high emission RCP 8.5 scenario.

The physiological effects of warming vary by salmon species and population. However, general temperature thresholds for Pacific salmon and other salmonids include:

- Above 18°C: **Decreased swimming performance**
- Above 19°C: **Early signs of physiological stress and slow migration**
- Above 20°C: **Increased pre-spawning mortality and disease risk**
- Above 21°C: **Chronic exposure can lead to severe stress and early mortality**

Recent research suggests juvenile Pacific salmon, specifically Chinook and coho, may have a maximum thermal threshold of 24°C, at which point swimming abilities are affected (DFO 2024; Iacarella et al. 2025). As temperatures rise, previously accessible salmon habitats may become unsuitable, which could threaten migration, spawning, and survival.



Shuswap River. Photo credit: SFC.

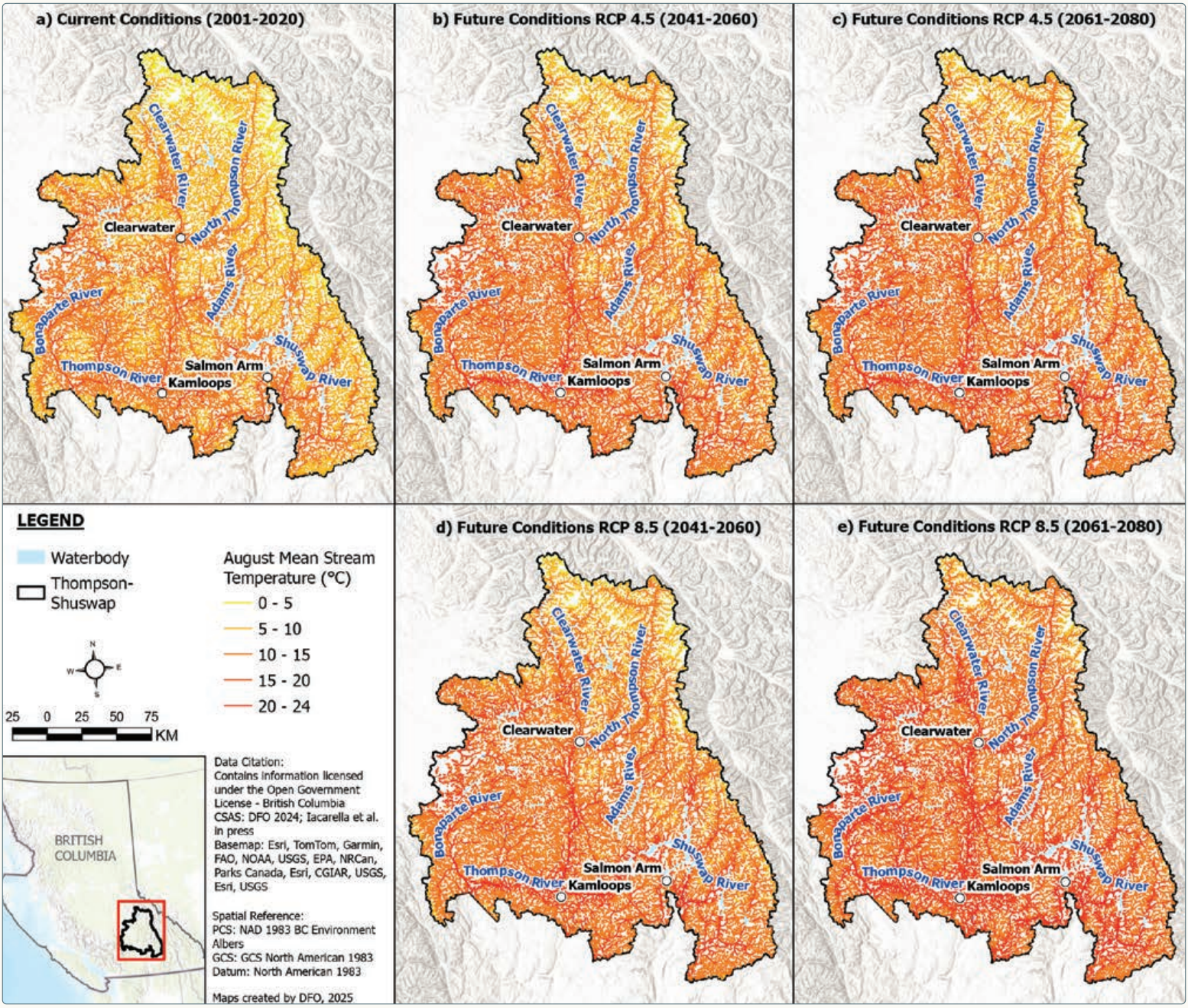


Figure 24. Modelled mean stream temperatures in August for the Thompson-Shuswap under
a) current conditions (2001 to 2020);
b) future conditions under RCP 4.5 (moderate global emission scenario) for years 2041 to 2060 and
c) years 2061 to 2080; and
d) future conditions under RCP 8.5 (high global emission scenario) for years 2041 to 2060 and
e) years 2061 to 2080 (DFO 2024; Iacarella et al. 2024).

2.5.2 Low Stream Flow

Historically, summer low flows have been most pronounced in the Eagle, Shuswap, Murtle, Clearwater, and Barrière Rivers and their tributaries. Climate models project that low-flow conditions will expand to additional tributaries, especially in headwater streams, with further reductions in flow rates over time (**Figure 25**). Clearwater River and Adams River tributaries are expected to be particularly affected.

Both RCP 4.5 and RCP 8.5 scenarios show similar patterns of declining summer flows. These low-flow conditions can dry up streams and side channels, block salmon migration, reduce access to spawning habitat, and strand individuals.



SFC biologists open channels to mitigate low flow conditions in the Deadman River. Photo credit: SFC.

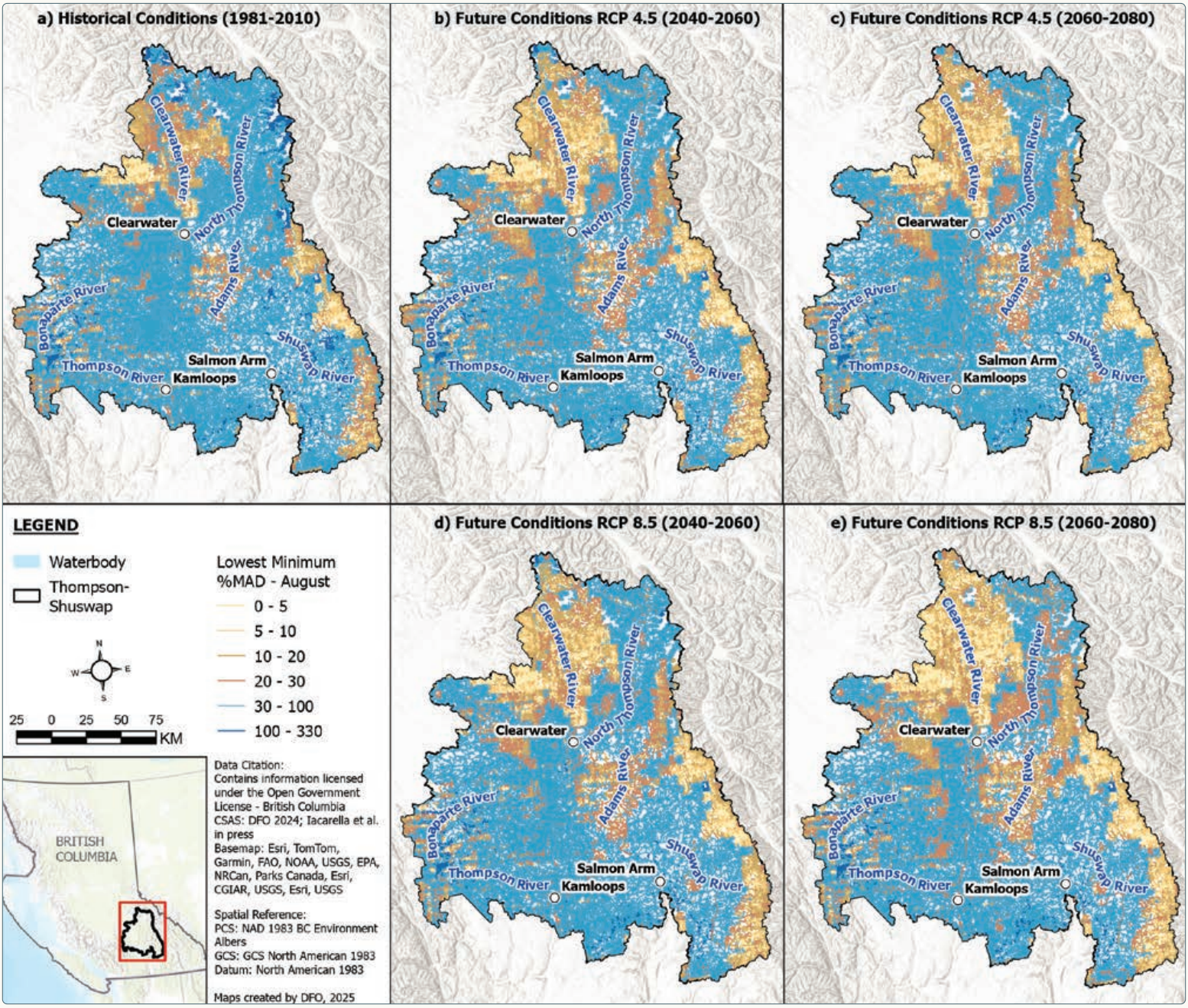


Figure 25. Predicted changes to summer flows in the Thompson-Shuswap based on modelled August mean annual monthly discharge (%MAD; i.e., the % contribution of August flow to the annual flow) for
a) historical conditions (1981 to 2010); future conditions relative to historical annual flow (i.e., the % contribution of future August flow relative to historical annual flow) under moderate global emission scenario (RCP 4.5) for years
b) 2040 to 2060 and
c) 2060 to 2080; and future conditions relative to historical annual flow under high global emissions scenario (RCP 8.5) for years
d) 2040 to 2060 and
e) 2060 to 2080 (DFO 2024; Iacarella et al. 2025).

Iacarella et al. (2025) calculated 'water resource composite scores' by comparing licensed water allocations with projected stream flows for both historical (1981 to 2010) and future conditions (2040 to 2060) under RCP 4.5 and RCP 8.5 emissions scenarios. These scores identify stream reaches and watersheds where low flows coincide with high water demand, highlighting areas that may be more vulnerable to future climate change. Under RCP 4.5, parts of Bessette Creek, Duteau Creek, Eagle River, Lower Shuswap River, North Thompson River, Salmon River, and Thompson River are notably high-risk areas (**Figure 26**). In Figure 26, orange and red indicate higher risk (medium to high scores), and areas in blue represent lower risk zones, where more water is predicted to be available, or less is allocated for withdrawal, or both.

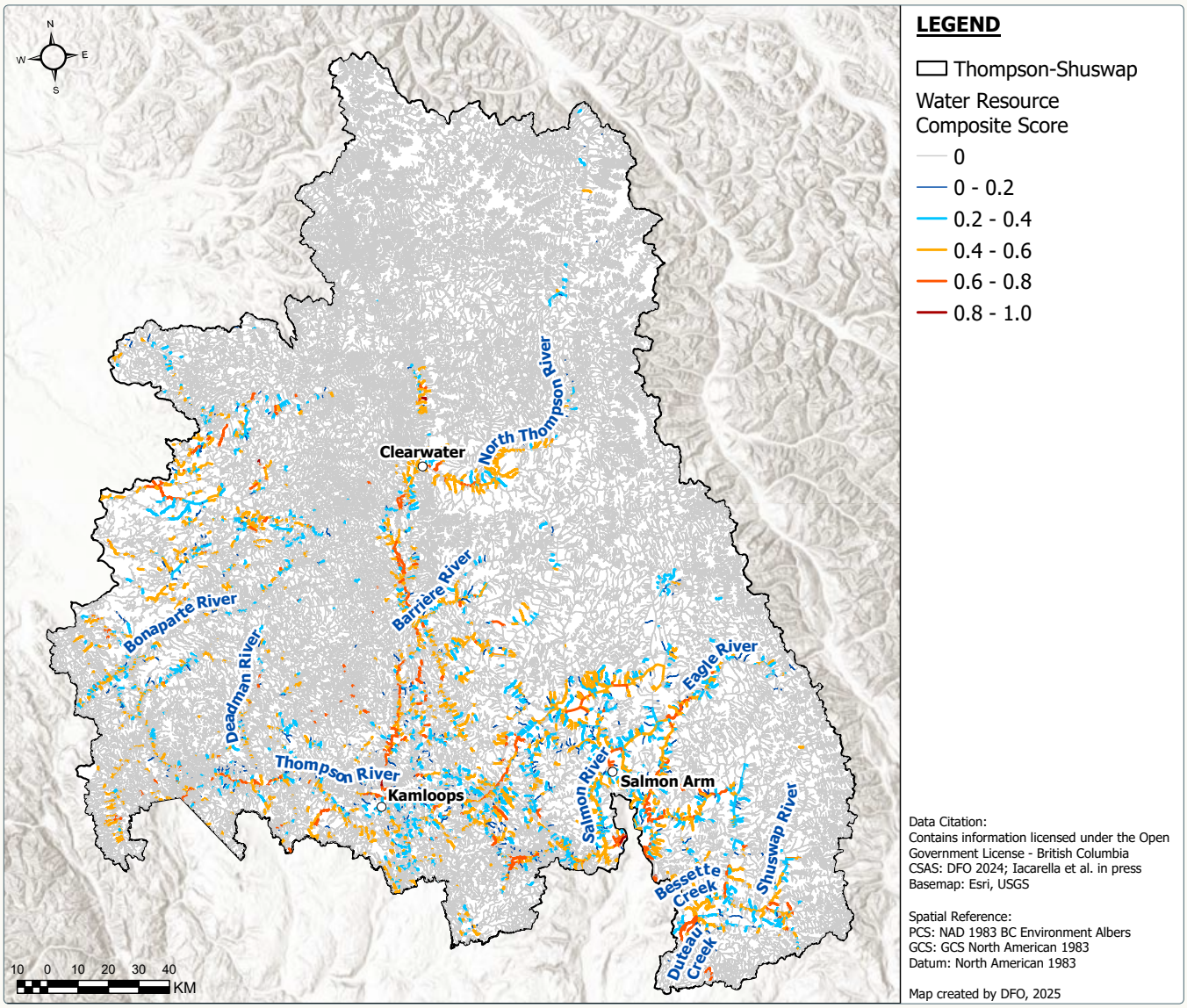


Figure 26. Water resource composite scores highlight streams in the Thompson-Shuswap that may be most impacted by a combination of reduced flow due to climate change and ongoing water use under future conditions (2040 to 2060; RCP 4.5 moderate global emissions scenario). Higher scores indicate lower predicted water availability or systems expected to be more impacted by low flows coupled with water withdrawals (DFO 2024; Iacarella et al. 2025).

3 Thompson River Major Watershed – In Detail

3.1 Overview

The Thompson River major watershed, located in the southwestern Thompson-Shuswap, spans approximately 10,529 km^2 and includes 4 B.C. Freshwater Atlas watershed groups: Green Lake, Bonaparte River, Deadman River, and Thompson River (**Figure 27**). Major streams (6th order or greater) include the Rayfield, Bonaparte, Deadman, and Thompson Rivers.

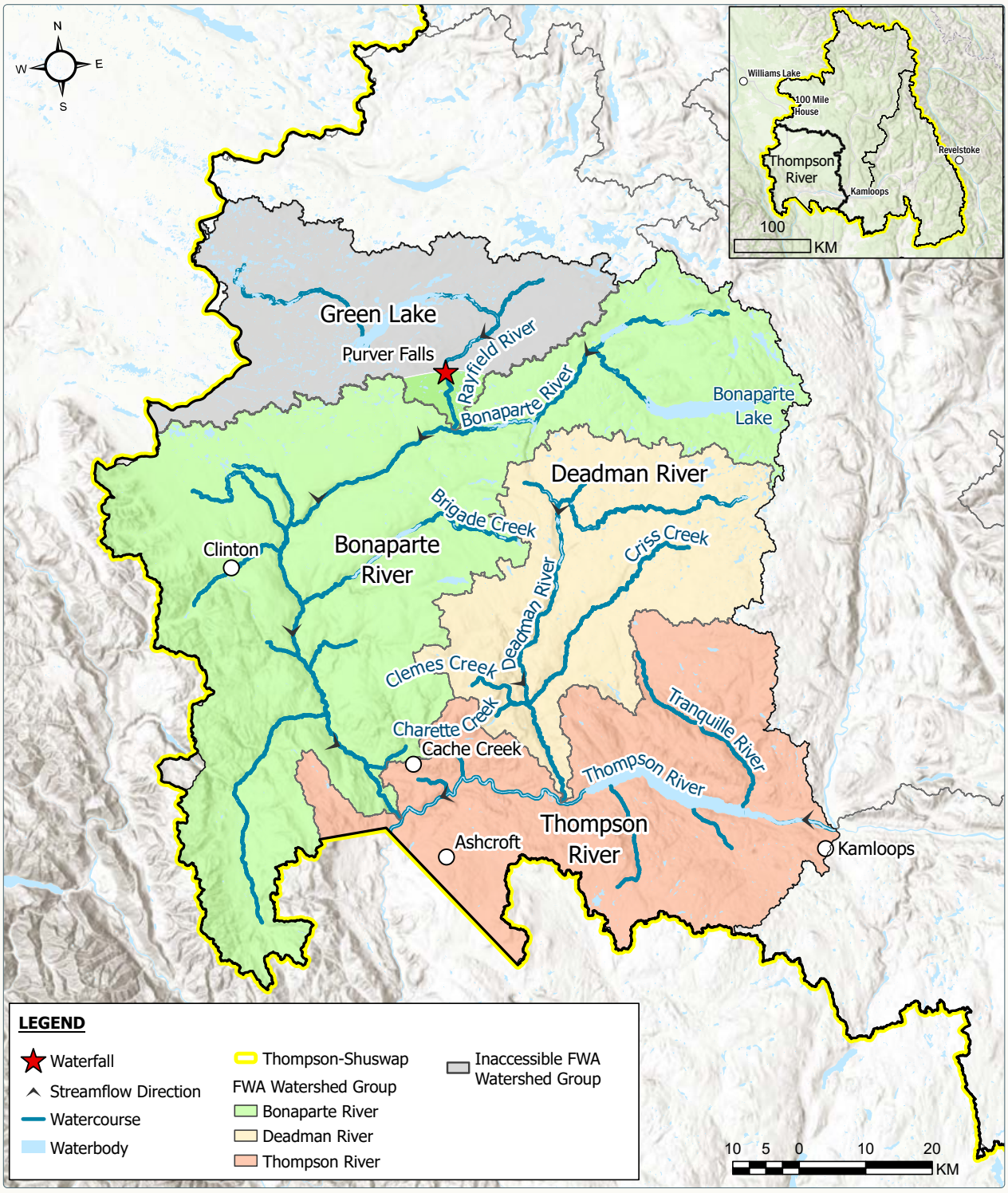


Figure 27. Thompson River major watershed showing the 4 Freshwater Atlas (FWA) watershed groups and major watercourses (GeoBC Branch 2003, 2023a, 2023b, 2024a, 2024b, 2024c, 2024e).

Thompson River Watershed Group:

The Thompson River watershed group covers approximately 3,613 km^2, with land cover dominated by forest (54%) and rangeland (39%), and smaller areas of water (3%) and crops (1%; Chu et al. 2025). Major watercourses include the Thompson River (9th-order) and several 5th-order tributaries that flow into the Thompson River. The river passes through Kamloops Lake just downstream of the confluence of the North and South Thompson Rivers.

The Thompson River flows through a valley carved into quaternary sediments, bordered by steep, unstable slopes formed during deglaciation. These slopes are prone to failure when saturated (Clague and Evans 2003).

Bonaparte River Watershed Group:

The Bonaparte River watershed group covers approximately 3,988 km^2, with land cover dominated by forest (53%) and rangeland (44%), and smaller areas of water (3%) and crops (<1%; Chu et al. 2025). Major watercourses include the Bonaparte River (7th-order) and its 5th-order tributaries: Machete, Fiftyseven, Caverhill, Chasm, Clinton, Loon, Scottie, Maiden, Hat, and Cache Creeks. The Bonaparte River originates in the Fraser Plateau, flows west through Bonaparte Lake, southwest through Young Lake, and joins the Thompson River near Ashcroft (McGill et al. 2020).

The Bonaparte River is highly sinuous, with a riffle-pool morphology, and meanders through glaciofluvial and lacustrine sediments. Historically, a 6.2 m waterfall blocked anadromous salmon from accessing most of the river. A fishway constructed in 1988 enabled upstream migration, allowing for spawning and rearing throughout the river. The full 145.1 km length of the Bonaparte River is now accessible to coho and likely other salmonid species (Arbeider et al. 2020; McGill et al. 2020).

Deadman River Watershed Group:

The Deadman River watershed group spans approximately 1,506 km^2, with land cover dominated by forest (54%) and rangeland (44%), and smaller areas of water (2%) and crops (<1%; Chu et al. 2025). Key watercourses include the Deadman River (6th-order), Criss Creek, Hamilton Creek, and Joe Ross Creek (5th-order), along with numerous 4th-order streams. All tributaries flow into the Deadman River, which joins the Thompson River just south of the watershed boundary, about 4.5 km west of the Kamloops Lake outlet.

Green Lake Watershed Group:

The Green Lake watershed group is about 1,370 km^2, with land cover dominated by rangeland (45%) and trees (44%), and smaller portions consisting of water (7%) and flooded vegetation (3%; Chu et al. 2025).

The majority of the Green Lake watershed group is inaccessible to salmon due to Purver Falls, a 10 m high waterfall in Crater Lake Provincial Park (Canadian Wildlife Federation n.d.). Purver Falls is located on Rayfield River, approximately 9 km upstream of the confluence with Bonaparte River (Canadian Wildlife Federation n.d.). According to the Known B.C. Fish Observations and B.C. Fish Distributions dataset, steelhead were observed in 1979 rearing approximately 5 km upstream of the confluence with Bonaparte River (Knowledge Management 2025b).



Salmon migrate through a narrow canyon to access habitat in the Bonaparte River. Photo credit: SFC.

3.2 Salmon and Their Ecosystems in the Thompson River Major Watershed

3.2.1 Salmon in the Thompson

There are 9 salmon populations in the Thompson River major watershed. Five CUs in this watershed have been assessed as at risk by COSEWIC (**Table 10**).

Table 10. Salmon populations found in the Thompson River major watershed and watershed groups. Populations are denoted by Conservation Unit (CU) and equivalent Designatable Unit (DU).

Species	Conservation Unit name and Status under the Wild Salmon Policy	Designatable Unit and Status Assessed by COSEWIC	Salmon Population Presence in Thompson River Watershed Groups			
			Thompson River	Bonaparte River	Deadman River	Green Lake
Sockeye	Kamloops - Early Summer Timing (SEL-10-01) Amber (Fair)	DU11 Special Concern	Y	N	N	N
	Shuswap Complex - Late (SEL-09-03) Amber (Fair)/ Green (Good)	DU18 Not At Risk	Y	N	N	N
	Shuswap Complex-Early Summer Timing (SEL-09-02) Amber (Fair)	DU19 Not At Risk	Y	N	N	N
Chinook	South Thompson SU 0.3 (CK-13) Green (Good)	DU12 Not At Risk	Y	N	N	N
	Lower Thompson SP 1.2 (CK-17) Red (Poor)	DU15 Endangered	Y	Y	Y	N
Coho	Lower Thompson (CO-7) Green (Good)	DU6 Endangered	Y	Y	Y	N
Pink	Fraser River (PKO-1) Green (Good)	Not assessed by COSEWIC	Y	Y	Y	N
Steelhead	Not Assessed under WSP	Thompson Summer Run Endangered	Y	Y	Y	Y

There are no hatcheries in the Thompson River major watershed; however, several of these salmon populations have received moderate enhancement from facilities outside the watershed (Pacific Salmon Foundation 2024). Lower Thompson Spring Chinook (CK-17) have been enhanced at Spius Creek hatchery; Lower Thompson coho (CO-7) at Eagle River, Shuswap River, and Kingfisher Creek hatcheries; and South Thompson Ocean Summer Chinook (CK-13) at Shuswap River and Kingfisher Creek hatcheries (COSEWIC 2018).

3.2.2 Habitat Features in the Thompson

Multiple assessments have identified a range of important salmon habitat features in the Thompson River major watershed (**Table 11**).

Table 11. Important salmon habitat features in the Thompson River major watershed, categorized by watershed group and stream name.

Watershed Group	Stream Name	Habitat Feature
Thompson River	Tranquille River	Deep pools and the highest complexity of fish habitat features have been observed above a water diversion structure that obstructs upstream access located approximately 4 km upstream from the mouth of the river (Secwépemc Fisheries Commission 2023b).
		The greatest total area of habitat features is located approximately 4 to 8 km from the mouth of the river (Secwépemc Fisheries Commission 2023b).
Bonaparte River	Bonaparte River	Spawning is frequent in gravels deposited on the point bars and floodplains created by the meandering channel between Bonaparte Lake and the Thompson River confluence (McGill et al. 2020).
		Areas of increased channel complexity, including high-quality pools and backwater areas, are associated with spawning and rearing habitat located in the upper portion of the river near Bonaparte Lake (McGill et al. 2020).
		Approximately 5.75 km^2 of good quality rearing and nursery habitat is available from Bonaparte Lake to the Thompson River confluence (McGill et al. 2020).
		Thompson (summer run) steelhead spawn in the Bonaparte River between the confluence of the Thompson River and Young Lake (COSEWIC 2020).
Deadman River	Deadman River	There are high-quality off-channel habitats and deep pools starting 7 km upstream of the confluence with the Thompson River up to Mowich Lake (Secwépemc Fisheries Commission 2024c).
		There is high-quality habitat approximately 6.5 to 13.5 km upstream of the Criss Creek confluence and approximately 3 km downstream of the confluence (Secwépemc Fisheries Commission 2024c).
		Thompson (summer run) steelhead spawn in the Deadman River in areas between the confluence with the Thompson River up to Mowich Lake (COSEWIC 2020).
	Criss Creek	There is high-value habitat, including deep pools and increased habitat complexity, between approximately 2 and 6 km upstream of the Deadman River confluence (Filipic 2023).
		There are cascade pool features, woody debris, and spawning gravels between approximately 8 and 14.5 km upstream of the Deadman River confluence (Filipic 2023).
		There are rearing habitats and spawning gravels between approximately 18 and 33 km upstream of the Deadman River confluence (Filipic 2023).

3.2.3 Habitat Stressors in the Thompson

Threats to Thompson-Shuswap salmon identified in RPAs and COSEWIC assessments have been outlined in **section 2.3.2**, many of which are prevalent throughout the Thompson River major watershed. Stressors to salmon and their habitats specific to the Thompson River major watershed are summarized in **Table 12**.

Table 12. A summary of stressors to salmon and their habitats occurring in the Thompson River major watershed.

Stress	Description of Stress
Altered hydrology	**Water extraction**: • Many streams are considered "Fully Recorded" (that is, their flow is fully allocated and there is not enough water to support issuing additional water licences). This includes the Tranquille River and its tributaries, many of the tributaries to the Thompson River, Charette Creek and its tributaries (Deadman River watershed group), and Brigade Creek and its tributaries (Bonaparte River watershed group; GeoBC Branch 2025). • Licences for groundwater and surface water extraction in the Deadman, Bonaparte, and Tranquille Rivers contribute to decreased flows and water shortages. This can also lead to restricted water withdrawal allocations (Arbeider et al. 2020; McGill et al. 2020; GeoBC Branch 2025).
	Climate change: • Hydrologic regimes in the Thompson River major watershed are predicted to shift from snow-dominated to rain-dominated, resulting in an earlier spring freshet and reduced snowpack, diminishing consistent summer flows. This, along with increased frequency of drought conditions during summer, could cause challenges for migrating salmon, diminishing spawning and rearing success (Arbeider et al. 2020; Dionne et al. 2023). • Decreasing groundwater availability caused by changes in snowmelt is a concern for Chinook salmon that spawn in areas with groundwater upwelling (COSEWIC 2018).
	Forestry: • Logging conducted adjacent to Clemes Creek in the Deadman River watershed has altered the creek's hydrology, with higher flows during spring run-off and lower flows during the winter months (Cirque Resources and BC Extension Services 2013). • Logging throughout the Thompson River watershed group may lead to a shift in the seasonal flow regimes and channel morphology of streams, affecting in-stream habitat for Lower Thompson Spring Chinook (CK-17; Dionne et al. 2023).
Altered riparian function	**Livestock farming and non-timber crops:** • Agricultural practices (both forage crops and livestock use) are the main cause of vegetation removal in the Deadman River (Secwépemc Fisheries Commission 2024c). • Agricultural activities have also led to streambank disturbance and riparian vegetation removal in the Tranquille and Bonaparte Rivers (McGill et al. 2020; Secwépemc Fisheries Commission 2023b).
	Mountain pine beetle infestation and salvage: • Mountain pine beetle has impacted approximately 18 per cent of the pine stands in the freshwater habitat of Lower Thompson Spring Chinook (CK-17), primarily in the Bonaparte and Deadman River watersheds (COSEWIC 2020). Salvage logging for impacted trees has occurred throughout these areas and typically involves removing riparian stands, thus altering riparian function (Community Mapping Network 2018).
	Shoreline development: • Bank armouring (like riprap) and retaining walls have been constructed along portions of the Bonaparte and Deadman Rivers, removing riparian vegetation. This often increases the rate of bank erosion downstream from armoured areas, increasing sedimentation and preventing the natural supply of gravel to the streambed (McGill et al. 2020; Ecoscape Environmental Consultants Ltd. 2022; Secwépemc Fisheries Commission 2024c).
	Wildfire: • Increased frequency and intensity of forest fires in the Bonaparte and Deadman River watersheds (for example, Elephant Hill wildfire in 2017, Sparks Lake and Tremont Creek wildfires in 2021) have resulted in loss of riparian vegetation (Palmer 2022; Secwepemcul'ecw Restoration and Stewardship Society 2024) which can lead to increases in stream temperatures and changes to flow regimes (Dionne et al. 2023).

Stress	Description of Stress
Decreased water quality	**Livestock farming and ranching and non-timber crops:** • Livestock access along Bonaparte and Deadman River banks has resulted in streambank disturbance, which increases sediment input to the streams (McGill et al. 2020; Secwépemc Fisheries Commission 2024c). • Intensive agricultural activities along the Bonaparte River have resulted in nutrient inputs and algal blooms in the stream (McGill et al. 2020). • Cattle grazing along the Bonaparte and Deadman River banks has resulted in the removal of riparian vegetation, which increases stream temperatures (McGill et al. 2020; Secwépemc Fisheries Commission 2024c).
	Mountain pine beetle salvage: • Large-scale forest cover loss from mountain pine beetle salvage logging in the Bonaparte and Deadman River watersheds caused increased sedimentation from bank instability and landslides (COSEWIC 2020).
	Wildfire: • The Elephant Hill and Sparks Lake wildfires caused increased sedimentation from bank instability and landslides (Palmer 2022).
Barriers to fish passage	**Water diversion structure:** • A water diversion structure 4 km upstream from the mouth of Tranquille River obstructs access to several kilometers of upstream habitat for coho, Chinook, and pink salmon (Secwépemc Fisheries Commission 2023c).
	Bonaparte Fishway: • The Bonaparte fishway was constructed in 1988 to specifically allow steelhead access to the 140 km of habitat upstream of a 6.2 meter impassable waterfall located 2.6 km above the Thompson River confluence (Ecoscape Environmental Consultants Ltd. 2020). Following the Elephant Hill wildfire in 2017, heavy rains and debris flows significantly damaged the fishway in 2018 (Ecoscape Environmental Consultants Ltd. 2020). Salmon were moved upstream by the Bonaparte First Nation, SFC, and DFO in 2019 to facilitate spawning (Lirette 2019). Repairs were made the following year, but upgrades are recommended to maintain long term access for steelhead, coho, and Chinook salmon.
Loss of habitat quantity, quality, and complexity	**Mining:** • Recreational gold panning and historical placer mining in the Tranquille River have led to high levels of bank erosion, disturbance, and widespread cobble deposits throughout the channel (Secwépemc Fisheries Commission 2023b).
	Multiple land use pressures: • Changes to riparian and upland areas from various development and land use pressures have resulted in reduced instream complexity in lower reaches of the Bonaparte and Deadman Rivers (for example, lack of large woody debris, deep pools, overhanging vegetation, boulders, and instream vegetation; McGill et al. 2020; Secwépemc Fisheries Commission 2024c).

4 South Thompson River Major Watershed – In Detail

4.1 Overview

Located in the southeastern Thompson-Shuswap, the South Thompson River major watershed spans approximately 17,481 km^2 and includes 4 watershed groups: South Thompson River, Shuswap Lake, Adams River, and Upper Shuswap (**Figure 28**). Major streams (6th order or greater) include the Salmon, Shuswap, Seymour, Perry, Eagle, Adams, and South Thompson Rivers and the Campbell, Bessette, and Cherry Creeks. Key waterbodies include Sugar Lake (22 km^2), Mabel Lake (60 km^2), Adams Lake (132 km^2), and Shuswap Lake (307 km^2).

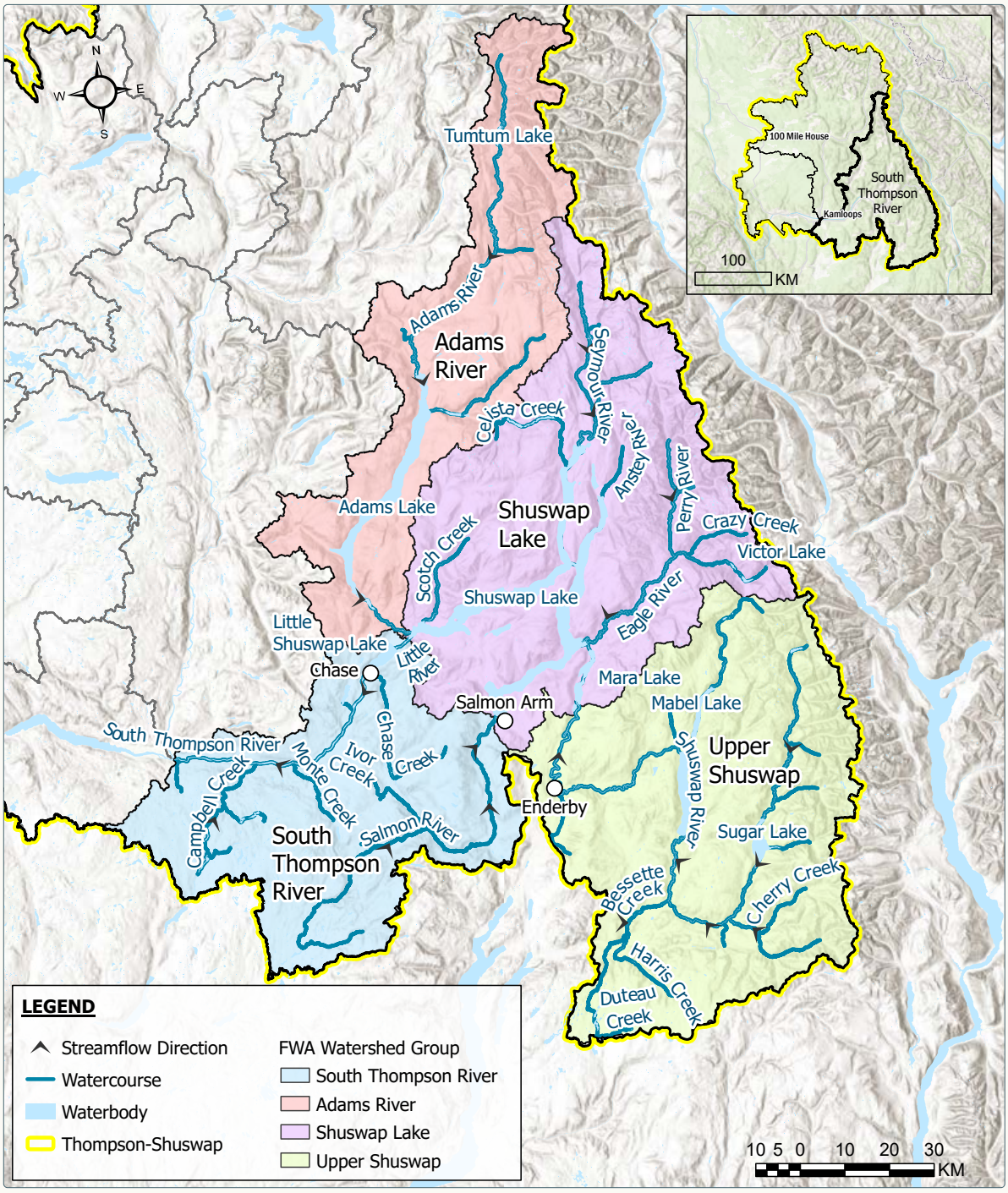


Figure 28. South Thompson River major watershed showing the 4 Freshwater Atlas (FWA) watershed groups and major watercourses (GeoBC Branch 2003, 2023a, 2023b, 2024a, 2024b, 2024c, 2024e).

South Thompson River Watershed Group:

The South Thompson River watershed group covers approximately 3,665 km^2, with land cover dominated by forest (64%) and rangeland (28%), along with smaller areas of crops (3%) and water (2%; Chu et al. 2025). Its largest tributary is Campbell Creek (6th order), with all tributaries flowing into the South Thompson River (8th order), which runs west from Little Shuswap Lake to Kamloops, where it joins the North Thompson River to form the Thompson River. The South Thompson River features a glide hydraulic character and a straight to slightly sinuous channel (Hawes et al. 2016).

Shuswap Lake Watershed Group:

The Shuswap Lake watershed group spans approximately 5,235 km^2 in the central-eastern region of the South Thompson River major watershed. Land cover is predominantly trees (76%), with smaller areas of the watershed attributed to rangeland (9%), water (7%), and snow/ice (5%; Chu et al. 2025). Shuswap Lake, covering 307 km^2 (about 6 % of the watershed area), is a popular destination for recreation and tourism, including fishing, boating, and swimming. Its shoreline features numerous beaches and parks, and various human activities around the lake have an impact on salmon ecosystems.

Nine major tributaries flow into Shuswap Lake, including the Shuswap River, Eagle River (7th order), Perry River, Seymour River, Adams River, Salmon River (6th order), Scotch Creek, Celista Creek, and Anstey River (5th order). Mara Lake lies just south of Shuswap Lake.

Adams River Watershed Group:

The Adams River watershed group is the smallest in the South Thompson River major watershed, covering approximately 3,335 km^2. Land cover is predominantly trees (77%), with smaller areas attributed to rangeland (12%), snow/ice (6%), and water (5%; Chu et al. 2025). Located in the northernmost region, it is also the most rugged, featuring high mountain peaks, deep valleys, alpine meadows, and rainforest (Fraser Basin Council 2016).

Key watercourses include the Adams River (6th order) and several 4th and 5th order tributaries. The Adams River flows through Tumtum Lake and Adams Lake, the largest lake in the watershed, before draining into Shuswap Lake to the south.

A splash dam was built for log storage at the outlet of Adams Lake in 1908. It devastated the upper Adams salmon run by disrupting water flows, reducing spawning habitat, and scouring redds. Although the dam was removed in 1945, its impacts were long-lasting (Allen 1979).

Upper Shuswap Watershed Group:

The Upper Shuswap watershed group spans approximately 5,246 km^2 in the southeastern region of the South Thompson River major watershed. Land cover is predominantly trees (79%), with smaller areas of the watershed attributed to rangeland (13%), crops (3%), and water (2%; Chu et al. 2025). In 1928, the Wilsey Dam was constructed on the Shuswap River at Shuswap Falls near Lumby, blocking access to 32 km of upstream habitat for anadromous salmon (McGrath and Laubman 2018). BC Hydro announced plans to decommission the dam and powerhouse in September 2021, though work on this has not started.

Key streams include the Shuswap River (7th order), Bessette Creek and Cherry Creek (6th order), and several 5th order tributaries. The Shuswap River flows north into Shuswap Lake and ultimately into the South Thompson River.

Bessette Creek is the uppermost accessible stream for anadromous salmon, providing important spawning and rearing habitat for Chinook and coho. It features riffle-pool hydrology with stretches of runs (McDonald et al. 2022). Creighton Creek, a 4th order tributary, also supports coho and Chinook, with riffle-pool and braided segments. Duteau Creek similarly exhibits riffle-pool hydrology with some runs.

Due to low water levels and high water use, Bessette, Duteau, and Harris Creeks are priority areas for low-flow mitigation efforts (Epp 2014).



Little River. Photo credit: DFO.

4.2 Salmon and Their Ecosystems in the South Thompson River Major Watershed

4.2.1 Salmon in the South Thompson

There are 11 salmon populations in the South Thompson River major watershed. Six CUs within this watershed have been assessed as at risk by COSEWIC (**Table 13**).

Table 13. Salmon populations found in the South Thompson River major watershed and watershed groups. Populations are denoted by Conservation Unit (CU) and equivalent Designatable Unit (DU).

Species	Conservation Unit name and Status under the Wild Salmon Policy	Designatable Unit and status assessed by COSEWIC	Salmon Population Presence in South Thompson River Watershed Groups			
			South Thompson River	Shuswap Lake	Adams River	Upper Shuswap
Sockeye	Shuswap Complex – Late (cyclic) (SEL-09-03) Amber (Fair)/ Green (Good)	DU18 Not At Risk	Y	Y	Y	Y
	Shuswap Complex-Early Summer Timing (SEL-09-02) Amber (Fair)	DU19 Not At Risk	Y	Y	Y	Y
	Momich - Early Summer Original population extinct, current population not assessed by WSP	DU199 Endangered	N	N	Y	N
Chinook	South Thompson SU 0.3 (CK-13) Not Assessed by WSP	DU12 Not At Risk	Y	Y	Y	Y
	South Thompson SU 1.3 (CK-14) Amber (Fair)/ Red (Poor)	DU13 Endangered	Y	Y	N	N
	Shuswap River SU 0.3 (CK-15) Not Assessed by WSP	DU12 Not At Risk	N	Y	N	Y
	South Thompson-Bessette Creek SU 1.2 (CK-16) Red (Poor)	DU14 Endangered	N	N	N	Y
	Upper Adams SU (CK-82) Data Deficient	Not assessed by COSEWIC	N	N	Y	N
Coho	South Thompson (CO-8) Green (Good)	DU7 Threatened	Y	Y	Y	Y
Pink	Fraser River (PKO-1) Green (Good)	Not assessed by COSEWIC	Y	Y	Y	Y

The Eagle River hatchery and the Spius Creek hatchery have historically supported Salmon River coho and Chinook enhancement (Fraser Basin Council 2016). The Eagle River hatchery, located east of Malakwa, operated from 1983 to 1994 and had the capacity to produce 17,000 coho and 5,400 Chinook. Since its closure, enhancement of these stocks is conducted through the Spius Creek hatchery (Fraser Basin Council 2016). The Middle Shuswap hatchery, also known as the Shuswap Falls hatchery, has been operating since 1984 on the Shuswap River east of Lumby. Enhancement has primarily been focused on both the middle and lower Shuswap River Chinook (CK-15; Fraser Basin Council 2016). In response to declining coho escapement, enhancement efforts were initiated on Middle Shuswap and Bessette/Duteau coho stocks in 2000, but ceased in 2013 (Fraser Basin Council 2016). Adams River sockeye had significant hatchery success at the Clearwater River hatchery when coupled with nutrient enrichment in Adams Lake in the 1990s. Enhancement efforts were relocated to the Middle Shuswap hatchery in 2000 and conducted on "off-cycle" years, but unfortunately stopped in 2008 due to poor escapement. Today, sockeye enhancement in the Shuswap Early-Summer CU has been minimal (Fraser Basin Council 2016).



Shuswap River. Photo credit: SFC.

4.2.2 Habitat Features in the South Thompson

Multiple assessments have identified a range of important salmon habitat features in the South Thompson River major watershed (**Table 14**).

Table 14. Important salmon habitat features in the South Thompson River major watershed, categorized by watershed group and stream name.

Watershed Group	Stream Name	Habitat Feature
South Thompson River	Salmon River	Salmon River is a significant Chinook spawning stream (Fraser Basin Council 2016). The central and lower sections of instream area from the Salmon River confluence with Shuswap Lake to the Highway 97 crossing contain natural areas with relatively high-value habitat compared to the rest of the surveyed river (Mohoruk et al. 2022).
	South Thompson River	Habitat complexity and quality increase near the Campbell Creek fan and areas upstream (Hawes et al. 2016).
		Between Little Shuswap Lake and downstream to Kamloops Lake, there are many areas of low flood bench sites, adjacent flooded pastures, backwater areas, and slough areas that create rearing and nursery habitat (Hawes et al. 2016).
		The east end of Kamloops Lake has shore marsh and backwater areas accounting for approximately 1.34 km^2 of rearing habitat (Hawes et al. 2016).
		High velocity runs and riffle-pool reaches occur near the Monte Creek confluence and upstream of Banana Island (Hawes et al. 2016).
		Chinook spawning occurs primarily from the outlet of Little Shuswap Lake, downstream to Campbell Creek, and throughout Little River (Fraser Basin Council 2016).
	Little Shuswap Lake	Little Shuswap Lake is utilized by juvenile sockeye for initial rearing stages before they move to Shuswap Lake (Fraser Basin Council 2016).
		Pink salmon spawning occurs from the outlet of Little Shuswap Lake downstream to Campbell Creek (Fraser River Action Plan (Canada) and Department of DFO 1997; Fraser Basin Council 2016).
	Tributary streams (Campbell, Monte, Dry, Neds, Martin, Niskonlith, and Harper Creeks)	Seasonal rearing habitat is available in these tributaries when the water is high (Fraser Basin Council 2016).
		These tributaries provide spawning gravel to the South Thompson River (Fraser Basin Council 2016).

Shuswap Lake	Eagle River	There is 0.57 km^2 of suitable spawning habitat between Victor Lake and Shuswap Lake (Hawes et al. 2015).
		About 0.25 km^2 of the channel between Victor Lake and Shuswap Lake has been categorized as rearing and nursery habitat, mostly in reaches upstream of the Crazy Creek confluence and the 2 km upstream of the confluence with Mitikan Creek (Hawes et al. 2015).
		There is increased habitat quality and channel complexity upstream of the Perry River confluence (Hawes et al. 2015).
		Chinook spawning habitat is present below Griffin Lake (Fraser Basin Council 2016).
		Within the Shuswap Lake watershed, the Eagle River is the largest coho-producing river (Fraser Basin Council 2016).
	Shuswap Lake	Shuswap Lake is a main rearing area for juvenile sockeye in the region, particularly in nearshore zones (Fraser River Action Plan (Canada) and Department of DFO 1997; Fraser Basin Council 2016).
		During rearing, sockeye fry from Adams River migrate primarily to the Main Arm, but also to Seymour, Anstey, and Salmon Arms (Fraser River Action Plan (Canada) and Department of DFO 1997; Fraser Basin Council 2016).
		Shuswap Lake and natal streams are used by Chinook for rearing and overwintering habitat (Fraser Basin Council 2016).
		Shuswap Lake is a rearing area for juvenile coho (Fraser Basin Council 2016).
		Coho spawning habitat occurs throughout the small tributary streams to the lake (Fraser Basin Council 2016).
	Mara Lake	Mara Lake is utilized by juvenile sockeye for initial rearing stages before migrating to Shuswap Lake (Fraser Basin Council 2016).
	Scotch Creek	Sockeye spawning habitat is located throughout Scotch Creek from Shuswap Lake to upstream of the Kwikoit Creek confluence (Fraser Basin Council 2016).
	Seymour River	Chinook spawning habitat is located below a waterfall approximately 6 km upstream from the mouth of the river (Fraser Basin Council 2016).
		Seymour River has overwintering habitat for coho (Fraser Basin Council 2016).
		Seymour River is a significant producer of early summer sockeye, Chinook, and coho salmon (Fraser Basin Council 2016).
	Anstey River	Chinook spawning occurs below a waterfall, approximately 5 km upstream from the mouth of the river (Fraser Basin Council 2016).
Adams River	Adams Lake	Juvenile sockeye use Adams Lake for initial rearing stages before moving to Shuswap Lake (Fraser Basin Council 2016).
	Adams River	The lower Adams River supports the largest sockeye run in the South Thompson River major watershed, as well as significant Chinook populations (Fraser Basin Council 2016).
		Chinook spawning occurs in the lower portion of the river, primarily from Shuswap Lake to the canyon (Fraser Basin Council 2016).
		Chinook spawning occurs above Adams Lake in the upper portion of the river (Fraser Basin Council 2016).
		Coho spawning occurs in side channels of the lower Adams and in the upper Adams River above and below TumTum Lake (Fraser Basin Council 2016).
		Adams River provides overwintering habitat for coho (Fraser Basin Council 2016).
		Pink salmon spawn in middle and lower reaches, and side channels (Fraser River Action Plan (Canada) and Department of DFO 1997; Fraser Basin Council 2016).

Upper Shuswap	Bessette Creek	Spawning substrate is located throughout the 29 km of stream surveyed around Lumby, B.C. (McDonald et al. 2022).
		Salmon spawning habitat is present in upper Bessette Creek (McDonald et al. 2022).
		Seventeen total tributaries, side channels, and ditches may provide seasonal nursery and rearing habitat for Bessette Creek salmon (McDonald et al. 2022).
	Creighton Creek	Salmon spawning habitat has been identified in lower Creighton Creek (McDonald et al. 2022).
	Duteau Creek	Salmon spawning habitat has been identified in Duteau Creek (McDonald et al. 2022).
		Suitable rearing habitat has been identified from the confluence with Bessette Creek to 14 km upstream, including the presence of woody debris, undercut banks, and side channels (McDonald et al. 2022).
	Shuswap River	There is suitable spawning habitat between Mara Lake and Mabel Lake outlet (Hawes et al. 2011).
		Approximately 1 km^2 of low flood bench and backwater areas for potential rearing and spawning habitat is located between Mabel Lake and Mara Lake (Hawes et al. 2011).
		Sockeye spawning occurs upstream of the Enderby bridge to the outlet of Mabel Lake (Hawes et al. 2011). The Lower Shuswap River is a major sockeye spawning stream within the South Thompson River major watershed group (Fraser Basin Council 2016).
		Chinook spawning habitat occurs downstream of the Wilsey Dam to Mabel Lake (Fraser Basin Council 2016) and downstream of Mabel Lake to Enderby, B.C. (Fraser Basin Council 2016).
		Coho spawning occurs in side channels of the Middle Shuswap River and in tributaries of the Lower and Middle Shuswap Rivers (Fraser Basin Council 2016).
	Mabel Lake	Juvenile sockeye occupy Mabel Lake for initial rearing stages before movement to Shuswap Lake (Fraser River Action Plan (Canada) and DFO 1997; Fraser Basin Council 2016).
	Wap Creek	Chinook spawning habitat occurs throughout Wap Creek (Fraser Basin Council 2016).
		Wap Creek is an important producer of coho within the South Thompson River major watershed (Fraser Basin Council 2016).

4.2.3 Habitat Stressors in the South Thompson

Threats to Thompson-Shuswap salmon identified in RPAs and COSEWIC assessments have been outlined in **section 2.3.2**, many of which are prevalent throughout the South Thompson River major watershed. Stressors to salmon and their habitats, specific to the South Thompson River major watershed, are summarized in **Table 15**.

Table 15. A summary of stressors to salmon and their habitats occurring in the South Thompson River major watershed.

Stress	Description of Stress
Altered hydrology	**Agricultural practices/water use:** • Many streams are considered "Fully Recorded" (that is, their flow is fully allocated and there is not enough water to support issuing additional water licences) around the Shuswap and Salmon Arms of Shuswap Lake, in and along the South Thompson and Salmon Rivers, and in Bessette Creek and its tributaries. • South Thompson-Bessette Creek Chinook (CK-16) spawn in drought-sensitive streams that have high levels of water use (DFO 2020). • Salmon migration and survival in the Salmon River have been impacted by inadequate flows exacerbated by water withdrawals (Mohoruk et al. 2022). • High levels of water use in Bessette, Creighton, and Duteau Creeks, in conjunction with low summer flows, have led to fish stranding and loss of spawning and rearing habitats (McDonald et al. 2022).
	Climate change: • Changes in groundwater availability, snowpack, and discharge regimes due to climate change result in decreased flows in the late summer, which can adversely affect rearing and spawning conditions for stream-type Chinook salmon (DFO 2020; Doutaz et al. 2021). • Extreme storms and flood conditions due to climate change can lead to changes in hydrology, specifically increased surface runoff. This is a concern for Chinook populations in the Eagle and Salmon Rivers, which are prone to scouring. Extreme flood conditions (especially flash flooding) can alter stream habitat and cause increased mortalities of incubating eggs and rearing juveniles (Dionne et al. 2023).
Altered riparian function	**Livestock farming and ranching and non-timber crops:** • Riparian vegetation has been trampled and removed along Bessette, Creighton, and Duteau Creeks due to hay/crop production and livestock access, especially in the lower reaches of the watercourses (Fraser Basin Council 2016; McDonald et al. 2022). • Riparian vegetation has been significantly reduced along the Salmon River due to agricultural land use and activities (Mohoruk et al. 2022).
	Urban development: • Urban development has degraded riparian habitat along Bessette Creek, Salmon River, and Eagle River (Hawes et al. 2015; McDonald et al. 2022; Mohoruk et al. 2022).
	Wildfire: • There is an increased rate of forest fires throughout the watershed, leading to increased nutrient and sediment loading to streams, and increased stream temperatures due to a loss of riparian vegetation (Arbeider et al. 2020; Doutaz et al. 2021).

Stress	Description of Stress
Decreased water quality	**Climate change:** • Drought, extreme air temperatures, and heat waves due to climate change are contributing to elevated stream temperatures in streams of the South Thompson major watershed, including Eagle River and Duteau Creek. These conditions are further exacerbated during summer low flows (Doutaz et al. 2021).
	Forestry: • There are sedimentation and streambank destabilization concerns in Noisy and Wap Creeks (tributaries to Mabel Lake) due to logging activities (Fraser Basin Council 2016). • There are sedimentation and streambank destabilization concerns in Bessette Creek due to logging activities in the upper watershed, including the construction and maintenance of roads and the removal of riparian vegetation (Fraser Basin Council 2016). • There are streambank destabilization and erosion concerns in Nikwikwaia and Hiuihill Creeks (tributaries to the lower Adams River) due to logging activities (Fraser Basin Council 2016). • Logging activities, including the development and use of forestry roads along steep terrain, have led to slope instability in the upper Adams River watershed. This has increased sedimentation in the Adams River and TumTum Lake (Fraser Basin Council 2016).
	Linear development: • Severe bank erosion has been observed along transmission line corridors adjacent to the Shuswap River due to riparian vegetation clearing (Hawes et al. 2011). • There are many roads (for example, Highways 1, 97A, and 97B, and FSRs), railway tracks, pipelines, and transmission lines throughout the South Thompson River major watershed that cause increased sedimentation and point source pollution from runoff and storm drains into adjacent streams (Fraser Basin Council 2016; Arbeider et al. 2020). • Canadian Pacific Railway (CP) constructed a railway track from Revelstoke to Kamloops in the 1880s. It was later realigned between 1912 and 1914, which required a diversion of the Eagle River mainstem (Golder Associates 2012). Near mile 16, there is now an intermittent obstruction to fish passage under low flow conditions and frequent fish entrainment against rail ballast (Rebellato et al. 2022).
	Livestock farming and ranching and non-timber crops: • The removal of riparian vegetation in the lower reaches of Bessette, Creighton, and Duteau Creeks due to agricultural activities and livestock has led to bank erosion and deposition of fine sediments. Significant areas of livestock access and/or crossings occur along Bessette Creek, Creighton Creek, and Duteau Creek, with 335 m, 443.5 m, and 483 m, respectively, of bank disturbance (McDonald et al. 2022). • Sediments in Chase Creek, likely caused by agriculture and urban development, are the primary contributor to the South Thompson River (Fraser Basin Council 2016). • Algal blooms and high phosphorus levels have been noted throughout Shuswap Lake, Hiuhill Creek, Adams River, and Bessette Creek (Fraser Basin Council 2016; Arbeider et al. 2020). Nutrients from agricultural activities are one of the biggest threats to water quality in the lakes in the South Thompson River major watershed, with the Shuswap and Salmon Rivers contributing significant levels of nutrients to Shuswap and Mara Lakes (Fraser Basin Council 2016; Province of British Columbia and Pespesellkwe te Secwepemc 2022). Nutrient inputs from livestock are high in the upper reaches of the Salmon River, between Falkland and Westwold (Mohoruk et al. 2022). • Non-point source pollution (such as nutrients) from livestock access and proximity to streams is a concern in many watercourses in the South Thompson major watershed (Fraser Basin Council 2016). • High stream temperatures resulting from summer low flows and high levels of water extraction are a concern in many watercourses in the South Thompson River major watershed, including the Salmon River, Bessette Creek, Creighton Creek, and Duteau Creek (Arbeider et al. 2020; McDonald et al. 2022; Mohoruk et al. 2022; Dionne et al. 2023). • The loss of riparian vegetation due to hay/crop production and livestock has resulted in increased stream temperatures, further exacerbated by hot and arid climates in many of the watercourses in the South Thompson River major watershed, as seen in the lower reaches of the Middle Shuswap River (McDonald et al. 2022).
	Recreation: • Boating in the South Thompson River has resulted in bank erosion and associated sedimentation (Fraser Basin Council 2016).
	Multiple land use pressures: • Anthropogenic activities such as residential and commercial development and recreational activities have resulted in nutrients such as phosphorus and nitrogen becoming a water quality concern in Shuswap Lake. Increased nutrients led to excessive algal growth near Salmon Arm in the summer of 2020 (Province of British Columbia and Pespesellkwe te Secwepemc 2022).

Stress	Description of Stress
Fish passage barriers	**Dams:** • Wilsey Dam, in the Upper Shuswap watershed group, has blocked access to approximately 32 km of historical upstream habitat, especially important for Chinook, coho, and sockeye populations that use the Shuswap River (McGrath and Laubman 2018). • On the Eagle River, a box culvert on the Canadian Pacific Railway (26 km marker) acts as a fish passage barrier during low flow conditions. This culvert blocks access to spawning and rearing habitat upstream (Dionne et al. 2023). • On the Perry River, there is a partial obstruction at the 6 km marker that blocks access to Chinook spawning habitat (Dionne et al. 2023).
Invasive species	**Aquatic invasive species:** • Invasive yellow perch presence has been confirmed in 9 lakes and 3 streams in the South Thompson watershed, including Hiuihill Creek, Sinmax Creek, and Cedar Creek (Runciman and Leaf 2009; Arbeider et al. 2020). • Invasive smallmouth bass is present in Salmon River and Gardom Lake (Runciman and Leaf 2009; Arbeider et al. 2020). • Boating activity in Shuswap Lake has led to the spread of water milfoil, especially in Salmon Arm Bay. Milfoil reduces salmon spawning habitat and provides cover for predators, both negatively affecting salmon populations (Fraser Basin Council 2016). • There is a significant risk that invasive perch, water milfoil, and zebra and quagga mussels could be introduced to Adams Lake (Fraser Basin Council 2016).
Loss of habitat quantity, quality, and complexity	**Forestry:** • A log dump, used for log transport and/or storage, is present in the Salmon Arm of Shuswap Lake, which may impact migrating salmon. Log dumps cause scour and vegetation removal, which adversely impacts salmon habitats in the lake. Additionally, log storage in the lake results in a depletion of dissolved oxygen, which may reduce juvenile presence in these areas (Dionne et al. 2023).
	Linear development: • Channel containment and associated riprap placement along channel edges to protect roads and other transportation corridors reduce channel and habitat complexity for salmon, and can also block access to side channels and off-channel habitats. This has been especially prevalent along the South Thompson and Eagle Rivers, where Highway 1 runs adjacent to these rivers (Fraser Basin Council 2016; Dionne et al. 2023).
	Livestock farming and ranching and non-timber crops: • Cattle accessing the stream can crush redds, adversely affecting spawning habitats. This is of particular concern in the Lower Shuswap River and Bessette Creek and tributaries (Arbeider et al. 2020; McDonald et al. 2022). • Agricultural areas along Bessette, Duteau, and Creighton Creeks have limited riparian vegetation, leading to reduced structural complexity within the channels and limiting rearing habitats (McDonald et al. 2022). • There are agricultural lands adjacent to the Eagle and Salmon Rivers. The loss of forested riparian areas to agricultural land use may result in a decrease in overwintering habitats along these streams due to the development of limited side channel and back water habitats (Dionne et al. 2023).
	Recreation: • Off-roading vehicles traversing watercourses may crush redds and damage or disrupt salmon habitats. These activities are becoming increasingly popular in the Perry River, where snowmobiles and off-road vehicles are driven on the vast network of forestry roads in the watershed (Dionne et al. 2023).
	Shoreline development: • Foreshore development along Shuswap and Mara Lakes has decreased the quality and quantity of nursing and rearing habitats. Foreshore development activities include dredging and filling, creating and grooming beaches, removing vegetation, and constructing docks, groynes, boat launches, and retaining walls (Fraser Basin Council 2016; R. Laubman, pers. comm. 2025).

5 North Thompson River Major Watershed – In Detail

5.1 Overview

The North Thompson River major watershed spans approximately 20,713 km^2 across the northern and central regions of the Thompson-Shuswap. It includes 6 FWA watershed groups: Lower North Thompson, Upper North Thompson, Clearwater River, Bridge Creek, Mahood Lake, and Murtle Lake (**Figure 29**). Natural barriers in the Clearwater River, Bridge Creek, Mahood Lake, and Murtle Lake watershed groups limit upstream access for salmon.

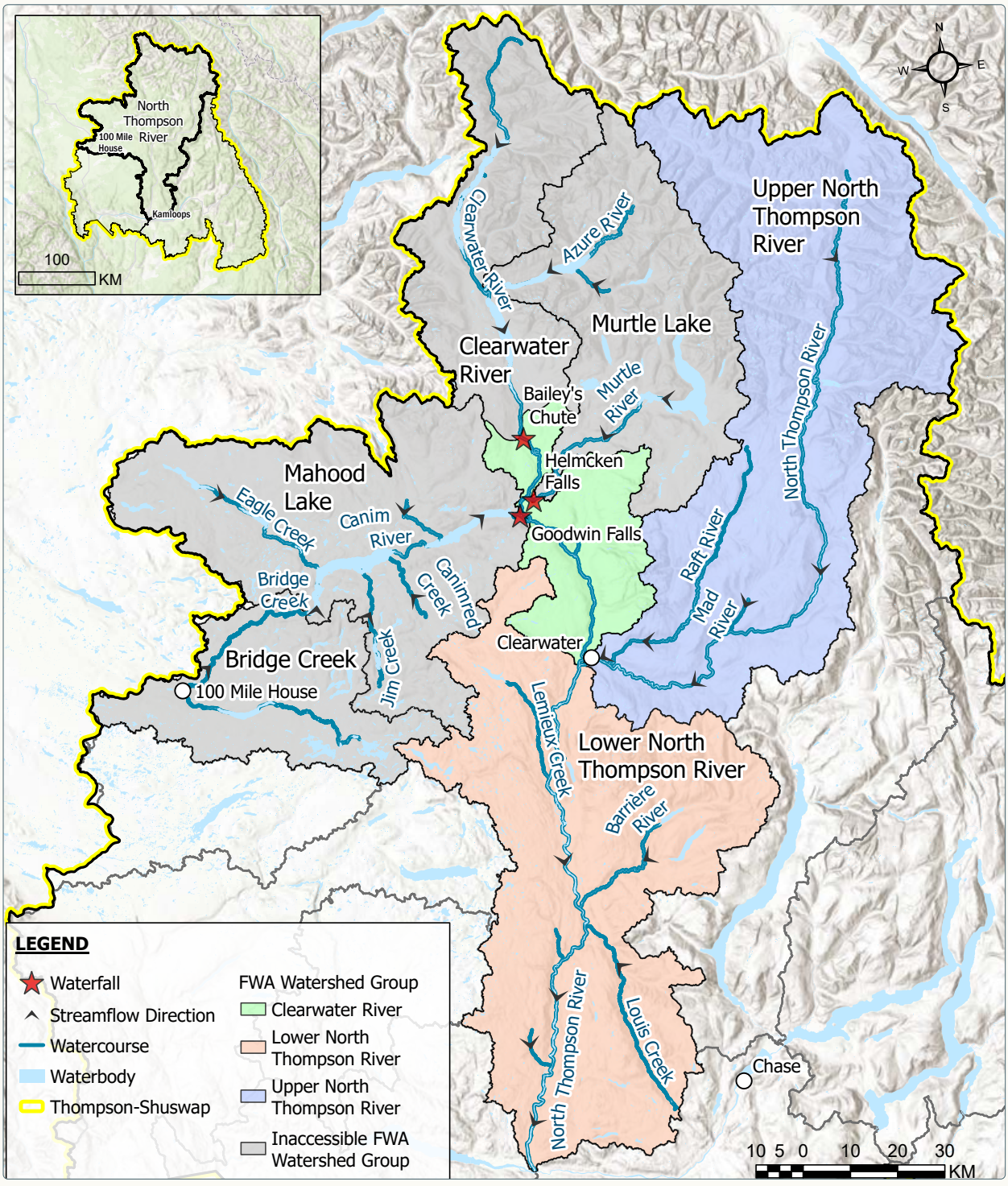


Figure 29. North Thompson River major watershed showing the 6 Freshwater Atlas (FWA) watershed groups and the major watercourses (GeoBC Branch 2003, 2023a, 2023b, 2024a, 2024b, 2024c, 2024e).

Lower North Thompson Watershed Group:

The Lower North Thompson watershed group, covering approximately 4,909 km^2, lies between Kamloops and Clearwater in the central Thompson-Shuswap region, forming part of the central and southern North Thompson River major watershed. Land cover is predominantly trees (77%), with smaller areas of the watershed attributed to rangeland (19%), water (3%), and built areas (1%; Chu et al. 2025). The North Thompson River (8th order) is the dominant watercourse, flowing into the Thompson River at Kamloops and supported by numerous salmon-bearing tributaries such as Louis and Lemieux Creeks, which feature runs, glides, and riffle/pool habitats (Hawes et al. 2015; McDonald and Hawes 2023; Secwépemc Fisheries Commission 2023a).

The watershed also includes smaller lakes like Dunn Lake (~4 km^2), North Barriere Lake (~5 km^2), and East Barriere Lake (~10 km^2). Historically, the North Barriere–Early Summer Timing sockeye population was lost due to dam construction, but a new population was later established through transplants from the Raft River into the Barrière River and Fennel Creek, supplemented by hatchery inputs (Grant et al. 2011).

Upper North Thompson Watershed Group:

The Upper North Thompson River watershed group spans approximately 5,389 km^2 in the northeast region of the Thompson-Shuswap. Land cover is predominantly trees (74%), with smaller areas of the watershed attributed to snow/ice (12%), rangeland (12%), and bare ground (1%; Chu et al. 2025). The headwaters originate in the Cariboo district, with the North Thompson River flowing south through the watershed before joining the Thompson River in Kamloops. This watershed features numerous salmon-bearing tributaries and smaller streams, including the Raft and Mad Rivers. Lakes in the Upper North Thompson are generally small compared to other groups, with the largest being Mud Lake (~4 km^2).

Clearwater River Watershed Group:

The Clearwater River watershed group covers approximately 3,111 km^2 in the northwest portion of the North Thompson River major watershed. Land cover is predominantly trees (74%), with smaller areas of the watershed attributed to snow/ice (11%), rangeland (10%), and water (3%; Chu et al. 2025). Most of the watershed lies within Wells Gray Provincial Park, except for the southern portion and the lower 4 km of the Clearwater River near its confluence with the North Thompson River.

The Clearwater River (8th order) is the largest tributary of the North Thompson River. It originates from glaciers in the Cariboo Mountains then flows south for 201 km. Two waterfalls in the lower watershed, including Bailey's Chute (10 m high, located ~63 km upstream of the confluence with the North Thompson River), act as barriers to upstream salmon migration, rendering most of the upper watershed inaccessible to anadromous salmon.

Clearwater and Hobson Lakes (each ~34 km^2) are the largest lakes in the watershed and are both above Bailey's Chute. Many smaller lakes are scattered throughout the watershed. Sockeye spawning has been observed up to 7 km upstream of Hemp Creek, and within Hemp and Grouse Creeks. Chinook spawning has also been recorded up to Bailey's Chute.

Bridge Creek Watershed Group:

The Bridge Creek watershed has a total area of approximately 1,541 km² and is located at the western edge of the North Thompson River major watershed. Land cover is predominantly trees (72%), with other areas of rangeland (19%), water (7%), and built areas (2%; Chu et al. 2025). Bridge Creek begins at Bridge Lake and flows northwest through Horse Lake to the District of 100 Mile House, then flows northeast into Canim Lake in the Mahood Lake watershed group.

There are no anadromous salmon in this watershed due to the impassable Goodwin Falls, located approximately 3 km upstream of the confluence with the Mahood River and Clearwater River (Canadian Wildlife Federation n.d.).



Boulder Creek. Photo credit: SFC.

Mahood Lake Watershed Group:

Mahood Lake watershed spans approximately 3,247 km² in the western region of the North Thompson River major watershed. Land cover is predominantly trees (80%), with smaller areas of rangeland (14%), water (6%), and snow/ice (<1%; Chu et al. 2025). Wells Gray Provincial Park extends partially into this watershed from the eastern side. Mahood River flows southeast from Mahood Lake in to the Clearwater River.

The majority of the Mahood Lake watershed group is inaccessible to anadromous salmon due to the presence of Goodwin Falls, located approximately 3 km upstream of the confluence of the Mahood River with the Clearwater River (Canadian Wildlife Federation n.d.) There are coho and Chinook observations in the Mahood River between the mouth of the Clearwater River and Goodwin Falls; however, there are no anadromous salmon observations upstream of these falls (Knowledge Management 2025a).

Murtle Lake Watershed Group:

Murtle Lake watershed covers approximately 2,516 km², with Murtle River originating in the mountains fringing the Upper North Thompson River watershed group, then flowing southwest through Murtle Lake and into the Clearwater River. Land cover is predominantly trees (68%), with smaller areas of the watershed attributed to snow/ice (16%), rangeland (8%), and water (6%; Chu et al. 2025). The Murtle Lake watershed is entirely within Wells Gray Provincial Park. There are no anadromous salmon in this watershed due to the impassable Helmcken Falls on Murtle River, located approximately 2 km upstream of the confluence with Clearwater River (Canadian Wildlife Federation n.d.).



North Thompson River. Photo credit: SFC.

5.2 Salmon and Their Ecosystems in the North Thompson River Major Watershed

5.2.1 Salmon in the North Thompson

There are 7 salmon populations in the North Thompson River major watershed, distributed across the various watershed groups within this area. Six CUs within this watershed have been assessed as at risk by COSEWIC (**Table 16**).

Table 16. Salmon populations found in the North Thompson River major watershed and watershed groups. Populations are denoted by Conservation Unit (CU) and equivalent Designatable Unit (DU).

Species	Conservation Unit name and Status under the Wild Salmon Policy	Designatable Unit and status assessed by COSEWIC	Salmon Population Presence in North Thompson River Watershed Groups					
			Clearwater River	Bridge Creek	Mahood Lake	Murtle Lake	Lower North Thompson	Upper North Thompson
Sockeye	Kamloops - Early Summer Timing (SEL-10-01) Amber (Fair)	DU11 Special Concern	Y	N	N	N	Y	Y
	North Barriere-Early Summer Timing (de novo) (SEL-10-03) Amber (Fair)	DU14 Threatened	N	N	N	N	Y	N
Chinook	North Thompson SP 1.3 (CK-18) Red (Poor)	DU16 Endangered	N	N	N	N	Y	Y
	Lower Thompson SP 1.2 (CK-17) Red (Poor)	DU15 Endangered	N	N	N	N	Y	N
	North Thompson SU 1.3 (CK-19) Red (Poor)	DU17 Endangered	Y	N	Y	N	Y	Y
Coho	North Thompson (CO-9) Green (Good)	DU8 Threatened	Y	N	Y	N	Y	Y
Pink	Fraser River (PKO-1) Green (Good)	Not assessed by COSEWIC	Y	N	N	N	Y	Y

The North Barrier-Early Summer Timing sockeye (SEL-10-03) within the Lower North Thompson were reintroduced to the area through transplants and hatchery inputs. Within the Upper North Thompson, coho are supported by moderate levels of enhancement from nearby hatcheries, and Chinook receive low levels of enhancement.

5.2.2 Habitat Features in the North Thompson

Multiple assessments have identified a range of important salmon habitat features in the North Thompson River major watershed within the accessible watershed groups (**Table 17**).

Table 17. Important salmon habitat features in the North Thompson River major watershed, categorized by watershed group and stream name.

Watershed Group	Stream Name	Habitat Feature
Lower North Thompson River	Louis Creek	There are approximately 8 km^2 of deep pools and 7 km^2 of large woody debris (McDonald and Hawes 2023).
		Deep pool, overstory vegetation, and coarse woody debris habitat features occur just downstream of McGillivray Creek confluence (Estsék' Environmental Services LLP 2017).
	Lemieux Creek	Primary habitat features (deep pools, large woody debris, tail outs of pools, off-channel habitat, and instream and over-stream vegetation) occur throughout the stream (Secwépemc Fisheries Commission 2023a).
		A high density of fish habitat features occurs between the mouth of the stream and 5 km upstream (Secwépemc Fisheries Commission 2023a).
		Large beaver ponds occur in lower areas of the creek (Secwépemc Fisheries Commission 2023a).
		Off-channel habitat, instream vegetation, and over-stream vegetation are prominent between 5.1 km and 9.5 km upstream of the mouth (Secwépemc Fisheries Commission 2023b).
		Side channels in the lower creek are known coho spawning areas (Estsék' Environmental Services LLP 2017).
	East Barrière River	The most common habitat features between the East Barriere Lake outlet and Barrière River confluence are deep pools, woody debris, and off-channel habitat (Secwépemc Fisheries Commission 2024a).
		Deep pools are abundant from the Barriere Lake outlet to 1.5 km downstream (Secwépemc Fisheries Commission 2024a).
		Accessible, off-channel habitat occurs between the mouth of the Barrière River to 5.5 km upstream (Secwépemc Fisheries Commission 2024a).
		High fish habitat feature density and complexity occur between the Barrière River confluence and approximately 5 km upstream (Secwépemc Fisheries Commission 2024a).
	Paul Creek	A high abundance of deep pools from beaver activity, woody debris, floodplain connectivity, and off-channel habitats occurs in the upper stream (Secwépemc Fisheries Commission 2024d).
Upper North Thompson River	Raft River	Two side channels provide off-channel rearing habitat between the confluence with the North Thompson River and approximately 4.2 km upstream (Estsék' Environmental Services LLP 2017).
		Spawning grounds occur between the North Thompson River confluence and approximately 4.2 km upstream (Secwépemc Fisheries Commission 2024b).
		Between the North Thompson River confluence and approximately 4.2 km upstream, off-channel habitat, deep pools, areas of groundwater influence, and large woody debris are abundant features (Secwépemc Fisheries Commission 2024b).
		Salmon are often observed in pools downstream of a series of waterfalls located 4.2 km upstream of the North Thompson River confluence, which are likely spawning and rearing areas (Secwépemc Fisheries Commission 2024b).
Clearwater River	Clearwater River	Chinook spawning occurs through the horseshoe bend downstream of Bailey's chute (Information Wells Grey 2025).

5.2.3 Habitat Stressors in the North Thompson

Threats to Thompson-Shuswap salmon identified in RPAs and COSEWIC assessments have been outlined in **section 2.3.2**, many of which are prevalent throughout the North Thompson River major watershed. Stressors to salmon and their habitats, specific to the North Thompson River major watershed, are summarized in **Table 18**.

Table 18. A summary of stressors to salmon and their habitats occurring in the North Thompson River major watershed.

Stress	Description of Stress
Altered hydrology	**Agricultural practices/water extraction:** • Many streams are considered "Fully Recorded" (that is, their flow is fully allocated and there is not enough water to support issuing additional water licences) or "Fully Recorded with Exceptions" (that is, there is limited water in the stream or aquifer for additional water licences to be issued, except for specified water use purposes) within the North Thompson River watershed group. However, there are no water licences within Wells Grey Provincial Park and very few along the upper North Thompson River (GeoBC Branch 2025). • Louis Creek is a drought-sensitive system, and water extraction is a significant concern (Dionne et al. 2023).
	Previous enhancement works: • A spawning channel constructed in Lemieux Creek in 1988 is contributing to the dewatering of the mainstem since the spawning channel was dug lower than the mainstem creek bed, and the intake of the channel is plugged and filled with sediments. This is causing a hydrological concern in Lemieux Creek as well as a potential juvenile salmonid stranding hazard (Secwépemc Fisheries Commission 2023a). • A 600 m constructed off-channel habitat adjacent to Raft River is no longer connected to the mainstem due to sediment blocking the intake culvert. This may result in fish stranding events (Secwépemc Fisheries Commission 2024b).
	Rural development: • Private landowners have diverted and altered flows in a 120 m segment of East Barrière River by using heavy equipment instream and damaging the stream bed and banks (Secwépemc Fisheries Commission 2024a).
Altered riparian function	**Livestock farming and ranching and non-timber crops:** • Livestock access in Lemieux and Louis Creeks has resulted in a significant loss of riparian areas, with 676 m and 5.3 km of bank, respectively, observed to be accessible to livestock during recent SHIM assessments (McDonald and Hawes 2023; Secwépemc Fisheries Commission 2023a). • There are sections with very narrow (such as less than 5 m) riparian vegetation bands (primarily alder) or no riparian vegetation along Louis Creek due to agricultural activities. This has resulted in reduced instream habitat complexity, bank erosion, sedimentation, and loss of spawning habitats (McDonald and Hawes 2023). • Agriculture and livestock access have significantly impacted riparian areas in the upper reaches of Paul Creek (between approximately 8 km and 10 km from the stream mouth), with vegetation removal and trampling along the banks (Secwépemc Fisheries Commission 2024d).
Decreased water quality	**Linear development:** • Highway runoff along the North Thompson River valley bottom, in both the lower and upper North Thompson River, has diminished the water quality (Doutaz et al. 2021). • Transportation of diluted bitumen along railway lines adjacent to the North Thompson River poses a spill risk with the potential to adversely impact coho and Chinook and their habitats (Arbeider et al. 2020; Dionne et al. 2023). • There is a potential risk of spills from the Trans Mountain pipeline that runs adjacent to the North Thompson River, which could negatively impact salmon (Arbeider et al. 2020; Doutaz et al. 2021).
	Livestock farming and ranching/annual and perennial non-timber crops: • Streambank erosion from channel edge modification and livestock access and crossings has led to the deposition of fine sediments in Louis and Lemieux Creeks (Bradford and Irvine 2000; Dionne et al. 2023; McDonald and Hawes 2023; Secwépemc Fisheries Commission 2023a).
	Rural development: • Development and land clearing in the mid-reach of the Barrière River (between approximately 1 km and 2 km from the stream mouth) has resulted in significant streambank erosion and sedimentation, which may adversely impact egg incubation and downstream spawning, migrating, and rearing (Secwépemc Fisheries Commission 2024a).
	Forestry: • Higher stream temperatures have been associated with higher levels of forest harvest in several watersheds in the North Thompson, with greater temperatures observed where timber harvest occurred in riparian areas (Cunningham et al. 2023).

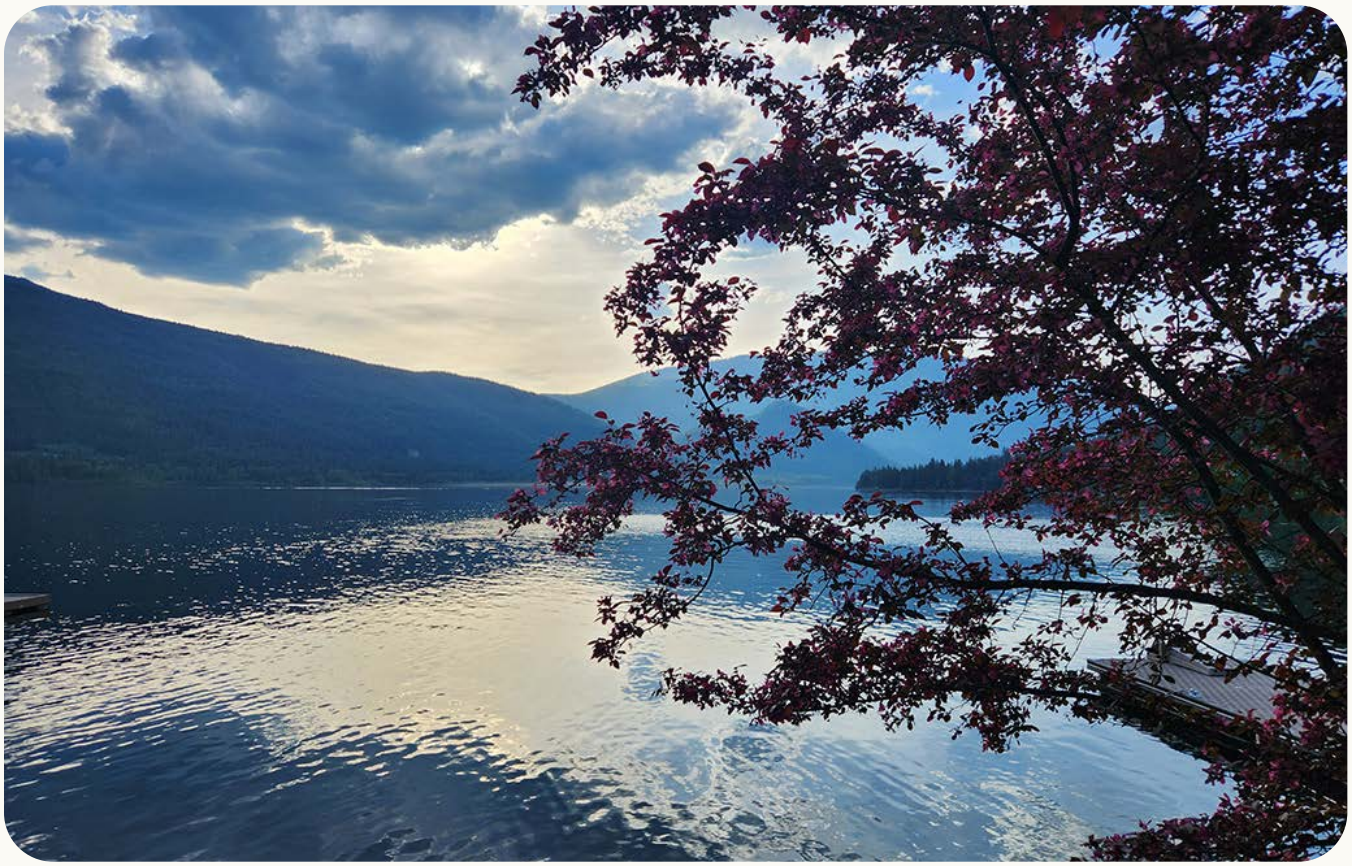
Stress	Description of Stress
Fish passage barriers	**Bridges:** • A bridge located approximately 450 m upstream of Chief Louis Way in Paul Creek is a potential barrier to fish passage due to a series of stepped drops. The baffles constructed in this bridge have been infilled with sediment and are no longer functioning to allow for fish passage (Secwépemc Fisheries Commission 2024d).
	Culverts: • One culvert was assessed as a barrier to fish migration in Louis Creek during the 2021 SHIM assessment and is a priority for restoration (McDonald and Hawes 2023). • Perched culverts at the CN Rail and Kootenay Way crossings in Paul Creek are a barrier to fish migration. The constructed diversion channel at this location may not be functioning as intended to allow fish to bypass these perched culverts, and is resulting in split flows between the mainstem and the diversion channel, likely impacting fish passage (Secwépemc Fisheries Commission 2024d).
	Dams: • Several beaver dams were noted as potential fish passage barriers throughout Paul Creek during the spring 2023 SHIM assessment (Secwépemc Fisheries Commission 2024d). • A dam was constructed with deposited sediment at the upstream end of a disturbed area in the East Barrière River (approximately 2 km from the confluence with the Barrière River). This constructed dam is creating a potential barrier to fish passage (Secwépemc Fisheries Commission 2024a).
	Dewatered sections/insufficient flows: • The mouth of Lemieux Creek periodically dewaters and becomes shallow with fanned out sections, which can prevent upstream migration (Secwépemc Fisheries Commission 2023a). • During the 2022 SHIM assessment in Lemieux Creek, a several hundred metre long section of the stream located approximately 7 km upstream of the mouth was observed to be dry, as the flows went subterranean. This creates fish stranding and migration issues in the creek (Secwépemc Fisheries Commission 2023a). • A 400 m section of subterranean flow was noted in the mid-reach of Paul Creek (between approximately 5 km and 8 km from the stream mouth) during the spring 2023 SHIM assessment creating a barrier to fish passage (Secwépemc Fisheries Commission 2024d).
Loss of habitat quantity, quality, and complexity	**Linear development:** • Channelization and riprap installation in Lemieux Creek from linear development is causing a loss of instream habitat complexity (Secwépemc Fisheries Commission 2023a). • The channel has been straightened, and riprap has been installed along the banks in Raft River, near the Raft River Bridge on the Yellowhead highway. This has resulted in reduced habitat complexity and riparian function, sedimentation, and changes in hydrology. Fish cover and habitat are especially limited along two bends downstream of the bridge that have been hard-armoured with riprap (Secwépemc Fisheries Commission 2024b). • The lower reaches of Paul Creek that are accessible for spawning have been channelized and hard-armoured with riprap to protect infrastructure, adversely impacting salmon habitats. Road crossings and associated culverts in these lower reaches have also resulted in channel straightening (Secwépemc Fisheries Commission 2024d).
	Livestock farming and ranching and non-timber crops: • Infilling of spawning gravels has been observed due to sedimentation from channel edge modification and livestock access in Louis and Lemieux Creeks (McDonald and Hawes 2023; Secwépemc Fisheries Commission 2023a). • Cattle accessing the stream can result in crushed redds in Louis, Dunn, and Lemieux Creeks, as a significant length of these streams is adjacent to pastures and accessible to cattle (Arbeider et al. 2020).
	Recreation: • Boat activity in the North Thompson River may impact Chinook spawning areas (Doutaz et al. 2021).
	Rural development: • Bank armouring with riprap occurs over a total of 2.2 km of Louis Creek bank (evenly distributed on left and right banks; McDonald and Hawes 2023).

6 Salmon Stewardship and Restoration

Many environmental stewardship organizations operate within the Thompson-Shuswap, promoting community-based actions that enhance watershed health and benefit salmon and their ecosystems.

Active watershed stewardship organizations in the Thompson-Shuswap at the time of publication include:

- Adams River Salmon Society
- Bessette Agricultural Sustainability Society
- Bonaparte Watershed Stewardship Society
- Cherryville Water Stewards
- Kingfisher Interpretive Centre Society
- Louis Creek Caretaker Group
- Lower Adams River Habitat Restoration Initiative
- Salmon River Collaborative
- Secwepemcúl'ecw Restoration and Stewardship Society
- Shuswap Watershed Council
- Simpcw "Séwllkwe" Initiative
- The B.C. Cattlemen's Association – Farmland Riparian Interface Stewardship Program
- The Middle Shuswap Wild Salmon Society
- The Shuswap River Ambassadors
- Tsecmenúlecwem-kt Initiative (Deadman Recovery and Resiliency Initiative)



Adams Lake. Photo credit: DFO.

Work to restore and conserve salmon ecosystems is ongoing in the Thompson-Shuswap. Examples of major recent or ongoing projects are highlighted in **Table 19**.

Table 19. Examples of salmon stewardship and restoration projects from 2000 to 2025 in the Thompson-Shuswap.

Project Name	Location(s)	Major Watershed(s)	Lead Organization	Years
Bessette Creek Restoration and Streamflow Monitoring	Harris Creek Nicklen Creek	South Thompson	Okanagan Nation Alliance	2 year project
Lower Adams Habitat Restoration Initiative	Adams River	South Thompson	Skwlāx te Secwepemcúl̓ecw	2023 to 2026
Thompson-Shuswap Salmon Habitat Assessment, Monitoring and Restoration Program	Across the Thompson-Shuswap	Thompson South Thompson North Thompson	Secwépemc Fisheries Commission	2023 to 2026
Tsecmenúl̓ecwem-kt (We Repair the Land) - Deadman Recovery & Resiliency Initiative	Deadman River Watershed	Thompson	Skeetchestn Indian Band	2023 to 2026
B.C. Fish Passage Restoration Initiative	Birk Creek Gollen Creek	South Thompson North Thompson	Canadian Wildlife Foundation	2019 to 2024
Collaborative Freshwater Research and Restoration Initiative in the Thompson Watershed	Across the Thompson-Shuswap	Thompson South Thompson North Thompson	Secwépemc Fisheries Commission	2021 to 2024
Elephant Hill Fire Riparian Restoration Project	Bonaparte River Watershed	Thompson	Secwepemcúl'ecw Restoration and Stewardship Society	2019 to 2024
Innovative Habitat Restoration Demonstration Project	Louis Creek	North Thompson	British Columbia Conservation Foundation	2019 to 2024
Innovative Habitat Restoration Demonstration Project	Bonaparte River Deadman River Salmon River	Thompson South Thompson	British Columbia Conservation Foundation	2019 to 2024
Kingfisher Interpretive Centre Intake Restoration	Cooke Creek	South Thompson	Kingfisher Interpretive Centre	2021 to 2024
Promotion of Habitat Restoration and Stewardship on Agricultural Lands in the B.C. Interior	Adams River Azzure Creek Bessette Creek Bonaparte River Deep Creek Maiden Creek Salmon River Shuswap River Sinmax Creek	Thompson South Thompson	B.C. Cattlemen's Association	2019 to 2024
Salmon River Collaborative Salmonid Habitat Enhancement and Restoration Initiative	Salmon River	South Thompson	Yucwmenlucwu (Caretakers of the Land) 2007 LLP	2021 to 2024
Upper Adams Salmon Restoration Program	Adams River	South Thompson	Adams Lake Indian Band	2020 to 2024
Secwépemc Leadership for Thompson-Shuswap Salmon Recovery	Across the Thompson-Shuswap	Thompson South Thompson North Thompson	Secwépemc Fisheries Commission	2019 to 2023

Project Name	Location(s)	Major Watershed(s)	Lead Organization	Years
Thompson River Salmonid Habitat Restoration Project	Bonaparte River Hat Creek Louis Creek Paul Creek Salmon River	Thompson South Thompson North Thompson	British Columbia Conservation Foundation	2019 to 2023
Thompson Basin Fish Habitat Restoration Through Collaboration and Shared Vision	Barrière River Bessette Creek Bonaparte River Creighton Creek Deadman River Duteau Creek Louis Creek Lemieux Creek Raft River Salmon River	Thompson South Thompson North Thompson	Secwépemc Fisheries Commission	2019 to 2022
Salmon River Sensitive Habitat Inventory Mapping	Salmon River	South Thompson	Yucwmenlucwu (Caretakers of the Land) 2007 LLP	2021
Fraser Basin Council - Water Quality Grants	Shuswap Lake Mara Lake	South Thompson	Shuswap Watershed Council	2020
Orca Sustenance: Thompson River Chinook Project	Louis Creek Salmon River	South Thompson North Thompson	British Columbia Conservation Foundation	2017 to 2020
Shuswap Lake Shoreline Habitat Restoration	Shuswap Lake	South Thompson	Habitat Conservation Trust Foundation	2010 to 2014
Bonaparte River Watershed Restoration Project	Bonaparte River Watershed	Thompson River	Bonaparte Watershed Stewardship Society	2009 to 2010

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(thank you)



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Thompson-Shuswap
Salmon Collaborative