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Canada

STATE OF THE SALMON: THE **FRASER RIVER**

Using data collected through 2023

We humbly and respectively acknowledge that this paper was written on the unceded traditional territories of the xʷməθkʷəy̓əm (Musqueam), Sḵwx̱wú7mesh (Squamish), and səlilwətaɬ (Tsleil-Waututh) Nations. We recognize that these Nations have been stewards of the land and water for millennia, and we honour their deep understanding of the interconnectedness between people and natural systems.

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Inside cover photo: Chilko River at Henry Bridge. Photo credits: Shane Kalyn, 4 Element Photos

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Preface

Fisheries and Oceans Canada (DFO) is accountable for the sustainable management of Canada's fisheries and oceans resources. Under the Wild Salmon Policy (WSP), status information guides key decisions on habitat conservation, resource use, and long-term planning. This requirement was further strengthened in 2019, when amendments to *DFO's Fisheries Act* established a legal requirement to manage major fish stocks sustainably and avoid serious harm. Here, salmon status information helps determine when populations are at risk, and when DFO rebuilding plans must be developed.

As climate change continues to alter habitats and salmon productivity across the Pacific Region, increasing uncertainty and risk make reliable status information even more essential for monitoring populations and guiding actions that strengthen the resilience of salmon, their ecosystems, and the communities that rely on them.

DFO's approach to status assessments recognizes that credible science and public trust are inseparable. DFO's Science Branch has developed a rigorous, collaborative assessment process that reflects this responsibility. Status assessments go through multiple rounds of expert review and rely on peer-reviewed, transparent methods refined over more than a decade. A status is only finalized when those with close knowledge of the salmon populations and the ecosystems they depend on agree that the assessment is scientifically sound and representative of local realities.

This State of the Salmon report is more than a scientific summary—it reflects the hard work and dedication of many people, past and present, who monitor, study, and posses in-depth knowledge of Pacific salmon. The statuses in this report were shaped, challenged, and ultimately approved by scientists, operational biologists, and First Nations technical experts who work day-to-day with salmon populations and bring a wealth of local knowledge into the process.

This report marks an important milestone: the first approved, fully reviewed set of conservation statuses for all Pacific salmon species in the Fraser River watershed. Achieving this milestone reflects 15 years of collaboration with conservation scientists and local biologists to develop the scientific methods, data systems, and review processes needed to assess the status of wild salmon under Canada's Wild Pacific Salmon Policy (WSP). Assessments for additional watersheds across the Pacific Region will follow in the coming years using these same methods.

These assessments will continue to:

- **produce** trusted, scientifically sound status information,
- **guide** sustainable fishery management,
- **fulfill** Canada's regulatory obligations to the public; and
- **protect** and **rebuild** salmon for future generations

Aerial landscape of the Fraser River and farms, taken near Chilliwack, east of Vancouver, British Columbia, Canada.

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Bowron Chinook. Photo by Shane Kalyn, 4 Element Photos.

Summary: Current Status Of Fraser River Salmon

Fisheries and Oceans Canada (DFO) annually tracks the biological state of five species of Fraser River salmon - Chinook, sockeye, coho, pink, and chum. This status information is used alongside social and economic factors to guide management decisions, and is essential for identifying where salmon rebuilding plans are needed under *Canada's Fisheries Act*.

To capture biodiversity, Pacific salmon populations are assessed in groups called **Conservation Units (CUs)**. A CU is a group of salmon that has adapted over thousands of years to live in specific environmental conditions (Waples 1995; Holtby and Ciruna 2007). These units are based on the genetic, ecological, and geographic diversity of salmon, and are vital for the long-term survival of these species.

DFO uses a scientific method called *Wild Salmon Policy (WSP) rapid status assessment* to determine the biological statuses of salmon CUs – a.k.a. WSP statuses (DFO 2024; Pestal et al. 2023; Grant et al. 2026). This method was developed over 15 years of research, peer-review, and application to salmon CUs. Using this method, each CU is placed into one of three status zones, based on its risk of extinction under current conditions (DFO 2005, pp.17):

Green Status: CU is in **good condition** and at low risk of extinction.

Amber Status: CU is in **fair condition**, showing signs of reduced production but low risk of extinction.

Red Status: CU is in **poor condition** and has a high risk of extinction.

Chilliwack Lake Sockeye.
Photo by Shane Kalyn, 4 Element Photos.

Status assessments follow a consistent set of steps that are reviewed by CU experts from DFO and Indigenous groups. Experts from non-governmental organizations (NGOs), consultants, and other local knowledge holders may also be included. Working together through a standardized process for each CU helps to ensure that results are reliable and comparable across different regions and species, and over time. This is essential when statuses are used to inform management and regulatory decisions. Details on the status assessment methods can be found in Grant et al. (2026).

WSP statuses in this report were assessed using Pacific salmon spawner data up to 2023. Updating these statuses takes time because field data must first be processed before it can be used for analysis, and the resulting statuses must be reviewed before they are finalized. In most cases, adding one or two more years of information does not substantially change the status of a CU. This is generally true even when those added years include large salmon returns, like those observed in some Fraser Sockeye CUs in 2025. This is because WSP statuses are based on information from multiple recent years rather than relying on a single year of data.

Up-to-date WSP statuses are available for 45 of the 50 current Fraser salmon CUs. This includes:

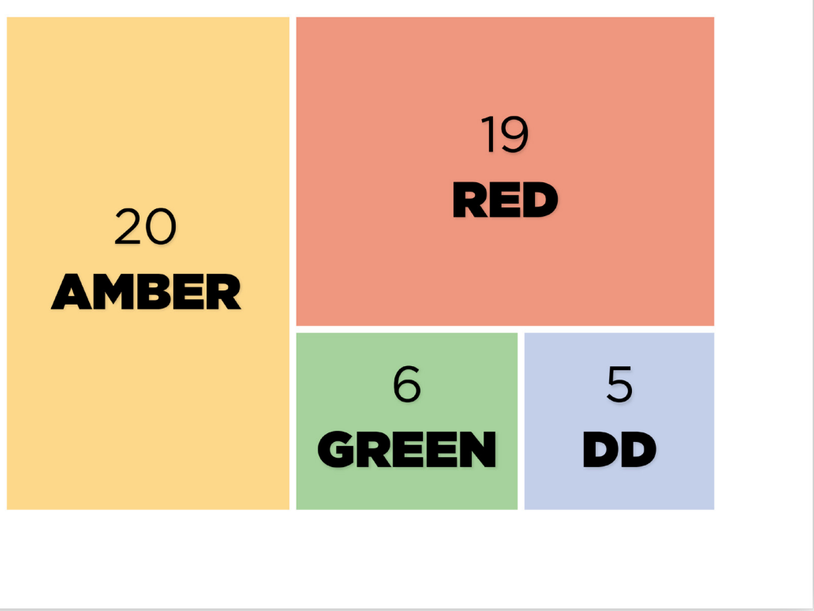
- **16** of the **17** current Chinook CUs
- **22** of the **24** current sockeye CUs
- **5** of the **7** current coho CUs
- the **1** chum CU
- the **1** pink CU

The five current Fraser salmon CUs without WSP statuses for 2023 are **data deficient**. This represents 10% of the Fraser salmon CUs, and includes one Chinook, two sockeye and two coho CUs. An additional seven CUs in the Fraser watershed - one Chinook and six sockeye – are extirpated and are not included in the "current" CU list. See the relevant species sections for details on these CUs.

Sweltzer Creek Chinook.
Photo by Shane Kalyn, 4 Element Photos.

Many Fraser salmon CUs are in poor condition. Almost 40% of CUs are in the *Red* zone, with low and/or declining abundances and high risk of extinction. Only 12% of CUs are in good condition - *Green* status, while 40% are in fair condition - *Amber* status.

Chinook and sockeye make up almost all of the Fraser CUs in poor and fair condition (92%). These species contribute the bulk of CUs in the Fraser watershed due to their genetic diversity and varied life histories.



The 2023 Wild Salmon Policy rapid statuses of Fraser salmon Conservation Units by WSP status zone. DD: data deficient in 2023.

Fraser Chinook are largely doing poorly.

Half of Fraser Chinook CUs are in poor status (Red). Many of these CUs were in poor status for most of the last decade. This is an improvement from 2021, when 60% of Fraser Chinook CUs were in poor status. Only two Fraser Chinook CUs are in good status (Green), both of which are ocean-type Chinook CUs located in the South Thompson. The Lower Fraser Fall Chinook CU is in fair status (Amber).

Fraser Sockeye CUs are split between poor and fair status.

Many Fraser Sockeye CUs declined over the last decade. Most notably, two CUs in the Harrison River watershed have declined from good to poor status since 2013. Several of the large Fraser Sockeye contributors declined from Green to Amber, including Chilko Summer, and the two Shuswap CUs. Only Nadina Sockeye have improved since 2013. However, Fraser Sockeye are doing better than they were in 2020, when more than half of CUs were in poor status.

Fraser Coho spawner abundances are doing relatively well.

Two Fraser Coho CUs have improved in status since 2013. Currently three of the five assessed Fraser Coho CUs are in good condition and two are in fair condition. The other two Fraser Coho CUs - located below Hell's Gate - are data deficient.

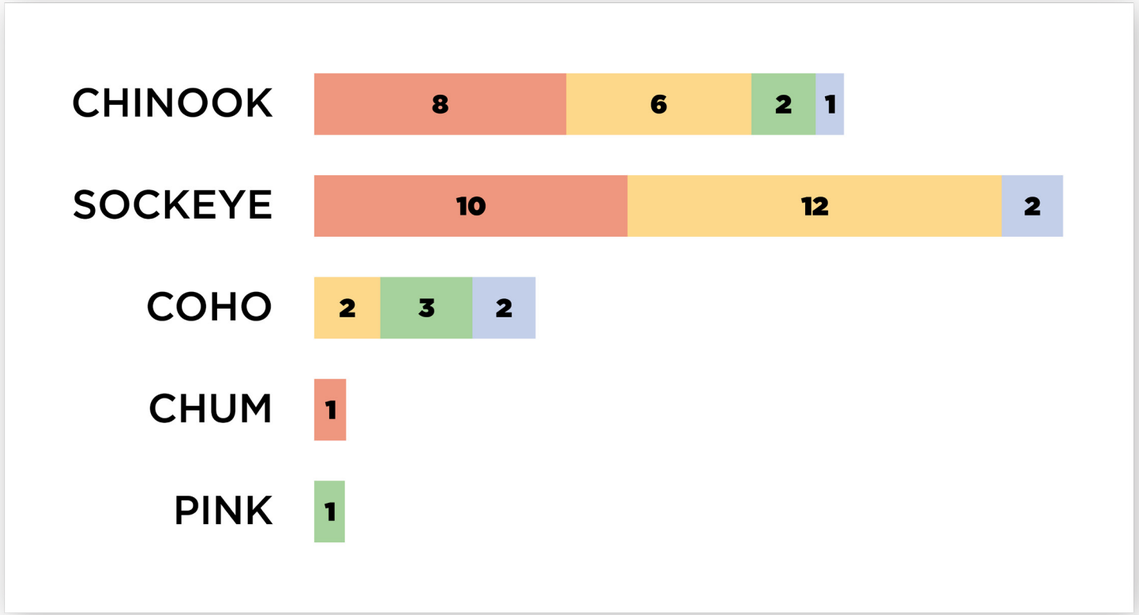
Fraser Chum have declined to poor status.

The one Fraser Chum CU - Lower Fraser Chum - declined from fair to poor status as of 2021. Data are limited for Fraser Chum, and statuses can only be determined from 2019 onwards.

Fraser Pink are in good status.

Fraser Pink have been consistently doing well over the past decade. Pink have been in good status in almost every year, including 2023. Fraser Pink only spawn in significant abundances every second year, so statuses are determined in odd years only.

Photos by Shane Kalyn, 4 Element Photos.



WSP rapid statuses of Fraser watershed Conservation Units (CUs) by species in 2023. The number of CUs in each status zone is indicated.

Fraser River salmon face many challenges to their survival. While fishing causes direct impacts on salmon populations, other human activities like development and forestry practices are changing salmon habitats, and high numbers of hatchery-released fish in the ocean increase competition for food. These and other challenges are amplified by the warming waters and numerous other impacts of climate change. As climate change continues to intensify, these pressures will continue to grow. Fraser salmon populations will likely look different in the future than they do today. This future may include changes in salmon abundances and distribution.

By tracking trends in the statuses of CUs, we can better understand how salmon respond to the pressures they are facing. This can help resource managers make better decisions now to support conservation and sustainable fisheries. It can also help all of us to better envision potential futures and identify opportunities to adapt.

Yohetta River.
Photo by Shane Kalyn, 4 Element Photos.

“ Pacific salmon are a cultural and ecological keystone species ”

– Earth Economics, 2021, in The sociocultural significance of Pacific salmon for Tribes and First Nations, page 4.

Introduction

Pacific salmon are iconic to Canada’s West Coast where they play a unique and significant role in local ecosystems, cultures, and economies.

Salmon follow an anadromous life cycle. They are born in freshwater rivers and streams, they migrate to the ocean to grow and mature, and then they return to fresh water to spawn, where the cycle begins again. Through their migration, salmon connect marine and freshwater ecosystems. Along the way, they provide food and nutrients for countless living things, ranging from marine mammals to bears, forests, and humans.

Pacific salmon are vital to the identities and ways of life of Indigenous peoples. They are an essential part of the social fabric that binds families, communities, and networks. For many Indigenous peoples, salmon are critical to both physical and mental health. Salmon provide food security, ecosystem health, community wellbeing, and cultural continuity across generations (Earth Economics 2021).

Throughout B.C., salmon are not only a source of food but also as a source of enjoyment, connection, and economic benefit. Salmon fisheries are an important part of the B.C. economy. Between 2015 and 2020, the commercial salmon fishery created an average of $46 million per year in direct value (DFO 2023a). Between 2020 and 2023, the recreational fishery generated around $358 million on average per year in total expenditures[1] (DFO 2023b).

These fisheries provide coastal communities with local employment, and they contribute to local businesses and to B.C.’s tourism economy.

Historically, the Fraser River watershed produced over 50% of all salmon in British Columbia (Grant et al. 2011). All five species of salmon managed by Fisheries and Oceans Canada (DFO) – Chinook, sockeye, coho, chum, and pink - spawn in the Fraser watershed. These salmon use hundreds of rivers, streams, and lakes, creating a diverse network of habitats that stretch from the Rocky Mountains at the Fraser headwaters downstream to the Salish Sea. The diversity of salmon that return to the Fraser River has supported the food security and cultural identities of Indigenous peoples for millennia (Nesbitt and Moore 2016).

Today, many populations of Fraser salmon are in decline. Between 2016 and 2020, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessed the extinction risk of Fraser Chinook, sockeye, and Interior Fraser Coho (COSEWIC 2016, 2017, 2018, 2020). They found that:

- 88% of Fraser Chinook Designatable Units[2] (DUs) were **endangered** or **threatened**;
- 43% of Fraser Sockeye DUs were similarly **endangered** or **threatened**, and
- Interior Fraser Coho (one DU) were **threatened**.

[1] Total expenditures include daily direct spending on goods and services (food, accommodation, transportation, supplies, etc.), packages (charter boats, lodges, etc.), and major purchases (boats, motors, land, buildings, etc.).

[2] COSEWIC assesses Pacific salmon populations in evolutionarily significant units called Designatable Units (DUs).

Chilko River. Photo by Shane Kalyn, 4 Element Photos.

Declines in Pacific salmon reach beyond the Fraser watershed. Many Pacific salmon populations in Canada and in other parts of the North Pacific have deteriorated, including Chinook salmon, many sockeye and coho populations, and some chum populations, for example Central Coast Chum (Atlas et al. 2022; NPAFC 2023; Wilson et al. 2025).

No single factor can explain the trends being seen across salmon populations. While fishing causes direct impacts on salmon populations, other human activities like development, industrial agriculture, and forestry practices are changing salmon habitats, and high numbers of hatchery-released fish in the ocean increase competition for food. These and other threats are amplified by climate change impacts, creating significant risks to salmon and their survival[3].

Salmon ecosystems are changing. In 2019, the DFO report *State Of Canadian Pacific Salmon: Responses To Changing Climate And Habitats* described how salmon and their freshwater and marine ecosystems are responding to the impacts of climate and habitat change (Grant et al. 2019).

[3] For information on specific threats to Fraser Sockeye, Chinook, and Interior Fraser Coho, see Arbeider et al. (2020), Doutaz et al. (2021, 2023), and Dionne et al. (2023).)

As these impacts continue to worsen, they will likely affect future Fraser salmon survival and abundances (Labelle 2009; MacDonald and Grant 2023). Some populations will fare better than others. However, overall, many existing salmon populations are under increasing threat (Crozier et al. 2019, 2021; Talloni-Álvarez et al. 2019;Cheung and Frölicher 2020; McClure et al. 2023).

As salmon ecosystems change, it is more essential than ever that we monitor the impacts of change on salmon biodiversity. Pacific salmon evolved across a range of different habitats. In doing so, they adapted to their local environments, developing differences in their genetics and biological traits - such as migration timing to their spawning grounds (Holtby and Ciruna 2007). These adaptations form the existing diversity of Pacific salmon.

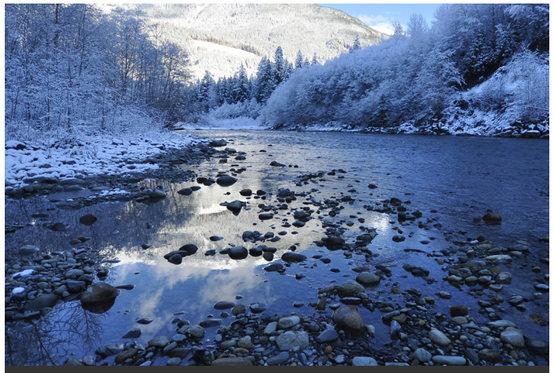
Biodiversity provides resilience in the face of environmental change. Some populations may adapt to certain changes better than others. Protecting biodiversity and connectivity between salmon populations is seen as “insurance” against change. This insurance provides the best possible chance that some populations will be able to adapt and survive (Irvine and Fraser 2008; Moore et al. 2021).

What do we mean by ‘the state of salmon’?

DFO Science monitors the state of Canadian Pacific salmon through annual assessments. To do this, we use the Wild Salmon Policy (WSP) rapid status assessment method to determine WSP statuses (Pestal et al. 2023; DFO 2024a; Grant et al. 2026). This approach was developed, peer-reviewed, and tested through more than 15 years of work to implement Canada’s Wild Salmon Policy (WSP), and is the standard method for monitoring the state of wild Pacific salmon in Canada.

WSP status is a measure of extinction risk faced by Pacific salmon under current conditions. WSP rapid status assessments are built on two key principles of conservation biology that describe this risk. The principles explain that: (1) extinction risk increases when populations are small; and, (2) extinction risk increases when populations are declining (Caughley 1994).

WSP status assessments evaluate risk according to these two important principles using criteria that are based on spawner abundances. By applying these criteria we can assign statuses that fall into one of three biological status zones: *Green (good), Amber (fair), or Red (poor)*.



Chilliwack River.
Photo by Shane Kalyn, 4 Element Photos.

Green Status: CU is in **good condition** and at low risk of extinction.

Amber Status: CU is in **fair condition**, showing signs of reduced production but low risk of extinction.

Red Status: CU is in **poor condition** and has a high risk of extinction.

The WSP rapid status assessment method is built on approaches used to assess species at-risk at international and national levels by the International Union for Conservation of Nature (IUCN) and COSEWIC. The methods are standardized so that statuses can be tracked over time and compared in decision-making. This also ensures that statuses are not influenced by personal bias, but are objective and can be easily reproduced. See Appendix A for more information on these methods.

WSP statuses are determined for groups of salmon populations called Conservation Units (CUs). **A CU is ‘a group of wild salmon sufficiently isolated from other groups that, if extirpated is very unlikely to recolonize naturally within an acceptable timeframe, such as a human lifetime or a specified number of salmon generations**’ (DFO 2005). This level of biodiversity is essential to the long-term resilience of salmon. CUs also generally align with the units used by COSEWIC to assess the status of wildlife species (Designatable Units, or DUs). Within CUs, finer-scale levels of diversity, like populations, are more likely to recover if lost (DFO 2005). However, these more local levels of biodiversity are often critical to Indigenous and local communities.

Before a status assessment is complete, the CUs, data, and results are reviewed with regional and local salmon experts, including members of DFO science, Indigenous groups, and sometimes academia and environmental non-governmental organizations (ENGOs). Statuses are only considered final once this review process has been completed and statuses have the approval of local experts. During reviews, important additional information about the CU - like recent significant environmental events – is documented in status narratives (Appendix A).

The iterative status review process is essential for building agreement and confidence in the status results. Local vetting of the CUs, data, and results means that statuses are reliable and can be used to guide resource management and regulatory decisions.

The future of status assessments

There are many ways to describe the state of Pacific salmon. Our current approach is rooted in Western science methods, and is supported by review processes with local and regional salmon experts. Indigenous partnerships are essential to ensure that statuses are co-determined. However, meaningful inclusion of Indigenous Knowledge remains a major gap in the current approach.

In the United Nations Declaration on the Rights of Indigenous Peoples Act (UNDA) Action Plan for 2023 to 2028, the Government of Canada committed to “develop and employ mechanisms that respect and incorporate Indigenous Knowledge as a distinct knowledge system in the management of fisheries, fish habitat, conservation, marine safety and protection of the marine environment” (Measure 40 in Government of Canada 2023). While Indigenous groups are involved in WSP status review processes, and in many cases also collect and analyze data that feed into WSP status assessments, this remains a Western scientific approach.

Some status assessments are moving towards more effective and meaningful inclusion of Indigenous Knowledge. For example, the Northwest Territories Species at Risk Committee uses a dual system for assessing species. This system includes two sets of criteria: one that is based on western scientific methods and the other on Indigenous and community knowledge (Northwest Territories Species at Risk Committee 2022; Singer et al. 2023). The Indigenous Knowledge criteria recognize connections between human cultural diversity and biological diversity, and include assessment of the impacts on Indigenous cultures and traditional ways of life that are tied to the species or its habitat (Singer et al. 2023). Species are assessed according to both sets of criteria, where possible, and final assessments are made by consensus, informed by either or both components.

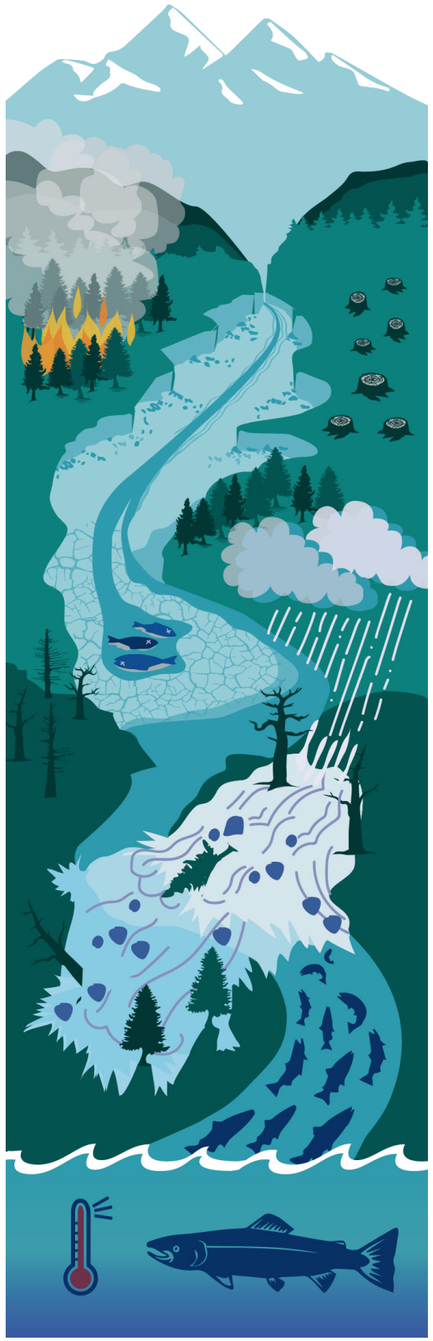
This State of the Salmon report is the first iteration of consensus-based status assessments for the Fraser River watershed. Moving forward, we have an opportunity and a responsibility to explore ways of bringing together the WSP status assessment approach and Indigenous Knowledge through meaningful engagement, where there is interest. Though in its early stages, the Tŝilhqot’in National Government (TNG) Fisheries Department has begun leading work in this direction (P. Nicklin, Tŝilhqot’in National Government (TNG), pers. com.)

Changing Environmental Conditions

Pacific salmon are paying the price of a warming planet. Salmon face growing environmental challenges, from the earliest stages of their life cycle as eggs in freshwater streams and rivers, to their return as spawning adults. These include more frequent droughts, flooding, warming river temperatures, and barriers to migration, all of which can affect their chance of survival and ability to successfully produce offspring.

The past ten years were by far the hottest on record since 1850 (NOAA National Centers for Environmental Information 2025), with 2024 claiming the warmest year and passing the 1.5°C limit[4] that has been deemed as critical to avoid significant global issues related to our life support systems. While temporarily exceeding 1.5°C does not mean that this limit is permanently crossed, it's a serious warning sign that we are heading into more severe and unpredictable climate conditions (IPCC 2014, 2018, UNEP 2019). Moving forward, environmental conditions will increasingly fall outside of what we have known in the past 11,000 years (Marcott et al. 2013) – a period of climate stability during which humans and salmon have thrived.

In British Columbia, climate change has already had significant impacts. Since 1948, the province has warmed by nearly 2°C (Bush and Lemmen 2019; Curry and Lang 2024). Climate warming not only affects local temperatures, it also alters global wind patterns, ocean currents, and the water cycle, all of which influence natural and human systems like agriculture, fisheries, and water availability (White et al. 2016).



A salmon's journey on a warming planet.
Artwork by Laura Timmermans (lauratimmermans.cs)

These changes have significant outcomes for salmon ecosystems. The combination of rising temperatures, natural fluctuations, and more frequent and severe extreme events can create conditions that fall outside of what Pacific salmon have evolved to survive within (Harris et al 2018). As salmon habitats and food availability change, these fish are facing increasing challenges related to their growth, health, migration behaviors, reproduction, and ultimately their survival (NOAA Fisheries 2021).

Warming rivers and changing flows

Summer water temperatures in the Fraser River have been increasing (Islam et al. 2019). Since 1950, the number of days when Fraser River temperatures are higher than 20°C has doubled (Islam et al. 2019). Warming water can have several negative impacts on salmon. High temperatures can affect salmon reproduction, increase risk of disease and death, and can negatively affect the health of any offspring (Tierney et al. 2009; Burt et al. 2011; Eliason et al. 2011; Sopinka et al. 2016). Warm temperatures can also shift the timing of key life events, like when eggs hatch (Whitney et al. 2014).

However, not all impacts of warming are negative. In places where water temperatures have been on the cooler end of those best suited to salmon, rising water temperatures can improve juvenile salmon growth, as long as enough food is available and temperatures don't exceed the optimal range for salmon (Brett 1971, Edmundson & Mazumder 2001).

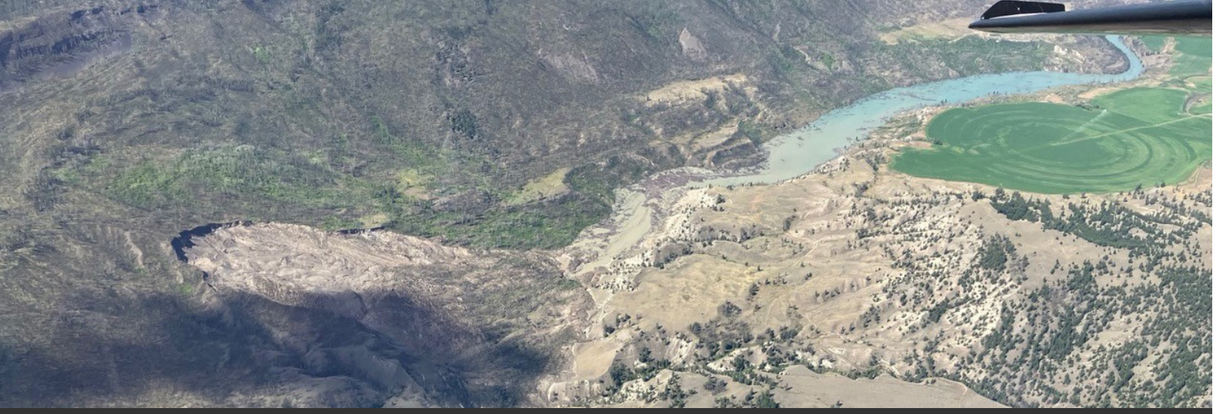
Alongside warming water temperatures, patterns of streamflow in the Fraser River are changing due to climate impacts (Morrison et al. 2002; Kang et al. 2014; Islam et al. 2019). In the Fraser River basin, snowmelt is a key factor that drives peak river flows in the spring and moderates water temperatures during the summer (Morrison et al. 2002; Islam et al. 2016). But snowpacks are now contributing less water to the overall flows in almost all areas of the Fraser watershed (Kang et al. 2014). This means that there is less snowmelt available to provide cool water inputs during the critical summer months. Further, spring temperatures have been unusually warm, causing snow to melt early and fast. This leads to early peak flows, which are then followed by lower river flows in the summer which can limit habitat availability and exacerbate temperature issues (Kang et al. 2016).

Earlier peak flows and ice-free lakes that come from warm spring conditions can lead to shifts in the downstream migration timing of juvenile salmon, as has been observed in Chilko Sockeye (MacDonald et al. 2018). This can create mismatches with food availability if growing seasons are not similarly shifted.

[4] The represents 1.5°C above pre-industrial levels (1850-1900)

Drought in the Fraser River Watershed

The Fraser basin has seen significant drought in six of the last 10 years (British Columbia Ministry of Water Land and Resource Stewardship 2025). Summer 2023 stands out as an extreme year, when every area of the Fraser watershed apart from the Middle Fraser experienced severe drought with almost certain adverse impacts (British Columbia Ministry of Water Land and Resource Stewardship 2025). Low water levels can further increase water temperatures, lower water quality, block passage to spawning grounds, increase predation, and in some cases can strand and suffocate salmon eggs and juveniles (Neitzel and Becker 1985).



The Chilcotin River completely blocked by the landslide as of July 31, 2024, approximately 12 hours post-slide. Photo credit: P. Nicklin, Tŝilhqot'in National Government Fisheries Department.

Floods and landslides

Extreme precipitation events are becoming more common in B.C. (Sharma and Déry 2020). These events can cause flooding, erosion, water contamination, and landslides (Gifford et al. 2022). The Fall 2021 atmospheric rivers caused extensive damage in southwestern B.C. through all of these impacts.

For Pacific salmon, extreme precipitation and high river flows can scour or bury salmon spawning beds with sediments. These impacts can affect egg survival, and degrade the quality and availability of salmon habitat (Holtby and Healey 1986; Lisle 1989; Lapointe et al. 2000; Pike et al. 2010; Cloutier et al. 2017; Crozier et al. 2019; Grant et al. 2019). In more extreme cases, landslides can block migrating salmon from accessing spawning grounds.

In the past decade, two major landslides have impacted Fraser salmon migrations. The Big Bar landslide, discovered in early summer 2019, created a five-meter waterfall in the mainstem of the Fraser River. The obstruction cut off migration access to many important salmon populations that spawn upstream of the site, near Lillooet B.C, until 2022 when a fishway was completed, restoring natural migration. The most recent event, the Chilcotin landslide in July 2024, cut off flows of the Chilcotin River for five days before water eventually overtopped the debris blockage (DFO 2024b; Verhaeghe et al. 2025). This event disrupted the migrations of multiple Chinook and sockeye populations that spawn upstream in the Chilcotin watershed.

Research at DFO

DFO's Science Branch conducts research to better understand salmon and their ecosystems in a changing climate. Research is used to provide science advice to support the sustainable management of Pacific salmon through fisheries regulation, hatchery enhancement, habitat restoration and regulation, and other decisions.
Key areas of research include:

- stock assessment and monitoring
- freshwater and marine ecosystems
- fish physiology and health
- genetics

Details of ongoing research being conducted within DFO Science can be found through the following resources:

- DFO's **State of the Pacific Ocean** reports
- **DFO Environmental Watch Program**
- **DFO Fieldnotes 2025-2026**
- **DFO's Canadian Science Advisory Secretariat (CSAS)**

Funding supplied through the 2021-2026 Pacific Salmon Strategy Initiative (PSSI) has supported new research that will improve our understanding of salmon ecosystems. This work is in addition to the ongoing science and research performed within DFO Science.
Information on projects supported by PSSI funding can be found through **DFO's website**.

Weaver Creek Sockeye. Photo by DFO.

Wildfires and mountain pine beetle can intensify other climate change impacts through the loss of forest canopy (Cloutier et al. 2017). The annual area burned has been trending upwards in B.C. since 2005 (Parisien et al. 2023). In 2023, record-breaking wildfires burned an area that was more than ten times the 20-year average (B.C. Wildfire Service 2023).

The Warming Northeast Pacific Ocean

Global sea surface temperatures have risen at an accelerating rate in recent decades (Merchant et al. 2025), reaching record highs in 2024 (Cheng et al. 2025). Superimposed on this long-term warming trend are large marine heatwaves, including those that have occurred in the Northeast Pacific since the 2013–2016 'Blob' event. Each year, DFO publishes a *State of the Pacific Ocean* report that summarize ocean conditions using data and analyses from multiple researchers and organizations (Boldt et al. 2025).

When ocean waters are warmer, salmon need more and better quality food for growth (Holsman et al. 2018). However, food quality likely declined during and after 'the Blob' marine heatwave. In warm years, ocean currents bring southern zooplankton species north along the coast of BC (Mackas et al. 2004; Galbraith et al. 2024). These southern species are less nutritious for fish and other predators, which can reduce their growth and survival and can propagate through the Northeast Pacific marine food web (Mackas et al. 2007). Zooplankton communities reflected these warmer water conditions during and after 'the Blob' until about 2021 (Galbraith and Young 2022; Ostle and Batten 2022). The problem is made worse by increased competition for food in the North Pacific, as large numbers of hatchery salmon compete with wild salmon for the same prey (Connors et al. 2020; Ruggerone et al. 2023).

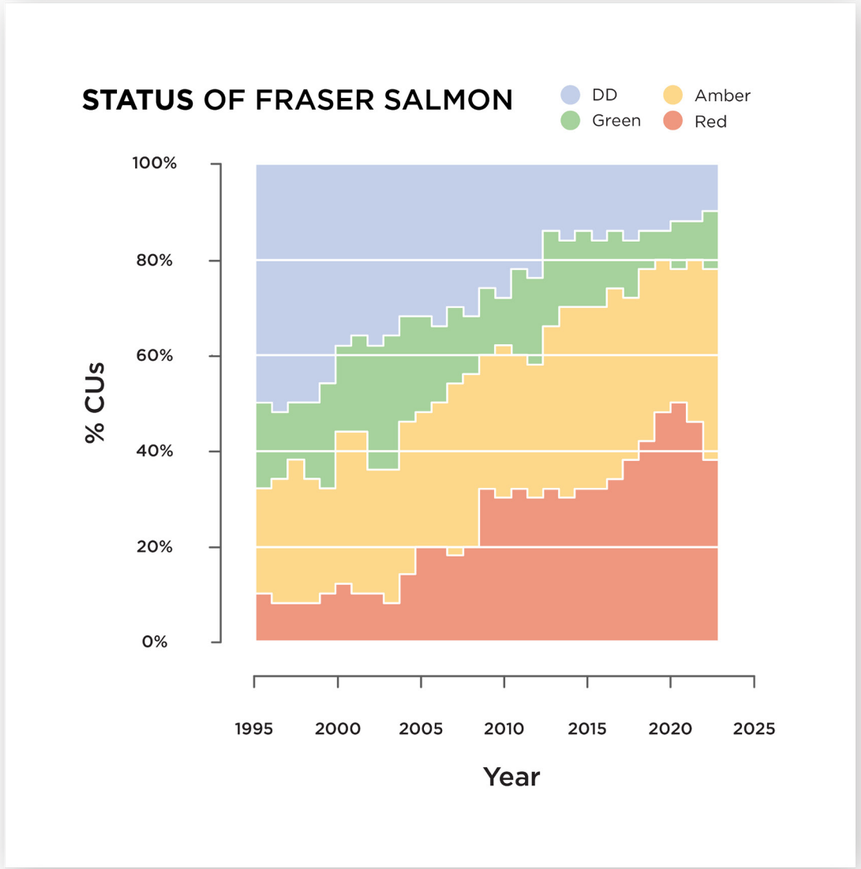
Status Of Fraser River Salmon

There are 50 Pacific salmon Conservation Units (CUs) in the Fraser watershed:

- 17 Chinook CUs
- 24 sockeye CUs
- 7 coho CUs
- 1 pink CU
- 1 chum CU

Five Fraser salmon CUs are data deficient and cannot be assessed for status. This includes Lillooet Coho, Lower Fraser Coho, Lower Fraser Summer 1.3 Chinook, Taseko Early Summer Sockeye, and Chilko Early Summer Sockeye.

The most recent WSP statuses are based on spawner data up to 2023. Updating these statuses requires several steps to ensure that the results are accurate. First, field data must be converted into spawner estimates. Then, estimates from different sites are combined to generate CU-level spawner estimates.



Fraser salmon Conservation Units in each of the three WSP status zones from 1995 to 2023. The proportion of the total 50 Fraser salmon CUs in each WSP status zone is shown for each year. Status zones are: poor (red), fair (amber), good (green), and data deficient (grey).

This process can be slow, especially the first time a CU is assessed, because appropriate sites must be chosen based on data quality and quantity. Finally, experts apply the WSP criteria to the CU data to determine and confirm the status (see Appendix A for details). In most cases, adding one or two more years of data does not significantly change the status of a CU, since status methods integrate information over multiple recent years.

WSP statuses are not available in every year for all CUs due to data limitations. For each year, we need a minimum number of prior years of data to assess status. The minimum number of years needed depends on the data preparation methods used for the CU and the dominant age of spawners in that CU (see Appendix A for details).

Over time, the number of Fraser salmon CUs that are data deficient has decreased, and has been relatively stable since 2013, varying between 10-15% of CUs. This report focuses on statuses between 2013 and 2023 to capture this recent period of stable data availability.

Between 2013 and 2023, the proportion of Fraser CUs in poor status increased from 32% to 38%. For a brief period between 2020-2021, around 50% of CUs were in poor status.

The proportion of CUs in good status decreased from 20% to 12% over the decade. In 2020 in particular only 6% of CUs were in good status.

CUs in fair status fluctuated between 30% and 40% of the total number of assessed CUs between 2013 and 2023.

The pattern of worsening status over the most recent decade is driven by sockeye and Chinook, which dominate the total number of CUs in the Fraser watershed.

Tumuch Lake. Photo by Shane Kalyn, 4 Element Photos.

Fraser Chinook

The Fraser River is the largest producer of Chinook salmon in Canada (DFO 1999; Parken et al. 2008). Fraser Chinook have historically contributed to commercial, recreational, and Indigenous fisheries from Southeast Alaska to Washington State. However, since 1980, multiple periods of decline in early-timed Fraser Chinook have led to fishery closures and restrictions (Bailey et al. 2001).

Chinook spawn in all major tributaries of the Fraser River that are accessible to salmon (DFO 2020). Some populations migrate up to 900 km to reach their spawning grounds near the headwaters of the Fraser River (DFO 2008). Among the five species of salmon in the Fraser, Chinook are the most diverse in terms of both their behaviour after emerging from the spawning gravel, and the age and seasonal timing of their return migration to spawn.

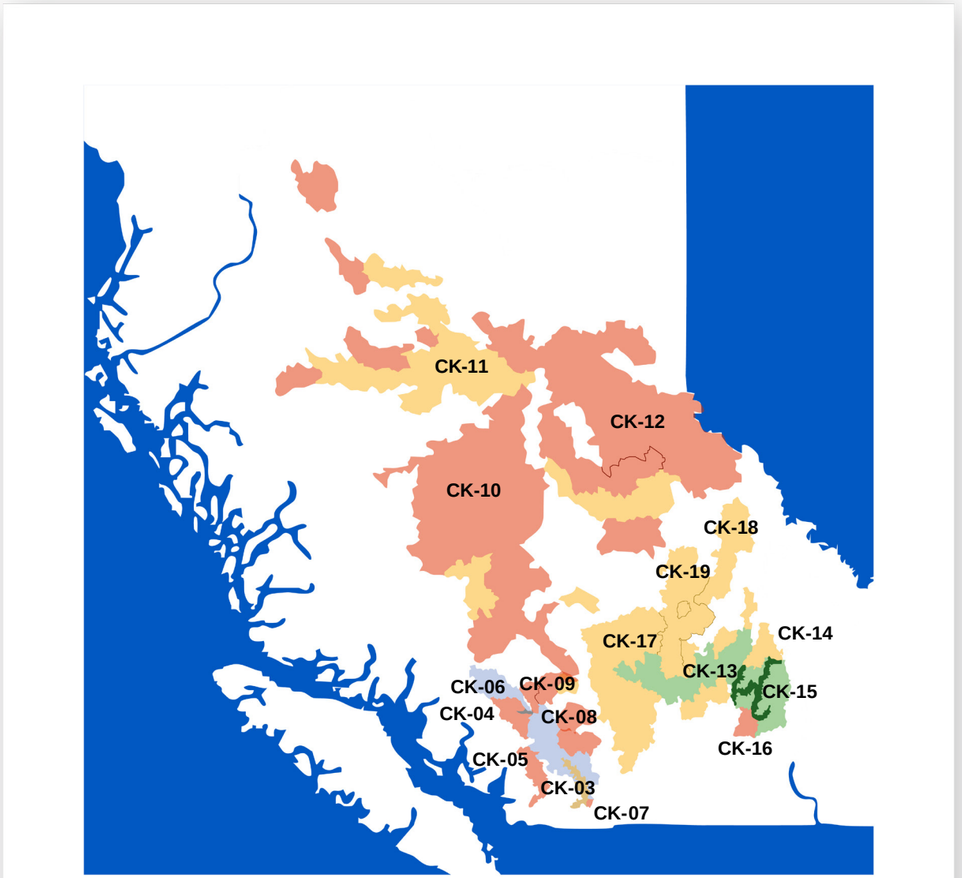
Fraser Chinook are classified into two main types.

- Stream-type Chinook spend one year in fresh water after emerging from the spawning gravel before migrating downstream to the Salish Sea the following spring or summer (DFO 2020).
- Ocean-type Chinook migrate downstream within five months of emergence. One group of Fraser Chinook, Lower Fraser Fall Chinook, migrate downstream to the Fraser estuary immediately after emergence, where they remain until the beginning of summer (DFO 2020).

Once in the ocean, nearly all Fraser Chinook spend several months in the Salish Sea before dispersing (DFO 2020). Most ocean-type Fraser Chinook remain within about 1,000 km of the Fraser River mouth for their entire marine phase. In contrast, stream-type Fraser Chinook migrate further offshore, moving north and west after their first year at sea (DFO 2020).

James Creek.
Photo credit: Shane Kalyn, 4 Element Photos.

Fraser Chinook typically return to spawn after one to three years in the ocean, most often returning between the ages of three and five. Though all Fraser Chinook spawn in the fall (DFO 2020), their return migration timing ranges widely across populations, with migrations occurring from April to November. Return migration timing is used alongside age structure to group CUs into five groups for fisheries management purposes, called Stock Management Units (SMUs). Stream-type CUs are grouped into the Fraser Spring 1.2, Fraser Spring 1.3, and Fraser Summer 1.3 Chinook SMUs, and ocean-type CUs are in the Fraser Summer 0.3 and Fraser Fall Chinook SMUs (see Box Fraser Chinook CU Names for details on the age structure naming convention).

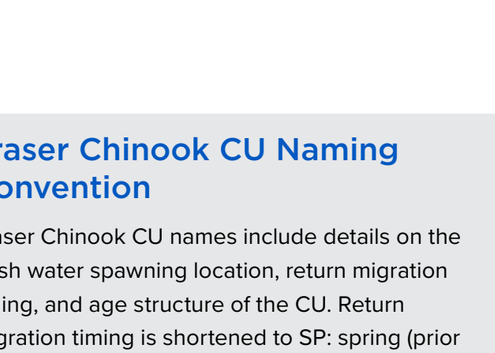


WSP statuses of Fraser Chinook CUs in 2023. Fraser Chinook consist of eight poor (red), six fair (amber), two good (green), and one data deficient (blue-grey) CU. Some CUs are dispersed over large, segmented spatial areas.

CU ID	CU Name
CK-03	Lower Fraser River-FA-0.3
CK-04	Lower Fraser River-SP-1.3
CK-05	Lower Fraser River-Upper Pitt-SU-1.3
CK-06	Lower Fraser River-SU-1.3
CK-07	Maria Slough-SU-0.3
CK-08	Middle Fraser-Fraser Canyon-SP-1.3
CK-09	Middle Fraser River-Portage-FA-1.3
CK-10	Middle Fraser River-SP-1.3
CK-11	Middle Fraser River-SU-1.3
CK-12	Upper Fraser River-SP-1.3
CK-13	South Thompson-SU-0.3
CK-14	South Thompson-SU-1.3
CK-15	Shuswap River-SU-0.3
CK-16	South Thompson-Bessette Creek-SU-1.2
CK-17	Lower Thompson-SP-1.2
CK-18	North Thompson-SP-1.3
CK-19	North Thompson-SU-1.3

Fraser Chinook CU Naming Convention

Fraser Chinook CU names include details on the fresh water spawning location, return migration timing, and age structure of the CU. Return migration timing is shortened to SP: spring (prior to July 15th); SU: summer (July 15th- Aug 31st), or FA: fall (Sept 1st onwards). Age structure is described using the European aging system, where the first number refers to the number of winters spent in fresh water after hatching (does not include winters spent in fresh water as eggs), and the second number refers to the number of winters spent in the ocean. In the example below, the Lower Fraser River FA 0.3 CU spawns in the Lower Fraser, returns in the fall months (Sept 1st or later), and spends zero winters in fresh water after hatching, and three winters in the ocean.



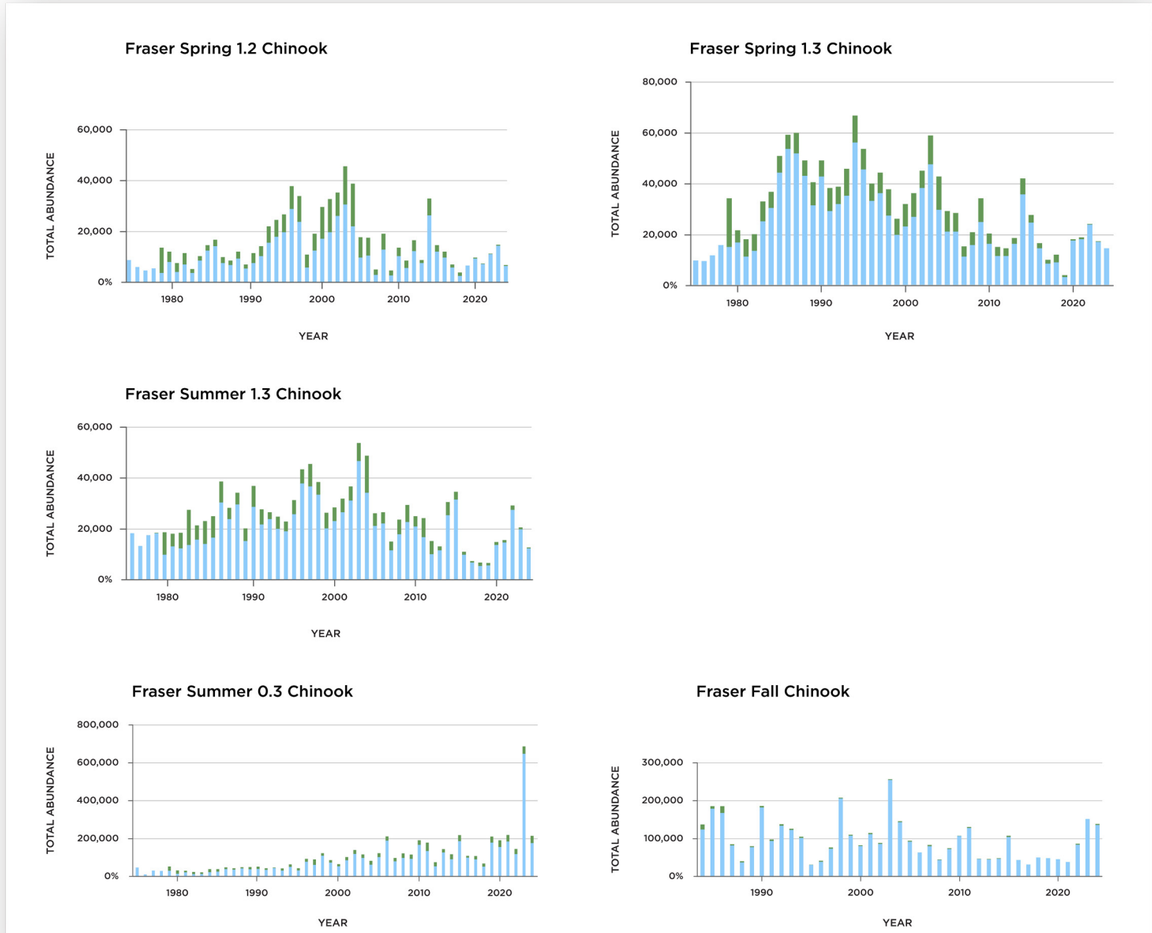
Maria Chinook. Photo by Shane Kalyn, 4 Element Photos.

History of trends

There have been Fraser Chinook stocks of concern for several decades. In the period leading up to 1980, declines in spring-migrating Fraser Chinook sparked a series of fishery restrictions aimed at protecting the vulnerable populations from commercial and recreational fisheries in the Strait of Georgia (Bailey et al. 2001). Additional regulations were introduced with the Pacific Salmon Treaty in 1985 (Bailey et al. 2001), its renewal in 1999, and through other conservation efforts targeting Interior Fraser Coho and West Coast Vancouver Island Chinook (Labelle 2009).

Following these efforts, early-migrating Chinook recovered, reaching peak abundances in 1994 and again in the early 2000s. However, after 2003, declines in spring and summer-timed stream-type Fraser Chinook triggered mounting concerns. In 2008, several populations were identified as 'stocks of conservation concern' and further fishery restrictions were introduced (DFO 2009; Chamberlain and Parken 2012).

In contrast, ocean-type Fraser Chinook have followed different trends. Summer-run ocean-type Chinook – particularly South Thompson SU 0.3 and Shuswap River SU 0.3 Chinook - improved in abundances starting in the mid-1990s. Between 2003 and 2015, the combined abundance of these two large CUs increased by 26% (COSEWIC 2018). The Maria Slough SU 0.3 CU, which exists at much smaller abundances, improved in the late 2000s before declining substantially after 2015. Fall-run ocean-type Chinook in the Lower Fraser peaked in abundance in the early 2000's, similar to the early-timed CUs. Spawner abundances then declined by 57% between 2003 and 2015 (COSEWIC 2018).



Historical trends in Fraser Chinook by Stock Management Unit (SMU). Lower bars (blue) show spawner abundances (wild & hatchery), including hatchery removals. Upper bars (green) show harvest in Fraser River First Nation, recreational, and commercial fisheries. Bars sum to the total annual return to the Fraser River. Note that Total Abundance axes are not on the same scale. Data are shown for illustration purposes only and are not the quality-controlled data sets used for WSP status assessments. Data were provided by DFO Fraser Interior Area Stock Assessment.

Recent status trends

Half of Fraser Chinook CUs are in poor status. All of these CUs have been in poor condition for the majority of the past decade, or for all years they were assessed[5]. Two CUs – Middle Fraser SP 1.3 and Upper Fraser SP 1.3 Chinook - showed temporary improvements during this period, but returned to poor status by 2023.

All of the CUs currently in poor condition are spring or summer-migrating stream-type Chinook, with the exception of Maria Slough SU 0.3, which is ocean-type. Maria Slough SU 0.3 Chinook began the decade in fair status but have been in poor status since 2017 and are of particular concern.

Fraser Chinook have generally improved since 2021, when 60% of CUs were in poor status. Additional fishery restrictions have been in place to protect early-migrating Fraser Chinook since 2019 (DFO 2019a), and some CUs have shown improvements in the past two years. In particular, Middle Fraser Summer 1.3 Chinook and two CUs in the Thompson Region - North Thompson SP 1.3 and North Thompson SU 1.3 - have improved from poor to fair status. While these trends are positive, experts have highlighted some concerns. Specifically, there is concern that recent improvements in North Thompson SU 1.3 Chinook are only occurring in the Clearwater River. Strong spawner abundances in this one system could be masking declines in less abundant sites that are subject to habitat issues, such as Lemieux Creek, which experiences severe drought.

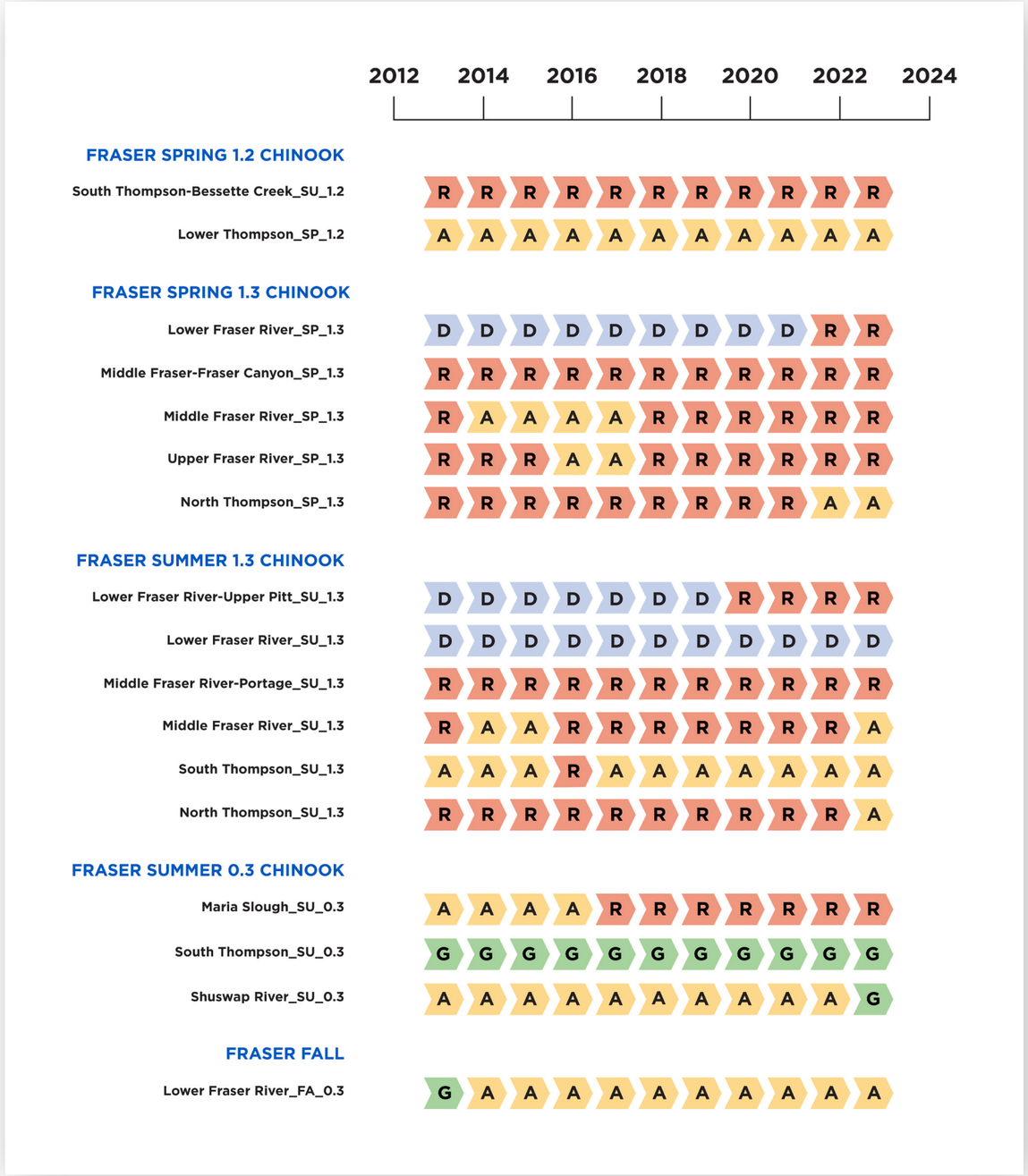
About 30% of Fraser Chinook CUs have been in fair or good condition over the last decade. This group includes three of the four ocean-type Fraser Chinook CUs, the exception being Maria Slough SU 0.3 Chinook, noted above. In the South Thompson Region, two ocean-type CUs - South Thompson SU 0.3 and Shuswap River SU 0.3 Chinook - have been improving in abundances since 2019 and were in good status in 2023. Outside of this region, Lower Fraser FA 0.3 Chinook declined from good to fair status early in the decade and have since remained in fair condition.

Among the stream-type CUs, Lower Thompson SP 1.2 Chinook and South Thompson Summer 1.3 Chinook have been in fair status throughout most of the past decade. However, local experts have expressed concerns over both of these CUs. Recent wildfires and flooding have impacted the spawning and rearing habitats of Lower Thompson SP 1.2 Chinook. Further, there are uncertainties around potential changes in spawner distribution in this CU. Trends in South Thompson Summer 1.3 Chinook abundances are largely driven by the largest contributor - the Eagle River, which potentially masks trends in the other sites that are much less abundant and less productive. Additionally, not all sites in this CU are included in the data set due to high hatchery contributions. This includes one site (Salmon River in Salmon Arm) that is drought-prone and has experienced a decline in Chinook.

Extirpated Conservation Units

Upper Adams River SU 1.x Chinook were extirpated by the presence of an impassable splash dam that was built on the lower Adams River in 1908 (Roos 1991). After dam removal in 1945, a new Chinook population was introduced using transplanted fish from other locations. It is unclear if this population is self-sustaining, therefore it has not been verified as a new CU.

[5] We don't have a complete decade of statuses for Lower Fraser River SP 1.3 and Lower Fraser - Upper Pitt SU 1.3 Chinook. These two CUs were in poor status for every year that can be assessed.



Fraser Chinook statuses between 2013 and 2023. Boxes show WSP statuses (R: red; A: amber; G: green, data deficient: blue-grey) for each CU, arranged into the five Fraser Chinook Stock Management Units.

Enhancement

Many Fraser Chinook CUs are hatchery-enhanced to some extent. DFO operates five major hatcheries in the Fraser watershed that enhance Chinook for multiple sites. These hatcheries are: Chehalis, Chilliwack, Inch Creek, Shuswap Falls, and Spius Creek (COSEWIC 2018). In addition, there are 10 Community Involvement Program (CIP) hatcheries located throughout the Fraser watershed that also enhance Chinook: Alouette, Little Campbell, Nicomekl, Tynehead, and Poco facilities in the Lower Fraser, and N'Quatqua, Kingfisher, Quesnel River Research Centre, Spruce City Wildlife Association, and Tsilhqot'in facilities in the Upper Fraser.

To assess WSP status, sites with high levels of enhancement are either excluded from the Fraser Chinook data or they are adjusted to reflect only the natural-origin spawners.

Data

There are 17 Fraser Chinook CUs. One of these CUs - Lower Fraser River SU 1.3 - cannot be assessed for WSP statuses between 2013 and 2023 due to data deficiencies. Data for two other CUs - Lower Fraser River SP 1.3 and Lower Fraser River Upper Pitt SU 1.3 - are limited but they are assessed for years in which data are available.

The data set used for this assessment is updated from data used in Recovery Potential Assessments for Southern BC Chinook (Weir et al. 2022; Dionne et al. 2023). These data were based on those used for the 2016 WSP integrated status assessment (DFO 2016), and the 2018 and 2020 COSEWIC status assessments (COSEWIC 2018, 2020). Data were updated and provided by DFO Fraser Interior Area Stock Assessment. See Appendix A for additional details.

Eagle River. Photo credit: Shane Kalyn, 4 Element Photos.

Fraser Sockeye

The Fraser River is the largest sockeye-producing river complex in the world (Northcote and Larkin 1989; COSEWIC 2017), with around 151 spawning populations (Labelle 2009). Fraser Sockeye have been central to the food security and cultures of Indigenous communities for millennia (Garibaldi and Turner 2004; Nesbitt and Moore 2016). Commercial fisheries were developed around Fraser Sockeye in the mid-1800's. This included building the first commercial canneries on the Fraser River in the late 1800's to export canned sockeye to European markets (Reid 1973). Recreational catches of Fraser Sockeye grew in the 1990s with the development of an in-river recreational fishery upstream of Mission, B.C. (Grant et al. 2011).

Fraser Sockeye display one of two major life history types:

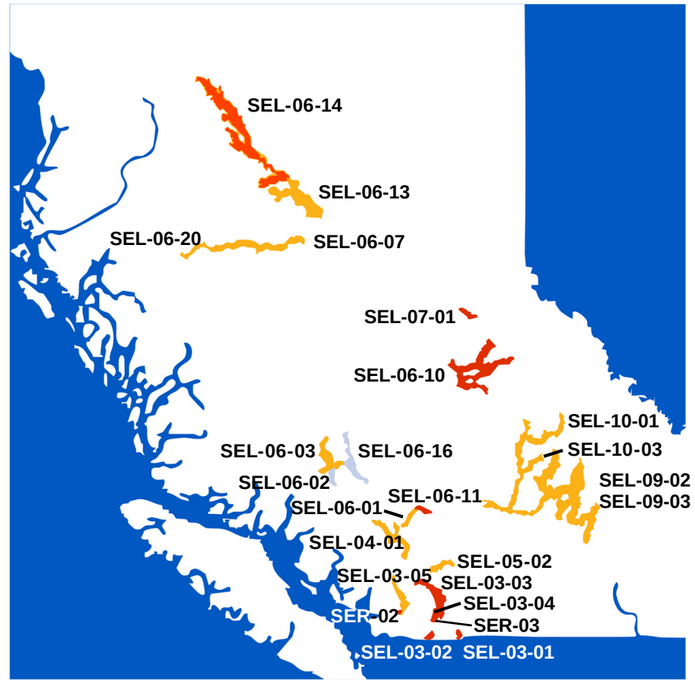
- Lake-type sockeye migrate to the ocean as smolts after rearing in freshwater lakes for one to three years. This group includes most Fraser Sockeye CUs.
- River-type sockeye migrate to the ocean shortly after emergence from the spawning gravel as fry. Two Fraser CUs fall into this type - Harrison River and Widgeon Slough.

When they reach the ocean, most sockeye migrate north through the Johnstone Strait to the Gulf of Alaska. Fraser Sockeye return to their spawning grounds via either the northern Johnstone Strait or southern Juan de Fuca route after one to three years in the ocean. Most Fraser Sockeye return as four year old fish, though approximately 10% return as five year olds.

Populations that spawn farther north in the Fraser watershed generally return earlier than those that spawn in more southern areas (Labelle 2009). Return migration timing is used to divide Fraser Sockeye into four fisheries management groups (aka Stock Management Units, or, SMUs): Early Stuart, Early Summer, Summer, and Fall.

Some Fraser Sockeye CUs show cyclic patterns in their abundances. In these CUs, there is a large return of sockeye every four years, followed by smaller returns in the other three years. There are five Fraser Sockeye CUs that follow this pattern: Takla-Trembleur EStu, Takla-Trembleur-Stuart S, Quesnel S, Shuswap ES, and Shuswap L. In both the Quesnel and Takla-Trembleur-EStu CUs, the dominant cycle line appears to have recently shifted, meaning the large returns now occur in different years than previously.

Chilcotin River.
Photo credit: Shane Kalyn, 4 Element Photos.



WSP statuses of Fraser Sockeye CUs in 2023. Fraser Sockeye consist of 10 poor (red), 12 fair (amber), and two data deficient (blue-grey) CUs.

CU ID	CU Name		
SEL-03-01	Chilliwack-ES	SEL-06-11	Seton-L
SEL-03-02	Cultus-L	SEL-06-13	Takla-Trembleur-Stuart-S
SEL-03-03	Harrison-DS-L	SEL-06-14	Takla-Trembleur-Estu
SEL-03-04	Harrison-US-L	SEL-06-16	Taseko-ES
SEL-03-05	Pitt-ES	SEL-06-20	Nadina-Francois-ES
SEL-04-01	Lillooet-Harrison-L	SEL-07-01	Bowron-ES
SEL-05-02	Nahatlatch-ES	SEL-09-02	Shuswap-ES
SEL-06-01	Anderson-Seton-ES	SEL-09-03	Shuswap-L
SEL-06-02	Chilko-ES	SEL-10-01	Kamloops-ES
SEL-06-03	Chilko-S	SEL-10-03	North-Barriere-ES
SEL-06-07	Francois-Fraser-S	SER-02	Widgeon-R
SEL-06-10	Quesnel-S	SER-03	Harrison-R

Fraser Sockeye CU Naming Convention

Most Fraser Sockeye CUs are lake-type and are named according to the lakes used by juveniles for rearing. This can include more than one lake. River-type sockeye CUs are named for their fresh water spawning locations.
The second part of Fraser Sockeye CU names refers to the return migration timing of the CU, where EStu refers specifically to the Early Stuart CU timing; ES: early summer; S: summer, and L: late. In the example below, Francois-Fraser-S Sockeye rear in Francois Lake and Fraser Lake, and return with summer timing. Two Fraser Sockeye CUs, Harrison (D/S)-L and Harrison (U/S)-L, have an additional component to their naming that refers to the direction juveniles travel from their spawning grounds to reach their rearing lake (D/S means downstream and U/S means upstream).

History of trends

Returns of Fraser Sockeye salmon have fluctuated between periods of high and low abundances over the past century, with an extended period of low returns persisting in recent decades.

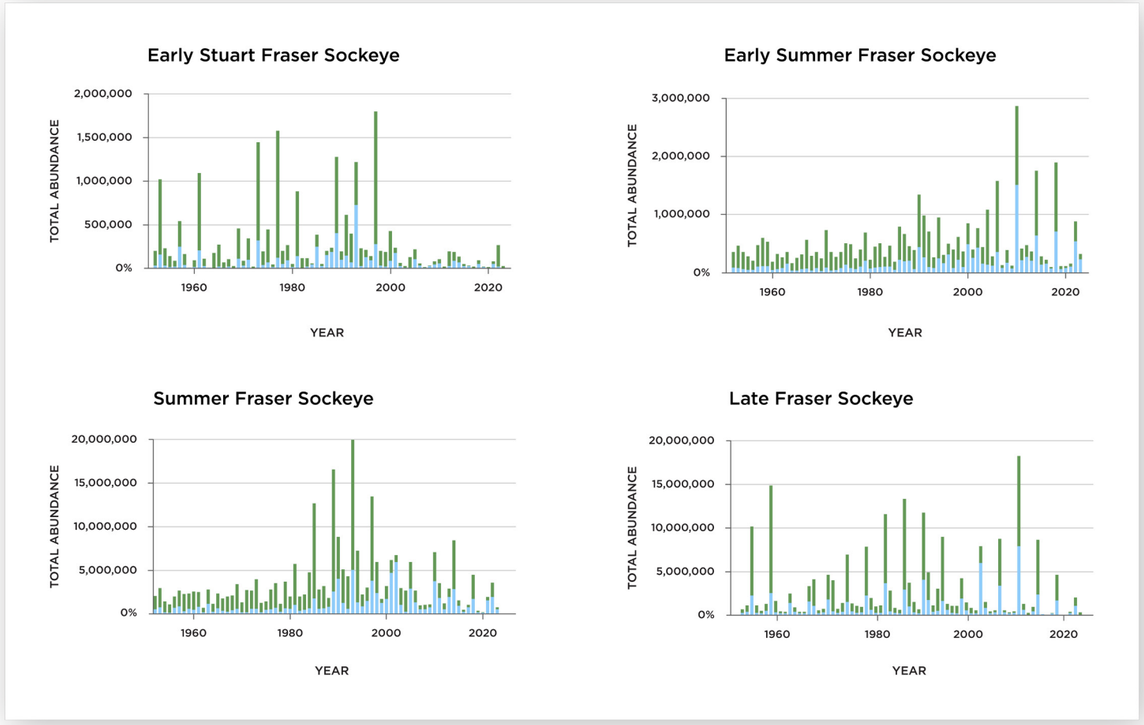
Before 1914, Fraser Sockeye were very abundant and the total abundance followed a strong four-year cycle. In most years, around 5 million sockeye came back to spawn, but every four years that number jumped to an average of 30 million fish (Pacific Salmon Commission 2025a). These large returns occurred on the 1901 cycle line, which was the dominant cycle of three important sockeye CUs: Takla-Trembleur EStu, Takla-Trembleur-Stuart S, and Quesnel S. Harvests were also very high during this time, reaching a peak of 32 million fish caught in 1913 (Pacific Salmon Commission 2025a).

In 1914, a major landslide was triggered by railway construction at Hell's Gate, a narrow section of the Fraser River. The landslide almost completely blocked sockeye from migrating to upstream spawning locations and caused a severe population collapse. As a result, the dominant 1901 cycle line was lost, and average returns dropped to about 2.5 million sockeye per year.

After 1929, sockeye numbers began to slowly recover. A new dominant cycle line emerged in 1930, driven by Shuswap Lake populations – the Shuswap ES and Shuswap L CUs. Despite this, overall returns remained modest, averaging just 4.5 million fish annually through the 1970s. In the decades that followed, sockeye numbers gradually increased again, eventually reaching a peak of 24 million sockeye in 1993.

However, this recovery was short-lived. Returns began to decline again, and by 2009, the situation had become so severe that the Canadian Federal Government launched the Cohen Commission to investigate the causes. The Commission identified several major threats including climate change, degradation of habitat, and salmon farming. Surprisingly, in 2010, one year after the Commission began, 28 million sockeye returned to the Fraser River. This was the largest return since 1913, before the devastating 1914 landslide.

Since 2010, Fraser Sockeye abundances have remained low. Returns during non-dominant cycle years over the past decade – 2013 to 2023 - were particularly low, averaging 1.7 million. Since 2013, returns have fallen below 1 million sockeye on three occasions. Previously this had only occurred twice in 120 years of records (Pacific Salmon Commission 2025a).



Historical trends in Fraser Sockeye by Stock Management Unit. Lower bars (blue) show spawner abundances and upper bars (green) show total harvest in U.S. and Canadian fisheries. Harvest estimates also include run size adjustments, which account for Fraser Sockeye that died en-route to their spawning grounds and any biases in the estimates. Bars sum to total returns. Note that the Total Abundance axes are not all on the same scale. Data are shown for illustration purposes only and are not the same quality-controlled data sets used for WSP status assessments. Data were provided by the Pacific Salmon Commission (Pacific Salmon Commission 2025).

Eagle River Sockeye. Photo credit: Shane Kalyn, 4 Element Photos.

Recent status trends

All 22 Fraser Sockeye CUs that are not *data deficient* are in fair or poor biological condition. No CUs are in good status.

Around 30% of Fraser Sockeye CUs were consistently in poor status over the past decade – since 2013. This includes Takla-Trembleur EStu, Bowron ES, Quesnel S, Seton L, Cultus L, and Widgeon river-type sockeye. Taseko ES was in poor status up to 2018 but has since been data deficient due to logistical issues in 2019 that created a gap in the data. Though the current status of Taseko is data deficient, in the WSP status review process it was recommended that Taseko continue to be treated as Red status based on recent data and concern over the impacts of the 2024 Chilcotin landslide on this CU.

Another 17% declined into poor status during the last decade. Two of these CUs - Harrison U/S L and Chilliwack ES – were in fair status in 2013 and declined to poor status. The other two CUs - Harrison River and Harrison D/S L Sockeye – began the decade in good status and declined to poor status in just over ten years.

Harrison River Sockeye is one of only two river-type Fraser Sockeye CUs and has shown unique trends over the past twenty years compared to other Fraser sockeye.

Adams Sockeye. Photo by DFO

Between 2005 and 2014, abundances of Harrison River Sockeye dramatically increased. While the average number of spawners before this period was around 10,000, during these ten years abundances jumped to an average of 300,000 spawners. Since 2015, abundances have declined and are now around 50,000 annually.

All four of the CUs that declined into poor condition since 2013 are located in the lower Fraser region. Three additional CUs are located in the lower Fraser. Out of these three CUs, Cultus L and Widgeon River-type were consistently in poor condition between 2013 and 2023, while Pitt ES declined from good to fair condition.

Despite the poor status of many Fraser Sockeye CUs, this is an improvement from 2020, when 58% of Fraser Sockeye CUs were in poor status. Since 2020, four CUs have improved to fair status - Lillooet-Harrison L, Nahatlatch ES, Kamloops ES, and North Barriere ES Sockeye. These CUs should be monitored due to their very recent improvements.

One additional CU, Nadina-Francois ES, improved from poor to fair status between 2013 and 2023.

The remaining CUs were primarily in fair status or declined from good to fair condition between 2013 and 2023, including several of the largest contributors to total annual Fraser Sockeye abundances: Chilko S, Shuswap L, Shuswap ES, Pitt ES, Takla-Trembleur-Stuart S, and Francois-Fraser S.

The predominant trend of declining and/or poor condition of Fraser Sockeye CUs is consistent with other sockeye populations. Many sockeye populations throughout their range in the Northeast Pacific have exhibited long-term declines, with the notable exception of Bristol Bay Sockeye in Alaska (NPAFC 2023)

Fraser Sockeye statuses between 2013 and 2023. Boxes show WSP statuses (R: red; A: amber; G: green, data deficient: blue-grey) for each CU, arranged into the four Fraser Sockeye Stock Management Units.

Extirpated Conservation Units

Seven additional Fraser Sockeye CUs are considered extirpated. While the specific causes of extirpation vary, localized damming was a primary driver for five of these CUs.

- **Adams ES and Momich ES**: Extirpated following splash damming on the lower Adams River (1908-1921) compounded by the Hell's Gate landslide (Roos 1991). New sockeye populations exist in both systems but are not presently recognized as CUs.
- **Alouette ES and Coquitlam ES**: Extirpated by hydroelectric dam construction at the outlets of Alouette and Coquitlam Lakes. Since the 2000's, juvenile sockeye have migrated downstream via spillway releases and returned as adults (Godbout et al. 2011). However, these populations are currently not self-sustaining – returning adults must be trapped and trucked upstream past the reservoir in order to complete their life cycle and reproduce. The new populations are not currently considered CUs though more work is required here.
- **North Barriere ES**: The original CU was lost due to damming on the lower Barriere River (1914-1952). A new, self-sustaining population was established through hatchery transplants and is considered a current CU (de novo).
- **Seton S**: Extirpated through the combination of poor hatchery practices in the early 20th century, the Hell's Gate landslide, and water diversion from the Bridge River into Seton Lake.
- **Fraser ES**: Last observed in 1991 despite repeated surveys. Information is limited, but the CU is considered very likely extinct.

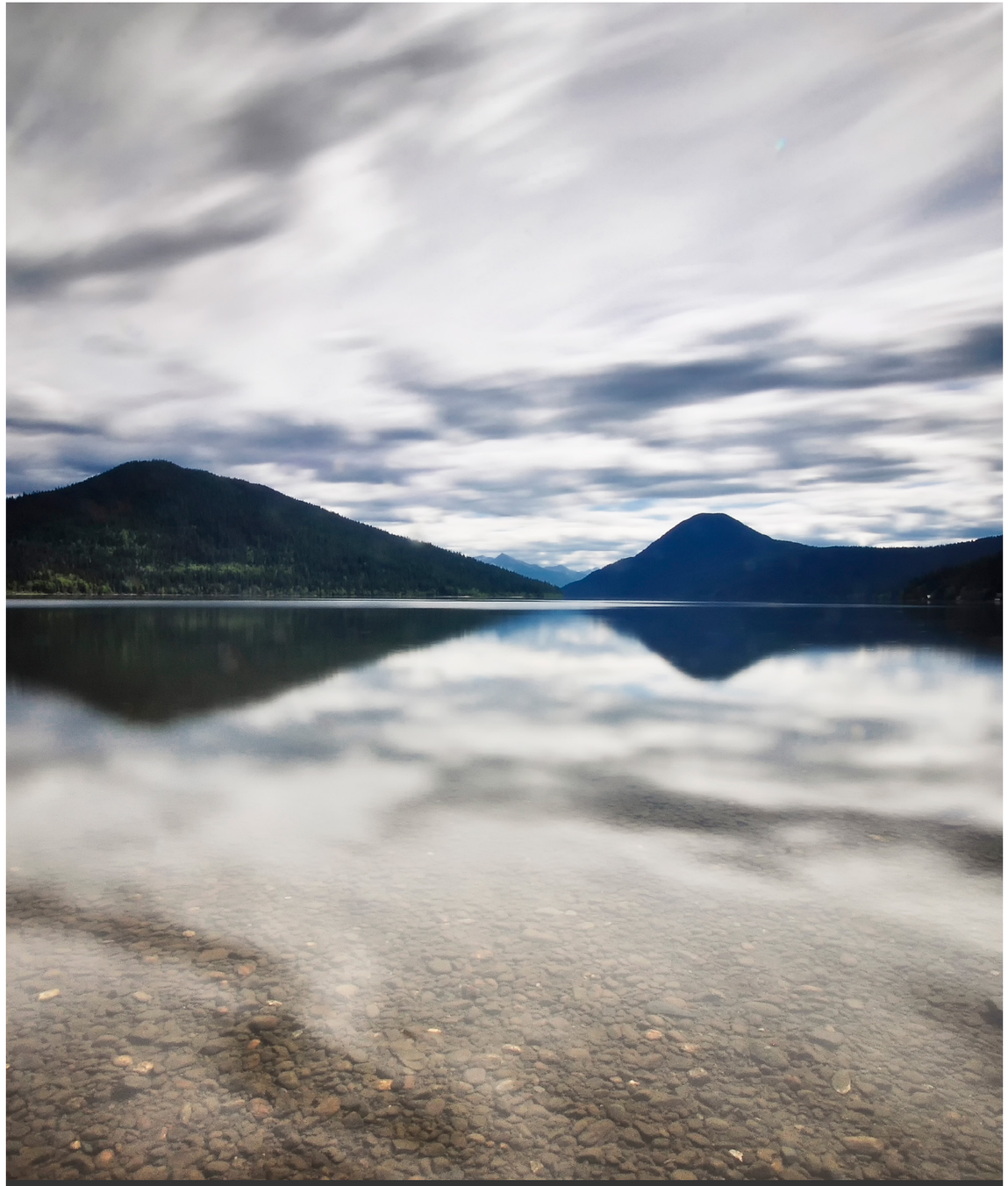
Enhancement

Almost all enhancement of Fraser Sockeye is through spawning channels, created to improve survival to the fry life-stage, while increasing available spawning habitat (Stephen et al. 2011). These are located at Weaver Creek, Nadina River, Horsefly River, and Gates Creek. Horsefly Channel and Gates Channel were last operated in 2015 and 2019, respectively. Weaver Channel has historically been the largest sockeye producing channel by far (Stephen et al. 2011), though in the past generation production has been dominated by Nadina Channel.

Until recently, approximately 3% of enhanced Fraser sockeye were produced in hatcheries, which supplement sockeye from the Upper Pitt River and Cultus Lake (Stephen et al. 2011). Recently, small numbers of Early Stuart Sockeye have been enhanced at the Takla and Nak'azdli facilities in the upper Fraser, and Taseko and Bowron Sockeye at the Shuswap Falls facility.

Data

Data used to assess Fraser Sockeye WSP statuses were updated from data sets used in the 2013 and 2017 WSP integrated status assessments (Grant et al. 2011; Grant and Pestal 2013; Grant et al. 2020). Data were provided by DFO Fraser Interior Area Stock Assessment. See Appendix A for additional details.



Bowron Lake. Photo credit: Shane Kalyn, 4 Element Photos.

Fraser Coho

Fraser Coho are divided into two groups:

- Lower Fraser Coho spawn below Hell's Gate, B.C. There are two CUs in this area. Lower Fraser Coho spawn in the tributaries of the lower Fraser River, including most of the creeks that flow into Harrison Lake. Lillooet Coho spawn in the Lillooet River and its tributaries.
- Interior Fraser Coho spawn above Hell's Gate, B.C. in the interior of the Fraser watershed. There are five Interior Fraser Coho CUs: Fraser Canyon, Middle Fraser, Lower Thompson, North Thompson, and South Thompson.

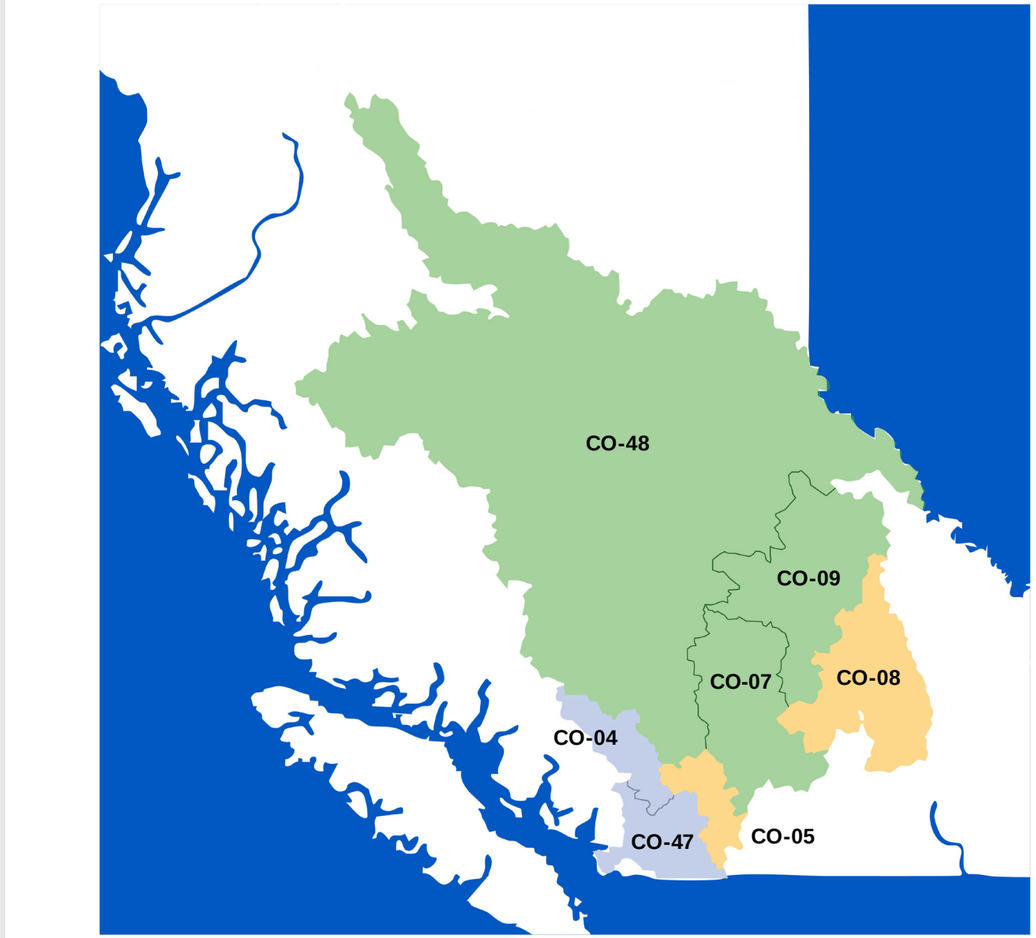
Coho CUs in the Lower Fraser River have not been assessed for status due to data limitations (see Appendix A for details). In this report we focus solely on the Interior Fraser Coho CUs.

Interior Fraser Coho (IFC) once supported large fisheries in southern B.C., including significant recreational fisheries in the Salish Sea. Between 1984 and 1997, around 66% of returning IFC were harvested annually. However, beginning in 1998, fishing was severely curtailed due to rapidly declining coho abundances, and harvest rates were reduced to below 13% (DFO 2019b). Caps on harvest rates are now determined annually based on the status of IFC. IFC is incidentally caught in both U.S. and Canadian fisheries.

IFC spawn late in the year, with spawning activity generally peaking in mid-November and often extending into January. Their spawning sites range from the Fraser Canyon to the upper Fraser as far north as the Nechako River, and east into the Thompson River watershed (DFO 2019b). After emerging from the spawning gravel, IFC spend one year rearing in fresh water before migrating downstream during the spring or early summer.

In the ocean, many IFC spend their first summer in the Strait of Georgia before moving into the coastal areas of the Northeast Pacific in fall. They remain at sea for a second summer before most IFC return in the fall as three-year-olds (DFO 2019b). Around 12% of IFC return as four-year-olds. These are fish that reared in freshwater for an additional year (Arbeider et al. 2020).

Hicks Creek Coho. Photo by Shane Kalyn, 4 Element Photos.



WSP statuses of Fraser Coho CUs in 2023. Fraser Coho consist of two fair (amber), three good (green), and two data deficient (blue-grey) CUs.

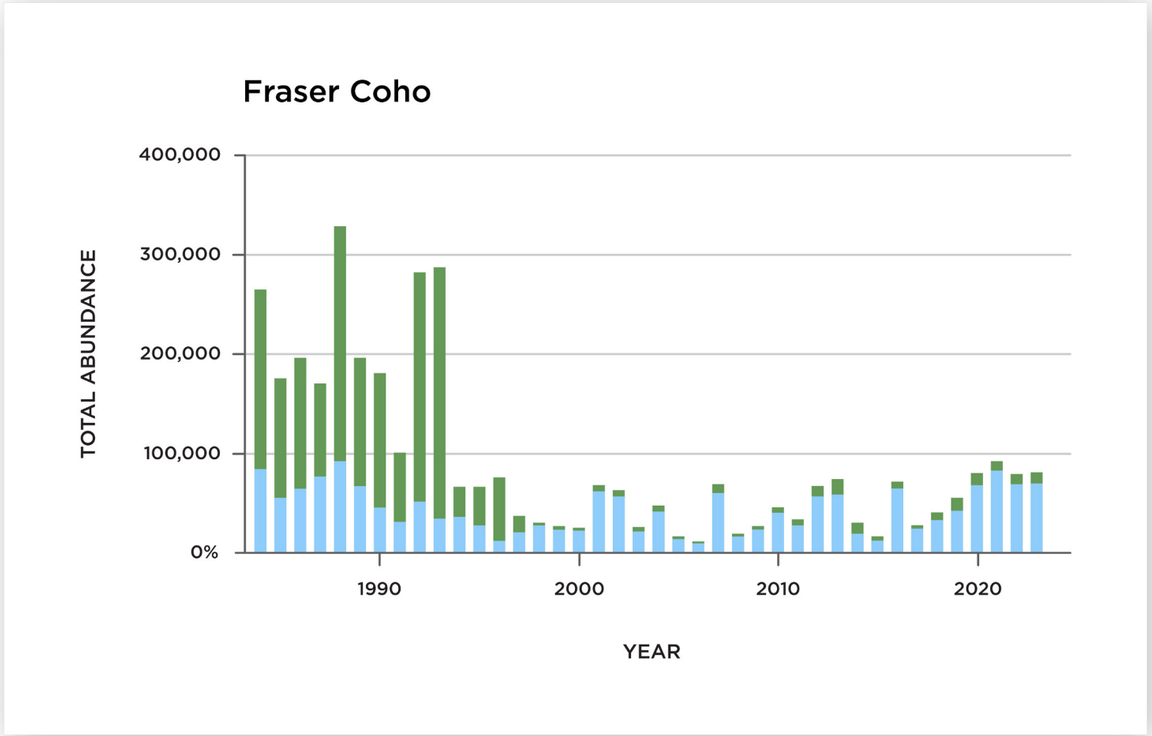
CU ID	CU Name
CO-04	Lillooet
CO-05	Fraser Canyon
CO-07	Lower Thompson
CO-08	South Thompson
CO-09	North Thompson
CO-47	Lower Fraser
CO-48	Middle Fraser

History of trends

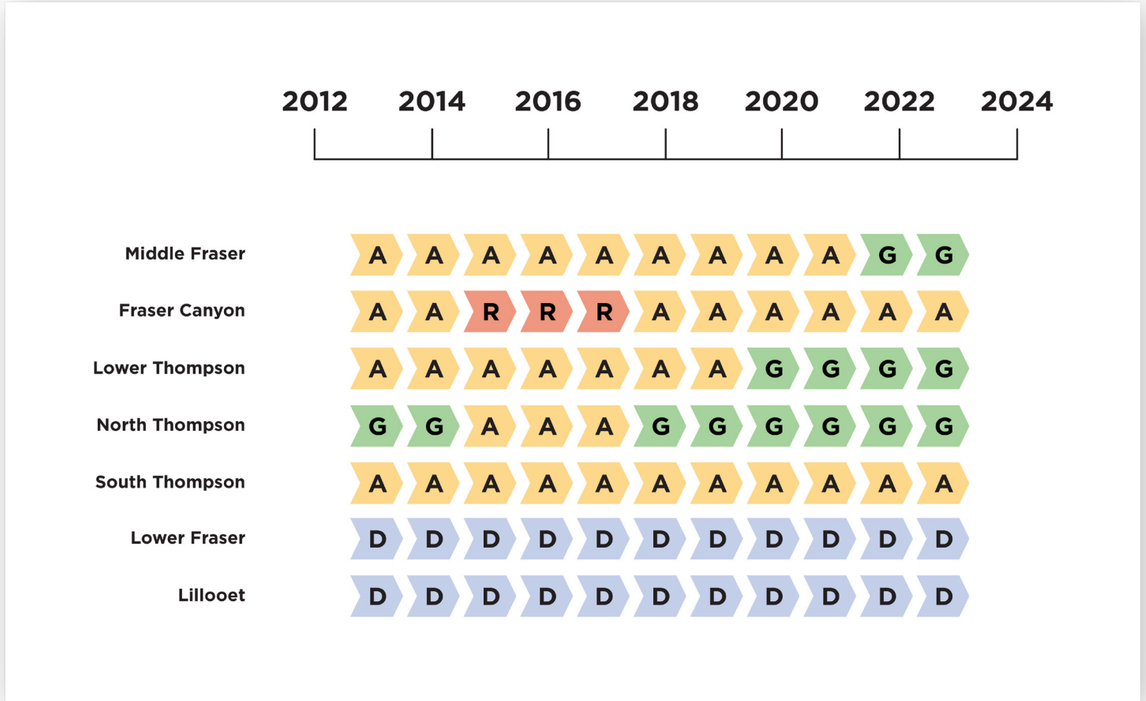
In the mid 1990's, total abundances of IFC (spawners and catches) declined by more than 60% (DFO 2019b, 2025a). The declines prompted severe harvest reductions, beginning in 1998. Fishing constraints reduced harvest rates from an average of 66% prior to 1998 (average from 1986 to 1997) to roughly 10% after 1998 (average from 1998 to 2011) (Decker and Irvine 2013).

In 2002, COSEWIC assessed IFC as *Endangered*, stating that the declines in IFC were due to overexploitation, and changes in both freshwater and marine habitats (COSEWIC 2002).

IFC briefly recovered after fishing constraints were implemented, with spawner numbers increasing in the early-2000s (COSEWIC 2016). However, IFC again steeply declined during the mid-2000s before reversing and slowly recovering over the next 15 years (DFO 2019b, 2025a). Despite the recovery in spawners, total abundances of IFC (spawners plus catches) remain low relative to historical levels prior their decline in the mid 1990's (DFO 2019b, 2025a).



Historical trends in Interior Fraser Coho. This figure does not include Lower Fraser Coho or Lillooet Coho. Lower bars (blue) show total spawner abundances (wild & hatchery) and upper bars (green) show harvest, summing to total returns. Harvest estimates also include coho that died en-route to the spawning grounds (at counting fences), and removals for purposes other than harvest, such as for hatcheries or educational programs. Data are shown for illustration purposes only and are not the same quality-controlled data sets used for WSP status assessments. Data were provided by DFO Fraser Interior Area Stock Assessment.



Fraser Coho statuses between 2013 and 2023. Boxes show WSP statuses (R: red; A: amber; G: green, data deficient: blue-grey) for each year assessed.

Recent status trends

Interior Fraser Coho are doing well in terms of spawner abundances. More than half of the five IFC CUs are in good biological status, while the remaining two CUs are in fair condition.

Since 2013, IFC CUs have either improved in status, or they have mainly been in fair or good condition.

Between 2013 and 2015, all five IFC CUs declined in abundances. However, the declines only affected the statuses of North Thompson and Fraser Canyon Coho. Statuses of these two CUs declined for three years between 2015 and 2018 before rebounding. Since 2018, North Thompson Coho have remained in good status, while Fraser Canyon Coho have remained in *fair* status.

Lower Thompson and Middle Fraser Coho were both in *fair* condition in 2013 and improved into good status within the last few years. South Thompson Coho were consistently in fair condition throughout last the decade.

During the WSP status review process in early 2025, Fraser Coho experts raised concerns related to the freshwater habitats of Fraser Canyon and Middle Fraser Coho. In 2022, a large forest fire burned through habitats used by Fraser Canyon Coho. This was followed by a significant rain event in 2023, which created debris flows in the area. Though the debris flows were thought to have not affected fish passage, experts remain concerned over the impacts of these events.

Regarding Middle Fraser Coho, there are concerns over the impacts of the recent Chilcotin landslide on local coho populations. Habitat conditions (water flows, turbidity, etc.) are being closely monitored to identify any ongoing effects that could influence future CU status.

Enhancement

Interior Fraser Coho have been enhanced since the late 1970s. Today, small-scale enhancement projects target conservation of at-risk populations (e.g. Bessette Creek), rebuilding populations (e.g. Spius), or providing information for assessments (e.g. Coldwater River) (IFCRT 2006). Supplementation has declined since the early 2000's. Since 2005, hatchery-origin spawners have made up on average only about 7% of the total spawners, compared to about 16% during the 15 years prior to 2005 (Decker and Irvine 2013). Nearly all of the hatchery-origin Interior Fraser Coho spawn naturally (Decker and Irvine 2013), with a few collected for hatchery brood stock programs. Hatchery-origin spawners are removed from the data set used in this report.

Data

Data used to assess the statuses of Interior Fraser Coho were updated from data used to develop and evaluate the WSP rapid status methodology (Pestal et al. 2023; DFO 2024a), and used in the 2020 IFC Recovery Potential Assessment (Arbeider et al. 2020), and previous WSP and COSEWIC status assessments (DFO 2015; COSEWIC 2016). Updated data were provided by DFO Fraser Interior Area Stock Assessment. See Appendix 5 in Arbeider et al. (2020) and DFO (2025a) for details.

Lower Fraser Coho and Lillooet Coho are considered data deficient and were not assessed. See Appendix A for additional details.

Peach Creek Coho. Photo by Shane Kalyn, 4 Element Photos.

Fraser Pink

The Fraser River hosts the largest population of pink salmon in B.C. Though commercial demand for Fraser Pink salmon has fluctuated over the past 100 years, Fraser Pink have been important for fisheries (DFO 1995), supporting commercial, recreation and Indigenous harvests in both Canada and the U.S. Between 1959 and 1997, around 64% of returning Fraser Pinks were harvested annually (Grant et al. 2014).

Since the late 1990s, harvests of Fraser Pink have declined. This is due to fishery restrictions imposed to protect species that migrate through the lower Fraser River and approach areas at the same time as pinks. High fuel costs and the low economic value of pink salmon have also contributed to the decline in harvests (Grant et al. 2014). Since 2015, less than 10% of the annual Fraser Pink return has been harvested despite allowable catches being much higher (Pacific Salmon Commission 2025b).

All pink salmon return as two-year-old fish. This has created two distinct groups of Fraser Pinks, one that spawns in odd years, and another that spawns in even years. These groups do not interbreed.

Pink Salmon. Photo credit: Shane Kalyn. 4 Element Photos.

South Thompson River.
Photo credit: Shane Kalyn, 4 Element Photos.

Almost all pink salmon in the Fraser River spawn in odd-years. These fish form the sole Fraser Pink CU. The number of pinks that return to the Fraser in even years is so small that they are not considered to be a CU.

Most Fraser Pinks – around 70% - spawn in the lower Fraser watershed, from the Fraser Canyon downstream (Grant and Pestal 2009a). In this area, the largest populations spawn in the Harrison River, Vedder-Chilliwack River, and the Fraser mainstem. Upstream of the Fraser Canyon, large populations of pink are found in the Seton-Anderson watershed, the Thompson River and the upper Fraser mainstem.

Pink salmon emerge from the spawning gravel in the early-spring and immediately migrate downstream. They enter into the Strait of Georgia where some remain and feed until mid-summer, before heading to offshore waters and the Gulf of Alaska (DFO 1995). Fraser Pinks spend one year in the ocean then return to the Fraser River in the late summer to spawn.

WSP status of the Fraser Pink CU in 2023. Fraser Pink consist of one CU in good (green) condition.

CU ID	CU Name
PKO-01	Fraser Pink

History of trends

Historically, the Fraser River watershed supported enormous numbers of pink salmon. Prior to the 1914 Hell's Gate landslide, on average, 48 million pink salmon returned to the Fraser River in odd years (Ricker 1989). During this time prior to 1914, most pinks - around 77% - spawned upstream of Hell's Gate, in the Thompson River system (Ricker 1989).

However, the Hell's Gate landslide had a massive impact on Fraser Pinks. The landslide partially dammed the Fraser River, and created a section of fast moving, turbulent flow. While other salmon species, like coho and Chinook, were able to migrate through these waters to the areas above the landslide (Roos 1991), pink salmon cannot make it past such barriers (Grant and Pestal 2009a).

Fraser Pinks were largely blocked from migrating upstream of Hell's Gate for over 30 years (Roos 1991). During this time, pinks were only occasionally observed in the upstream watersheds (Ricker 1989; Roos 1991). In 1947, fishways were opened at Hell's Gate, allowing pinks to pass upstream and naturally re-establish populations above the slide (Pess et al. 2012). However, those upstream populations have not recovered to the point of dominating the total abundance of Fraser Pinks, like they did before the landslide (Pess et al. 2012).

During the late 1970s and early 1980s, total Fraser Pink abundances improved, despite large numbers of these fish being harvested in fisheries (Ricker 1989; Grant et al. 2014). This improvement was potentially due to a shift in environmental conditions towards those that are favorable to pink salmon (Pess et al. 2012).

In the 1990s, Fraser Pink abundances declined from a peak of 13 million spawners in 1991. However, after harvest rates were reduced in 1999 they rebounded, reaching over 22 million spawners in 2003 (Grant et al. 2014). For the past 15 years – between 2009 and 2023 – roughly 9 million pinks on average have spawned in the Fraser in odd years.

Recent status trends

Fraser Pink salmon abundances are in good status.

Fraser Pinks were in good status throughout much of the last decade. During this time, Fraser Pinks declined into *fair* status for only one year, 2017, when spawner numbers reached a recent low of around 3 million before quickly rebounding.

The recent status of Fraser Pinks is consistent with other odd-year pink salmon populations in B.C. Odd-year pinks have generally been stable or have improved in abundances, and have largely been doing better than other Pacific salmon species (Irvine et al. 2014; NPAFC 2023).

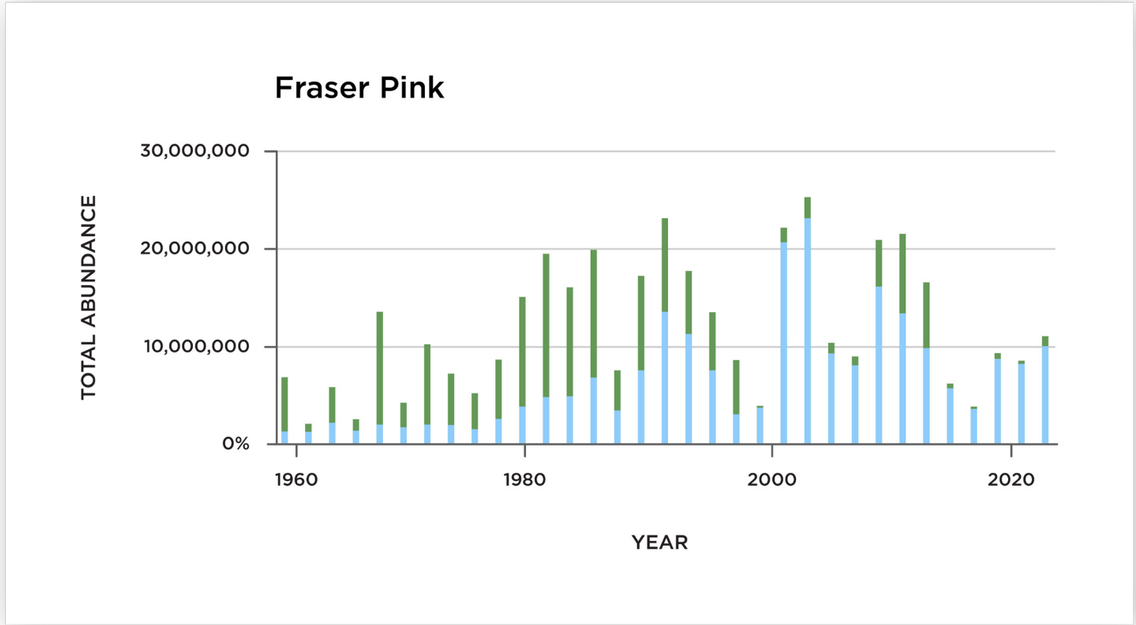
Enhancement

Enhancement contributes less than 5% of Fraser Pink returns (Grant and Pestal 2009a). Since Fraser Pink salmon are not associated with conservation concerns, enhancement is focused on supplementation (Grant and Pestal 2009a). Prior to 1977, most supplementation of pink salmon was through incidental stocking in the Seton, Jones, and Weaver spawning channels (Glaser et al. 2025). Since then, pinks have been enhanced through hatcheries as well, though releases have declined since the late 2000's (Glaser et al. 2025).

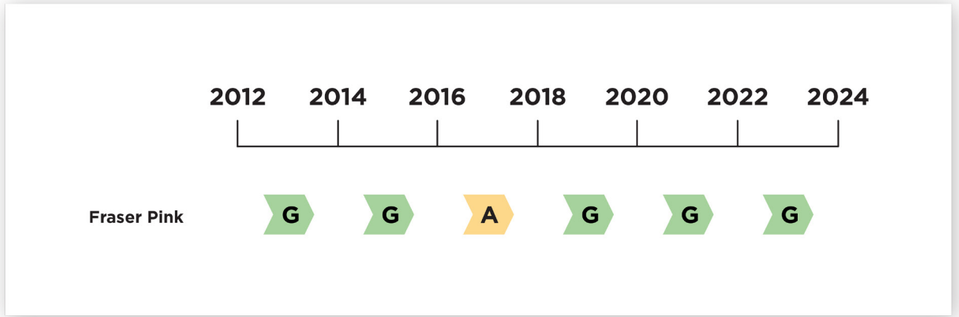
Data

Fraser Pink data were provided by the Pacific Salmon Commission (PSC) and Glaser et al. (2025). Methods used to estimate Fraser Pink abundances have changed multiple times since 1959 with no calibration across methods. Estimation methods are well documented in Grant et al. (2014). Spawner estimates of Fraser Pink are available at the tributary scale up to 1991. Since 1993, a single estimate has been generated for the entire Fraser system.

As a result, it is difficult to detect potential shifts in spawner distributions or assess how individual populations are performing within this large CU. See Appendix A for additional details.



Historical trends in Fraser Pink. Lower bars (blue) show spawner abundances and upper bars (green) show harvest in Canadian and U.S. fisheries, summing to total return. Spawner estimates were generated using several different methods between 1959 and 2023 and have not been calibrated across years (see section Fraser Pink-Data). Data were provided by the Pacific Salmon Commission.



Fraser Pink statuses between 2013 and 2023. Boxes show WSP statuses (R: red; A: amber; G: green, data deficient: blue-grey) for each year assessed. Statuses are available in odd-years only due to the unique life history of Fraser Pinks.

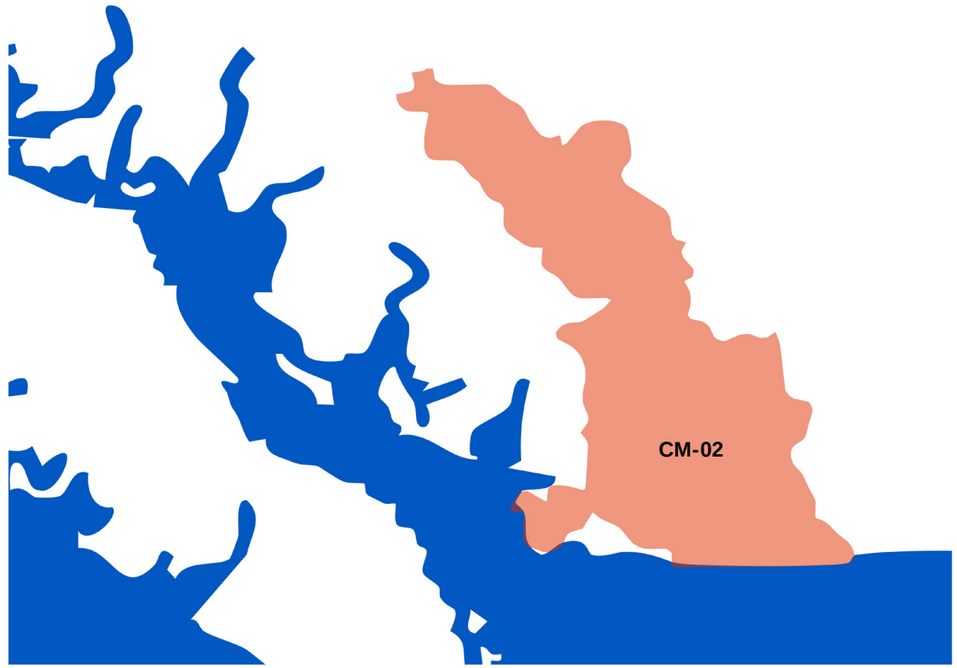
Fraser Chum

The Fraser River supports one confirmed CU of chum salmon: Lower Fraser Chum (see Appendix A for details). These chum spawn in over 100 streams, mainly in the lower Fraser River. Unlike other species of salmon, chum do not 'leap' over obstacles, which limits their access to spawning locations (Salo 1991; Grant et al. 2007). Ten river systems produce about 90% of all Fraser Chum, with the Harrison River, Chilliwack-Vedder River, and the Stave River being the most abundant (DFO 1996).

Fraser Chum are harvested in commercial, recreational, and Indigenous fisheries. They are culturally significant to many First Nations in the lower Fraser, who harvest chum during the fall for food, social and ceremonial purposes (DFO 2024c). When Fraser Chum returns are strong, they are harvested in commercial fisheries in Johnstone Strait, Straight of Georgia, Juan de Fuca Strait, Puget Sound, and the Fraser River (DFO 2024c). Although in-river recreational fishing for Fraser Chum became more popular in the 1990s (DFO 1996), low returns have led to more recent restrictions on this fishery (DFO 2024c).

Fraser Chum migrate downstream shortly after emerging from the spawning gravel in early spring. They spend several weeks in the Fraser River estuary, and up to six months in the Strait of Georgia, prior to migrating north through Johnstone Strait into the Northeast Pacific (Grant and Pestal 2009b). After three years in the ocean, most Fraser Chum return to the Fraser River as four year olds, entering the river between late September and December (DFO 1996; Grant and Pestal 2009b).

Photo credit: Shane Kalyn, 4 Element Photos.



WSP status of Fraser Chum in 2023. Fraser Chum consist of one CU in poor (red) condition.

CU ID	CU Name
CM-02	Lower Fraser Chum

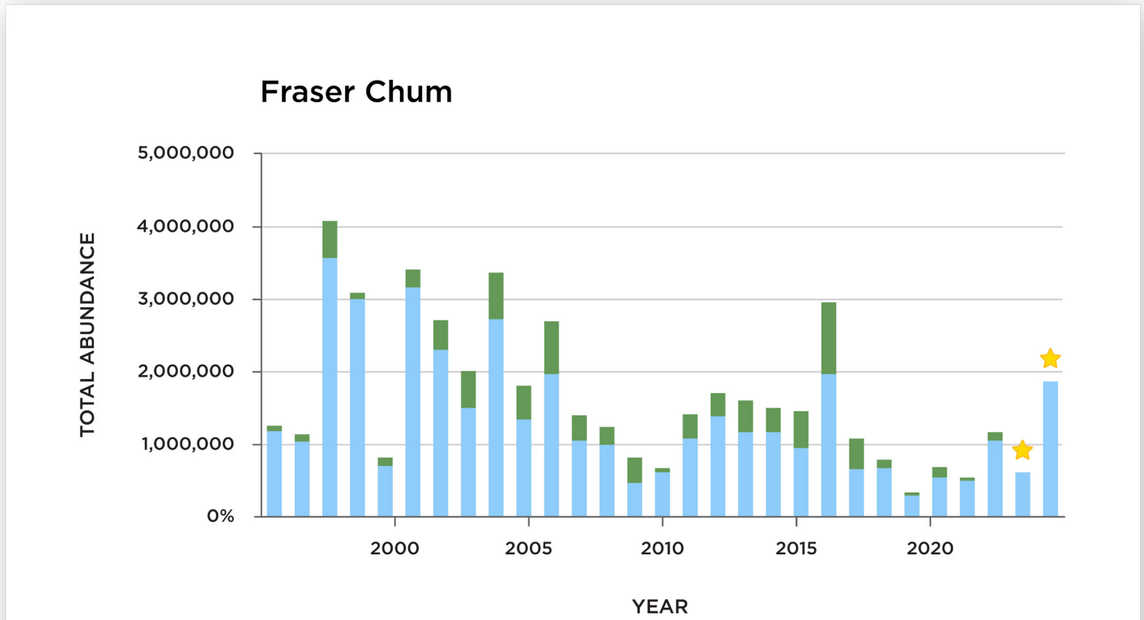
History of trends

Between the mid-1980s and the late 1990s, the number of annual Fraser Chum spawners tripled, increasing from an average of 370,000 during the 1980s, to 1.2 million during the 1990s (Grant and Pestal 2009b). This coincided with two changes that took place in the 1980's: a reduction in chum harvests; and, the onset of large-scale hatchery production of chum (Grant and Pestal 2009b). At the end of the 1990s into the early 2000s, spawner abundances were over 2 million chum in most years, and reached a peak of over 3.5 million in 1998 (Grant and Pestal 2009b).

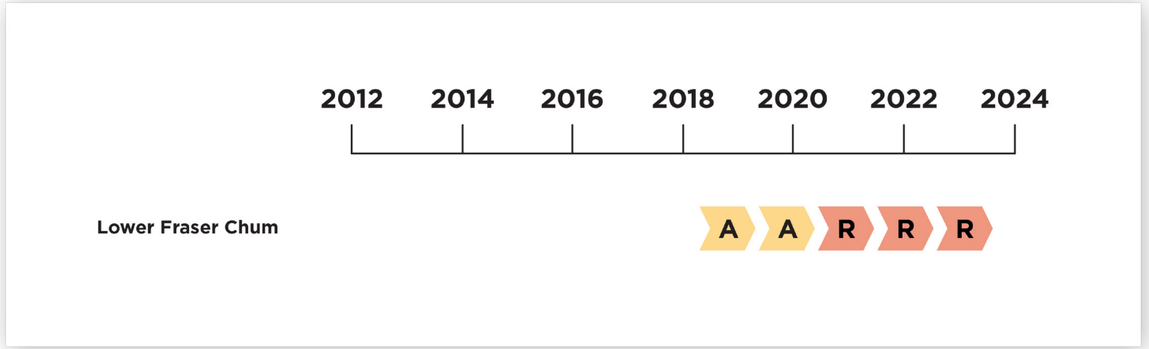
In the mid- to late-2000s, Fraser Chum abundances declined. Though the early 2010s saw some improvements, Fraser Chum abundances have been considered 'low' since 2017 (DFO 2024c). The recent low abundances of Fraser Chum are consistent with a coast-wide trend of low chum returns (DFO 2024c).

Recent status trends

Fraser Chum abundances are in poor condition. Since 2019, Fraser Chum have declined from *fair* to *poor* status. This decline is not unique amongst chum populations. Many Canadian chum populations have declined in the last decade.



Historical trends in Fraser Chum. Lower bars (blue) show spawner abundances (wild & hatchery) and upper bars (green) show harvest in Canadian and U.S. fisheries, summing to total returns. Harvest estimates for 2023 and 2024 are not yet available – indicated with yellow stars. Data are shown for illustration purposes only and are not the same quality-controlled data used for WSP status assessments. Data were provided by Fraser Interior Area Stock Assessment and the Pacific Salmon Commission Chum Technical Committee.



Fraser Chum statuses between 2013 and 2023. Boxes show WSP statuses (R: red; A: amber; G: green, data deficient: blue-grey) for each year assessed.

This includes other Inner South Coast Chum populations that spawn in streams surrounding Johnstone Strait and the Strait of Georgia (NPAFC 2023).

Fraser Chum status can only be assessed for the most recent five years, between 2019 and 2023, due to data deficiencies (see data section for details).

Enhancement

Fraser Chum have been enhanced since 1970. However, early enhancement was small in scale (DFO 1996; Labelle 2009). Starting in 1980, enhancement of chum was expanded, with the opening of two new hatcheries in the lower Fraser. Hatcheries significantly contributed to total Fraser Chum abundances starting in 1985 (DFO 1996; Labelle 2009). Between 1990 and 1993, enhancement contributed ~35% of returning Fraser Chum (DFO 1996).

After 1998, hatchery enhancement of chum was reduced due to the combination of large spawner abundances during this time, and reduced market demand for chum (Grant and Pestal 2009b).

Four major facilities produce chum on the Fraser River: Chehalis River Hatchery, Inch Creek Hatchery, Chilliwack River Hatchery, and the Weaver Creek spawning channel, which is targeted towards sockeye but is also used by chum (Grant and Pestal 2009b). Chum are also enhanced by local community groups carrying out small-scale enhancement projects in lower Fraser tributaries (Grant and Pestal 2009b).

Data

Fraser Chum data were provided by DFO Fraser Interior Area stock assessment. Data consist of spawner estimates for the Stave River and the Harrison River system, which includes Weaver Creek, Weaver spawning channel, Chehalis River, Chehalis hatchery, and Squawkum Creek. Wild fish cannot be separated out from total Lower Fraser Chum spawners; therefore, statuses are based on wild and enhanced fish combined. Data begin in 2002 to account for changes in hatchery production as of 1998. See Appendix A for additional details.

Chum. Photo credit: Shane Kalyn, 4 Element Photos.

Where Are We Going?

Fraser salmon will face greater challenges in the years ahead. The climate changes we are seeing today are only the beginning. British Columbia is expected to warm by 1.3°C to 1.9°C by 2031-2050[6], depending on how much global greenhouse gas emissions are reduced (Bush and Lemmen 2019). If the world takes only minimal action to restrict future emissions, B.C. could warm by over 5°C by 2100.

Many Fraser salmon populations are already struggling. Over the past ten years, Fraser Chum and many Fraser Sockeye CUs declined. Meanwhile, half of Fraser Chinook CUs are in poor condition. However, there are some positive signs - as of 2023, Fraser Pinks and several Interior Fraser Coho CUs are in good condition. Also, in 2023, the South Thompson Summer 0.3 Chinook CU had the largest return on record.

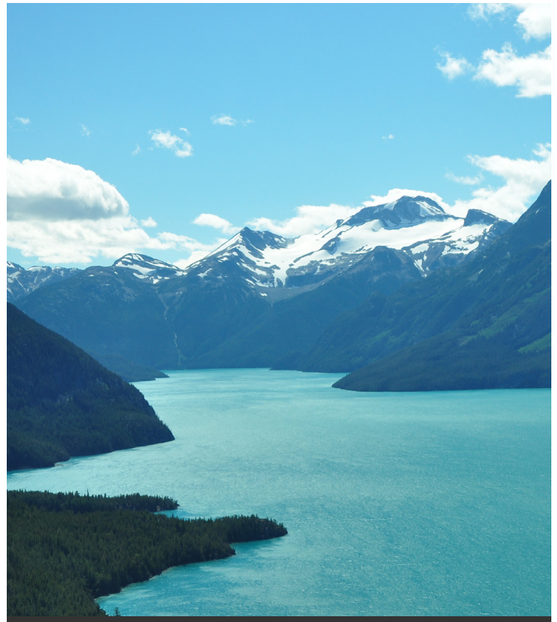
In the future, salmon populations will likely look different from what we know today, and what we may remember from the past. Fisheries scientists in the U.S. have studied how climate change may affect West Coast U.S. Pacific salmon populations (Crozier et al. 2019). They found that populations in the south and interior areas of the U.S. West Coast are more at-risk than those in the north and coastal regions (Crozier et al. 2019). At the species level, U.S. Chinook populations generally have the highest vulnerabilities, followed by coho and sockeye, while chum are less vulnerable, and the sole pink population is the least vulnerable (Crozier et al. 2019). Generally, salmon that spend more time in fresh water are more vulnerable. These patterns align with some of the broad observations made so far for Canadian Pacific salmon, though, of course, there are exceptions (Grant et al. 2019; NPAFC 2023).

Little River Chinook. Photo by DFO.

What can we do?

The future of Pacific salmon in Canada depends on adaptability in the face of change - in ecosystems, communities, and in how salmon are managed (MacDonald and Grant 2023). Monitoring salmon populations is a first, essential step. By tracking trends in salmon, we can make better decisions to support conservation and sustainable fisheries. This information helps guide fisheries management, hatchery supplementation, and discussions around habitat conservation and restoration.

Improving our understanding of how climate change will affect Canadian Pacific salmon is also essential, and relies on monitoring how salmon are responding to climate change and other stressors. DFO Science is currently in the process of assessing the climate change vulnerability of the five species of Pacific salmon in the Fraser River basin.



Chilko Lake. Photo by Shane Kalyn, 4 Element Photos.

Tributary to the Chilliwack River.
Photo credit: Shane Kalyn, 4 Element Photos.

It is also important to understand how people and communities are affected by climate change impacts on salmon. By considering where we are now and where we may be headed, we can develop realistic, forward-looking goals (Stein et al. 2014). Defining goals in light of this knowledge can help to identify ways in which we can adapt to the changes that are still to come. Some effects of climate change will be beyond our control – but we can choose how to prepare for them.

To start to think about this, we leave you with the following questions:

- What does resilience mean for salmon — and for us?
- What responsibilities do we share to ensure that salmon remain part of our future?
- What could our future relationship with salmon look like?

[6] Compared to the 1986-2005 average.

Data and code associated with this report are available at *https://doi.org/10.5281/zenodo.18498157*.

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Appendix A: WSP Rapid Status Assessment Approach & Assessment Details

The WSP Rapid Status Assessment Process

We follow a series of steps to assess WSP rapid statuses for each group of CUs. These steps are carried out together with CU experts, including DFO scientists, Indigenous partners, and sometimes researchers from universities and environmental organizations.

The steps are:

1. **Review the CU list**
2. **Prepare the data**
3. **Calculate metrics**
4. **Determine statuses**

In the sections that follow, we describe these four steps and explain how the steps were used to assess the status of Fraser River salmon CUs.

Step 1: Review the CU list

During CU list reviews, experts may recommend changes, such as merging or deleting CUs, or updating the sites within each CU, while ensuring alignment with CU delineation methods (Holtby and Ciruna 2007). Any revisions are further reviewed and approved through a formal DFO Science process (Wade et al. 2019).

The original Fraser River CU list was developed in 2007 (Holtby and Ciruna 2007) and has since been updated with new information (Wade et al. 2019). Changes have been made to Fraser Sockeye (Grant et al. 2011) and Chinook CUs (DFO 2013; Brown et al. 2019). One Fraser Chinook CU - Upper Adams SU 1.x (unknown age structure) - is currently not considered a valid CU by local experts, though a formal review (Wade et al. 2019) has not yet been completed.

Two Fraser Chum CUs were identified in the 2007 CU list: Lower Fraser Chum and Fraser Canyon Chum (Holtby and Ciruna 2007). Lower Fraser Chum is confirmed and assessed in this report, while genetic work is still underway to confirm whether Fraser Canyon Chum is a distinct CU (M. Townsend, DFO, pers. comm.).

Fraser Coho CUs and the Fraser Pink CU remain unchanged from the 2007 CU list.

Step 2: Prepare data

To assess WSP biological status, we need a composite time series of wild spawner abundances for each CU. Two steps are required develop this time series from raw spawning site data:

1. Selecting spawning sites. Ideally, data from all spawning sites within each CU would be used to generate the composite time series. In practice, this is not always possible because monitoring does not cover every site in every year, or the data quality of some sites is insufficient for analysis. To ensure reliability, only sites that meet minimum data standards are included in the composite time series—specifically those with sufficiently precise spawner abundance estimates over a specified timeframe (for example: see Appendix 5 in Arbeider et al. 2020).

Sometimes, sites must be combined or adjusted if site coverage or survey methods have changed over time. For example, if several sites are estimated as an aggregate in part of the time series, but are estimated independently for the remainder, the sites are combined to create a consistent time series.

2. Preparing the data. Once sites are selected, data may be prepared by removing hatchery fish if applicable, so only natural spawning salmon are included (Withler et al. 2018), or by filling small gaps in the records where information is missing, following established guidelines (Appendix 5 of Grant et al. 2011).

The data selection and preparation stage of WSP rapid status assessments is usually the most time-consuming. However, once the composite time series' have been established, they can be updated annually using computer code packages.

Data for Fraser Sockeye, Chinook, and Interior Fraser Coho were updated from those used to develop and test the WSP rapid status method (Pestal et al. 2023; DFO 2024a). These data sets were developed for previous WSP and COSEWIC status assessments (Grant et al. 2011, 2020; Grant and Pestal 2013; DFO 2015, 2016; COSEWIC 2016, 2017, 2018, 2020). Details on how the data were prepared and updated are provided for:

- Fraser Chinook: COSEWIC (2018), Brown et al. (2020), COSEWIC (2020), Doutaz et al. (2021), Weir et al. (2022b), and Dionne et al. (2023).
- Fraser Sockeye : Grant et al. (2011), and Grant et al. (2020);
- Interior Fraser Coho: Appendix 5 of Arbeider et al. (2020), and DFO (2025a).

More recent updates to the data preparation steps for CUs in each of these groups are documented in DFO State of the Salmon Program (2025). Further data updates have been applied to Cultus Sockeye. In this report, we assessed the status of Cultus Sockeye using total spawner data. Hatchery enhanced sockeye were not removed from total spawners, and age data and spawner success were not applied due to a lack of reliable estimates.

Coho CUs in the Lower Fraser River (Lower Fraser and Lillooet Coho) were not assessed for status and are considered data deficient. Spawning escapements for the Lower Fraser Coho CU have been assessed intermittently through visual surveys (Grant et al. 2007), but the data are not sufficiently consistent to conduct WSP status assessments. For the Lillooet Coho CU, surveys have been somewhat regular at one site – Birkenhead River, but the quality and length of this time series is also insufficient for WSP status assessments. Better quality estimates for both the Lower Fraser and Lillooet Coho CUs are currently being developed, but these data will only be for 2021 onwards, meaning that WSP status assessments will not be possible for these CUs for several years.

Fraser Pink data were provided by the Pacific Salmon Commission for 1959 to 2023. Data are described in Glaser et al. (2025).

Details on data preparation for Fraser Chum are outlined below.

Fraser Chum Data Preparation Methods

Fraser Chum data were provided by DFO Fraser Interior Area Stock Assessment experts (J. A. Tadey and M. Townsend). These experts also provided information on data suitability and appropriate data preparation methods.

The composite data for Fraser Chum consists of the two systems with the most reliable spawner estimates: the Harrison River and the Stave River. These two systems plus the Chilliwack-Vedder River support the most abundant Fraser Chum populations. The Chilliwack-Vedder River estimates are not included in the composite data set at this point because estimates prior to 2015 are not considered reliable. Estimates for the Harrison system are generated using mark-recapture methods and include the Harrison River, Squawkum Creek, Weaver Creek, and the Chehalis River.

Fraser Chum abundances are enhanced through hatchery production. Unfortunately, it is not possible to remove hatchery fish from the estimates available. We have truncated the Fraser Chum data to begin in 2002 to include only the time period after Fraser Chum enhancement was reduced (enhancement was reduced in 1998 and Fraser Chum generally live to 4 years old). No infilling has been performed on this data set.

Step 3: Calculate metrics

Up to four key WSP metrics are calculated for each CU to determine status: absolute abundance, relative abundance, long-term trend, and short-term trend a.k.a. percent change (Pestal et al. 2023; DFO 2024a). These metrics are summarized in Table A1 and described in detail in Pestal et al. (2023). Each metric is calculated only where it is appropriate for the CU (Table A2), based on the available data and expert judgement. For example, if the data available for a CU is a relative index that does not reflect the total number of fish, the absolute abundance metric cannot be calculated, with the exception of a few very specific cases. Experts also decide on metric settings, such as the average generation length, and options like log-transforming or smoothing data as part of the metric calculations (Tables A2 and A3).

To calculate the relative abundance metric, we require unique lower and upper benchmarks for each CU. These benchmarks are usually calculated using stock-recruitment models or habitat capacity models.

When stock-recruitment models are used, the lower benchmark has typically been set at S_{gen}, which represents the number of spawners needed for the CU to recover to S_{msy} in one generation without fishing. The upper benchmark is generally set at 80% or 85% (Chinook only) of S_{msy}, which is the number of spawners that produces the maximum sustainable yield (Holt 2009). Freshwater habitat capacity models may be used to generate estimates of S_{gen} and S_{msy}, as has been done for some Fraser Chinook CUs (Parken et al. 2006; Pestal et al. 2023). For CUs with limited data, percentile-based benchmarks can be used under specific conditions, but these were not applied in this assessment (Holt et al. 2018).

In a recent update, the lower relative abundance metric benchmarks of Chinook CUs in the Spring 1.2 Stock Management Group (CUs: South Thompson-Bessette Creek SU 1.2 and Lower Thompson SP 1.2) were calculated using 20% of carrying capacity (S_{max}) instead of S_{gen} (DFO State of the Salmon Program 2026). Juvenile lake rearing habitat capacity has also been used to derive relative abundance metric benchmarks for one Fraser Sockeye CU (Chilliwack-ES). These were set at 20% and 40% of S_{max} (Holt et al. 2009; Grant et al. 2011; DFO 2025b).

We calculated WSP metrics using the same settings that were applied in previous WSP status assessment processes for Fraser Sockeye (Grant et al. 2020) and Interior Fraser Coho (DFO 2015) (Table A2). Relative abundance benchmarks used for Fraser Sockeye CUs are consistent with those used in Grant et al. (2020), while Interior Fraser Coho relative abundance benchmarks were recently updated (DFO 2025a) (Table A3).

For Fraser Chinook, WSP metric settings were updated in Pestal et al. (2023), and have since been further revised following a recent evaluation by DFO Fraser Interior Area Stock Assessment experts (Table A2). The relative abundance benchmarks for applicable Fraser Chinook CUs were also recently updated (DFO State of the Salmon Program 2026) and are provided in Table A3.

We worked with DFO Fraser Interior Areas Stock Assessment experts (M. Townsend and J.A. Tadey) to determine WSP metric settings for Fraser Chum and Fraser Pink. Originally, only trend-based metrics (long-term and short-term trend) were used for both chum and pink, based on the available data (Pestal et al. 2023). However, relative abundance metric benchmarks were calculated and applied to Fraser Pink in a recent status assessment (DFO 2025c; Glaser et al. 2025). Metric settings for Fraser Pink were therefore updated in this report to include the relative abundance metric (Table A2). Relative abundance metric benchmarks are not available for Fraser Chum.

Trend metrics (long and short-term trend) were calculated for both Fraser Chum and Fraser Pink using primarily the same settings as for non-cyclic Fraser Sockeye. The one difference is that the short-term trend metric for Fraser Pink was calculated using 10 years of data instead of three generations. This accounts for the very short generation time of pink salmon, 2 years, and the fact that pink only return every second year.

All metric settings and relative abundance benchmarks used in this report are provided in Tables A2 and A3. Once settings are established, WSP metrics are calculated automatically using the WSPMetrics R package, available on GitHub (*https://github.com/Pacific-salmon-assess/WSP-Metrics-Pkg*).

Step 4: Determine statuses

We use the WSP rapid status decision tree (Figure A1), in combination with iterative expert review, to determine statuses for each CU using the WSP metrics. The decision tree was developed from previous WSP status assessments for Fraser Sockeye, Interior Fraser Coho, and Southern B.C. Chinook (Pestal et al. 2023; DFO 2024a). The decision tree asks a series of Yes/No questions that identify which WSP metrics are available, and compares available metric values to thresholds. The thresholds and order of decisions were derived from past WSP status assessments and reflect how Pacific salmon experts interpreted the metrics and used them in combination with each other to determine CU statuses.

The decision tree path taken for each annual CU assessment depends on which metrics are available, and the values of those metrics in comparison to the thresholds. Each path leads to a status and a confidence rating (low, medium, or high) for that status. Confidence ratings are associated with the metrics used to assign each status. Statuses determined using the absolute and/or relative abundance metrics are assigned higher confidence than those determined using only trends in abundance (short- or long-term) (Pestal et al. 2023).

The WSP rapid statuses presented in this report were reviewed by CU experts through iterative processes. Experts evaluated results from the decision tree and either approved statuses or adjusted metric settings as appropriate. Comments and concerns raised by CU experts during these reviews were documented in status narratives (DFO State of the Salmon Program 2026), and in some cases are highlighted in this report. This includes additional context like trends in demographic traits (example: sex ratios, spawner success, and body side), where they are not incorporated into spawner abundances, as well as concerns over environmental conditions, and changes in productivity and/or spawner distributions.

Decision Tree Details

The first step in the WSP rapid status decision tree sorts CUs into one of three branches based on the absolute abundance metric, which measures the absolute abundance averaged over the most recent generation.

- CUs with fewer than 1,500 spawners are considered very small, and are assigned a Red status due to a high risk of extinction.
- CUs with 1,500 to 10,000 spawners are considered small to moderate. These CUs are further evaluated using either the relative abundance metric, where available, or the long-term trend metric. Statuses in this branch can be either Red or Amber, but not Green, because CUs with fewer than 10,000 spawners are inherently at risk from environmental variation and catastrophic events (National Research Council (US) 1995; McElhany et al. 2000).
- CUs with more than 10,000 spawners are considered large. CUs that cannot be assessed using the absolute abundance metric are also filtered down this branch. These CUs are further evaluated using either the relative abundance metric, where available, or trend metrics. Statuses in this branch can be Green, Amber, or Red. If there are not enough metrics to assign a status, the CU is considered Data Deficient.

Worked examples showing how the decision tree works are available at *https://github.com/SOLV-Code/WSP-Rapid-Status-WorkedExamples*.

Metric	Description	Decision Tree Thresholds	Additional Details
Absolute Abundance	Assesses the recent generation geometric average spawner abundance (not smoothed) against thresholds. Usually only used when absolute abundance data are available representing the total number of spawners in the CU.	Node 1: 1,500 spawners Node 2: 10,000 spawners	Thresholds align with COSEWIC criteria and are supported by conservation biology. Data must have no missing years in the most recent generation.
Relative Abundance	Assesses the recent generation geometric average spawner abundance (not smoothed) against relative abundance benchmarks estimated using stock-recruit relationships or freshwater habitat models. CU-specific benchmarks are provided by DFO Stock Assessment (see Table A2).	Nodes 9 & 11: relative abundance metric lower benchmark Node 18: relative abundance metric upper benchmark PLUS a 10% buffer	Lower benchmark: Sgen; or 20% Smax. Upper benchmark: 80% Smsy (85% Smsy for Southern BC Chinook), or 40% Smax. Data must have no missing years in the most recent generation. Cyclic Fraser Sockeye CUs are assessed using the most recent dominant cycle abundance instead of the recent average.
Long-term Trend	Compares the (geometric) average spawner abundance in the current generation to the long-term (geometric) average. Thresholds vary depending on the node in the decision tree and are applied in conjunction with other metrics.	Nodes 8 & 10: long-term trend < 79%. Node 32: long-term trend < 233%	Data must have no missing years in the most recent generation. The minimum number of years required to calculate this metric is set by CU experts, but generally is 15 years (see Table A2). Geometric average spawner abundances may or may not be smoothed (see Table A2).
Short-term Trend (percent change)	Estimates the linear change in total spawner abundances over the most recent three generations, or ten years for species with short generation lengths (i.e. Fraser Pink).	Node 16: short-term trend < 70% decline	Data used to calculate the slope must have no missing years. Short-term trend is calculated using log-transformed spawner abundances. Data may or may not also be smoothed (See Table A2).

Table A1. WSP metric descriptions and thresholds applied in the WSP rapid status decision tree. Metric thresholds are documented according to the node in the decision tree where they appear (see Figure A1).

	CU Details			Metric Applicability			
CU ID	CU Name	Stock Management Unit	Gen. Length	Absolute Abund.	Relative Abund.	Long-term Trend	Short-term Trend
CK-16	South Thompson-Bessette Creek SU-1.2	CK Fraser Spring 1.2	4	Yes	Yes	Yes	Yes
CK-17	Lower Thompson SP-1.2	CK Fraser Spring 1.2	4	Yes	Yes	Yes	Yes
CK-04	Lower Fraser River SP-1.3	CK Fraser Spring 1.3	5	No	No	Yes	Yes
CK-08	Middle Fraser-Fraser Canyon SP-1.3	CK Fraser Spring 1.3	5	Yes	Yes	Yes	Yes
CK-10	Middle Fraser River SP-1.3	CK Fraser Spring 1.3	5	No	No	Yes	Yes
CK-12	Upper Fraser River SP-1.3	CK Fraser Spring 1.3	5	No	No	Yes	Yes
CK-18	North Thompson SP-1.3	CK Fraser Spring 1.3	5	No	No	Yes	Yes
CK-07	Maria Slough SU-0.3	CK Fraser Summer 0.3	4	No	No	Yes	Yes
CK-13	South Thompson SU-0.3	CK Fraser Summer 0.3	4	No	No	Yes	Yes
CK-15	Shuswap River SU_0.3	CK Fraser Summer 0.3	4	Yes	Yes	Yes	Yes
CK-05	Lower Fraser River-Upper Pitt SU-1.3	CK Fraser Summer 1.3	5	No	No	Yes	Yes
CK-06	Lower Fraser River SU-1.3	CK Fraser Summer 1.3	5	No	No	Yes	Yes

Table A2. Metric applicability by CU. Yes/No responses were provided by CU experts to determine which WSP metrics are appropriate for each CU, based on the dataset available. Definitions: Gen Length = average generation length.

CU Details				Metric Applicability			
CU ID	CU Name	Stock Management Unit	Gen. Length	Absolute Abund.	Relative Abund.	Long-term Trend	Short-term Trend
CK-09	Middle Fraser River-Portage FA-1.3	CK Fraser Summer 1.3	5	Yes	Yes	Yes	Yes
CK-11	Middle Fraser River SU-1.3	CK Fraser Summer 1.3	5	No	No	Yes	Yes
CK-14	South Thompson SU-1.3	CK Fraser Summer 1.3	5	No	No	Yes	Yes
CK-19	North Thompson SU-1.3	CK Fraser Summer 1.3	5	No	No	Yes	Yes
CK-03	Lower Fraser River FA-0.3	CK Fraser Fall 0.3	4	Yes	Yes	Yes	Yes
CM-02	Lower Fraser Chum	CM Fraser	4	No	No	Yes	Yes
CO-48	Middle Fraser	CO Interior Fraser	3	Yes	Yes	Yes	Yes
CO-05	Fraser Canyon	CO Interior Fraser	3	Yes	Yes	Yes	Yes
CO-07	Lower Thompson	CO Interior Fraser	3	Yes	Yes	Yes	Yes
CO-09	North Thompson	CO Interior Fraser	3	Yes	Yes	Yes	Yes
CO-08	South Thompson	CO Interior Fraser	3	Yes	Yes	Yes	Yes

Table A2 cont'd. Metric applicability by CU.

CU Details				Metric Applicability			
CU ID	CU Name	Stock Management Unit	Gen. Length	Absolute Abund.	Relative Abund.	Long-term Trend	Short-term Trend
PKO-01	Fraser Pink	PK Fraser	1	No	Yes	Yes	Yes
SEL-06-14	Takla Trembleur-EStu	SK Fraser Early Stuart	4	Yes	Yes	Yes	Yes
SEL-07-01	Bowron-ES	SK Fraser Early Summer	4	Yes	Yes	Yes	Yes
SEL-05-02	Nahatlatch-ES	SK Fraser Early Summer	4	Yes	Yes	Yes	Yes
SEL-06-16	Taseko-ES	SK Fraser Early Summer	4	No	No	Yes	Yes
SEL-03-01	Chilliwack-ES	SK Fraser Early Summer	4	Yes	Yes	Yes	Yes
SEL-06-01	Anderson Seton-ES	SK Fraser Early Summer	4	Yes	Yes	Yes	Yes
SEL-09-02	Shuswap-ES	SK Fraser Early Summer	4	Yes	Yes	Yes	Yes
SEL-06-20	Nadina Francois-ES	SK Fraser Early Summer	4	Yes	Yes	Yes	Yes
SEL-10-03	North Barriere-ES	SK Fraser Early Summer	4	Yes	Yes	Yes	Yes
SEL-03-05	Pitt-ES	SK Fraser Early Summer	4	Yes	Yes	Yes	Yes
SER-02	Widgeon River Type	SK Fraser Summer	4	Yes	Yes	Yes	Yes

Table A2 cont'd. Metric applicability by CU.

CU Details			Metric Applicability				
CU ID	CU Name	Stock Management Unit	Gen. Length	Absolute Abund.	Relative Abund.	Long-term Trend	Short-term Trend
SEL-10-01	Kamloops-ES	SK Fraser Summer	4	Yes	Yes	Yes	Yes
SEL-06-13	Takla Trembleur Stuart-S	SK Fraser Summer	4	Yes	Yes	Yes	Yes
SEL-06-10	Quesnel-S	SK Fraser Summer	4	Yes	Yes	Yes	Yes
SEL-06-03	Chilko-S	SK Fraser Summer	4	Yes	Yes	Yes	Yes
SEL-06-07	Francois Fraser-S	SK Fraser Summer	4	Yes	Yes	Yes	Yes
SER-03	Harrison River Type	SK Fraser Summer	4	Yes	No	Yes	Yes
SEL-06-11	Seton-L	SK Fraser Late	4	Yes	Yes	Yes	Yes
SEL-03-04	Harrison (U/S)-L	SK Fraser Late	4	Yes	Yes	Yes	Yes
SEL-04-01	Lillooet Harrison-L	SK Fraser Late	4	Yes	Yes	Yes	Yes
SEL-03-03	Harrison (D/S)-L	SK Fraser Late	4	No	No	Yes	Yes
SEL-09-03	Shuswap-L	SK Fraser Late	4	Yes	Yes	Yes	Yes
SEL-03-02	Cultus-L	SK Fraser Late	4	Yes	Yes	Yes	Yes

Table A2 cont'd. Metric applicability by CU.

Short-term Trend Settings				Long-term Trend Settings		Relative Abundance Benchmarks	
CU ID	Number of generations	Extra years	Smoothed	Min. # of years	Smoothed	Lower Benchmark	Upper Benchmark
CK-16	3	0	No	15	No	77	103
CK-17	3	0	No	15	No	2,662	3,604
CK-04	3	0	No	15	No	NA	NA
CK-08	3	0	No	15	No	224	870
CK-10	3	0	No	15	No	NA	NA
CK-12	3	0	No	15	No	NA	NA
CK-18	3	0	No	15	No	NA	NA
CK-07	3	0	No	15	No	NA	NA
CK-13	3	0	No	15	No	NA	NA
CK-15	3	0	No	15	No	12,410	24,394
CK-05	3	0	No	15	No	NA	NA
CK-06	3	0	No	15	No	NA	NA

Table A3. Metric settings and relative abundance benchmarks. Short-term trend settings determine the number of generations of data used, if extra years of data are added, and if data are smoothed. Long-term trend settings include the minimum number of years required to calculate this metric, and if data are smoothed. Relative abundance benchmarks are provided by Fraser Interior Area Stock Assessment.

	Short-term Trend Settings			Long-term Trend Settings		Relative Abundance Benchmarks	
CU ID	Number of generations	Extra years	Smoothed	Min. # of years	Smoothed	Lower Benchmark	Upper Benchmark
CK-09	3	0	No	15	No	333	1,316
CK-11	3	0	No	15	No	NA	NA
CK-14	3	0	No	15	No	NA	NA
CK-19	3	0	No	15	No	NA	NA
CK-03	3	0	No	15	No	15,318	63,808
CM-02	3	0	Yes	15	Yes	NA	NA
CO-48	3	1	Yes	15	No	1,676	2,380
CO-05	3	1	Yes	15	No	327	1,099
CO-07	3	1	Yes	15	No	2,359	3,170
CO-09	3	1	Yes	15	No	2,692	4,975
CO-08	3	1	Yes	15	No	2,599	3,529

Table A3 cont'd. Metric settings and relative abundance benchmarks.

	Short-term Trend Settings			Long-term Trend Settings		Relative Abundance Benchmarks	
CU ID	Number of generations	Extra years	Smoothed	Min. # of years	Smoothed	Lower Benchmark	Upper Benchmark
PKO-01	10	0	Yes	10	Yes	1,700,000	4,600,000
SEL-06-14	3	0	Yes	15	Yes	96,682	376,174
SEL-07-01	3	0	Yes	15	Yes	5,047	18,580
SEL-05-02	3	0	Yes	15	Yes	NA	NA
SEL-06-16	3	0	Yes	15	Yes	NA	NA
SEL-03-01	3	0	Yes	15	Yes	8,000	16,000
SEL-06-01	3	0	Yes	15	Yes	3,662	22,534
SEL-09-02	3	0	Yes	15	Yes	36,380	141,746
SEL-06-20	3	0	Yes	15	Yes	21,694	68,273
SEL-10-03	3	0	Yes	15	Yes	640	5,097
SEL-03-05	3	0	Yes	15	Yes	6,240	20,333
SER-02	3	0	Yes	15	Yes	NA	NA

Table A3 cont'd. Metric settings and relative abundance benchmarks.

	Short-term Trend Settings			Long-term Trend Settings		Relative Abundance Benchmarks	
CU ID	Number of generations	Extra years	Smoothed	Min. # of years	Smoothed	Lower Benchmark	Upper Benchmark
SEL-10-01	3	0	Yes	15	Yes	4,958	17,838
SEL-06-13	3	0	Yes	15	Yes	112,600	622,626
SEL-06-10	3	0	Yes	15	Yes	180,491	1,337,891
SEL-06-03	3	0	Yes	15	Yes	72,471	379,321
SEL-06-07	3	0	Yes	15	Yes	24,256	122,612
SER-03	3	0	Yes	15	Yes	NA	NA
SEL-06-11	3	0	Yes	15	Yes	2,193	13,453
SEL-03-04	3	0	Yes	15	Yes	10,731	84,597
SEL-04-01	3	0	Yes	15	Yes	14,178	76,930
SEL-03-03	3	0	Yes	15	Yes	NA	NA
SEL-09-03	3	0	Yes	15	Yes	310,783	1,794,869
SEL-03-02	3	0	Yes	15	Yes	14,634	30,642

Table A3 cont'd. Metric settings and relative abundance benchmarks.

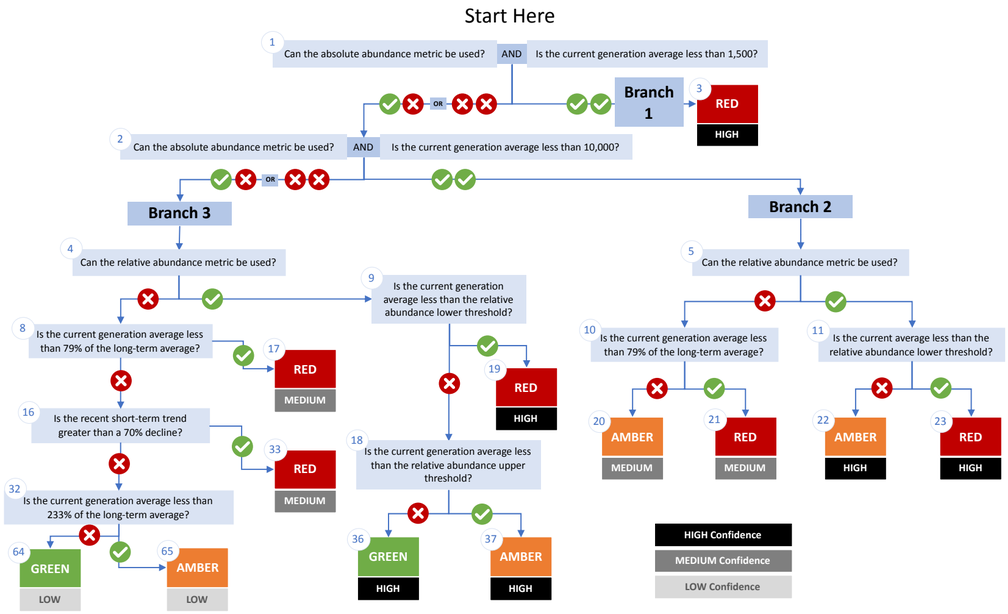

Figure A1. The WSP rapid status decision tree.

Appendix B: Key Documents On WSP Status Assessments

Canada's Wild Salmon Policy

DFO. 2005. *Canada's Policy for Conservation of Wild Pacific Salmon. Fisheries and Oceans Canada, Vancouver*, B.C., pp. vi+ 49.

Wild Salmon Policy Status Assessment Methods Papers

Holt, C.A., Cass, A., Holtby, B., and Riddell, B. 2009. *Indicators of status and benchmarks for Conservation Units in Canada's Wild Salmon Policy*. Can. Sci. Advis. Sec. Res. Doc. 2009/058: viii + 74.

Holt, C.A. 2009. *Evaluation of benchmarks for conservation units in Canada's Wild Salmon Policy: technical documentation*. Can. Sci. Advis. Sec. Res. Doc. 2009/059: x + 50.

Holt, C.A. 2012. *Identifying benchmarks and assessing status of CUs under the Wild Salmon Policy: converging on consistent methods. Summary of progress meeting*. Can. Tech. Rep. Fish. Aquat. Sci. **3019**: v + 23.

Holtby, B.L., and Ciruna, K.A. 2007. *Conservation units for Pacific salmon under the Wild Salmon Policy*. Can. Sci. Advis. Sec. Res. Doc. 2007/070: viii + 350 pp. Available from *http://www.dfo-mpo.gc.ca/csas-sccs/publications/resdocs-docrech/2007/2007_070-eng.htm*

Pestal, G., MacDonald, B.L., Grant, S.C.H., and Holt, C.A. 2023. *State of the Salmon: rapid status assessment approach for Pacific salmon under Canada's Wild Salmon Policy*. Can. Tech. Rep. Fish. Aquat. Sci. 3570: xiv + 200 p.

Wild Salmon Policy Status Assessments

DFO. 2013. *Review and update of southern BC Chinook Conservation Unit assignments*. DFO Can. Sci. Advis. Sec. Sci. Resp. **2013/022**: 25 pp.

DFO. 2015. Wild Salmon Policy status assessment for conservation units of Interior Fraser River coho (*Oncorhynchus kisutch*). Can. Sci. Advis. Sec. Sci. Advis. Rep. 2015/022: 12 pp. Available from *https://waves-vagues.dfo-mpo.gc.ca/Library/364851.pdf*

DFO. 2016. Integrated biological status of southern British Columbia Chinook salmon (*Oncorhynchus tshawytscha*) under the Wild Salmon Policy. Can. Sci. Advis. Sec. Sci. Advis. Rep. 2016/042: 15 pp. Available from *https://waves-vagues.dfo-mpo.gc.ca/Library/40595419.pdf*

Grant, S.C.H., MacDonald, B.L., Cone, T.E., Holt, C.A., Cass, A., Porszt, E.J., Hume, J.M.B., and Pon, L.B. 2011. Evaluation of uncertainty in Fraser sockeye (*Oncorhynchus nerka*) Wild Salmon Policy status using abundance and trends in abundance metrics. Can. Sci. Advis. Sec. Res. Doc. 2011/087: viii + 183 pp. Available from *https://science-catalogue.canada.ca/record=4054219~S6*

Grant, S.C.H., and Pestal, G. 2013. Integrated biological status assessments under the Wild Salmon Policy using standardized metrics and expert judgement: Fraser River sockeye salmon (*Oncorhynchus nerka*) case studies. Can. Sci. Advis. Sec. Res. Doc. 2012/106: v + 132 pp. Available from *https://waves-vagues.dfo-mpo.gc.ca/Library/349637.pdf*

Grant, S.C.H., Holt, C.A., Pestal, G., Davis, B.M., and MacDonald, B.L. 2020. The 2017 Fraser Sockeye salmon (*Oncorhynchus nerka*) integrated biological status re-assessments under the Wild Salmon Policy using standardized metrics and expert judgement. Can. Sci. Advis. Sec. Res. Doc. 2020/038: vii+ 211. Available from *https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/40924646.pdf*