REBUILDING PLAN

West Coast Vancouver Island Chinook Salmon

Oncorhynchus tshawytscha

This rebuilding plan was developed through a technical collaboration between West Coast Vancouver Island First Nations and DFO Pacific Region

Date Stock was Determined to be At or Below LRP: November 14, 2024

Date stock was prescribed to the Fish Stocks Provisions: April 4, 2022

Date Rebuilding Plan Approved: March 11, 2025

Foreword

In 2009, Fisheries and Oceans Canada (DFO) developed A Fisheries Decision−Making Framework Incorporating the Precautionary Approach (PA Policy) under the auspices of the Sustainable Fisheries Framework. It outlines the departmental methodology for applying the precautionary approach (PA) to Canadian fisheries. A key component of the PA Policy requires that when a stock has declined to or below its limit reference point (LRP), a rebuilding plan must be in place with the aim of having a high probability of the stock growing above the LRP within a reasonable timeframe.

In addition, under section 6.2 of the Fish Stocks provisions (FSPs) in the amended *Fisheries Act* (2019), rebuilding plans must be developed and implemented for prescribed major fish stocks that have declined to or below their LRP. This legislated requirement is supported by section 70 of the *Fishery (General) Regulations* (FGRs), which set out the required contents of those rebuilding plans and establish a timeline for each rebuilding plan's development.

The purpose of this plan is to identify the main rebuilding objectives for West Coast Vancouver Island Chinook salmon, as well as the management measures that will be used to achieve these objectives. This plan provides a common understanding of the basic "rules" for rebuilding the stock(s). This stock is *prescribed* in the *Fishery (General) Regulations* (section 69) and thus *is* subject to section 6.2 of the *Fisheries Act* and regulatory requirements.

The objectives and measures outlined in this plan are applicable until the stock(s) has reached its rebuilding target. Once the stock is determined to be at the target, the stock(s) will be managed through the standard Integrated Fisheries Management Plan (IFMP) or other fishery management process in order to fulfill the requirements of the FSPs. Management measures outlined in this rebuilding plan are mandatory, and may be modified or further measures added if they fail to result in stock rebuilding.

This rebuilding plan is not a legally binding instrument which can form the basis of a legal challenge. The plan can be modified at any time and does not fetter the Minister's discretionary powers set out in the *Fisheries Act*. The Minister can, for reasons of conservation or for any other valid reasons, modify any provision of the rebuilding plan in accordance with the powers granted pursuant to the *Fisheries Act*.

Decisions flowing from the application of this rebuilding plan must respect the rights of Indigenous peoples of Canada recognized and affirmed by section 35 of the *Constitution Act* (1982), including those through modern treaties. Where DFO is responsible for implementing a rebuilding plan in an area subject to a modern treaty, the rebuilding plan will be implemented in a manner consistent with that agreement. The plan should also be guided by the 1990 *Sparrow* decision of the Supreme Court of Canada, which found that where an Aboriginal group has a right to fish for food, social and ceremonial purposes, it takes priority, after conservation, over other uses of the resource.

The Honourable Diane Lebouthillier, P.C., M.P.
Minister of Fisheries, Oceans and the Canadian Coast Guard

Date of approval of rebuilding plan

Acknowledgments

The WCVI Chinook Rebuilding Plan has been developed through an extensive collaborative effort between DFO, WCVI First Nations and stakeholders across Vancouver Island. The Joint Steering Committee would like to thank everyone who has participated in the development of this plan. Your knowledge and expertise have been instrumental in completing this work. The development of this Rebuilding Plan was largely made possible through the Pacific Salmon Strategy Initiative (PSSI). Investments under PSSI have provided additional capacity to support activities related to WCVI Chinook rebuilding.

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List of Acronyms

AABM	Aggregate Abundance–Based Management
CEDPs	Community Economic Development Program [Hatcheries]
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSAS	Canadian Science Advisory Secretariat
CU	Conservation Unit
CWT	Coded Wire Tag
CYER	Calendar year [fishery] exploitation rate
DFO	Department of Fisheries and Oceans [Canada]
DU	Designatable Unit
ENSO	El Niño–Southern Oscillation
FMP	Fishery Management Plan
FSAR	Fisheries Science Advice Report
ISBM	Individual Stock–Based Management
IFMP	Integrated Fisheries Management Plan
LRP	Limit Reference Point
NBC	Northern British Columbia
NoKy	Nootka and Kyuquot (Sounds)
NWVI	North West Vancouver Island
PAR	Pacific Aquaculture Regulations
PBT	Parentage–based tagged
PDO	Pacific Decadal Oscillations
PIPs	Public Involvement Program (community owned and operated hatcheries)
PNI	Proportionate Natural Influence
PST	Pacific Salmon Treaty
RAMS	Risk Assessment Methodology for Salmon
SMU	Stock Management Unit
SWVI	South West Vancouver Island

WCVI	West Coast of Vancouver Island

1 Introduction and Context

This rebuilding plan is focused on natural−origin Chinook salmon (*Oncorhynchus tshawytscha*) within the West Coast Vancouver Island (WCVI) Chinook stock management unit (SMU), as current assessment is not capable of differentiating between natural−origin and wild Chinook. Natural−origin salmon are the offspring of fish that spawned in the wild. Natural−origin salmon are not all wild salmon, which are defined in the Wild Salmon Policy as: "salmon that spend their entire lives in the wild and originate from parents that were also produced by natural spawning and continuously lived in the wild" (DFO 2005). Currently, management plans for this stock are included in the annual Southern BC Salmon Integrated Fisheries Management Plan (IFMP), which is updated annually (DFO 2023). The Southern BC Salmon IFMP will continue to provide yearly fishery management measures for WCVI Chinook.

WCVI Chinook are important to the economic and social wellbeing of WCVI First Nations and communities. As a result, First Nations and communities along the WCVI have a common goal of increasing abundance of WCVI Chinook salmon while maintaining their genetic and demographic diversity. The challenge is to rebuild natural−origin Chinook abundance and diversity while maintaining and improving food, cultural, social, and economic benefits.

Salmon are central to the WCVI First Nation culture, not only as a food source but as they connect to all aspects of life. The decline of wild Chinook and other salmon over these last hundred years has mirrored the imposed loss of land and culture for Nuu−chah−nulth and all First Nations. And so, this decline in Chinook and all salmon is not separate from the decline in cultural practices and self−governance for First Nations. A rebuilding plan for WCVI Chinook should accompany a rebuilding for Nations in stewardship, fisheries, management and governance.

The geographic area occupied by WCVI Chinook is immense, extending from their spawning and rearing areas within major watersheds along the WCVI northward in the ocean throughout the Gulf of Alaska and sometimes north of the Aleutian Islands. Also important are large Sounds, key geographical features of the WCVI coastline that include Barkley Sound/Alberni Inlet, Clayoquot Sound, Nootka Sound/Esperanza Inlet, Kyuquot Sound, and Quatsino Sound. The terrain surrounding the complex coastline of these inlets and their watersheds is generally steep and mountainous.

There are many third−order rivers entering the inlets, but most are relatively short, generally much less than 100 km, with limited flood plains and side channels. Suitable Chinook spawning habitat, including appropriate gradient, gravel substrate, percolation, and water depth and velocity, is generally limited to mainstems of the larger WCVI rivers. The total length of accessible Chinook spawning habit for surveyed WCVI rivers ranges from about 2–97 km.

River discharge during the fall and winter is primarily driven by rainfall. Precipitation on the WCVI is among the highest in North America, with most falling from October to March. Rivers supporting Chinook tend to be 'flashy' (rapid and frequent fluctuations in discharge) during these months due to the steep topography of most watersheds and the high levels of precipitation; some rivers can increase by 2–3 m in height within 12 hours during major rainfalls. In contrast, discharge during spring and summer is primarily driven by snow melt. Only a handful of WCVI rivers are fed by glaciers or large lakes with dams that moderate flows; the rest are even more vulnerable to drought following depletion of the annual snowpack until the return of fall rains. Water levels can be very low during extreme droughts (typically mid−July to September), with some sections receiving only subsurface water input. Deforestation caused by widespread logging contributes to increased variability in river discharge by reducing capacity for water retention relative to intact watersheds buffered by old growth forests.

1.1 Biology of WCVI Chinook

1.1.1 Stock Structure

The WCVI Chinook SMU consists of three Conservation Units (CUs): West Vancouver Island−North (NWVI), West Vancouver−Island Nootka and Kyuquot (NoKy), and West Vancouver Island−South (SWVI) (Holtby & Ciruna 2007, DFO 2013, Brown et al. 2020) (Figure 1.1). Seventy−eight watersheds across the SMU are understood to support self−sustaining Chinook populations. Spawning population sizes can range from less than 100 in small natural systems to more than 100,000 Chinook in systems with major hatcheries. Twenty rivers have annual or periodic enhancement programs that supplement natural spawning. Most WCVI hatchery Chinook are released from the major hatcheries on the Stamp, Conuma, and Nitinat rivers. Approximately 85% of the Chinook returning to WCVI are hatchery−origin while the remaining 15% are natural−origin or wild. Further description of the genetic structure of WCVI Chinook

and designations related to hatchery influence (Withler et al. 2018) can be found in Brown et al. in review[OBJ][1].

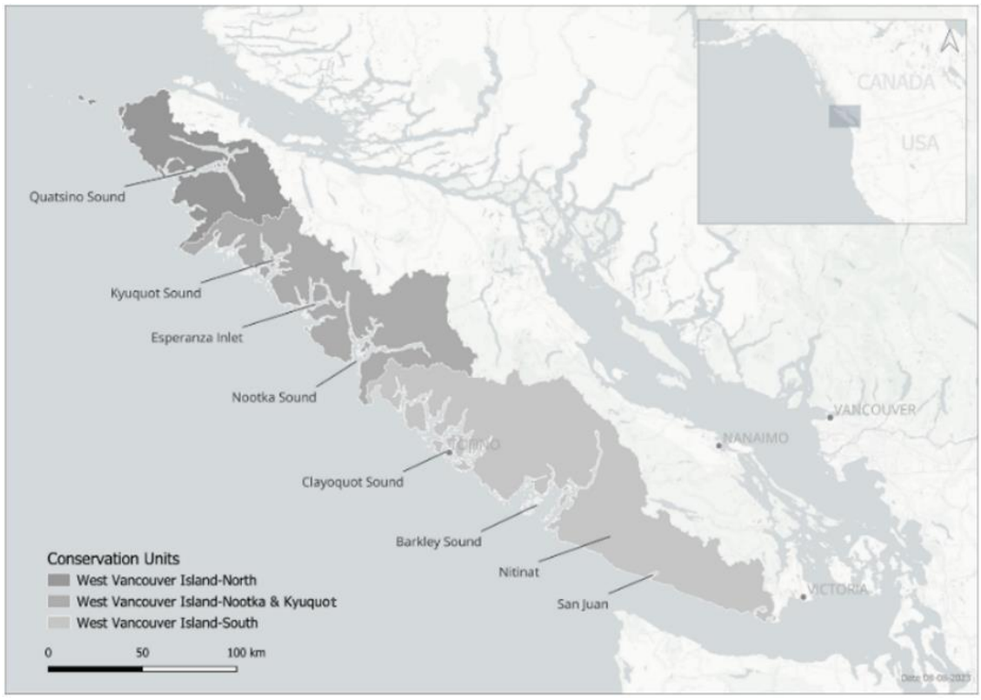

Figure 1.1. WCVI Stock Management Unit (SMU) consists of 3 Wild Salmon Policy Conservation Units (CU) with about 50 rivers consistently supporting Chinook populations as well as their associated nearshore marine environment. Adapted from Holt et al. (2023).

1.2 Life History

Chinook salmon are the largest of seven Pacific salmon species. North American populations are broadly distributed from California to Alaska. The WCVI is approximately in the middle of the species' latitudinal distribution in the Northeast Pacific.

Chinook salmon exhibit a variety of life history strategies associated with notable behavioral differences at particular life cycle phases. Healey (1991) identifies the key variation as being smolt freshwater residence time and provides the classifications of either 'stream−type' or 'ocean−type'. WCVI Chinook are categorized as ocean−type, which highlights their limited duration of freshwater rearing that typically ranges between 0–4 months (as opposed to *circa* 15 months for stream−type Chinook). Ocean distribution has also become a basis for life history categorization; WCVI are 'far−north migrating,' i.e. they travel north to the Gulf of Alaska to rear and grow during adulthood (ref?). Additional factors in freshwater, estuarine, and nearshore marine ecosystems have resulted in adaptations in WCVI Chinook that make them genetically distinct from nearby SMUs (Brown et al. in review[Erreur ! Signet non défini.]).

Peak spawning for most WCVI Chinook occurs from late September to mid−October. Timing of peak spawning varies between years and rivers depending on environmental conditions and water quality. Emergence of alevins from the gravel as fry occurs early in the spring, which is followed by a ~1 month period where fry drift downstream and into estuaries to smolt. During most of their first year at sea, juvenile Chinook reside in the nearshore waters along the WCVI. The early marine phase is critical to the survival of the cohort, which depends on ocean conditions, predation and food abundance to survive this first ocean year. After the first year, most Chinook migrate north to the Gulf of Alaska where they live for 1−6 years, returning to natal rivers along the WCVI as they approach maturity. They appear to have a primarily coastal distribution and are susceptible to many fisheries starting at age 2.

The maturation rates of WCVI Chinook appear to vary depending on smolt size and growth in the marine environment. In recent years, cohort analysis of Robertson Creek Hatchery coded wire tags (CWTs) indicates approximately 2−3% mature in their second year, approximately 20% mature in their third year,

[1] Brown N, Holt C, Irvine J, Luedke W, McHugh D, Thom M. in review. West Coast of Vancouver Island natural−origin Chinook Salmon (*Oncorhynchus tshawytscha*) stock assessment. DFO Can. Sci. Advis. Sec. Res. Doc. 2024/nnn. iv + xx p.

more than 50% in their fourth year, and approximately 20% in their fifth year. A few natural populations have small proportions maturing at ages 6 and 7. CWTs are small wires with unique binary codes that are injected into the nose of juvenile salmon. Monitoring the proportion of CWT fish in a population that are captured in fisheries or return to spawning grounds provides an estimation of survival and maturation rates.

Most fish arrive at their natal streams from July through September. The peak of migration into the terminal WCVI areas is usually late August for most populations in the SWVI with peak of spawning in mid−October, with timing depending on water flows. Populations originating from NWVI and NoKy CU's, such as the Conuma River stock, return about 3 weeks earlier (see Figure 1.2 for an overview of the WCVI Chinook life cycle). Upstream migration of WCVI Chinook has often been significantly delayed by environmental barriers to fish passage such as low water levels and high water temperatures. Delays elicit pooling of mature adults in terminal areas which increases their exposure to predation, parasites, and harvest.

A more detailed description of each life stage of WCVI Chinook can be found in Brown et al. in review[1].

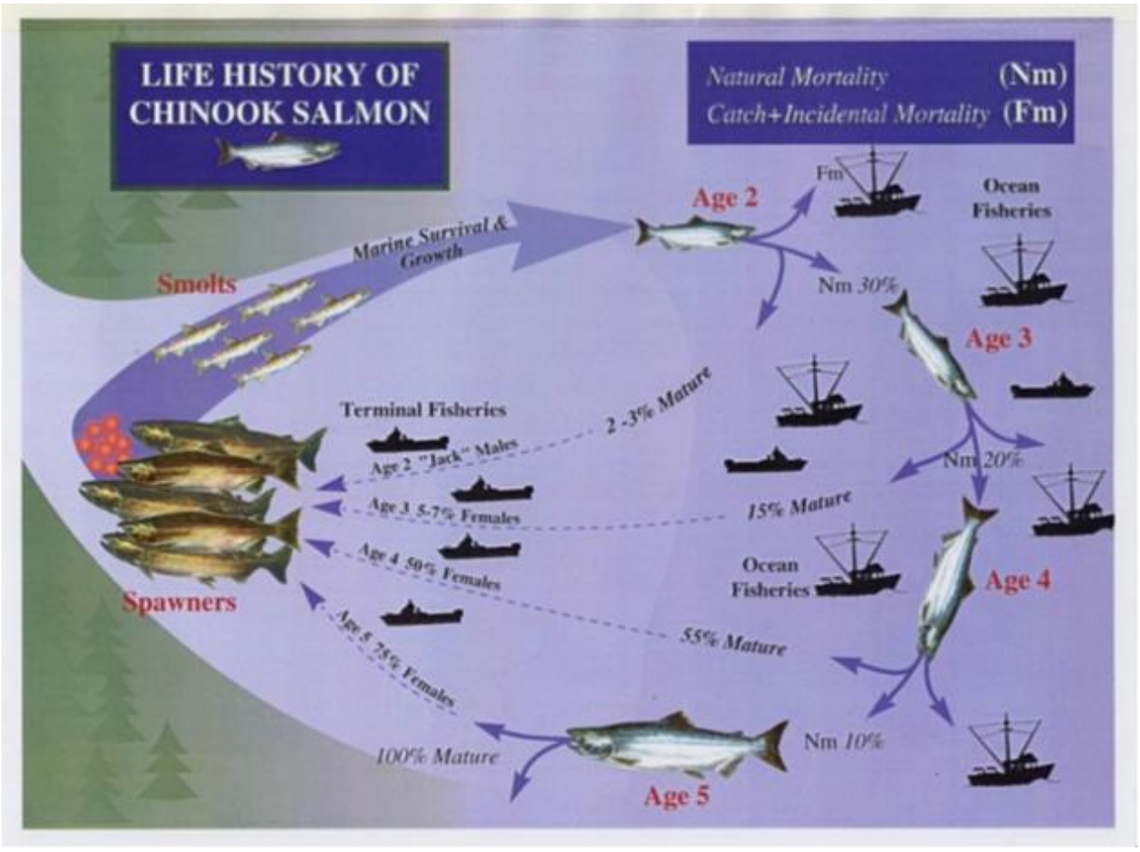

Figure 1.2. A rendering of the life cycle of WCVI Chinook salmon from spawning in WCVI rivers to rearing in the northern BC and southeast Alaskan ocean waters and returning mature adults back to the WCVI natal rivers. From Riddel et al (2013).

In recent decades, body size, age at maturity, and fecundity have been declining for WCVI Chinook; which follows a pattern observed among many Chinook populations originating from the west coast of North America. These demographic changes contribute to widespread declines in reproductive potential.

1.2.1 Stock Enhancement Activities

Within the WCVI SMU, 20 Chinook populations are currently enhanced with hatchery releases. An average of 15.5 million juvenile Chinook salmon are released annually from Department of Fisheries and Oceans (DFO) licensed hatchery facilities on WCVI. Three types of enhancement facilities operate along the WCVI:

- DFO owned and operated major facilities (Major Ops)
- Federally funded community economic development hatcheries (CEDPs)
- Community owned and operated Public Involvement Program hatcheries (PIPs)

All these facility types operate under licences issued under the authority of the *Fisheries Act* and the *Pacific Aquaculture Regulations* (PAR) and the *Aquaculture Activities Regulations*. The overarching

objective of salmon hatchery production in Canada is to augment the abundance of specific salmon populations beyond what can currently be produced naturally, thereby aiding in the achievement of fisheries management goals specific to that population or the broader management aggregate it may be associated with (CU, SMU, etc.). Each hatchery release is guided by specific production objectives, which include harvest, conservation, rebuilding, assessment, stewardship, and education. Predominantly, the hatchery Chinook produced from WCVI facilities are aligned with enhancement goals related to harvest or rebuilding.

Of the 15.5 million annual Chinook releases on WCVI, approximately 14 million (90%) are released from the three DFO Major Ops hatcheries. These are situated along the Nitinat (including production for the Sarita River), Somass and Conuma Rivers. The remaining 1.5 million (10%) are released from CEDP and PIP facilities. These include CEDPs for the San Juan and Kennedy Rivers and on Thorton Creek as well as PIPs for the Marble, Zeballos, Tahsis, Leiner, Bedwell, Tranquil, and Cypre Rivers. Currently two Major Ops hatcheries (Conuma and Somass Rivers) and one PIP (Tahsis Creek) mass mark their production. Mass Marking is the removal of all or a portion of a fin (usually the adipose fin) from most or all hatchery−production juvenile salmon prior to their release into the natural environment. This 'mark' enables visual detection of hatchery−origin fish and can be used for improved genetic management of hatchery programs.

Hatchery production has increased the overall abundance of WCVI Chinook and contributes to significant fisheries. However, reduced genetic diversity has been observed in natural spawning populations that receive hatchery enhancement. In addition to planned and directed enhancement activities on specific populations, there is evidence of hatchery production, especially from major production facilities, straying into non−natal streams in the surrounding areas (Wiel et al. In review[2]).

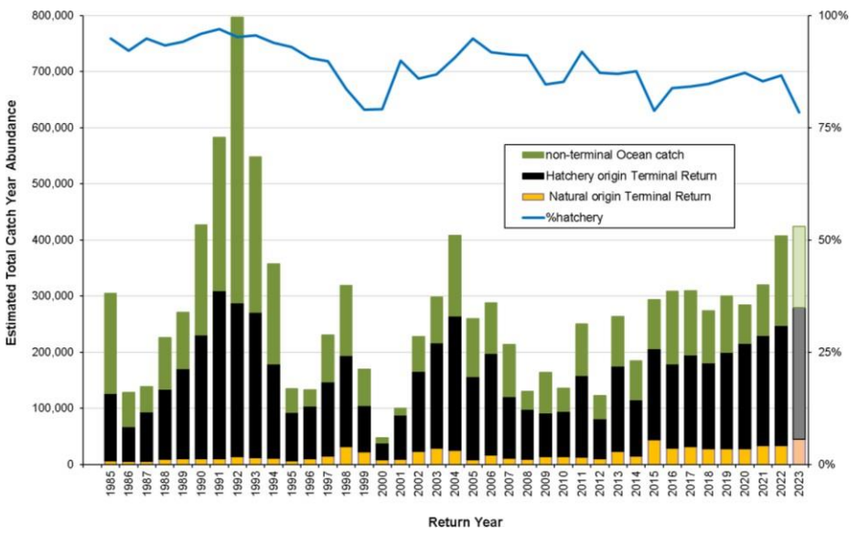

Figure 1.3. Annual estimates of adult total catch year abundance of WCVI Chinook salmon. Bar segments indicate the proportion of each estimate in pre−terminal fisheries, hatchery−origin terminal return, and natural−origin terminal return. The blue line, with reference to the secondary y−axis, shows the estimated percent hatchery−origin for each year's return (~85% on average). Data for 2023 are preliminary.

Among the 20 Chinook populations on WCVI that receive hatchery releases annually, 15 (75%) exhibit an average proportionate natural influence (PNI), a metric of gene flow in a sampled stock or population, below 0.50. A PNI below 0.50 signifies that the genetic influence is predominantly influenced by the hatchery environment. Managing the hatchery genetic influence on nearby natural populations involves three key actions: 1) adjusting the scale of the hatchery program, 2) excluding hatchery fish from hatchery broodstock, and 3) excluding hatchery fish from the natural spawning population. The latter two management actions necessitate the ability to identify hatchery fish in the natural environment, most efficiently achieved through the presence of a visual mark, typically in the form of an adipose fin clip. Straying of hatchery fish into natural spawning populations is a known phenomenon on the WCVI. Proportionate hatchery−origin spawners (pHOS) values from WCVI natural populations with adequate data and that do not receive hatchery releases range from 9–40% (Weil et al. in review[2]); Brown et al. in review[Erreur ! Signet non défini.]). This range indicates that the majority of spawners in these populations are

[2] Weil, J., Luedke, W., Healy, T.M., Withler, R.E., Brown, N., Bokvist, J., and Porszt, E. The Magnitude and Extent of Chinook Straying from Hatcheries in Southern British Columbia. DFO Can. Sci. Advis. Sec. Res. Doc. In Prep

natural−origin but that the reference level for wild populations set forth by Withler et al. (2018) (i.e., pHOS ≤ 3%) is not being attained.

1.3 Relevant environmental conditions and ecosystem factors

Anadromous fish like WCVI Chinook are impacted by environmental and biological factors in both the freshwater and marine ecosystems they inhabit throughout their life cycle. Freshwater and estuarine habitat degradation combined with changing climatic conditions are key factors in population decline and described in more detail below (Section 3). The survival rates of juvenile salmon in the early ocean−rearing phase appears to underlie major trends in stock abundance and are associated with ocean conditions (e.g., water temperature, prey availability, predator concentration). Many of the environmental variables that most strongly affect WCVI Chinook survival are exacerbated by the effects of climate change (e.g., increased frequency and magnitude of drought and flood events in freshwater habitats; increased frequency and magnitude of unfavourable ocean events such as warm water 'blobs').

1.4 Fishery Overview

1.4.1 Current WCVI Chinook Fishery Management

WCVI Chinook are vulnerable to marine fisheries during most of their life, with fisheries targeting ages 3 and above. WCVI Chinook are harvested in fisheries operating in Alaskan waters and in subsequent fisheries all the way south to the WCVI rivers they spawn in. Northern BC and Alaskan fisheries harvest WCVI Chinook stocks as both immature fish feeding in the area and as mature adults during their return migration to their natal stream. Central and southern BC fisheries harvest only maturing Chinook as they migrate to their natal streams to spawn. The far northerly distribution of WCVI Chinook limits Canada's ability to conserve WCVI Chinook through fishery regulation, since approximately 50% of the annual fishery related mortality (catch plus incidental mortality) of WCVI Chinook occurs in Southeast Alaska (SEAK; CTC 2023) fisheries, which are regulated under the Pacific Salmon Treaty (PST).

Allowable harvest impacts in areas under joint Canada−US Aggregate Abundance−Based Management (AABM) are determined by provisions in the PST and subject to domestic considerations, such as conservation and allocation. AABM fisheries include the Alaskan troll, northern BC troll, Haida Gwaii sport, and the WCVI troll and WCVI sport (for parts of the year as defined in the Pacific Salmon Treaty). Individual Stock−Based Management (ISMB) fisheries are also subject to the PST. Examples of ISBM fisheries include fisheries in the Central Coast and inshore areas of the west coast of Vancouver Island. All sectors participate in Canadian AABM and ISBM fisheries, including First Nation Treaty, FSC, and Economic Opportunity Fisheries, Recreational Fisheries and Commercial Net and troll.

Large returns of enhanced WCVI Chinook in the 1980s and early 1990s resulted in rapid growth of directed Chinook fisheries along the WCVI. Catches during the peak fishing periods of August through September were comprised of 90–100% WCVI−origin stocks. Since 1994, these fisheries were restricted during peak migration periods of WCVI Chinook in response to declines in WCVI abundance and later in response to Interior Fraser Coho salmon declines. Except for terminal fisheries targeting hatchery surpluses (Alberni Inlet, Barkley Sound, and Tlupana Inlet) or mixed stocks (Juan de Fuca), the estimated catches of WCVI Chinook in ISBM fisheries are relatively low. Despite these measures, WCVI natural−origin Chinook abundance has remained at low levels for over three decades (see section 3, Stock Status).

WCVI hatchery Chinook salmon continue to be an important economic driver for WCVI communities including First Nations. WCVI fishery management has transitioned away from prioritizing large, mixed−stock commercial fisheries and now emphasizes Chinook as a basis for recreational fishery tourism, regular gillnet and seine fisheries targeting hatchery returns, and First Nation FSC and commercial fisheries. A detailed description of the economic value of WCVI Chinook fisheries can be found in Section 1.3.3.

The average annual calendar year fishery exploitation rate (CYER) in ocean (non−terminal) fisheries, including release mortality (from capture−related injuries), is about 35% or about 90,000 Chinook annually (Figure 1.4). Terminal fisheries in the approach to Robertson Creek Hatchery and Conuma River Hatchery are more variable between years, with total allowable catches depending on return abundance minus escapement targets. Terminal fisheries account for an additional 25% exploitation rate, on average, and have ranged between 2–50% historically. Non−terminal fisheries are primarily regulated through the PST, while terminal fisheries are regulated domestically by DFO under the IFMP. Recent exploitation rates on older ages 4 and 5 fish have approached or exceeded 50%. Older fish are exposed to fisheries over a longer time period compared to younger fish, but recent increases in ages 4 and 5 exploitation rates relative to age 3 exploitation rates (Figure 1.5) indicate some fisheries may

disproportionately harvest larger and older fish. Since female WCVI Chinook tend to mature later than males, a higher proportion of older fish are female. This additional mortality can contribute to loss of population productivity due to fewer eggs being deposited and smaller spawners returning that dig shallower redds.

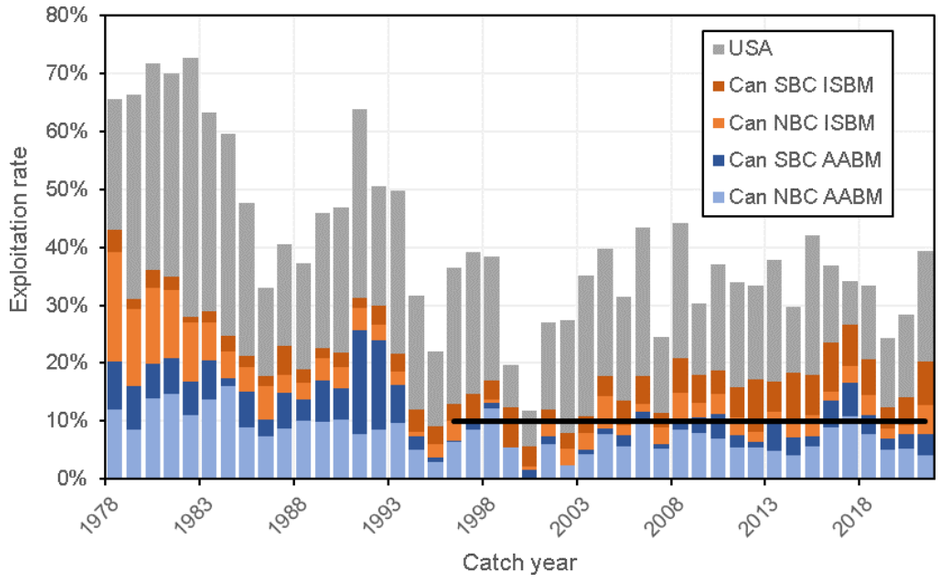

Figure 1.4. Distribution of calendar year exploitation rate (CYER), which includes incidental mortalities, among key Canadian and USA pre-terminal fisheries. "NBC" and "SBC" in the legend denote Northern and Southern BC, respectively. CYER estimates are based on Robertson Creek Hatchery Chinook coded-wire tag recoveries. The solid black line shows the 10% exploitation rate limit for Canadian AABM fisheries (blue bars).

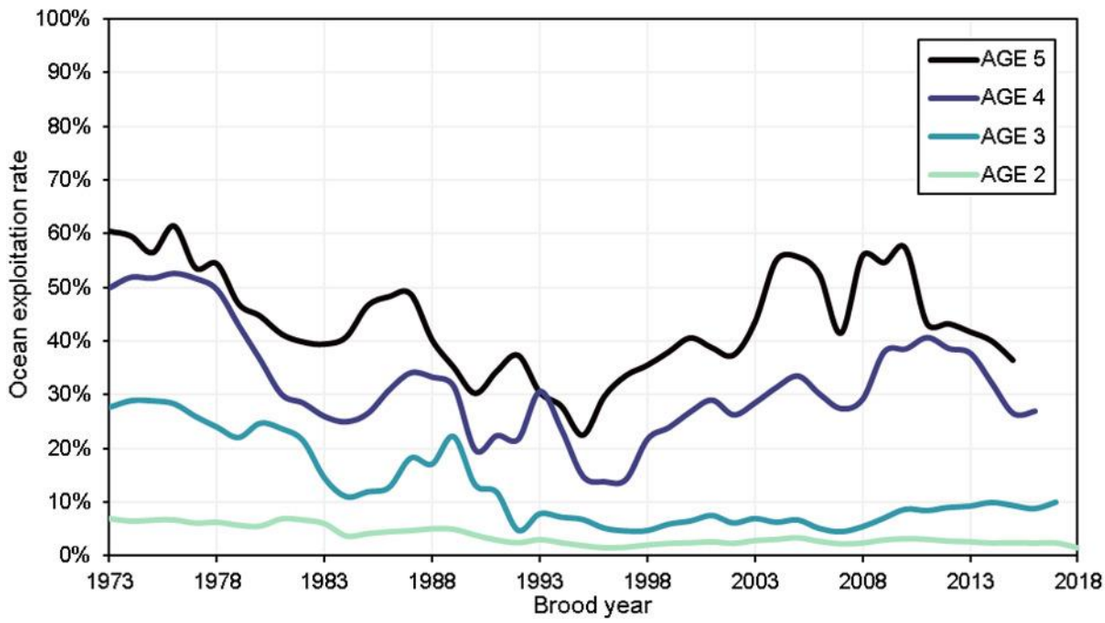

Figure 1.5. Three-year rolling average age-specific exploitation rates of WCVI Chinook in PST-monitored pre-terminal (ocean) fisheries for brood years 1973–2020. Data for 5-year-old Chinook from 1983, 1992, and 1997 were omitted due to low CWT recovery numbers that generated anomalous estimates. Annual exploitation rates were estimated by cohort analysis using Robertson Creek Hatchery Indicator Stock CWT recoveries. Brood years are plotted along the x-axis to group fish from the same cohort, e.g., Chinook of all ages from brood year 2000 would have migrated to the ocean together in early 2001 and been susceptible to being caught in pre-terminal fisheries as age-2's in 2002, age-3's in 2003, etc.

1.4.2 Harvest Management

Allowable harvest impacts in pre-terminal fisheries are defined in the PST, which includes marine south from SEAK to coastal Oregon (CTC 2023). AABM mixed stock fisheries are managed to an annual total

allowable catch based on the forecast aggregate abundance of all stocks and harvest rates stipulated by the PST. CYERs in ISBM fisheries are regulated domestically by either Canada or the USA. ISBM fisheries that regularly intercept WCVI Chinook include fisheries along the Central Coast of BC and terminal areas of the WCVI. It should be noted that the PST does not cover bycatch in non−salmon fisheries such as groundfish trawl in either country and does not extend to areas such as western Alaska and the Bering Sea, where WCVI Chinook have historically been intercepted, meaning that catch estimates are biased low.

Most WCVI terminal area fisheries are managed according to the number of mature spawners forecast to reach spawning grounds or for brood stock collection, with some terminal fisheries managed to spawner targets based on the forecast number of eggs returning. Specific fisheries management measures include: implementation of a special management corridor extending one nautical mile out from the surfline, a maximum size 'slot limit' (designed to conserve larger egg−bearing females) in AABM fisheries, time and area closures, daily limit restrictions, and more recently mark−selective (selective harvest of hatchery origin fish with adipose fin clips) fisheries in some areas. Harvest opportunities for Chinook in terminal fishing areas outside of the approaches to the major hatcheries have been severely restricted using: area closures within 2 km of most Chinook river mouths, spot area closures along the migration path, reductions in daily limits, maximum size limits. Kyuquot Sound and Clayoquot Sound have been closed to fishing other than First Nations FSC/treaty domestic fishing. Most First Nations have deterred members from fishing near river mouths. More harvest opportunities were permitted in terminal locations where hatchery surpluses may be identified, such as Alberni Inlet (Area 23), Tlupana and Matchlee Inlets (Area 25), or Nitinat Lake (Area 22).

1.4.2.1 Aggregate Abundance Based Management (AABM) Fishery Management Regime

Fisheries management of the WCVI SMU is described in annual Integrated Fisheries Management Plans (IFMP) for Southern BC Salmon (IFMP 2023). Since 1995, domestic fishery management has limited fishery exploitation on WCVI Chinook in Canadian waters to a level less than what is allowable under the PST. In 1996, a closure was implemented from Haida Gwaii to the WCVI during the peak migration period. In 1997, an exploitation cap was placed on AABM and WCVI ISBM fisheries in Canada that intercept WCVI natural−origin Chinook (Figure 1.4). The exploitation cap varied between 10–15% depending on the forecast returns to Clayoquot Sound, which was treated as a wild refugium. Currently the exploitation rate cap is 10% for all Canadian AABM fisheries combined. The exploitation rate is estimated annually from CWT recoveries and the PSC Chinook Technical Committee analysis and annual reporting as 'adjusted' exploitation for Robertson Creek Hatchery Chinook with the terminal fisheries directed at hatchery surpluses in Barkley Sound and Alberni Inlet removed from analysis (so as to reflect exploitation on wild Clayoquot Sound populations). Measures are in place to reduce the impact of fisheries on WCVI Chinook while still providing harvest opportunities. For WCVI recreational fisheries, these include the maximum size 'slot limit' (designed to conserve larger egg−bearing females), time and area closures, and daily limit restrictions. The majority of the harvest is in hatchery approach areas. The Northern Troll fishery is restricted to an annual exploitation rate limit of 3.2% for WCVI Chinook. Impacts in the WCVI troll have been reduced to near zero through time and area closures.

1.4.2.2 Individual Stock Based Management (ISBM) Fishery Management Regime

Harvest opportunities for Chinook in terminal fishing areas outside of the approaches to the major hatcheries are severely restricted to allow for conservation of natural−origin populations. These restrictions include specific areas and/or periods of time that are closed to Chinook retention or closed to retention of all finfish. These closures are implemented for either migration corridors or holding areas of the populations of concern. Additional harvest opportunities are permitted in terminal locations where hatchery surpluses may be identified in season by stock assessment, such as Alberni Inlet (Area 23), Tlupana Inlet (Area 25), or Nitinat Lake (Area 22).

1.4.2.3 Nuu-chah-nulth Resource Management

For Nuu−chah−nulth, access to sea resources is managed by the haw`iih, or hereditary leadership, who traditionally made the decisions on significant resource issues, such as timing for the deployment of fish traps, weirs, and deadfall traps; the opening and closing of fishing sites and rivers; and other activities requiring communal effort. The haw`iih were responsible for ensuring that these decisions were well informed, and were arrived at through deliberations amongst themselves, and with advice from specialists and other advisors. The haw`iih were ultimately responsible for the promotion and continuation of plentiful runs of fish, and for the availability of game and other resources. The rights to fish, hunt, or collect berries at highly productive locations were assigned by the haw`iih to individuals or families who, as a result, would owe a portion of what they caught or collected as tribute to the haw`iih.

Traditionally, Nuu−chah−nulth rituals and taboos were closely linked to managing continued salmon abundance. The First Salmon Ritual is a symbolic example of the importance of salmon to Nuu−chah−nulth. This ritual was a celebration of the arrival of the first salmon. It was believed essential to make the first salmon feel welcome and celebrated. The return of salmon was regarded as a favour that could be withdrawn at any time should the spirits be offended.

1.5 Guiding Principles, Knowledge Systems and Indigenous Rights and Treaties

Indigenous knowledge (IK) is not fixed or directly translatable; it is as dynamic and personal as the Knowledge holders themselves. How IK weaves into fisheries science, management and conservation cannot be determined by a template or a method for including IK as one source. True co−production and co−management starts at the beginning and continues throughout a process. Knowledge holders, First Nations' fishery managers and/or leadership should work alongside government to have the best success.

The spatial scope of the WCVI Chinook extends from T'Sou−ke Nation's traditional territory in the south, through the traditional territories of the Nuu−chah−nulth Nations, to the Quatsino First Nation's traditional territory in the northwestern tip of the WCVI. Chinook are known as "suuhaa" within the Nuu−chah−nulth language, as "SƛOḰIꞌ" in the SENĆOŦEN language of the T'Sou−ke First Nation, and as "sat'sam" in Kwak'wala language of the Quatsino First Nation. WCVI Chinook are of great social, cultural, spiritual and economic importance to these First Nations along WCVI. Indigenous groups within Canada have a right to fish for Food, Social, and Ceremonial (FSC) purposes and five Nuu−chah−nulth Nations also have a court confirmed aboriginal right to fish and sell fish under section 35(1) of the *Constitution Act*. This right takes priority, after conservation, over other uses of the resource. While DFO does not define, establish, or negotiate rights, it seeks to support rights that have been confirmed by the courts, and is responsible for administering access to fish for FSC purposes in an attempt to accommodate them. Along with Section 35 rights, select groups of First Nations along WCVI have other treaty and court−defined fishing rights to WCVI Chinook salmon.

1.5.1 Douglas Treaty

The T'Sou−ke First Nation is a Douglas Treaty band. Douglas Treaties are one of the few historical treaties signed in British Columbia between 1850 and 1854. These treaties agree to allow settlement and share parts of their territories. T'Sou−ke is one of the 14 treaty groups on Vancouver Island that signed during this period. Further detail on the Douglas Treaties can be found here.

1.5.2 First Nations of the Maa-nulth Treaty

The Maa−nulth First Nations are comprised of five Nuu−chah−nulth Nations (Huu−ay−aht First Nations, Ka:'yu:'k't'h'/Che:k'tles7et'h' First Nations, Toquaht Nation, Ucluelet First Nation, Uchucklesaht Tribe) whose Final Agreement is the only of the four modern treaties in British Columbia applicable to the WCVI area. The Maa−nulth Final Agreement Fisheries chapter provides the provisions for the treaty right to harvest for domestic purposes. Provisions in a Side Agreement were negotiated (Me Too) to provide for certain outcomes for Maa−nulth First Nations in the event Ahousaht et al. Decision provided for right−based sale fisheries. Further detail on the Maa−nulth Treaty can be found in the applicable IFMP Sections 4 and 10.1 and the full Maa−nulth First Nations Final Agreement can be found here: maa_nulth_first_nations_harvest_agreement.pdf (gov.bc.ca). Discussions with Maa−nulth First Nations are ongoing under the Me Too provisions.

1.5.3 The Five Nations (Ahousaht, Ehattesaht, Hesquiaht, Mowachaht/Muchalaht, and Tla-o-qui-aht) Multi-species Right-based Sale Fishery (Ahoushat et al. Decision)

In 2004, the five Nuu−chah−nulth Nations (Ahousaht, Ehattesaht, Hesquiaht, Mowachaht/Muchalaht, and Tla−o−qui−aht) on the WCVI began an 18−year court process with the Government of Canada to affirm their rights to harvest and sell all species in their territories by their preferred means. The first of many court decisions, Ahousaht Indian Band and Nation v. Canada (2009), upheld these rights and eventually resulted in a multispecies community fishery. The Five Nations have used the court−acknowledged right to fish as another opportunity to renew the relationship between the *ḥawʷ ʲiḥ, ḥatkṁ iʲʰ and* ḥaḥuułi *(Milne*, 2022).

Suuhaa or Chinook salmon are an important species in the multi−species fishery, currently comprising about 20% of the annual gross revenue to fishers. The Five Nations have a constitutional right to fish and sell any species, with the exception of Geoduck, within their court−defined fishing territories. Fisheries and Oceans Canada currently implements the right through an annual Five Nations Multi−Species Fishery Management Plan (FMP). The FMP outlines the Five Nations' fishing opportunities for salmon,

groundfish, crab, prawn, Sea Cucumber and Gooseneck Barnacle and the associated fishery management regime while the Five Nations draft and submit Rights−Based fishing plans outlining the Nations preferred methods, allocations and management for fishing. These two management plans are the basis of ongoing negotiations between all Nations to characterize and accommodate the right. Presently, this 'economic fishery' is restricted within the "Court−Defined Fishing Area" (CDA) and allocation is fished communally. Further detail on the Five Nations' economic fishery' can be found in at: https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41096605.pdf . In 2024, DFO and the five Nuu−chah−nulth Nations signed an Interim Reconciliation Agreement for Fisheries Resources that supports a Community Based Economic Fishery (CBEF) planning process. The first CBEF plan is anticipated in December of 2024 and will replace the FMP. Additional flexibilities will be included in the CBEF plan, including an expansion of the fishing area to 69 nm, and is intended to provide enhanced participation in commercial fisheries for community members, and various fishery flexibilities to improve the economic viability of the Five Nations' fisheries.

1.5.4 Economic Opportunities

Participation in the commercial salmon fishery provides socio−economic benefits to Indigenous communities and individuals from fishery revenues and employment−generated income. Generally, Indigenous commercial harvest opportunities are managed by the Department using the same harvest decision guidelines as the commercial fishery. Indigenous commercial harvest opportunities may be implemented with different times, areas, gears and regulations consistent with the overall management approach for the commercial fishery. The landings and value attributable to Indigenous commercial harvest are included in the values reported for the commercial sector above and this includes inland fisheries. Further details on economic opportunities can be found in the applicable IFMP Section 4.

The Hupacasath and Tseshaht First Nations have participated in Economic Opportunity fisheries (initially called Pilot Sales) since 1992. The current Tsu−ma−uss Fishery Agreement includes a Chinook commercial fishery in Alberni Inlet targeting Robertson Creek hatchery Chinook salmon.

1.6 Engagement on the WCVI Chinook Rebuilding Plan

The rebuilding plan has been collaboratively developed through a Joint Steering Committee made up of DFO and WCVI First Nation representatives, with extensive engagement with First Nations, and commercial and recreational harvesters. WCVI First Nations were given multiple opportunities to engage government−to−government with DFO, and local salmon area round tables made up of First Nation, commercial and recreational harvesters were regularly updated and engaged on development of the Plan. WCVI First Nations were given the opportunity to provide feedback in late 2024 on the objectives and management measures prior to the public comment period. A public comment period was then held Winter 2024−2025.

2 Stock status and trends

Safeguarding the genetic diversity of wild Pacific salmon is a primary objective of Canada's Wild Salmon Policy, and "DFO intends to maintain [genetic] diversity through the protection of 'Conservation Units' (CUs)" (DFO 2005). The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) defines designatable units (DUs), based on attributes of discreteness and evolutionary significance, to assess wildlife for the purposes of the *Species at Risk Act*. Both CUs and DUs aim to maintain genetic variability at the wildlife species level. For WCVI Chinook, the CU/DU structure is the same.

In 2016, DFO assessed two of the three CUs in this SMU, SWVI and NoKy, as Red status in an integrated Wild Salmon Policy assessment (DFO, 2016). In 2020, COSEWIC assessed both the SWVI and NoKy DUs as threatened, while the NWVI DU was deemed data deficient (COSEWIC, 2020). These threatened statuses were primarily due to genetic risks from hatchery enhancement and habitat threats from forestry. The NWVI DU was designated data deficient because it contains only one escapement indicator population, which is periodically hatchery enhanced and unlikely to represent the entire population. Previously, Riddell et al. (2002) reported ongoing concerns for natural−origin Chinook populations along the WCVI. Based on total accessible habitat area within WCVI watersheds, the habitat capacity for the 50 largest Chinook−bearing watersheds is estimated at 80,000 Chinook spawners (Brown et al. in review). Capacity has likely declined due to habitat degradation, except in a few places (Brown et al. in review)(ref). For example, a fish ladder built at Stamp Falls fishway in 1927 and rebuilt in 1955 likely significantly increased capacity and productivity of Stamp River Chinook.

The total natural spawning abundance of WCVI Chinook is in the order of 60,000 in recent years (Figure 2.1). However, the majority of these natural spawners exist in 3 of the larger rivers where DFO SEP hatchery operations were built, with returns starting in the early 1980s. Soon after, smaller hatcheries were built or satelliting initiated out of the major SEP hatcheries. Satelliting refers to the process of enhancing a river that is not directly connected to a major hatchery, and instead eggs and broodstock are transported back to the hatchery, and after rearing the juveniles are transported back to the original river for release. Many of these rivers are also key escapement indicators. The result is that a significant portion of the total spawning abundance is either first or subsequent generation hatchery production.

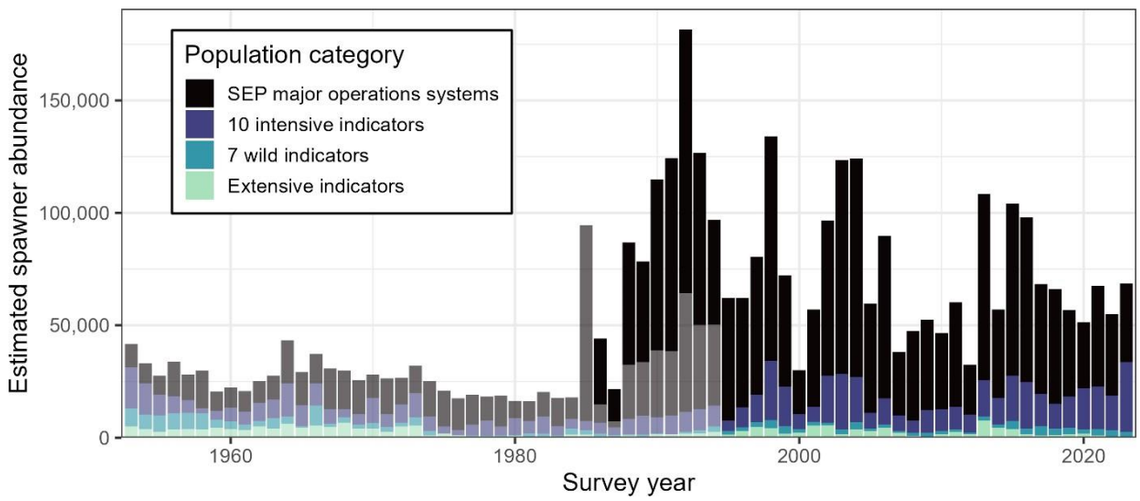

Figure 2.1. WCVI Chinook spawner abundance by return year 1953–2023. Bars are coloured to differentiate populations into categories based on their levels of hatchery influence and survey rigour. Bars that are partially transparent earlier in the time series show years and populations where abundances were estimated qualitatively by fishery officers. By 1995, all populations in the time series were being monitored more rigorously using snorkel surveys and quantitative methods. The Stamp River (included in the black bars) has been monitored using daily counts from a fishway since 1986.

Hatchery enhancement significantly increased the total abundance of Chinook from this SMU. The recent 10−year mean of total annual production from the WCVI Chinook SMU is estimated at over 250,000 Chinook, enumerated in ocean catches and river escapement. Approximately 30% of the total return each year is caught in distant fisheries, resulting in a terminal return to the WCVI which is averaging over 200,000 Chinook over the last 10 years. The vast majority (approximately 85%) of the total WCVI Chinook production originates from hatcheries. Until only recently most hatchery Chinook were not visually distinguishable from natural−origin Chinook.

In Spring 2024, a stock status assessment was completed for WCVI Chinook (DFO 2024), and determined the following:

- The natural origin Chinook within this SMU should be considered as critical status (i.e., below the LRP), for reasons of low overall abundance of natural−origin spawners, low returns in many natural populations especially in Clayoquot Sound, loss of genetic diversity across the SMU and so likely loss of resilience and potential for rapid rebuilding, and changing demographics with fewer eggs due to fewer and smaller spawning females.
- Indicator populations considered to be 'wild' or 'wild−stray influenced' (Withler et al. 2018) appear to be persisting at low levels, since the precipitous decline in the 1990s. The smaller, less productive populations in Clayoquot Sound continue to be the focus of the concern (e.g., Riddell et al. 2002). Other populations in the Withler et al. (2018) categories of 'Integrated−wild' and 'Integrated−transition' are being supported by hatchery production. The hatchery production cannot be visually differentiated from natural origin Chinook resulting in uncertainty in status of the natural origin. Recent assessment of hatchery introgression (pHOS and PNI) from local hatchery production and out−of−basin strays in Weil et al. (in review)[2] suggested a majority of 'escapement indicators' should be categorized as 'Integrated−hatchery', indicating that hatchery genetic influence is dominating.
- Based on an initial review using the Rapid Salmon Scanner (Pestal et al. 2023; DFO 2024) to inform the CU−status LRP, the WCVI SMU would be assessed as critical status (below LRP), since one component CU (South West Vancouver Island) has Red status. This approach to SMU status does not explicitly consider spatial distribution of production among inlets and populations, genetic risks of hatcheries, or changing demographics.
- Assessing status with reliance on an abundance−based LRP proved to be problematic for the WCVI SMU, which indicates the need for any status assessment to carefully consider a broad suite methods and broad understanding of the SMU and the ecosystem the fish depend on.
- To derive SMU status, DFO Science recommends pairing CU statuses with other reference information, such as:
    - population−scale assessments indicating persistent poor status of escapement indicators within Clayoquot Sound,
    - high levels of hatchery influence across large portions of the SMU that may be inconsistent with maintaining adaptive influence of the natural environment for many populations,
    - reductions in age and size at maturity likely reducing population productivity,
    - low smolt to adult survival rate,
    - or other specific components of the natural−origin life cycle.
- The candidate aggregate removal reference of U_{MSY} = 43% likely over−estimates sustainable exploitation for poor productivity stocks. The current management regime, with a lower pre−terminal fishery exploitation rate near 35%, and terminal fishery actions to avoid fishing mortality of less productive populations, appears to be appropriate. However, higher exploitation on older age classes suggests further actions to address demographic risks are required.
- Hatchery production has significantly increased the overall abundance of WCVI Chinook which contribute to or drive fisheries from Alaska to the WCVI, and has important cultural, food, and economic benefit for WCVI First Nations and communities. The integrated hatchery program has maintained genetic diversity within the hatcheries, but straying has led to a loss of genetic diversity along the WCVI.

Further description of stock status and the stock status assessment process can be found in Brown et al. in review[1].

3 Probable causes for the stock's decline.

Recent risk assessments evaluated probable causes for the decline and persistent low abundance of natural−origin WCVI Chinook using the Risk Assessment Methodology for Salmon (RAMS; Irvine et al., 2024).

Freshwater RAMS workshops focused on 20 WCVI rivers and their estuaries; a WCVI−wide summary is currently under development. Seven marine RAMS workshops between 2021 and 2022 focused on the following categories of probable causes of decline: 1) basin−scale oceanographic processes; 2) water quality, contaminants; 3) pathogens, parasites, harmful algae; 4) nutrition and prey; 5) predation; 6) hatcheries; and 7) harvest. Irvine et al. (2024) summarizes the marine risk assessment process and results, including the identified highest risks, priority knowledge gaps, and recommendations for further assessment and mitigation.

Principal factors limiting the productivity and survival of natural−origin WCVI Chinook salmon are summarized, primarily from the freshwater and marine workshops held over the last several years (Table 4.1). A weakness in the RAMS approach used for WCVI Chinook was that most limiting factors were evaluated independently from each other. Yet there are many interactions in any ecosystem. Future research should evaluate the cumulative, antagonistic, and synergistic interactions among factors identified as high risks. Moreover, a greater understanding of the mechanistic relationships between human activities and resultant risks is required. Ecosystem modelling can address cumulative and synergistic associations among factors, especially as they pertain to climate change and anthropogenic activities that could be mitigated.

Table 3.1. Summary of factors that potentially limit natural origin WCVI Chinook during major life stages (interactions with climate possible at all stages)

Life Stage	Limiting Factors and Mechanisms
Adult upstream migration	Climate change leading to low and variable river discharge. Habitat degradation altering channel morphology, limiting or delaying access to spawning grounds.
Adult spawning	Climate change and habitat degradation increase the frequency and intensity of peak flow events, destabilizing spawning gravel and increasing bedload movement, scour, and sedimentation. Reduced spawning success due to unstable conditions for egg incubation. Changing demographics: small females dig shallower redds and produce fewer eggs than larger ones. Genetic input from hatchery fish (particularly stray hatchery fish) reduces genetic and demographic diversity, impacting the fitness of future generations.

Life Stage	Limiting Factors and Mechanisms
Egg incubation and fry emergence	Climate change and habitat degradation e:acerbate the frequency and magnitude of peak flow events, disrupting sediment regimes (e.g., surplus sediment, changes in composition, bedload movement). Egg displacement and disruption of fry emergence due to altered sedimentation and scour.
In-river rearing	Degradation of freshwater habitats reduces habitat complexity, variety, and connectivity. Limited rearing space, reduced fish growth, and lower survival rates. Increased reliance on estuarine habitats for rearing.
Estuarine rearing and first marine winter	Carry-over effects from freshwater stages (e.g., smolt size and readiness) impact survival in estuarine and marine environments. Phenological mismatches between prey availability and smolt migration timing. Changes in river discharge patterns increase sediment deposition, reducing habitat complexity. Habitat degradation in the estuary (e.g., loss of salt marsh and eelgrass). Competition with larger hatchery smolt and juveniles for prey. Predation by birds, fish, and seals. E:posure to pathogens, parasites (e.g., sea lice), and toxic contaminants.

Life Stage	Limiting Factors and Mechanisms
Later marine Residence (1–5 years)	Interspecific competition with hatchery salmon and other salmon species for limited prey. Demographic declines in size-at-age and age-at-maturity driven by size-selective natural and fishery mortality.
Return migration to WCVI natal rivers	Habitat degradation and climate change can alter holding habitat and behavior by delaying access to rivers, which increases Chinook vulnerability to predation, primarily by marine mammals such as seals and sea lions that e:ploit Chinook at key geographical bottlenecks like river mouths.

Further information on limiting factors impacting WCVI natural−origin Chinook is available in Brown et al (in review[1]), and Irvine et al. (2024). A key outcome of both the marine and freshwater RAMS processes was a recognition that declining survivals and productivity of natural−origin WCVI Chinook result from the cumulative effects of many factors. In other words, there is no single factor responsible for the decline and ongoing poor status of natural−origin WCVI Chinook but rather multiple factors, many of which interact with the changing climate. Rebuilding objectives and management measures were determined based on the understanding that there is no single action that will lead to rebuilding, and that rebuilding will therefore require an integrated approach.

3.1 Nuu-chah-nulth and Local Knowledge Holder Perspective on Stock Decline

The following sections (3.1 – 5.0) describe Nuu-chah-nulth and local knowledge holder perspectives on WCVI Chinook declines. The views and conclusions expressed in these sections are intended to directly represent the perspectives of these groups and are not necessarily endorsed by DFO.

Nuu−chah−nulth knowledge holders have emphasized that colonial greed, individualism, and governance have driven and facilitated human activities for over a century that have eroded the status of WCVI salmon (Sainsbury et al. 2024). As stated by an expert in Sainsbury et al 2024 −"*There are lots of Chinook to catch, but wild Chinooks are in trouble" In reference to Chinook in Nootka Sound (Sainsbury et al. 2024)"*

Nuu−chah−nulth knowledge holders identified a parallel between a loss of salmon and loss of traditional harvest, fish preparation and preservation and family knowledge transfer opportunities. Over a century, opportunities to share family knowledge have disappeared, first through the physical removal of children from their families, the dismantling of the Nations' fishing fleets and now as salmon stocks decline to critical levels. Harm to salmon is harm to people (Sainsbury et al. 2024), salmon recovery on the WCVI is tied to the cultural and socio−economic recovery of the First Peoples along the coast. In addition, Sainsbury et al. (2024) noted that respondents both Nuu−chah−nulth and non−Nuu−chah−nulth on the WCVI indicated that other primary reasons for the decline of WCVI Chinook were: insufficient inclusion of Nuu−chah−nulth Nations and knowledge, regional and national centralization, siloed jurisdictions, inaccurate data and monitoring, failure to manage fisheries adaptively, lack of transparency and accountability, and insufficient enforcement.

haahuupa: The traditional teachings and knowledge of our ancestors that have been passed down to us through our Elders will guide us. Our traditional ways, our language, our culture and our spiritual beliefs strengthen our tlimiksti (how we feel). (qʷamaḥsaqin, p3, 2022).

Since the expropriation of management authority from Indigenous leaders to colonial government systems, salmon and ecosystem health have declined precipitously. The reasons for the declines are great and span from inadequate legislation around extractive activities such as logging, pulp mills, commercial and recreational fishing, enhancement, open−pen fin fish aquaculture, predation by unharvested species, municipal development, climate change, waste and transport (Sainsbury et al., 2024). However, the source of decline can all be traced back to a culture of colonial greed and the failure to manage industry adaptively and a lack of transparency, accountability in management and a loss of First Nation salmon traditional practices and culture.

Reversing the decline will involve a reversal in approach away from resource management towards stewardship, reciprocity and accountability. Stewardship of the *ha−houlthee* (territory) is a complex process, which includes wider considerations of community wellbeing in a complex social context of competing and changing social interests made more challenging by extensive cumulative harm to salmon systems and Nuu−chah−nulth communities from colonial policies and management (Sainsbury et al. 2024). A return to stewardship of the rivers, lands and resources with a place−based approach co−managed by First Nations, communities and the Federal and Provincial governments is required to rebuild Chinook and the social, economic and cultural framework they support.

> *"People, when they get self−government, the first thing they want to do is put the fish back in the rivers (elder Barney Williams taken from Nuu−chah−nulth Governance and Fisheries Management, Traditions Consulting 2004)"*

4 Nuu-chah-nulth Worldview

Within the Nuu−chah−nulth worldview, there is a continuity between all elements of Nature, including people, and the animals and fish they seek as prey. These connections must be respected by the Nuu−−chah−−nulth, and are acknowledged through various practices, the most prominent being **ʔuusimch** or the extensive ritual preparation for an undertaking like harvesting. Richard Atleo describes a Nuu−chah−nulth worldview as a “network of relationships” throughout the universe. This philosophy connects people, animals, plants and natural and the spiritual realms in an interconnected web of life worthy of mutual respect, not just as a commodity to be exploited (Atleo, 2004).

hišukʔiš cʼawaak “Everything is one” is a well−known principle amongst Nuu−chah−nulth peoples and is the ultimate principle that guides the others. hišukʔiš cˀ awaak is the foundation on which Nuu−chah−nulth peoples have built upon. Everything is connected. These principles teach us to look at things in their most basic form. The current approach to management where monitoring and assessment are fragmented and separate, would benefit from applying a more holistic Nuu−chah−nulth approach where a connection between these departments could lead to more balance within fisheries and conservation towards true Ecosystem−Based Management.

Despite challenges with direct translations nuučaaʕuɬʔatḥ values and ethics are understood to correspond with Ecosystem Based Management while extending beyond traditional western biology into the dimensions of human culture and society. The right to be alive comes from living in a manner that is sustainable. In order to survive and thrive we must continue as strong people and have the resources to sustain those people and for future generations” (qʷamaḥsaqin, p3, 2022).

Respect for the resources and the Nuu−chah−nulth's essential dependency on the resources result in a high value being placed on sustainability. Fish were not traditionally treated as a commodity for human consumption. Rather fish were respected for what they were in and of themselves. Human beings interacted with fish out of respect for the fish. Certain protocol was required when dealing with living beings out of respect for life and because of the need for the resource to sustain the people forever. Nuu−chah−nulth people and governments acted out of long− term consideration.

Knowledge holders advocate for local collaborative decision−making between governments (Sainsbury et al. 2024). Nuu−chah−nulth see people and territory (ha−houthlee) as inseparable−−as interdependent. Territory and all the living creatures in that territory are also seen as inseparable and interdependent. The Nuu−chah−nulth concept of territory or haʼhoulthee, is fully inclusive in a way that no English word can describe.

Ha−houlthee includes the rights, privileges and responsibilities of those who were stewards of the ha−houlthee. Nuu−chah−nulth have strict laws regarding ownership of territory. Hawilth, hereditary Chiefs, have their ha−houlthee patrolled and looked after by specialists. These people have a deep understanding of the river or mountain under their care. The boundaries are guarded and the resources are kept for the use of the Chief and his people. Use of the resources by outsiders required formal permission. Infractions of territorial boundary laws can mean a penalty as severe as death. Through a comprehensive system that combined monitoring of all species, habitat condition, timing and abundance of resources, and associated species, that led directly to in−season harvest decisions, Nuu−chah−nulth managed using this ecosystem−based approach to avoid overharvest for millennia.

5 WCVI Suuhaa Rebuilt from a Nuu-chah-nulth Perspective

Current strategies for including Indigenous Knowledge (IK) in research and management often focus on assessing species status, socio−ecological system health, or general guidelines for incorporating IK (Singer et al., 2023; Reid et al., 2021; Plagányi et al., 2013). Typically, these approaches create dual criteria for species assessments—one based on IK, the other on scientific knowledge (Singer et al., 2023). The Two−Eyed Seeing framework, proposed by Reid et al. (2021), acknowledges IK and Western science as distinct yet complementary. This process−driven framework allows both forms of knowledge to operate in parallel, leading to a richer, more holistic understanding and mutual respect. Applying this framework in the WCVI Chinook context could unify different knowledge systems to better understand Chinook ecology and co−develop management measures with agreed targets, objectives, and indicators. However, Reid et al. (2021) questions the significance of this approach if it fails to influence policy decisions that ultimately guide fisheries management.

Current frameworks lack specific descriptions for integrating IK and Western science in decision−making, especially in co−developing species rebuilding targets and reference points across broad spatial scales involving many populations and First Nations. Research led by a Nuu−chah−nulth Master's student at the University of Victoria and the Ha'oom Fisheries Society aims to address these gaps by helping three Nuu−chah−nulth communities gather Chinook−related IK to inform their own ecological targets and reference points. The study's primary goals are to identify best practices for synthesizing IK with Western science and to develop an inclusive species rebuilding plan that reflects Nations' ontologies and definitions of a 'healthy' Chinook ecosystem. The first research question asks: What is a healthy Chinook ecosystem according to the Tla−o−qui−aht, Ahousaht, and Mowachaht/Muchalaht First Nation knowledge holders? From this inquiry, indicators of a healthy Chinook ecosystem are expected to emerge. The second question explores how Nuu−chah−nulth Knowledge can be effectively paired with Western science to inform the WCVI Chinook Rebuilding Plan.

6 Objectives aimed at rebuilding the stock

Many First Nations and stakeholders across British Columbia and the West Coast of Vancouver Island rely on WCVI Chinook to support their livelihoods and cultures. DFO recognizes that fisheries, oceans, aquatic habitat and marine waterways are of great social, cultural, spiritual and economic importance to First Nations along WCVI. The ongoing goal of the WCVI Chinook rebuilding process beyond the present Rebuilding Plan is to develop locally specific integrated management plans to allow continued stock growth into the 'healthy zone,' where stock size can support a wide variety of harvest practices.

The following strategic and measurable objectives have been developed by the WCVI Chinook Rebuilding Joint Steering Committee, and are informed by DFO science advice, outcomes of the Marine and Freshwater Risk Assessments, and conversations with First Nations and stakeholders over the past 10 years. Strategic objectives have been developed to describe the overarching goals for a healthy, resilient natural−origin WCVI Chinook population, while the measurable objectives describe specific quantitative targets.

6.1 Strategic Objectives

- Seek to rebuild natural−origin stock abundance and diversity while maintaining and improving food, cultural, social, and economic benefits.
- Manage impacts on natural−origin WCVI Chinook in a manner that does not threaten biodiversity or impede rebuilding.
- In the long−term, rebuild WCVI natural origin Chinook levels to the 'healthy zone' to support sustainable ecosystems and prosperous fisheries.

6.2 Measurable Objectives

This rebuilding plan sets measurable objectives related to three foundational principles:

1. Integrated Rebuilding Target,
2. Collaborative Governance and Planning,
3. Research, Monitoring and Assessment.

This approach acknowledges that rebuilding salmon populations is process that should reflect:

- There are multiple factors associated with stock decline throughout all Chinook life stages and a holistic ecosystem−based approach to assessment and management is required;
- Conserving a stock while also providing sustainable benefits to communities requires managing trade−offs between often conflicting objectives;
- Building a common understanding of the problem and prioritizing actions requires effective engagement, planning and governance;
- Engagement and collaboration with First Nations, municipal, provincial and federal governments is key for successful implementation of this plan and its recommendations.
- The rebuilding process should use adaptative management principles; recognizing that our knowledge is incomplete but that we can learn and adapt through effective monitoring and assessment.

6.2.1 Integrated Rebuilding Target

The Rebuilding Targets for natural−origin WCVI Chinook go beyond simply using abundance as a measure of stock status, to include a more holistic, collaboratively developed list of targets that will be required to move the SMU from the critical zone to the cautious zone. Based on advice from DFO Science (Brown et al. in review) and WCVI First Nations, the rebuilding targets for natural−origin WCVI Chinook describe three tiered objectives: 1) an aggregate abundance with a specific spatial distribution across the SMU, 2) a majority proportion of natural−origin spawners, 3) that are increasingly bigger and older fish, leading to increasing egg deposition rates. For the rebuilding target to be met, all three of these objectives must be achieved.

Integrated Rebuilding Targets are developed at both the SMU and CU scale to provide direction to specific local plans that will be developed at the watershed scale. The management measures associated with the Integrated Rebuilding Targets describe the development of locally specific habitat, hatchery and harvest management plans in the coming years, with the sum of these local plans aligning with the CU− and SMU−level objectives described within this plan.

6.2.2 Natural-origin Chinook Indicator Rivers

Seventeen natural−origin Chinook rivers have been identified as suitable indicators to measure the integrated rebuilding targets (Figure 6.1, Table 6.1; Brown et al. In review[1]). These rivers were identified due to their availability of long−term abundance estimates with moderate to high confidence. Additional indicator rivers may be added in the future. Suitable indicator rivers for WCVI Chinook should have a considerable quantity of accessible watershed area for spawning (i.e., ≥ 10km^2) and assessment programs implemented that yield reliable annual abundance estimates.

Although progress towards meeting the measurable objectives will be measured using the 17 natural−origin indicator rivers, rebuilding efforts will not be limited to these 17 rivers.

Table 6.1. List of 17 natural−origin Chinook indicator rivers identified to measure the integrated rebuilding targets.

Conservation Unit	Indicator River
Northwest Vancouver Island (NWVI)	Marble
	Cayeghle
Nootka Kyuquot (NoKy)	Tahsish
	Artlish
	Kaouk
	Zeballos
	Tahsis
	Leiner
	Gold* (indicator river for aggregate abundance rebuilding target, but not used as an indicator river for genetic rebuilding target)
	Burman
South West Vancouver Island (SWVI)	Megin
	Moyeha
	Bedwell
	Tranquil
	Nahmint
	Sarita
	San Juan

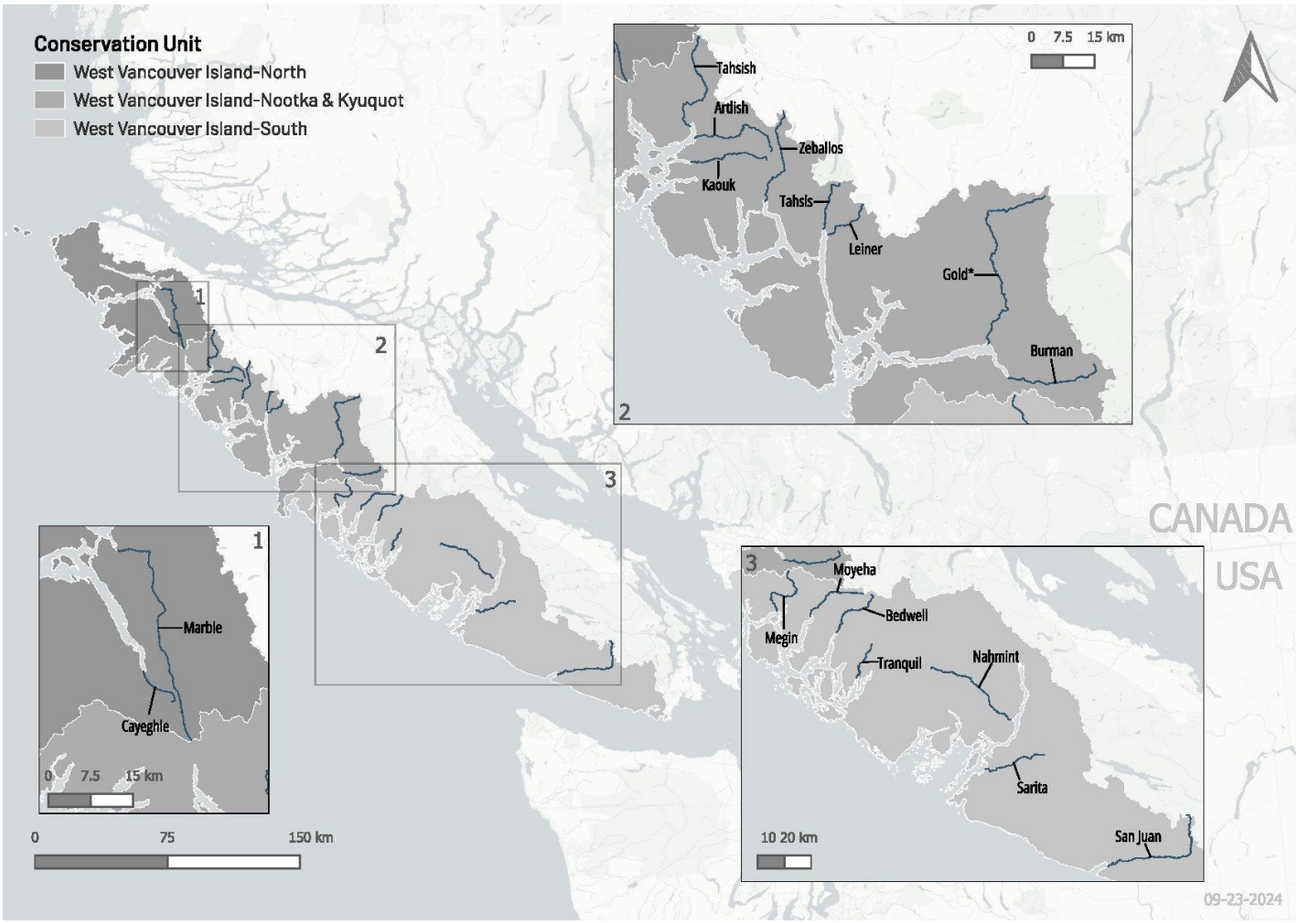

*Figure 6.1. The WCVI SMU consists of 3 Wild Salmon Policy CU with about 50 rivers consistently supporting Chinook populations as well as their nearshore marine environment. Adapted from Holt et al (2023). * Gold river is included as an indicator river for the aggregate abundance rebuilding target, but is not used as an indicator river for the genetic rebuilding target.*

Table 6.2. Measurable objectives for natural−origin WCVI Chinook rebuilding, the timeline to achieve these measurable objectives, and the metrics being used to track progress towards these objectives, as resources allow.

Measurable Objectives	Timeline	Metric to Measure Progress
Integrated Rebuilding Target		
1. **Abundance Target:** Increase the 4−year rolling average aggregate spawning abundance of natural−origin WCVI Chinook in the 17 natural−origin indicator rivers (see figure) to 10,617 individuals (25% above the summation of CU Sgens), with a distribution of at least 2,903 individuals in SWVI, 4,950 individuals in NoKy, and 640 individuals in NWVI. For this objective to be met, the 4−year rolling average must exceed the aggregate spawning abundance in 4 years of every 8. * Rebuilding efforts will not be limited to the 17 indicator rivers; these are currently being used as the metric to measure aggregate abundance across the SMU due to data availability	12 years (3 Generations)	Aggregate abundance, based on data from both DFO and WCVI First Nations, is measured yearly, but there are not currently assessments being completed on all of the 17 indicator rivers to determine how many fish are natural−origin each year. *To be able to measure this objective with high confidence, all hatchery fish would need to be adipose clipped (i.e., mass marked) for visual identification, or capacity for genetic sampling and monitoring would need to increase significantly.*
2. **Genetic Target**: Build towards and then maintain a genetic influence dominated by natural−origin Chinook within each indicator river*. This is measured by maintaining an "Integrated−transition" biological designation as defined by CSAS for the enhanced populations (PNI ≥ 0.50 over a 4−year rolling average for the 16 indicator rivers), and a pHOS−stray <0.03 for the unenhanced indicator populations. *Note that the Gold River has been removed from the list of indicator rivers for this target, as this river is dominated by hatchery strays from Robertson Creek and is believed to be an outlier. The Gold River genetic status will still be measured.	12 Years (3 Generations)	PNI is estimated annually for all enhanced populations. Stray rates (pHOS−stray) can be estimated in streams that are visually assessed and if all hatchery fish are adipose−clipped. Stray rates can also be estimated by employing genetic sampling and testing, which are currently intermittent.
3. **Demographics Target**: Improve our understanding of factors impacting demographics of natural−origin WCVI Chinook to be able to better support future management decisions.	N/A	Track progress towards the completion of a comprehensive report that analyzes the costs and benefits of different management actions designed to improve population demographics, e.g., submitting request for science advice, assigning authors and SMEs, and drafting of report.
Collaborative Governance and Planning Objectives		

Measurable Objectives	Timeline	Metric to Measure Progress
4. Collaboratively implement the WCVI Chinook rebuilding plan and evaluate implementation and progress towards achieving rebuilding objectives.	N/A	Track development of an implementation plan, including assigning implementation coordinators and determining the role of a steering committee.
5. Continue to engage and collaborate with First Nations on the WCVI Chinook rebuilding process in a manner that respects of both treaty and non−treaty arrangements.	N/A	Track inclusion of WCVI Rebuilding Plan implementation discussion in current committees, steering committees and area round tables.
6. Continue to engage and collaborate with stakeholders and other levels of governments on the WCVI Chinook rebuilding process.	N/A	Track inclusion of WCVI Rebuilding Plan implementation discussion in current committees, steering committees and area round tables.
Research, Monitoring and Assessment Objectives		
7. Improve understanding of highest risk factors and key knowledge gaps from Marine Risk Assessment and Freshwater Risk Assessment that are believed to be limiting production of natural−origin WCVI Chinook, and effectiveness of potential mitigations.	N/A	Completion of a report on Follow the Fish (March 2026). Completion of a report summarizing the Freshwater RAMS process. Track number of CSAS processes and new research projects implemented by both DFO and First Nations.

7 Management measures aimed at achieving the measurable objectives

7.1 Introduction

These management measures describe a multi−faceted, integrated approach to achieving the objectives of this rebuilding plan. The management measures aim to mitigate the highest risk factors identified in the marine and freshwater risk assessments (Brown et al. In Review[1]) and to highlight key areas of research, monitoring and assessment that are required to support the development of future management measures. Implementing these management measures will require an integrated approach across DFO programs, First Nations, stakeholders, and other levels of government.

The management measures outlined below describe current initiatives being implemented by DFO and WCVI First Nations, as well as potential new initiatives. To fully implement the management measures outlined in this plan, there will be requirements for new resources and capacity, and/or a reprioritization of current resources. However, there are many measures that can be implemented with the resources available to DFO, First Nations and stakeholders, and a lack of new resources should not prevent management measures from being implemented where possible.

The management measures as they are written within this plan aim to describe what are currently perceived as the best ways to achieve the rebuilding objectives. As our knowledge of the limiting factors impacting natural−origin WCVI Chinook improves, management measures must be expanded or updated to reflect this new knowledge.

7.1.1 Habitat

The Freshwater Risk Assessment (FWRA) highlighted numerous habitat−related high risks impacting WCVI Chinook throughout their life cycle (Brown et al in review[1]). Developing and implementing scientifically and locally informed habitat restoration plans to address key risks impacting natural−origin WCVI Chinook will be key to supporting long term rebuilding, particularly in a changing climate. Long term, process−based, habitat restoration measures, need to go hand in hand with more immediate management measures to best support rebuilding. The measures identified below support an adaptive management approach to protecting and rehabilitating WCVI Chinook habitat, including critical monitoring and research activities to support learning and improvements over time.

7.1.2 Hatchery

Managing the genetic effects of hatchery chinook on natural−origin WCVI Chinook will be required to support rebuilding of natural−origin Chinook while still allowing harvest of WCVI Chinook throughout Alaska and the Pacific Region. Mass marking all hatchery origin Chinook is key action to managing these genetic effects, both to better identify impacts and to increase opportunities to apply harvest management measures such selective removals in terminal and non−terminal areas. DFO Salmon Enhancement Program is already implementing a variety of other management measures to limit hatchery impacts on natural−origin WCVI Chinook and will continue to implement and expand these programs in collaboration with First Nations and relevant stakeholders.

7.1.3 Harvest

Harvest management measures have been developed to mitigate the highest risks from fishery harvest, and hatchery impacts on genetics, as determined by the MRA and FWRA (see section 3). Harvest measures outline steps to evaluate the risks and benefits of selective harvest in non−terminal areas for hatchery fish, better understand the mechanisms that are leading to changes in demographics, and evaluate the costs and benefits of implementing new harvest management measures to limit these impacts. Currently, existing harvest management measures to limit harvest on natural−origin WCVI Chinook remain in place as part of this plan. Any future changes to harvest management of WCVI Chinook will be determined through consultation and engagement with First Nations and stakeholders via salmon area round tables, harvest committees, Nation to Nation discussions, discussions through the Pacific Salmon Treaty, and the Southern BC Pacific salmon IFMP.

7.1.4 Aquaculture

Open net−pen salmon aquaculture is a key issue for First Nations across WCVI, with differing perspectives on the risks and benefits of open net−pen salmon aquaculture. The Draft Salmon Aquaculture Transition Plan for British Columbia outlines next steps in the development of a responsible approach to support the transition from open net−pen salmon aquaculture to more sustainable and innovative approaches, with an implementation of a ban on open net−pen salmon aquaculture in B.C. coastal waters effective July 1, 2029. The final Transition Plan is expected to be released in 2025.

Table 7.1 *Summary of management measures aimed at achieving the rebuilding plan objectives, as resources allow.*

Management lever	Management measure(s)	Sub-Actions	Expected outcome	Biology or environmental conditions taken into account
Habitat	Develop plans and strategies to protect and rehabilitate Chinook habitat across WCVI, including prioritization of geographic areas and appropriate actions.	Co−develop geomorphologically−informed restoration strategies and plans based on the most recent and/or best available scientific and Indigenous knowledge, beginning with the 17 indicator rivers and their watersheds.	Increased quantity and quality of freshwater habitat, leading to increased spawning success, egg−to−fry survival, and juvenile survival and fitness.	See Section 3 on Probable Causes of Decline
Habitat	(cont.) Develop plans and strategies to protect and rehabilitate Chinook habitat across WCVI, including prioritization of geographic areas and appropriate actions.	With First Nations partners, identify key areas for conservation and protection of high−value Chinook habitat, including but not limited to stream reaches in good geomorphic condition, forested floodplains and headwater streams that support ecological, hydrological, and geomorphological processes that create and sustain freshwater Chinook habitat	Protection of intact or high−value freshwater and nearshore marine habitat.	See Section 3 on Probable Causes of Decline
		Develop sediment management plans, slope stabilization strategies, and road deactivation plans where alterations to the sediment	Increased quantity and quality of freshwater habitat, leading to increased spawning success, egg−to−fry	See Section 3 on Probable Causes of Decline

Management lever	Management measure(s)	Sub-Actions	Expected outcome	Biology or environmental conditions taken into account
		regime, such as sediment surplus or changes in composition, are limiting factors	survival, and juvenile survival and fitness.	
		Provide guidance on watershed assessment and rehabilitation planning to promote consistency across WCVI; guidance should include understanding river character and behavior, condition assessments, determining recovery potential, and systematic prioritization of rehabilitation options	Improved consistency, effectiveness and efficiency of restoration actions across WCVI watersheds	See Section 3 on Probable Causes of Decline
		Develop a prioritized list of freshwater habitat restoration projects that will address high risk limiting factors and immediately benefit WCVI Chinook, in conjunction with longer term process−based restoration	Short−term increases in habitat quality and quantity leading to improved freshwater survival.	See Section 3 on Probable Causes of Decline
Habitat	Protect areas of high−value Chinook habitat and areas with good geomorphic and ecological conditions.	Support the Indigenous−led conservation initiatives that protect areas with high value Chinook habitat identified in watershed assessments and plans.	Protection of intact or high−value freshwater and nearshore marine habitat, preventing further impacts to freshwater habitat and fluvial processes.	See Section 3 on Probable Causes of Decline
		Work with First Nations, other levels of government, and other partners to protect areas with intact or high−value fluvial processes that create and maintain Chinook habitat.		
Habitat	Continued support for, and partnering in, the implementation of freshwater and nearshore ecosystem restoration and rehabilitation initiatives and	Implement priority freshwater and nearshore ecosystem restoration projects and management strategies identified in restoration plans. Example measures include: restoration of forested areas in floodplains and	Increased quantity and quality of freshwater habitat, leading to increased spawning success, egg−to−fry	See Section 3 on Probable Causes of Decline

Management lever	Management measure(s)	Sub-Actions	Expected outcome	Biology or environmental conditions taken into account
	management strategies targeting key limiting factors and processes that create and sustain Chinook habitat.	headwater streams, improving floodplain connectivity, implementing slope stabilization measures, and mitigating the effects of river scour and aggradation in critical spawning areas of index rivers.	survival, and juvenile survival and fitness.	
		Collaborate with First Nations, municipalities, BC Government, BC Hydro and relevant stakeholders to develop and regulate flow control schedules that support Chinook migration, spawning, incubation and rearing.	N/A	
Habitat	(cont.) Continued support for, and partnering in, the implementation of freshwater and nearshore ecosystem restoration and rehabilitation initiatives and management strategies targeting key limiting factors and processes that create and sustain Chinook habitat.	Implement climate change adaptation strategies including but not limited to water storage options (e.g. natural wet land storage, beaver dams, forest and wetland restoration, engineered water control structures and more) to support drought and flood management across WCVI as identified in watershed restoration plans.	Mitigation of climate change impacts including drought and high flow conditions, increased stream temperature, and others.	See Section 3 on Probable Causes of Decline
		Implement priority freshwater habitat restoration projects that will provide immediate benefit to WCVI Chinook, in conjunction with longer term process−based restoration programs.	Short−term increases in habitat quality and quantity leading to improved freshwater survival.	
Research, Monitoring and Assessment - Habitat	Implement research projects to better understand high habitat risks impacting WCVI Chinook rebuilding, fill key habitat knowledge gaps identified by Marine and	Support advancements and pilot novel watershed and nearshore assessment and restoration frameworks, methods and tools	Improvements in efficiency, effectiveness and strategic selection of restoration and habitat management actions.	See Section 3 on Probable Causes of Decline

Management lever	Management measure(s)	Sub-Actions	Expected outcome	Biology or environmental conditions taken into account
	Freshwater Risk Assessments, and support habitat management actions and decisions.	that can be systematically applied across the diversity of WCVI habitats		
		Continued support for, and partnering in, effectiveness monitoring and adaptive management of Chinook habitat conservation, restoration and rehabilitation	Improved understanding and ability to improve restoration action outcomes.	N/A
Research, Monitoring and Assessment - Habitat	(cont.) Implement research projects to better understand high habitat risks impacting WCVI Chinook rebuilding, fill key habitat knowledge gaps identified by Marine and Freshwater Risk Assessments, and support habitat management actions and decisions.	Monitor habitat status and trends in 17 indicator streams for WCVI Chinook based on key ecological, geomorphic and hydrological indicators	Improved ability to track change in habitat condition over time.	N/A
		Continue to investigate and improve understanding of WCVI Chinook habitat response to common disturbances and land use impacts in WCVI streams, including development and application of conceptual models of stream evolution in response to disturbance and restoration interventions	Improved understanding of how rivers will respond to continuing disturbance and restoration activities.	See Section 3 on Probable Causes of Decline
		Evaluate and monitor hydrological conditions within WCVI Chinook indicator watersheds to gain a deeper understanding of climate change impacts, habitat conditions, and recovery trends over time.	Improved understanding of hydrological condition and ability to plan successful restoration outcomes.	See Section 3 on Probable Causes of Decline
		Continue to investigate limiting factors affecting freshwater life history phases of WCVI Chinook to address knowledge gaps such as egg to fry survival and early rearing conditions.	Improved understanding of key risks and impacts to WCVI Chinook	See Section 3 on Probable Causes of Decline

Management lever	Management measure(s)	Sub-Actions	Expected outcome	Biology or environmental conditions taken into account
Genetic Effects from Hatchery Production	Expand mass marking of WCVI hatchery Chinook production, where appropriate and feasible	Assess requirements/benefits of mass marking on a population−specific basis. Determine operational feasibility of individual facilities' capacities for mass marking of target populations.	Increased ability to distinguish hatchery Chinook from natural−origin Chinook.	See Section 3 on Probable Causes of Decline
Genetic Effects from Hatchery Production	Establish population−specific enhancement plans that document objectives, strategies, genetically− based biological goals, and project performance assessment metrics to support adaptive management	Enhancement Plan Development is underway for WCVI populations. Compile priority list of Enhancement Plans to develop and outline support and information required. Establish timeline for completion. Investigate binning similar populations to improve efficiency of plan development.	N/A	N/A
Genetic Effects from Hatchery Production	Employ hatchery strategies expected to improve natural productivity in WCVI Chinook	Examples (but not limited to): 1) Revised mating protocols − implement science advice of hatchery spawning guidelines. 2) Investigate hatchery out−crossing strategies. 3) Investigate effectiveness of captive breeding programs	Improved natural productive in natural−origin WCVI Chinook.	See Section 3 on Probable Causes of Decline
Genetic Effects from Hatchery Production	Employ hatchery strategies to reduce risks to natural−original Chinook	Examples (but not limited to): 1) Transparently identify levels of hatchery genetic influence likely required to meet objectives of various environment projects. 2) Employ strategies to reduce genetic risks of hatchery straying. 3) Screening of hatchery fish prior to release for parasites and pathogens	Reduced impacts of hatchery fish on natural−origin Chinook.	See Section 3 on Probable Causes of Decline
Research, Monitoring and	Implement research projects to better understand high genetic effect risks impacting WCVI Chinook rebuilding,	Develop and implement a dedicated and structured program to monitor straying within	N/A	N/A

Management lever	Management measure(s)	Sub-Actions	Expected outcome	Biology or environmental conditions taken into account
Assessment – Genetic Effects from Hatchery Production	fill key genetic effect knowledge gaps identified by Marine and Freshwater Risk Assessments, and support hatchery management actions and decisions.	WCVI that include monitoring of straying between populations within a CU, as well as across CU boundaries.		
		Increase genotyping capacity to support natural origin WCVI Chinook rebuilding	N/A	N/A
Fishery Harvest	In future Pacific Salmon Treaty (PST) discussions propose expanding PST monitoring boundaries to include fisheries operating in western Alaska where WCVI Chinook are caught to better account for harvest in these areas	N/A	N/A	N/A
Fishery Harvest	Where appropriate and feasible, implement selective removals of hatchery−marked fish in terminal areas to support rebuilding of natural origin WCVI Chinook	Consider and evaluate with engagement of First Nations, the use of mark−selective fisheries where stock−specific removals of hatchery origin fish for the major enhanced WCVI Chinook populations can be achieved and adequately monitored and evaluated.	Decreased abundance of hatchery fish on spawning grounds, leading to reduced genetic influence from hatchery origin fish	See Section 3 on Probably Causes of Decline
Fishery Harvest	As information on impacts of recreational and commercial troll fisheries on demographics of WCVI Chinook become available, apply appropriate management measures if necessary	N/A	N/A	N/A
Research, Monitoring and Assessment – Fishery Harvest	Implement research projects to better understand high harvest risks impacting WCVI Chinook rebuilding, fill key harvest risk knowledge gaps identified by Marine and Freshwater Risk Assessments, and support fisheries management actions and decisions.	Evaluate impact of selective removals (e.g. MSFs) in non−terminal areas and how they may be used as tools to decrease harvest rates on natural−origin WCVI Chinook	N/A	N/A
		Peer review and publish existing catch reporting data describing impacts of fisheries	N/A	N/A

Management lever	Management measure(s)	Sub-Actions	Expected outcome	Biology or environmental conditions taken into account
		on demographics of WCVI Chinook (and all Chinook populations)		
		Implement monitoring programs to understand impacts of recreational and commercial troll fisheries on demographics of WCVI Chinook	N/A	N/A
		Prepare a research summary report that evaluates the potential benefits and costs of different management measures aimed at improving demographics of natural–origin WCVI Chinook improving demographics of natural–origin WCVI Chinook	Decreased abundance of hatchery fish on spawning grounds, leading to reduced genetic influence from hatchery origin fish	See Section 3 on Probably Causes of Decline
Aquaculture	The transition to closed containment salmon fish aquaculture will be managed through the Salmon Aquaculture Transition Plan for British Columbia, expected to be released in 2025*. *It should be noted that open net–pen salmon aquaculture is a key issue for First Nations, with differing perspectives on the risks open net–pen salmon aquaculture poses to natural–origin WCVI Chinook.	Engagement and consultation on the Draft Salmon Aquaculture Transition Plan for British Columbia is currently underway led by Innovation, Science and Economic Development (ISED). An Interdepartmental Task Force on Salmon Aquaculture Transition has been established and is currently engaging with those directly and indirectly affected by this transition to discuss how best to support them and to inform a final version of the transition plan, expected to be released in 2025.	N/A	See Section 3 on Probable Causes of Decline
Research, Monitoring and Assessment - General	Review ongoing First Nation and DFO monitoring projects and where possible align work to better measure progress towards objectives and support management decisions	Work with the WCVI First Nations to identify opportunities for joint delivery of monitoring and assessment projects.	N/A	N/A

Management lever	Management measure(s)	Sub-Actions	Expected outcome	Biology or environmental conditions taken into account
Research, Monitoring and Assessment - General	Implement research projects to better understand high risks impacting WCVI Chinook rebuilding, fill key knowledge gaps identified by Marine and Freshwater Risk Assessments, and support management actions and decisions.	Synthesize outcomes of Follow the Fish Research project, and assess the need for new or ongoing research projects.	N/A	N/A
		Implement research programs to better understand how increased water temperatures are impacting parasite and pathogens along WCVI.	N/A	See Section 3 on Probable Causes of Decline
		Monitor near shore migration corridors for parasites and pathogens of the 17 Index Populations.	N/A	See Section 3 on Probable Causes of Decline
		Initiate a salmon and climate informed assessment of the WCVI marine ecosystem.	N/A	N/A
		Enhance research on predation effects: Conduct targeted studies to better understand the impacts of various predators on Chinook during all life stages, with an emphasis on smolts and returning adults.	N/A	See Section 3 on Probable Causes of Decline
Research, Monitoring and Assessment - General	Continue to develop a decision−support tool for Pacific salmon management, with WCVI Chinook as a case study	N/A	N/A	N/A
Collaborative Governance and Planning	Develop an Implementation and Review Processes for the WCVI Chinook Rebuilding Plan. This process should include: Clear timelines and milestones for each management measure, regular review meetings to	N/A	N/A	N/A

Management lever	Management measure(s)	Sub-Actions	Expected outcome	Biology or environmental conditions taken into account
	assess progress, address challenges, and adjust actions as needed.			
Collaborative Governance and Planning	Assign a dedicated coordinator(s) to oversee the implementation of the WCVI Chinook Rebuilding Plan. This role(s) should include representation from DFO, as well as from a group well positioned to bring together necessary local collaborators. The coordinating team would be responsible for tracking the outcomes and status of management measures, coordinating regular implementation reviews, and maintaining effective communication across all involved entities.	N/A	N/A	N/A
Collaborative Governance and Planning	Leverage Existing Committees and Groups to support integrated implementation of the WCVI Chinook Rebuilding Plan.	Embed rebuilding plan discussions on clear deliverables and implementation of the WCVI Rebuilding Plan into the agendas of current steering committees, First Nations organizations, round tables, treaty established processes, and other relevant groups to ensure continuity without creating new bodies.	N/A	N/A
		If deemed necessary, maintain a Joint Steering Committee with WCVI First Nations to coordinate and provide strategic guidance to implement the WCVI Chinook Rebuilding Plan.	N/A	N/A
Collaborative Governance	When management options are outside of DFO jurisdiction, DFO supports Nations to engage with the relevant federal agencies, other levels of government and stakeholders	N/A	N/A	N/A

Management lever	Management measure(s)	Sub-Actions	Expected outcome	Biology or environmental conditions taken into account
Collaborative Governance	Continue to engage with other levels of government and stakeholders on WCVI Chinook Rebuilding, such as through salmon area roundtables, SFAB and IHPC	N/A	N/A	N/A
Collaborative Governance	Establish a centralized communication hub to streamline information flow between DFO, Nations, and other stakeholders. Develop and maintain a tool that allows all participants to access key documents, timelines, and status updates in real time.	N/A	N/A	N/A

8 Periodic review of the rebuilding plan

Stock rebuilding is not always a slow and steady, or even predictable process. Stocks may fluctuate and/or persist at low levels for years until conditions promote rapid population growth, resulting in rapid growth of the population. Thus, lack of progress towards rebuilding may not always be an indication that the rebuilding plan's objectives or management measures are insufficient or ineffective and will be dependent on available resources.

The rebuilding plan will be reviewed 1 year after completion to incorporate key knowledge on objectives and management measures from two research programs finishing in March 2026, and then every 5 years thereafter. The review beginning in April 2026 will be to determine if there are any updates or changes to the Rebuilding Plan objectives and management measures, based on new knowledge generated through the Follow the Fish project, a multi−year project researching the main causes of juvenile Chinook mortality, and a Masters thesis project currently being completed on Nuu−chah−nulth Rebuilding Objectives.

Each 5−year review will be used to determine whether progress towards the plan's objectives is being made and whether revisions to the rebuilding plan are necessary in order to achieve those objectives. The 5−year timeframe was chosen to reflect the longer time frame of many of the management measures described within the plan. Review of the transition to closed containment salmon fish aquaculture being managed through the Salmon Aquaculture Transition plan for British Columbia is being completed by DFO. This rebuilding plan may be updated to reflect any updates in the Transition plan.

Additional reviews may also be conducted outside the schedule stated above due to exceptional circumstances. For WCVI Chinook, exceptional circumstances are defined as:

- An unforeseen event has occurred that may impact the purpose of the rebuilding plan
- Stock status has drastically changed before the next scheduled review
- Any other circumstance that warrants a review of the rebuilding plan

The review will be based on the data gathered using the metrics identified in the Measurable Objectives Table (Table 6.2). It will assess the progress of the implementation of management measures and evidence of their effectiveness, as well as the status of the stock and recent trends. In addition, the review will include opportunities for engagement with First Nations and relevant stakeholders on their views of the stock's progress towards rebuilding.

The review process will generate a brief report that evaluates progress towards each management objective against their timelines with accompanying evidence and states whether adjustments to the rebuilding plan were determined to be necessary to achieve the objectives. These reports will be appended to the rebuilding plan once completed. Where progress towards an objective is not being made, modifications to the plan may be considered. This process will involve engagement with First Nations and relevant stakeholders.

9 References

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