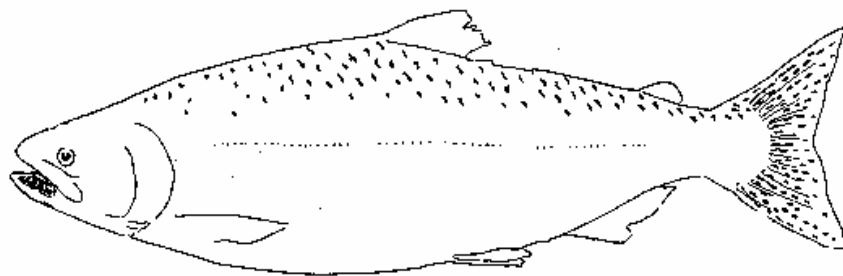


2008

**Information Document to Assist
Development of a**

Fraser Chinook Management Plan



RECORD OF REVISIONS

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1. Introduction

Fraser River Chinook salmon are an important part of the ecology of the Fraser River watershed. They are the largest of the seven species of Pacific salmon (including steelhead and anadromous cutthroat) returning to the Fraser and have the widest distribution, with some stocks migrating distances over 900 km from the mouth to systems near the headwaters of the Fraser. They have sustained First Nations for thousands of years, provide important recreational harvesting opportunities, and were an important part of the colonization of British Columbia and commercialization of the British Columbia fishing industry.

This information document is intended to compliment the Southern BC Integrated Fisheries Management Plan for salmon. This document is necessary as Chinook fisheries in the Lower Fraser area generally start in March, the estimate of aggregate abundance used to determine allowable harvest levels for Chinook is also available in March but the Integrated Fishery Management Plans are usually not finalized until June or July of a given year.

Fisheries and Oceans Canada will continue to consult with First Nations, recreational and commercial fishers to further co-ordinate Chinook fishing plans for 2008. Further consultation will occur as sector specific plans are finalized.

2. Lifecycle

Chinook salmon spawn in numerous tributary systems throughout the Fraser River watershed from just above the tidal limits to the upper tributaries of the Stuart drainage and Tete Jaune Cache near Mount Robson. Fry emerge from the gravel in the spring following spawning and rear as juveniles in fresh water for varying periods of time. The time the juveniles spend in freshwater is an important characteristic of the life history exhibited by the population. In the Fraser River, there are several distinctly different life histories exhibited by Chinook salmon.

Chinook life history can be categorized into two distinct behavioural forms: stream-type and ocean-type¹.

Stream-type Chinook spend one or more years as juveniles in fresh water before migrating to sea. Another way of saying this is that, as juveniles they over-winter in freshwater and then enter the ocean in the second spring of their life². Stream-type Chinook generally exhibit an extensive off-shore ocean migration and return to the Fraser River in the spring or summer, several months before spawning. Juveniles of this type are sometimes referred to as “yearlings” or “1+ smolts”.

¹ Healey, M.C. 1991. The life history of Chinook salmon (*Oncorhynchus tshawytscha*). Pages 311-393 in C. Groot and L. Margolis, editors. Pacific salmon life histories. UBC Press, Vancouver.

² Fraser, F.J., P.J. Starr, and A.Y. Fedorenko. 1982. A review of the chinook and coho salmon of the Fraser River. Can. Tech. Rep. Fish. Aquat. Sci. 1126: 130p.

Ocean-type Chinook migrate to sea during their first year of life, generally after spending two to five months in fresh water³. Ocean-type Chinook spend most of their ocean life in coastal waters and generally return to the Fraser River in the fall, a few days or weeks before spawning. Juveniles of this type are sometimes referred to as “underyearlings” or “0+ fry”.

Of importance to Fraser River Chinook is a variation of the ocean-type life history. Harrison River Chinook (and their transplants) exhibit an immediate fry migration pattern. That is, upon emergence from the gravel, they migrate immediately downstream to the estuary. They rear in the estuary for three to six weeks before moving off-shore. This unique ocean-type life history is sometimes referred to as an “immediate-type” or “immediate fry migrant” life history.

Chinook smolts adapt to salt water in the Fraser River estuary before migrating into marine waters. While the majority of lower Fraser stocks rear off the south-west coast of Vancouver Island (Harrison and Chilliwack fall stocks), coded wire tag (CWT) information has shown that other stocks may be found over a wide geographic area with many spring and summer run populations⁴ utilizing offshore marine waters. Other populations migrate and reside at least as far north as Southeast Alaska. During their ocean residence and depending on their ocean rearing location and return migrations, Chinook may be subject to numerous fisheries. Offshore migrants such as the Interior spring and summer yearlings are less vulnerable to coastal fisheries than Lower Fraser fall stocks and South Thompson summer stocks.

After one to three years spent feeding at sea, Chinook return to the Fraser River from February to November, primarily as three, four and five year old fish. They migrate back to their natal streams where spawning activity commences from early August until mid-November depending on the system. The following spring, the fry of these returning fish emerge from the gravel and the lifecycle begins anew.

2.1. Nomenclature

In many documents, age and life history type are expressed as a group of numbers such as 4₂ (Gilbert and Rich format) or 1.2 (European format). These notations can be confusing and an attempt is made here to shed some light on what they represent.

In the Gilbert-Rich (G-R) format the large number “4” represents the age of the fish on it’s next “birthday” or the number of winters from its deposition in the gravel as an egg to the time of sampling.⁵ The subscript number “2” represents the year in which the fish migrated to the ocean (i.e. it migrated as a one year-old in its second year of life). The subscript number can also be interpreted as the number of winters spent in freshwater

³ Department of Fisheries and Oceans (DFO). 1995. Fraser River Chinook. Prepared for DFO by Fraser River Action Plan. Vancouver, BC.

⁴ see section 5.1 Stock Assessment – Management Units, for a definition of spring and summer-run

⁵ Note: a common mistake is the belief that the first G-R number represents age; however, this is not the case in most situations. A fish sampled in the marine areas that is aged 4₂ is not a 4 year-old fish, it is in fact a 3 year-old fish in its 4th year of life. The exception would be aged samples from spawning ground carcasses where the fish would have just had its 4th “birthday”

from the egg stage. The 4₂ age format can also be expressed as 4sub2. To obtain the parental brood-year, simply subtract the first number from the sample year.

A 1.2 fish in the European format is the same as a 4₂ fish in the G-R format. Here, the number “1” represents the total number of complete years the fish spent in freshwater (or the number of winters from hatching the fish spent in fresh water), and the number “2” represents the total number of complete years spent in the ocean (or the number of winters the fish spent in the ocean). To obtain the parental brood-year, add 1 to the sum of the 2 numbers and subtract from the sample year.

3. General Context

3.1. Policy Framework for the Management of Pacific Salmon Fisheries

Salmon management programs in 2008 will continue to be guided by policy and operational initiatives adopted over the past several years. These include; *Canada's Policy for Conservation of Wild Pacific Salmon* (WSP), *An Allocation Policy for Pacific Salmon*, Pacific Fisheries Reform, *A Policy for Selective Fishing*, *A Framework for Improved Decision Making in the Pacific Salmon Fishery*, and *Fishery*, the Integrated Harvest Planning Committee and the Pacific Integrated Commercial Fisheries Reform package.

Canada's Policy for Conservation of Wild Pacific Salmon (also called the Wild Salmon Policy) sets out the vision regarding the importance and role of Pacific Wild Salmon as well as a strategy for their protection. More information on this can be found on the internet at http://www-comm.pac.dfo-mpo.gc.ca/publications/wsp/default_e.htm

An Allocation Policy for Pacific Salmon, announced in 1999, is a significant step towards providing certainty and fairness by establishing clear priorities for allocation between First Nations, commercial and recreational harvesters and forms the basis for general decision guidelines used for planning fisheries.

Pacific Fisheries Reform, announced by the Department in April 2005, provides a vision of a sustainable fishery where the full potential of the resource is realized, Aboriginal rights and title are respected, there is certainty and stability for all, and fishery participants share in the responsibility of management. Future treaties with First Nations are contemplated, as is the need to be adaptive and responsive to change. This policy direction provides a framework for improving the economic viability of commercial fisheries, and to addressing First Nations aspirations with respect of FSC and commercial access and involvement in management. Work has also been initiated in developing a vision for recreational fisheries to better understand their place in future fisheries. Pacific Fisheries Reform is consistent with existing fisheries management policies and is central to ensuring well integrated, sustainable fisheries for salmon.

In January 2001, the Department released *A Policy for Selective Fishing in Canada's Pacific Fisheries*. Under the Department's selective fishing initiative, harvester groups have experimented with a variety of methods to reduce the impact of fisheries on non-target species, with a number of measures reaching implementation in fisheries.

Consultative elements of an *Improved Decision Making* discussion paper have been implemented through establishment of the Consultation Secretariat, which works to improve the flow of information between stakeholders and the Department. Up-to-date information pertaining to on-going consultations can be found on the Secretariat's website at: http://www-comm.pac.dfo-mpo.gc.ca/pages/consultations/consult_e.htm

The Integrated Harvest Planning Committee (IHPC) for salmon is comprised of First Nations, recreational and commercial interests (as represented by the Sport Fishing Advisory Board and the Commercial Salmon Advisory Board) and the Marine Conservation Caucus (representing a coalition of environmental organizations). This committee is recognized as the primary source of stakeholder input into Integrated Fisheries Management Plans for Salmon.

Further information on salmon consultations, including terms of reference, membership, meeting dates and records of consultation can be found on the Salmon Consultation website at: http://www-ops2.pac.dfo-mpo.gc.ca/xnet/content/consultations/salmon/sapdefault_e.htm

3.2. Pacific Salmon Treaty (PST)

In March 1985, the United States and Canada agreed to co-operate in the management, research and enhancement of Pacific salmon stocks of mutual concern by ratifying the Pacific Salmon Treaty (PST). Under the Treaty, Canada and the United States agreed on a Chinook conservation program (based on fixed catch ceilings in certain major mixed-stock ocean fisheries) to rebuild stocks from both countries by 1998. This strategy has met with mixed success; some populations are slowly rebuilding, while others remain depressed.

Starting in 1985, Canada based its Chinook fisheries management on a rebuilding strategy. Total exploitation rates on a brood year were reduced from past high levels in the range of 75% - 85%. The minimum requirement of the Pacific Salmon Treaty (1985) was a 15% reduction in total exploitation of the four indicator stocks identified at that time. This was in addition to domestic measures already in place, such as the closure of the terminal Fraser River commercial gillnet fishery, and measures required in pass-through fisheries to protect specific stocks.

The PST was revised in 1999 through amendments to the "fishing chapters" contained in Annex IV of the Treaty. Chinook management changed so that fishing levels would vary in response to the annual production of Chinook salmon (aggregate abundance-based management or AABM). If the ocean abundance of Chinook was poor, then the allowable harvest rates and catches would be reduced so that spawning escapements were protected. However, if the ocean abundance of Chinook was very good, then harvest

rates and catches could increase, but only to a level that still protected spawning escapements.

The 1999 PST Annexes specifies allowable landed catches under the AABM management regime for three ocean fishing areas at various levels of Chinook abundance. These areas are:

1. SE Alaskan troll, net, and sport fisheries;
2. Northern BC troll and the Queen Charlotte Island sport fishery; and
3. the west coast of Vancouver Island troll and outside sport fisheries.

All other fisheries are referred to as Individual Stock Based Management (ISBM) and will be managed to an overall bilaterally-agreed harvest rate (catch will vary with the abundance of Chinook). Harvest rates are assessed for individual Canadian and US stocks using coded wire tag (CWT) data and the PSC Chinook Technical Committee (CTC) coast wide model to estimate exploitation rates.

For Canadian and US fisheries, the 1999 agreement established a general obligation to reduce exploitation rates in the ISBM fisheries to 63.5% and 60.0% of the respective average exploitation rates during the 1979-1982 base period. If returns were less than the biologically-based escapement goal then the ISBM fisheries can be required to further reduce their exploitation rates to improve escapements. If returns were greater than the goal, then the harvest rates (and catch) in ISBM fisheries could be increased so long as the goal was still achieved. Only one Fraser River Chinook stock has a biologically-based escapement goal (Harrison River) accepted by the PSC Chinook Technical Committee.

The major difference between the 1999 agreement and the 1985 PST is the necessity for a pre-season estimation of Chinook abundance in the ocean, and the need for agreed escapement goals for each Chinook stock identified in Attachments I to V of the 1999 agreement. Chinook forecasts are usually available in March. The establishment of escapement goals is the responsibility of each management agency but the technical basis for establishing a goal will be reviewed by the PSC Chinook Technical Committee.

3.2.1. PST Renewal

Five of the chapters contained in Annex IV of the PST are set to expire at the end of the 2008 fishing season: Chapter 1 (Transboundary Rivers); Chapter 2 (Northern Boundary); Chapter 3 (Chinook, coastwide); Chapter 5 (Coho); and Chapter 6 (Chum). Chapter 4 covering Fraser River sockeye and pink will expire in 2010. These chapters are currently being renegotiated with the United States. In 2006, the Parties agreed to renew the expiring chapters using the existing Pacific Salmon Commission (PSC) structure. The renewal process was initiated in January 2007 whereby the bilateral PSC panels, under direction of the Commission, would review and make recommendations to revise the treaty

language for Chapters 1, 2, 5 and 6. The one exception is Chapter 3 (Chinook), which is being led by the Commission.

Both Parties have identified Chinook negotiating teams of five PSC Commissioners who, with the support of the bilateral Chinook Technical Committee, are reviewing and recommending changes to the Chinook chapter. The negotiating teams met several times in 2007 with a view to concluding negotiations on all expiring chapters at the PSC Annual Meeting, February 11 to 15, 2008, in Vancouver, BC. With respect to Chinook, the key issue for both Parties remains the conservation and long-term sustainability of Chinook stocks. Building on changes made in 1999, the Parties have looked at potential adjustments to the Chinook regime which will help address conservation concerns in both countries while maintaining the abundance-based management approach established under the 1999 agreement. Once the PSC has agreed to revisions to the chapters the agreement will be referred to the governments of Canada and the United States for domestic consultation and approval.

3.3. Special Concerns for 2008

Many Pacific salmon stocks in southern British Columbia experienced extremely poor production for brood years that entered the ocean in 2005. The widespread pattern of poor production levels amongst Pacific salmon species and stocks is rare and perhaps unprecedented among DFO observations. Pink salmon entering the sea in 2005 returned to spawn in 2006. Their observed returns in 2006 were far below expectations with the pattern of poor returns extended from southern BC through Southeast Alaska.

Coho salmon had very low returns compared to expectations in 2006. Coho have a predominantly 3-year life cycle, and smolts that went to the ocean in 2005 (brood year 2003) returned in 2006. The 2006 spawning escapement to the Interior Fraser was the lowest recorded since 1975. The pattern of extremely low marine survival and spawning escapements extended to other southern B.C. stocks, with the Strait of Georgia hatchery and wild stocks experiencing record low marine survival (since 1985).

Sockeye salmon return mainly at ages 3 to 5 in southern BC with most at age-4. Smolts from brood year 2003 entered the ocean in 2005. Fraser sockeye returns in 2007 were extremely low compared to pre-season expectations, with the estimated survival rate for Chilko Lake sockeye being the lowest recorded in over 50 years (1.2% compared with long term average of 8.7%). In Barkley Sound, age-3 jack returns in 2006 were 10% of the long term average, indicating poor marine survival. In-season run size estimates were two-thirds of expectations and the 2007 spawning escapement was the lowest among all years since 1992.

Chinook returns associated with the poor 2005 ocean entry year are expected to be compounded by apparent poor survival for the 2003 and 2004 brood years for many stocks. In the Fraser River, Age-4 returns from the 2004 brood year and age-5 returns from the 2003 brood year will account for most of the female spawners in 2008. The poor returns in 2007 and the over-whelming evidence of a 2005 at-sea impact suggests

that returns in 2008 will be poor, particularly for interior Fraser River Spring and Summer stream-type Chinook.

Stream-type Chinook spend at least one year in freshwater before migrating to the sea and return to spawn between ages 3 and 6. In the Fraser River, detailed age-structure data are collected at the Nicola River (hatchery and wild) and Nechako River, and spawning returns are monitored for three groups (spring run age 4₂, spring run age 5₂ and summer run age 5₂ stocks). The groups differ in maturation schedules, about 90% of the spring run age 4₂ group spawn at age-4, and about 70-80% of the spring and summer run age 5₂ groups spawn at age-5. Spawning escapements observed in 2007 were poor for each of these groups, returning only 11% (spring run age 4₂), 25% (spring run age 5₂), and 29% (summer run age 5₂) respectively of their parental brood year levels. Age structure information sampled from the 2007 returns will not be available until early 2008.

The 2008 Outlook for early timed Fraser Chinook stock components suggests returns in 2008 will continue to be poor due to very poor brood year escapements and overwhelming evidence of 2005 at-sea impact. Abundance of Fraser Chinook returning in the spring is estimated to be at 20 year lows and exploitation rates may have increased in a number of recent years⁶. The earliest timed Chinook populations are the first to return in the spring period and have peak migration into the Fraser in the March to May period. Earliest timed Chinook populations include: Coldwater River, Louis Creek, Spius Creek, Cottonwood River, Chilako River, Upper Chilcotin River and Birkenhead River. Poor returns are expected to continue recent spawner declines observed in these populations, with the notable exception of Birkenhead. Birkenhead has had good spawning escapements possibly related to very early migration timing and far north marine distribution. However, in the other earliest timed Chinook populations brood year escapements are at a small fraction of the estimated habitat capacity (e.g. <10%) that would maximize the harvestable surplus (see Appendix B: 1993-2007 Chinook escapement estimates to tributaries in the BC Interior and Lower Fraser).

As of January 1, 2008, the near normal or above normal snow accumulation in many areas provides a favorable outlook for spring and summer stream flow and water-supply. Further updates on this topic can be found at the following web address: <http://www.env.gov.bc.ca/rfc/>

⁶ **English et al. 2006.** Assessment of Chinook salmon returns to the Fraser River watershed using run reconstruction techniques, 1982-04

4. Management Objectives

4.1. Conservation

Conservation of Chinook is the primary objective and will take precedence in managing the resource.

The Department manages fisheries with the objective of ensuring that stocks are returning at sustainable levels. When escapements decline below sustainable levels, management actions are taken which may include reducing the impact of fisheries on specific stocks, strategic enhancement and habitat restoration.

4.2. Aboriginal fisheries for food, social and ceremonial purposes

The objective is to manage fisheries to ensure that, subject to conservation needs, first priority is accorded to First Nations for opportunities to harvest fish for FSC purposes and any treaty obligations.

Consultations are on-going between Resource Management staff and First Nations, both within the Fraser River Watershed and outside the Watershed. Feedback from consultation sessions will be relied upon to provide priority access to First Nations to fish for FSC purposes and any First Nations treaty obligations that may exist.

4.3. International Allocation

The objective is to manage Canadian treaty fisheries to ensure that obligations within the PST are achieved.

Details can be found on the Pacific Salmon Commission (PSC) website at: <http://www.psc.org>

Pre-season fishing plans are formally discussed in bilateral meetings with the United States within the framework of the Pacific Salmon Commission. Scientists from both countries determine catch ceilings in mixed stock fishing areas (AABM fishing areas off the Queen Charlotte Islands and off the West Coast of Vancouver Island). Each country is responsible for managing their respective fisheries to ensure these catch ceilings are not exceeded.

4.4. Domestic Allocations

The objective is to manage fisheries in a manner that is consistent with the Allocation Policy for Pacific Salmon.

The Allocation Policy for Pacific Salmon can be found online at:
www-comm.pac.dfo-mpo.gc.ca/publications/allocation/AllocationPolicyoct201.htm

4.5. Early timed Chinook Objective

For earliest timed Chinook the 2007 IFMP objective was: *to limit harvest levels in Fraser River fisheries to levels similar, or less than in previous years. Further assessments are being undertaken and increased management measures in the spring of 2008 are possible.*

Given the poor outlook for earliest timed Chinook, the Department is seeking feedback on increased management measures to reduce exploitation rates from previous years to reverse or slow declines in escapement until marine conditions improve.

Department staff have proposed a revised management objective for the 2008 IFMP and to guide fishery planning in the Spring of 2008 as follows:

The objective for earliest timed Chinook is to reduce the exploitation rate to less than in previous years. Increased management measures for all fisheries that impact these populations will be developed.

5. Stock Assessment

5.1. Management Units

Historically, Chinook salmon in the Fraser River have been divided into management units based on geography and run timing. Following a review of Chinook stock structure in 2002, they have been grouped based on life history (i.e. ocean-type vs. stream-type) and run timing in the lower Fraser River. Until WSP Conservation Units are confirmed, the five interim management units are:

- Fraser spring-run age 4₂
- Fraser spring-run age 5₂
- Fraser summer-run age 5₂
- Fraser summer-run age 4₁
- Fraser fall-run age 4₁

Run timing is indicated by the words, spring, summer and fall and refers to the time where the majority of the population has entered the lower Fraser River. Spring-run populations enter the Fraser before July 15th, summer-run populations enter the Fraser from July 15th to August 31st, and fall-run populations enter the Fraser after August 31st.

Interim management units are outlined in Table 1.

Watersheds may have more than one population with different life history characteristics (e.g., run timing, time spent in freshwater, etc.).

Table 1: Interim Management Units for Fraser River Chinook salmon

Management Unit	Sample Streams	Indicator Stock
Fraser spring-run age 4 ₂	Bonaparte River, Bessette Creek, Coldwater River, Deadman River , Nicola River, and Spius Creek	Nicola River
Fraser spring-run age 5 ₂	Birkenhead River, Chilcotin River, upper Chilcotin River, Chilako River, Westroad River, Cottonwood River, Elkin Creek, Horsefly River, upper Cariboo River, upper Pitt River, Fraser River mainstem tributaries above Prince George (Bowron, Willow, Slim, McGregor etc.), spring runs of North Thompson and Salmon River in South Thompson	Willow River (proposed)
Fraser summer-run age 5 ₂	Chilko River, Quesnel River, Stuart River, Taseko, Lower Cariboo River, and the Clearwater River	Chilko River (proposed)
Fraser summer-run age 4 ₁	Lower Shuswap River, Mid Shuswap River, Lower Adams River, Little River, South Thompson River, Lower Thompson River (below Kamloops Lake), and Maria Slough	Lower Shuswap River
Fraser fall-run age 4 ₁	predominantly fish of Harrison River origin (those natural spawners returning to the Harrison River, and transplanted populations to the Chilliwack, Chehalis, and Stave Rivers)	Chilliwack River

Long term escapement trends for each management unit are illustrated in Appendix B.

5.2. Lower Fraser River Stocks

The lower Fraser River supports a number of relatively small, unique populations of spring and summer-run Chinook. These can be either red or white-fleshed stocks that typically exhibit a stream-type life history. Birkenhead, upper Pitt, Big Silver, and Sloquet are examples of lower Fraser River spring and summer-run populations that exhibit this life history. Chinook returning to Maria Slough are distinct in the lower Fraser River in that they are a summer-run population that exhibits an ocean-type life history pattern.

Lower Fraser River Chinook stocks are numerically dominated by the fall returning, white-flesh Harrison River stock group, also known as the Fraser fall-run (or Fraser lates). The Fraser fall-run stock group includes the original natural population of fall returning Chinook to the Harrison River, and transplanted Harrison origin populations returning to the Chilliwack and Stave Rivers. Fall-run returns to these three systems

continue to be supported, to varying degrees, by enhancement. As discussed earlier in this document, the Fraser fall-run stock group exhibits an ocean-type life history but is unusual in that upon emergence from the gravel the fry migrate immediately to the estuary where they rear for three to six weeks before moving offshore (instead of staying 60 to 150 days in freshwater as is typical of most stocks with an ocean-type life history.)

5.2.1. Other Populations/Watersheds of Note in the lower Fraser River

The Chilliwack River watershed supports three distinct stock groups:

- a spring-run population that spawns between Slesse Creek and the Chilliwack Lake outlet; this population is indigenous to the Chilliwack River and is very small in abundance;
- a summer-run population that predominately spawns in the upper reaches of the lower Chilliwack River above Slesse Creek; this population's origin is from transplants of mid/upper Fraser River summer-run populations and is supported by enhancement; and,
- a transplanted Harrison-origin fall-run population that predominately spawns downstream of the Slesse Creek confluence; this population is significantly supported by enhancement efforts.

Birkenhead River Chinook are a very unique early timed spring-run population that is thought to begin returning to the Fraser River as early as February. Data is extremely limiting but peak migration into the lower Fraser River is thought to occur in early April. DNA analysis of Albion Test Fishery catch data indicates Birkenhead Chinook continuing to be present in the lower Fraser River to mid-May.

Birkenhead River Chinook are subject to First Nations fisheries in the Fraser mainstem and to First Nation fisheries and a non-retention recreational fishery in the Birkenhead and Lillooet Rivers. Recreational fishing for Chinook is prohibited in that portion of the Birkenhead River from the Birkenhead Bridge on Portage Road to the canyon approximately 10 km upstream of the bridge from August 1st to September 15th each year. This closure is to protect these Chinook before and during their critical spawning time. In addition, Birkenhead Chinook are far north migrating and are exploited in Alaskan and northern troll fisheries and northern marine recreational fisheries. A comprehensive report on the status of the Birkenhead River Chinook was recently published⁷.

5.3. Interior Fraser River Stocks

Chinook salmon in the interior Fraser River (above Hope) comprise a large and complex group of spawning populations. Interior Fraser Chinook have historically been divided into three major geographical regions:

⁷ Schubert, N.D., J.R. Candy, R. Cook, J. Greenbank, D. Lofthouse, R. McNicol, C.K. Parken, D. Sneddon, J.A. Tadey, K. Wilson. 2007. Status of Birkenhead River Chinook salmon (*Oncorhynchus tshawytscha*). Canadian Science Advisory Secretariate Research Document 2007/019.

- the upper Fraser (those returning upstream of Prince George and including Nechako),
- middle Fraser (downstream of Prince George but excluding the Thompson), and
- Thompson (which are divided into lower Thompson/Nicola, North Thompson, and South Thompson/Shuswap).

Within these regions, two migration times are recognized: early or spring-run, and summer-run. Recent work by Chuck Parken (DFO Science Branch) has identified further temporal segregation and Parken has suggested dividing the spring run into spring and early summer components, depending on peak passage times past Albion.

Currently, Interior Fraser stocks are assessed in the four spring and summer aggregates listed previously. No fall-run Chinook populations have been identified to date in the Interior Fraser.

5.4. Stock Assessment Methods

Assessment of the lower Fraser River Chinook spawning stocks rely on visual surveys, a calibrated dead-pitch project and a mark-recapture project, and coded-wire tagging of hatchery produced fish.

The Harrison River is the only lower Fraser River system where Chinook spawner abundance is estimated by mark-recapture methods. This project has been conducted annually since 1984. Since 1985, the Fraser-fall run component returning to the Chilliwack River population has been estimated with an extensive dead-pitch program. Additionally, in certain years, visual surveys of a suite of smaller stocks including Birkenhead, Big Silver and upper Pitt Rivers, as well as Maria Slough provide some information on escapements.

In the BC Interior, assessment of these large stock aggregates is largely informed by annual estimates of escapement by aerial surveys, mark-recapture (Nicola River and lower Shuswap River), and electronic counters (Deadman and Bonaparte Rivers). Trends in these spawning escapements, comparisons of spawning abundance to Wild Salmon Policy benchmarks, and the relative distribution of spawners amongst rivers are all used to assess stock status.

Additional technical information on stock assessment as it relates to exploitation rates can be found in Appendix I.

5.5. Forecasts

Forecasts of the next year's pre-fishery ocean abundance and expected escapement of Fraser fall-run (Harrison and Chilliwack rivers) Chinook are developed for use in the Chinook Technical Committee's coastwide modeling work. This is the only stock group in the Fraser River, and only one of two Canadian Chinook stocks, for which a forecast is currently calculated. Additional technical information on the Harrison River Chinook,

stock assessment, and forecasting can be found in Appendix J. Quantitative forecasts for most Fraser River Chinook are not prepared by DFO.

The Chinook Technical Committee coastwide model calculates a forecast of ocean abundance for certain Chinook stocks in the aggregate. This number is used to manage the AABM fisheries described in Section 3.2. A forecast for 2008 is not available at this time, but will be by mid to late March. Forecasts are not adjusted in-season since there is insufficient information for updates (e.g. CWT recoveries in southern U.S. fisheries are not reported in-season).

Although quantitative forecasts are not done for stocks managed under the Individual Stock Based Management Regime, the Science Branch of DFO does come up with a qualitative assessment of expectations for the upcoming year. This assessment is called the Salmon Outlook and is available in a draft format by mid-November each year. The Salmon Outlook assigns a categorical value between one and four to the various salmon stocks. The category reflects interpretation of various available quantitative and qualitative information and forecasts as well as expert opinion of status.

Status Category	Category Definition	Criteria
1	Stock of Concern	Stock is (or is forecast to be) less than 25% of target or is declining rapidly
2	Low	Stock is (or is forecast to be) well below target or below target and declining
3	Near Target	Stock is (or is forecast to be) within 25% of target and stable or increasing.
4	Abundant	Stock is (or is forecast to be) well above target.

Table 2: 2008 Outlook status for Fraser River Chinook

Stock	Outlook Status	Comments
Early spring – upper & mid-Fraser, North Thompson	1	Populations of concern are upper and lower Chilcotin, Westroad, Cottonwood, and Chilako rivers. Very poor escapements observed in 2007 with escapements averaging ~22% of brood escapements. Very poor survivals have been observed for of Fraser salmon that went to sea in 2005. These fish will form the bulk of returns in 2008. No indicator stock.
Late summer – South Thompson	3	Indicator is Lower Shuswap. Returns in 2007 were generally above brood year escapements, although mid and lower Shuswap were below brood. South Thompson and Lower Adams were both strong. Outlook may be tempered if 3-yr old returns to Lower Shuswap indicator predict poor 4-yr old returns in 2008
Spring – upper & mid-Fraser, North Thompson	1	Returns throughout range in 2007 were poor, averaging only 25% of brood year escapements. Very poor survivals have been observed for of Fraser salmon that went to sea in 2005. These fish will form the bulk of returns in 2008. No indicator stock.
Summer – upper & mid-Fraser, North Thompson	1	No indicator. Returns throughout range in 2007 were poor. Escapements averaged only 29% of brood escapements. Very poor survivals have been observed for of Fraser salmon that went to sea in 2005. These fish will form the

Stock	Outlook Status	Comments
		bulk of returns in 2008.
Spring – lower Thompson	1/2	Indicator is Nicola. Extremely poor returns in 2005 to 2007 Continued major decline in escapements from brood year. Returns averaged 10% of brood. Returns in 2008 will be from fish that went to sea in 2006, when marine conditions are reported to have improved. This may indicate a change in trend.
Fall – lower Fraser natural	2/3	2007 adult spawning estimates are not available yet, although preliminary indications are that it will meet or exceed goal. Age specific escapement estimates are needed to evaluate 3 yr-old run strength, to predict 4 yr-old returns in 2008.
Fall – lower Fraser hatchery	2/3	Although there are significant hatchery releases of Harrison fall-run Chinook stock into the Harrison & Stave Rivers, lower Fraser River fall-run hatchery Chinook consists mainly of Chilliwack Hatchery releases. 2007 adult spawning escapement estimates for Chilliwack and Stave (will not be available until mid December).
Early spring – lower Fraser	2	Birkenhead River escapement (~1,000 adults) is significantly greater than brood year 2002 (512 adults) and greater than the previous 10-year average. Previous to past three years, the trend in escapement was down. Returns in 2008 will be predominately from the 2003 escapement of about 427 adults. Very poor survivals have been observed for of Fraser salmon that went to sea in 2005 (2003 brood). These fish will form the bulk of returns in 2008. No indicator stock.
Summer – lower Fraser	2	Maria Creek escapements in 2007 (650 adults) were slightly lower than the brood year (823). Big Silver escapement was only 70. Expectations are for near target abundance levels, however, returns in 2008 will have mostly gone to sea in 2005, and may have experienced poor survival.

5.6. Escapement Objectives

With the Harrison River fall-run population being the exception (escapement goal range: 75,100 to 98,500), the escapement goals currently being used were set in 1986 following negotiation of the original Pacific Salmon Treaty in 1985. While there were a variety of methodologies that could have been used to determine escapement goals, it was agreed to establish the goals at twice the average escapement observed during the period 1979 to 1982. This strategy was to be used until 1998 at which time the goals were to be reviewed. Scientists are now evaluating current information and with the implementation of the Wild Salmon Policy, discussions have commenced regarding identification of Conservation Units. Following this, lower (conservation) and upper (target) benchmarks will be set based on input from a broad spectrum of interests.

More information on setting future escapement goals for Fraser River Chinook populations can be found in Appendix I.

5.7. Albion Test Fishery

Since 1981, Fisheries and Oceans Canada (DFO) has conducted a Chinook test fishery at Albion, British Columbia (near Fort Langley) from early April to late-October. The test fishery is conducted each year with a drifted gillnet at a specific site near the Albion ferry crossing in the lower Fraser River.

For each sampling event, two 30-minute sets are made daily - just prior to and after daylight high tide. The original “standard” Chinook net was constructed using eight-inch mesh and was used exclusively until 1997 when an experimental multi-panel net was alternated daily with the standard net. Originally, the multi-panel net consisted of panels of five, six, seven, eight, and nine inch mesh sizes, and was fished identically to the standard net (eight-inch mesh). The purpose of the multi-panel net was to address questions regarding the representation of Chinook stocks captured at Albion. Intuitively, it was expected the catch in the multi-panel net would more fully represent the wide range of body sizes of Fraser River Chinook stocks. As a result of the analysis from the 1997-2000 multi-panel net study, a modified multi-panel net has been fished on alternating days with the standard 8” mesh net every year since. This protocol continued in 2007.

The 2007 Chinook information document suggested that recent legal decisions from cases involving the use of fish to fund departmental activities, may affect the operation of the Albion test fishery. This turned out to be the case for the 2007 season.

In response to the courts decisions, a Joint Project Agreement (JPA) was developed between the DFO and: the Pacific Salmon Commission (PSC) and the BC Wild-Harvest Salmon Producers Association (BCWHSPA). Appropriate approval of the JPA delayed the start of the Albion test fishery. In 2007, the Albion test fishery ran from June 18th to October 20th.

Chinook catch in 2007 was 1067 for the standard 8-inch mesh net and 567 for the multi-panel nets for a combined total of 1634 Chinook. The cumulative catch per unit effort (CPUE) for the standard 8-inch mesh net from June 18th to October 20th was 194.13 (adjusted for days the multi-panel net was fished). This value is approximately 86% of the long term average for the same time period. Catch information from the Albion Test Fishery can be found in Appendix A or at:

<http://www.pac.dfo-mpo.gc.ca/fraser/river/commercial.htm>.

6. Enhancement

Egg targets, eggs taken and fry/smolt release details for all South Coast hatcheries can be found in the South Coast Integrated Fisheries Management Plan for Salmon available online at:

<http://www-ops2.pac.dfo-mpo.gc.ca/xnet/content/MPLANS/MPlans.htm>

6.1. Chilliwack River Hatchery

On the Chilliwack River, the spring Chinook population is thought to be a mixed population of indigenous and transplanted mid-Fraser stocks. From 1985 to 1988, mid/upper Fraser River Chinook were transplanted from Bowron (Spring-run 5₂), Slim (Spring-run 5₂), Finn (Spring-run 5₂), Chilko (Summer-run 5₂) and Quesnel (Summer-run

5₂), stocks. Between 1981 and 1985, some upper Pitt (Spring run 5₂) white-fleshed Chinook were transplanted into this system to reportedly bolster a weak summer-run. Harrison Chinook were transplanted to the Chilliwack River in the early 1980's. This population is sustained predominately through continuing enhancement by the Chilliwack hatchery. Escapements of the spring and summer-run populations are significantly smaller than those of the fall-run population.

6.2. Chehalis Hatchery

The Chehalis River historically had a spring/summer-run red-fleshed Chinook population that was enhanced in the late eighties with summer-run red-fleshed populations from Slim Creek and Chilliwack River. This population arrives on the spawning grounds in late June to July with peak of spawn usually occurring from late August to early September.

6.3. Birkenhead Hatchery

The Birkenhead Hatchery on the Birkenhead River was established in 1977. Historical CWT tag returns indicated approximately 10% contribution of enhanced Chinook to the run⁸. The hatchery suffered devastating damage in the flood of the fall of 2003 and is now closed. This volunteer-run hatchery was operated by the Pemberton Wildlife Association (PWA) and enhanced both Chinook and coho. The impact of the hatchery closure is unknown, although a recent review on the status of Birkenhead Chinook suggested that, on average, the hatchery production only replaced the number of fish removed for brood stock each year. As Birkenhead Chinook have a five year life cycle, 2007 was likely the last year in which returns were seen from this hatchery enhancement program.

6.4. Interior Fraser Chinook Enhancement

Since the early 1980's, the main hatcheries enhancing upper Fraser River Chinook have been the Eagle, Shuswap, Clearwater, and Spius (all Thompson); the Quesnel (mid-Fraser); and Stuart (upper Fraser). Dome Creek Chinook were enhanced through the Penny Enhancement Society facility at Penny. Since the early 1990's, the Clearwater, Eagle, Quesnel, Penny and Stuart facilities have been closed. The Penny facility is being relocated and it is anticipated that it will be rebuilt on or near the Willow River (see below). Some enhancement still occurs throughout the watershed, mostly linked to stock assessment and the production of coded-wire tag mark groups. Overall, enhancement is thought to have a relatively small effect on the total number of Chinook returning to the interior Fraser although the effects on certain watersheds may be significant (e.g., Nicola watershed enhanced by Spius hatchery and Shuswap stocks from the Shuswap hatchery).

6.5. Spius Creek Hatchery

Spius Creek hatchery enhances yearling Chinook from Spius Creek, the Coldwater River, Nicola River and Salmon River (near Salmon Arm). Coded wire tagged releases into the

⁸ Schubert et al. 2007. Status of Birkenhead River Chinook salmon, Canadian Science Advisory Secretariat, Research Document 2007/019

Nicola support an indicator stock program for spring-run age 4₂ Chinook of the Lower Thompson and Louis Creek. The indicator program provides information on harvest rates and smolt to adult survival rates. This information is required as part of Canada's commitment under the Pacific Salmon Treaty. Indicator programs for Chinook salmon typically require hatchery production because capturing and tagging enough naturally-produced Chinook smolts is very difficult. These hatchery smolts must be same size and have the same release timing as natural smolts in the system..

Early timed Spius Creek and Coldwater River Chinook are enhanced by Spius Creek hatchery, although the annual smolt releases are relatively small (~50K per system) compared to the Nicola release of 140K CWT smolts annually. No CWT application is done on Spius or Coldwater smolts.

6.6. Proposed New Hatchery – Willow River

An indicator stock is required in the Upper Fraser for Fraser spring-run age 5₂ Chinook salmon to provide information on harvest rates and smolt to adult survival rates. Like the Nicola River, this information is required as part of Canada's commitment under the Pacific Salmon Treaty.

The Willow River is being examined as a potential new hatchery site to provide an indicator stock for the following reasons:

- System has Fraser spring-run age 5₂ Chinook;
- Chinook life history provides representative timing for other upper river spring Chinook (offshore resident, migrating into lower Fraser on the freshet)
- System is accessible and “workable”
- Availability of potential sites
- Proximity to Prince George and nearby interpretive trails
- Partnership opportunity with the Lheidli T'enneh Band

For the Upper Fraser spring run age 5₂ Chinook salmon, 200,000 coded wire tagged smolts will be required to ensure sufficient recoveries of adult Chinook salmon. 200 000 coded wire tagged smolts will likely result in the annual return of 800 to 1000 extra adult Chinook salmon to the mouth of the Fraser River. This would mean approximately 500 to 700 enhanced and tagged salmon returning to Willow Creek. This is the minimum desired sample size required to accurately estimate returning coded wire tags. As a comparison, releases at production hatcheries are often in excess of 1 million smolts.

7. First Nations Fisheries

7.1. 2007 Fishery Summary

First Nations both in and outside the Fraser River are provided with an opportunity to harvest Fraser River Chinook. The number of fishing days is dependent upon the conservation needs of Chinook stocks and other species, such as sockeye, wild steelhead and Interior Fraser coho salmon. Alterations to fishing patterns, reached via consensus, are subject to ensuring escapement requirements are met.

Once sockeye enter the Fraser River, management actions are driven by considerations for those stocks and Chinook are generally harvested as by-catch. Conservation concerns for wild steelhead and coho salmon have resulted in net fisheries being curtailed from early September to mid October in recent years. There is no information available that would suggest this pattern will change in the near future.

Stock identification information indicates that those Chinook stocks entering the river from February to July 15 are bound for tributary systems in the lower Thompson basin, the middle and upper Fraser basins, as well as the Birkenhead River in the Harrison River system. These stocks are understood to have a low productivity and individual stocks range in size from 100 to > 10,000 spawners.

Pre-season consultations with Lower Fraser First Nations in 2007 resulted in a fishing regime that was designed to reduce the impacts on the earliest timed Chinook stocks.

In 2007, selective Chinook fisheries took place in those times and places when sockeye were migrating through the river. There were much fewer targeted sockeye fisheries in 2007 than anticipated due to the low sockeye returns. In the Lower River (downstream of Sawmill Creek), selective Chinook fisheries utilized 8 inch mesh drifted gill nets and additional monitoring to ensure that impacts on sockeye were minimal. In the areas upstream of Sawmill Creek, selective Chinook fisheries were largely promulgated using dip nets or rod and reel. An experimental selective fishery was undertaken in the Siska Canyon using an 8 inch mesh set net. Sockeye encounter limits were set and catch monitoring occurred during the entire time of the fishery. The fishery showed that with certain site specific flow characteristics and with constant monitoring it may be possible to have a directed Chinook fishery with minimal sockeye impacts.

A table of First Nations fishery openings and catch for 2007 can be found in Appendix D.

7.2. Catch Monitoring

All First Nation's fisheries are authorized by communal licence. The majority of areas have catch monitoring systems in place to estimate catches. In areas where there is not a specific catch monitoring program, the fisher is required by licence to report his/her catch to the band and the band to report to DFO.

Areas where specific catch reporting programs have been implemented include:

a) Below the Port Mann Bridge

During fisheries for food, social, and ceremonial purposes, catch monitoring is undertaken by Aboriginal Fishery Officers and First Nations fishery monitors who collect hail information from the fishers. This information is compiled by each band and forwarded to DFO following the close of the fishery.

b) Port Mann Bridge to Sawmill Creek

i) Set net and drift net fishery between Port Mann Bridge and Mission:

First Nations monitors collect hails at Katzie Reserve Dock, Barnston Island and the Kwantlen Reserve Dock at Fort Langley. Set net fishers hail in their data by phone to band fisheries offices. In addition, Charter Patrolmen count effort and take on-the-water hails during the Katzie, Kwantlen and Matsqui communal fisheries.

ii) Set net and drift net fishery between Mission and Sawmill Creek:

Monitors are stationed at main access points on the river during openings to collect catch per unit effort (CPUE) and 24-hour effort surveys. Sites include: Leq'a:mel, Island 22/Kilby, Skway, Scowlitz, Seabird, Agassiz Bridge, Hunter Creek, Chawathil Reserve, Coquihalla, and Yale Beach.

Helicopter over flights are used to conduct instantaneous gear counts between Mission and Sawmill Creek. These over flights are conducted once during the fishery and require one flight technician on each flight.

Data collection forms are gathered from each of the monitors at the various monitoring sites and provided to DFO. DFO then produces catch estimates for each opening by expanding the catch rates by effort counts to generate weekly catch estimates.

c) Sawmill Creek to Kelly Creek and the Thompson River downstream of the Bonaparte River, Kelly Creek upstream to Deadman Creek and Deadman Creek to Naver Creek

A sample survey program during FN directed Chinook fisheries is conducted by FNs /DFO staff along the Fraser River between Sawmill Creek and Kelly Creek and in the Thompson River downstream of the Bonaparte River confluence. Fishery Technicians interview all fishers encountered during random roving vehicle patrols to obtain catch and effort information (CPUE). Fishing effort is obtained by averaging the count of each type of active gear observed during a given week.

No catch monitoring program was undertaken in the mainstem Fraser River from Kelly Creek upstream to Deadman Creek during directed First Nation Chinook fisheries. Catch and effort in directed Chinook fisheries in this area is extremely small. Catch monitoring is undertaken by members of the High Bar Indian Band when sockeye fisheries occur in

this area. Chinook caught incidentally in fisheries directed on sockeye salmon are enumerated.

Very limited First Nation fisheries directed on Chinook salmon occur in the mainstem Fraser River from Deadman Creek to Naver Creek. Accordingly, no monitoring program is in place to monitor catch in directed Chinook fisheries. Monitoring occurs during directed sockeye fisheries in this area and Chinook harvested incidentally to directed sockeye fisheries are enumerated.

d) Naver Creek upstream and the Nechako River to Isle Pierre

Lheidli T'enneh Nation monitor each of the fisheries via collecting hail information from the fishers.

e) Nechako River upstream of Isle Pierre and the Stuart System

Carrier Sekani Tribal Council, Tl'azt'en Nation, Nadleh Whut'en Band and Stelat'en First Nation monitor each of the fisheries via collecting hail information from the fishers.

f) Thompson River upstream of the Bonaparte River

The Secwepemc (Shuswap) Nation Fisheries Commission monitor each of the fisheries on a census basis utilizing staff from their individual member bands.

g) Shuswap River (Shuswap Falls to Mabel Lake)

The Okanagan Nation Alliance monitor their fisheries on a census basis utilizing staff from their individual member bands.

7.3. 2008 Fishing Plan

The objective of the 2008 harvest strategy for early season First Nations fisheries is to provide access to First Nations for food, social and ceremonial needs while respecting the objective of reducing the exploitation rate for earliest timed Chinook to lower levels than in previous years. Fisheries in the latter part of the year are managed to protect other stocks of concern such as wild steelhead and Interior Fraser coho stocks

The proposed management approach is to meet the objective for earliest timed Chinook is presented in Appendix H.

The Department also encourages discussion among all Fraser River First Nation groups in the watershed in the development of fishing plans. Improved discussion and coordination regarding the development of a Fraser River watershed Chinook fishing plan for First Nations will assist in addressing conservation concerns for all early timed Fraser River Chinook stocks.

Selective fisheries may be considered during periods of increased Chinook abundance. Selective methods must ensure that co-migrating stocks of concern are avoided or released unharmed. First Nations are encouraged to submit their selective fishing proposals as soon as possible. Compliance with 2007 licence conditions for selective fisheries will be considered during the review of selective fishing proposals.

8. Recreational Fisheries

8.1. Fishery Summary

The marine waters off the Pacific coast of British Columbia are generally open for harvest of Chinook salmon year round. Recreational harvest is constrained using daily and annual limits. The coast-wide daily limit for Chinook is two. The total Chinook annual limit is 30 from any tidal waters, of which at most, 10 may be caught in the tidal waters of the Fraser River; 15 may be caught in the waters of Areas 12 to 18, 28 and 29 and that portion of Area 19 north of Cadboro Point; 20 may be caught in the waters of Area 20 and that portion of Area 19 south of Cadboro Point.

Recreational harvest is further constrained using minimum size limits (minimum size limit 45 cm coast wide with the exception of a 62 cm size limit in Johnstone Strait, the Strait of Georgia and the Fraser River mouth), maximum size limits (in some areas), reduced daily quotas and closed areas. Closed areas may be closed year-round or closed seasonally depending on local stocks.

Historically, the recreational fishery in the Fraser River, downstream from Sawmill Creek was open year-round with a daily limit of four Chinook and no annual limit. In 1980, the fishery was closed to assist in rebuilding Chinook stocks. When the fishery re-opened, it started on June 1st of each year. In 1998, the recreational Chinook fishery was opened on May 1 based on an assessment that the additional fishing time and associated catch and effort would not compromise the long term sustainability of Fraser Chinook stocks.

In 2007, the Lower Fraser River recreational fishery was open from May 1st to December 31 with the exception of a 10 day closure in late August designed to protect co-migrating sockeye salmon.

In all non-tidal waters there is an annual limit of 10 Chinook. Daily limits range from one to two adults per day. In the Lower Fraser River, an adult Chinook is defined as a Chinook over 50 cm in length except during the fall when the larger Harrison origin fish predominate. From September 1 to December 31 in those waters of the Fraser River downstream of the Agassiz-Rosedale Bridge, in the Harrison River and in the Chilliwack River an adult Chinook is defined as being over 62 cm.

Details on recreational Chinook opportunities may be found online at:

http://www.pac.dfo-mpo.gc.ca/recfish/default_e.htm

8.2. Catch Monitoring

DFO obtains most of its catch information through the Creel Survey Program which is carried out in recreational fisheries that have displayed important catch and effort characteristics in past years. This program incorporates surveys by land (access point and roving surveys) and air of active fishermen.

In 2007, the lower Fraser River was surveyed between Sumas and Hope from May 1st to November 30th, with the following two exceptions:

- (a) Due to extremely high water conditions resulting in very unfavorable angling and surveying conditions from June 7th to 26th, the survey area was shifted to the area upstream of Hope to the Alexandra Bridge (lower Fraser River Canyon).
- (b) Due to a salmon fishing closure from August 20th to August 30th, the survey area was once again changed to upstream of Hope to the Alexandra Bridge.

The Chilliwack River was surveyed from September 15th to November 15th.

Chinook salmon recreational openings in specific sections of the Fraser River upstream of Sawmill Creek, the Bridge River, the lower Shuswap River, Mabel Lake and the Thompson River at Spences Bridge are also surveyed during their open times. Preliminary catch numbers are available in Appendix E.

The Strait of Georgia (STG) creel operates from May to October and covers Areas 13 to 18, 28 and 29. The STG creel also operates in the Victoria area, which covers Areas 19 and that portion of Area 20 east of Sherringham Point from January to December.

The Strait of Juan de Fuca (the portion of Area 20 west of Sherringham Point) and the West Coast of Vancouver Island (Areas 23 to 26, 121 and 123 to 126) are covered by the West Coast (WC) creel program which operates from June to September. Fishing effort drops markedly after Labour Day.

The WC creel program for Northern Vancouver Island covers Areas 27 and 127 on the West Coast of Vancouver and Johnstone Strait (Area 12) from July to August. Fishing effort drops substantially in September.

The Johnstone Strait (Area 12) creel program goes from July to August, the time period of most effort.

Information on creeled areas is provided in Appendix E.

8.3. 2008 Fishing Plan

The proposed management actions to protect earliest timed Fraser River Chinook are presented in Appendix H.

Tables outlining the proposed tidal and non tidal recreational Chinook opportunities in the Strait of Georgia and Fraser River watershed for the remainder of the 2008 fishing season are provided in Appendix F.

9. Commercial

9.1. Overall Commercial Fishery Summary

Fraser River Chinook migrating along northern (Johnstone Strait) and southern (Juan de Fuca Strait) approach routes to the Fraser River are harvested in a number of fisheries. These fish are taken as by-catch in sockeye net fisheries (seine and gillnet) in Johnstone Strait, Juan de Fuca Strait, Fraser River and Alaska. In addition, there are directed fisheries for Chinook by WCVI, North Coast and Alaskan troll fisheries. Only very limited directed commercial net fisheries (i.e., 2004 Area E gillnet exploratory fishery) have occurred within the Fraser River since 1980.

During the last eight years, a mandatory non-retention requirement in all South and North Coast seine fisheries has significantly reduced Chinook mortalities. Over the past few years the majority of the Fraser River commercial Chinook catch has been taken in the Area F commercial troll fishery in northern B.C. waters. Fall-run Chinook stocks are also harvested in the Area G commercial troll fishery off the west coast of Vancouver Island.

The principal U.S. fisheries harvesting Fraser River Chinook are the net fisheries in Juan de Fuca Strait, the San Juan Islands area, and off Point Roberts. The Fraser Chinook catch taken in Southeast Alaska is unknown but thought to be smaller.

9.2. Catch Monitoring

Commercial catch data for the salmon fishery is gathered primarily from fisher hail reports, fish slips, mandatory phone catch reporting requirements, logbooks, on-board observers, offload sampling and CWT catch sampling programs. Fish slips are required when fish are sold, offloaded or taken home for personal consumption. The number and weight of each salmon species landed and/or sold are required on the slip.

DFO obtains further information about salmon average weight data through a Mark Recovery Program (MRP). This program involves collecting salmon heads from adipose fin clipped fish from commercial, recreational and aboriginal landings. When the samplers are at a plant, they also collect individual salmon weights to contribute to the average weight estimate. An average weight estimate is obtained by species, and gear, MRP catch region and fishing period (week). The average weight is used to calculate pieces from the total weight reported on the fish slips.

A table of all Canadian commercial catches of Chinook can be found in Appendix G.

9.3. Area E Gillnet – Fraser River

Directed gillnet fisheries for Chinook within the Fraser River have been closed since 1980 in order to rebuild stocks. Retention of Chinook by-catch is permitted during the in-river commercial gillnet sockeye fisheries that usually take place from late July to early September and chum fisheries in October and November.

In 2004, Area E Gillnet Association (AEGA) submitted a multi-year proposal to conduct a limited opportunity "exploratory" Chinook-targeted fishery. The planned timing of this fishery was late July to mid-August, within the peak abundance timing period of the summer run Chinook aggregate. Fisheries were planned to occur during times when a commercial sockeye TAC was available for harvest.

Plans to continue with year two of this proposal have thus far been cancelled.

During pre-season discussions with AEGA advisors, the possibility of continuing the Chinook exploratory program in 2008 will be reviewed. DFO staff will continue evaluating the status of Chinook stocks and reviewing the impacts of this fishery. In reviewing the viability and direction of this proposal, the Department will be consulting with First Nations and stakeholders in order to make a decision about the future direction of this initiative.

9.4. Area G Troll – West Coast of Vancouver Island

Under the Pacific Salmon Treaty, West Coast of Vancouver Island Chinook fisheries are managed through an Aggregate Abundance Based Management model. Fisheries are prosecuted on an aggregate of different US and Canadian Chinook stocks. Abundance forecasts provide estimates for 2 years in advance. The Fall 2006 stock information was used to forecast the aggregate abundance of all Chinook stocks for Fall 2007 through to Fall 2008.

The 2006 forecast information provides for a domestic surplus of approximately 143,000 Chinook for the 2007-2008 Chinook year. (October 1, 2007 to September 30, 2008).

For planning purposes, the domestic harvest levels are estimated to be:

- First Nations FSC – 5,000 pieces
- Recreational – 50,000 pieces
- Area G Commercial troll – 88,300 pieces

It is important to note that the aggregate abundance can, and usually does change in April when stock information from the previous fall can be entered in the model. It is likely that in April 2008, the aggregate Chinook abundance will decrease; which in turn will reduce the number of Chinook available for domestic harvest requirements.

9.5. Area H Troll – Strait of Georgia

There have been no directed Area H troll fisheries for Chinook since 1994 due to conservation concerns. Retention of Chinook by-catch was permitted during most sockeye, pink and chum fisheries until 2005, since then all Area H troll fisheries have had non-retention provisions for Chinook.

In 2004, the Gulf Trollers Association (GTA) submitted a proposal for a Chinook sampling program designed to gather stock composition information in order to determine areas and times where stocks of concern could be avoided while targeting abundant stocks. See Appendix H for a summary of results.

In 2005, a project was proposed and ready to implement if the in-season stock indicators showed a significant improvement from the weak early season stock test results at Albion. When the project was reduced in size and co-management funding was not obtained during the sockeye season this project was cancelled for 2005.

Similar smaller scale proposals focusing on Area 29 and the assessment of more abundant stocks (i.e. South Thompson and Harrison Chinook) in August and September were submitted in 2006 and 2007, neither of which were implemented

During pre-season discussions with Area H advisors, the possibility of continuing the Chinook sampling program in 2008 will be reviewed. DFO staff will continue evaluating the status of Chinook stocks and reviewing the impacts of this fishery. In reviewing the viability and direction of this proposal, the Department will be consulting with First Nations and stakeholders in order to make a decision about the future direction of this initiative.

9.6. Area F Troll – North Coast

From 2005 through to 2007, the Salmon Licence Area F (Northern Troll) fishery was managed under a limited entry licensing system with the total harvest controlled largely through fishery openings and closures. The fishery itself was operated in a competitive "derby" style where all licensed fishers are entitled to fish in order to maximize their harvest during the open periods. The option to continue to operate within the competitive "derby" style was maintained as well during these years.

Since 2005, a demonstration fishery has been conducted annually to test the feasibility and the benefits of changing the management of the fishery to an Individual Transferable Quota (ITQ) system. The implementation of this system directly controlled the total harvest by setting limits on the harvest by individual fishers.

A Chinook allocation to the fleet is calculated based on the Aggregate Abundance Based Management model. For 2007, that allowable catch of Chinook for the combined North Coast Troll and Queen Charlotte Islands recreational fishery was 178,000 pieces. The pre-season estimate of recreational catch was 60,000 pieces, leaving 118,000 fish as the pre-season troll allocation. The North Coast trollers landed 83,235 Chinook in 2007 and

the Queen Charlotte Island recreational catch was 54,000 fish for a total Chinook catch of 137,235.

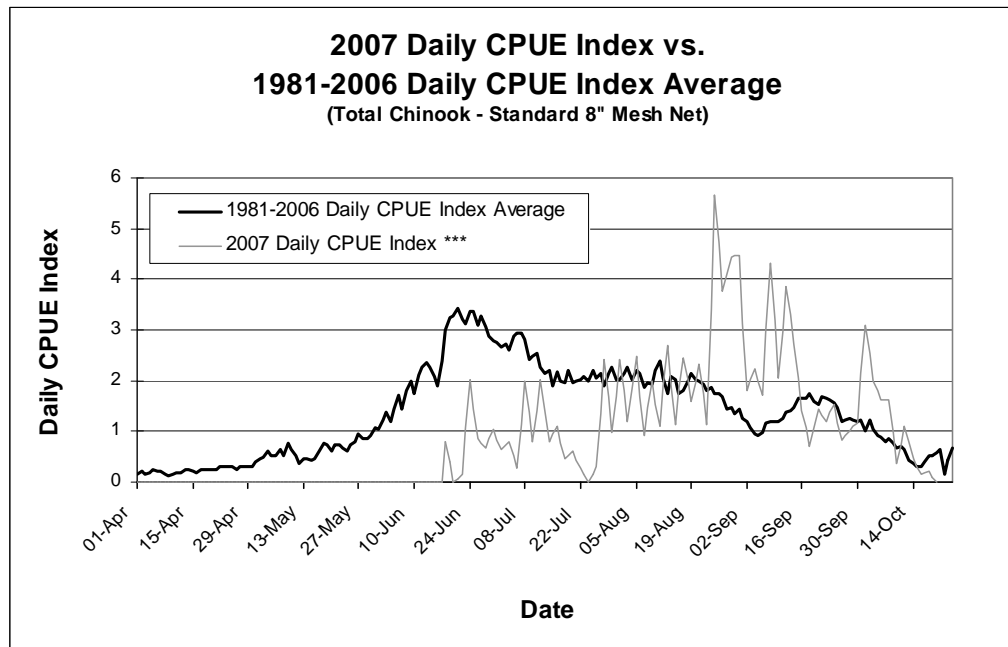
Chinook catches in the North Coast troll fishery were sampled and DNA analyses were conducted. This fishery is constrained by a management objective designed to limit the exploitation of Chinook stocks originating from the West Coast of Vancouver Island. Due to these constraints the fishery generally does not open until mid-May to early June and closes in September. In 2007 the fishery opened on June 15th and closed on August 17 due to the excessive WCVI prevalence (31.8%) and the fact that the WCVI Chinook mortality TAC had been achieved.

Based on this analysis approximately 38% of the 2007 Area F Troll Chinook catch originated from the Fraser River system. With the majority of the Fraser Chinook (90%) originating from the South Thompson River.

Appendix A: Albion Test Fishery

The following figures summarize catches in the Albion Chinook test fishery for 2007 and compares these catches with data averaged from previous years. Figure 1 gives the 2007 daily catch per unit effort (CPUE) index and compares it to the average of the historical data from 1981-2006. Note that the daily CPUE index in 2007 is zero until June 18th (the start date for the Albion in 2007).

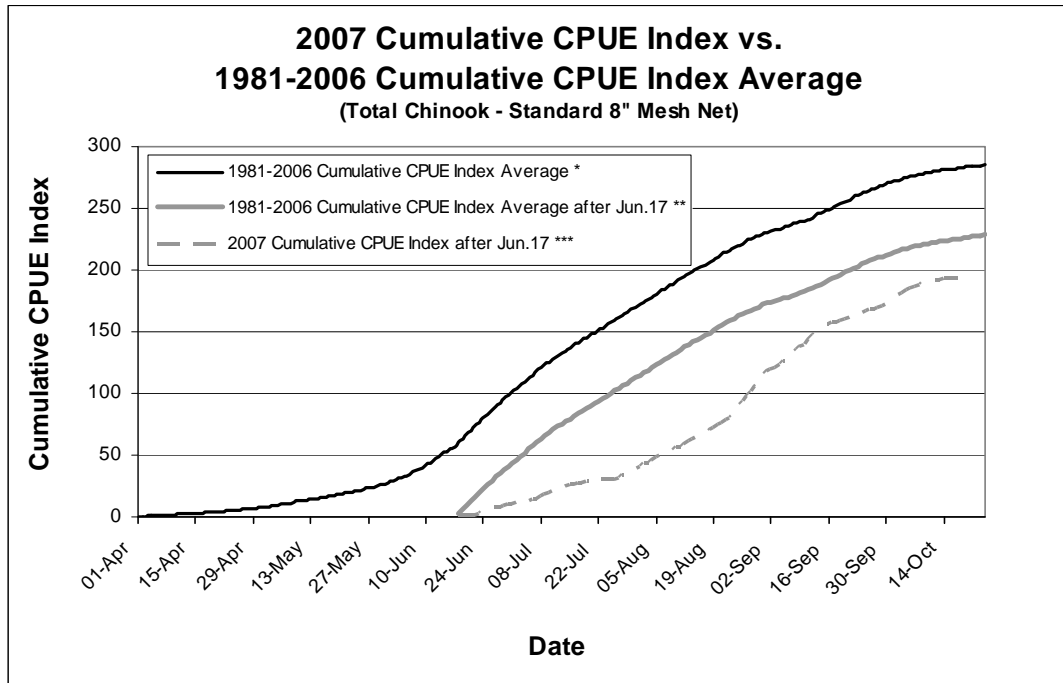
Figure 1. The 2007 daily catch per unit effort (CPUE) index compared to the 1981 to 2006 daily CPUE index average.



*** In 2007, the Albion Test Fishery did not begin until June 18th, daily CPUE index was zero before this date.

Another more informative visual for reporting Albion catch and effort data is to compare the current years cumulative CPUE index to the historical cumulative CPUE index average. Normally, the advantage of viewing CPUE information cumulatively is it provides a clearer understanding of the total success of the year's fishery as compared to historical averages. However, the late start date for the Albion test fishery in 2007 (June 18th compared to the normal April 1st) made this comparison to the entire historical cumulative CPUE data misleading. Figure 2 attempts to show this complexity using the entire historical CPUE data set and then attempts a more suitable comparison by including a plot of only the historical cumulative CPUE data occurring after June 17th.

Figure 2. The 2007 cumulative catch per unit effort (CPUE) index compared to the 1981 to 2006 cumulative CPUE index average.



* entire historical data set from April 01st to October 20th.

** historical data set from June 18th to October 20th only; cumulative CPUE index average was zero before June 18th.

*** In 2007, the Albion Test Fishery did not begin until June 18th, cumulative CPUE index was zero before this date.

Appendix B: 1993-2007 Chinook escapement estimates to tributaries in the BC Interior and Lower Fraser

CTC Indicator Stream	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006²	2007³
Spring - Run Age 1.3 (5₂)															
Upper Pitt River (Lower Fraser)	175	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	276	171	N/I	341	248	138
Birkenhead River ¹ (Lower Fraser)	263	379	183	344	634	636	166	446	703	512	480	202	1491	1259	1968
Bridge River	950	615	851	1900	1968	626	898	769	198	969	N/I	1115	183	109	138
Chilcotin River	3100	6354	3480	2285	4000	1636	2896	2971	1574	2092	3396	1064	1509	1027	360
Cottonwood River	4470	4690	2100	1750	3329	2592	641	1208	781	1352	1555	1241	646	740	392
Horsefly River	200	4154	185	400	115	43	137	174	281	380	246	375	509	345	51
Westroad River	3200	6150	6050	4615	7206	3827	984	1600	1924	1620	2966	1366	846	1052	461
Bowron River	6140	9104	8316	4577	7334	7618	3455	3220	5491	8719	10059	8160	4074	3876	1823
Fraser R. (Tete Juane)	3300	4240	6000	4100	2935	2586	2081	2262	4976	3913	3048	2062	2535	2142	1021
Goat River	55	293	400	440	354	302	89	212	411	820	569	174	151	158	114
Holmes River	2100	1877	2600	2775	3203	2362	523	1795	1018	3740	4110	1376	821	1458	764
Horsey River	130	N/K	120	20	75	57	14	128	78	308	288	62	34	146	22
McKale River	N/A	N/A	N/A	N/A	N/A	20	Present	32	9	81	49	68	78	11	17
McGregor Tributaries	N/K	1851	2412	3461	2505	4471	1870	2449	2420	3751	4103	3253	1310	1333	1041
Morkill River	N/I	1231	407	567	550	2398	1152	926	Present	Present	Present	1122	355	549	408
Chilako Creek	25	119	200	624	186	39	115	20	7	229	N/I	106	202	168	78
Endako River	20	200	125	167	43	191	171	160	275	292	N/I	N/I	252	118	26
Ormond Creek	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/I	N/I	N/I	N/I	N/I
Nevin Creek	N/A	N/A	N/A	N/A	N/A	161	46	62	57	132	385	238	77	174	42
Slim Creek	1300	2473	4634	2268	3130	2664	1235	2112	2876	3021	3676	2284	2161	2204	654
Swift Creek	1000	886	1700	1500	1200	1098	375	486	982	1535	835	520	335	643	328
Walker Creek	150	240	101	426	122	392	206	252	177	381	543	277	103	234	160
Torpy River	1000	1921	1590	1055	1042	2293	1819	1468	1755	2565	4457	2730	1027	1221	886
Willow River	600	1170	817	1612	1961	2041	717	1314	893	1033	1980	1887	1012	1206	377
Barriere River	50	44	21	N/K	N/K	N/I	Present	77	362	377	131	306	220	215	100
Finn Creek	1300	1837	810	1569	725	632	524	1511	1115	650	45	538	185	157	38
Eagle River	1100	1200	700	780	915	N.I.	624	1085	1397	1458	1583	867	427	521	334
Salmon River (Prince George)	25	729	901	1054	1200	1362	823	634	478	429	2395	1681	668	544	269
Salmon River (Salmon Arm)	1850	800	700	727	252	284	350	357	1362	1003	89	395	307	554	173
Stock Aggregate Totals	32481	52521	45382	38965	44923	40260	21892	27687	31521	41589	47106	33447	21793	20955	12145

¹ historical escapement estimates to the Birkenhead River were reviewed and adjusted in Schubert et al. 2007.

CTC Indicator Stream	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006²	2007³
Spring Run Age 1.2 (4₂)															
Deadman River	1200	1591	540	1506	934	665	350	787	780	1940		1159	417	1234	301
Spius Creek	900	150	500	500	450	300	52	668	603	1012	1170	1866	291	529	64
Coldwater River	1500	275	1050	1500	400	300	267	497	781	1394	1195	1018	183	478	107
Nicola River	4000	7970	6500	16400	7614	1211	7263	8808	7771	11643	14574	7850	2926	3863	912
Louis Creek	20	510	800	420	480	377	183	611	349	481	198	105	63	297	18
Besette Creek	270	100	280	400	N.I.	150	404	360	323	350	N/O	182	18	241	5
Stock Aggregate Totals	7890	10596	9670	20726	9878	3003	8519	11731	10607	16820	17137	12180	3898	6642	1407
Summer Run Age 1.3 (5₂)															
Portage Creek	330	36	N/R	300	N/R	18	200	46	248	445	158	103	86	248	51
Seton River	150	69	N/R	N/I	N/R	N/I	N/I	N/I	N/O	6	5	N/I	Present	N/I	N/I
Chilko River	6343	5665	10461	17000	16272	14549	8920	9171	10891	11027	21625	16287	7668	5201	4366
Quesnel River	5028	1549	3073	3100	3185	4906	1620	1718	2418	5520	5265	3356	3230	2665	1758
Cariboo River	2480	2000	817	1850	1800	936	573	744	503	1097	2198	351	526	949	546
Stuart River	1000	2420	3730	7415	6221	4642	3875	1875	1954	Present	Present	Present	Present	Present	Present
Nechako River	664	1144	1689	2040	1954	1868	1917	N/A	9331	5546	4077	5189	3217	7376	0
Stellako River	N/R	10	N/R	N/R	N/R	15	18	N/R	N/R	N/R	N/O	N/I	231	0	1895
Clearwater River	2700	5450	5100	7780	7830	7007	3837	4563	5051	5689	6234	4622	3519	3768	74
Raft River	190	935	1371	870	1230	309	712	936	237	443	311	741	109	141	38
North Thompson River	2400	4164	N/I	2375	2130	2156	3375	2732	3175	2200	1989	N/I	N/I	N/I	N/I
Stock Aggregate Totals	21285	23337	26241	42430	40622	36388	24847	21739.4	33560	31522	41699	30546	18586	20100	10521
Summer Run Age 0.3 (4₁)															
Maria Slough (Lower Fraser)	N/R	N/R	N/R	100	100	150	198	266	400	1200	823	N/R	439	314	650
Adams River	800	1800	1900	2200	3400	4182	2029	2266	5890	3674	2496	2216	3837	6344	3181
Little River	unk	400	150	3000	1850	1246	1163	2043	9885	3680	2488	6000	7504	8590	7352
Lower Shuswap River	6000	10150	10000	19000	13100	16704	24691	20409	18349	19327	21380	13329	12927	28828	14503
Middle Shuswap River	2500	4000	3000	5000	3800	4474	2449	2617	3022	5442	4799	1415	1883	5468	1080
Thompson River (Bel Kamloops L.)							2015	3205	6904	18927	N/A	10010	Present	23646	8549
South Thompson River	4000	3000	5500	21600	27000	41277	22675	17560	36740	51298	38178	38592	61837	103387	58956
Stock Aggregate Totals	13300	19350	20550	50900	49250	68033	55220	48366	81190	103548	70164	71562	88427	176577	94271

Summer Run Age 0.3 (41)

Maria Slough (Lower Fraser)	N/R	N/R	N/R	100	100	150	198	266	400	1200	823	N/R	439	314	650
Adams River	800	1800	1900	2200	3400	4182	2029	2266	5890	3674	2496	2216	3837	6344	3181
Little River	unk	400	150	3000	1850	1246	1163	2043	9885	3680	2488	6000	7504	8590	7352
Lower Shuswap River	6000	10150	10000	19000	13100	16704	24691	20409	18349	19327	21380	13329	12927	28828	14503
Middle Shuswap River	2500	4000	3000	5000	3800	4474	2449	2617	3022	5442	4799	1415	1883	5468	1080
Thompson River (Bel Kamloops L.)							2015	3205	6904	18927	N/A	10010	Present	23646	8549
South Thompson River	4000	3000	5500	21600	27000	41277	22675	17560	36740	51298	38178	38592	61837	103387	58956
Stock Aggregate Totals	13300	19350	20550	50900	49250	68033	55220	48366	81190	103548	70164	71562	88427	176577	94271

CTC Indicator Stream

	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u> ²	<u>2007</u> ³
Late Run Age 0.3 (4₁)															
Harrison River (Lower Fraser)	118998	98334	28616	56809	72277	188420	106995	125854	113777	89968	247121	128944	86730	50942	75000
Chilliwack River (Lower Fraser)	17834	6826	29820	21928	79717	78780	74945	70983	68247	58852	56995	67952	39429	53216	40318
Stave River (Lower Fraser)	N/R	N/R	N/R	N/R	N/R	1046	600	550	822	1000	1000	1000	1200	1500	NYA
Stock Aggregate Totals	136832	105160	58436	78737	151994	268246	182540	197387	182846	149820	305116	197896	127359	105658	NYA

Non CTC Indicator Streams

Spring - Run Age 1.3 (5₂)

Baker Creek	300	250	250	150	292	420	47	282	268	420	423	N/I	51	N/I	N/I
Dome Creek	575	530	550	571	625	400	309	198	49	450	444	270	248	224	181
East Twin Creek	N/I	N/I	N/I	N/I	N/I	64	N/I	18	35	51	52	62	25	12	6
Holliday Creek	N/I	N/I	N/I	N/I	N/I	N	N/I	15	74	126	48	54	72	17	6
Humbug Creek	N/I	N/I	N/I	N/I	N/I	N/I	N/I	26	22	85	35	N/A	N/I	N/I	N/I
Kazchek Creek	N/I	N/I	N/I	N/I	N/I	0	Present	Present	N/O	N/O	6	8	N/I	N/I	N/I
Kenneth Creek	N/I	N/I	N/I	N/I	N/I	132	17	65	58	338	148	N/A	N/I	N/I	N/I
Kuzkwa	N/I	N/I	N/I	N/I	N/I	N/I	N/I	N/I	215	300	345	245	N/A		N/I
Naver Creek	250	250	150	150	777	994	57	231	240	281	489	N/I	236	N/I	N/I
Narcosli Creek	250	350	250	150	757	254	161	145	383	129	382	N/I	89	N/I	N/I
Pinchi Creek	N/I	N/I	N/I	N/I	N/I	N/I	Present	45	14	Present	15	25	N/A		N/I
Ptarmigan Creek	N/I	N/I	N/I	N/I	N/I	58	103	49	8	66	140	N/A	N/I	N/I	N/I
Small Creek	N/I	N/I	N/I	N/I	N/I	115	66	34	48	268	212	6	15	77	49
Snoeshoe Creek	N/I	N/I	N/I	N/I	N/I	N	N	N/I	N/I	165	66	N/I	N/I	N/I	N/I
Fraser River (Tete Juane)	3300	4240	6000	4100	2935	2586	2081	2262	4976	3913	3048	2062	2535	2142	1027
Upper Cariboo River	N/I	N/I	N/I	N/I	N/I	N/I	N/I	N/I	407	198	367	N/I	N/I	477	152
West Twin Creek	N/I	N/I	N/I	N/I	N/I	24	N/I	34	14	22	108	40	58	75	14
Stock Aggregate Totals	4675	5620	7200	5121	5386	5047	2841	3404	6811	6812	5905	2772	2637	3415	1429

Non CTC Indicator Streams Spring Run Age 1.2 (4₂)	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006²	2007³	
Bonaparte River	1500 4000	4283 7970	4157	4391	10084	1864	1954	5258	6150	8216	8470	7990	3516	3995	1046
Stock Aggregate Totals	5500	12253	4157	4391	10084	1864	1954	5258	6150	8216	8470	7990	3516	3995	1046
Summer Run Age 1.3 (5₂)															
Adams River (Upper)	N/K	N/K	128	220	275	100	107	60	109	46	150	238	N/I	165	20
Big Silver (Lower Fraser)	N/K	N/K	N/K	N/K	N/K	N/K	N/K	N/K	N/K	363	138	N/I	243	209	62
Blue River	8	48	35	0	0	110	11	235	88	480	329	152	N/I	212	117
Chilcotin River (Upper)	200	450	262	735	360	617	285	229	243	523	678	220	97	158	89
Eagle River	1100	1200	700	780	915	N.I.	624	1085	1397	1458	1583	867	426	521	334
Elkin Creek	450	508	786	1250	806	651	417	394	458	420	1038	N/I	N/I	N/I	N/I
Lemieux Creek	N/I	N/I	N/I	N/I	N/I	N/I	216	115	117	155	N/O	194	28	297	5
Lion Creek	12	150	65	95	N/I	N/I	34	0	3	N/O	N/I	N/I	N/I	N/I	N/I
Sloquet Creek (Lower Fraser)															
Stock Aggregate Totals	1770	2356	1976	3080	2356	1478	1694	2119	2415	3082	3778	1671	551	976	565

N/I = Not Inspected

N/O = None Observed

N/R = Not Recorded

N/K = Not Known

NYA = Not Yet Available

Present = Chinook seen but quality of assessment too poor to estimate escapement

¹ historical escapement estimates to the Birkenhead River were reviewed and adjusted in Schubert et al. 2007.

² estimates for populations in the lower Fraser River in 2006 are near final

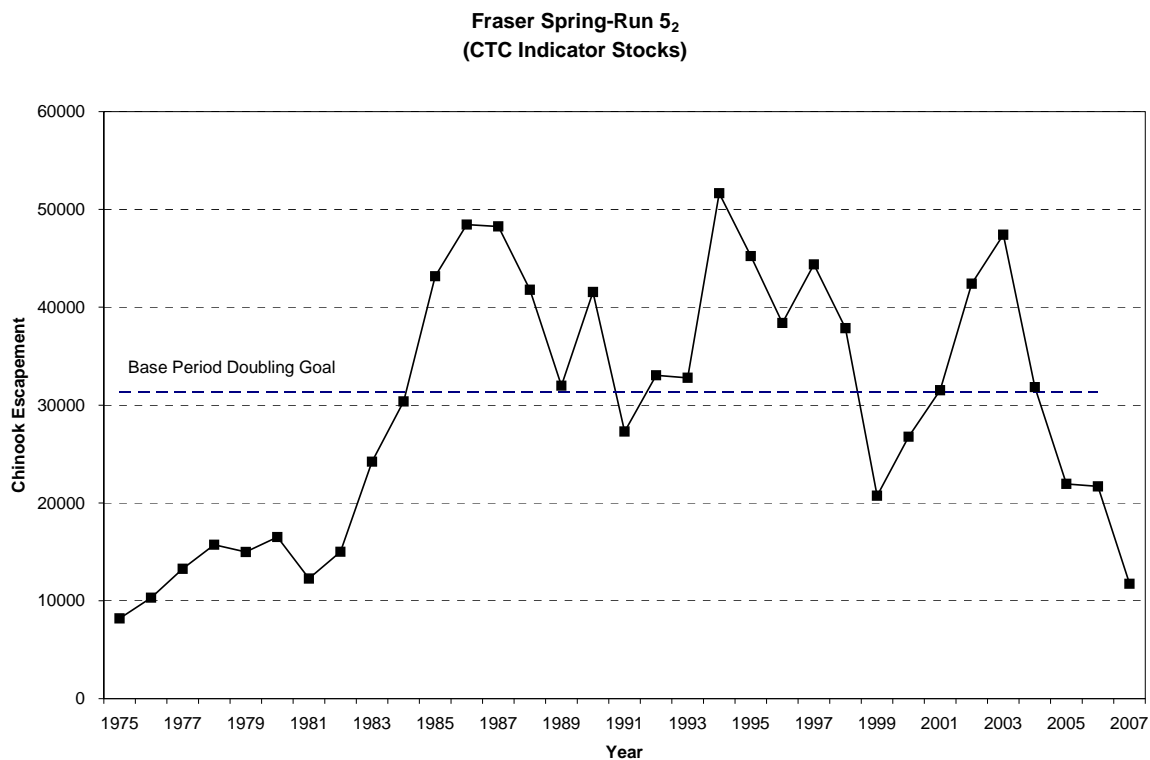
³ estimates for populations in the lower Fraser River in 2007 are preliminary

Appendix C: CTC Indicator Stocks

In 1986, DFO established interim escapement goals for British Columbia Chinook stocks. The escapement goals were set at either double the averaged escapement for the 1979-82 base period or, for key streams, double the 1984 escapement estimate. These escapement goals are not biologically-based and consequently, they are not used for stock assessment and management of stock impacts under the Pacific Salmon Treaty. The Lower Fraser fall run has a biologically-based escapement goal range between 75,000 and 101,000 based on a stock-recruitment analysis (Brown et al. 2001). Biologically-based escapement goals based on habitat carrying capacity, are being developed and several examples for Fraser River stocks are available (Parken et al. 2006; described in Appendix I).

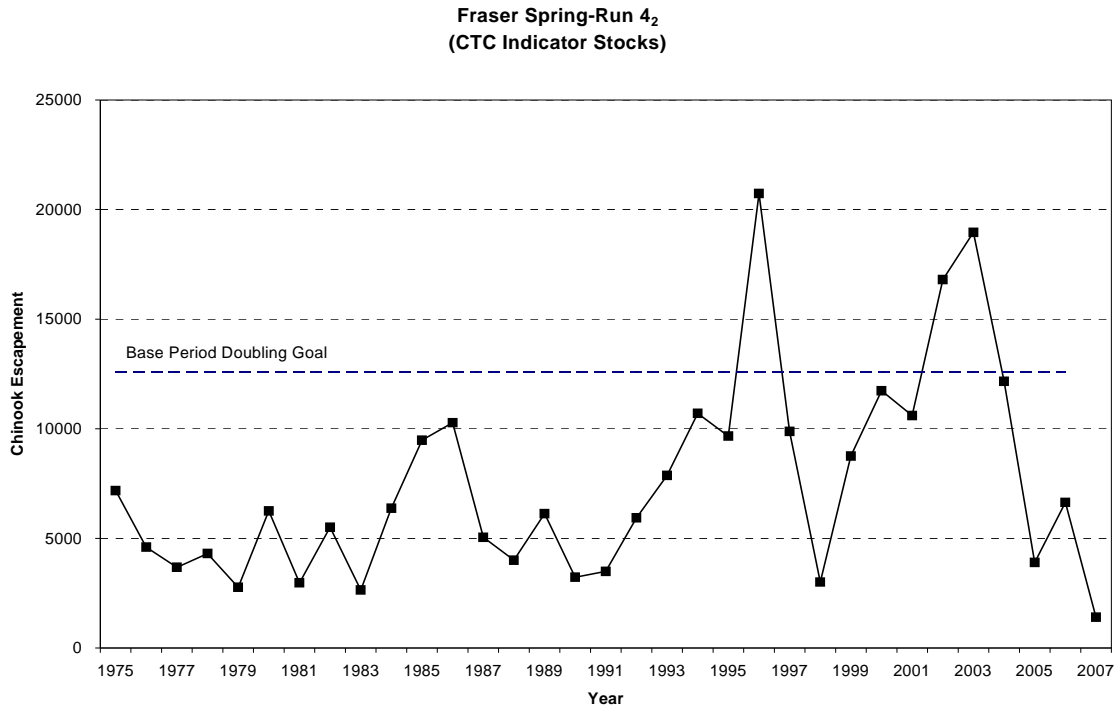
The escapement information provided below is specific to the indicator stock reported annually through the Chinook Technical Committee of the Pacific Salmon Commission. These stocks are enumerated annually, in support of Canada's commitments to the Pacific Salmon Treaty.

Fraser Spring Run 5₂ (CTC Indicator Stocks)



This aggregate includes the Upper Pitt River and Birkenhead River stocks in the Lower Fraser, and the spring-run Chinook of the Mid and Upper Fraser, North Thompson, and South Thompson, but excluding those of the Lower Thompson (CTC 2002b). Escapements declined sharply in 2007, continuing the trend that started in 2004. Escapement to the aggregate was estimated at 11,737 in 2007; only 27% of the brood year escapement in 2002, and similar to levels observed in the early 1980's.

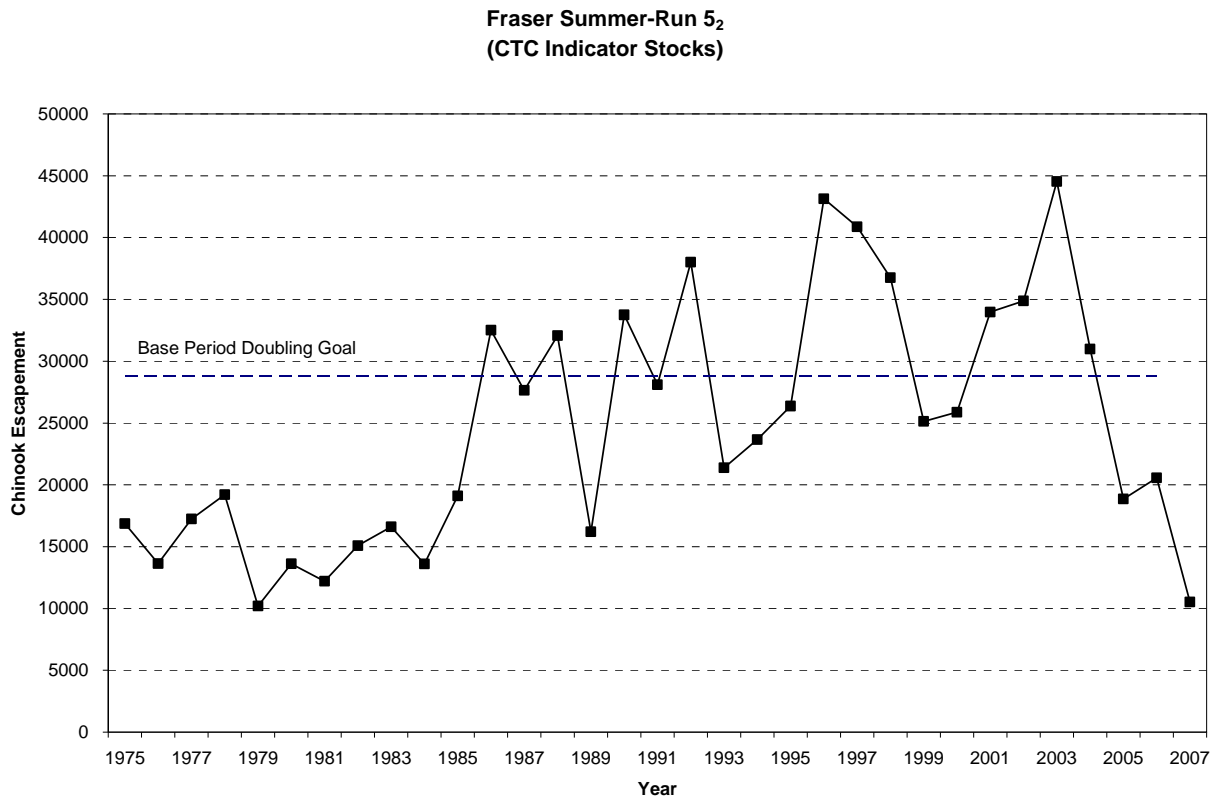
Fraser Spring Run 4₂ (CTC Indicator Stocks)



The Fraser Spring-Run Age 4₂ aggregate includes six smaller body size populations that spawn in the Lower Thompson River tributaries, Louis Creek of the North Thompson and the spring-run fish of Bessette Creek in the South Thompson (CTC 2002b). Escapements declined sharply in 2007 to less than 10% of parental brood escapements in 2003. The aggregate escapement was estimated to be 1407, and three stocks escaped less than 100 adult Chinook (Spius Creek – 64 adults; Louis Creek – 18 adults; and in Bessette Creek only 5 adults were estimated to have returned and spawned). Escapements at Nicola declined from the brood year escapement of 14,574 to just 941 spawners in 2007.

Fraser Summer Run 5₂ (CTC Indicator Stocks)

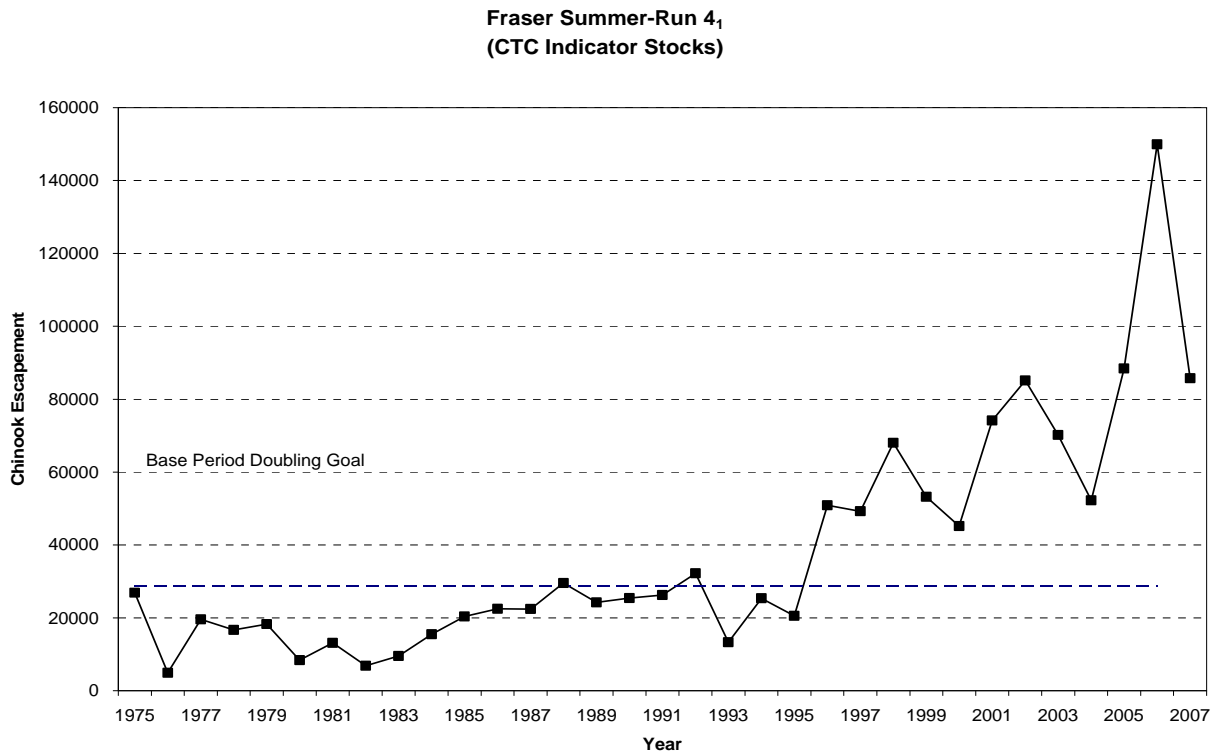
The Fraser Summer-Run Age 5₂ stock complex includes 10 populations, spawning in large rivers, mostly below the outlets of large lakes. These include the Nechako River upstream of Prince George, Chilko and Quesnel Rivers in the mid Fraser and the Clearwater River in the North Thompson watershed (CTC 2002b). Escapement surveys of the Stuart River and North Thompson River were discontinued in 2004 due to unreliable counting conditions. Escapements in 2007 continued to decline sharply. Aggregate escapement was estimated at 10,521, compared to the 2002 parental brood of 27,897.



Fraser Summer Run 4₁ (CTC Indicator Stocks)

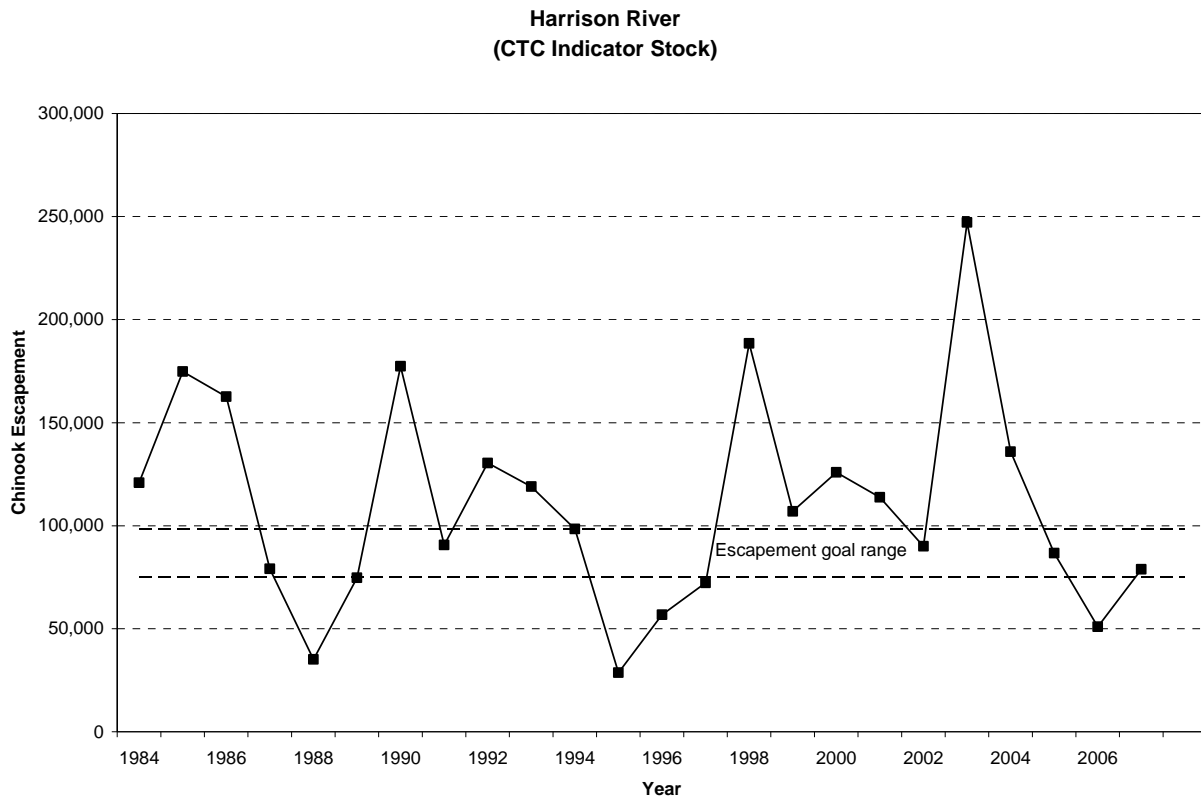
The Fraser Summer-Run Age 4₁ aggregate includes six populations of Chinook spawning in the South Thompson watershed upstream of Kamloops and one in the lower Fraser. These include the Middle Shuswap, Lower Shuswap, Lower Adams, Little River and the South Thompson River mainstem, in the BC interior, and Maria Slough in the lower Fraser (CTC 2002b).

Escapements to the Summer Run Age 4₁ aggregate were again strong in 2007. An estimated 85,722 Chinook spawned, exceeding the aggregate escapement of 70,164 in the parental brood year (2003). Middle and Lower Shuswap rivers and Maria Slough failed to reach parental escapement levels, while the Lower Adams, Little River and South Thompson all exceeded brood escapements. Returns to the South Thompson River were estimated to be 58,956 adults.



Harrison Fall Run 4₁ (CTC Indicator Stocks)

The lower Fraser stock is dominated by fall returning Harrison-origin Chinook that includes natural spawners in the Harrison River and Harrison-origin fish that were introduced to the Chilliwack River. Since 1984, mark-recapture studies have been conducted annually on the Harrison River to obtain reliable estimates of spawning escapements. Estimates of fall Chinook escapement to the Chilliwack River are based on a procedure long established by the Chilliwack Hatchery staff for expanding the number of carcasses counted in standardized reaches of the river. Returns to the Harrison River in 2007 were estimated to be 78,862 adult Chinook, and 31,920 jacks. Total fall Chinook returns to the Chilliwack River were estimated to be 26,500 adults and 13,845 jacks.



Appendix D: 2007 Fraser River First Nations Fishing Times and Catch by Area

Area and Gear	Dates	Hours per Week	
Mouth to Pt Mann Bridge-drift net	Mar. 24 - Apr. 8	24 hours per week	
	Apr. 14 - Apr. 22	36 hours per week	
	Apr. 27 - June 25	48 hours per week	
	8" mesh 3:1 hang ratio June 29 - July 22	48 hours per week*	
	July 28 - Aug. 6	24 hours per week*	
	September	24 hours per week*	
Pt Mann Bridge to Sawmill Creek-drift net	Mar. 16 - Apr. 21	10 hours per week	
	Apr. 28- June 24	12 hours per week	
	8" mesh 3:1 hang ratio June 29- July 24	24 hours per week*	
	August 9-24	24 hours per week*	
	September	24 hours per week*	
Pt Mann Bridge to Sawmill Creek- set net	Mar. 16 - Apr. 21	24 hours per week	
	Apr. 25 - June 24	48 hours per week	
Sawmill Creek to Thompson River –set net	Mar. 28 - May 20	4 days per week	
	May 20 – July 1	7 days per week	
	July 1 - July 29	Closed**	
	8" mesh 2:1 hang ratio July 23 – July 27	102 hrs (2 licences)	
	July 29 – Aug 5	4 days	
	Aug 5 – Aug 12	Closed**	
	Aug 12 – Aug 19	7 days per week	
	Aug 19 – Aug 26	5 days	
	Aug 26 – Sep 30	Closed**	
Thompson River to Texas Creek – set net	Mar. 28 - May 20	4 days per week	
	May 20 – July 1	7 days per week	
	July 1 - July 29	Closed**	
	July 29 – Aug 5	7 days	
	Aug 5 – Aug 12	Closed**	
	Aug 12 – Aug 26	7 days per week	
	Aug 26 – Sep 2	4 days	
	Sep 2 – Sep 30	Closed**	
	Thompson River below Bonaparte – set net	Mar. 28 - May 20	4 days per week
		May 20 – July 29	7 days per week
July 29 – Aug 5		4 days	
Aug 5 – Aug 19		Closed**	
Aug 19 – Aug 26		4 days	
Aug 26 – Sep 30		Closed**	
Sep 30 – Oct 7		Closed** (selective 4 days)	
Texas Creek to Deadman Creek – set net	Mar. 28 – Apr 1	4 days per week	
	Apr 1 - July 1	7 days per week	
	July 1 – July 29	Closed**	
	July 29 – Aug 26	7 days per week	
	Aug 26 – Sep 2	4 days below Kelly / 7 days above Kelly	
	Sep 2 – Sep 23	Closed **	
	Sep 23 – Sep 30	Closed** (selective 4 days)	

Area and Gear	Dates	Hours per Week
Deadman Creek upstream – set net	Mar 28 – June 24	Closed ***
	June 24 – July 8	7 days per week
	July 8 – Aug 5	Closed** (3 weeks per area)
	Aug 5 - Dec 31	7 days per week

A table of catches for 2007 can be found in Appendix E.

* Selective fisheries for Chinook used 8” mesh drifted gill nets.

** Selective fisheries for Chinook used dip nets or rod and reel.

*** Little interest by FN’s to fish as few Chinook in this area until after June 24th.

2007 Annual Summary of First Nations Fisheries Chinook Catch by Area in the Fraser River Mainstem and Tributaries

AREA	Chinook (directed fisheries)	Total Chinook
Mainstem Fraser		
Below Port Mann Bridge	1577	1817
Port Mann Bridge to Mission	1222	1818
Mission to Hope	2411	7728
Hope to Sawmill Creek	3405	5465
Sawmill Creek to Texas Creek	1125 ^a	2234
Texas Creek to Kelly Creek	383 ^b	829
Kelly Creek to Deadman Creek	0 ^b	2
Deadman Creek to Marguerite Ferry	15 ^c	74
Naver Creek to Shelly & Nechako R to Isle Pierre	104 ^d	187
Mainstem Subtotals	10242	20154
Tributaries		
Harrison River	0	2
Lillooet River System	unknown	unknown
Thompson River downstream of Bonaparte River confluence	107 ^e	120
Thompson River upstream of Bonaparte River confluence	12 ^f	765
Chilcotin River System	0 ^c	12
Nechako River System upstream of Isle Pierre	n/m ^d	1
Stuart River System	n/m ^d	0
Tributary Subtotal	119	900
Totals	10361	21054

^a This number represents the catch to July 29th and between Aug 5th and Aug 12th, and following Sep 9th until closure (Sep 30th) in First Nations directed Chinook fisheries.

^b This number represents the catch to July 29th and between Sep 9th – Sep 30th in First Nations directed Chinook fisheries.

^c This number represents the catch to July 29th in First Nations directed Chinook fisheries.

^d This number represents the catch to Aug 5th in First Nations directed Chinook fisheries.

^e This number represents the catch to July 29th and between Aug 5th and Aug 19th, and following Sep 2nd until closure (Sep 30th) in First Nations directed Chinook fisheries

^f This number represents the catch to July 29th and between Aug 5th and Aug 12th in First Nations directed Chinook fisheries
n/m – no monitoring conducted at that time.

Please note, the Fraser River is permanently closed from Williams Creek to Petch Creek. Kelly Creek to Barney Creek and The Lillooet River System was not monitored. The Harrison River upstream of the Highway 7 Bridge was also closed.

Appendix E: 2006 Recreational Catch Data

Figure 1: 2000 to 2007 South Coast Marine Creel Survey Chinook Catch Estimates by Month

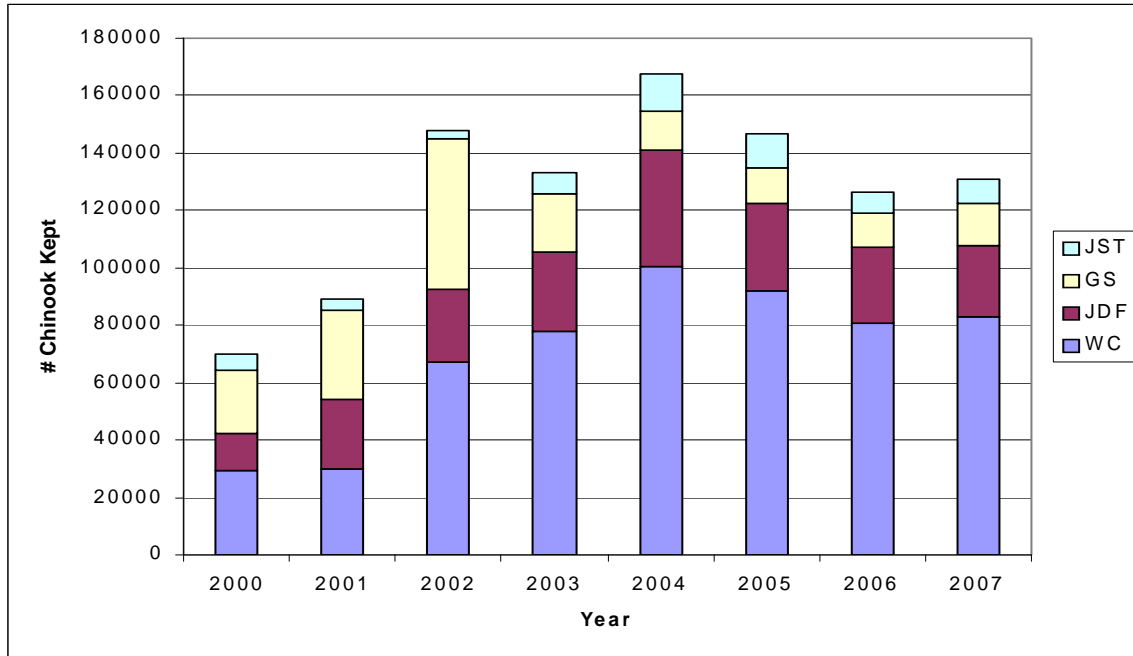
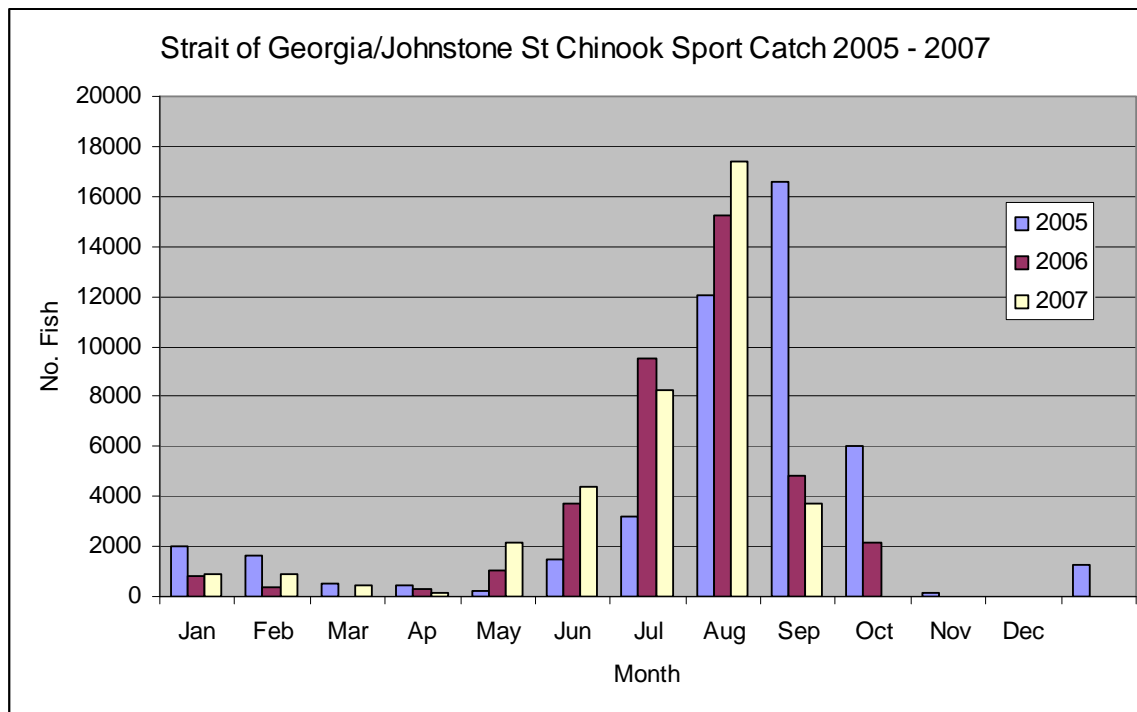


Figure 2: 2005 – 2007 Recreational Chinook Catch by Month for Strait of Georgia and Johnstone Strait (Areas 12 to 19, 28 and 29 and a portion of Area 20)*



*east of Sherringham Point

Figure 3: 2005 - 2007 Recreational Chinook Catch by Month for Juan de Fuca (that portion of Area 20 west of Sherringham Point)

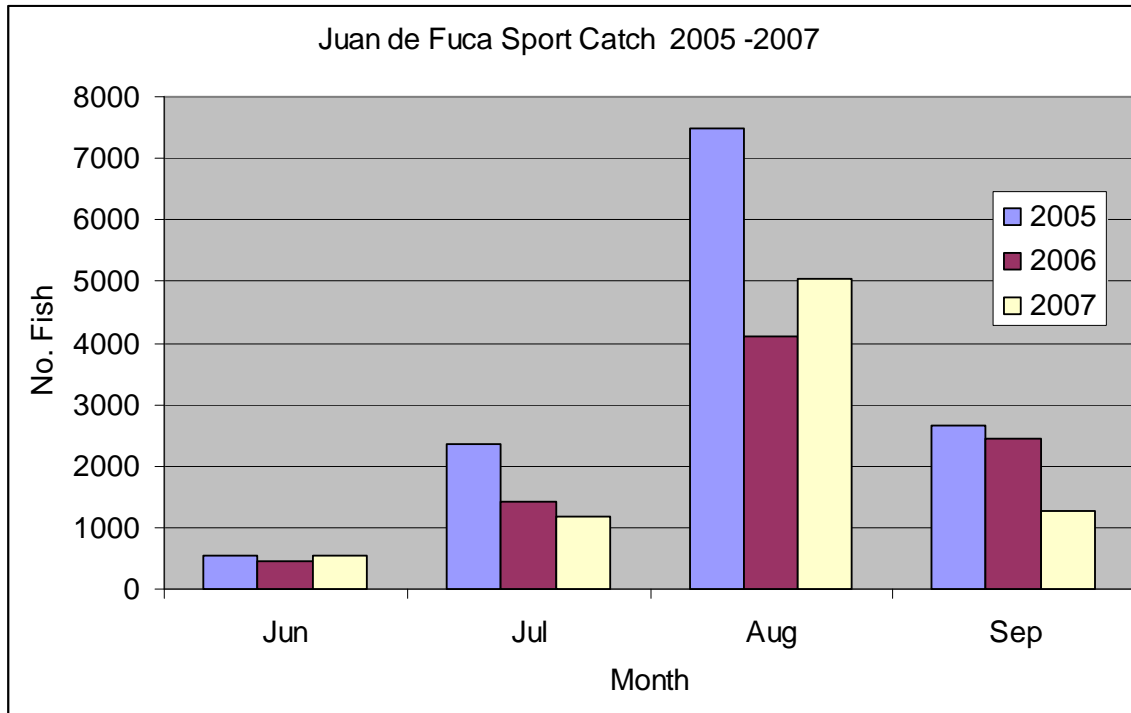


Figure 4: 2005 - 2007 Recreational Chinook Catch by Month for West Coast of Vancouver Island (23 to 27, 121 and 123 to 127)

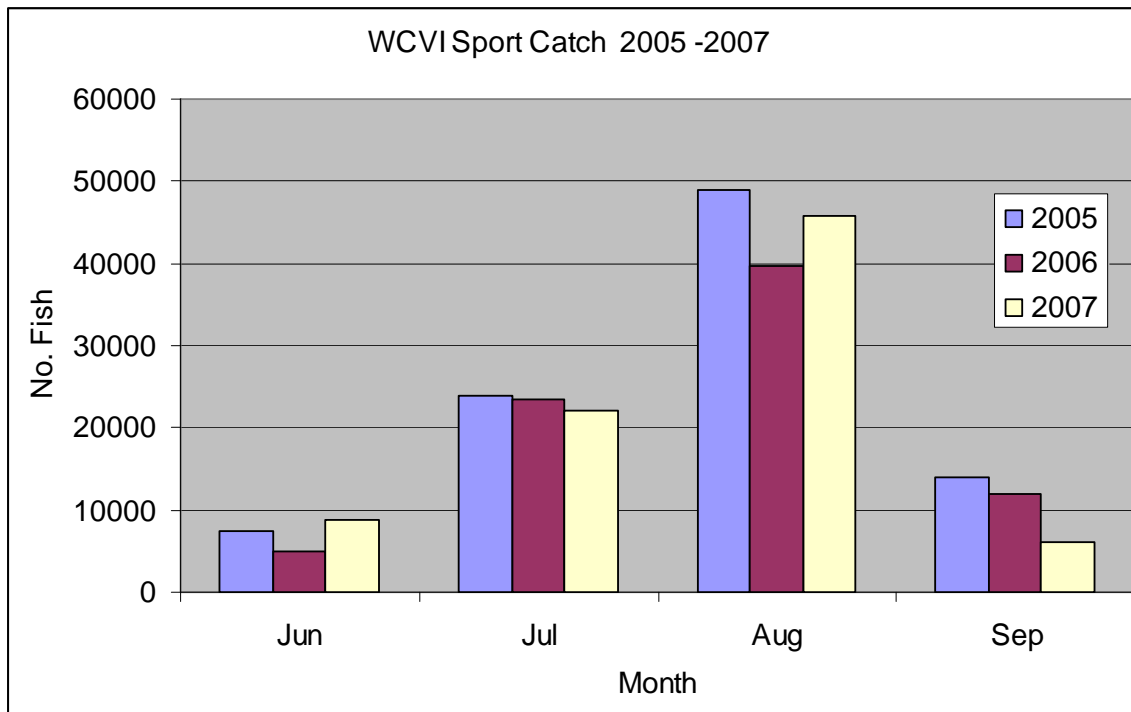


Figure 5: 2003 – 2007 Recreational Chinook Harvest by Month for the Fraser River from the Confluence with the Sumas River upstream to Hope, BC (see notes).

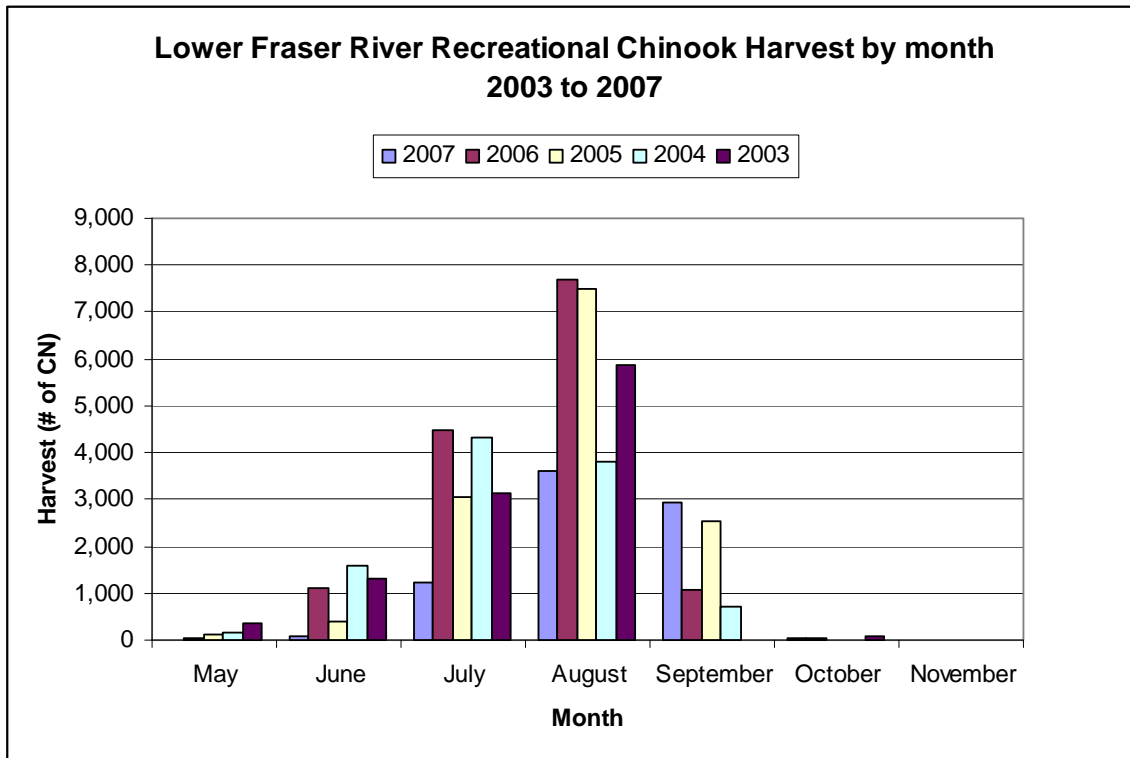


Figure 6 Notes:

All years – Figure 6 reports estimated total Chinook catch (including adults and jacks).

2007 – Due to extremely high water conditions, resulting in very unfavorable angling and surveying conditions from June 7th to 26th, the survey area was shifted from the above mentioned area and replaced by the area of Hope up to the Alexandra Bridge. This area switch occurred a second time when the Fraser mainstem (below Hope) was closed to all angling during August 20th to 30th. These two survey periods are not included in figure 6.

2006 – The recreational catch monitoring surveys ended on October 9th.

2005 – The recreational catch monitoring surveys ended on September 7th.

2004 – The recreational catch monitoring surveys ended on September 10th.

2003 – Angling below Hope was closed from September 1st to October 9th. No recreational catch monitoring occurred at this time.

2007 Chinook Recreational Openings and Catch - Lower Fraser River Area

Table 1 below describes where and when recreational anglers were allowed to retain Chinook on the Lower Fraser River in 2007 (downstream of the Alexandra Bridge). Fishing was permitted during daylight hours only (from one hour after sunset to one hour before sunrise). The daily limit was four Chinook per day of which only one could be an adult. In the Lower Fraser River, an adult Chinook is defined as a Chinook over 50 cm in length except during the fall when the larger Harrison origin fish predominate. From September 1 to December 31, in those waters downstream of the Agassiz-Rosedale Bridge, an adult Chinook is defined as being over 62 cm.

The lower Fraser River recreational fishery was surveyed between the Sumas River and Hope from May 1st to November 30th with the following exceptions. Due to extremely high water conditions on the lower Fraser mainstem from June 7th to 26th, surveys were conducted in the lower Fraser canyon from Hope up to the Alexandra bridge. Also, the lower Fraser River mainstem, below Hope, was closed to all angling from August 21st to 30th. The surveys were conducted in the lower Fraser canyon during this time. The Chilliwack River was surveyed from September 15th to November 15th. Nicomen Slough (including Norrish Creek) was surveyed from October 9th to November 30th; however, no Chinook were retained on this system.

Dates	Area	Daily Limit
May 01-Aug 31	Tidal waters of the Fraser River.	4 per day, only one of which may be greater than 50 cm.
Aug 21 - 30	Non-tidal waters of the Fraser River Mission bridge to the confluence with Sawmill Creek.	No fishing for salmon.
May 01 to Aug 20 and Aug 31	Non-tidal waters of the Fraser River Mission bridge to the confluence with Sawmill Creek.	4 per day, only one of which may be greater than 50 cm.
Sep 01-Dec 31	Tidal waters of the Fraser River and non-tidal waters of the Fraser River downstream from the Alexandra Bridge, except Landstrom Bar which is closed to all angling from May 1 to Oct 31.	4 per day, only one of which may be greater than 62 cm.

Recreational catch data from the Fraser River Creel is provided in Table 2.

Recreational catch data from the Chilliwack River Creek is provided in Table 3.

Due to extremely high water conditions in 2007, resulting in very unfavorable angling and surveying conditions from June 7th to 26th, the survey area was shifted away from the Sumas River up to Hope, and replaced by the area of Hope up to the Alexandra Bridge (lower Fraser River Canyon). This area switch occurred a second time when the Fraser River mainstem (below Hope) was closed to all angling during August 20th to 30th. Results from both areas are summarized in Tables 2 and 3.

Table 2. Fraser River recreational fishery assessment (below Hope) from May 1st to November 30th, 2007. Total harvest and release (weekend and weekday data combined). Time periods not included are June 7th to 26th and August 20th to 30th

	Fraser Mainstem – Sumas River to Hope (May 1st to Oct 8th) and New Westminster up to Agassiz (Oct 9th to November 30th)							
	May	June	July	August	Sept	October	Nov	2007 TOTALS
Number of Interviews	59	61	1,072	1,122	2,043	1,106	404	5,867
Interview Hours	191	276	5,432	6,059	10,962	5,746	1,536	30,200
Number of Overflights	8	4	7	7	9	7	6	48
Average Overflight Count	11	39	125	329	415	76	40	148
ANGLER EFFORT								
Estimated Effort (hours)	1,946	2,587	45,324	75,778	111,666	35,832	10,246	283,379
ESTIMATED HARVEST								
Chinook Adult	18	81	1,218	3,626	2,953	41	0	7,937
Chinook Jack	0	0	0	15	338	33	0	386
Coho Adult	0	0	0	0	8	144	16	168
Coho Jack	0	0	0	0	0	66	0	66
Sockeye	0	0	0	0	11	0	0	11
Pink	0	0	0	73	17,893	46	0	18,012
Chum	0	0	0	0	90	1,120	1,797	3,007
ESTIMATED RELEASE								
Chinook Adult	0	0	0	106	179	88	0	373
Chinook Jack	0	0	0	0	83	58	0	141
Coho Adult	0	0	0	0	1,107	649	64	1,820
Coho Jack	0	0	0	0	0	377	0	377
Sockeye	0	3	689	21,724	1,548	222	0	24,186
Pink	0	0	0	204	51,949	3,360	0	55,513
Chum	0	0	0	0	536	4,937	4,595	10,068

Table 3 - Lower Fraser River recreational fishery assessment (Hope to Alexandra Bridge) from June 7th to 26th, and August 20th to 30th, 2007. Total harvest and release (weekend and weekday data combined).

	Fraser River Canyon - Hope up to the Alexandra Bridge		
	June 7-26	August 21-31	Totals
Number of Interviews	194	114	308
Interview Hours	660	462	1,121
Number of Overflights	4	4	8
Average Overflight Count	4	5	5
ANGLER EFFORT			
Estimated Effort (hours)	982	800	1,782
ESTIMATED HARVEST			
Chinook Adult	8	40	48
Chinook Jack	0	0	0
Coho Adult	0	0	0
Coho Jack	0	0	0
Sockeye	0	0	0
Pink	0	16	16
Chum	0	0	0
ESTIMATED RELEASE			
Chinook Adult	0	4	4
Chinook Jack	1	0	1
Coho Adult	0	0	0
Coho Jack	0	0	0
Sockeye	0	78	78
Pink	0	65	65
Chum	0	0	0

In 2007, recreational anglers were permitted to retain Chinook on the Chilliwack River from Slesse Creek downstream to boundary signs near the confluence with the Fraser River from July 1 to December 31. Fishing was permitted during daylight hours only (from one hour after sunset to one hour before sunrise). The daily limit was four Chinook per day of which only one could exceed 62 cm in length. A creel program was run from September 15th to November 15th, 2007 on the Chilliwack River. Results from this creel are presented in the tables below.

Table 3: Chilliwack River recreational fishery assessment from September 15th to November 15th, 2007. Total catch and release (weekend and weekday combined).

	Sept 16-30	October 1-31	November 1-15	Totals
Number of Interviews	1,375	3,135	725	5,235
Interview Hours	4,630	10,292	2,518	17,440
Number of Overflights	5	9	3	17
Average Overflight Count	355	489	116	320
ANGLER EFFORT				
Estimated Effort (hours)	52,496	132,487	14,450	199,433
ESTIMATED HARVEST				
Chinook Adult	499	1,250	16	1,765
Chinook Jack	1,566	1,449	0	3,015
Coho Adult	1,004	6,147	406	7,557
Coho Jack	26	24	0	50
Sockeye	0	0	0	0
Pink	4,178	1,189	0	5,367
Chum	110	1,166	277	1,553
ESTIMATED RELEASE				
Chinook Adult	787	2,127	48	2,962
Chinook Jack	1,680	2,553	31	4,264
Coho Adult	707	7,094	395	8,196
Coho Jack	35	33	0	68
Sockeye	0	0	0	0
Pink	16,826	11,502	0	28,328
Chum	111	5,124	1,538	6,773

Preliminary 2007 Chinook Recreational Catches – Upper Fraser River ⁽¹⁾

System	Time/Duration	Hours Fished	Total Annual Catch
Bowron River	July 15 – Aug 15: 7days/week	N/A	No creel survey
Chilko River	July 25 - Aug 16: 7days/week	N/A	No creel survey
Fraser River at Prince George	Jul 10 – Jul 25: 7days/week	N/A	No creel survey
Fraser River (confluence of Seton / Fraser River downstream to Seton powerhouse)	July 1 - Sept. 10: 7days/week	N/A	No creel survey
Cariboo River	Jul 27 – Aug 18: 7days/week	N/A	No creel survey
Quesnel River	Jul 15 - Sept 1: 7days/week	N/A	No creel survey
Bridge River	June 21 – Jul 16: 5 days/week (0600 - 2100 hrs)	264	0
Mabel Lake	noon July 25 to noon Sept 12: 7days/week	9148	272
North Thompson River (Clearwater River)	Aug 1 – Aug 31: 7 days/week	N/A	No Creel
Shuswap River (lower)	noon July 25 - noon Sept 12: 7days/week (0500 to 2200 hrs. daily)	14215	531
Shuswap River (middle)	noon July 25 - noon Aug 15: 7days/week	N/A	No Creel
South Thompson River	Aug 5 - Sept 22: 7days/week	N/A	No Creel
Thompson River (near Spences' Bridge)	Jul 27 - Aug 13: Sat/Sun/Mon only 0600 - 2100 hrs.	1466	170
Thompson River (near Martel)	Aug 22 - Sept 3: 7 days/week	N/A	No Creel

(1) Note: Due to budget constraints in 2007 creel surveys were not undertaken in some recreational fisheries. Creel surveys were not undertaken in recreational fisheries where past years information suggested that catch and effort, and associated harvest rates, were very low.

Appendix F: Draft 2007 Chinook Recreational Fishing Plans

Note: See also Appendix H

Table 1: Freshwater Salmon Sport Fishing Regulations: Region 2: Lower Mainland

1. Unless otherwise stated in the table, the daily limit in all waters of Region 2 is zero (0).
2. The aggregate daily limit for all species of Pacific salmon (other than kokanee) from tidal and non-tidal waters combined is four (4).
3. All retained Chinook must measure 30 cm or more from tip of nose to tail fork.
4. A single, barbless hook is in effect year round for all streams in Region 2.
5. There is an annual limit of 10 adult Chinook from all non-tidal waters. All retained adult Chinook must be recorded immediately on the back of your Provincial Non-tidal Angling licence. An "adult Chinook" in Region 2 is defined as being over 50 cm except in the following areas where an "adult Chinook" is defined as being over 62 cm:
 - a) the Fraser River between the CPR bridge at Mission to the powerline crossing approximately 1 km above the Aggasiz/Rosedale bridge from Sep 01 - Dec 31,
 - b) the Chilliwack/Vedder River (including the Sumas River), the Capilano River and the Harrison River.

WATERS	SPECIFIC AREA	SPECIES	DATES	LIMITS / GEAR
Chehalis River	From the logging bridge 2.4 km below Chehalis Lake to the confluence of the Harrison/Chehalis Rivers, including tributaries to that part	All	Sep 01-Dec 31	Daylight hours only.
		Chinook	Jan 01-May 31	<i>No fishing for Chinook.</i>
			Jun 01-Aug 10	4 per day, only 1 over 50 cm.
			Aug 11-Sep 15	<i>No fishing for Chinook.</i>
			Sep 16-Dec 31	4 per day, only 1 over 62 cm.
Chilliwack/Vedder River (including Sumas River)	Downstream from Slesse Creek including that portion of the Sumas River from the Barrow Town Pump Station downstream to boundary signs near the confluence with the Fraser River	All	Sep 01-Dec 31	Daylight hours only.
		Chinook	Jul 01-Dec 31	4 per day, only 1 over 62 cm.
Dewdney Slough - See Nicomen Slough				
Fraser River	Salmon closures are being considered from early September to mid-October to protect co-migrating Upper Fraser and Thompson River coho. Please contact your local DFO office for details.			
	From the downstream side of the CPR Bridge at Mission upstream to the Alexandria bridge, except Landstrom Bar (described below) which is closed to all angling from May 1 to Oct. 31.	All	Jul 01-Dec 31	Daylight hours only.
		Chinook	May 1-Aug 31	4 per day, only 1 over 50 cm.
		Chinook	Sep 01 – Dec 31	4 per day, only 1 over 62 cm.
Landstrom Bar is those waters of the Fraser River inside a line beginning at a fishing boundary sign on the eastern end of Landstrom Bar, then to a fishing boundary sign on the opposite bank, then to a fishing boundary sign at the southern end of Croft Island, then westerly to a fishing boundary sign on the nearest bank of the river, then following the river bank to the beginning point.				
Harrison River	From the Highway 7 bridge to the confluence with the Fraser River	All	Jul 01-Dec 31	Daylight hours only.
		Chinook	Sep 01-Dec 31	4 per day, only 1 over 62 cm
Pitt River	Upper and Lower, including tributaries	Chinook	Jan 01-Dec 31	<i>No fishing for Chinook.</i>
Stave River	Downstream of B.C. Hydro Dam to the CPR Railway Bridge	Chinook	Jan 01-Dec 31	1 per day.
Sumas River - See Chilliwack River				
Vedder River - See Chilliwack River				

Table 2: Freshwater Salmon Sport Fishing Opportunities: Region 3: Thompson-Nicola

1. Unless otherwise stated in the table, the daily limit in all waters of Region 3 is zero (0).
2. The aggregate daily limit for all species of Pacific salmon (other than kokanee) from tidal and non-tidal waters combined is four (4).
3. All retained Chinook must measure 30 cm or more from tip of nose to tail fork.
4. A single, barbless hook is in effect year round for all streams in Region 3.
5. There is an annual limit of 10 adult Chinook from all non-tidal waters. All retained Chinook must be recorded immediately on the back of your Provincial Non-tidal Angling licence. An "adult Chinook" in Region 3 is defined as being over 50 cm.

WATERS	SPECIFIC AREA	SPECIES	DATES	LIMITS/GEAR
Bridge River	Downstream from Road 40 bridge to the confluence of the Fraser River (see also Fraser River opportunity).	Chinook	Jun 22- Jul 15 Sun, Mon, Tue, Wed, Thur only 06:00 to 21:00 hours daily.	4 per day, only 1 over 50 cm.
Clearwater River	From Clearwater Lake downstream to the confluence of the North Thompson River (except CLOSED from Murtle River downstream to 35km post from Aug 16 - 31 to protect Mahood R. Chinook).	Chinook	Aug 1-Aug 31	4 per day, only 2 over 50 cm. Monthly quota is 4 over 50cm (includes adult Chinook caught and retained from North Thompson River).
Fraser River	Mainstem of the Fraser R. in Region 3 except for that portion of the Fraser R. described below	Chinook	April 1-Sep 17	4 per day, none over 50 cm.
	From the confluence of the Seton River and the Fraser River, downstream to the BC Hydro turbine generator tailrace located approximately 1 km downstream of the town of Lillooet.	Chinook	Jul 1-Sep 10	4 per day, only 1 over 50 cm.
	From the confluence with the Bridge River downstream to the BC Railway bridge, 2 km north of Lillooet (see also Bridge River opportunity).	Chinook	Jun 22-Jul 15 Sun, Mon, Tue, Wed, Thur only 0:600 to 21:00 hours daily.	4 per day, only 1 over 50 cm.
Little Shuswap Lake - See South Thompson River				
North Thompson River	Downstream of Station Road Bridge in Clearwater to the Ferry crossing at Little Fort.	Chinook	Aug 1-Aug 31	4 per day, only 2 over 50 cm. Monthly quota is 4 over 50cm (includes adult Chinook caught and retained from Clearwater River)
	Mainstem river.	Chinook	Sep 1-Sep 22	4 per day none over 50 cm .
South Thompson River	From the green can buoy near outlet of Little River to 100m downstream of Campbell Creek.	Chinook	Aug 5-Sep 22	4 per day, only 2 over 50 cm. Monthly quotas are 6 over 50cm.
Thompson River	From Kamloops Lake downstream to the confluence with the Fraser River.	Chinook	Jun 1-Sep 21	4 per day, none over 50 cm (retention of jack Chinook only) See exceptions below

WATERS	SPECIFIC AREA	SPECIES	DATES	LIMITS/GEAR
	From the upstream side of the mouth of the Nicola River downstream to the Hwy 8 bridge at Spences Bridge.	Chinook	July 19 to August 11. Sat, Sun, Mon only, 06:00 to 21:00 hours only.	4 per day, only 1 over 50 cm. Environmental conditions in Nicola River may result in closure. Check with your local DFO office for updates.
	From confluence with Bonaparte River to boundary sign approximately 1 km downstream. North Bank of the river only.	Chinook	To be determined in-season.	Opening dependent on number of Chinook returning to Bonaparte fish way by July 25. Check with your local DFO office for updates.
	From Hwy 8 bridge at Spences Bridge upstream to a fishing boundary sign located approximately 1 km downstream of Martel (west side of river only). These waters open to fishing are subject to change.	Chinook	Aug 22-Sep 03	4 per day, only 1 over 50 cm. Check with your local DFO office for updates.

Table 3: Freshwater Salmon Sport Fishing Opportunities: Region 5a: Cariboo (Part A, Fraser River Watershed, Management Units 5-1 to 5-5 and 5-12 to 5-16)

1. Unless otherwise stated in the table, the daily limit in all waters of Region 5 is zero (0).
2. The aggregate daily limit for all species of Pacific salmon (other than kokanee) from tidal and non-tidal waters combined is four (4).
3. All retained Chinook must measure 30 cm or more from tip of nose to fork in tail (fork length).
4. A single, barbless hook is in effect year round for all streams in Region 5.
5. There is an annual limit of 10 adult Chinook from all non-tidal waters. All retained Chinook must be recorded immediately on the back of your Provincial Non-tidal Angling licence. An "adult Chinook" in Region 5 is defined as being over 50 cm (fork length).

WATERS	SPECIFIC AREA	SPECIES	DATES	LIMITS / GEAR
Cariboo River	From confluence of the Quesnel River to the confluence of Seller Creek.	Chinook	Jul 27-Aug 18	4 per day, only 2 over 50 cm.
Chilko River	From Chilko Lake downstream to boundary signs 1.5km upstream of Siwash bridge (12 km upstream from Chilcotin R. junction).	Chinook	Jul 25-Aug 16	4 per day, only 2 over 50 cm. Monthly limit of 4 over 50 cm.
Quesnel River	downstream of Poquette Creek	Chinook	Jul 15-Sep 01	4 per day, only 2 over 50 cm.

Table 4: Freshwater Salmon Sport Fishing Opportunities: Region 7: Omineca-Peace

1. Unless otherwise stated in the table, the daily limit in all waters of Region 7 is zero (0).
2. The aggregate daily limit for all species of Pacific salmon (other than kokanee) from tidal and non-tidal waters combined is four (4).
3. All retained Chinook must measure 30 cm or more from tip of nose to fork in tail (fork length).
4. A single, barbless hook is in effect year round for all streams in Region 7.
5. There is an annual limit of 10 adult Chinook from all non-tidal waters. All retained Chinook must be recorded immediately on the back of your Provincial Non-tidal Angling licence. An "adult Chinook" in Region 7 is defined as being over 50 cm (fork length).

WATERS	SPECIFIC AREA	SPECIES	DATES	LIMITS / GEAR
Bowron River	From Forestry Road bridge nearest to the Fraser River, upstream to the Bowron Forest Road bridge crossing near Haggan Creek.	Chinook	Jul 15-Aug 15	4 per day, only 2 over 50 cm.
Fraser River	From power lines crossing the Fraser River near College Heights, upstream to the Northwood Bridge crossing the Fraser River	Chinook	Jul 10-Jul 25	4 per day, only 1 over 50 cm.

Table 5: Freshwater Salmon Sport Fishing Opportunities: Region 8: Okanagan

1. Unless otherwise stated in the table, the daily limit in all waters of Region 8 is zero (0).
2. The aggregate daily limit for all species of Pacific salmon (other than kokanee) from tidal and non-tidal waters combined is four (4).
3. All retained Chinook must measure 30 cm or more from tip of nose to fork in tail (fork length).
4. A single, barbless hook is in effect year round for all streams in Region 8.
5. There is an annual limit of 10 adult Chinook from all non-tidal waters. All retained Chinook must be recorded immediately on the back of your Provincial Non-tidal Angling licence. An "adult Chinook" in Region 8 is defined as being over 50 cm (fork length).

WATERS	SPECIFIC AREA	SPECIES	DATES	LIMITS / GEAR
Mabel Lake	South of fishing boundary signs located on opposite shores approximately 1 km from Wap Creek.	Chinook	12:00 Jul 25-12:00 Sep 12	4 per day, only 2 over 50 cm. Monthly quota is 4 over 50cm, including all Shuswap River and Mabel Lake Chinook.
Shuswap River	Between Shuswap Falls and Mabel Lake.	Chinook	12:00 Jul 25 - 12:00 Aug 15	4 per day, only 2 over 50 cm. Monthly quota is 4 over 50cm, including all Shuswap River and Mabel Lake Chinook.
	Upstream from signs above Mara Bridge to Mabel Lake.	Chinook	12:00 Jul 25 - 12:00 Sep 12 05:00-22:00 hours only	4 per day, only 2 over 50 cm. Monthly quota is 4 over 50cm, including all Shuswap River and Mabel Lake Chinook.

Tidal Waters

- The coast-wide daily limit for Chinook is two.
- The total Chinook annual limit is 30 from any tidal waters, of which at most,
 - 10 may be caught in the tidal waters of the Fraser River;
 - 15 may be caught in the waters of Areas 12 to 18, 28 and 29 and that portion of Area 19 north of Cadboro Point; and
 - 20 may be caught in the waters of Area 20 and that portion of Area 19 south of Cadboro Point.
- Barbless hooks are required for all salmon fishing.
- The aggregate daily limit (total daily limit) for all species of Pacific salmon from tidal or non-tidal waters combined is four.
- The minimum size limit for Chinook in Areas 13 to 18, 28 and 29 and in that portion of Area 19 north of Cadboro Point is 62 cm. The minimum size limit in all other waters is 45 cm.
- Substantial management measures are taken on Chinook fisheries on the West Coast of Vancouver Island and in the Strait of Georgia. Maps showing details of these measures can be found online at:
<http://www.pac.dfo-mpo.gc.ca/recfish>

Appendix G: 2007 Commercial Catches and Summary of 2004 Area H Sampling Program

Figure 1: Preliminary Estimates of Canadian Commercial Catch of Chinook Salmon by Gear Type and Salmon Licencing Area October 1, 2006 to September 30, 2007 (from FOS*)

Areas	Purse Seine	Gill Net	Troll	Total
Area A	0			0
Area B	4 041			4 041
Area C		14 589	14 589	14 589
Area D		22 884	22 884	22 884
Area E		32	32	32
Area F			83 235	83 235
Area G			87	941
Total	4041	37 505	171 176	212 722

*Fishery Operations System – a database in which DFO maintains catch information for various fisheries.

Figure 2: Summary of 2004 Area H Chinook Sampling Program

Date	Feb. 16-29/04	Feb. 16-29/04	Apr. 27- /May 9/04	Sept. 17-27/04
Location	Upper Strait of Georgia	Lower Strait of Georgia	Lower Knight Inlet	Lower Fraser
Area	Area 14	Area 17,18 and 29-5	Area 12	Area 29-3, 4 and 6
Vessel days	18	25	11	13 (3 vessels)
Chinook (kept)	64	18	0	17
Chinook (rel)	73	23	0	6
Total Chinook	137	41	0	21
Sample Size*	113	41	0	21
DNA Results	82% ECVI; 17% Puget Snd; 1% other	60% ECVI; 35.5% Puget Snd; 2.5% Upper Fraser; 2% other	n/a	94.8% Lower Fraser; 2.5% Puget Snd; 1.8% S. Mainland 0.8% other

*Note: approximately 70 samples from a DFO science project (sea lice) are included in the Upper Strait of Georgia results. The samples were collected from Area 14 on Feb. 10-12/04

DNA data was provided by the Molecular Genetics Laboratory at PBS

Figure 3: WCVI Chinook Troll Fishery Preliminary Catch and Releases Estimates – Generated from the Department Fishery Operations System (FOS) October 2006 to September 2007

THE FOLLOWING CATCH ESTIMATES ARE PRELIMINARY ONLY AND SUBJECT TO CHANGE

AREA G OCT 2006 TO JUNE 2007 PRELIMINARY CHINOOK CATCH ESTIMATES					
Date	Areas	Chinook Kept	Chinook Released	Coho Released	Marked Coho Retained
Oct 1 TO 3, 2006	123 to 127	16,026	1,752	740	260
Nov 8 to 30, 2006	23 to 27, 123 to 127	1,190	203	72	0
Dec 1 to 31, 2006	23 to 27, 123 to 127	770	162	8	0
Jan 1 to 31, 2007	23 to 27, 123 to 127	5,440	771	209	0
Feb 1 to 28, 2007	23 to 27, 123 to 127	2,587	449	12	0
March 1 to 6, 2007	123 to 127, 23 to 27	528	3	0	0
March 17 to 31, 2007	125 to 127, 23 to 27	1,728	319	2	0
April 7 to 15, 2007	125 to 127, 23 to 27	440	65	0	0
April 16 to 30, 2007	23 to 27, 123 to 127	4,783	214	70	0
May 1 to 31, 2007	23 to 27, 123 to 127	23,464	1,567	2749	0
June 1 to 10, 2007	23 to 27, 123 to 127	13,503	530	2,416	
June 18 to 22, 2007	23 to 27, 123 to 127	11,500	712	2,768	
Sept 18 to 20 , 2007	123 to 127	5,450	1,876	2,300	1,432
Sept 21 to 28, 2007	125 to 127	532	69	39	16
TOTAL		87,941	8,692	11,385	1,708

Marked coho were allowed to be kept in the Oct 06 and Sept 07 Fishery

Appendix H: 2008 Proposed Management Measures to Protect Earliest Timed Fraser River Chinook

Option 1: Fishery Restrictions (target of 50% harvest reduction)

Fishery	Area	March			April			May			June		
		1	15	31	1	15	30	1	15	31	1	15	30
Area G Troll^A	SWVI (Area 123/124)	Closed March 1 to April 30											
Marine Recreational^B	Subareas 19-1 to 19-4 and 20-5)	Status Quo (see below)			Slot limit: 2 Chinook per day between 45 - 67cm only April 1 to May 31								
	Area 29 off Fraser River (Area 29-7, 9-10)	Status Quo (see below)			Non-retention of Chinook April 1 to May 31								
Fraser River Recreational^C	Fraser River Tidal (Areas 29-11 to -17)	Closed (Status Quo)						Non-retention of Chinook May 1 - June 15					
	Freshwater (Mission to Alexandra Bridge)	Closed (Status Quo)						Non-retention of Chinook May 1 - June 15					
Fraser River First Nations^D	Downstream of Port Mann		Proposed: later start			Reduced time to June 1							
	Port Mann to Sawmill		Proposed: later start			Reduced time to June 1							
	Sawmill to Kelly Cr. And Thompson below the Bonaparte	Closed (Status Quo)			Proposed reduced time: 2 days per week (weekends) April 1 - June 15 for gill net								
Albion Test Fishery^E	Fraser River Chinook Assessment Fishery	Closed (Status Quo)			Status quo: required to assess CWT recoveries for in-river fisheries								

A: Area G Status Quo: Closed Mar. 15 to Apr. 15 in SWVI (Area 123/124)

B: Marine Recreational Status quo:

Daily limit is 2 Chinook per day with minimum size limit of 45cm in those waters west of Cadboro Point to Sheringham Point (Subareas 19-1 to 19-4 and 20-5)

Daily limit is 2 Chinook per day with minimum size limit of 62cm in those waters of Area 29 off the Fraser River (Area 29-7, 29-9 and 29-10)

C: Fraser River Recreational Status Quo:

Currently closed. Open May 1 with daily limit of 4 Chinook, only 1 over 50 cm in Fraser River tidal waters (Areas 29-11 to 29-17) and non-tidal waters downstream of the Alexandra Bridge.

D: Fraser River First Nations Status Quo:

Fishery generally opens in mid March: 24 hrs/wk drift nets Mid April: 36 hrs/wk drift nets May 1: 48 hrs/wk in the waters downstream of the Port Mann Bridge.

Fishery generally opens in mid March: 24 hrs/wk set net, 10hrs/wk drift net May 1: 48 hrs/wk set net, 12 hours/wk drift net in the waters upstream of the Port Mann Bridge to the confluence with Sawmill Creek.

Fishery generally opens April 1 to June 15: 4 days per week, all gears, June 16 until E. Stuart Sockeye window closure: 7 days per week in the BC Interior: Fraser River from the confluence with Sawmill Creek to the confluence with Kelly Creek and the Thompson River below the Bonaparte

E: Albion Test Fishery Status Quo: Fishery usually starts April 1: 2 sets per day with 8" or multi-panel net

Option 2: Window/Corridor Closure (target greater than 50% harvest reduction)

Fishery	Area	March			April			May			June		
		1	15	31	1	15	30	1	15	31	1	15	30
Area G Troll^A	SWVI (Area 123/124)	Closed March 1 to April May 15											
Marine Recreational^B	Subareas 19-1 to 19-4 and 20-5)	Non-retention of Chinook: March 15 to May 31											
	Area 29 off Fraser River (Area 29-7, 9-10)	No fishing for salmon: March 15 to 31											
Fraser River Recreational^C	Fraser River Tidal (Areas 29-11 to -17)	Closed (Status Quo)						No fishing for salmon: May 1 - June 15					
	Freshwater (Mission to Alexandra Bridge)	Closed (Status Quo)						No fishing for salmon: May 1 - June 15					
Fraser River First Nations^D	Downstream of Port Mann	Proposed: closed											
	Port Mann to Sawmill	Proposed: closed											
	Sawmill to Kelly Cr. And Thompson below the Bonaparte	Closed (Status Quo)			Proposed: closed								
Albion Test Fishery^E	Fraser River Chinook Assessment Fishery	Closed (Status Quo)			Later start if all Fraser River fisheries are closed, consistent with start of Fraser River fisheries.								

A: Area G Status Quo: Closed Mar. 15 to Apr. 15 in SWVI (Area 123/124)

B: Marine Recreational Status quo:

Daily limit is 2 Chinook per day with minimum size limit of 45cm in those waters west of Cadboro Point to Sheringham Point (Subareas 19-1 to 19-4 and 20-5)

Daily limit is 2 Chinook per day with minimum size limit of 62cm in those waters of Area 29 off the Fraser River (Area 29-7, 29-9 and 29-10)

C: Fraser River Recreational Status Quo:

Currently closed. Open May 1 with daily limit of 4 Chinook, only 1 over 50 cm in Fraser River tidal waters (Areas 29-11 to 29-17) and non-tidal waters downstream of the Alexandra Bridge.

D: Fraser River First Nations Status Quo:

Fishery generally opens in mid March: 24 hrs/wk drift nets Mid April: 36 hrs/wk drift nets May 1: 48 hrs/wk in the waters downstream of the Port Mann Bridge.

Fishery generally opens in mid March: 24 hrs/wk set net, 10hrs/wk drift net May 1: 48 hrs/wk set net, 12 hours/wk drift net in the waters upstream of the Port Mann Bridge to the confluence with Sawmill Creek.

Fishery generally opens April 1 to June 15: 4 days per week, all gears, June 16 until E. Stuart Sockeye window closure: 7 days per week in the BC Interior:

Fraser River from the confluence with Sawmill Creek to the confluence with Kelly Creek and the Thompson River below the Bonaparte

E: Albion Test Fishery Status Quo: Fishery usually starts April 1: 2 sets per day with 8" or multi-panel net

Appendix I: Salmon Endowment Fund

As part of the 1999 Pacific Salmon Treaty, the US and Canada established an endowment fund, the interest from which would be used for the benefit of Pacific salmon. More information on approved projects and application process can be found at:

http://www.psc.org/news_restoration.htm

Chinook related projects approved in 2007:

Enhancement

- Campbell River Mainstem Chinook Enhancement
- Salmon River Chinook Recovery

Habitat Restoration

WCVI

- Kauwinch River Side Channel
- Harris Creek Side Channel
- Charters Creek Salmon Habitat Restoration Project
- Nahmint River Side-Channel Construction Feasibility Study
- Somass Estuary Salt Water Marsh Restoration
- Water Use Planning Forum for Stamp-Somass-Sproat Rivers, Port Alberni

Georgia Basin

- Cowichan River – Stoltz Bluff Remediation.
- Habitat Assessment and Rehabilitation Designs for Koksilah River Watershed
- Water Storage Feasibility on East Coast Vancouver Island
- Georgia Basin Eelgrass Habitat Restoration Project.
- Squamish River Estuary Restoration.

Fraser Basin

- South Thompson River Chinook Spawning Area Remediation.
- Coldwater River Habitat Restoration.
- Fish Passage Improvements in the BC Interior.
- Nicola Basin Stream Flow Recovery and Development of In-stream Flow Requirements.

Improved Information Projects

Chinook

- Sampling of Chinook Double Index Tag Recoveries in Southern BC commercial fisheries.
- Improvements to the Harrison River Chinook key stream program: an alternative release strategy for hatchery-reared Harrison Chinook to improve CWT recoveries
- Estimate spawning escapement, juvenile production, and contribution to fisheries of Coweeman River fall Chinook salmon
- Validation of Aerial Redd Counts for Estimating Fall Chinook Salmon Abundance in the Deschutes River, Oregon
- Lower Granite Fall Chinook Run Reconstruction Assistance
- Feasibility investigation and development of an indicator stock program at the Chilko River for Fraser River 1.3 Summer Chinook.
- Nanaimo River Chinook Indicator Stream Surrogate.
- Determine origin of out of basin stray fall Chinook salmon in the Deschutes River, Oregon
- Habitat-Based Chinook Escapement Goal Calibration: large, clear rivers and small, low visibility rivers in the interior Fraser River Watershed, BC.
- West Coast of Vancouver Island Chinook Area Under the Curve Index and Habitat-Based Escapement Goal Calibrations.
- Estimates of the abundance of hatchery Chinook in wild spawning populations.
- Collection and Analysis of DNA Based Stock Composition Data – WCVI Chinook Troll Fishery.
- Genetic Stock Identification – Collection of Baseline data for WCVI Chinook Stocks
- Mixed Stock Analysis of Selective and Sport Chinook Fisheries in the Strait of Juan de Fuca using Molecular Markers.
- Chinook Baseline Expansion with Additional Genetic Markers.

Multi-species

- Using environmental data to improve wild and hatchery estimates of Chinook and coho salmon return rates
- Assessing growth and survival of juvenile Chinook and coho salmon off the West coast of Vancouver Island.
- Multi-species Migration and Improved Escapement Enumeration using a DIDSON on the Cowichan River, BC.
- Coldwater River Resistivity Counter Calibration.

Appendix J: Additional Technical Information

1. Harrison Chinook:

The run size of Harrison fall returning Chinook is calculated using the results of the Harrison River escapement program. An exploitation rate is calculated using the run size estimate. However, the tag rate from Chinook produced at the Chehalis River hatchery is very low compared to the total Harrison return. This makes finding enough tags to develop an exploitation rate during the Harrison escapement program difficult. To get a better estimate, the Chilliwack River exploitation rate has been used in place of Harrison run size calculations. Unfortunately, several problematic issues with the Chilliwack escapement program have contributed to high uncertainty with the estimated exploitation rates. Discussions are underway to decide whether to improve the Harrison program (Chehalis hatchery fish survival), or to improve the Chilliwack escapement and creel programs.

The Chehalis hatchery enhances Harrison River fall returning Chinook through the collection of broodstock from the Harrison River and a small number of "swim-ins" to the hatchery. Production from both facilities is monitored through application and recovery of coded-wire tags (CWT's). The contribution from the Chehalis hatchery to the in-river escapement in the Harrison River is less well known than the Chilliwack hatchery's contribution to the in-river escapement of fall-run fish returning to the Chilliwack River system. This is due in part to the relatively small Chehalis hatchery contribution within the large natural spawning Harrison population, making the recovery of CWT's during annual assessment programs difficult, and the absence of CWT recovery sampling and escapement estimation for the Chehalis River. The estimate of fall-run Chinook hatchery contribution to the escapement in the Chilliwack River is better known due to a smaller natural spawning population and a greater proportion of CWT's present.

2. Stock Assessment:

Stock assessment of Chinook salmon coast wide relies upon estimating the exploitation rate on "indicator stocks" and annual monitoring of escapements to a sample of these naturally spawning Chinook populations. Exploitation rate is the portion of the production from one spawning year that is killed by fishing; this includes catch and incidental mortality. It is determined by dividing the total fishing mortality (i.e., the sum of all kept catches plus incidental mortality over all ages and is adjusted for natural mortality rates of juvenile fish) by the total pre-fishery cohort estimate (i.e., the total fishing mortality plus total spawning escapement).

Currently, exploitation rate can only be estimated through the CWT program because accurate age- and stock-specific catches are required, but other methods and technologies have not been able to provide similar accuracy at similar costs. CWT data from the fall returning, white-flesh stock to the Chilliwack River are used as a surrogate to estimate exploitation of the Harrison River natural stock. Harrison stock from the Chehalis hatchery has been used to determine Harrison exploitation but this technique has been limited by the CWT data due to a small CWT sample size in the Harrison River spawning escapement, a lack of assessment information on the number of CWT Chinook returning to the Chehalis River, and lower survival of fish released from Chehalis hatchery than Chilliwack hatchery. This results in a sub-optimal estimation of

Harrison stock contribution to fisheries. However, the annual mark-recapture program in the Harrison River does provide a quantitative estimate of this population's spawning escapement (natural production plus the Chehalis hatchery enhancement) by age and sex. Total production from one spawning year in the Harrison natural population is estimated by:

- estimating the exploitation rate by age from the CWT program;
- estimating the spawning escapement by age based on the mark-recapture program;
- estimating the return of Chehalis Chinook and subtracting them from the total escapement by age;
- expanding the terminal run (terminal catch plus spawners) by the ocean exploitation rate by age;
- summing over ages (ages 3 to 5).

Accurate CWT and escapement data are essential to the detection of changes in survival due to the effects of fishing. Appendix B contains lower Fraser River Chinook enumeration data.

Exploitation rate indicator stocks were identified for the upper Fraser, but due to an inability to recover coded-wire tags in the in-river terminal fisheries and to quantify recoveries in the spawning escapements, much of the tagging was discontinued in the late 1980's. Tagging of hatchery production has been continued, largely for Dome, Nicola, and Lower Shuswap exploitation rate indicator stocks. Spawning escapements are estimated quantitatively with representative sampling of CWTs these rivers. As CWT recoveries from some in-river fisheries have not been directly sampled, CWT recoveries will be estimated using alternate methods with information from other nearby in-river fisheries. The best available approach will be used in order to estimate fishing impacts across all fisheries, including those in the Fraser River. The spawning escapement data used in annual assessments are from a subset of streams selected for annual consistency in enumeration methods (referred to as the CTC indicator stocks).

In order to properly account for the full impact of fishing on Chinook stocks, the PST specifies that all parties develop programs to monitor all sources of fishing related mortality on Chinook. Catch monitoring programs are being modified to include estimates of encounters of all legal and sub-legal Chinook, as well as other salmon species, in all fisheries.

3. Forecasting:

Currently, abundance forecasts are developed for only the Fraser fall-run aggregate, excluding those produced by the PST CTC Chinook model. The Fraser fall-run forecast is actually the total of two separate forecasts: one for the natural Harrison River spawning population and one for the river spawning and hatchery broodstock components of Chilliwack River. Each forecast is based on sibling regressions of either the age-specific estimated terminal run to each river versus estimated total ocean production or estimated total production versus total production based on data collected since the 1984 return year. Sibling regressions use past observations of the number of spawners at one age to predict the subsequent return at a later age. These relationships explain high amounts of variance ($r^2 \geq 0.80$) and provide useful forecasts of ocean abundance, terminal runs and spawning escapements. For the relationship between spawners to

be accurate, it is assumed that the ocean exploitation rates are similar to the average over recent years.

To develop forecasts (other than just recent average values, etc.), annual sampling for age structure in the catch and escapement, and a quantitative estimate of spawning escapements is needed. As noted above, upper Fraser escapements are visual estimates of trends, whose bias is largely unassessed except for a few locations. Further, it would be desirable to have in-river catch by stock and age. The real deficiency in our inability to develop forecasts for upper Fraser Chinook is the fact we cannot reconstruct cohort abundance because some in-river fisheries have not been directly sampled for CWTs. As mentioned above, several alternate approaches are under consideration and the best available ones will be used to address this deficiency in order to estimate fishery impacts and reconstruct cohort abundances. Currently, Nicola River, Dome Creek, and Lower Shuswap River have CWTs and reliable escapement estimation programs; however, the utility of these programs to produce forecasts is limited by the lack of a reliable estimate of CWT removals from in-river fisheries.

To accurately estimate the number of CWT's removed during in-river fisheries, required information includes:

- accurate catch estimates in all the time/area strata; catch must be estimated for all fisheries in order to produce accurate estimates of cohort size and fishing impacts;
- reliable and representative sampling of CWT's from those strata (sampling rates of about 20%, preferably all CWT's encountered by surveyors); indirect CWT recovery rate information can be used from suitable alternate fisheries when direct information is unavailable; and,

DFO assessment capabilities and resources are acknowledged as a serious limitation to catch estimation and sampling of all fisheries. An approach to address these data gaps may involve greater participation by stakeholders in catch estimation and sampling programs in addition to a greater role in decision making. To summarize, we currently do not have an empirical basis to forecast upper Fraser River Chinook returns.

4. Other Stock Assessment Information:

a.) Coded Wire Tag Information

Nearly all the exploitation rate information available on Fraser River Chinook is derived from CWT's recovered from commercial, recreational and aboriginal fisheries. In addition, CWT analyses provide information on the stock distribution, abundance, survival and timing.

b.) DNA Analysis

Over successive generations, distinct fish populations have adapted to fit and prosper in particular niches in their ecosystems. These specialized characteristics are frequently expressed as unique patterns in their genetic code. The Molecular Genetics Lab at the Pacific Biological Station utilizes microsatellite DNA and major histocompatibility complex (MHC) genetic variation to examine differences in fish populations for ecological and conservation reasons as well as to assist in fisheries management.

To date, hundreds of distinct fish stocks (primarily Pacific salmon) have been examined, resulting in the most comprehensive set of microsatellite DNA baseline data for fisheries in the world. DNA baseline samples and fishery samples have been collected from selected Pacific fisheries for the past five years. DNA analysis of fishery samples and additional baseline sampling has been reduced since 2000 due to other funding priorities.

5. Setting Escapement Objectives:

DFO is looking at new methodologies for setting escapement goals including a stock-recruitment based assessment and a habitat based escapement assessment. The information needs for the stock recruitment method include; number of spawners, fishing mortalities by stock and age, definitions of spawning stocks, and assumptions must be made about natural mortality rates and patterns, time sequence of environmental patterns, and consistency of data series.

The information needs for a habitat based assessment are more readily available in large spatial databases such as the Provincial Watershed Atlas and Terrain Resource Information Maps. Two biologically-based methods appear useful to establish escapement goals and both focus on estimating carrying capacity. Escapement goals will be based on each aggregate's management objectives. One method estimates spawner capacity from spawner density-habitat relationships developed from Fraser River populations (Parken et al. 2002¹). Presently, the method is being ground-truthed with fish production and stock-recruitment data for the Nicola River. The second method relies on relationships between carrying capacity, estimated from stock-recruitment analyses, and habitat parameters such as watershed area (Parken et al. 2006²). The habitat and stock-recruitment data are from 25 populations ranging from Northwestern Alaska to 9 coastal Oregon. The model predicts the spawning abundance producing maximum sustained yield and the spawning abundance at the stable equilibrium, called capacity, in units of total spawners. Since most of the Fraser River stocks only have spawner abundance indices, which tend to underestimate the total number of spawners (Bailey et al. 2000³; Parken et al. 2003⁴), further calibration of the current visual escapement estimates is needed in order to use similar units for comparisons. Calibration work will be undertaken at the Lower and Mid Shuswap rivers, Coldwater River, and possibly Chilcotin River in 2007.

¹ Parken, C.K. J.R. Irvine, R.E. Bailey, and I.V. Williams. 2002. Habitat-based methods to estimate spawner capacity of Chinook salmon in the Fraser River watershed. Canadian Science Advisory Secretariat Research Document 2002/114, Ottawa.

² Parken, C.K., R.E. McNicol, and J.R. Irvine. 2006. Habitat-based methods to estimate escapement goals for data limited Chinook salmon stocks in British Columbia, 2004. Canadian Science Advisory Secretariat Research Document 2006/083, Ottawa.

³ Baiely, R.E., C. K. Parken, J. R. Irvine, B. Rosenberger, and M. K. Farwell. 2000. Evaluation of the utility of aerial overflight based estimates versus mark– recapture estimates of Chinook salmon escapement to the Nicola River, British Columbia. Canadian Stock Assessment Secretariat, Research Document 2000/152, Ottawa.

⁴ Parken, C.K., R.E. Bailey, and J.R. Irvine. 2003. Incorporating uncertainty in area-under-the-curve and peak counts salmon escapement estimation. North American Journal of Fisheries Management 23:78-90.

Appendix K: DFO Contacts

Fisheries Management - Lower Fraser Area	A/Area Chief	Bilal Cheema	(604) 666-6512
	A/Resource Manager – Aboriginal Fisheries	Bev Carpenter	(604) 666-8426
	Resource Manager – Aboriginal Fisheries	Brian Matts	(604) 666-2096
	Resource Manager - Recreational Fisheries	Debra Sneddon	(604) 666-6509
	Resource Manager - Commercial Fisheries	Barbara Mueller	(604) 666-2370
	A/Management Biologist (Chinook, coho, chum)	Joe Tadey	(604) 666-7273
	A/Management Biologist (FN catch monitoring)	Mark Fetterly	(604) 666-6608
Fisheries Management - B.C. Interior	Area Chief	Les Jantz	(250) 851-4878
	Resource Manager - Fraser River watershed upstream of Deadman Creek	Linda Stevens	(250) 305-4004
	Asst. Resource Manager - Fraser River watershed upstream of Deadman Creek	Al Charbonneau	(250) 992-8157
	Resource Manager – Thompson/Columbia/Okanagan Rivers and Fraser River from Sawmill Creek to Deadman Creek.	Dean Allan	(250) 851-4821
	Asst. Resource Manager - – Thompson/Columbia/Okanagan Rivers and Fraser River from Sawmill Creek to Deadman Creek.	Merv Mochizuki	(250) 851-4952
	A/Senior Management Biologist	Jamie Scroggie	(250) 851- 4948
	Management Biologist	Cindy Samaha	(250) 851- 4852
Stock Assessment Division	Head – Fraser River Stock Assessment	Timber Whitehouse	(250) 851-4833
	Biologist, Chinook/Coho Program	?	(604) 666-7273
	Biologist, Chinook/Coho Program	Mike Chamberlain	(250) 851-4947
	Program Head, Chinook/Coho	Richard Bailey	(250) 851-4814
Conservation & Protection	Area Chief - Lower Fraser River Area	Herb Redekopp	(604) 607-4156
	A/Area Chief – B.C. Interior Area	Stu Cartwright	(250) 851-4922