

**PACIFIC SALMON COMMISSION
JOINT CHUM TECHNICAL COMMITTEE**

**FINAL 2002 – 2003 POST SEASON
SUMMARY REPORT**

Report TCCHUM (05) - 1

February 2005

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1. INTRODUCTION

This Joint Chum Salmon Technical Committee report presents the appropriate information on chum salmon stocks and fisheries in southern British Columbia and Washington for the years 2002 and 2003. It also addresses the specific provisions and requirements of Chapter 6 of Annex IV of the Pacific Salmon Treaty (PST) (Attachment 1).

The treaty between the governments of Canada and the United States of America (U.S.) concerning Pacific salmon was designed to facilitate co-operation between the two countries in the management, research and enhancement of Pacific salmon stocks. Chapter 6 of Annex IV of the Pacific Salmon Treaty (PST) required that certain fisheries for chum salmon in southern British Columbia (B.C.) and Washington be managed in a specified manner. Other fisheries, while not specifically mentioned in the PST, are known to harvest chum of the other country's origin. This report discusses various aspects of the chum present in Washington State and in B.C. waters between Vancouver Island and the mainland and off the west coast of Vancouver Island, and discusses the management actions of Canada and the U.S. in relation to the PST requirements.

The Chum Annex (Chapter 6 of Annex IV of the PST) had been renewed for one or more years since it was initially negotiated in 1987. However, in 1994, the Parties to the PST were unable to reach agreement on a number of provisions of the PST, including the Chum Annex. Thus, no formal agreement existed for the 1994 season, although the parties essentially continued to observe the provisions of the expired annex.

In 1995 the Parties were able to agree on a Chum Annex that was essentially the same as had existed in the years immediately prior to 1994. This annex was renewed annually until 1999 when a new Chum Annex was negotiated for a term of 10 years (Attachment 1). This new annex was updated to be consistent with changes in the "Clockwork" management strategy implemented by Canada for fisheries in Johnstone Strait. It also included provisions to address the conservation concerns the United States has for Hood Canal and Strait of Juan de Fuca summer chum, which have been listed as a "threatened" species under the United States' Endangered Species Act.

2. STATUS OF TREATY REQUIREMENTS

Chum stocks and fisheries in southern British Columbia and in United States Areas 4B, 5, 6C, 7, 7A (See: Attachment 2) are managed under the terms set out in the Pacific Salmon Treaty. The following provides a brief synopsis of the provisions of the Chum Annex and of Canadian and U.S. management actions to meet those provisions for the years 2002 and 2003. New Chum Annex provisions included in the 1999 revised version are noted as such.

2.1 Paragraph 1:

The Parties were to maintain a Joint Chum Technical Committee (Technical Committee) to review stock status, develop new methods for stock management and report on management and research findings.

The Technical Committee convened several times during 2002 and 2003, primarily during the PSC post-season or annual meetings, but also held a separate two-day session in December of 2002. The Committee completed the post-season catch up report covering the years 1994 through 2001. The Committee did not undertake, nor complete any other reports on management or research findings. The Committee initiated discussions on the development of a southern chum DNA baseline for future stock composition work. Desirable baseline stocks were identified for the U.S. and a request was made of WDFW to collect samples during the 2003 spawning season. Work on many of the Technical Committee's tasks has been hampered by a small number of committee members with limited available time, and by a lack of data from the Parties, because of budget reductions in both the U.S. and Canada.

2.2 Paragraph 2:

Canada was to manage its inside fisheries to provide rebuilding of depressed naturally spawning stocks and minimize increased interceptions of U.S. chum.

Table 1 provides an evaluation of the performance of the Clockwork and current management strategy (1994 – 2003). The total estimated escapement for Inside chum stocks met or exceeded the goal of 2.5 million in 5 of the past 10 years and 8 of 10 years exceeding 2 million. Stock identification information has been limited in recent years, and suggest minimal interception of US chum stocks.

2.3 Paragraph 3:

Canada was to manage its Johnstone Strait Clockwork harvest to set exploitation rates dependent on the run size entering Johnstone Strait, as determined in-season. The catch level of chum salmon in U.S. fishing Areas 7 and 7A was determined by the catch of chum salmon in Johnstone Strait. In addition, the total proportion of effort and catch between Areas 7 and 7A was to be maintained.

Canada implemented a significant change in Southern B.C. chum management in 2002 and 2003, abandoning the "Clockwork" stepped exploitation rates in favor of a fixed fishing schedule designed to approximate a total harvest rate of 20%. Results of this new approach are provided in Table 1. The U.S. fishery in Areas 7 and 7A was managed consistent with the catch triggers provided for in the annex, and caught fewer chum salmon than allowed by the annex quotas in both

2002 and 2003 (see Table 13). The proportion of catch between Areas 7 and 7A is shown in Table 12, and is generally consistent with the historical distribution.

2.4 Paragraph 4:

The U.S. was to maintain the limited effort nature of its chum fishery in U.S. Areas 4B, 5, and 6C to minimize increased interceptions of Canadian chum. In addition the U.S. was to monitor this fishery for increasing interceptions of Canadian chum.

This fishery has continued to be restricted to gillnet gear only and to treaty Indian fishermen from four tribes. The technical committee has not specifically addressed interception estimates during the 1994 through 2001 time period, or the issue of “minimizing increased interceptions”. However, GSI samples collected from the fishery indicate the majority of the catch is chum salmon of U.S. origin, and the total catch in the fishery has declined significantly over the period from 1994 through 2003 (see Table 10). Therefore, interceptions have likely decreased as well.

2.5 Paragraph 5:

When the catch of chum salmon in U.S. Areas 7 and 7A fails to achieve the specified ceiling, the ceiling in subsequent years will be adjusted accordingly.

The U.S. fishery in Areas 7 and 7A fell short of its catch ceiling in both 2002 and 2003 and an adjustment is called for under the terms of the annex. The cumulative shortfall due the U.S. is 220,669 chum salmon (See Table 13).

2.6 Paragraph 6:

Catch composition in fisheries covered by this chapter was to be estimated post-season using methods agreed upon by the Joint Chum Technical Committee.

Only a few fisheries covered by this chapter were sampled for stock composition in 2002 and 2003 (See Table 14), and stock composition estimates are available. However, the Joint Chum Technical Committee has not specifically reviewed and reported on these results. Catch composition work has recently received a lower funding priority, due to budget constraints.

2.7 Paragraph 7:

Canada was to manage the Nitinat chum fishery to minimize the harvest of non-targeted stocks.

In 2002 and 2003, Canada has addressed specific by-catch concerns by delayed opening dates, continued use of reduced fishing area, increased use of weed lines, and selective fishing techniques.

2.8 Paragraph 8:

Canada was to conduct genetic stock identification (GSI) sampling of the West Coast Vancouver Island troll fishery (Areas 121-124) if catch levels were predicted to reach levels similar to those in 1985 and 1986.

The West Coast Vancouver Island troll fishery catch of chum salmon was specifically constrained during the 2002 and 2003 seasons for domestic allocation purposes and the catch levels were well below those experienced in 1985. Therefore no GSI sampling was necessary and none has occurred.

2.9 Paragraph 9 (added in 1999):

From August 1 to September 15 of each year, purse seine fisheries in Canadian Area 20 and non-Indian seine fisheries in U.S. Areas 7 and 7A shall release all chum salmon.

Regulations have been implemented by both countries to require the live release of chum salmon in these areas during this time period.

2.10 Paragraph 10 (added in 1999):

The parties will assess chum catches and attempt to collect GSI samples from boundary area fisheries during the August 1 to September 15 time period.

Tables 4 and 11 provide the catch of chum salmon during the period of summer chum migration in boundary areas. Due to the low numbers of chum encountered during this time period, neither the U.S. nor Canada have collected any GSI samples.

3. CANADIAN INSIDE CHUM

3.1 Introduction

Southern B.C. chum salmon stocks and fishing areas are, for the purposes of management, analysis and reporting, divided into two major components. The stocks of Johnstone and Georgia straits and the Fraser River, are termed Inside chum, and those of the West Coast of Vancouver Island, including Juan de Fuca Strait, are termed West Coast chum. The primary fisheries of concern for 2002 and 2003 are the WCVI Nitinat Lake, Johnstone, Georgia and Juan de Fuca straits and the Fraser River.

3.2 Status of Treaty Requirements

A bilateral agreement for sharing of chum salmon was reached on June 30, 1999. Canada and the U.S. agreed to implement, without any prejudice to future agreements, the most recently expired sharing arrangement as outlined in Chapter 6 of Annex IV of the Pacific Salmon Treaty. Canada would continue to manage chum fisheries in Johnstone Strait, Strait of Georgia and Fraser River areas in a manner consistent with the 1983 Clockwork plan and minimize, where practicable, interceptions of United States origin stocks. The U.S. would limit its harvest of Canadian chum in some areas to negotiated catch ceilings as specified in the sharing arrangements of Chapter 6.

3.3 Conservation and Harvest Management Requirements

Inside chum are managed with the long term objective of providing maximum benefits to the fishing industry. The general approach adopted by Fisheries and Oceans Canada (CDFO) is to achieve the present target wild escapements, while augmenting production through enhancement of selected stocks. In practice, this approach is achieved through the application, in mixed stock fishery areas, of harvest rates which are compatible with wild or natural stock productivity. If there are stocks which return to their area of origin in numbers above that area's escapement goal, they may be subjected to additional harvesting in the appropriate terminal area.

The following describes the harvest strategy, Pacific Salmon Treaty (PST) requirements for Inside chum and discusses Inside (Johnstone Strait, Fraser River, and mid Vancouver Island/Georgia Strait) chum stocks in relation to these plans.

3.3.1 Harvest Strategy for Johnstone Strait

The Clockwork strategy in use from 1983 to 2001 was described in the Final 1985 Post Season Summary Report of the Joint Chum Technical Committee (TCCHUM 87-4). The Clockwork strategy was designed to rebuild wild chum stocks to the estimated optimum escapement levels by limiting the overall harvest rate. An assessment of the effectiveness of the Clockwork strategy is discussed in Ryall et al. 1999 (Canadian Stock Assessment Secretariat Research Document 99/169). The Clockwork management strategy required accurate estimates of catch and escapement and the reliability of this strategy depended upon the quality of these data. During the time period in which Inside chum stocks were managed by the Clockwork strategy, the high variability in chum returns, the inadequate escapement coverage and highly unstable fishing opportunities demonstrated a need to move to an alternative approach.

In a move to address the limitations with the Clockwork strategy, a new approach for chum management was initiated in Johnstone Strait starting in 2002. Following extensive technical reviews and several years of discussions with First Nations, stakeholders and the commercial fishing industry, the stepped exploitation rate approach (“Clockwork”) was replaced by a stable fishing schedule designed to approximate a fixed exploitation rate (~20%). Some of the key objectives of this strategy are to ensure sufficient escapement levels while providing more stable fishing opportunities. The exploitation rate is set at 20 percent across all harvesters, when abundance is above critical level. Of this 20 percent, 15 percent is allocated to the commercial sector, and the remaining five percent is set aside to satisfy Food/Social/Ceremonial (FSC), recreational, test fish requirements and to provide a buffer to the commercial exploitation. Past tagging studies conducted in 2000, 2001 and 2002 helped in the development of this strategy by assessing the migration timing and harvest rate on an available abundance of chum in the Johnstone Strait. The impact of the Johnstone Strait fisheries, Clockwork years (1994-2001) and new approach (2002-2003), on Inside chum stocks are detailed in Table 1.

Table 1. Assessment of Clockwork and the current Johnstone Strait Chum Management 1994-2003.

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
PRE-SEASON										
Expectation	Above Average	Above Average	Above Average	Above Average	Above Average	Below Average	Below Average	Below Average	Average to Above Average	Below Average
POST-SEASON										
Total Assessed Stock	4,250,815	2,524,099	1,430,313	2,350,916	6,365,195	3,353,059	1,175,226	3,238,935	4,057,228	3,233,464
Assessed Catch										
COMM & TF A11-13	1,275,511	287,625	80,850	84,004	1,527,222	44,723	178,898	210,781	686,875	1,031,139
IFF A11-13	25,185	20,117	21,956	17,075	2,479	11,736	14,899	23,562	17,131	10,482
US 7-7A	60,907	37,108	86	211	30,791	75	303	2,525	89,008	67,560
Total	1,361,603	344,850	102,892	101,290	1,560,492	56,534	194,100	236,868	793,014	1,109,181
Desired HR	30.0%	10.0%	10.0%	10.0%	40.0%	20.0%	10.0%	20.0%	20.0%	20.0%
Actual HR	32.0%	13.7%	7.2%	4.3%	24.5%	1.7%	16.5%	7.3%	19.5%	34.3%
Johnstone Strait HR									17.4%	32.2%
ESCAPEMENT										
(includes wild and enhanced)										
Estimated	2,889,212	2,179,249	1,327,421	2,249,626	4,804,703	3,296,525	981,126	3,002,067	3,264,214	2,124,283

For 2002 and 2003 the specific objectives of the fixed exploitation strategy were to:

- a. Continue to rebuild/maintain stocks to the optimum wild escapement objective (defined as 2.5 million wild Inside chum);
- b. Establish a preseason fishing plan to achieve the commercial allocation of 15%;
- c. Stabilize commercial catch to provide opportunities at both low and high abundance levels

3.3.2 Fraser River Chum Management Strategy

The harvest management plan for Fraser River chum was implemented to provide management goals and fishing limits for the harvest of Fraser River chum in the terminal area. Historically, the

terminal run was further divided into early and late segments with escapement goals and harvest guidelines set independently for each segment. In 1992, the minimum gross escapement goal for the early and late segments was set at 390,000 and 350,000 respectively, including First Nations fishing and test fishing requirements. The plan provided for either escapement goal to be increased in season if the return to the river exceeded the pre-season goal. For the early chum run, the harvest was not to exceed 10% on a terminal run size in the range of 425,000 to 550,000 and for a terminal run of over 550,000 the harvest rate was increased to 15%. For the late chum run, the harvest was not to exceed 10% of a terminal run size in the range of 385,000 to 500,000 and for a terminal run of over 500,000 the harvest rate was increased to 15%. This allowed an upward scaling of the escapement goal with an increase in the run size. In 1999 the escapement goal (following two recommendations from PSARC, 1992 and 1999) was increased to 800,000 and the early and late run escapements were increased proportionately. There have been ongoing discussions regarding the validity of managing the run based on early and late components; there is little current documentation to support the concept. Since 2002 the Fraser run has been managed on the basis that it is a single aggregate largely because, while evidence for bimodality of run timing exists from the Cottonwood test fishery and from run timing into individual systems, this characteristic has never been exhibited in the Albion test catches from which in-season run size estimates are derived.

3.3.2.1 Fraser River Management Rules

Rule 1. Directed harvest will not occur unless the run size estimate derived from cumulative test fishing catches predicts that the abundance of chum exceeds the gross escapement goal. For computational purposes, a commercial fishery within the river will be considered to harvest a minimum of 35,000 chum. The harvest rate schedule (Table 2) will be used to determine the available surplus.

Table 2. Commercial harvest rate schedule for the Fraser River.

RUN TIMING	TERMINAL RUN SIZE	MANAGEMENT	POTENTIAL CATCH
Oct. 1 - Nov. 30	916,000 – 1,050,000	Minimum Gross Escapement Goal* = 881,000; One opening not to exceed 10% harvest rate	35,000 - 105,000
	>1,050,000	Set harvest rate at 15%	144,000+

* (Gross Escapement Goal = Net Escapement (800,000) + Test Catch (9,000) + Native Harvest 72,000) = 881,000

Rule 2. Albion test fishing data will be used to determine the timing of commercial openings. In 2002 a Bayesian based run size estimation model was adopted. Test fishing data from September 1 to October 20 is required to establish the estimated run size. Since 1998 the test fishery has operated on alternate days to reduce coho by-catch.

Rule 3. The standard openings for directed commercial chum harvesting are inside the river (Subareas 29-11 through 29-17).

Rule 4. The daily commercial chum openings will be structured to avoid night fishing.

Rule 5. Whenever practical, 24 hours notice will be given for openings, however, shorter notice may sometimes be required. Notices to Industry advising of run status and possible management actions will be issued when appropriate.

Rule 6. The minimum mesh size of 158 mm (approximately 6.25”) has been in effect since 1995.

Rule 7. Area E license conditions include: fish slips, observers, logbooks, hails, revival tanks, etc. In-season advisors will be updated on current status through conference calls.

Rule 8. Conservation of Thompson River coho became a major issue in 1997 and will likely remain so for the foreseeable future. Fishing restrictions between Aug. 29 and Oct. 15 in Area 29 can be anticipated. Conservation of Thompson and Chilcotin River steelhead will result in fishing restrictions in later October and possibly early November. Potential low returns of Harrison River chinook are also a consideration.

Rule 9. The B.C. Ministry of Water, Lands and Air Protection (MWLAP) has used Albion test fishing data to estimate abundance of Interior Fraser steelhead. Fishing related mortality is estimated with a steelhead harvest model the MWLAP also developed. Conservation measures during in-river fisheries are discussed with CDFO. Commercial fisheries are not allowed before late October to protect Interior Fraser steelhead. Exact timing of commercial and First Nations net fisheries are finalized following discussions with provincial staff.

3.3.2.2 Fraser River In-season Run Size Estimation

A test fishery has operated at Albion on the Fraser River since 1978 to provide the means for an index of chum salmon abundance (escapement) within a season. Recent degradation of the accuracy and consistency of escapement estimates has seriously undermined the potential to evaluate Clockwork management for the Fraser River chum salmon (PSARC paper S99-20, Ryall et al. 1999). To address this problem the cumulative catch-per-unit-effort (CPUE) was calculated to account for saturation, depletion in the second set and interpolation for missing sampling days. In addition, the test fishery data were cast into a Bayesian framework that incorporated preseason knowledge of run size and migration timing, with in-season information on migration timing and a predictive regression to calibrate run size to the historical record. Based on a retrospective analysis of 1979-1998 data, the Bayesian procedure was judged to be superior to the classical test fisheries approach of using a simple predictive regression of cumulative CPUE on run size. However, the predictive ability of both models was seriously compromised by the reliability of escapement enumeration. The new Bayesian procedure for estimating in-season Fraser River chum run size has been in use since the 2000 fishing season.

3.3.3 Strait of Georgia Chum Management Strategy

Chum stocks returning to the terminal areas are directly affected by the harvest in Johnstone Strait. A portion of this return is harvested in Johnstone Strait. Chum returning to mid Vancouver Island (Area 14) are primarily from enhancement facilities. Terminal harvesting is directed at a mix of surplus mid Vancouver Island wild and enhanced chum, with the conservation requirements of passing chum stocks considered. Conservation requirements of local chinook and coho salmon in this fishery area are also considered in determination of area closures for the Area 14 chum fishery.

Other terminal areas in the Strait of Georgia are assessed for their abundance and terminal harvest occurs when surpluses are identified.

3.4 Planning, Implementation and Post Season Review

3.4.1 Preseason Planning

For 2002 and 2003 there were no formalized forecasts provided for Inside chum. A stock status outlook was provided taking into account brood year performances and trends in recent marine survival indices. For 2002, the outlook for Inside chum was average to above average returns based primarily on the strong 1998 brood year and indications of improved survival in the 2001 return year. For 2003, the stock outlook for inside chum was below average to average due to the dominant 4 year old component recruiting from the lowest Inside area return on record in 2000. However, recent returns in 2001 and 2002 demonstrated continued improvements in marine survival of inside chum which could compliment the 2003 return.

Prior to the season, in both 2002 and 2003, a preseason commercial fishing plan was established through consultation with commercial user groups. Each plan was designed to achieve the 15% commercial allocation based on the specific gears estimated daily harvest rate at an anticipated effort level.

3.4.2 In Season Implementation

Prior to 2002, the Area 12 test fishing data was utilized to determine relative weekly chum abundance and the magnitude of the total run entering Johnstone Strait (correlation between weekly test fish catch per unit effort and total run). For 2002 and 2003 the test fishery, which consisted of two purse seine vessels fishing from early September until early November, was pivotal in establishing run timing, relative abundance and stock structure information. The reliance on the test fishery to provide inseason runsize updates was reduced.

In both 2002 and 2003, fisheries were conducted based on the pre-season plan. Some modifications to the plan were made to account for large variation in effort participation compared to the pre-season expectations. Severe weather events, during anticipated commercial openings, were typically the cause for adjustments to the plan. Table 3 outlines the duration of fishery openings during the 2002 and 2003 seasons.

Terminal surpluses are estimated from escapement, test and commercial harvesting. Areas for potential terminal fishing in the Strait of Georgia occur at mid Vancouver Island (Area 14), Jervis Inlet (Area 16), Nanaimo (Area 17) and Cowichan (Area 18).

Estimates of Fraser River total run size were made from test fishing conducted within the Fraser River between September 1 and November 30.

Table 3. Johnstone Strait chum commercial openings 2002-2003 (hours open)

Year	Stat Week	Statistical Area					
		12			13		
		Seine	Gillnet	Area H Troll	Seine	Gillnet	Area H Troll
2002	10-1	12			12		
	10-2		82	96		82	96
	10-3						48
	10-4	10	32		10	32	48
	10-5		82			82	120
	11-1		105			105	120
2002 Total		22	301	96	22	301	432
2003	10-1		41	96		41	96
	10-2	12	41	96	12	41	96
	10-3		65	120		65	120
	10-4	15	41	96	15	41	96
	10-5		41			41	
2003 Total		27	229	408	27	229	408

3.4.3 Post Season Review

The total chum catch in all Inside areas (including the catch of Canadian chum in U.S. Areas 7 and 7A) plus Inside chum gross escapements are summed to estimate the total Inside chum assessed run size.

An evaluation table of Inside chum management goals, stock sizes, catch, escapement and harvest rates is presented in Table 1.

3.5 Catch / Fishery

Fall chum in Inside waters are harvested by commercial, First Nations, recreational and test fisheries. Commercial catch of chum in Inside waters occurs in three main areas: Johnstone Strait, Strait of Georgia and the Fraser River. Fall chum fisheries generally begin in late September and end in November. In addition, a bycatch of chum may occur in fisheries directed at sockeye and pink. This chum bycatch is assumed to be comprised mainly of summer chum destined for streams in the Johnstone Strait and Canadian central coast areas and are not part of the directed chum fishery management plan. The summer chum catches are presented in Table 4.

Table 4. Catch of chum salmon by statistical area for Commercial, Research and Test Fishing vessels (July through the second week of September).

Year	Stat Week	Statistical Area					Year Total
		18	19	20	21	29	
1994	7/1 – 9/2	4	0	703	215	263	1,185
1995	7/1 – 9/2	146	0	1,654	84	396	2,280
1996	7/1 – 9/2	0	0	528	12	494	1,034
1997	7/1 – 9/2	0	0	409	0	215	624
1998	7/1 – 9/2	0	0	50	0	46	96
1999	7/1 – 9/2	0	0	35	0	0	35
2000	7/1 – 9/2	0	0	37	0	73	110
2001	7/1 – 9/2	0	0	26	0	77	103
2002	7/1 – 9/2	0	0	37	0	197	234
2003	7/1 – 9/2	0	0	27	0	63	90
Area Total		150	0	3,506	311	1,824	5,791

3.6 Escapement

Chum that escape the commercial, First Nations, recreational and test fisheries form the gross escapement to Inside chum streams. This gross escapement is made up of chum that spawn in wild areas, those which are spawned in enhancement facilities, and those which are surplus to facility requirements and are removed from the spawning areas. Gross escapement estimates are used in reconstruction of the total run size in a given year.

Some of the streams within the Inside area support summer run spawners. These are relatively minor stocks and because of their distinctively early run timing in Johnstone Strait, i.e. July to late August, they are not included in the escapement total for the fall chum run.

The primary enhanced escapement areas are presently limited to the mid Vancouver Island and Fraser River areas. The enhancement facilities in the mid Vancouver Island consist of Big Qualicum, Little Qualicum and Puntledge rivers. Fraser River enhancement facilities are located on the Inch (Inch and Stave stocks), Chilliwack, Chehalis and Weaver rivers however production from the Fraser facilities has declined sharply recently as resources were channelled elsewhere.

The stocks which are managed within the context of the Inside chum plan are the fall run chum. These chum enter Johnstone Strait during the September to November time period.

Escapement estimates, for Inside chum since 1994, are presented in Table 5.

Table 5. Inside chum spawning escapement for wild and enhanced stock groupings (Fraser and Non-Fraser) for 1994-2003.

	1994 Estimate	1995 Estimate	1996 Estimate	1997 Estimate	1998 Estimate	1999 Estimate	2000 Estimate	2001 Estimate	2002 Estimate	2003 Estimate
Fraser (Wild + Enhanced)	1,603,081	1,576,687	777,724	1,531,958	3,462,678	2,793,304	681,080	1,882,077	1,998,271	1,320,654
NonFraser (Wild + Enhanced)	1,286,131	602,562	549,697	717,668	1,342,025	503,221	300,046	1,119,990	1,265,943	803,629
Total	2,889,212	2,179,249	1,327,421	2,249,626	4,804,703	3,296,525	981,126	3,002,067	3,264,214	2,124,283

3.7 Annual Detailed Inside Area Summaries

The annual detailed summaries are descriptions of the run size and harvest strategies on a weekly or commercial fishery basis. The description contains run size forecasts, commercial opening times, harvest rate goals, and commercial and First Nation catches.

3.7.1 2002 Season

Pre-season expectations for 2002 indicated an average to above average return for total Inside chum salmon.

3.7.1.1 Johnstone Strait

There were 8 directed commercial chum fisheries in Johnstone Strait in 2002. The first occurred on October 2 (seines 12 hours). The catch for this fishery was 181,000. A second fishery on October 6 - 8 (gill nets 41 hours, troll 48 hours) harvested a further 40,000 chum salmon. The third fishery on October 10 – 12 (gill nets 41 hours, troll 48 hours) harvested 45,000 chum. Two boats took part in a selective gill net fishery in Bute Inlet from October 1 – 3 and October 16 – 18 for a catch of 2,000 chum. Three seine vessels participated in a selective fishery October 13 – 17 for a catch of 27,000 fish. The next fishery (troll 48 hours) on October 16 - 17 caught 6,500 chum. The second full seine fleet fishery occurred on October 21 (10 hours) harvested 313,000 chum. The last significant fishery of 2002 was from October 24 – November 7 (troll 12 days, gill nets 219 hours) and harvested 34,000 fish. A very small fishery at Nimpkish November 26-28 (gill nets 48 hours) harvested 100 chum. The total 2002 commercial catch for Johnstone Strait (Areas 12 and 13) was 648,000. First Nation catch totalled 17,000 and test fishing catch totalled 43,000.

3.7.1.2 Strait of Georgia

In Qualicum (Area 14), there was a total catch of 151,000 chums for the following five openings; October 15 - 17 (troll 72 hours), October 15- 17 (gill nets 48 hours), October 21 - 27 (gill nets 4 days, troll 7 days), October 28 (seine 10 hours), October 29 - 31 (gill nets 48 hours, troll 72 hours). Terminal fisheries in Jervis Inlet (Area 16) did not occur. In Nanaimo (Area 17), there was one 48 hour fishery (gill net and troll) on November 12 - 14 for a catch of 200 chum. In Satellite Channel

(Area 18) there was a fishery October 15 – 17 (gill net 72 hours, troll 72 hours), November 15 – 16 (seine 16 hours), November 16 – 22 (gill net 168 hours, troll 168 hours), and November 19 – 20 (seine 16 hours). In Victoria (Area 19) there was a fishery November 14 (seine, 8 hours), November 15 – 16 (seine 16 hours), November 16 – 22 (gill net 168 hours, troll 168 hours). The total 2002 commercial catch estimate for Strait of Georgia was 410,000. First Nation catch was 22,000.

3.7.1.3 Fraser River

Total run size, based on test fishing, was estimated at 1.6M chum on October 20. A commercial gill net fishery occurred on October 21 and caught 35,000 pieces. There was a negligible troll catch from fisheries October 16 – 18 and 23 – 25 (200 fish). First Nations harvested 62,000 fish and test fishing at Albion caught 13,230. The final run size estimate was 2.4M on November 27.

3.7.2 2003 Season

Pre-season expectations for 2003 indicated an average to below average return for total Inside chum salmon.

3.7.2.1 Johnstone Strait

There were 8 directed commercial chum fisheries in Johnstone Strait in 2003. The first occurred on October 1-6 (troll 5 days, gill nets 41 hours, seine 12 hours). The catch for this fishery was 322,000. A second commercial opening was held October 8 - 11 (troll 3 days, gill nets 41 hours) which harvested a further 60,000 chum salmon. The third fishery took place October 14 – 19 (gill net 65 hours, troll 6 days) with a catch of 72,000 fish. On October 20 – 21 (15 hours) the seine fleet harvested 432,000 chum salmon. An additional 62,000 chum were harvested October 22 – 25 (gill net 41 hours, troll 3 days). The final fishery of 2004 on October 30 (gill net 41 hours) harvested 37,000 chum. Terminal fisheries in Bute Inlet on September 20 – 22 (gill net 2 days) and September 24 – 26 (gill net 2 days) harvested 18,000 chum. The total 2003 commercial catch estimate for Johnstone Strait was 1,003,000 (includes terminal harvest). In addition, 10,000 was taken by First Nations fisheries. Test fishing catches totalled 46,000.

3.7.2.2 Strait of Georgia

There were six directed commercial chum fisheries in terminal areas of Georgia Strait in 2003. There were no terminal chum fisheries at Jervis Inlet, Satellite Channel, Victoria, or Cowichan. The first fishery was October 13 – 15 (gill net 48 hours, troll 3 days) in Qualicum (Area 14) which harvested 13,000 chum salmon. The second fishery at Qualicum was October 20 – 24 (gill net and troll 4 days) and gill net vessels caught 10,000 chum (troll boats had 0 catch). Troll fishing at Qualicum opened “until further notice” on October 27 and caught 200 fish. The October 27 – 30 Qualicum gill net fishery (3 days) caught 15,000 fish. The November 3 – 6 gill net fishery at Qualicum (2 days) harvested 9,000 fish. There was a five day gill net fishery November 2 - 6 in Nanaimo (Area 17) for a catch of 2,000. The total 2003 commercial catch estimate for Strait of Georgia was 68,000. First Nation catch totalled 39,000.

3.7.2.3 Fraser River

Run size, based on test fishing was estimated at 1.4M on October 26. There was one fishery in the Fraser River on October 27 (gill net 10 hours) and one on November 3 (gill net 10 hours). Total catches in these fisheries were 24,000 and 17,000, respectively for a total of 41,000 chum salmon. The First Nation fishery in the lower Fraser River caught 56,000 chum and the test fishing catch at Albion was 7,488. The final run size estimate on November 30 was 1.6M.

4. WEST COAST VANCOUVER ISLAND CHUM

4.1 Conservation and Harvest Management Requirements

Chum salmon stocks return to all Statistical areas on the west coast of Vancouver Island (WCVI). The major stock, and the stock which has implications for the PST, is the Nitinat group of stocks, originating from tributaries to Nitinat Lake (Statistical Area 22) including a major hatchery on the Nitinat River. The net spawning escapement requirement for the Nitinat Lake tributaries totals 175,000, including 150,000 into the Nitinat River and 25,000 into other tributaries. Additional requirements for hatchery and test fishing may total up to 75,000. Therefore, the gross escapement requirement is 250,000 chum. The escapement objective is 250,000 to a maximum of 350,000. The 100,000 above the 250,000 target are for additional hatchery brood stock and increased distribution of spawners in Nitinat River.

The management of this fishery is based on achieving the gross escapement requirement of 250,000 into the Nitinat watershed. Weekly escapement targets are set to ensure that all timing components of the run are represented. Weekly fisheries are scheduled in Area 21 and surrounding waters to harvest any identified surplus. Secondary objectives of the management regime are to obtain stock assessment information, assess fish quality, and achieve allocation requirements.

The fishing plan is based on providing early opportunities for gill net followed by a seine fishery to balance allocation and then a seine/gill net fishery at the peak of the run. Fisheries are dependent on reaching weekly escapement milestone levels into Nitinat Lake. Early season opportunities are constrained by concerns over Thompson River steelhead by-catch.

Gill net and seine vessels take part in the Nitinat area fishery. A gill net assessment fishery begins in late September to provide early allocation to gill nets plus information for stock assessment. If weekly escapement targets are achieved and a further surplus is identified, then seines are allowed to fish to a catch equal to that of the gill nets. During these single gear fisheries, the outer fishing boundary is a line between a point two miles due south of Pachena Point and a point two miles south of Bonilla Point. Subsequent fisheries may be open to both gear types, depending on achievement of the weekly escapement targets. A gill net test vessel, along with visual surveys of the river, are used to determine escapement into Nitinat Lake.

During combined gear fisheries, a gill net only area is provided in Area 20-1 (extending the line two miles offshore eastward). This action is meant to increase the exploitation rate on the Nitinat chum stock and thereby reduce the risk of over-escapement into Nitinat Lake. Migration of the Nitinat chum stock through the extension area also provides some increased exploitation by gill nets. Safety concerns for smaller gill net vessels are also a consideration for the extended area. Additional objectives in the commercial fisheries are to minimize bycatch of non-Nitinat chum salmon, chinook, coho, and steelhead.

Since 1995, bycatch concerns at Nitinat have been addressed by delayed opening dates, reduced fishing area, increased use of weed lines, and selective fishing techniques. In 1998, to minimize encounters of passing stocks of coho and Interior Fraser River steelhead, the first commercial gill net fishery was delayed until October 4. In addition, the initial fishing area was reduced to within a one mile boundary between lines true south from Pachena and Dare Points, based on information

from the gill net test fishery. To reduce mortality of coho and steelhead and to improve the quality of catch data, the following measures were implemented for the entire season:

- non-retention of coho and steelhead (seine and gill net)
- mandatory functional revival tanks (seine and gill net)
- daylight fishing only (gill net)
- onboard observers (portions of seine and gill net fleet)
- logbooks and weekly hail-ins (seine and gill net)

The outside gill net test fishery was continued in 1999 with further modification. The area remained the same as in 1998 and fishing was not implemented until September 25 to avoid passing steelhead and coho. All nets were hung with a 2-meter weed line to further reduce steelhead bycatch. These measures were still in place in 2002 and 2003.

4.2 Catch, Escapement and Run Size

Catch in Nitinat (Area 21) has traditionally occurred by gill net and seine (Table 6) outside the lake in marine areas. In the past, catch of non West Coast chum has occurred in the outside seaward portion of the fishing area. Management actions have been implemented to reduce this catch by restricting harvest closer to the terminal area. More recently, catches for special purposes or surpluses to First Nations have occurred within the lake. Escapements have varied over the years from a high of 450,000 to a low of 8,000.

Table 6. Nitinat area catch and escapement 1994- 2003 (Areas 21 & 22)

Year	Area 21		Area 22	
	Seine Catch	Gillnet Catch	in-Lake Catch & Broodstock	Natural Spawners
1994	533,000	293,000	197,000	341,000
1995	30,000	179,000	41,000	119,000
1996	268,000	75,000	122,000	343,000
1997	831,000	218,000	254,000	435,000
1998	537,000	157,000	350,000	192,000
1999	12,000	85,000	89,000	153,000
2000	0	7,000	11,000	22,000
2001	89,000	75,000	178,000	303,000
2002	466,000	81,000	183,000	40,000
2003	265,000	190,000	78,000	243,000
Average	303,100	136,000	150,300	219,100

Pre-season forecasts are based on escapement, survival of each year class and previous years' environmental factors. Fishing may start using pre-season forecasts, but quickly are replaced by information from test fishing, commercial catch and escapement data.

4.3 Annual Detailed Summaries

4.3.1 2002 Season

The pre-season forecast for the Nitinat area, in 2002, was approximately 712,000 chum.

The season opened with two 10 hour gill net fisheries on October 1 and 2. This was extended by two additional 11 hour days (Oct 3 and 4) and then opened for 59 hours from October 5 through 7. This was further extended through October 10 and then again through October 12. Seines opened for 34 hours on October 13 and were then extended until further notice. Gill nets re-opened until further notice on October 15. Seines and gill nets both closed at 1800 October 28. Gill nets fished for 21 days and caught 81,000 chum; seines fished 11 days and caught 466,000 chum for a combined total of 548,000 chum. The viable escapement into Nitinat Area was 40,000. In 2002, Nitinat Lake chum salmon effective escapement was reduced by substantial in-lake mortality. This mortality was caused by upwelling of sulphur dioxide, following a lake turnover event. Therefore, a precise estimate of the total return is not available for 2002.

The 2002 WCVI troll catch of chum (Areas 21 to 27, 121 to 127 and 130-1) was 2,700. The troll catch was taken predominantly in the northwest region of WCVI.

4.3.2 2003 Season

The pre-season forecast for 2003 return to Nitinat was 1.24 million chum.

The 2003 season opened for two 10 hour gill net fisheries on September 29 and 30, followed by two additional 12 hour gill net fisheries on October 1 and 2. Gill nets re-opened on October 6 for two days and subsequently extended in several steps until 1800 October 18. Seine fishing opened on October 19 – 20 (34 hours) and was then extended to October 29 (10 days). Gill netting re-opened until further notice on October 21 and then closed on October 29. Gill net catch was 190,000 and seine catch 265,000 for a total of 455,000. The escapement to Nitinat Area was 243,000. The estimated total return to Nitinat, in 2003, is 776,000.

The 2003 WCVI troll catch of chum (Areas 21 to 27, 121 to 127 and 130-1) was 3,600

5. UNITED STATES STOCKS AND FISHERIES

5.1 Washington Run Sizes, Catches, and Spawning Escapements

Tables 7 through 9 provide the pre-season forecasts of run size, post-season estimates of spawning escapement and the total run size for the various chum salmon runs returning to Puget Sound and Coastal Washington areas. The tables break the estimates down by three major groupings associated with return timings (summer, fall and winter chum) that are forecast and managed separately.

Table 7. Washington Summer Chum Salmon Pre-Season and Post-Season Estimates of Abundance and Estimated Spawning Escapements (1994 to 2003).

Region		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Strait of Juan de Fuca	Pre-Season	532	474	2,440	1,338	1,310	869	792	941	1,468	3,131
	Post-Season	214	882	1,106	985	1,316	577	987	3,982	6,981	7,015
	Escapement	178	839	1,084	962	1,269	573	983	3,955	6,955	6,959
Hood Canal	Pre-Season	1,490	2,972	7,212	10,823	10,856	6,742	6,988	6,871	7,846	10,128
	Post-Season	2,959	9,984	21,056	9,373	4,274	4,527	9,506	13,375	13,170	36,328
	Escapement	2,429	9,462	20,490	8,972	4,001	4,114	8,649	12,044	11,454	35,696
South Puget Sound*	Pre-Season	52,303	29,230	79,551	69,634	149,950	121,039	84,867	75,599	155,000	47,788
	Post-Season	63,830	63,700	125,072	16,697	87,504	23,545	39,028	84,111	58,545	49,817
	Escapement	54,391	55,179	114,316	16,001	80,404	23,461	27,705	62,821	46,798	45,945

* Washington run sizes only

Table 8. Washington Fall Chum Salmon Pre-Season and Post-Season Estimates of Abundance and Estimated Spawning Escapements (1994 to 2003).

Region		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Willapa Bay	Pre-Season	32,200	53,400	42,116	25,500	35,000	78,010	69,188	79,892	79,892	75,817
	Post-Season	35,310	27,617	22,499	34,112	76,714	26,409	46,991	53,384	92,334	85,283
	Escapement	30,526	24,695	20,011	33,286	65,092	24,751	40,030	29,623	59,750	47,347
Grays Harbor	Pre-Season	20,344	46,988	36,098	27,138	13,370	46,400	32,000	21,182	35,773	42,064
	Post-Season	25,287	20,816	16,881	14,071	37,161	15,198	10,432	26,049	39,997	48,652
	Escapement	24,592	12,612	12,413	13,456	35,188	12,260	8,942	24,898	31,405	37,947
Strait of Juan de Fuca	Pre-Season	4,546	4,879	5,177	4,720	3,130	3,029	2,823	1,841	1,761	2,494
	Post-Season	2,564	610	2,162	3,927	1,535	1,313	269	1,737	5,198	1,177
	Escapement	2,491	566	2,121	3,780	1,419	1,272	219	1,562	4,603	1,071
Nooksack Samish	Pre-Season	156,206	107,800	154,200	51,122	82,000	25,378	95,598	95,598	171,000	81,921
	Post-Season	197,300	88,000	69,900	55,000	149,600	94,000	18,878	131,412	109,591	133,458
	Escapement	103,804	41,300	51,889	22,222	89,206	34,594	5,244	75,919	86,284	112,685
Skagit	Pre-Season	255,000	84,000	302,841	62,418	186,000	59,345	168,000	45,000	304,049	52,410
	Post-Season	295,237	69,799	120,504	17,544	148,970	50,393	41,393	98,617	410,293	37,437
	Escapement	121,775	38,667	74,474	14,392	121,500	36,767	22,377	73,368	210,028	18,017
Stillaguamish Snohomish	Pre-Season	290,663	154,186	234,598	244,707	338,331	151,012	184,867	113,600	685,100	245,246
	Post-Season	391,600	111,400	213,800	28,500	352,800	123,100	56,093	361,347	689,850	214,551
	Escapement	244,482	55,336	152,239	20,066	243,991	91,091	39,050	85,119	377,481	172,354
South Puget Sound	Pre-Season	467,862	302,733	926,459	380,111	500,000	662,000	402,000	214,000	241,500	448,365
	Post-Season	557,600	442,000	634,600	130,700	682,700	234,500	234,976	940,776	955,726	753,584
	Escapement	286,414	243,818	360,255	85,951	430,589	163,403	105,857	313,570	320,817	327,060
Hood Canal	Pre-Season	459,115	723,187	912,942	528,823	662,659	1,158,571	624,623	299,944	446,616	342,061
	Post-Season	961,800	606,000	821,100	456,000	575,300	147,300	153,346	793,359	898,754	1,304,222
	Escapement	382,213	217,199	409,523	125,302	244,354	87,095	62,931	255,371	370,840	333,118

Table 9. Washington Winter Chum Salmon Pre-Season and Post-Season Estimates of Abundance and Estimated Spawning Escapements (1994 to 2003).

Region		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
South Puget Sound	Pre-Season	80,018	43,647	48,875	82,900	36,748	51,973	33,568	54,631	11,700	34,575
	Post-Season	104,174	47,202	29,862	13,099	77,885	17,579	11,323	158,380	219,205	53,507
	Escapement	76,072	26,233	24,103	9,271	76,676	15,691	8,524	139,046	206,468	50,050

Table 10 provides chum catch information from the Strait of Juan de Fuca fisheries (areas 4B, 5, 6C) and the San Juan Islands/Point Roberts fisheries (areas 6,7,7A), and for all other Puget Sound and Washington Coastal areas combined into regional aggregates.

Table 10. Catch of Summer, Fall and Winter Chum Salmon in Puget Sound and Washington Coastal Areas

Region	User Group	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
4B,5,6C	Treaty	55,735	21,193	33,338	30,802	18,577	7,190	5,621	10,209	1,554	401
	Non-Treaty	0	0	0	0	0	0	0	0	0	0
6,7,7A	Treaty	25,340	19,794	85	62	34,559	79	31	4	62,327	42,554
	Non-Treaty	46,987	27,577	5	186	6,380	0	402	3,243	49,649	39,059
Puget Sound ¹	Treaty	687,371	333,859	217,887	156,236	253,716	102,831	141,288	643,796	769,616	771,061
	Non-Treaty	514,256	345,346	530,367	229,075	498,969	133,404	139,218	813,630	1,068,017	725,069
Coast ²	Treaty	36,515	13,152	16,597	3,061	20,184	11,284	16,473	2,910	5,434	8,598
	Non-Treaty	654	4,891	2,215	45	9,727	1,268	6,860	23,473	36,208	41,138
Total	Treaty	804,961	387,998	267,907	190,161	327,036	121,384	163,413	656,919	838,931	822,810
	Non-Treaty	56,1897	377,814	532,587	229,306	515,076	134,672	146,480	840,346	1,153,874	805,270

¹All other Puget Sound freshwater and marine catch reporting areas except SJF or San Juans Fisheries.

²Coastal Areas combine Catch and Reporting Areas 1-4 including Grays Harbor, Willapa Bay & Columbia River.

Paragraph 10 of the Chum Annex requires Canada and the United States to assess catch levels of summer chum salmon caught during the August 1 through September 15 time period in boundary area fisheries. Table 11 provides weekly chum catch during the summer chum management period for U.S. boundary area fisheries.

Table 11. Catch of Chum Salmon in the Strait of Juan de Fuca and the San Juan Islands' Commercial Fisheries, During the Summer Chum Management Period.

7-Day Periods:	7/27-8/2 ¹	8/3-8/9	8/10-8/16	8/17-8/23	8/24-8/30	8/31-9/6	9/7-9/13
95-97 GSI ²	0.68	0.68	0.68	0.40	0.45	0.14	0.07
1994	8	10	15	62	17	8	0
1995	33	23	3	36	9	44	0
1996	4	20	64	8	0	0	0
1997	27	14	4	7	2	24	65
1998	20	22	17	3	0	0	0
1999	2	5	0	0	0	0	0
2000	7	0	4	1	0	0	0
2001	21	507	0	0	0	0	0
2002	16	10	9	0	0	0	8
2003	101	80	100	114	4	0	12

1 Indicates cumulative catch through this week.

2 Percentage of Hood Canal /Strait of Juan de Fuca summer chum from GSI samples.

5.2 U. S. Strait of Juan de Fuca Fisheries (Areas 4B, 5, 6C)

5.2.1 Management Intent

During the 2002 and 2003 seasons the management strategy for the Strait of Juan de Fuca fishery has consisted of limiting the total effort in this fishery and keying management decisions on the needs of Puget Sound stocks of chum salmon. The regime of this fishery is maintained by limiting access to only four treaty Indian tribes using only gillnet gear.

This fishery has been constrained by low catch rates, low market prices, and often poor weather conditions, resulting in relatively modest catch levels, which have had a pronounced decreasing trend over the period of 1994 to 2003 (Table 10). This coupled with GSI information collected through 1996 indicates a decreasing level of interceptions of Canadian origin stocks.

5.2.2 2002 Season

As in previous years, the chum fishery in Areas 4B, 5, 6C was restricted to Treaty Indian gillnet gear only. The commercial chum fishery began the week of October 13 and remained open 5 days per week until November 8. No test fisheries for collection of GSI samples were conducted, and no samples for GSI analysis were collected from the commercial catch during 2002.

Only small incidental catches of chum salmon occurred in fisheries prior to the fall chum management period. Twenty-three chum were taken prior to September 16 (summer chum management period), and 15 chum were taken as by-catch to the coho fishery between September 16 and the start of fall chum directed fisheries on October 13. Effort and catch in the chum fishery were the lowest observed since the PST was implemented in 1985, largely due to extremely low prices and low catch per effort. The commercial harvest recorded from the fall chum management period was 1,496 chum, bringing the total chum catch in Areas 4B,5,6C, reported through November 30, to 1,554.

5.2.3 2003 Season

As in previous years, the chum fishery in areas 4B, 5, 6C was restricted to Treaty Indian gillnet gear only. The fall chum fishery opened the week of October 12 and remained open 5 days per week until November 8.

Incidental catches of chum salmon occurred in fisheries for other species occurring prior to the fall chum management period. Prior to September 16, incidental catches of chum salmon totaled 392 fish, with an additional 9 taken in fisheries during the coho management period. Due to adverse weather conditions and poor prices, effort and catch were zero, during the fall chum fishing period.

No tissue samples were collected, during the 2003 fishery, for genetic analysis.

5.3 U. S. San Juan Islands/Point Roberts Fisheries (Areas 7 and 7A)

5.3.1 Management Intent

The U.S. fishery in areas 7 and 7A is managed pursuant to paragraph 3 of the Chum Annex. This provision is intended to link this fishery to the Canadian Clockwork management strategy employed in Johnstone Strait. The Chum Annex provides for a U.S. harvest in areas 7 and 7A of no more than 20,000 chum when the Johnstone Strait run size was less than 3.0 million, and the catch in Johnstone Strait was less than 225,000 chum. It also provided for a U.S. harvest in areas 7 and 7A of 120,000 chum when the run size exceeded 3.0 million and the catch in Johnstone Strait was greater than 280,000 chum, and provided for a U.S. harvest in areas 7 and 7A of 140,000 chum when the run size exceeded 3.9 million and the catch in Johnstone Strait was greater than 745,000 chum.

Paragraph 3 of the Chum Annex also provides for the U.S. to manage its fishery to maintain a traditional proportion of the catch between areas 7 and 7A and to avoid concentrations of effort along the international boundary in area 7A. Table 12 provides a summary of the catch by area for the years 1994 through 2003. There have been only five years with a significant fishery during this time period and the percentage of the catch in area 7A ranged from 23.8% to 61.5%. Historically, the catch had been distributed approximately 50/50 between the two areas.

Table 12. Distribution of Catch Between Areas 7 and 7A.

Catch Area	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
7	27,491	31,552	1	97	30,913	0	430	2,241	69,475	39,943
7A	43,856	15,813	89	151	9,634	79	2	1,006	42,501	41,670
% in 7A	61.5%	33.4%	*	*	23.8%	*	*	*	38.0%	51.1%

* Non-fishing years; primarily incidental catches.

Paragraph 5 of the Chum Annex to the PST provides a “make-up” and “pay-back” provision should the U.S. fishery in areas 7 and 7A fail to achieve the catch levels specified in paragraph 3. Table 13 provides a summary of the differences between the specified catch levels in this fishery for the years 1991 through 2003 and the actual catches achieved, and provides a cumulative summary of any “make-ups” or “pay-backs” due.

Table 13. Summary of U.S. Areas 7 and 7A allocations and catches, 1991-2003.

YEAR	PST SPECIFIED CATCH LEVEL	ADJUSTED CATCH QUOTA	ACTUAL CATCH	CURRENT DUE U.S.
1991	120,000	120,000	138,361	- 18,361
1992	140,000	121,639	119,210	2,429
1993	140,000	142,429	139,861	2,568
1994	*	*	72,327	*
1995	120,000	122,568	47,371	75,197
1996	20,000	20,000	90	75,197
1997	20,000	20,000	248	75,197
1998	140,000	215,197	40,939	174,258
1999	20,000	20,000	79	174,258
2000	20,000	20,000	433	174,258
2001	20,000	20,000	3,247	174,258
2002	120,000	294,258	111,976	182,282
2003	120,000	302,282	81,613	220,669

* - No annex in place in 1994.

5.3.2 2002 Season

Preseason forecasts were for a good return of harvestable fall chum in Puget Sound, and in-season updates of abundance indicated runs even larger than the preseason forecast. In 2002 Canada implemented a significant change to Southern B.C. chum management, abandoning the “Clockwork” stepped exploitation rates in favor of a fixed fishing schedule designed to approximate a fixed harvest rate of 20%. Canada did not make a preseason forecast nor provide in-season updates of chum abundance. This was a significant deviation from the Chum Annex provisions and resulted in some uncertainty as to how the U.S. should manage its fishery in areas 7 and 7A. Based on the 20% exploitation rate objective and the catches and fishing schedule established by CDFO, the U.S. began its fishery on the normal start of the fall chum management period (week beginning 10/13) with a target quota of 120,000 chum. This was consistent with the Chum Annex provisions that call for a catch quota in areas 7 and 7A of 120,000 when the run size exceeds 3.0 million and the Johnstone Strait catch exceeds 280,000 chum, which are the run sizes and catches associated in the “Clockwork” management scheme with the 20% exploitation rate.

Non-Treaty reef net fisheries were conducted following the end of Fraser Panel control, and fished through mid-October. This fishery was required to release all chum salmon prior to October 1.

A Non-Treaty purse seine fishery opened at the start of the fall chum management period with a one day fishery on October 14. Non-Treaty gillnet fishing was not allowed this first week due to coho by-catch limitations. The treaty Indian fleet fished for 27 hours beginning at 6:00 AM October 15.

For the week beginning October 20, the Non-Treaty gillnet fleet fished from 5:00 PM October 21 to 7:00 AM on October 22. The Treaty Indian fishery went from 6:00 AM October 22 to 10:00 PM October 25.

For the week of October 27, the Non-Treaty purse seine fleet fished on October 28 and the gillnet fleet fished on October 29. The Treaty Indian fishery went from 6:00AM October 30 to 10:00 PM

November 1. Additional openings were scheduled the following week (week of 11/3) for both Treaty Indian and Non-Treaty fleets but only a few landings were made, with very little catch.

There were only 20 summer chum reported caught in areas 7 and 7A prior to September 16. These were taken incidental to sockeye fisheries. The total chum catch by all gears in areas 7 and 7A was 111,976 fish.

5.3.3 2003 Season

Preseason forecasts were for a moderate return of fall chum in Puget Sound, however, in-season updates of abundance indicated many runs were much larger than the preseason forecast. This year Canada again implemented a fishery management scheme for Southern B.C. chum that deviated substantially from the “Clockwork” stepped exploitation rates provided for in the Chum Annex of the PST. While some discussions were underway on developing a revised Chum Annex, no agreement was reached on new Annex language prior to the beginning of the 2003 fall chum fishery. Canada did not make a preseason forecast nor provide in-season updates of chum abundance. CDFO staff did indicate that chum abundance did not appear to be at a critical level that would necessitate severe fishery restrictions, and that it was their intent to mount Johnstone Strait fisheries consistent with a 20% exploitation rate. U.S. fishery managers communicated to Canada their intent to fish in areas 7 and 7A for a target of 120,000 chum, plus a portion of the underage due the U.S. from past seasons, and that the U.S. would begin its gillnet and purse seine fisheries at the normal start of the fall chum management period (week beginning October 12).

Non-Treaty reef net fisheries targeting coho salmon were conducted following the end of Fraser Panel control, and fished through mid-October. A program to collect tissue samples for genetic analysis was in place for chum salmon caught between September 16 and September 30. The reef net fishery harvested 4,058 chum.

A Treaty Indian gillnet and purse seine fishery opened at the start of the fall chum management period with a two day fishery on October 13 and 14. The Non-Treaty fishery followed with one day of gillnet fishing on October 15 and one day of purse seine fishing on October 16. Due to extremely stormy weather the Non-Treaty fleet was unable to fish either day.

For the week beginning October 19, the Treaty Indian fishery went for three days from October 19 through October 21. The Non-Treaty fishery was also expanded to three days from October 22 through October 24, with both gillnet and purse seine gear fishing all three days. Again, adverse weather conditions hampered both fleets and effort was limited.

Given the poor results from the first two weeks, continued poor prices, and dwindling effort, the managers sought to maximize opportunity for the following week (week of October 26). The Treaty Indian fishery resumed on October 25 and continued through October 27. The Non-Treaty fishery was reopened from October 28 through October 31. Following these openings the fishery was opened continuously for Treaty fishers from November 1 through November 21, and opened for the Non-Treaty fleet Monday through Friday from November 3 through November 14. However, only a few fishermen continued to fish during this period.

There were 19 summer chum reported caught in areas 7 and 7A prior to September 16. These were taken incidental to sockeye and pink salmon fisheries. The total chum catch by all gears in areas 7 and 7A is 81,613 fish (Table 13).

6. STOCK IDENTIFICATION

6.1 Genetic Stock Identification – Using Allozyme Analysis

United States

In 2002 and 2003, no samples were taken in Washington mixed stock fishing areas. However work continued in Puget Sound on specific project areas. One such project was the continuing work of the Tulalip Tribes on genetically marked fall chum salmon. Another project, by WDFW, focused on the interrelationships of Summer Chum salmon (currently listed as threatened, under provisions of the United States' ESA)

The Tulalip Tribes continued to assess the persistence of genetically marked fall chum salmon, from the Tulalip Hatchery, based on selection from brood years 1990 through 1993. This work, while it confirmed the persistence of the marks (allelic frequencies at *mIDHP-1* and *mMEP-2*), initially established to serve as indices in U.S. and Canadian fisheries, focused on the persistence and variation of this population's entry pattern, as well as straying frequency and distribution. In doing this, samples were taken from adults, in fisheries and spawning grounds, as well as emigrating juveniles, from nearshore marine areas. (Rawson, 2005).

The WDFW work focused on an extensive analysis of summer chum salmon, using an array of samples taken over the past decade, from twelve populations. The analysis supported previous conclusion regarding the significance of differences between Strait of Juan de Fuca and Hood Canal populations, as well as their overall difference from Southern B.C and other Puget Sound populations. Allele frequencies were also examined temporally, to monitor changes in genetic characteristics, during the species' recovery period. (Kassler and Shaklee, 2003).

Canada

For the 2002-2003 time period, Canada only conducted sampling for GSI in 2003. Three GSI collections were undertaken in Johnstone Strait in 2003. The first sample was taken from a Food Social and Ceremonial test vessel on August 18th in order to assess the stock contribution of summer chum during the August time period. Two additional samples were taken from the two purse seine openings that occurred in Johnstone Straits (October 7th and 22nd respectively). A table of chum GSI sampling is presented in Table 14.

Table 14. Number of chum salmon sampled for GSI data, 1994-2003.

Year	Commercial Samples		Test Fishery Samples	
	Johnstone	Nitinat	Johnstone	Nitinat
1994	0	0	0	0
1995	0	0	0	0
1996	0	0	1,795	0
1997	0	0	0	0
1998	150	0	150	0
1999	0	0	0	0
2000	300	0	0	0
2001	300	0	0	0
2002	0	0	0	0
2003	600	0	100	0

6.2 Tagging of Adult Chum Salmon

United States

During the 2002 and 2003 seasons, there were no adult chum salmon tagging projects implemented in Washington areas of concern to the Treaty.

Canada

Adult chum salmon tagging programs occurred in Johnstone Strait during the 2002 chum season. This was a continuation of the 2000 and 2001 tagging program. The objective of the program was to further evaluate the purse seine fleet fishing efficiency as an important part of the development of the new Johnstone Strait chum management strategy. The tagging program was designed to provide harvest rate and migration timing information. The tagging operations in 2000 and 2001 were the same with approximately 4,000 fish tagged (1,000 of which were double tagged) targeting the first purse seine opening. In 2002, the tagging operation expanded to look at both purse seine openings in the first and third week of October with similar tag application levels as in 2000 and 2001. The tag recovery method in 2002 was identical to that in 2001 with sampling effort focused mainly at fish processing plants.

6.3 Coded Wire Tagging , Otolith Marking, Fin Clipping

United States

A summer chum salmon supplementation program was begun in 1992 at the Quilcene National Fish Hatchery to address severe declines in the numbers of summer chum returning to the Quilcene River and Hood Canal. The first brood (1992) was coded wire tagged to evaluate returns and to confirm where summer chum might be intercepted in marine fisheries. Concerns over the physical impacts of tagging small fish, and limited sampling for tags in chum fisheries, led to the discontinuation of the CWT effort. In more recent years an adipose-only clip has been applied to aid in identifying hatchery fish for terminal fisheries management and project evaluation purposes. Table 15 provides a summary of marks applied at this program.

Table 15. Summer Chum Salmon Marking and Release from Quilcene National fish Hatchery

Brood Year	CWT+Ad clip	Adipose clip	Unclipped	Total Release
1994	0	0	343,550	343,550
1995	0	0	441,167	441,167
1996	0	0	612,598	612,598
1997	0	313,212	27,532	340,744
1998	0	333,409	10,121	343,530
1999	0	168,572	13,139	181,711
2000	0	393,055	21,298	414,353
2001	0	344,675	7,034	351,709
2002	0	253,653	18,364	272,017
2003	0	88,786	3,773	92,559

A number of other hatchery supplementation and reintroduction programs for summer chum in the Hood Canal and Strait of Juan de Fuca regions have utilized otolith marks to aid in assessing the success of the programs and to determine the proportion of hatchery and natural origin fish on the spawning grounds. Table 16 provides a summary of otolith marks applied to summer chum.

Table 16. Numbers of summer chum salmon released with otolith marks, by brood year and location.

Brood Year	Sequim	Discovery	Chimacum	Big Beef	Hamma Hamma	Lilliwaup	Union	Tahuya
1992	-	19,200	-	-	-	-	-	-
1993	-	44,000	-	-	-	-	-	-
1994	-	2,000	-	-	-	-	-	-
1995	-	38,808	-	-	-	-	-	-
1996	-	62,000	-	-	-	-	-	-
1997	-	71,821	-	-	12,000	14,200	-	-
1998	-	67,832	-	214,936	2,800	17,200	-	-
1999	3,880	34,680	39,170	39,800	51,600	17,400	-	-
2000	25,900	90,435	73,300	80,550	55,400	14,800	75,876	-
2001	54,515	163,850	18,100	80,925	49,500	38,000	73,472	-
2002	20,887	118,347	57,300	72,622	61,000	0	82,636	-
2003	49,142	88,610	57,435	76,353	75,356	199,913	35,343	111,232

Canada

Thermal marking has been used as a technique of mass marking hatchery raised salmonids in B.C. since 1992. The method involves manipulating the temperature of the rearing water by at least 2°C to induce a mark on the otolith. The change in water temperature can be accomplished through the use of two different water sources, through heating the water or by chilling it. By altering the water temperatures over a period of time a unique mark can be created.

Thermal marking was first used on chum from Nitinat hatchery in 1993 and continues to be used as a means of estimating hatchery contribution to both fisheries and escapement (Table 17). Thermal marking is currently the only method of marking being applied to chum from Nitinat hatchery (due to the dropping of the Multiple Fin Clip program). Transplanting of thermally marked chum into Klanawa River began with the 2001 brood year in an attempt to help re-establish that stock.

Conuma Hatchery first began thermal marking several stocks with the 1998 brood year. The first return year for which all hatchery fish will be thermally marked was 2003. A comprehensive sampling program occurred during the fall chum fisheries and permitted a better understanding of timing and distribution of the different stocks in Nootka Sound.

Enhanced contributions of chum from major hatchery facilities are based on marking a portion of the fry released with an adipose clip and coded-wire tag (Ad-cwt) or a ventral fin-clip with or without an adipose clip, and subsequent recovery of these marks in the commercial fishery and escapement programs. Marked fry are enumerated individually at marking. Released chum marked with finclips include the Big Qualicum River (since 1964) and Little Qualicum River (since 1979), the Chilliwack River (since 1980), the Nitinat River (since 1980), Pallant Creek (since 1978), and Conuma River (since 1978). Released chum marked with adipose clips (Ad) and coded-wire-tags (CWT's) include the Puntledge River (since 1980), Chehalis River (since 1983), Inch Creek (since 1978), and Stave River (since 1982) with Ad-CWT's. Unmarked fry represented by the mark are enumerated by subtracting egg and fry mortalities from the egg number which is usually calculated using electronic egg counters. Since egg and fry mortality generally is less than 10%, fry enumeration is considered very accurate. Not all release groups are represented by a mark. Contributions for those groups are estimated by associating them with a marked release group with a similar size and release timing. Tables 18 and 19 provide a summary of marks applied from 1994-2003.

Table 17. WCVI Chum Thermal Marks in British Columbia

Release Site(s)	Hatchery Facility							
	Nitinat		Conuma					
	Nitinat River & Lake	Klanawa River	Conuma River	Conuma Estuary	Tlupana River	Sucowa River	Canton River	Deserted River
1994	30,831,080							
1995	24,649,925							
1996	31,941,437							
1997	34,830,668							
1998	35,455,056		1,105,067	3,686,051	1,234,402	1,998,626	1,340,117	2,058,209
1999	23,721,507		525,964	1,369,785	1,103,714	1,883,722	1,071,147	1,822,476
2000	5,153,902		543,511	1,296,654	998,400	139,090	1,009,746	269,284
2001	27,093,836	3,162,846	569,118	1,649,290	390,754	200,803	1,070,539	272,395
2002	22,757,842	2,915,502	no release	1,792,758	1,038,542	445,007	892,140	341,635
2003	21,252,421	2,516,338	no release	1,585,534	425,261	410,872	484,570	798,330

Table 18. Chum Salmon Tagged (CWT-Ad) and Released from Southern based Canadian hatchery facilities from 1994-2003; marking data prior to 1994 are not included.

Stock	Brood Year	CWT+Adipose-clip	Adipose-clip	Unclipped	Total Released
Chehalis River	1994	103,939	4,142	8,804,134	8,912,215
	1995	89,473	5,616	10,894,248	10,989,337
	1996	106,731	391	7,656,991	7,764,113
	1997	102,633	3,038	7,842,567	7,948,238
	1998	102,182	536	3,902,166	4,004,884
Conuma River	1990	55,243	671	0	55,914
Nimpkish River	1990	80,146	680	308,238	389,064
	1992	81,991	828	1,085,196	1,168,015
McLaughlin Bay	1996	99,763	628	712,971	813,362
	1997	98,974	1,000	908,384	1,008,358
	1998	98,830	1,403	370,024	470,257
Inch Creek	1994	48,010	1,485	1,037,829	1,087,324
	1995	51,785	848	1,113,189	1,165,822
	1996	48,215	2,538	1,075,929	1,126,682
	1997	49,725	604	971,992	1,022,321
	1998	48,653	1,922	1,070,913	1,121,488
	1999	49,826	98	952,769	1,002,693
	2000	49,759	264	926,658	976,681
	2001	49,931	100	1,124,599	1,174,630
Stave River	1994	95,734	3,797	4,723,244	4,822,775
	1995	97,665	2,320	4,524,242	4,624,227
	1996	95,104	4,646	2,977,339	3,077,089
	1997	49,614	450	2,028,888	2,078,952
Nitinat River	1990	50,285	3,187	3,133,601	3,187,073
	1992	102,813	2,367	6,725,511	6,830,691
Lang Creek	1994	50,501	0	397,805	448,306
	1996	49,348	248	534,871	584,467
	1997	50,876	256	457,900	509,032
Puntledge River	1996	100,939	11,465	3,777,382	3,889,786
	1997	68,848	12,566	4,667,836	4,749,250
Sliammon River	1994	50,119	252	489,853	540,224
	1995	99,071	499	535,219	634,789
	1996	49,472	500	552,624	602,596
	1997	47,915	484	444,274	492,673
	1999	100,053	0	505,633	605,686
	2000	99,615	879	500,628	601,122

Table 19. West Coast Chum salmon fin clipped at southern Canadian hatchery facilities
(Ad: adipose; LV: left ventral; RV: right ventral; AN: anal; D: dorsal).

Stock	Brood Year	Clip Type	# Clipped	# Poor Clips	# Unmarked
Conuma River	1994	AdLV	100,340	2,921	1,983,286
	1995	AdLV	98,782	5,170	1,877,816
	1996	AdLV	93,220	5,281	3,616,157
	1997	AdLV	98,573	3,429	4,964,089
	1998	AdLV	97,907	6,787	4,686,424
	1999	AdLV	99,225	8,549	1,787,975
	2000	AdLV	97,906	4,720	1,655,535
	2001	AdLV	102,059	4,018	2,112,331
Deserted/NWVI	1997	RV	78,085	601	16,003
	1998	RV	74,985	5,359	1,977,865
	1999	RV	75,043	4,560	1,742,873
	2000	RV	76,928	1,174	191,182
Mathers Creek	1994	RV	53,350	24,820	2,016,372
	1995	RV	73,675	1,543	2,651,003
	1996	RV	76,015	683	2,527,287
Nitinat River	1994	LV	79,151	1,731	9,784,240
	1994	RV	79,135	3,949	4,943,642
	1994	AdRV	105,091	2,706	13,471,605
	1995	LV	77,361	616	3,258,407
	1995	RV	77,769	509	3,170,230
	1995	AdRV	99,753	1,519	15,964,115
	1996	LV	77,400	648	10,209,175
	1996	RV	76,406	76	3,720,152
	1996	AdRV	110,656	478	7,793,677
	1997	LV	88,272	964	6,554,665
	1997	RV	82,680	682	6,178,764
	1997	AdRV	84,197	520	13,334,717
	1998	LV	77,356	514	8,305,934
	1998	RV	75,732	106	8,723,288
	1998	AdLV	100,132	534	8,248,614
	1998	AdRV	100,576	627	8,557,977
Sucwoa River	1994	LV	74,880	203	3,039,426
	1995	LV	74,297	0	840,135
	1996	LV	78,930	143	1,332,111
	1997	LV	74,578	211	2,001,294
	1998	LV	78,139	0	1,920,487
	1999	LV	76,297	715	1,806,710
	2000	LV	76,400	0	62,690
	2001	LV	76,516	0	124,287
Sugsaw Creek	2001	LV	31,000	0	107,000
	2003	LV	11,000	0	79,000
	2004	LV	20,600	0	151,900
Thorsen	1995	LV	70,440	5,302	1,589,550
	1996	LV	71,747	3,376	736,323
	1996	RV	73,002	2,258	748,734
	1997	LV	72,691	2,389	749,664
	1997	RV	69,913	4,994	744,332
Tlupana River	1994	RV	72,022	4,079	1,687,290
	1995	RV	72,982	2,079	143,479
	1996	RV	71,924	1,727	1,572,720
	2001	RV	73,928	2,784	314,042

Table 19. *Continued* – Inside Areas’ Chum salmon, fin clipped at southern Canadian hatchery facilities

Stock	Brood Year	Clip Type	# Clipped	# Poor Clips	# Unmarked
Big Qualicum River	1994	AdRV	251,345	7,556	45,775,992
	1995	AdRV	259,684	5,357	16,862,532
	1996	AdLV	99,979	2,877	1,454,601
	1996	AdRV	216,759	6,250	6,517,105
	1997	AdLV	70,236	1,433	1,223,185
	1997	AdRV	249,992	4,568	29,910,744
	1998	AdRV	254,720	8,562	49,966,270
	1999	AdRV	250,225	5,014	26,422,017
	2001	ADRV	245794	8596	46369268
	2002	ADRV	252260	10359	38507964
	2003	ADRV	251939	4856	24254648
Chilliwack River	1994	RV	99,513	30	2,966,629
	1995	RV	99,572	22	2,968,212
	1996	RV	98,616	74	2,367,830
	1997	RV	99,920	122	2,779,742
Little Qualicum River	1999	AdLV	251,600	4,129	12,510,271
	2001	AdLV	266,330	7,874	21,755,530
	2002	ADLV	249,887	120	10,941,493
Sliammon R	2002	LV	101,029	0	300

6.4 Genetic Stock Identification – Using DNA Analysis

United States

Baseline sampling of relevant Washington State populations of chum salmon continued in 2002 and 2003 (Table 20). Mixture samples were also taken in both years in Area 7. In both cases, fin tissues were clipped and stored in alcohol, for future analyses of DNA – based genetic variability.

Table 20. Chum salmon genetics tissue collections from Washington in 2002 and 2003
(summarized by JB Shaklee, WDFW Genetics Laboratory)

Collection Code	Run Timing	2002 Collection Name	Number of Samples
02GF	SU & F	Cowlitz River (from the separator)	12
02IM	SU	Jimmycomelately Creek	30
02IN	SU	Snow Creek	25
02IQ	SU	Hamma Hamma River	74
02IR	SU	Liliwaup River	81
02JD	SU	Big Beef Creek	63
02KF	F	Big Mission Creek	100
02KS	SU	Curley Creek	100
02KX	F	Abernathy Creek	2
02KY	F	Bonneville trap @ the Dam	5
02LC	F	EF Lewis River	3
02LD	F	Elochoman River	4
02LE	F	Germany Creek	6
02LH	F	Hardy Creek	100
02LL	F	mainstem Columbia River near Multnomah Creek (Oregon side)	100
02LO	F	NF Lewis River	15
02LQ	F	Skamokawa Creek	65
02LR	F	Washougal River	16
02ME	F	Hamilton Spring Channel	95
02ML	F	Ives Island/Hamilton Creek/Hardy Creek to Washougal Hatchery	160
02MM	F	Ives Island/Hamilton Creek/Hardy Creek to Duncan Creek	53
02MN	F	Skokomish River	3
02OO	F	Lacamas Creek	8
02SK	F	Dungeness system (Beebe Creek)	52
02SL	F	Dungeness system (Dungeness River)	5
02KQ		Area 7 Reef Net fishery	200
02ZZ		Enforcement samples	2
		TOTAL	1,379

Collection Code	Run Timing	2003 Collection Name	Number of Samples
03CL	unknown	Cowlitz River	15
03FB	SU	Jimmycomelately Creek	97
03FC	SU	Salmon Creek	130
03FF	SU	Dosewallips River	172
03FG	SU	Duckabush River	100
03FH	SU	Hamma Hamma brood River + 3 naturals	103
03FI	SU	Lilliwaup River	142
03FJ	SU	Union River	137
03FM	SU	Big Beef Creek broodstock	72
03FN	SU	Dosewallips River	137
03GN	F	Big Mission Creek	126
03HQ	F	Skykomish Slough - fry	100
03HR	W	Kalama Creek (Nisqually River trib)	72
03HS	F	Tulalip Hatchery - adults	100
03HV	F	Skykomish Slough - adults	100
03IA	F	Abernathy Creek	4
03IH	F	Germany Creek	35
03JN	F	Hoodsport Hatchery	200
03JO	F	Minter Creek Hatchery	200
03JX	F	Kennedy Creek	200
03KM	F	John Creek	100
03KP	F	SF Nooksack River	9
03KQ	F	Grant Creek	100
03KR	F	Jim Creek	100
03KX	F	McClane Creek	125
03GW		Area 7 Reef net fishery	203
TOTAL			2,879

Canada

Canadian tissue samples for DNA analysis have been collected over a number of years (Table 21). Early DNA work consisted of experimental work on identifying appropriate markers for stock separation. Samples continue to be collected to provide a complete baseline for southern British Columbia inside chum stocks.

Table 21. Chum sample tissue collection from southern British Columbia (up to 2003, sample sizes greater than or equal to 50).

Population Name	Collection Year(s)	Sample Size
Algard	2003	99
Campbell_River	2002	193
Cayeghle	2002 2003	79
Cheakamus	1992 2002 2003	96
Chehalis	1991 1992	98
Chemainus	1992 1997	167
Cold_Creek	2002	193
Colonial	2002	220
Cowichan	1997 1999 2000	403
Cowichan_Lake	2002	55
Demamiel	1992	50
Glendale	2003	91
Goldstream	1991 1992 1997 1999	285
Goodspeed_River	2002	197
Harrison	2002	200
Heydon_Creek	1998 2001 2003	250
Inch_Creek	2002 2003	405
Indian_River	2000 2002	344
Klinaklini	1997 2002	116
Lower_Lillooet	2002	124
Mamquam	1991 2002	107
Nanaimo	1991 1997 2001 2002	248
Nimpkish	2002	214
Nitinat	1992	50
Orford	2003	103
Pegattum_Creek	2002	67
Puntledge	1991	50
Sliammon	1991	50
Smith_Creek	1997	95
Southgate	2003	206
Squamish	2002 2003	85
Stave	1991 2003	244
Theodosia	2002	145
Tzoonie	1991	50
Vedder	2002 2003	75
Viner_Sound	2002 2003	205
Wahleach	1991	50
Wortley_Creek	2002	242

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ATTACHMENT 1:

ANNEX IV, CHAPTER 6, OF THE PACIFIC SALMON TREATY

Chapter 6: Southern British Columbia and Washington State Chum Salmon

The provisions of this Chapter shall apply for the period 1999 through 2008.

1. The Parties shall maintain a joint Chum Technical Committee ("the Committee") reporting, unless otherwise agreed, to the Southern Panel and the Commission. The Committee will undertake to, *inter alia*:

- (a) identify and review the status of stocks of primary concern;
- (b) present the most current information on harvest rates and patterns on these stocks, and develop a joint database for assessments;
- (c) collate available information on the productivity of chum stocks to identify escapements which produce maximum sustainable harvests and allowable harvest rates;
- (d) present historical catch data, associated fishing regimes, and information on stock composition in fisheries harvesting those stocks;
- (e) devise analytical methods for the development of alternative regulatory and production strategies;
- (f) identify information and research needs, to include future monitoring programs for stock assessment; and
- (g) for each season, make stock and fishery assessments and evaluate the effectiveness of management.

2. In the years 1999 through 2008, Canada will manage its Johnstone Strait, Strait of Georgia, and Fraser River chum fisheries to provide continued rebuilding of depressed naturally spawning chum stocks, and, to the extent practicable, minimize increased interceptions of United States origin chum. Terminal fisheries conducted on specific stocks with identified surpluses will be managed to minimize interception of non-targeted stocks.

3. In the years 1999 through 2008,

- a) for Johnstone Strait run sizes less than 3.0 million
 - (i) Canada, taking into account the catch of Canadian chum in United States Areas 7 and 7A, will limit its harvest rate in Johnstone Strait to

less than 10 percent, resulting in a Johnstone Strait catch level of up to 280,000 chum; and

(ii) when the catch in Johnstone Strait is 280,000 chum or less, the United States catch of chum in Areas 7 and 7A shall be limited to chum taken incidentally to other species and in other minor fisheries, but shall not exceed 20,000, provided, however, that catches for the purposes of electrophoretic sampling shall not be included in the aforementioned limit;

(b) for Johnstone Strait run sizes from 3.0 million to 3.9 million

(i) Canada, taking into account the catch of Canadian chum in United States Areas 7 and 7A, will limit its harvest rate in Johnstone Strait to 20 percent, resulting in a Johnstone Strait catch level of 280,000 to 745,000 chum; and

(ii) when the catch in Johnstone Strait is from 280,000 to 745,000 chum, the United States catch of chum in Areas 7 and 7A shall not exceed 120,000;

(c) for Johnstone Strait run sizes of 3.9 million and greater

(i) Canada, taking into account the catch of Canadian chum in United States Areas 7 and 7A, will harvest at a rate in Johnstone Strait of 30 percent or greater, resulting in a Johnstone Strait catch level of 745,000 chum or greater; and

(ii) when the catch in Johnstone Strait is 745,000 chum or greater, the United States catch of chum in Areas 7 and 7A shall not exceed 140,000;

(d) it is understood that the Johnstone Strait run sizes, harvest rates, and catch levels referred to in 3(a), 3(b), and 3(c) are those determined in season, in Johnstone Strait, by Canada; and

(e) the United States shall manage in a manner that, as far as practicable, maintains a traditional proportion of effort and catch between United States Areas 7 and 7A, and avoids concentrations of effort along the boundary in Area 7A.

4. In the years 1999 through 2008, the United States shall conduct its chum fishery in the Strait of Juan de Fuca (United States Areas 4B, 5 and 6C) so as to maintain the limited effort nature of this fishery, and, to the extent practicable, minimize increased interceptions of Canadian origin chum. The United States shall continue to monitor this fishery to determine if recent catch levels indicate an increasing level of interception.

5. If, in any year, the United States chum fishery in Areas 7 and 7A fails to achieve the catch levels specified in paragraphs 3(a)(ii), 3(b)(ii) and 3(c)(ii), any differences shall be compensated by

adjustments to the Areas 7 and 7A fishery in subsequent years, except that chum catches below the level specified in paragraph 3(a)(ii) shall not be compensated.

6. Catch compositions in fisheries covered by this Chapter will be estimated by post-season analysis using methods agreed upon by the Committee.

7. Canada will manage the Nitinat net chum fishery to minimize the harvest of non-targeted stocks.

8. In the years 1999 through 2008, Canada shall conduct electrophoretic sampling of chum taken in the West Coast Vancouver Island troll fishery if early-season catch information indicates that catch totals for the season may reach levels similar to 1985 and 1986. Sampling, should it occur, will include catches taken from the southern areas (Canadian Areas 121-124).

9. During the period of August 1 through September 15 of each year, Canada will require the live release of chum salmon from all purse seine gear fishing in the Strait of Juan de Fuca (Canadian Area 20) and the United States will require the same for non-Indian seine fisheries in Areas 7 and 7A. Note: purse seine fisheries are not permitted in U.S. Areas 4B, 5 and 6C.

10. Canada and the United States shall assess catch levels and make attempts to collect additional genetic samples from any chum salmon caught during the August 1 through September 15 time period in the boundary area fisheries (U.S. Areas 4B, 5, 6C, 7 and 7A; Canadian Areas 18, 19, 20, 21 and 29).

ATTACHMENT 2:

U.S. AND CANADIAN STATISTICAL AREA MAPS





