PACIFIC SALMON COMMISSION
JOINT CHUM TECHNICAL COMMITTEE REPORT

FINAL 1992 POST SEASON SUMMARY REPORT

REPORT TCCHUM (94)-1

May, 1994

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INTRODUCTION

This Joint Chum Salmon Technical Committee report presents the appropriate information for 1992 chum salmon stocks and fisheries in southern British Columbia and Washington, as required by Chapter 6 of Annex IV of the Pacific Salmon Treaty (PST) (Attachment 1). In addition, paragraph 6 of the Pacific Salmon Treaty Letters of Transmittal, dated May 17, 1991, provided for an amendment to Chapter 6 of Annex IV of the PST (Attachment 2). Detailed information may be found in the United States and Canadian agency sections of this report (see Chapters 2 and 3 respectively).

STATUS OF TREATY REQUIREMENTS

Chum stocks and fisheries in southern B.C. and in U.S. Areas 4B, 5, 6C, 7, and 7A are managed under the terms set out in the Pacific Salmon Treaty. The following provides a brief synopsis of the PST Chum Annex provisions (italics) and of Canadian and United States management actions in 1992.

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

   The Joint Chum Technical Committee convened on three separate occasions during the year to address various assignments. The following reports were published: Final 1990 Post-Season Summary Report, TCCHUM (92)-1; Accuracy and Precision of Genetic Stock Identification for Estimating the Stock Composition of Mixed-Stock Chum Salmon Fisheries in Northern Puget Sound and Southern Georgia Strait, TCCHUM (92)-2; Update of Research Needs for Southern British Columbia and Washington Chum Salmon, TCCHUM (92)-3.

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

   In 1992, the gross escapement of Inside chum totalled 2,031,000. Escapement to natural spawning areas totalled 1,790,000 which was 10% below the Clockwork goal of 2,000,000. The Fraser River escapement was 682,000, or 97% of the 700,000 goal.

   Terminal area commercial fisheries scheduled by Canada to harvest specific stocks with

identified surpluses included; mid Vancouver Island (Area 14), Jervis Inlet (Area 16), Nanaimo (Area 17), Cowichan (Area 18), and Fraser River (Area 29). These fisheries were managed to limit interceptions of U.S. origin or other non-targeted stocks. Stock composition samples were taken, but the technical committee has not addressed the issue of "minimizing increased interceptions".

3. *In 1992, Canada was to manage its Johnstone Strait Clockwork harvest to set levels dependent on the run size entering Johnstone Strait, as determined inseason. 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 traditional proportion of effort and catch between Areas 7 and 7A was to be maintained.*

   The Clockwork Harvest Plan was reviewed and revised after the end of the 1991 fishing season. The threshold level for harvest at 30% was increased from 3.7 million to 3.9 million. No further changes were incorporated in 1992. The inseason estimate of the Johnstone Strait run size was 4,400,000 providing for a harvest rate of 30% or 1,320,000 chum. Post-season, the Clockwork run size was estimated at 4,317,000 chum. The actual Clockwork harvest was 1,479,000, resulting in a harvest rate of 34%.

   The total allowable chum catch for U.S. Areas 7 and 7A was 140,000, based on a total Johnstone Strait chum harvest which exceeded 640,000 fish. The target harvest was reduced to 122,000 fish due to a 18,000 fish overharvest in these areas in 1991. The total catch for the Area 7 and 7A fishery in 1992 was 119,000 chum. This fishery was managed to maintain a traditional fishing pattern with both areas opened simultaneously. The final catch distribution between Area 7 and Area 7A was 46% and 54%, respectively.

4. *In 1992, 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.*

   The U.S. chum fishery in the Strait of Juan de Fuca (Areas 4B, 5, and 6C) was limited, as it has been in past years, to participation by gillnet fishermen from the four Tribes that fish in the Strait of Juan de Fuca. The commercial catch of 58,000 chum was 3% higher than the 1985-1991 average Strait harvest. Genetic Stock Identification (GSI) samples were taken. However, the technical committee has not addressed the issue of "minimizing increased interceptions".

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. Area 7 and 7A catch fell short of the 1992 ceiling by 2,400 fish. This deficit will be added to a future year's allowable catch (Table 1, Sec. 1.2).

6. *Catch compositions in fisheries covered by this chapter were to be estimated post-season using methods agreed upon by the Joint Chum Technical Committee.*

Fisheries covered by this chapter were sampled, and stock composition estimates were provided to the Joint Interception Committee. Methods for estimating stock composition are under continuing review by the committee.

7. *In 1992, Canada was to manage the Nitinat chum net fishery to minimize the harvest of non-targeted stocks.*

A gillnet only fishing area, used during combined gear fisheries only, was reduced in size by 50% in 1992 relative to 1991. In addition, the start of the Nitinat fishery was delayed by two weeks, to late September, to reduce the interception of non-target stocks. Canada conducted GSI sampling to quantify the incidence of interceptions of non-target stocks in Area 121. Additional GSI samples were not collected from Area 20-1. The technical committee has not addressed the issue of "minimizing the harvest of non-target stocks".

8. *In 1992, Canada was to conduct 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.*

Early season catch information from the West Coast Vancouver Island troll fishery did not indicate that the season's total chum catches would reach the 1985 and 1986 levels. As a result, Canada did not conduct GSI sampling of this fishery. The total catch for this fishery was 45,500 chum salmon.

CHAPTER 1

JOINT SUMMARY REPORT

1.1 RUN SIZES

Southern British Columbia

The two areas of concern under the PST are those waters inside of Vancouver Island from Johnstone Strait to the southern portion of Vancouver Island (Inside) and those waters of the west coast of Vancouver Island (West Coast).

Inside Chum

The post-season Clockwork assessment of chum salmon was 4,317,000 which was 5.1% larger than the expected run size of 4,111,000. The overall harvest rate for clockwork assessment purposes was 34%. The total return of Fraser River chum was 1,330,000, or 90% of the expected run size.

West Coast Chum

The stock of concern, relative to the Treaty, is the chum stock returning to Area 22 (Nitinat Lake). Commercial catches of this stock occur in Area 21 and parts of 121 and 20-1. Preseason expectations were for a harvestable surplus of approximately 600,000 chum. The post-season estimate of run size was 1,143,000 chum.

United States

The two regions to be reported under the PST are those waters south of the U.S./Canada border from the western Strait of Juan de Fuca to Point Roberts (Puget Sound) and the embayments and rivers along the coast of Washington State (Washington Coastal).

Puget Sound Chum

The total expected run size of Puget Sound origin chum (all timing components) returning to Puget Sound waters was 1,660,000. Of these, 1,146,000 were expected from natural spawning areas and 514,000 were expected from enhancement facilities. The runs that were expected to produce the largest returns included the Stillaguamish/Snohomish system (394,000), South Puget Sound (456,000) and Hood Canal (457,000).

The post-season run size, as estimated from run reconstruction, was 1,918,000, or 16% above the preseason forecast. The natural component totaled 1,328,000 fish while the enhanced

component reached 590,000 fish. The returns to both the South Puget Sound region and the Hood Canal region exceeded the preseason expectations by 44% and 69%, respectively, but the Stillaguamish/Snohomish return fell short of preseason expectations by 49%.

Washington Coastal Chum

On the Washington coast, chum salmon return in significant numbers to Grays Harbor and Willapa Bay. In addition, a small return of enhanced chum salmon occurs in the Quinault River. The 1992 preseason run estimate of the Washington coastal chum stock was 119,000. The actual return, as estimated by run reconstruction, was 243,000 fish.

1.2 MANAGEMENT OF FISHERIES

Southern British Columbia

Inside Fisheries

Management of the fall chum salmon fisheries in Johnstone Strait utilized the Clockwork management strategy which combines rules and procedures for stock assessment, harvest management, and allocation of catch.

The Clockwork is a variable harvest rate strategy directly tied to the size of the fall chum run passing through Johnstone Strait. This strategy was designed to permit limited fishing in most years while rebuilding the wild stock escapements. Maximum catch levels for Johnstone Strait are determined by applying the appropriate Clockwork harvest rate to the estimated stock size. The Clockwork Harvest Plan was reviewed and revised after the 1991 fishing season. The threshhold for harvest at 30% was increased from 3.7 million to 3.9 million to expedite the Clockwork rebuilding objectives. Fishing plans are designed to limit catches to this overall Clockwork allowable harvest.

Stock size assessment uses both commercial and test fishing information to estimate returning stock abundance. The initial inseason run size estimate is provided by a late September commercial fishery in Johnstone Strait, and weekly test fishing results. If the assessment indicates the fall chum run through Johnstone Strait will exceed 3,000,000, then further commercial harvesting will occur. If commercial and Indian Food Fish harvesting in Johnstone Strait exceeds 225,000 chum, then directed chum harvests in U.S. Areas 7 and 7A are scheduled.

The Fraser River Chum Harvest Management Plan, formalized in 1988, dictates management of the Fraser River terminal fishery. Under this plan, past linkages with the Johnstone Strait Clockwork have been removed and harvests in the Fraser River are dependent on escapement to the river.

The Qualicum fishery is managed as a terminal fishery for mid Vancouver Island area enhanced chum. Objectives include limiting the catch of local coho and chinook stocks. The Jervis, Nanaimo and Cowichan terminal fisheries, (Area 16, 17 and 18) harvest primarily wild chum.

West Coast Fisheries

The escapement objective is 250,000 chum, including 175,000 into Nitinat Lake tributaries, 15,000 for test fishing payment, and 60,000 for hatchery requirements. The fishing plan is based on providing an early opportunity for gillnets, with subsequent seine fisheries dependant on achieving weekly escapement goals into Nitinat Lake. Early gillnet opportunities (eg. start date) are constrained by objectives of reducing the interception of non-target species.

United States

The management objective for the Strait of Juan de Fuca (Areas 4B, 5, 6C) is to maintain the limited effort nature of the fishery by limiting participation to local treaty Indian Tribes using gillnet gear. This fishery harvests primarily Puget Sound stocks.

In Areas 7 and 7A, the objective was to conduct fisheries to harvest 122,000 chum using traditional fishing patterns, given the applicable Johnstone Strait harvest and the U.S. harvest overage in 1991. An additional objective of the U.S. management in Areas 7 and 7A was to apportion the harvests between treaty Indian and non-treaty fishermen to achieve domestic allocation.

1.3 REVIEW AND EVALUATION OF FISHERIES

Southern British Columbia

Inside chum

During July and August, an incidental catch of summer chum occurred in Johnstone Strait during commercial fisheries directed at Fraser River sockeye and pinks. The catch for these two months was 32,500.

Fall chum salmon fishing occurred in Johnstone Strait (Areas 11 to 13) and mid Vancouver Island (Area 14), Jervis Inlet (Area 16), Nanaimo (Area 17), Cowichan (Area 18) and Fraser River (Area 29). Fisheries in Johnstone Strait and Qualicum may incidentally harvest U.S. origin chum during harvests directed at Canadian origin chum.

The first inseason run size projection of 3,700,000 was made on October 1. This estimate was based on the chum catch and effort data from the Johnstone Strait test fisheries and from the

commercial assessment fishery in September. The chum catch during the Johnstone Strait assessment fishery totalled 245,000. This provided for additional harvest at the 20% level and fishing occured on October 5, which harvested 599,000 chum. Information from this fishery and further test fishing resulted in an increase in the projected run size to 4,000,000. A third fishery occured on October 20 to harvest at the 30% level. Catch for this fishery was 464,000 chum. The final inseason run size estimate was 4,470,000 chum.

Fishing in the Strait of Georgia occured to mid Vancouver Island (Area 14), Jervis Inlet (Area 16), Nanaimo (Area 17) and Cowichan (Area 18) in 1992. Commercial fisheries were directed primarily at enhanced chum in Area 14. Commercial fisheries occurred on October 12, and on November 2, 3, and from November 9 to 18. The total catch for Area 14 was 429,000. Terminal fisheries in Areas 16, 17, and 18 harvested 128,600 chum.

Under the Fraser River Chum Harvest Management Plan, one commercial fishery was permitted on October 27 based on terminal surpluses identified in the early portion of the run. The total catch for this commercial fishery was 41,800 chum. There were no surpluses identified on the late portion of the run.

West Coast Chum

Catch in the commercial troll fishery off the WCVI (Areas 121-127) was 45,500 chum during the entire troll season (from July through September).

Gillnet fisheries were conducted for 4 days, beginning September 28. Seine fisheries were conducted 2 days, October 5 and October 6. Subsequently, the combined gear fishery started October 7, and continued until October 15. A 3 day closure was instituted to provide for further escapement. The fishery was reopened October 19, and continued through October 24, followed by another escapement closure. The combined gear fishery was reopened on October 27, but low catch rates resulted in closure of the fishery on October 28. No further fishing was conducted.

In total there were 21 days fishing for gillnets and 19 days fishing for seines. The combined gear fishery lasted 17 days. The total Area 21 catch was 1,076,000 chum.

During the single gear fisheries, the area was limited to inside a line two miles south of Pachena Point and Bonilla Point. During the combined gear fisheries, a gillnet only area was instituted in part of Area 20-1 inside a line two miles south of Bonilla Point to Logan Creek. This gillnet only area is less than half the size of the extension used in 1991.

Other catchs in Nitinat Lake (Area 22) included the Native food fishery, test fishery payment, hatchery brood stock, and rack sales, for a total of approximately 71,700 chum.

United States

The major fisheries intercepting Canadian origin chum salmon in the U.S. are in the Strait of Juan de Fuca (Areas 4B, 5, 6C), San Juan Islands (Area 7) and Point Roberts (Area 7A).

Strait of Juan de Fuca

Gillnet fisheries in Areas 4B, 5, and 6C occurred from October 18th to November 3, with a total of 58,000 chum caught by four Treaty Indian Tribes using gillnet gear only. The fishery opening was delayed until October 18 due to domestic coho conservation concerns. The fishery was initially opened for 7 days, beginning on October 18. After catches were assessed, the fishery was reopened for 4 days, starting on October 27. A final day of fishing was scheduled for November 3, after which the fishery was closed for the season. The total harvest was only marginally higher than previous years' catches for this fishery.

San Juan Islands

The total catch from commercial, test and ceremonial fisheries in Areas 7 and 7A was 53,000 and 66,000 chum respectively, totalling 119,000. Of these, 65 were taken in U.S. fisheries directed at Fraser River sockeye salmon. A single fishing period of 3.5 days by treaty Indians was responsible for the total harvest. Daily catch rates were three times greater than expected and resulted in daily catches that were nearly double the highest daily catch previously observed for the treaty Indian fleet. The unexpectedly large treaty Indian harvest precluded any non-treaty chum fisheries in Area 7 or Area 7A in 1992.

Table 1. Summary of U.S. Treaty chum allocations and catches for Areas 7 and 7A, 1986-1992.

YEAR	PST SPECIFIED CATCH LEVEL	ADJUSTED U.S. 7 & 7A CATCH[1]	ACTUAL CATCH	CURRENT DUE U.S.
1986	80,000	80,000	92,984	N/A
1987	20,000	20,000	26,323	-6,323
1988	140,000	133,677	131,356	2,321
1989	120,000	122,321	81,021	41,300
1990	140,000	181,300	180,544	756[2]
1991	120,000	120,000[2]	138,361	-18,361
1992	140,000	121,639	119,210	2,429

1. Takes into account underages or overages from previous years.

2. 1990 accumulated U.S. shortfall foregone through P.S.C. agreement.

1.4 ESCAPEMENT

Southern British Columbia

Inside Chum

Some of the streams within the Inside area contain 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, are not included in the escapement total for the fall chum run. The total escapement of summer chum in 1992 was 8,300.

The chum stocks which are managed within the context of the Clockwork plan are the fall runs. These chum enter Johnstone Strait during the September to November time period. The estimated number of all Study Area fall chum spawning in wild spawning areas was 1,790,000 chum. Total escapement, including hatchery returns, was 2,031,000. This escapement was 122% of the 1983 to 1991 average escapement.

The terminal run size to the Fraser River system was 832,000. This left an escapement of approximately 757,000 after commercial, test, and Indian Food Fish catches were subtracted. The enhanced systems in the Fraser River drainage showed very strong returns and the smaller drainages exhibited variable returns. The overall escapement to the Fraser River was approximately 97% of the net escapement goal.

West Coast Chum

Escapement to the spawning grounds of the Nitinat River system was estimated to be 150,000, achieving the goal.

United States

Puget Sound Chum

The total Puget Sound chum salmon escapement was 665,000, 40% above the escapement goal. The previous cycle escapement, in 1988, was 622,000 fish.

Washington Coastal Chum

The chum escapements in Willapa Bay, Grays Harbor and the Quinault River totaled 104,000, 96% above the goal.

1.5 REVIEW OF GSI PROGRAMS

In 1992, all GSI sampling requirements were met. The commercial fishing areas sampled in 1992 were upper Johnstone Strait (Area 12) and mid Vancouver Island (Area 14). In Area 12, the samples were from chum caught by test fishing vessels and in the commercial fishery.

For each Nitinat commercial fishery, 200 samples were collected in Vancouver, for a total of 1,200 samples.

The WCVI troll fishery was not sampled because of low catch rates relative to 1985 and 1986 levels.

The GSI samples collected in U.S. waters were from commercial and test fisheries in the San Juan Islands and Point Roberts (Areas 7 and 7A) and the Strait of Juan de Fuca (Area 5). A total of 2,720 samples were analyzed in 1992.

Some replicate and several new GSI baseline samples were collected from both Washington stocks and from stocks within the Fraser River. In addition, a GSI subcommittee continued its task of evaluating approaches to GSI. The GSI subcommittee work is ongoing at this time.

1.6 1992 CHUM TECHNICAL COMMITTEE PUBLICATIONS

TCCHUM (92)-1	Final 1990 Post-Season Summary Report.
TCCHUM (92)-2	Accuracy and Precicion of Genetic Stock Identification for Estimating the Stock Composition of Mixed-Stock Chum Salmon Fisheries in Northern Puget Sound and Southern Georgia Strait.
TCCHUM (92)-3	Update of Research Needs for Southern British Columbia and Washington Chum Salmon.

CHAPTER 2

REVIEW OF 1992 WASHINGTON CHUM SALMON FISHERIES

2.1 INTRODUCTION

This report was prepared by the United States section of the Joint Chum Technical Committee formed under provisions of the Pacific Salmon Treaty (PST). It provides a general overview of the 1992 chum salmon fisheries in Washington State and a more detailed review of those fisheries that intercept chum salmon of southern British Columbia origin.

The fisheries in Washington State waters that are believed to harvest significant numbers of southern British Columbia origin chum salmon are those in the western Strait of Juan de Fuca (Areas 4B,5,6C), the San Juan Islands (Area 7) and Point Roberts (Area 7A). The majority of the harvest in Areas 4B,5,6C is of U.S. fall chum origin. This fishery is restricted to the gillnet effort of four treaty Indian Tribes. Management objectives in these areas are based primarily on the needs of stocks originating in Puget Sound. The fall chum harvest in Areas 7 and 7A is primarily of southern B.C. origin, and (in recent years) has been managed to meet the terms of Chapter 6, Annex IV of the PST. Additional U.S. fishing areas that could likely contain chum salmon of Canadian origin include the eastern Strait of Juan de Fuca (Area 6) and West Beach (Area 6A). A small number of chum salmon were harvested in Area 6 in 1992, but no fishery occurred in Area 6A.

Other Puget Sound and Washington coastal fisheries are primarily terminal fisheries targeted on local runs, with little or no interception of non-Washington stocks.

2.2 TREATY LIMIT FISHERIES (Strait of Juan de Fuca, San Juan Islands, Point Roberts)

2.2.1 Management Strategy

The Sixth Annual Meeting of the Pacific Salmon Commission concluded in May, 1991 by adopting a two year chum salmon fishery regime for 1991 and 1992. That regime was identical to Chapter 6 of Annex IV of the PST for 1990. The Commission also formulated additional understandings with regard to the 1991 and 1992 fishery regimes, recorded in the letters of transmittal, dated May 17, 1991. These understandings provided that: (1) the U.S. would forego the harvest of the Areas 7 and 7A chum salmon shortfall that had accumulated through 1990; and (2) the Commission would "initiate discussions on chum within the Southern Panel area with a view toward clarifying and improving the understanding of the conservation concerns and management approaches of the Parties". The 1992 U.S. management strategy for the Strait of Juan de Fuca, the San Juan Islands and Point Roberts fisheries remained comparable to fishing plans of 1990 and 1991.

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. This strategy was again implemented in 1992. The limited effort nature of this fishery is maintained by limiting access to only four treaty Indian tribes using gillnet gear only.

The management strategy as well as the harvest quotas for Areas 7 and 7A are contained in Chapter 6, Annex IV of the PST. According to the Annex, fishing schedules for both areas should maintain an historical proportion of effort and catch between the two areas. In practice, this requirement is implemented by opening both areas simultaneously when fisheries are scheduled. Harvest quotas for Areas 7 and 7A are triggered by catch levels in the Canadian fishery in Johnstone Strait. The 1992 regime called for an Area 7 and 7A ceiling of 20,000 chum if the total chum catch in Johnstone Strait was less than 225,000 (10% Clockwork harvest rate); a 7 and 7A ceiling of 120,000 chum if the total Johnstone Strait catch was between 225,000 and 640,000 (20% Clockwork harvest rate); and a 7 and 7A ceiling of 140,000 chum if the Johnstone Strait catch was greater than 640,000 (30% or greater Clockwork harvest rate).

2.2.2 Fishery Review

The fall chum management period for Areas 4B, 5 and 6C began on October 11th. Test fisheries were conducted the last week of the coho management period and the first week of the chum management period to collect GSI samples. The commercial fishery opening was delayed until October 18 due to domestic coho conservation concerns. The fishery was initially opened for 7 days, beginning on October 18. After catches were assessed, the fishery was reopened for 4 days, starting on October 27. A final day of fishing was scheduled for November 3, after which the fishery was closed for the season. Test fishing for GSI samples continued for one additional week following the close of the commercial fishery.

Incidental summer chum catches in fisheries prior to the chum management period totalled 127 fish. Catches in the Strait fall chum fishery were about as expected given the forecasted high abundance of Puget Sound chum runs. The total commercial harvest during the chum management period was 58,000. There were an additional 2,100 chum harvested in test fisheries for GSI sample collection and in ceremonial/subsistence fisheries, bringing the total chum catch in areas 4B,5,6C to 60,200.

Prior to the fall chum management period in Areas 7 and 7A (10/4 & 10/11 respectively), 65 chum were harvested incidental to fisheries targeting on Fraser River origin sockeye salmon. The start of chum fishing in Areas 7 and 7A was also delayed until October 18 due to domestic coho conservation concerns.

Throughout the fall chum season, U.S. and Canadian technical staffs maintained close communication with regard to the status of the chum run size entering Johnstone Strait. Run projections from the commercial assessment fishery in the third week of September indicated an Inside run of 3.7 million chum. Catches in the assessment fishery exceeded 225,000 fish, allowing for a U.S. quota of 120,000 chum in the Area 7 and 7A fisheries. By October 9, the

Canadian commercial harvest in Inside gillnet and seine fisheries had reached approximately 655,000 fish, thus raising the U.S. quota to 140,000 chum. Due to a U.S. harvest overage of approximately 18,400 chum in 1991, it was the U.S. intent to limit catches in these areas to 121,600 fish.

Treaty Indian and non-indian fisheries were scheduled starting the week of October 18 and October 25, respectively, to harvest the U.S. quota. The treaty Indian fishery was scheduled for 3.5 days, from October 18 to October 21, and was expected to harvest approximately 45,000 fish. The actual catch was much larger than expected with a total harvest of 116,900 chum. Daily catch rates were three times greater than expected and nearly double the highest daily catch previously observed for the treaty fleet. Catches increased over successive days of the opening, with the highest catches occurring on the last day.

Because the treaty Indian fishery harvested virtually all of the U.S. quota, and because of high fish availability, U.S. managers decided to forego any additional openings in order to maintain the U.S. catch within the total harvest objective. Test fisheries for collection of GSI samples were conducted both prior to and following the commercial fishery, harvesting an additional 900 chum. Ceremonial/subsistence fisheries harvested 1,400 fish, bringing the total season catch in Areas 7 and 7A from all sources to 119,200 chum, or about 2,400 fish less than the 121,600 harvest objective. The cumulative shortfall in the U.S. quota is thus 2,400 chum.

2.3 PUGET SOUND INSIDE FISHERIES

2.3.1 Preseason Expectations

Puget Sound chum salmon fisheries are managed to achieve fixed spawner escapement goals for natural and/or hatchery returns to each production unit of Puget Sound. Domestic management and allocations are established for harvestable surpluses returning to several broad regions of origin. Although management within a region may address the escapement objectives of one or more specific stocks, Puget Sound fishery descriptions in this report provide only a brief overview of regional management strategies.

The preparation of annual management plans, including preseason run size forecasts and management recommendations for Puget Sound stocks, proceeds according to schedules outlined in the Puget Sound Salmon Management Plan (PSSMP). Both the Washington Department of Fisheries (WDF) and the treaty Indian Tribes develop and exchange methodologies and recommendations on preseason forecasts, escapement goals and other aspects of preseason management planning according to these schedules. The planning efforts are documented in a published status report each season.

The preseason expectation of abundance for 1992 Puget Sound origin chum salmon of all timing components was 1,660,000, of which 1,146,000 were expected to be of natural origin and 514,000 of hatchery origin. This projection was below the record run of 1988 but above the average for recent even year runs to Puget Sound.

2.3.2 Fisheries Descriptions, Catches and Spawning Escapements

The estimated return of 1,918,000 chum exceeded the preseason forecast by 258,000 fish (16%) and was the second highest chum run to Puget Sound in the last 20 years. The combined natural component produced a greater return than expected with a total of 1,328,000 fish. The hatchery runs were also higher than expected, totaling 590,000 fish.

The hatchery run component returned at approximately the same level in 1992 as in 1991. On the other hand, the natural run component was the second highest in the database and was dominated by age 4 fish, which composed 89.4% of the total run. As in 1990, age 3 fish contributed a lower percentage to the total run than age 5 fish. Although the winter run timing component has historically made a minor contribution to the total natural run, the return this year matched the low returns of 1979 and 1983, and was only slightly above the record low return of 1975. The winter run timing component has steadily declined since the record high return in 1987. The total Puget Sound escapement of 665,000 chum salmon exceeded the goal by 40%.

A summary of the preseason forecasts, final inseason estimates of abundance, post-season run size estimates, and escapements is presented in Table 2, with a breakdown of hatchery and natural components by stock timing shown in Table 3. Additional information on each stock is available through the Puget Sound run reconstruction reports. These run size estimates include Puget Sound origin stocks harvested within Washington waters only. Detailed information on chum harvests in each Puget Sound catch area is provided in Table 4. A comparison of 1985 through 1992 total Puget Sound run sizes and escapements is provided in Table 5.

The following is an overview of stock status and management actions for the Puget Sound mixed-stock area (Admiralty Inlet) as well as each of the terminal Puget Sound regions of origin.

Admiralty Inlet

Areas 6B and 9 constitute the principle mixed stock management areas inside Puget Sound. Although the actual stock composition in these areas has not been established quantitatively, it is assumed that all harvest in these areas is composed of Puget Sound stocks. Generally, Area 6B has remained closed by joint agreement between the Washington Department of Fisheries and the treaty tribes. Fisheries may be scheduled in Area 9 after inseason verification of run strength for stocks returning to the Hood Canal, Stillaguamish/Snohomish and South Puget Sound regions of origin. In 1992, there were no commercial openings in either area, except for an on-reservation Treaty set net fishery in Area 9. The total catch for this fishery was 324 chum.

Strait of Juan de Fuca Tributaries

Chum salmon from Strait of Juan de Fuca tributaries are of natural origin and consist of both summer and fall runs. The estimated summer run return of 1,000 was 40% below the preseason forecast, while the fall return of 5,600 was 7% above the forecast. Spawning

escapements for both the summer and fall runs totaled 1,000 and 5,300, respectively. The summer run escapement was below the goal by 54% but the fall run exceeded the goal by 50%. Terminal catches were minor. Increased effort continues to be devoted to determining the amount and extent of spawning in individual streams.

Nooksack/Samish Region

The fall chum return of 100,700 was essentially equal to the preseason expectations. The hatchery component was significantly above the preseason forecast, but the natural component returned slightly below the preseason expectation. The spawning escapement of 56,500 was 66% above the goal.

Skagit Region

The fall chum return to the Skagit River of 182,900 fish was 26% below the preseason forecast but only 6% below the inseason run size update. Estimated escapement totaling 95,900 fish was short of the goal by 18%. The Skagit run is totally of natural origin.

Stillaguamish/Snohomish Region

Chum salmon from this region are all of fall timing, and historically have been of natural origin. The hatchery program at Tulalip Bay, however, is beginning to have a greater influence on the composition of the total return. In 1992, 23% of the chum return of 199,300 was composed of hatchery fish. The total run was 49% below the preseason forecast of 394,400, with both hatchery and natural components falling short of preseason expectations. Total escapement of 80,800 was 16% above the goal.

South Puget Sound Region

This region supports summer, fall and winter timed chum runs. The summer and winter chum runs are largely of natural origin. The majority of the fall timed chum are also of natural origin, with some hatchery production.

Return of the summer component exceeded preseason expectations again this year, as it has for each of the last 7 years. The excellent survival rate exhibited by this stock group since 1986 has been aided, in part, by a natural stock supplementation program. The supplementation program has been discontinued, however, and the 1992 run was purely of natural origin. The total return of 135,500 in 1992 was 101% above the forecast, but the total escapement of 19,600 was 43% below the goal. There was a substantial incidental take of summer chum during coho directed terminal fisheries in South Puget Sound.

The fall return of 490,600 was the highest recorded since 1968. The final post-season estimate of the run size exceeded the preseason forecast by 43%. Estimated escapement of 163,200 exceeded the goal by 74%. Harvest rates on the fall return in terminal fisheries were

diminished by poor market conditions.

The winter return of 30,400 represented a 35% decline from preseason expectations and continued a five year slide in survival rates since the run peaked in 1987. The spawning escapement of 8,100 chum was 74% below the goal and represented the lowest estimated escapement in the database.

Hood Canal Region

The Hood Canal region supports runs of summer (natural), early fall (hatchery and natural) and late fall (natural) chum salmon. Early fall chum fisheries are managed on the basis of hatchery harvest and escapement needs. There are no directed fisheries on the summer or late fall run components.

The natural summer chum return of 3,100 represented a 19% decline from preseason expectations. Adult spawners totaling 2,900 fish exceeded the expected escapement, however, by 31%.

Early fall chum are predominantly of hatchery origin. The return of the combined (early + late) fall run segment was 768,900, which was 70% above the preseason forecast. The inseason update of run strength also underestimated the actual run by 27%. This helped to push estimated escapement of 231,800 above the escapement expectation by 157%. The total harvest, as well as the accuracy of the inseason estimates of abundance, were affected to a certain extent by the lack of any non-indian commercial fishery openings in this region throughout the month of October, in order to further diminish incidental impacts to depressed natural coho stocks.

2.4 WASHINGTON COASTAL FISHERIES

The 1992 fall chum runs to the three major coastal chum systems (Willapa Bay, Grays Harbor, and the Quinault River) were double the preseason forecasted returns. Comparisons indicate the 1992 run exceeded the 1991 run by 72% and exceeded the 10-year average by 41%. Run sizes, catches and escapements for Washington coastal stocks are shown in Table 6.

Willapa Bay

The Willapa Bay run size totaled 151,000 chum,and exceeded the 10-year average of 104,000 by 45%. The 1992 chum catch was 89,700 fish compared to a 10-year average catch of 56,000. Chum salmon are managed for natural escapement in Willapa Bay, although some hatchery escapements occur. Natural chum escapement exceeded the goal by 83%.

Grays Harbor

In 1992, 82,200 chum returned to Grays Harbor compared the to previous 10-year average of 59,500. The 1992 catch was 43,900 fish, or 29% above the previous 10-year average catch

of 34,000. Grays Harbor chum are entirely of natural origin and escapement exceeded the goal by 82%.

Quinault

Chum salmon returning to the Quinault River are almost entirely of hatchery origin, although significant straying to natural spawning areas occurs. The 1992 return to the Quinault River was 10% above the 10-year average run size. Of the total return of 9,500 chum, 2,600 were caught in the treaty Indian net fishery. Total escapement reached 7,600, with 700 fish returning to the Quinault National Fish Hatchery and the remaining 6,900 fish allowed to spawn naturally.

2.5 STOCK COMPOSITION AND RUN RECONSTRUCTION

During 1992, Puget Sound GSI chum salmon studies consisted of collecting replicate and additional baseline samples from Washington stocks (Table 7) as well as samples for stock composition analysis from test and commercial fisheries in mixed stock areas in northern Puget Sound and the Strait of Juan de Fuca (Table 8).

The 1992 commercial fishery sampling design followed closely that employed in 1990 and 1991. The 1992 sampling plan in Areas 7 and 7A focused on collecting one sample of 400 fish each week from each area during commercial fisheries. The weekly sampling goal for Area 5 remained at 200 fish. Test fisheries were scheduled for the Strait of Juan de Fuca in the two weeks preceding commercial fishery openings and the final week after commercial fisheries closed. Test fisheries were also scheduled for the Point Roberts area during weeks in which no commercial fishery was open. The sampling goal of the test fisheries was identical to that of the commercial fisheries, with the exception that, in Area 7A, an additional goal was set to collect 200 samples from the contracted test fishers during Treaty commercial openings. The primary purpose of the test fisheries was to ensure that weekly GSI samples were available to evaluate trends in stock composition over the season.

The results of the 1992 commercial and test fishery studies are described in LeClair, et al (1993). The sampling goal was reached each week for commercial fisheries in Area 5 during management weeks 43, 44 and 45 (10/18-10/24; 10/25-10/31; 11/1-11/7). During the single week that commercial fisheries were scheduled in Areas 7 and 7A (week 43), the sampling goal in both areas was also achieved. Test catch sample goals were not achieved in any one week in Area 7A, necessitating the combination of two samples from weeks 41 and 42, and two samples from weeks 43 and 45, to obtain the desired 400 sample goal . No test fisheries were conducted in Area 7. In Area 5, test catch sample goals were successfully achieved in weeks 41 and 42. The test fishery during week 46 collected only 120 samples, but the samples were still used for stock composition analysis.

All 1992 commercial and test fishery samples were assayed for 28 loci. Twenty one of these loci were used for stock composition analysis. The same 21 locus baseline database used

for chum GSI estimates in 1988 through 1991 was again used in 1992. The Chum Technical Committee is nearing completion of its investigations into the utility of increasing the number of loci for GSI analysis.

Puget Sound run reconstruction incorporated stock composition proportions derived from 1992 GSI estimates for the Strait of Juan de Fuca and San Juan Island fisheries. Stock composition estimates for these areas have been based, either directly or indirectly, on GSI estimates since 1980.

Table 1. 1992 Commercial Chum Harvest in Selected Puget Sound Catch Reporting Areas

Areas	Opening/ Week	Treaty Indian			Non-Indian				Grand Total
		GN	PS	Total	GN	PS	RN	Total	
San Juans/Point Roberts									
Area 7A	Prior to 9/01 (a)	10	4	14	1	10	-	11	25
	9/02 to 10/10 (b)	-	-	-	-	-	-	-	-
	10/11 to 10/17 (c)	1,414	0	1,414	0	0	-	0	1,414
	10/18 to 10/24	54,233	9,336	63,569	0	23	-	23	63,592
	10/25 to 10/31	-	-	-	-	-	-	-	-
	11/1 to 11/7	-	-	-	-	-	-	-	-
	11/8 to 11/14	-	-	-	-	-	-	-	-
Area 7A Total		55,657	9,340	64,997	1	33	0	34	65,031
Area 7	Prior to 9/01 (a)	20	2	22	5	13	0	18	40
	9/02 to 10/10 (b)	-	-	-	-	-	-	-	-
	10/11 to 10/17	-	-	-	-	-	-	-	-
	10/18 to 10/24	4,972	48,289	53,261	0	0	0	0	53,261
	10/25 to 10/31	-	-	-	-	-	-	-	-
	11/1 to 11/7	-	-	-	-	-	-	-	-
	11/8 to 11/14	-	-	-	-	-	-	-	-
Area 7 Total		4,992	48,291	53,283	5	13	0	18	53,301
Areas 7 and 7A Total		60,649	57,631	118,280	6	46	0	52	118,332
Strait of Juan de Fuca									
Areas 4B,	Prior to 9/01 (a)	85	-	-	-	-	-	-	85
5 and 6C	9/02 to 10/10 (b)	42	-	-	-	-	-	-	42
	10/11 to 10/17 (d)	409	-	-	-	-	-	-	409
	10/18 to 10/24	45,404	-	-	-	-	-	-	45404
	10/25 to 10/31	11,824	-	-	-	-	-	-	11824
	11/1 to 11/7	689	-	-	-	-	-	-	689
	11/8 to 11/14	9	-	-	-	-	-	-	9
Areas 4B, 5 and 6C Total		58,462	0	0	0	0	0	0	58,462

(a) Harvest prior to 9/01 consists of summer chum taken incidentally to Fraser sockeye fisheries.

(b) Coho management period for 1992

(c) Ceremonial/subsistence fishery

(d) 359 fish taken in ceremonial/subsistence fishery; 50 fish taken commercially.

Data source: WDF "HCCE WEEKCAT" program, executed 11/10/93.

Table 2. Summary of 1992 Puget Sound Chum Salmon Management Information by Region of Origin

Region	Preseason Forecast	Final Inseason Update	Post-Season Run Estimate	Preseason Escapement Expectation	Estimated Escapement	Escapement Goal
Strait of Juan de Fuca						
Summer	1,609	-	967	1,553	967	2,100
Fall	5,279	-	5,650	4,770	5,333	3,550
Nooksack/Samish	99,010	79,429	100,718	36,845	56,489	34,000
Skagit River	246,420	194,879	182,908	116,557	95,940	116,850
Stillaguamish/Snohomish	394,400	215,139	199,288	68,578	80,765	69,650
South Puget Sound						
Summer	67,300	-	135,504	34,400	19,592	34,400
Fall	341,950	565,010	490,630	90,562	163,199	93,750
Winter	46,507	44,370	30,414	30,131	8,088	30,900
Hood Canal						
Summer	3,837	-	3,094	2,210	2,893	41,200
Fall	453,418	607,029	768,855	91,093	231,808	90,250
Total	1,659,730	1,705,856	1,918,028	476,699	665,074	516,650

Source: WDF, Puget Sound Treaty Tribes and NWIFC, 1992 Puget Sound Chum Salmon Forecasts and Management Recommendations. WDF Stock Strength Calculation Summary (5/28/93).

Table 3. 1992 Puget Sound Post-Season Chum Salmon Run Size Estimates

Region	Production Type	Summer	Fall	Winter	Total
Strait of Juan de Fuca	Natural	902	5,618		6,520
	Hatchery	65	32		97
Nooksack/Samish	Natural		80,508		80,508
	Hatchery		20,210		20,210
Skagit River	Natural		182,908		182,908
	Hatchery				0
Stillaguamish/Snohomish	Natural		153,565		153,565
	Hatchery		45,723		45,723
South Puget Sound	Natural	135,504	448,637	26,494	610,635
	Hatchery		41,993	3,920	45,913
Hood Canal	Natural	2,582	291,156		293,738
	Hatchery	512	477,699		478,211
Subtotal	Natural	138,988	1,162,392	26,494	1,327,874
	Hatchery	577	585,657	3,920	590,154
Total		139,565	1,748,049	30,414	1,918,028

Regional Summary

Region	Summer	Fall	Winter	Total
Strait of Juan de Fuca	967	5,650		6,617
Nooksack/Samish		100,718		100,718
Skagit River		182,908		182,908
Stillaguamish/Snohomish		199,288		199,288
South Puget Sound	135,504	490,630	30,414	656,548
Hood Canal	3,094	768,855		771,949
Total	139,565	1,748,049	30,414	1,918,028

Source: WDF Stock Strength Calculation Summary (5/28/93).
Off-station plant returns have been included with hatchery returns.

Table 4. 1992 Commercial Chum Salmon Catch -- Puget Sound Areas

	Indian					Non-Indian					
Area Code & Name	Setnet/ Gillnet	Purse Seine	Beach Seine	Troll	Sub-Total	Gillnets	Purse Seine	Reefnet	Troll	Sub-Total	Area Total
4B-Neah Bay	103	0	0	5	108	0	0	0	0	0	108
5 -Sekiu	54936	0	0	105	55041	0	0	0	0	0	55041
6C-Crescent By	2956	0	0	3	2959	0	0	0	0	0	2959
Sub-Total	**57995**	0	0	**113**	**58108**	**0**	0	**0**	**0**	**0**	**58108**
6 -Pt Angeles	6577	0	0	4	6581	2	0	0	0	2	6583
6A-West Beach	0	0	0	0	0	0	0	0	0	0	0
7 -San Juan Is	4992	48291	0	0	53283	5	13	0	0	18	53301
7A-Pt Roberts	56096	9340	0	0	65436	1	33	**0**	0	34	65470
Sub-Total	**67665**	**57631**	0	**4**	**125300**	**8**	**46**	**0**	0	**54**	**125354**
6D-Dungeness By	34	0	0	0	34	56	0	0	0	56	90
74B-Sail R	0	0	0	0	0	0	0	0	0	0	0
75A-Clallam R	0	0	0	0	0	0	0	0	0	0	0
75B-Deep Cr	0	0	0	0	0	0	0	0	0	0	0
75C-Hoko R	1	0	0	0	1	0	0	0	0	0	1
75D-Lyre R	0	0	0	0	0	0	0	0	0	0	0
75E-Pysht R	0	0	0	0	0	0	0	0	0	0	0
75F-Sekiu R	1	0	0	0	1	0	0	0	0	0	1
76A-Dungeness R	0	0	0	0	0	0	0	0	0	0	0
76B-Elwha R	43	0	0	0	43	0	0	0	0	0	43
76C-Morse Cr	0	0	0	0	0	0	0	0	0	0	0
76D-Salt Cr	0	0	0	0	0	0	0	0	0	0	0
Sub-Total	**79**	0	0	**0**	**79**	**56**	**0**	**0**	**0**	**56**	**135**
7B-Bellingham By	12215	0	0	0	12215	14011	152	0	0	14163	26378
77B-Low Nooksck R	9364	0	0	0	9364	0	0	0	0	0	9364
77C-Upr Nooksck R	4850	0	0	0	4850	0	0	0	0	0	4850
7C-Samish Bay	0	0	0	0	0	0	0	0	0	0	0
77D-Samish R	0	0	0	0	0	0	0	0	0	0	0
7D-Lummi Bay	5	0	0	0	5	0	0	0	0	0	5
7E-East Sound	0	0	0	0	0	0	0	0	0	0	0
77A-California Cr	0	0	0	0	0	0	0	0	0	0	0
Sub-Total	**26434**	**0**	0	**0**	**26434**	**14011**	**152**	0	**0**	**14163**	**40597**
8 -Skagit Bay	16057	0	0	0	16057	18526	16449	0	0	34975	51032
78B-Sauk R	0	0	0	0	0	0	0	0	0	0	0
78C-Low Skagit R	8084	0	0	0	8084	0	0	0	0	0	8084
78D-Upr Skagit R	19389	0	0	0	19389	0	0	0	0	0	19389
Sub-Total	**43530**	0	**0**	**0**	**43530**	**18526**	**16449**	**0**	**0**	**34975**	**78505**
6B-Discovry By	0	0	0	0	0	0	0	0	0	0	0
9 -Admirality	324	0	0	0	324	0	0	0	0	0	324
Sub-Total	**324**	0	**0**	0	**324**	**0**	**0**	0	**0**	0	**324**
8A-Port Susan	55133	11	257	0	55401	10522	24460	0	0	34982	90383
78F-Snohomish R	0	0	0	0	0	0	0	0	0	0	0
78G-Stilagumsh R	9634	0	0	0	9634	0	0	0	0	0	9634
8D-Tulalip Bay	7510	0	2236	0	9746	1590	461	0	0	2051	11797
Sub-Total	72277	**11**	**2493**	0	74781	**12112**	**24921**	**0**	**0**	**37033**	**111814**

Table 4. 1992 Commercial Chum Salmon Catch -- Continued

	Indian					Non-Indian					
Area Code & Name	Setnet/ Gillnet	Purse Seine	Beach Seine	Troll	Sub-Total	Gillnets	Purse Seine	Reefnet	Troll	Sub-Total	Area Total
10-Seattle	27882	27115	0	0	54997	93828	106186	0	0	200014	255011
10A-Elliott Bay	3118	0	0	0	3118	0	0	0	0	0	3118
80B-Duwamish R	902	0	0	0	902	0	0	0	0	0	902
10C-S Lk Washngtn	0	0	0	0	0	0	0	0	0	0	0
10D-Lk Sammamish	0	0	0	0	0	0	0	0	0	0	0
10E-E Kitsap	33418	0	0	0	33418	0	0	0	0	0	33418
10F-Ship Canal	2	0	0	0	2	0	0	0	0	0	2
10G-N Lk Washngtn	0	0	0	0	0	0	0	0	0	0	0
11-Tacoma	9094	243	0	0	9337	22104	66104	0	0	88208	97545
11A-Commencmt By	0	0	0	0	0	0	0	0	0	0	0
81A-Carbon R	0	0	0	0	0	0	0	0	0	0	0
81B-Puyallup R	6198	0	0	0	6198	0	0	0	0	0	6198
81C-White R	0	0	0	0	0	0	0	0	0	0	0
13-Nisqually Rch	326	0	304	0	630	0	0	0	0	0	630
83D-Nisqually R	10885	0	0	0	10885	0	0	0	0	0	10885
83F-McAllistr Cr	2183	0	0	0	2183	0	0	0	0	0	2183
13A-Carr Inlet	2253	517	221	0	2991	0	0	0	0	0	2991
83C-Minter Cr	0	0	0	0	0	0	0	0	0	0	0
13C-Chambers By	148	0	0	0	148	0	0	0	0	0	148
83H-Chambers Cr	0	0	0	0	0	0	0	0	0	0	0
13D-Case Inlet	5812	0	2339	0	8151	0	0	0	0	0	8151
13E-Hendersn Inlt	0	0	0	0	0	0	0	0	0	0	0
13F-Budd Inlet	15	0	0	0	15	0	0	0	0	0	15
13G-Eld Inlet	1507	0	0	0	1507	0	0	0	0	0	1507
13H-Totten Inlet	6470	0	0	0	6470	0	0	0	0	0	6470
13I-Skookum Inlet	68	0	0	0	68	0	0	0	0	0	68
13J-Hammersley In	0	0	0	0	0	0	0	0	0	0	0
13K-Upr Case Inlt	55	0	3	0	58	0	0	0	0	0	58
Sub-Total	**110336**	**27875**	**2867**	**0**	**141078**	**115932**	**172290**	**0**	**0**	**288222**	**429300**
9A-Pt Gamble	435	0	3	0	438	0	0	0	0	0	438
12-N Hood Canal	162141	475	0	0	162616	48751	177623	0	0	226374	388990
12A-Dabob Bay	217	0	0	0	217	36	370	0	0	406	623
82F-Quilcene R	0	0	0	0	0	0	0	0	0	0	0
12B-C Hood Canal	21021	0	0	0	21021	5591	4163	0	0	9754	30775
82C-Dosewallip R	0	0	0	0	0	0	0	0	0	0	0
82D-Duckabush R	0	0	0	0	0	0	0	0	0	0	0
82E-Hamma-Hamma R	0	0	0	0	0	0	0	0	0	0	0
12C-S Hood Canal	69539	0	4957	0	74496	156	1458	0	0	1614	76110
82B-Dewatto Cr	0	0	0	0	0	0	0	0	0	0	0
82G-Skokomish R	14439	0	0	0	14439	0	0	0	0	0	14439
82J-Purdy Cr	0	0	0	0	0	0	0	0	0	0	0
12D-SE Hood Canal	0	0	0	0	0	0	0	0	0	0	0
82H-Tahuya R	0	0	0	0	0	0	0	0	0	0	0
82I-Union R	0	0	0	0	0	0	0	0	0	0	0
Sub-Total	**267792**	**475**	**4960**	**0**	**273227**	**54534**	**183614**	**0**	**0**	**238148**	**511375**
Grand Total	**646432**	**85992**	**10320**	**117**	**742861**	**215179**	**397472**	**0**	**0**	**612651**	**1355512**

Table 5. Historical Puget Sound Chum Run Sizes, Catches and Escapements (All Run Timings).

Year	Total Run Size	Total Catch	Escapement
1985	1,466,094	965,426	500,668
1986	1,553,221	1,054,330	498,891
1987	1,761,184	1,265,400	495,784
1988	2,039,153	1,347,606	691,547
1989	1,041,302	801,127	240,175
1990	1,350,282	921,871	428,411
1991	1,256,451	866,190	390,261
1992	1,918,028	1,252,954	665,074

Table 6. 1992 Washington Coastal Chum Run Sizes, Catches, and Escapements.

	Willapa Bay	Grays Harbor	Quinault R.	Total
Preseason Forecast	72,100	42,200	4,700	119,000
Actual Run Size	151,000	82,200	9,500	242,700
Harvest	89,700	43,900	2,600	136,200
Wild Escapement Goal	32,100	21,000	-	53,100
Wild Escapement	58,700	38,300	6,900	103,900
Hatchery Escpmt Goal	1,900	-	1,400	3,300
Hatchery Escapement	2,600	0	700	3,300

Table 7. 1992 Chum Salmon Genetic Baseline Collections

Region of Origin	Number Sampled
Fraser River	
Chehalis CDFO FH	100
Harrison River	100
Squakum Creek	100
Columbia River	
Grays River	100
Hamilton Creek	100
Washington Coast	
Wynoochee River (Chehalis)	22
Nooksack/Samish Rivers	
Chuckanut Creek	35
Nooksack River	35
Thomas Creek (Samish)	74
Bob Smith Creek (Samish)	100
Skagit River	
Dan Creek Slough	100
Finney Creek	41
Stillaguamish/Snohomish Rivers	
Jim Creek (S. Fork Stilly)	51
Squire Creek (N. Fork Stilly)	71
Wallace River (Snohomish)	43
Schoolhouse Slough (Skykomish)	100
Game Trail Slough (Skykomish)	100
Hood Canal	
Big Quilcene River (summer)	102
Quilcene Bay (summer)	138
Dosewallips River (summer)	100
Lilliwaup River (summer)	60
Duckabush River (summer)	77
Union River (summer)	2
Hamma Hamma River	41
Dewatto River	40
South Puget Sound	
Upper Skookum Creek	100
Ollala Creek	2

Source: WDF GSI lab.

Table 8. Summary of 1992 Chum Salmon GSI Samples Taken From Fisheries in the Strait of Juan de Fuca and Northern Puget Sound

Location	Statistical Week	No. Fish Sampled	No. Fish Analyzed	Gear Type	Fishery Type
Strait of Juan de Fuca (Area 5)	41	200	200	GN	Test
	42	200	200	GN	Test
	43	200	200	GN	Commercial
	44	200	200	GN	Commercial
	45	200	200	GN	Commercial
	46	120	120	GN	Test
Salmon Banks (Area 7)	43	400	400	Mixed	Commercial
Point Roberts (Area 7A)	41	257		GN	Test
	42	325	400	GN	Test
	43	400	400	Mixed	Commercial
	43	200		GN	Test
	44		400		
	45	240		GN	Test
Total		2,942	2,720		

GN = gillnet PS = purse seine

Source: LeClair, Miller, Baker, CdeBaca, and Beattie. 1993. Genetic Stock Identification Estimates of 1992 Washington Commercial And Test Chum Fisheries in the Strait of Juan de Fuca and North Puget Sound. WDF, the Nooksack Tribe, and the NWIFC.

CHAPTER 3

REVIEW OF THE 1992 SOUTHERN BRITISH COLUMBIA CHUM SALMON FISHERIES

3.1 INTRODUCTION

The treaty between the governments of Canada and the United States of America (U.S.) concerning Pacific salmon was designed to facilitate cooperation 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 in 1992. 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 B.C. waters between Vancouver Island and the mainland and off the west coast of Vancouver Island and discusses the management actions of Canada in relation to the PST requirements.

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, herein termed Inside chum, and those of the West Coast of Vancouver Island, including Juan de Fuca Strait, termed West Coast chum. The primary fisheries of concern are the West Coast Vancouver Island troll, Nitinat net, Johnstone, Georgia and Juan de Fuca Straits and the Fraser River.

3.2 INSIDE CHUM

3.2.1 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 the Department of Fisheries and Oceans (DFO) 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 clockwork strategy for 1992, PST requirements for Inside chum and discusses Inside, Fraser River, and mid Vancouver Island chum stocks in relation to these plans.

3.2.1.1 Clockwork Harvest Strategy for Johnstone Strait

This strategy was more fully described in the Final 1985 Post Season Summary Report of the Joint Chum Technical Committee (TCCHUM 87-4). The Clockwork strategy is designed to rebuild wild chum stocks to the estimated optimum escapement levels by limiting the overall harvest rate. Specific objectives of this strategy are to:

a. achieve the rebuilding objective within 12 to 15 years: the optimum wild escapement objective is defined to be 2.5 million chum;
b. reduce the number of years during which no commercial chum fishing is permitted;
c. consider wild stock production when establishing harvest management plans.

Under this scheme, harvest rates are directly related to the total run size of the chum run migrating through Johnstone Strait as estimated during the season. The allowable harvest rates for the expected magnitudes of chum salmon run sizes in 1992 were:

a. below 3.0 million, up to a 10% harvest rate;
b. 3.0 to 3.9 million, maximum of 20% harvest rate;
c. 3.9 to 5.2 million, maximum of 30% harvest rate; and
d. over 5.2 million, maximum of 40% harvest rate.

The chum run harvest rate thresholds were reviewed in 1991 and new minimums and maximums were agreed upon for 20 and 30 percent harvest rates. The threshold of 3.7 was increased to 3.9 million for 1992 to expedite the Clockwork rebuilding objectives.

The clockwork strategy was developed to limit the harvest in those areas containing numerous mixed stocks; however, it was recognized that harvesting in terminal areas would be required, particularly in areas of major enhancement.

3.2.1.2 Canada/U.S. Treaty

No changes were made to the chum chapter of the PST in 1992. Canada would continue to manage the 1992 chum fisheries in Johnstone Strait, Strait of Georgia and Fraser River areas in a manner consistent with the 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 Chapter 6 of Annex IV of the PST.

3.2.1.3 Fraser River Chum Management Strategy

Chum produced from the Fraser River were of major importance during the development of the Clockwork harvest strategy and the negotiation of the PST. While the Johnstone Strait Clockwork plan was designed to conserve all Inside chum in the Johnstone Strait mixed stock fishery area, this strategy potentially results in terminal Fraser River surpluses. As part of the revisions to the 1988 Johnstone Strait Clockwork, terminal harvesting of Fraser River chum was

no longer directly linked to the harvesting pattern in Johnstone Strait. Fraser River harvest would be dependent on abundance assessments by two in-river test fisheries. The removal of this linkage required the adoption of a harvest management plan for the Fraser River (Area 29).

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. The terminal run is 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 Indian Food Fish and test fishing requirements. The plan provided for either escapement goal to be increased in season if the return to the river exceeded the escapement 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% on 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.

3.2.1.4 Strait of Georgia Chum Harvest Strategy

Chum stocks returning to the terminal areas are directly affected by the harvest in Johnstone Strait.

The chum produced in the mid Vancouver Island area are primarily from enhancement facilities. In 1992, a portion of this return was harvested in Johnstone Strait, under the Clockwork harvest strategy. Terminal harvesting was directed at a mix of surplus mid Vancouver Island wild and enhanced chum, with the conservation requirements of passing chum stocks considered. In 1992, conservation requirements of local chinook and coho salmon in this fishery area were 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 occurred when surpluses were identified.

3.2.2 Run Size Estimation

Preseason run size forecasts were prepared to facilitate the planning of potential conservation actions as well as domestic and international allocations. As the season progressed, revisions to the run size projection were used to alter harvest plans in accordance with the clockwork approach.

3.2.2.1 Preseason

The 1992 preseason forecast of Inside chum returning to wild spawning areas was 2,867,000 which included 1,151,000 Fraser River and 1,716,000 non-Fraser chum (Table 1).

The number of Inside chum returning to enhanced spawning areas was determined through the application of average survival rates by enhancement facility and the average returns by age to the number of fry released by the facilities. The 1992 pre-season forecast for enhanced origin Fraser River chum was 328,000 while the mid Vancouver Island area was expected to produce 716,000 enhanced chum. In addition, there were 99,000 enhanced origin chum estimated to return to other Georgia Strait areas. The total run size estimate for enhanced Inside chum was 1,143,000 (Table 1).

The total Inside chum stock size was forecast to be 4,011,000. In addition, past data show a portion of U.S. chum migrate through Johnstone Strait and for computational purposes this number is set at 100,000. Therefore, the total forecast run through Johnstone Strait was 4,111,000 chum.

3.2.2.2 Inseason

The abundance of chum in Johnstone Strait was assessed, in part, through test fishing by two seine vessels in Area 12. The test fishing in Area 12 began in early September and continued until early November (Table 4).

The Area 12 test fishing data were utilized to determine relative weekly chum abundance and the magnitude of the total run entering Johnstone Strait. The relationship between catch per unit effort in the test fishery and the total run size was monitored weekly throughout October to assist in the determination of the inseason estimates of the run size (Table 2).

The first inseason run size was projected to be 3,700,000 and announced on October 1. This projection was based on the chum catch and effort data from the upper Johnstone Strait test fisheries and the September assessment fishery. The chum catch during the Johnstone Strait assessment fishery totalled 245,000. Based on a run size greater than 3,000,000, additional harvest was allowed at the 20% level. Hence a fishery occurred on October 5, which harvested 599,000 chum. Information from this fishery and further test fishing, resulted in an increase in the projected run size to 4,000,000. A third fishery occurred on October 20 to harvest at the 30% level. Catch for this fishery was 464,000 chum. The final inseason run size estimate was 4,470,000 chum.

Based on terminal surpluses, fishing in the Strait of Georgia occurred at mid Vancouver Island (Area 14), Jervis Inlet (Area 16), Nanaimo (Area 17) and Cowichan (Area 18) in 1992. Commercial fisheries were directed primarily at enhanced chum in Area 14.

Initial estimates of Fraser River total run size were made from Johnstone Strait commercial and test fishing assessments combined with GSI estimates. Fraser River test fishing was used after mid October to estimate the return to the terminal area. Test fishing on the Fraser River was conducted from October 1 to early December. Based on test fishing to October 21, the inseason projection of terminal run size to the Fraser River was 560,000 chum. Under the Fraser River Chum Harvest Management plan, one commercial fishery was permitted on October

27 based on terminal surpluses identified in the early portion of the run. The run size was updated on November 4 to 670,000, however no further surpluses were identified on the early run. The late component of the chum run was weak and no further fisheries were scheduled. The final inseason projection of the terminal run size to the Fraser River was 530,000 chum (Table 2).

3.2.2.3 Post season

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 were summed to estimate the total Clockwork assessed run size (Table 9). The post-season Clockwork run size estimate of 4,360,000 was 2% smaller than the in-season estimate of 4,447,000. In addition, the post-season estimate was 6% larger than the pre-season forecast of 4,111,000.

The post-season Fraser River total chum stock size, including the catch of Fraser River chum in U.S. and Canadian waters, was 1,330,000 (756,000 escapement and 574,000 total catch in Canadian and U.S. waters). This run size was 90% of the preseason forecast.

U.S. catches of Fraser chum were 89,300 in areas 7 and 7a and 19,300 in areas 4B, 5, and 6C. The catches of Fraser River chum in the Johnstone Strait, Strait of Georgia, and Nitinat commercial net fisheries were estimated, through analysis of GSI data, to be 315,700, 42,200 and 32,000 chum, respectively. The use of current GSI analysis to determine Fraser River interceptions in the Nitinat catch is under review. The catch of Fraser River origin chum salmon in the U.S. Juan de Fuca, Area 20 and Nitinat fisheries is not included in the Clockwork estimated catch.

3.2.3 Catch

Fall chum in Inside waters are harvested by commercial, Indian food, and test fisheries and by biological samplers. In 1992, these harvests totalled 2,169,000. The catch by each fishing group and area is presented below.

3.2.3.1 Commercial

Commercial catch of chum in Inside waters occurs in three main areas: Johnstone Strait, Strait of Georgia and the Fraser River. The 1992 Johnstone Strait fishery (Areas 11, 12 and 13), began in July and ended in late September. During the July and August period, the Johnstone Strait fishery was directed at harvesting Fraser River sockeye and pink salmon. During those two months, 32,500 chum salmon were harvested (Table 3). These chum are 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 Clockwork management plan.

As part of the Clockwork plan, a commercial assessment fishery during the fourth week of September is required to provide a run size estimate. In 1992, the Johnstone Strait chum

assessment fishery harvested 245,000 chum. Two further fisheries occurred on October 5 and 20 which harvested 599,000 and 464,000 chum respectively.

Based on terminal abundance, fishing in the Strait of Georgia occurred at mid Vancouver Island (Area 14), Jervis Inlet (Area 16), Nanaimo (Area 17) and Cowichan (Area 18) in 1992. Commercial fisheries were directed primarily at enhanced chum in Area 14 and occurred on October 12, and November 2,3 and 9 to 18. The total catch for Area 14 was 429,000. Area 16 fisheries occured on October 27,28 November 2,3 and November 11 to 13. In Area 17 fisheries occurred on October 27, 28 and November 2 and 3. Area 18 fisheries occured on November 2, 3, 16, 23 and 30. The total catch for Area 16, 17 and 18 fisheries was 128,600.

Under the Fraser River Chum Harvest Management Plan, one commercial fishery was permitted on October 27 based on terminal surpluses identified in the early portion of the run. The total catch for this fishery was 41,800 chum. The late portion of the run was weaker and no commercial fisheries were scheduled after November 12.

3.2.3.2 Test and Sample

The abundance of chum salmon was monitored through test fishing programs in Johnstone Strait and the Fraser River. In addition, sampling for GSI purposes was conducted in Johnstone Strait and the Strait of Georgia.

A total of 6,664 chum were sampled from Inside waters for biological purposes (Table 8). Samples were collected from Johnstone Strait, Qualicum and Nanaimo fishing areas.

Two test fisheries were conducted within the Fraser River. Fishing occurred daily at the Cottonwood site in the lower river near Ladner, and in the upper river area near Albion. From October 1 to early December the chum test catch was 9,855 (Table 5).

3.2.3.3 Indian

Native people of British Columbia are permitted to harvest chum for food fish and commercial uses. Indian food fish catches occur in Johnstone and Georgia Straits and within streams flowing into these areas.

The Indian food fishery in the Inside waters harvested 82,300 chum, of which the food fishery in Johnstone Strait harvested a total of 23,500 chum, the majority of which were taken in marine waters in October. In the Strait of Georgia there were 29,700 chum taken in the Indian food fishery. The Native commercial chum harvest totalled 96,900. The combined food fish and commercial fish catch in the Fraser River system was 29,800 (Table 3).

3.2.4 Escapement

Chum which escape the commercial, test, sampling, and Indian fisheries form the gross

escapement to Inside chum streams. This gross escapement is made up of chum which 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.

3.2.4.1 Spawning

Some of the streams within the Inside area contain 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, are not included in the escapement total for the fall chum run. The total escapement of summer chum in 1992 was 8,300.

The stocks which are managed within the context of the Clockwork plan are the fall run chum. These chum enter Johnstone Strait during the September to November time period. The estimated number of all Study Area fall chum spawning in wild spawning areas was 1,790,000 chum. This escapement was 122% of the 1983 to 1991 average escapement.

The terminal run size to the Fraser River system was 832,000. This left an escapement of approximately 757,000 after commercial, test, and Indian Food Fish catches were subtracted.

The enhanced systems in the Fraser River drainage showed very strong returns and the smaller drainages exhibited variable returns. The net spawning escapement to the Fraser River was 682,000, which is 97% of the net escapement goal.

In nine of the fourteen major spawning areas, the chum escapement was above the average observed during the 1983-91 period (Table 6). Overall, the fall chum spawning escapement in wild spawning areas was 90% of the present interim total spawning goal of 2,000,000 chum.

The total Inside chum stock size and wild escapement for the years prior to Clockwork management (1980-1982) and under Clockwork management (1983-1992) are presented in Table 7.

3.2.4.2 Enhanced

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 area received their spawning requirements (Table 6). All major Fraser River enhancement facilities met or exceeded broodstock requirement. Wherever possible, enhanced chum not required for broodstock were diverted to wild spawning areas.

3.2.4.3 Gross Escapement

The gross escapement in 1992 was estimated at 2,031,000 fall chum of which 1,790,000

spawned in wild or natural spawning areas. Of the remaining balance, 240,600 were spawned in enhancement areas or facilities. (Table 6).

3.2.5 Status of Treaty Requirements

3.2.5.1 Overall Fishery Management

During the fourth week of September, the Johnstone Strait assessment fishery indicated a stock size of 3,700,000. Subsequent test fishing indicated increased stock strength and the run size was estimated at 4,000,000 on October 14. Further analysis of test fish and commercial catch suggested the seasonal Clockwork run size was approximately 4,500,000 (October 30). Based on these run size estimates, no further fishing occurred in Johnstone Strait, however the Canadian catch had exceeded the 640,000 catch threshold which under the treaty allows the U.S. a catch of 140,000 chum.

Final test fishing and commercial assessments estimated a run size through Johnstone Strait of 4,447,000 chum. The subsequent post season review indicated an actual run size of 4,317,000 chum. The inseason calculation of the Clockwork catch of 1,479,000 was higher than the desired catch of 1,334,000 (Table 9).

The total Clockwork assessed run size includes the gross escapement of Inside chum, the total catch in Inside areas, and the apportionment of the commercial catch in U.S. areas 7 and 7A which was of Canadian origin. The 1992 gross escapement was 2,031,000 and the total Clockwork catch was 1,479,000. An assessment of clockwork management is provided for the years 1983 to 1992 in Table 10.

3.2.5.2 Stock Identification

Genetic stock identification (GSI) was conducted in a number of areas in 1992. The majority of the GSI work concentrated on sampling commercial and test fishery catches in the various statistical areas.

The commercial fishing areas sampled were upper Johnstone Strait (Area 12) and mid Vancouver Island (Area 14). In Area 12, the samples were from chum caught by test fishing vessels and in the commercial fishery. The samples in Areas 14 were from the commercial catch and the samples from Area 17 was from test fishing (Table 8).9

3.3 WEST COAST CHUM

3.3.1 Conservation and Harvest Management Requirements

Chum salmon stocks return to most 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 was 250,000 chum. This represents an increase of 50,000 over 1990, to address actual hatchery requirements.

The management of this fishery is based on achieving the total escapement requirement of 250,000 into Nitinat Lake. 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 achieve stock assessment, fish quality, and allocation requirements.

Gillnet and seine vessels take part in the Nitinat area fishery. A gillnet assessment fishery begins in late September to provide early allocation to gillnets plus information for stock assessment. If weekly escapement targets are achieved and a further surplus is identified, then seines will be allowed to fish to a catch equal to the gillnets. 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 (Figure 1). Subsequent fisheries may be open to both gear types, depending on achievement of the weekly escapement targets. During combined gear fisheries, a gillnet 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. Increased exploitation rates result mainly from reduced congestion in the regular area, which increases the efficiency of the seine fleet. Migration of the Nitinat chum stock through the extension area also provides some increased exploitation by gillnets. Safety concerns for smaller gillnet vessels are also a consideration for the extended area. A gillnet test vessel, along with visual surveys of the river, are used to determine escapement into Nitinat Lake.

3.3.2 Run Size Estimation

The 1992 preseason forecast was 850,000 chum, which provided a harvestable surplus in Area 21 of 600,000 chum.

The post season estimate of the total Nitinat area chum stock includes commercial and test catch of Nitinat stock, native food fish, spawning escapements and hatchery broodstock. The 1992 post season estimate of the total Nitinat chum stock is 1,143,000 chum (Table 12).

Stock composition in the commercial fishery is based on GSI results. Two hundred were collected from each commercial fishery at Vancouver for a total of 1,200 samples. Uncorrected results were used to estimate WCVI contribution to the catch (note that the Chum Technical Committee has not yet finalized a methodology for analysis and application of WCVI GSI results).

3.3.3 Catch

Gillnet fisheries were initiated September 28, on a 48 hour basis. This fishery was extended 48 hour to October 2. Escapement required to initiate a seine fishery was achieved at this time and a seine fishery was initiated on October 5 for 2 days.

Subsequently, the combined gear fishery started October 7 and continued until October 15. Fishing time was restricted to daylight hours for safety. A three day window was provided for further escapement. The combined gear fishery was reopened on October 27; low catch rates resulted in closure of he fishery October 28. No further fishing was conducted.

In total there were 21 days fishing for gillnets and 19 days fishing for seines. The combined gear fishery lasted 17 days. The catch for these fisheries was 1,076,000 chum.

During the single gear fisheries, the area was limited to inside a line two miles south of Pachena Point and bonilla Point. During the combined gear fisheries, a gillnet only area was instituted in part of Area 20-1 inside a line two miles south of Bonilla Point to Logan Creek. This gillnet only area is less than half the size of the extension used in 1991.

Catch in Nitinat Lake (Area 22) included test fishery payment, native fishery, hatchery brood stock, and rack sales, for a total of approximately 71,700 chum.

Catch in the commercial troll fishery off the WCVI (Areas 121-127) was 45,500 chum during the entire troll season. The majority of the catch occurred in July and August and were thought to be returning to streams in the north and central coast areas of British Columbia. Due to the limited chum catch, no GSI sampling was conducted in the troll fishery.

3.3.4 Escapement

The net escapement to the wild spawning grounds of the Nitinat River system was estimated to be 150,000.

3.3.5 Status of Treaty Requirements

Canada was to manage the Nitinat chum fishery to minimize the harvest of non-targeted stocks. To accomplish this, fisheries were conducted in a restricted area and GSI samples taken to determine stock composition. Additional GSI samples were not collected from Area20-1. The technical committee has not determined whether the harvest of non-target stocks has been minimized.

Early season catch information from the West Coast Vancouver Island troll fishery did not indicate that the season's total chum catches would reach the 1985 and 1986 levels. As a result, Canada did not conduct GSI sampling of this fishery. Total catch for this fishery was 45,500 chum.

Table 1. Preseason run forecasts by stock, 1992.

Stock	Origin	Expected run size		Percent run size	
Canadian Inside Chum					
Fraser River:	Wild	1,151,400		28.0%	
	Enhanced	328,000		8.0%	
	sub-total		1,479,400		36.0%
Mid Vancouver Island:	Wild	a.			
	Enhanced	716,000		17.4%	
	sub-total		716,000		17.4%
Non-Fraser Stocks:	Wild	1,716,300		41.8%	
	Enhanced	99,000		2.4%	
	sub-total		1,815,300		44.2%
Total Inside Stocks:	Wild	2,867,700		69.8%	
	Enhanced	1,143,000		27.8%	
	Total		4,010,700		97.6%
U.S. Chum					
Puget Sound:		100,000		2.4%	2.4%
	GRAND TOTAL		4,110,700	100.0%	100.0%

a. Included in Total Inside Stocks, wild total

Table 2. Pre-season and weekly estimates of Study Area chum stock size, 1992.

Week Ending	Total Stock (1)	U.S. (2)	Canadian Total	Fraser River	Mid Vancouver Island	Other Canadian
PRE-SEASON (3)	4,110,700	100,000	4,010,700	1,479,400	716,000	1,815,300
IN-SEASON (4)						
(Johnstone Strait fishery)						
26-Sep	3,835,500	100,000	3,735,500	1,377,889	666,871	1,690,741
03-Oct	3,700,000	100,000	3,600,000	1,327,908	642,681	1,629,411
10-Oct	4,000,000	100,000	3,900,000	1,438,567	696,238	1,765,196
28-Oct	4,100,000	100,000	4,000,000	1,475,453	714,090	1,810,457
04-Nov	4,500,000	100,000	4,400,000	1,622,998	785,499	1,991,503
(Estimates from Fraser River test fishing - terminal run size)						
21-Oct	-	-	-	560,000	-	-
04-Nov	-	-	-	670,000	-	-
18-Nov	-	-	-	660,000	-	-
02-Dec	-	-	-	575,000	-	-
16-Dec	-	-	-	530,000	-	-
POST-SEASON (5)	-	-	4,350,000	1,299,800	776,573	1,968,872

(1) Total Stock is the sum of Stock Components (i.e. enhanced and wild Study Area chum, and the U.S. origin chum).

(2) U.S. assumed constant at 100,000.

(3) Pre-season estimate from Table 1.

(4) In-season estimate for Johnstone Strait from commercial and test fishery data. In-season estimate for Fraser River stock from in-river test fishing.

(5) Post-season Canadian Total is Total Study Area Stock.

Table 3. Catch of chum salmon by statistical area for commercial and test fishing vessels and by statistical area for Indian food and commercial fisheries, 1992.

Week ending	Statistical Areas							Total
	11	12	13	14	15-19	20	28-29	
05-Sep	28	1	117	0	0	0	3	149
12-Sep	0	18	54	1	1	0	27	101
19-Sep	0	387	468	4	0	0	95	954
26-Sep	0	178,218	67,074	118	23	0	281	245,714
03-Oct	0	51	13,644	86	1,069	0	565	15,415
10-Oct	0	343,299	255,370	0	0	230	787	599,686
17-Oct	0	0	0	46,229	155	0	1,952	48,336
24-Oct	0	229,435	234,340	0	177	0	1,766	465,718
31-Oct	0	0	0	0	27,870	0	41,758	69,628
Nov.1 to Nov.28	0	23,663	0	382,902	94,483	0	3,672	504,720
Nov.29 to Dec.26	0	0	0	0	4,805	0	55	4,860
Commercial Total after week 9/1	28	775,072	571,067	429,340	128,583	230	50,961	1,955,281
Commercial Total prior week 9/1	14,253	15,072	3,126	9	128	1,966	25	34,579
Commercial Native Fishery		10,000			80,000		6,894	96,894
Indian Food Fishery		4,925	17,886	654	28,183	840	29,774	82,262
Grand total	14,281	805,069	592,079	430,003	236,894	3,036	87,654	0 2,169,016

Source: British Columbia Catch Statistics, 1992.

Table 4. Catch, effort, and catch per unit effort in Johnstone Strait test fisheries, 1992.

Week Ending	Stat Week	Weekly Catch	Effort (sets)	Catch per set
Upper Johnstone St.				
05-Sep	9/1	120	18	6.7
12-Sep	9/2	413	18	22.9
19-Sep	9/3	2,006	30	66.9
26-Sep	9/4	14,934	22	678.8
03-Oct	10/1	28,064	27	1039.4
10-Oct	10/2	8,766	27	324.7
17-Oct	10/3	20,825	24	867.7
24-Oct	10/4	890	12	74.2
31-Oct	10/5	14,694	23	638.9
07-Nov	11/1	885	18	49.2
	sub total	91,597	219	418.3
Mid Johnstone St.				
07-Sep	9/1	121	18	6.7
14-Sep	9/2	332	18	18.4
21-Sep	9/3	3,436	30	114.5
28-Sep	9/4	4,856	17	285.6
05-Oct	10/1	6,747	30	224.9
12-Oct	10/2	8,076	20	403.8
19-Oct	10/3	7,841	19	412.7
26-Oct	10/4	1,320	10	132.0
02-Nov	10/5	3,109	20	155.5
09-Nov	11/1	1,471	12	122.6
	sub total	37,309	194	192.3
	Grand Total	128,906	413	312.1

Table 5. Weekly total catch and catch per unit effort in the Fraser River chum test fisheries, 1992.

Week Ending	Cottonwood		Albion	
	Catch	CPUE	Catch	CPUE
07-Oct	380	27.76	487	35.68
14-Oct	698	51.19	416	33.42
21-Oct	835	60.55	1,012	66.93
28-Oct	739	60.24	686	59.84
04-Nov	706	53.27	1,350	88.09
11-Nov	523	42.91	562	41.19
18-Nov	412	33.62	460	36.48
25-Nov	153	15.81	327	30.08
02-Dec	-	-	92	9.04
09-Dec	-	-	17	1.53
16-Dec	-	-	-	-
Total	4,446	345.35	5,409	402.28

Table 6. Number (thousands) of inside chum spawning in wild areas, and number spawning in enhanced facilities or otherwise utilized by hatcheries, in 1992, compared to spawning capacity of the previous nine year averages.

Spawning Areas by Stock Group	Target Escapement	1992 Estimate	1992 as percent of Target	1983 - 91 Average	1991 as percent of 83-90 Ave
Wild Spawning Areas					
Upper Vancouver Island	67.0	0.2	0%	0.5	33%
Kingcome Inlet	196.0	0.8	0%	8.0	10%
Bond to Knight Inlet	346.0	22.2	6%	28.3	78%
Johnstone Strait	180.0	122.1	68%	62.7	195%
Loughborough/Bute Inlet	436.0	221.9	51%	114.2	194%
Mid Vancouver Island	230.8	171.9	74%	129.0	133%
Toba Inlet	172.0	0.5	0%	8.1	6%
Jervis Inlet	140.1	137.7	98%	104.2	132%
Lower Vancouver Island	130.0	97.1	75%	65.7	148%
Southern Vancouver Island	216.5	160.4	74%	173.8	92%
Howe Sound/Sunshine Coast	357.5	136.0	38%	136.3	100%
Burrard Inlet	35.0	37.0	106%	30.7	121%
Fraser River	700.0	682.3	97%	605.1	113%
Boundary Bay	5.0	0.3	6%	0.3	108%
WILD TOTAL	3,211.9 (a)	1,790.3	56%	1,467.0	122%
Enhanced Spawning Areas					
Mid Vancouver Island (b)	149.0	176.9	119%	143.9	123%
Fraser	30.0	63.7	212%	48.6	131%
ENHANCED TOTAL	179.0	240.6	134%	192.4	125%
GRAND TOTAL	3,390.9	2,030.9	60%	1,659.4	122%

(a) Current long term goal. Interm goal for 1987-1990 is 2,000,000.
(b) Includes small enhancement projects in the area

Table 7. Total Clockwork assessed stock, Clockwork catch, total escapement, wild and gross enhanced escapement and desired Clockwork and actual harvest rate for Inside chum, 1980 - 1992.

Year	Total Clockwork Assessed Stock	Total Clockwork Catch	Total Wild & Enhanced Escapement	Total Study Area Wild Escapement	Desired Clockwork Harvest Rate	Actual Harvest Rate
1980	2,479,000	N/A	1,325,300	1,209,200	NA	46.9%
1981	1,494,000	N/A	1,291,200	1,333,400	NA	13.8%
1982	3,057,000	N/A	1,480,100	1,048,700	NA	49.6%
1983	1,594,300	168,400	1,214,900	1,048,700	10.0%	10.6%
1984	1,924,700	96,900	1,595,600	1,443,100	10.0%	5.0%
1985	4,087,000	759,200	2,700,400	2,467,400	30.0%	18.6%
1986	4,052,800	1,313,400	2,098,700	1,865,000	30.0%	32.4%
1987	1,986,300	166,200	1,346,400	1,163,000	10.0%	8.4%
1988	3,262,100	1,224,600	1,616,600	1,415,500	20.0%	37.5%
1989	1,815,400	554,000	1,023,400	839,600	10.0%	30.5%
1990	3,739,100	1,349,900	1,655,200	1,486,000	30.0%	36.1%
1991	2,786,600	438,200	1,685,600	1,474,400	10.0%	15.7%
1992	4,317,300	1,479,100	2,031,000	1,790,400	30.0%	34.3%

Wild escapement goal for 1983-86 was 1.8 million.
Wild escapement goal for 1987-90 was 2.0 million.

Table 8. Number of chum salmon sampled for GSI data, 1992.

Area	Weeks Sampled	Commercial Samples	Test fish Samples
Johnstone Strait	10	1,786	2,938
Qualicum	2	740	0
Nitinat	4	1,200	0
Total		3,726	2,938

Table 9. Summary of Clockwork catch, escapement and harvest rate, 1992.

Fishery Type	Areas	Total Catch	Contribution to Clockwork		Clockwork Catch
Commercial and Test	11 to 13	1,346,200	100%		1,346,200
	14	429,340	2%	a	10,200
	29	51,000	0%		0
	other	217,913	0%		0
	sub total	**2,044,453**			**1,356,400**
Indian Food					
	12 & 13	22,800	100%		22,800
	29	17,200	0%		0
	other	27,500	0%		0
	sub total	**67,500**			**22,800**
U.S.					
	7	53,300	70%	b	37,300
	7A	65,900	95%	b	62,600
	sub total	**119,200**			**99,900**
		Total Clockwork catch			1,479,100
		Total Escapement			2,031,000
		Total Clockwork Assessed Stock Size			4,317,300 c
		Clockwork Harvest Rate			34.3%
		Total Study Area Stock Size			4,360,000 d

a. Based on GSI data.
b. Based on apportionment methods as per Chum Technical Report 88-4
c. Total Clockwork Assessed Stock Size (Commercial, IFF, Test and Sampled catch, plus Hatchery Rack Sales for Area 11-20 plus the Canadian component of the US catch in Areas 7 & 7a).
d. Total Study Area Stock Size (Commercial, IFF and Test catch Area 11-20 & 29 plus Canadian component of the US catch Areas 4b,5,6c,7, & 7a plus Can. Area 21(Nitinat) catch of Study Area origin minus Can. catch of US origin chum in the Study Area)

Table 10. Assessment of Clockwork management, 1983-1992.

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
1. INSEASON										
Inseason Assessment Total Stock	1,420,000	1,810,000	2,970,000	3,730,000	2,480,000	4,100,000	3,000,000	3,790,000	2,700,000	4,200,000
Date Assessed	-	-	Oct 18	Oct 20	Oct 19	Oct 17	Oct 18	Oct 19	Oct 21	Oct 16
Assessed Total Stock	1,420,000	1,810,000	2,970,000	3,806,000	2,305,600	4,217,000	2,635,000	3,470,000	2,682,000	4,447,000
Desired HR	10.0%	10.0%	20.0%	30.0%	10.0%	30.0%	20.0%	30.0%	10.0%	30.0%
Apparent HR	11.9%	5.4%	25.6%	35.2%	6.7%	29.9%	18.5%	35.6%	13.0%	35.2%
2. POST SEASON										
Total Clockwork Assessed Stock (1)	1,594,300	1,924,700	4,087,000	4,052,800	1,986,300	3,262,100	1,815,400	3,739,100	2,786,600	4,317,300
Clockwork Assessed Catch (2,3)										
COMM & TF A11-13	101,800	38,200	516,300	1,048,700	68,400	1,086,900	458,800	1,160,200	246,000	1,346,200
COMM & TF A29	7,900	2,100	52,500	99,000	10,000	(4)	(4)	(4)	(4)	(4)
COMM A 14 FR	36,400	15,800	33,200	59,900	18,000	4,500	8,100	8,700	42,200	10,200
IFF A11-13	20,300	39,500	18,600	28,900	48,600	24,700	23,000	23,700	28,200	22,800
US 7-7A	2,000	1,300	138,600	76,900	21,200	108,500	64,100	157,300	121,800	99,900
Total	168,400	96,900	759,200	1,313,400	166,200	1,224,600	554,000	1,349,900	438,200	1,479,100
Desired HR	10.0%	10.0%	30.0%	30.0%	10.0%	20.0%	10.0%	30.0%	10.0%	30.0%
Actual HR	10.6%	5.0%	18.6%	32.4%	8.4%	37.5%	30.5%	36.1%	15.7%	34.3%
3. ESCAPEMENT										
Goal	1,800,000	1,800,000	1,800,000	1,800,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000
Estimated wild	1,048,700	1,443,100	2,467,400	1,865,000	1,163,000	1,415,500	839,600	1,486,000	1,474,400	1,790,400
Difference(5)	(751,300)	(356,900)	667,400	65,000	(837,000)	(584,500)	(1,160,400)	(514,000)	(525,600)	(209,600)

(1) Total Clockwork Assessed Stock includes Total Clockwork Catch plus Escapement . Total Clockwork Catch includes all Study Area catches (Areas 11-19,28,29).

(2) Clockwork Assessed Catches for 1983 - 87 include commercial catches from Areas 11 - 13 and 28 (after Sept. 1), Area 14 Fraser origin catch and Area 29 (all catch), IFF catches in Areas 11 - 13 (prior to 1988 Fraser River IFF included), test fishery payment catches from Areas 11 -13 and 29 and U.S. catches of Canadian chum in Areas 7 and 7A. Note: Clockwork Assessed Catch is based primarily on Johnstone Strait fishery (Areas 11 - 13).

(3) Bute Inlet terminal catches were not included in Clockwork Assessed Catch.

(4) Clockwork catches from 1988 to 1992 exclude catch from the Area 29 fishery. Fraser River catches were accounted for in the Fraser River Clockwork.

Table 11. Weekly Nitinat Commercial Catch, 1992

Stat Week	Gillnet	Seine	Total
Pre 92	20	0	20
93	0	0	0
94	0	0	0
101	137497	0	137497
102	47719	320620	368339
103	48626	320271	368897
104	27910	122246	150156
105	10403	40213	50616
111	0	0	0
112	0	0	0
113	0	0	0
114	0	0	0
121	0	0	0
Total	272175	803350	1075525
	25.31%	74.69%	

Table 12. Nitinat area escapement, catch, and total stock.

Year	Area 22 Spawners	Area 21 Catch	Area 21 Catch WCVI Only	Area 22 Inlake Catch	Lake Mortality	Total Nitinat Stock
1980	54,500	279,211	279,211		0	333,711
1981	115,000	0	0		0	115,000
1982	22,500	0	0		0	22,500
1983	7,960	0	0		0	7,960
1984	76,000	186,669	148,962		0	224,962
1985	210,000	1,609,364	1,081,422		0	1,291,422
1986	142,820	387,470	297,355	8,000	0	448,175
1987	50,200	395,397	316,994	8,576	150,000	525,770
1988	188,728	1,821,677	1,419,091	56,000	0	1,663,819
1989	116,300	294,660	249,136	31,553	0	396,989
1990	229,000	24,549	8,167	71,122	0	308,289
1991	350,000	494,750	466,599	71,000	50,000	937,599
1992	150,000	1,075,525	916,764	71,700	5,000	1,143,464
AVERAGE	131,770	505,329	398,746	45,422	15,769	570,743

Notes: 1980 catch from Area 22
1993 preliminary and incomplete
WCVI stock from preliminary GSI stock composition estimates, NOT BIAS CORRECTED.
Lake mortality is estimated from abundance before and after turnover.
Inlake catch includes hatchery swim ins, hatchery broodstock from lake/river, testfishery, native fisheries.

LITERATURE CITED

LeClair, L., M. Miller, B. Baker, C. CdeBaca and W. Beattie. 1993. Genetic Stock Identification Estimates of 1992 Washington Commercial and Test Chum Fisheries in the Strait of Juan de Fuca and Northern Puget Sound. Washington Department of Fisheries, the Nooksack Indian Tribe and the Northwest Indian Fisheries Commission.

ATTACHMENT 1

CHAPTER 6 OF ANNEX IV OF THE PACIFIC SALMON TREATY

1991 CHAPTER

Chapter 6

SOUTHERN BRITISH COLUMBIA AND WASHINGTON STATE CHUM SALMON

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

(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 data base 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 1991 and 1992, 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.

92 HB

3. In each of 1991 and 1992,

(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 225,000 chum; and,

(ii) when the catch in Johnstone Strait is 225,000 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 3.7 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 225,000 to 640,000 chum; and,

(ii) when the catch in Johnstone Strait is from 225,000 to 640,000 chum, the United States catch of chum in Areas 7 and 7A shall not exceed 120,000;

(c) for Johnstone Strait run sizes of 3.7 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 640,000 chum or greater; and,

(ii) when the catch in Johnstone Strait is 640,000 chum or greater, the United States catch of chum in Areas 7 and 7A shall not exceed 140,000;

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(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 1991 and 1992, 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 the United States chum fishery in Areas 7 and 7A fails to achieve the 1991 and 1992 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 Joint Chum Technical Committee.

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

8. In 1991 and 1992, 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).

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ATTACHMENT 2

TREATY LETTER OF TRANSMITTAL

MAY 17, 1991

Appendix D

Recommendations of the Commission to the Parties for Amendments to Annex IV and other understandings to give effect to the agreed fishery regimes for 1991 and 1992

PACIFIC SALMON COMMISSION

The Honorable James A. Baker, III
Secretary of State
U.S. Department of State
2201 C Street N.W.
Washington, D.C. 20520

The Honourable Barbara MacDougall, P.C., M.P.
Secretary of State for External Affairs
Ottawa, Ontario
K1A 0G2

The Honorable Robert A. Mosbacher
Secretary of Commerce
U.S. Department of Commerce
14th Street N.W.
Washington, D.C. 20230

The Honourable John C. Crosbie, P.C., M.P.
Minister of Fisheries and Oceans
Ottawa, Ontario
K1A 0E6

Dear Sir:

I have the honour to report to you on understandings that have been reached by the Pacific Salmon Commission and to recommend changes in Annex IV of the Pacific Salmon Treaty.

In accordance with Article XIII, Paragraph 2 of the Treaty, the Commission recommends that Chapters 3, 5, and 6 of Annex IV be amended. The entire text of Annex IV as proposed by the Commission is attached. Pursuant to Article XIII, Paragraph 3 of the Treaty, amendments to the Annex may be implemented through an exchange of notes between the Governments. The Commission recommends that an exchange of notes occur implementing these proposals as soon as possible. The Commission expects that the relevant management agencies will manage fisheries under their responsibility consistent with these agreements.

The amended chapters are of two years duration, consistent with the intent of the Commission to provide the time necessary to develop longer-term approaches to addressing the needs of the Parties.

The Commission has also reached the following understandings as to the implementation of the Pacific Salmon Treaty:

1.) With respect to Annex IV, Chapter 3, the Commission agrees that:

a) in 1991 and 1992, the Southeast Alaska all gear catch shall consist of the base ceiling, with a ceiling adjustment for 1991 only, as specified in Annex IV, Chapter 3, plus a catch of new Alaska hatchery add-on chinook to be calculated in-season using the procedures approved by the Commission for the 1990 add-on and as described in Alaska's February 4, 1991 report to

the Commission; the preseason expectation of the 1991 hatchery add-on is 57,800 chinook salmon;

the U.S. agrees to continue tagging and catch sampling rates which provide precision of hatchery contribution estimates similar to that of recent years and provide a report to the Commission in November 1992 describing the results of the 1991 and 1992 hatchery add-on programs;

the Commission agrees to consider a reduced risk adjustment level for 1992 based upon evaluation and review by the Chinook Technical Committee of the following information to be provided by the United States by November 1991:

i) the computational procedures for estimating the coefficient of variation associated with the add-on;

ii) the effects of hatchery add-on fisheries, if any, on the rebuilding of wild stocks including information on the stock composition of chinook catches in the June fisheries and on the duration of subsequent chinook non-retention periods;

b) with respect to terminal exclusions, the Commission agrees that the CWG with the assistance of the CTC and the findings reported in TCCHINOOK (91)-2, shall recommend standards and criteria to the Commission by January 1993, to govern consideration for future proposals for terminal exclusions. With regard to the exclusion of selected terminal area chinook catches from the Northern and Central B.C. catch ceiling, the Commission agrees to the provisions detailed in Attachment A;

c) with respect to the west coast Vancouver Island troll fishery, and in light of the below average forecast of chinook abundance in 1991, Canada will manage this fishery in a manner consistent with the spirit and intent of the Treaty and the rebuilding program. Prior to the start of each season, Canada will provide the U.S. with details regarding its plans and intentions for this fishery;

d) with respect to the adjustments in catch ceilings for the 1991 Southeast Alaska and Northern and Central B.C. fisheries, the Parties agree that the overage/underage policy set forth in Chapter 3, paragraph 1(e)(vii) is to be applied to the base ceiling levels of 263,000 chinook;

e) with respect to the Strait of Georgia fisheries, Canada agrees to provide a report to the Commission on the evaluation of the effectiveness of the management measures taken in 1988, 1989 and 1990 to reduce the harvest rates on depressed chinook stocks following completion of the PSARC and domestic review processes; and,

f) the Parties remain committed to evaluating management regimes for chinook that might better address the Parties' long term objectives and are consistent with the fundamental principles established in Article III of the Pacific Salmon Treaty.

To this end, in January 1991, the Parties held a workshop to explore alternative chinook management approaches. There was an overall view among the participants that the Workshop was a good forum for exploring new management ideas and for understanding problems that jurisdictions face implementing management approaches. The participants identified information needs and policy issues that must be resolved before completing development of alternative management approaches. Accordingly, the Commission agreed that the Chinook Work Group, in cooperation with the Chinook Technical Committee, shall:

(i) develop operational definitions for policy issues such as rebuilding, rebuilt, pass through, and stocks of concern which are necessary components of a longer term chinook management approach;

(ii) advise the Commission on processes to ensure active participation by the Panels in the development of options for a long term chinook management approach;

(iii) identify technical tasks that need to be addressed before the management approaches can be fully evaluated, and a timetable for completion of these tasks; and,

(iv) consistent with paragraph 1(b) of Annex IV, Chapter 3, present the Commission with management options to respond to short-term variations in abundance in a manner consistent with the conservation and equity principles of the Treaty.

The Chinook Work Group will provide a progress report to the Commission in November 1991 containing a proposed workplan and a prioritized schedule for completion of these assignments with a view toward completion of the work for consideration by the Commission at the 1993 annual meeting.

2.) With respect to Annex IV, Chapter 4, the Commission agrees to the provisions of Attachment 3: "Establishment of Fraser Sockeye and Pink Salmon Escapement Goals for 1991 and 1992 for the Purposes of Computing the Total Allowable Catch; and Attachment 4: "Fraser Panel Agreement on Sockeye Escapement Add-On Computation";

3.) With respect to Annex IV, Chapter 5, the Commission agrees:

a) For 1991 and 1992, Canada will not conduct a directed coho net fishery in Area 20 and the U.S. may conduct a directed coho fishery in Areas 7 and 7A subject to U.S. domestic management processes;

b) Although the Parties hold differing views on the appropriateness of the directed coho fishery in Areas 7 and 7A, they agree that the enhancement based approach proposed by the U.S. appears to be a positive step forward and agree to explore the merits of this approach to address the Areas 7 and 7A directed coho issue. In doing so, both Parties have agreed to clarify the technical and procedural questions which will form the basis for making an informed decision on the proposed approach.

The parties have also identified the need to jointly develop a time frame and methodology for the purpose of assessing how well the average annual contributions of new specified U.S. production to Canadian fisheries compare to the average interceptions that may occur in directed Areas 7 and 7A coho fisheries.

c) that, with respect to the 1990 directed coho fishery in Areas 7 and 7A:

i) to jointly estimate the level of interceptions that occurred in the 1990 Areas 7 and 7A directed coho fishery (recognizing that the estimates generated for this purpose may not necessarily reflect improved stock composition estimates that will eventually be available to the Parties when currently on-going joint technical studies are completed);

ii) to establish a base period and level of production from which the new increased production could be measured and clarify which Canadian fisheries

would receive benefits from the new specified U.S. production. (It is recognized the Parties have differing opinions on whether it is appropriate to apply actions taken prior to 1991);

iii) that the U.S. will not harvest the cumulative Areas 7 and 7A chum salmon shortfall through 1990 (as provided in Annex IV, Chapter 6, Paragraph 5); and

iv) that if the above steps are determined not to adequately address compensating measures for the 1990 Areas 7 and 7A directed coho fishery, the Parties will consider and agree to appropriate additional compensating measures by no later than the February 1992 annual meeting of the Pacific Salmon Commission;

d) to complete discussions on compensating measures for the 1990 Area 7/7A fishery and assess the merits of the long term enhancement based approach. Results of these discussions will be provided to the Commission in February 1992;

e) to initiate discussions on coho within the Southern Panel area with a view toward clarifying and improving understanding of the conservation concerns and the management approaches of the Parties; and,

f) to adjust the date of the workshop on southern coho issues to January 1992 and to report the findings to the Commission during the January 1992 meetings of the Commission.

4.) With respect to Annex IV, Chapter 6, the Commission agrees to initiate discussions on chum within the Southern Panel area with a view toward clarifying and improving understanding of the conservation concerns and the management approaches of the Parties.

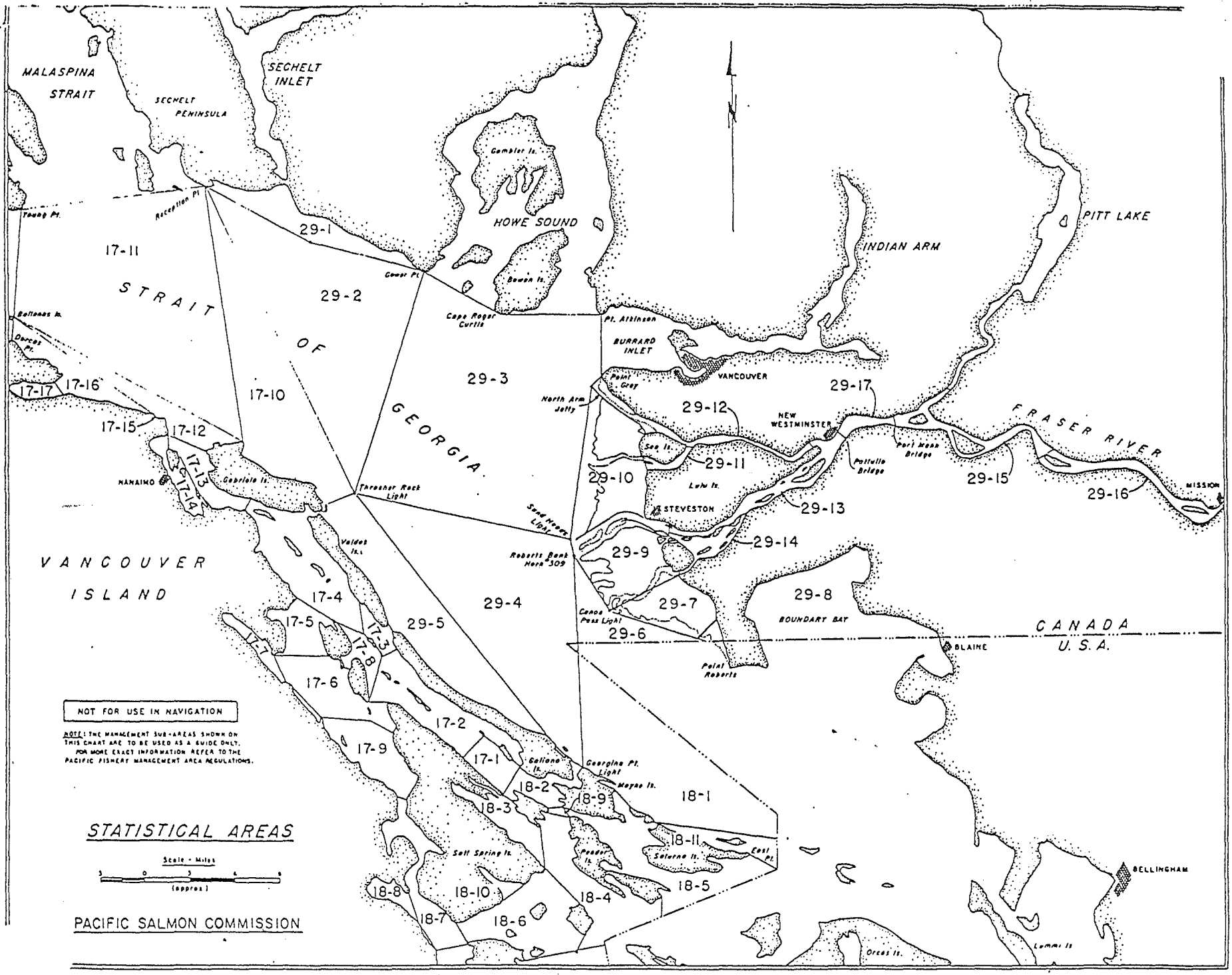
5.) With respect to implementation of Article III, Paragraph 1 of the Pacific Salmon Treaty, the Commission agrees that:

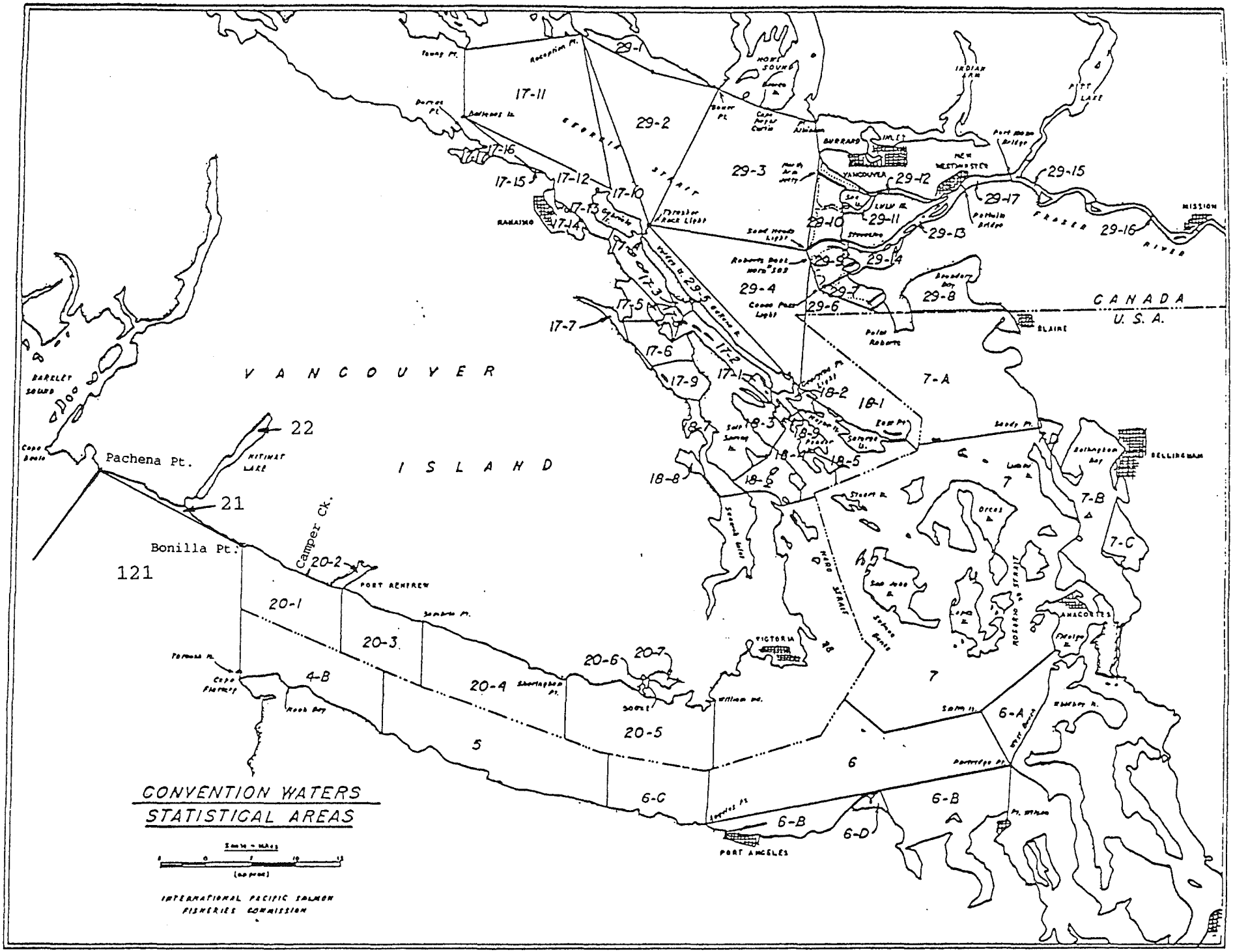
The Parties are committed to developing a mutually acceptable approach to identify and resolve equity issues in a timely manner. In the "Understanding Between the Canadian and United States Sections of the Pacific Salmon Commission Concerning Equity Related Issues", Item 7 identifies that the Parties will "hold a bilateral workshop in September 1991 for the purpose of exchanging alternative technical approaches for determining each Party's benefits in relation to salmon production and interceptions." To coordinate this workshop, the Commission has established a Steering Group which will meet in June 1991 to develop a schedule, agenda, attendance requirements, and format for the workshop. Workshop discussions will be structured around selected topics and papers identified in advance by the Parties. At the conclusion of the workshop, the Steering Group, supported by Commission staff, will compile the papers, work products, discussion comments, and a summary of the workshop and provide these to the Commission by October 1991.

The Commission respectfully requests your approval of these recommendations.

ATTACHMENT 3

U.S. AND CANADIAN STATISTICAL AREA MAPS


MALASPINA STRAIT
SECHELT PENINSULA
SECHELT INLET
HOWE SOUND
Gambier Is.
Bowen Is.
INDIAN ARM
PITT LAKE
Recreation Pt.
Young Pt.
29-1
17-11
STRAIT OF GEORGIA
Gower Pt.
29-2
Cape Roger Curtis
Pt. Atkinson
BURRARD INLET
Point Grey
VANCOUVER
29-3
17-10
North Arm Jetty
29-17
29-12
NEW WESTMINSTER
FRASER RIVER
Port Mann Bridge
Pattullo Bridge
Sea Is.
29-11
29-15
29-16
MISSION
Lulu Is.
29-10
STEVESTON
29-13
Sand Heads Light
29-14
Roberts Bank Hora 309
29-9
Canoe Pass Light
29-7
29-8
BOUNDARY BAY
CANADA
U.S.A.
BLAINE
Point Roberts
29-6
29-4
29-5
Valdez Is.
VANCOUVER ISLAND
17-4
17-5
17-3
17-8
17-7
17-6
17-2
17-9
17-1
Galiano Is.
Georgina Pt. Light
Mayne Is.
18-2
18-9
18-1
18-3
18-11
Saturna Is.
Coal Pt.
Prevost Is.
Salt Spring Is.
18-5
18-8
18-10
18-4
18-7
18-6
Orcas Is.
Lummi Is.
BELLINGHAM
17-17
17-16
17-15
17-12
17-13
17-14
NANAIMO
Gabriola Is.
Thrasher Rock Light
Ballenas Is.
Dorcas Pt.
NOT FOR USE IN NAVIGATION
NOTE: THE MANAGEMENT SUB-AREAS SHOWN ON THIS CHART ARE TO BE USED AS A GUIDE ONLY. FOR MORE EXACT INFORMATION REFER TO THE PACIFIC FISHERY MANAGEMENT AREA REGULATIONS.
STATISTICAL AREAS
Scale - Miles
(approx.)
PACIFIC SALMON COMMISSION


CONVENTION WATERS
STATISTICAL AREAS
INTERNATIONAL PACIFIC SALMON
FISHERIES COMMISSION
VANCOUVER
ISLAND
CANADA
U. S. A.
Pachena Pt.
Bonilla Pt.
Camper ck.
121
22
21
PORT ANGELES
BLAINE
BELLINGHAM
17-11
17-16
17-15
17-12
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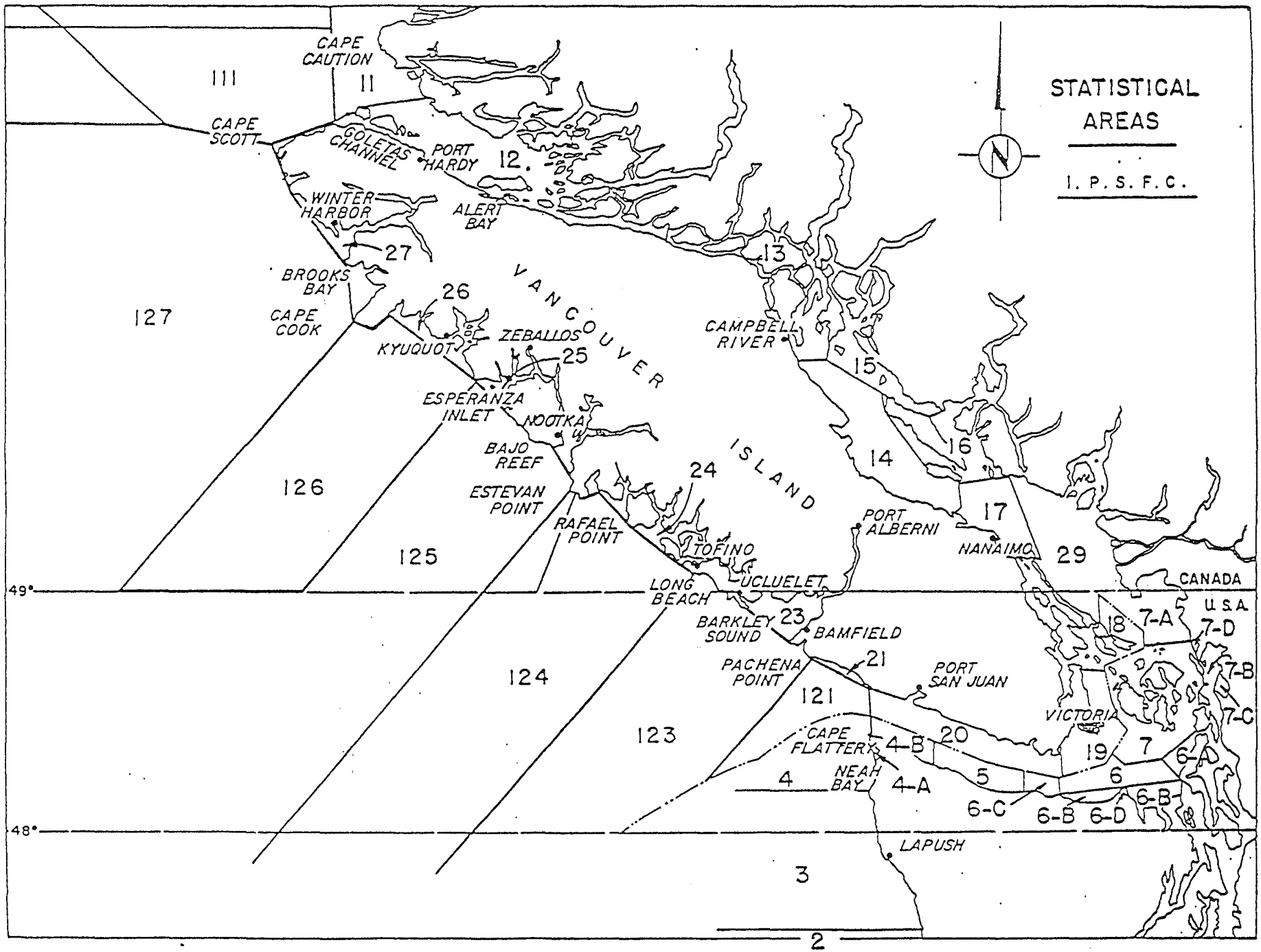
STATISTICAL AREAS
I. P. S. F. C.
CAPE CAUTION
CAPE SCOTT
COLETAS CHANNEL
PORT HARDY
WINTER HARBOR
ALERT BAY
BROOKS BAY
CAPE COOK
KYUQUOT
ZEBALLOS
ESPERANZA INLET
NOOTKA
BAJO REEF
ESTEVAN POINT
RAFAEL POINT
VANCOUVER ISLAND
CAMPBELL RIVER
PORT ALBERNI
NANAIMO
TOFINO
UCLUELET
LONG BEACH
BARKLEY SOUND
BAMFIELD
PACHENA POINT
PORT SAN JUAN
VICTORIA
CAPE FLATTERY
NEAH BAY
LAPUSH
CANADA
U.S.A.
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48°
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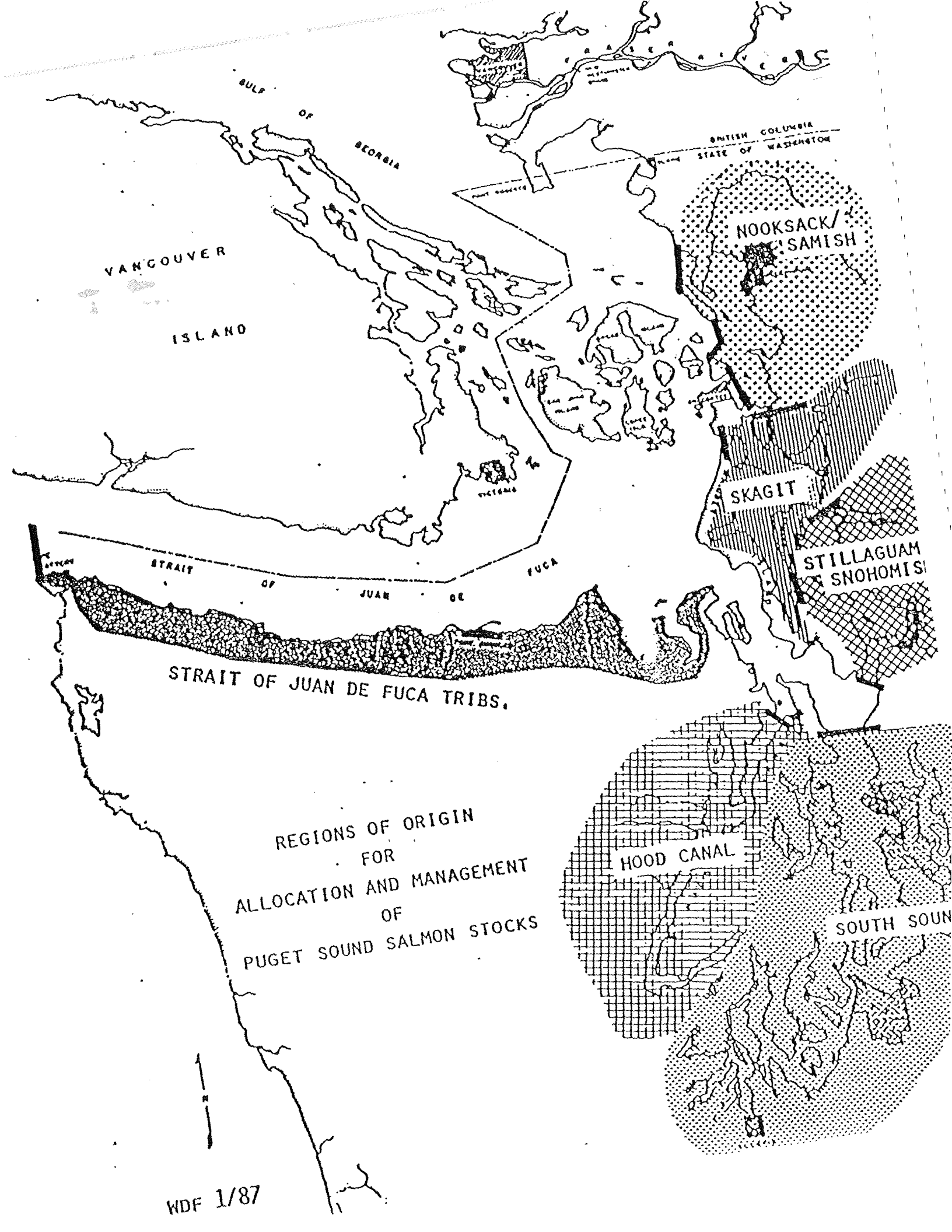

STRAIT OF JUAN DE FUCA TRIBS.

REGIONS OF ORIGIN
FOR
ALLOCATION AND MANAGEMENT
OF
PUGET SOUND SALMON STOCKS

WDF 1/87