PACIFIC SALMON COMMISSION
JOINT CHUM TECHNICAL COMMITTEE
FINAL 1993 POST SEASON SUMMARY REPORT
TCCHUM (96)-1

December, 1996

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INTRODUCTION

This Joint Chum Salmon Technical Committee report presents the appropriate information for 1993 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). 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 1993.

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 two separate occasions during the year to address various assignments. The following report was published: Final 1991 Post-Season Summary Report, TCCHUM (93)-1.

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 1993, the gross escapement of Inside chum totalled 2,049,000. Escapement to natural spawning areas totalled 1,799,000 which was 10% below the Clockwork goal of 2,000,000. The Fraser River escapement was 694,000, or 99% 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 1993, 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 1993. The inseason estimate of the Johnstone Strait run size was 4,000,000 providing for a harvest rate of 30% or 1,200,000 chum. Post-season, the Clockwork run size was estimated at 4,144,000 chum. The actual Clockwork harvest was 1,384,000, resulting in a harvest rate of 33%.

   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 increased to 142,400 fish due to a 2,400 fish under harvest in these areas in 1992. The total catch for the Area 7 and 7A fishery in 1993 was 140,000 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 57% and 43%, respectively.

4. *In 1993, 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 40,000 chum was 29% lower than the 1985-1992 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 1993 ceiling by 2,500 fish. This deficit will be added to a future year's allowable catch (Table 1, Sec. 1.3).

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 1993, 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 1993 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 1993, 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 8,400 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 4,144,000 which was 4.0% larger than the expected run size of 4,000,000. The overall harvest rate for clockwork assessment purposes was 33%. The total return of Fraser River chum was 1,295,000, or 6% greater than the preseason forecast.

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 800,000 chum. The post-season estimate of run size was 1,118,000 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 979,000. Of these, 398,000 were expected from natural spawning areas and 581,000 were expected from enhancement facilities. The runs that were expected to produce the largest returns included the Stillaguamish/Snohomish system (146,000), South Puget Sound (269,000) and Hood Canal (448,000).

The post-season run size, as estimated from run reconstruction, was 1,480,000, or 51% above the preseason forecast. The natural component totaled 871,000 fish while the enhanced

component reached 609,000 fish. The returns to the Stillaguamish/Snohomish region, the South Puget Sound region and the Hood Canal region, all exceeded the preseason expectations by 55%, 95% and 35%, respectively.

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 1993 preseason run estimate of the Washington coastal chum stock was 75,000. The actual return, as estimated by run reconstruction, was 94,000 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 threshold 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 142,000 chum using traditional fishing patterns, given the applicable Johnstone Strait harvest and the U.S. harvest underage in 1992. 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 24,500.

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 2,200,000 was made on September 30. 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 80,700. A run size of this magnitude allows for a 10% or less harvest rate. Further test fishing resulted in an increase in the projected run size to 3,200,000. A run size of this magnitude allows for a 20% harvest rate. A second fishery occurred on October 23-25, which harvested 728,200 chums. 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 November 2-4 to harvest at the 30% level. Catch for this fishery was 361,600 chum. The final post-season run size estimate was 4,144,000 chum.

Fishing in the Strait of Georgia occurred to mid Vancouver Island (Area 14), Jervis Inlet (Area 16), Nanaimo (Area 17) and Cowichan (Area 18) in 1993. Commercial fisheries were directed primarily at enhanced chum in Area 14. The total catch for Area 14 was 381,500. Terminal fisheries in Areas 16, 17, and 18 harvested 214,800 chum.

Under the Fraser River Chum Harvest Management Plan, one commercial fishery was permitted on November 3 based on terminal surpluses identified in the early portion of the run. The total catch for this commercial fishery was 74,600 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 8,400 chum during the entire troll season (from July through September).

Gillnet fisheries were conducted for 4 days, beginning September 27, then for four days starting October 4, and then 2 days starting October 11. An 11 day closure was instituted to provide for further escapement. Seine fisheries were conducted 3 days starting October 23. The combined gear fishery started October 27, and continued until November 10. No further fishing was conducted.

In total there were 25 days fishing for gillnets and 18 days fishing for seines. The combined gear fishery lasted 15 days. The total Area 21 catch was 763,000 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 catches in Nitinat Lake (Area 22) included the Native food fishery, test fishery payment, hatchery brood stock, and rack sales, for a total of approximately 216,000 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 14th to October 23, with a total of 40,000 chum caught by four Treaty Indian Tribes using gillnet gear only. The fishery opening was delayed until October 14 due to domestic coho conservation concerns. The fishery was initially opened for 5 days, followed by a 24 hour closure for catch evaluation. After catches were assessed, the fishery was reopened for 3 days, starting on October 20. Test fisheries conducted the week before scheduled commercial fisheries and two weeks following the closure of the commercial fishery boosted the total catch to 42,000 chum.

San Juan Islands

The total catch from commercial, test and ceremonial fisheries in Areas 7 and 7A was 80,000 and 60,000 chum respectively, totalling 140,000. Of these, 26 were taken in U.S. fisheries directed at Fraser River sockeye salmon. Commercial fishing was delayed until the first week of November at the request of Canadian fishery managers. Fishery openings were alternated between non-treaty and treaty Indian fleets, beginning with the non-treaty fleet. Two fishing periods for each fleet were provided, and totaled 50 open hours for the non-treaty fishery and 58 open hours for the treaty Indian fishery.

Table 1. Summary of U.S. Treaty chum allocations and catches for Areas 7 and 7A, 1986-1993.

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
1993	140,000	142,429	139,861	2,568

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 1993 was 68,000.

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 1,799,000 chum. Total escapement, including hatchery returns, was 2,049,000. This escapement was 120% of the 1983 to 1992 average escapement.

The terminal run size to the Fraser River system was 895,000. This left a total escapement from wild and enhanced components of approximately 789,000 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 wild escapement to the Fraser River was 694,000 chum, or approximately 99% of the net escapement goal.

West Coast Chum

Escapement to the spawning grounds of the Nitinat River system was estimated to be 259,000 chum.

United States

Puget Sound Chum

The total Puget Sound chum salmon escapement was 488,000, 42% above the escapement goal. The previous cycle escapement, in 1989, was 240,000 fish.

Washington Coastal Chum

The chum escapements in Willapa Bay, Grays Harbor and the Quinault River totaled 63,000, 7% above the goal.

1.5 REVIEW OF GSI PROGRAMS

In 1993, all GSI sampling requirements were met. The commercial fishing areas sampled in 1993 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 Nitinat commercial fisheries, samples were collected in Vancouver over a six week period, for a total of 1,131 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 2,174 samples were analyzed.

Some replicate and some new GSI baseline samples were collected from Washington stocks in 1993. A new baseline was implemented to analyze stock composition in U.S. fisheries. In addition, a GSI subcommittee continued its task of evaluating approaches to GSI. In particular, the GSI subcommittee work regarding bias correction in stock composition estimates is ongoing at this time.

1.6 1993 CHUM TECHNICAL COMMITTEE PUBLICATIONS

TCCHUM (93)-1 Final 1991 Post-Season Summary Report.

CHAPTER 2

REVIEW OF 1993 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 1993 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 (57) were harvested in Area 6 in 1993, 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 Eighth Annual Meeting of the Pacific Salmon Commission concluded in June, 1993 by adopting a one year chum salmon fishery regime for 1993. That regime was identical to Chapter 6 of Annex IV of the PST for 1990, 1991 and 1992. The 1993 U.S. management strategy for the Strait of Juan de Fuca, the San Juan Islands and Point Roberts fisheries therefore remained comparable to fishing plans of previous years.

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 1993. 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 1993 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 10th, but chum fishing was delayed until October 14 due to domestic coho bycatch concerns. In addition, the duration of the commercial fishery was restricted due to preseason forecasts indicating a relatively poor fall chum return to Puget Sound. Test fisheries were conducted the last week of the coho management period to collect GSI samples. The commercial fishery was initially opened for 5 days, from noon October 14 to noon October 19. The fishery was then closed for 24 hours for catch evaluation, and reopened on noon October 20 for three additional days. All commercial fishing was terminated on noon October 23. Test fishing for GSI samples continued for two additional weeks following the close of the commercial fishery.

Incidental summer chum catches in Fraser sockeye fisheries prior to the chum management period totalled 11 fish. Catches in the Strait fall chum fishery were considerably greater than expected, given the expected abundance of Puget Sound and Canadian chum runs. The total commercial harvest during the chum management period was 40,486. There were an additional 1,646 chum harvested in test fisheries for GSI sample collection, and a single chum recorded as bycatch in treaty Indian troll fisheries after November 7. The total chum catch in areas 4B,5,6C from all sources therefore totaled 42,144 fish.

Prior to the fall chum management period in Areas 7 and 7A (10/10 & 10/17 respectively), 31 chum were harvested incidental to fisheries targeting on Fraser River origin sockeye salmon.

Preseason, very little fishing opportunity was anticipated for areas 7 and 7A due to a low forecast for the Johnstone Strait chum run of less than 3 million fish. Under the terms of the chum annex, the U.S. was limited to a harvest of no more than 20,000 chum in areas 7 and 7A when the Johnstone Strait run size failed to reach 3 million fish (and the Johnstone Strait catch fell below 225,000 chum). Given this limitation, the U.S. scheduled a limited reef net only fishery beginning October 10. The total harvest from the reef net fishery prior to November 1 was 3,608 chum. After November 1, an additional 218 chum were caught in this fishery. Of the total reef net harvest, 93% was taken in Area 7.

Throughout the chum management period, U.S. and Canadian technical staffs remained

in close contact regarding the status of the chum run size entering Johnstone Strait. Indications from the initial evaluation fishery and subsequent test fisheries in late September and early October were that the run was slightly lower than expected, with the estimated total run size remaining less than 3 million chum. However, on October 20 DFO staff notified U.S. managers that test fisheries had picked up a large abundance of chum salmon and the Johnstone Strait run size was updated to 3.2 million chum. This permitted additional fishing in Johnstone Strait under the "clockwork" management plan, allowing the catch to exceed 225,000, and subsequently raising the U.S. allocation in areas 7 and 7A to 120,000 chum. However, U.S. managers were asked by the DFO staff to consider delaying any areas 7 and 7A fishery until the first week of November due to concerns over the lack of chum arriving at the Fraser River.

On October 29, U.S. managers were notified that the Johnstone Strait run size had been upgraded to 4.0 million chum, and that the Johnstone Strait harvest had exceeded 640,000 fish. As provided in the chum annex, the U.S. areas 7 and 7A allocation was increased to 140,000, plus an additional 2,400 chum from a shortfall in 1992. The total target harvest was therefore 142,400 chum.

U.S. managers agreed to delay any U.S. openings until November 1, and began U.S. fishing with a non-treaty purse seine fishery opening on November 1, from 6:00 AM to 5:00 PM, followed by a non-treaty gillnet fishery from 4:00 PM November 1 to 7:00 AM November 2. The catch for this opening was 44,652 chum. The first treaty Indian fishery opened on November 3 at 6:00 AM, and closed at 9:00 AM on November 4. The reported catch for this fishery was 21,586 chum. A second non-treaty fishery followed immediately on November 4, opening at 4:00 PM and closing at 5:00 PM on November 5. The catch from this fishery totaled 45,102 chum. A final treaty Indian fishery was scheduled to open at noon, November 7 and close at 6:00 PM, November 8. A total of 24,100 chum were taken in this fishery, bringing the total commercial chum catch in areas 7 and 7A, including the reef net catch, to 139,297 chum. Test fisheries, conducted for collection of GSI samples, were scheduled prior to the commercial fisheries, and harvested an additional 564 chum. Thus the total catch from all sources in areas 7 and 7A was 139,861 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 Fish and Wildlife (WDF&W) 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 1993 Puget Sound origin chum salmon of all timing components was 979,000, of which 398,000 were expected to be of natural origin and 581,000 of hatchery origin. This projection was the lowest for an odd year run since 1983 and was 29% below the average odd year run size since the inception of the Treaty.

2.3.2 Fisheries Descriptions, Catches and Spawning Escapements

The estimated return of 1,480,000 chum exceeded the preseason forecast by 51%. The combined natural component produced a much greater return than expected with a total of 871,000 fish. The hatchery runs were also somewhat higher than expected, totaling 609,000 fish.

The hatchery run component returned at approximately the same level in 1993, as in 1992 and 1991. The natural run component was below the near record return in 1992, but still represented one of the higher returns, particularly for an odd year run. The age 3 component of the run approximated the long term average for odd year runs at 33%, but the age 5 component of the run, at 20%, exceeded the odd year long term average by 110%. The winter run timing component historically makes a minor contribution to the total natural run, and has been on a declining trend since 1987. However, this year's return represented a reversal in that trend, producing a run that was near the average return for an odd year run. The total Puget Sound escapement of 488,000 chum salmon exceeded the expected escapement by 55%.

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 1993 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 Fish and Wildlife 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 1993, 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 261 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 600 fell short of the preseason forecast by 48%, while the fall return of 5,800 was 6% above the forecast. Spawning escapements for both the summer and fall runs totaled 600 and 5,600, respectively. The summer run escapement was below the goal by 71% but the fall run exceeded the goal by 58%. 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 67,600 exceeded preseason expectations by 43%. The hatchery component was somewhat below the preseason forecast, but the natural component returned significantly above preseason expectations. The spawning escapement of 32,600 was 26% above the goal.

Skagit Region

The fall chum return to the Skagit River of 47,400 fish was 24% below the preseason forecast and 50% below the inseason run size update. Estimated escapement totaling 16,700 fish was short of the goal by 58%. 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 having a greater influence on the composition of the total return. In 1993, 54% of the chum return of 226,300 was composed of hatchery fish. The total run was 55% above the preseason forecast of 145,800, with both hatchery and natural components exceeding the preseason expectations. Total escapement of 35,500 was 16% above the escapement expectation.

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 8 years. The excellent survival rate exhibited by this stock group since 1986 has been aided, in part, by a natural stock supplementation program. Although the supplementation program was discontinued with the 1991 brood, the 1993 return still benefitted from this program. The total return of 35,800 was 23% above the forecast, and the total escapement of 33,200 was 257% above the goal.

The fall return of 443,000 was the third highest recorded since 1968. The final post-season estimate of the run size exceeded the preseason forecast by 117%. Estimated escapement of 169,400 exceeded the goal by 116%. Harvest rates on the fall return in extreme terminal fisheries were again diminished by poor market conditions.

The winter return of 46,400 represented a 27% increase from preseason expectations and halted an apparent five year slide in survival rates. The spawning escapement of 24,800 chum was 21% above the goal.

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 1,100 represented a 22% decline from preseason expectations. Adult spawners totaling 1,100 fish fell short of the expected escapement by 20%.

Early fall chum are predominantly of hatchery origin. The return of the combined (early + late) fall run segment was 605,500, which was 36% above the preseason forecast. The inseason update of run strength also underestimated the actual run by 34%. These factors contributed to an estimated escapement of 168,900, which exceeded the escapement expectation by 74%. The total harvest was affected to a certain extent by the lack of any non-indian commercial fishery openings in this region during the first half of October, in order to further diminish incidental impacts to depressed natural coho stocks.

2.4 WASHINGTON COASTAL FISHERIES

The 1993 coastal chum runs from Grays Harbor and the Quinault River systems exceeded the preseason forecast by 92% and 260% respectively, while the Willapa Bay chum run fell short of preseason expectations by 15%. 1993 represents a 61% decline from the 1992 run and a 41% decline from the 10-year average run. Table 6 shows the 1993 Washington coastal stock run sizes, catches, and escapements.

Willapa Bay

The Willapa Bay run size of 44,400 chum was 53% below the 10-year average of 95,300. The 1993 chum catch was 13,400 compared to a 10-year average catch of 49,300. Chum salmon are managed entirely for natural escapement in Willapa Bay, although some hatchery escapements occur. Natural chum escapement fell short of the goal by 12%.

Grays Harbor

In 1993, 34,600 chum returned to Grays Harbor compared the to previous 10-year average of 55,200. The 1993 catch was 13,600 fish, or 56% below the previous 10-year average catch of 30,700. Grays Harbor chum are entirely of natural origin and escapement met the goal 21,000.

Quinault

The majority of chum salmon returning to the Quinault River are of hatchery origin, although significant straying to natural spawning areas occurs. The return to the Quinault River system in 1993 was 62% greater than the 10-year average run size. The run size totaled 15,100, of which 5,300 were caught in the treaty Indian net fishery. The total chum escapement was 9,800, with 800 chum returning to the Quinault National Fish Hatchery and 9,000 spawning in the wild.

2.5 STOCK COMPOSITION AND RUN RECONSTRUCTION

During 1993, Puget Sound chum salmon GSI 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 1993 commercial fishery sampling design followed closely that employed in previous years. The 1993 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 both the week preceding commercial fishery openings and the final two weeks after commercial fisheries closed. Test fisheries were also scheduled for the Point Roberts area during the two weeks prior to commercial fisheries. The sampling goal of the test fisheries was identical to that of the commercial fisheries. 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 1993 commercial and test fishery studies are described in LeClair, et al (1995). The sampling goal was achieved in one of the two weeks in which commercial fisheries were conducted in Area 5 (management week 43, 10/17-10/23). During the commercial fishery in management week 42 (10/10-10/16), only 177 samples were collected, but the samples

were still used for stock composition analysis. In Area 7, the sampling goal was achieved during commercial fisheries in week 45 (10/31-11/6), but no samples were collected for the commercial fishery in week 45. Sampling efforts in Area 7A fell short of the goal in both commercial fishing weeks, with 320 samples taken during week 45 and 280 samples taken during week 46. These two collections were subsequently combined to produce a single sample of 600 fish. Test catch sample goals were only achieved in week 44 in Area 7A. The week 43 (10/17-10/23) sample of 94 fish was not used for stock composition analysis. No test fisheries were conducted in Area 7. In Area 5, test catch sample goals were successfully achieved in weeks 41 (10/3-10/9), 44 (10/24-10/30) and 45.

All 1993 commercial and test fishery samples were assayed for 29 loci. Twenty eight of these loci were used for stock composition analysis. This was the first year that the number of loci was expanded from 21 to 28 loci for stock composition analysis in U.S. fisheries. A new baseline was also constructed for the analysis of this year's fisheries, incorporating the most recent collections of U.S. and Canadian reference stocks. Some stocks were removed from the baseline, in most cases to reduce the bias associated with the inclusion of stocks that contribute at very low levels to the fisheries. The new baseline for Area 5 incorporated stocks from Johnstone Strait, Fraser River, the southwest coast of Vancouver Island, Puget Sound, the Washington Coast, and the U.S. Strait of Juan de Fuca. The baseline used for analysis of Area 7 and 7A fisheries included Johnstone Strait, Fraser River and Puget Sound stocks.

Puget Sound run reconstruction incorporated stock composition proportions derived from 1993 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. 1993 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 9/08 (a)	-	-	-	2	2	-	4	4
	9/08 to 10/16 (b)	-	-	-	-	5	114	119	119
	10/17 to 10/23	-	-	-	-	-	32	32	32
	10/24 to 10/30	-	-	-	-	-	-	-	-
	10/31 to 11/06	6,133	3,214	9,347	25,941	15,344	104	41,389	50,736
	11/07 to 11/13	5,215	3,515	8,730	-	-	-	-	8,730
	Post 11/14	-	-	-	-	-	-	-	-
Area 7A Total		11,348	6,729	18,077	25,943	15,351	250	41,544	59,621
Area 7	Prior to 9/08 (a)	6	1	7	2	13	-	15	22
	9/08 to 10/09 (b)	-	-	-	-	-	-	-	-
	10/10 to 10/16	-	-	-	-	-	623	623	623
	10/17 to 10/23	-	-	-	-	-	795	795	795
	10/24 to 10/30	-	-	-	-	-	2,044	2,044	2,044
	10/31 to 11/06	4,354	7,885	12,239	27,534	20,273	114	47,921	60,160
	11/07 to 11/13	4,908	10,462	15,370	230	432	-	662	16,032
	Post 11/14	-	-	-	-	-	-	-	-
Area 7 Total		9,268	18,348	27,616	27,766	20,718	3,576	52,060	79,676
Areas 7 and 7A Total		20,616	25,077	45,693	53,709	36,069	3,826	93,604	139,297
Strait of Juan de Fuca									
Areas 4B, 5 and 6C	Prior to 9/08 (a)	11	-	-	-	-	-	-	11
	9/08 to 10/09 (b)	-	-	-	-	-	-	-	-
	10/10 to 10/16	3,401	-	-	-	-	-	-	3401
	10/17 to 10/23	37,085	-	-	-	-	-	-	37085
	10/24 to 10/30	-	-	-	-	-	-	-	-
	10/31 to 11/06	-	-	-	-	-	-	-	-
	Post 11/07	1	-	-	-	-	-	-	1
Areas 4B, 5 and 6C Total		40,498	0	0	0	0	0	0	40,498

(a) Harvest prior to 9/08 consists of summer chum taken incidentally to Fraser sockeye fisheries.

(b) Coho management periods for 1993: for the Strait of Juan de Fuca and Area 7 the coho period extended through 10/09; for Area 7A the coho period extended through 10/16.

Data source: WDF "HCCE WEEKCAT" program, executed 11/21/94.

Table 2. Summary of 1993 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	1,142	-	588	1,108	558	1,950
Fall	5,470	-	5,787	4,589	5,623	3,550
Nooksack/Samish	47,363	72,969	67,566	32,153	32,566	25,900
Skagit River	62,131	94,835	47,398	40,085	16,682	40,000
Stillaguamish/Snohomish	145,812	313,976	226,277	30,631	35,534	31,850
South Puget Sound						
Summer	29,042	-	35,788	9,300	33,177	9,300
Fall	203,781	485,819	443,028	78,438	169,385	77,900
Winter	36,469	93,742	46,444	20,463	24,781	20,800
Hood Canal						
Summer	1,417	-	1,112	1,380	1,107	41,200
Fall	446,826	452,794	605,551	96,787	168,877	90,250
Total	979,453	1,514,135	1,479,539	314,934	488,290	342,700

Source: WDF, Puget Sound Treaty Tribes and NWIFC, 1993 Puget Sound Chum Salmon Forecasts and Management Recommendations. WDF Stock Strength Calculation Summary (5/12/94).

Table 3. 1993 Puget Sound Post-Season Chum Salmon Run Size Estimates

Region	Production Type	Summer	Fall	Winter	Total
Strait of Juan de Fuca	Natural	531	5,746		6,277
	Hatchery	57	41		98
Nooksack/Samish	Natural		52,629		52,629
	Hatchery		14,937		14,937
Skagit River	Natural		47,373		47,373
	Hatchery		25		25
Stillaguamish/Snohomish	Natural		104,754		104,754
	Hatchery		121,523		121,523
South Puget Sound	Natural	35,788	339,136	44,560	419,484
	Hatchery		103,892	1,884	105,776
Hood Canal	Natural	1,089	239,132		240,221
	Hatchery	23	366,419		366,442
Subtotal	Natural	37,408	788,770	44,560	870,738
	Hatchery	80	606,837	1,884	608,801
Total		37,488	1,395,607	46,444	1,479,539

Regional Summary

Region	Summer	Fall	Winter	Total
Strait of Juan de Fuca	588	5,787		6,375
Nooksack/Samish		67,566		67,566
Skagit River		47,398		47,398
Stillaguamish/Snohomish		226,277		226,277
South Puget Sound	35,788	443,028	46,444	525,260
Hood Canal	1,112	605,551		606,663
Total	37,488	1,395,607	46,444	1,479,539

Source: WDF Stock Strength Calculation Summary (5/12/94).
Off-station plant returns have been included with hatchery returns.

Table 4. 1993 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	0	0	0	0	0	0	0	0	0	0	0
5 -Sekiu	39889	238	0	0	40127	0	0	0	0	0	40127
6C-Crescent By	370	0	0	1	371	0	0	0	0	0	371
Sub-Total	40259	238	0	1	40498	0	0	0	0	0	40498
6 -Pt Angeles	57	0	0	0	57	0	0	0	0	0	57
6A-West Beach	0	0	0	0	0	0	0	0	0	0	0
7 -San Juan Is	9269	18348	180	0	27797	27766	20718	3576	0	52060	79857
7A-Pt Roberts	11348	6729	0	0	18077	25943	15351	250	0	41544	59621
Sub-Total	20674	25077	180	0	45931	53709	36069	3826	0	93604	139535
6D-Dungeness By	0	0	0	0	0	0	0	0	0	0	0
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	4	0	0	0	4	0	0	0	0	0	4
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	26	0	0	0	26	0	0	0	0	0	26
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	31	0	0	0	31	0	0	0	0	0	31
7B-Bellingham By	11416	14	0	0	11430	19320	111	0	0	19431	30861
77B-Low Nooksck R	191	0	0	0	191	0	0	0	0	0	191
77C-Upr Nooksck R	183	0	0	0	183	0	0	0	0	0	183
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	1	0	0	0	1	0	0	0	0	0	1
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	11791	14	0	0	11805	19320	111	0	0	19431	31236
8 -Skagit Bay	10548	0	0	0	10548	0	0	0	0	0	10548
78B-Sauk R	0	0	0	0	0	0	0	0	0	0	0
78C-Low Skagit R	7620	0	0	0	7620	0	0	0	0	0	7620
78D-Upr Skagit R	10888	0	0	0	10888	0	0	0	0	0	10888
Sub-Total	29056	0	0	0	29056	0	0	0	0	0	29056
6B-Discovry By	0	0	0	0	0	0	0	0	0	0	0
9 -Admirality	261	0	0	0	261	0	0	0	0	0	261
Sub-Total	261	0	0	0	261	0	0	0	0	0	261
8A-Port Susan	82018	0	889	0	82907	13780	57153	0	0	70933	153840
78F-Snohomish R	0	0	0	0	0	0	0	0	0	0	0
78G-Stilagumsh R	4857	0	0	0	4857	0	0	0	0	0	4857
8D-Tulalip Bay	13446	0	1837	0	15283	31	0	0	0	31	15314
Sub-Total	100321	0	2726	0	103047	13811	57153	0	0	70964	174011

Table 4. 1993 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	14176	8683	0	0	22859	62776	66063	0	0	128839	151698
10A-Elliott Bay	793	0	0	0	793	0	0	0	0	0	793
80B-Duwamish R	81	0	0	0	81	0	0	0	0	0	81
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	24383	0	0	0	24383	0	0	0	0	0	24383
10F-Ship Canal	0	0	0	0	0	0	0	0	0	0	0
10G-N Lk Washngtn	0	0	0	0	0	0	0	0	0	0	0
11-Tacoma	8025	0	0	0	8025	12148	33044	0	0	45192	53217
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	393	0	0	0	393	0	0	0	0	0	393
81C-White R	0	0	0	0	0	0	0	0	0	0	0
13-Nisqually Rch	0	0	19	0	19	0	0	0	0	0	19
83D-Nisqually R	20040	0	0	0	20040	0	0	0	0	0	20040
83F-McAllistr Cr	1313	0	7	0	1320	0	0	0	0	0	1320
13A-Carr Inlet	12793	0	139	0	12932	0	0	0	0	0	12932
83C-Minter Cr	0	0	0	0	0	0	0	0	0	0	0
13C-Chambers By	0	0	0	0	0	0	0	0	0	0	0
83H-Chambers Cr	0	0	0	0	0	0	0	0	0	0	0
13D-Case Inlet	4909	0	527	0	5436	0	0	0	0	0	5436
13E-Hendersn Inlt	0	0	0	0	0	0	0	0	0	0	0
13F-Budd Inlet	6	0	0	0	6	0	0	0	0	0	6
13G-Eld Inlet	40	0	0	0	40	0	0	0	0	0	40
13H-Totten Inlet	5311	0	0	0	5311	0	0	0	0	0	5311
13I-Skookum Inlet	0	0	0	0	0	0	0	0	0	0	0
13J-Hammersley In	0	0	0	0	0	0	0	0	0	0	0
13K-Upr Case Inlt	3	0	0	0	3	0	0	0	0	0	3
Sub-Total	**92266**	**8683**	**692**	**0**	**101641**	**74924**	**99107**	**0**	**0**	**174031**	**275672**
9A-Pt Gamble	165	0	0	0	165	0	0	0	0	0	165
12-N Hood Canal	115387	149	109	0	115645	49328	170254	0	0	219582	335227
12A-Dabob Bay	104	0	0	0	104	1	0	0	0	1	105
82F-Quilcene R	0	0	0	0	0	0	0	0	0	0	0
12B-C Hood Canal	7964	0	0	0	7964	422	8053	0	0	8475	16439
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	48061	0	1304	0	49365	0	0	0	0	0	49365
82B-Dewatto Cr	0	0	0	0	0	0	0	0	0	0	0
82G-Skokomish R	17819	0	0	0	17819	0	0	0	0	0	17819
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	**189500**	**149**	**1413**	**0**	**191062**	**49751**	**178307**	**0**	**0**	**228058**	**419120**
Grand Total	**484159**	**34161**	**5011**	**1**	**523332**	**211515**	**370747**	**3826**	**0**	**586088**	**1109420**

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
1993	1,479,539	991,249	488,290

Table 6. 1993 Washington Coastal Chum Run Sizes, Catches, and Escapements.

	Willapa Bay	Grays Harbor	Quinault R.	Total
Preseason Forecast	52,400	18,000	4,200	74,600
Actual Run Size	44,400	34,600	15,100	94,100
Harvest	13,400	13,600	5,300	32,300
Wild Escapement Goal	35,400	21,000	-	56,400
Wild Escapement	31,000	21,000	9,000	61,000
Hatchery Escpmt Goal	1,000	-	1,400	2,400
Hatchery Escapement	900	0	800	1,700

Table 7. 1993 Chum Salmon Genetic Baseline Collections

Region of Origin	Number Sampled
Washington Coast	
Wynoochee River (Chehalis)	115
Cloquallum Creek (Chehalis)	93
Canon River (Willapa Bay)	88
Nemah River (Willapa Bay)	85
Ellsworth Creek (Willapa Bay)	100
Bear River (Willapa Bay)	100
Strait of Juan de Fuca	
Lower Elwha River	40
Nooksack/Samish Rivers	
Chuckanut Creek	100
Skagit River	
Finney Creek	42
Stillaguamish/Snohomish Rivers	
N. Fork Stillaguamish	100
Jim Creek (S.Fork Stilly)	20
Wallace River (Snohomish)	100
Hood Canal	
Union River (summer)	44
Lilliwaup Creek (summer)	7
Quilcene NFH (summer)	26
South Puget Sound	
Green River	58
Donkey Creek (Gig Harbor)	100
Olalla Creek (Gig Harbor)	100
Cowling Creek TFH (Port Madison)	56

Source: WDF GSI lab.

Table 8. Summary of 1993 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	177	177		GN	Commercial
	43	197	197		GN	Commercial
	44	200	200	*	GN	Test
	45	200	200		GN	Test
Salmon Banks (Area 7)	45	400	400		Mixed	Commercial
Point Roberts (Area 7A)	43	94			GN	Test
	44	400	400		GN	Test
	45	320			Mixed	Commercial
	46	280	400		GN	Commercial
Total		2,468	2,174			

GN = gillnet PS = purse seine

* = Samples were not analyzed immediately due to lack of funds. Analysis was finally completed in January, 1995.

Source: LeClair and Beattie. 1994. Genetic Stock Identification Estimates of 1993 Washington Commercial And Test Chum Fisheries in the Strait of Juan de Fuca and North Puget Sound. WDF and the NWIFC.

CHAPTER 3

REVIEW OF THE 1993 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 1993. 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 1993, 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 1993 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 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 1993. Canada would continue to manage the 1993 chum fisheries in Johnstone Strait, Strait of Georgia and Fraser River areas in a manner consistent with the clockwork plan. 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 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 1993, 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 1993, 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 1993, 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

Pre-season 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 Pre-season

The 1993 pre-season forecast of Inside chum returning to wild spawning areas was 1,618,000 which included 920,000 Fraser River and 698,000 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 1993 pre-season forecast for enhanced origin Fraser River chum was 307,000 while the mid-Vancouver Island area was expected to produce 546,000 enhanced chum. In addition, there were 86,000 enhanced origin chum estimated to return to other Georgia Strait areas. The total run size estimate for enhanced Inside chum was 939,000 (Table 1).

The total Inside chum stock size was forecast to be 2,557,000. 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 2,657,000 chum.

3.2.2.2 In-season

The in-season run size techniques rely upon two basic data sources: test fisheries in Johnstone Strait and commercial fisheries. Regressions are done between the independent variables catch and catch/effort versus the dependent variable Clockwork chum stock size. The test fishing in Area 12 began in early September and continued until early November (Table 2).

The first in-season run size was projected to be 2,200,000 and announced on September 30. 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 totaled 80,700 (Table 3). Under Clockwork rules a run size of this magnitude allows for a harvest of 10% or less. Test fishing continued in Johnstone Strait in order to monitor the progress of the returning chum salmon stocks. For two weeks following the commercial fishery held September 21-23 (seines 24 hours and gill nets 40 hours) test fishing catches increased. Both the upper and lower Johnstone Strait test fisheries registered increased chum salmon catches following the commercial fishery (Table 4). The following week the upper Johnstone Strait test fishery had a modest increase in catch levels while the lower Johnstone Strait test fishery catches climbed from 281 to 802 per set. Run size assessment on test fishing data to October 16, in conjunction with the earlier commercial fishery, resulted in an estimated run size of 3.2 million. As a run size of this magnitude allowed for a 20% harvest rate a second commercial fishery was planned for October 23-25 (seines 10 hours, gill nets 38 hours). This fishery harvested a total of 728,200 chum salmon. Following the commercial fishery test fishing recorded strong catches in both test fishing areas. Re-analysis of all test fishing data and the commercial fisheries resulted in a run size estimate of 4.0 million.

The new estimate of run size increased the Clockwork TAC to 1.2 million and increased the allowable harvest rate from 20% to 30%. As of week ending October 30 it was estimated in-season that there was a remaining Johnstone Strait commercial allocation of about 260,000. The third and final Clockwork fishery occurred November 2 through 4 (seines 8 hours and gill nets 42 hours) and caught 361,600 chum salmon.

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 1993. 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 28,

the in-season projection of the total terminal run size to the Fraser River was 620,000 chum. Under the Fraser River Chum Harvest Management plan, one commercial fishery was permitted on November 3 based on terminal surpluses identified in the early portion of the run. The total 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 in-season projection of the total terminal run size to the Fraser River was 540,000 chum (Table 2).

3.2.2.3 Post-season

The total Clockwork chum catch in all inside areas (Areas 11-13 and Area 14 (Fraser interceptions only) including the catch of Canadian chum in U.S. Areas 7 and 7A) plus Inside chum total escapements were summed to estimate the total Clockwork assessed run size. The post-season Clockwork run size estimate of 4,144,000 (Table 9) was 3% larger than the in-season estimate of 4,000,000 (Table 10). In addition, the post-season estimate was 36% larger than the pre-season forecast of 2,657,000 (Table 1). The pre-season estimate was based upon average recruits/spawner for the wild stock component and average survival rates for the enhanced contribution.

The post-season Fraser River total chum stock size, including the catch of Fraser River chum in U.S. and Canadian waters, was 1,295,000 (789,000 escapement and 506,000 total catch in Canadian and U.S. waters). This run size was 6% greater than the pre-season forecast (Table 1).

U.S. catches of Fraser chum were 109,300 in areas 7 and 7a and 16,700 in areas 4B, 5, and 6C. The catches of Fraser River chum in the Johnstone Strait, Strait of Georgia (excluding the Fraser River fishery), and Nitinat commercial net fisheries were estimated, through analysis of GSI data, to be 248,000, 24,900 and 28,400 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 (Areas 4B, 5 and 6C), 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 for biological samples. In 1993, these harvests totaled 2,179,000. 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 1993 Johnstone Strait fishery (Areas 11, 12 and 13), began in July and ended in early November. During the July and August period, the Johnstone Strait fishery was directed at harvesting Fraser River sockeye and pink salmon. During those two

months, 24,500 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 1993, the Johnstone Strait chum assessment fishery harvested 80,700 chum. Two further fisheries occurred on October 23 and November 2 which harvested 728,200 and 361,600 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 1993. Commercial fisheries were directed primarily at enhanced chum in Area 14. The total catch for Area 14 was 381,500. Area 16 fisheries occurred three times in 1993 resulting in a catch of 117,300. In Area 17 fisheries occurred twice in 1993 with a total catch of 17,300. Area 18 fisheries were the last of the chum salmon season and totaled 80,200.

Under the Fraser River Chum Harvest Management Plan, one commercial fishery was permitted on November 3 based on terminal surpluses identified in the early portion of the run. The total catch for this fishery was 74,600 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 4,900 chum were sampled from Inside waters for biological purposes (Table 8). Samples were collected from Johnstone Strait and Qualicum fishing areas.

A test fishery was conducted within the Fraser River. Fishing occurred daily in the upper river area near Albion. From October 1 to early December the chum test catch was 5,600 (Table 5). The lower river, Cottonwood test fishery was canceled in 1993 because only the Albion test fishery was being used to estimate terminal run strength.

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 48,900 chum, of which the food fishery in Johnstone Strait harvested a total of 10,000 chum, the majority of which were taken in marine waters in October. In the Strait of Georgia there were 38,900 chum taken in the Indian

food fishery. The majority of this catch was taken in the Cowichan and Saanich Inlet area. The Native commercial chum harvest totaled 171,200. The combined food fish and commercial fish catch in the Fraser River system was 25,900 (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 (notably the Orford and Ahnuhati rivers). 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 1993 to the Orford and Ahnuhati rivers was 68,500.

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 1,799,000 chum. Total escapement, including hatchery returns, was 2,049,100. This escapement was 120% of the 1983 to 1992 average escapement.

The terminal run size to the Fraser River system was 895,000. This left an escapement of approximately 788,800 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 694,000, which is 99% of the net escapement goal.

In eight of the fourteen major spawning areas, the chum escapement was above the average observed during the 1983-92 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 (1983-1993) 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.

3.2.5 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 2,600,000 from an in-season catch estimate of 85,000. Subsequent test fishing indicated increased stock strength and the run size was estimated at 3,200,000 on October 19. The second commercial fishery in Johnstone Strait of October 23-25 harvested an in-season estimate 652,000. The total Johnstone Strait catch exceeded the threshold under which the treaty allows the U.S. catch of 140,000. Further analysis of test fish and commercial catch suggested the seasonal Clockwork run size was approximately 4,000,000 (October 29). Based on this updated run size estimate one further commercial fishery was planned for Johnstone Strait.

The subsequent post-season review indicated an actual run size of 4,144,000 chum. The in-season calculation of the Clockwork catch of 1,384,000 was higher than the desired catch of 1,243,000 (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 1993 gross escapement was 2,049,000 and the total Clockwork catch was 1,384,000. An assessment of clockwork management is provided for the years 1983 to 1993 in Table 10.

3.2.5.2 Stock Identification

Genetic stock identification (GSI) was conducted in a number of areas in 1993. 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 Area 14 samples were from the commercial catch and the Area 17 samples were from the test fishing (Table 8).

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 totaled 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.

Gill net and seine vessels take part in the Nitinat area fishery. A gill net assessment fishery begins in late September to provide early allocation to gill nets plus information for stock assessment. If weekly escapement targets are achieved and a further surplus is identified, then seines will be allowed to fish to a catch equal to the gill nets. During these single gear fisheries, the outer fishing boundary is a line between a point two miles due south of Pachena Point and a point two miles south of Bonilla Point. Subsequent fisheries may be open to both gear types, depending on achievement of the weekly escapement targets. During combined gear fisheries, a gill net only area is provided in Area 20-1 (extending the line two miles offshore eastward). This action is meant to increase the exploitation rate on the Nitinat chum stock and thereby reduce the risk of over-escapement into Nitinat Lake. 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 gill nets. Safety concerns for smaller gill net vessels are also a consideration for the extended area.

3.3.2 Run Size Estimation

The 1993 pre-season forecast was 1,050,000 chum, which provided a harvestable surplus in Area 21 of 800,000 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 1993 post-season estimate of the total Nitinat chum stock is 1,118,000 chum (Table 12).

Stock composition in the commercial fishery is based on GSI results. A total of 1,131

samples were collected from the commercial Area 21 fishery over a six week period. 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

Gill net fisheries were initiated September 27 for four days; a further four day opening was allowed starting October 4 and then a two day fishery starting October 11. Fisheries were then halted as escapement targets were behind schedule. By October 19 test fishing in Nitinat Lake indicated sufficient escapement to initiate seine fisheries. Seine fisheries were conducted for three days starting October 23. Finally, combined seine and gill net fisheries commenced October 27 and continued through to November 10.

In total there were 25 days of fishing for gill nets and 18 days for seines. The combined gear fishery lasted 15 days. The catch for these fisheries was 763,000 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 gill net only area was instituted in part of Area 20-1 inside a line two miles south of Bonilla Point to Logan Creek. This gill net 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 216,000 chum.

Catch in the commercial troll fishery off the WCVI (Areas 121-127) was 8,400 chum during the entire troll season. Due to the limited chum catch, no GSI sampling was conducted in the troll fishery.

3.3.4 Escapement

A gill net test vessel, along with visual surveys of the river, are used to determine escapement into Nitinat Lake. The net escapement to the wild spawning grounds of the Nitinat River system was estimated to be 259,000.

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 Area 20-1.

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 8,400 chum.

Table 1. Pre-season run forecasts by stock, 1993.

Stock	Origin	Expected run size		Percent run size	
Canadian Inside Chum					
Fraser River:	Wild	920,000		34.6%	
	Enhanced	307,000		11.6%	
	sub-total		1,227,000		46.2%
Mid Vancouver Island:	Wild	a.			
	Enhanced	546,000		20.5%	
	sub-total		546,000		20.5%
Non-Fraser Stocks:	Wild	698,000		26.3%	
	Enhanced	86,000		3.2%	
	sub-total		784,000		29.5%
Total Inside Stocks:	Wild	1,618,000		60.9%	
	Enhanced	939,000		35.3%	
	Total		2,557,000		96.2%
U.S. Chum					
Puget Sound:		100,000		3.8%	3.8%
	GRAND TOTAL		2,657,000	100.0%	100.0%

a. Included in Total Inside Stocks, wild total

Table 2. Pre-season and in-season weekly estimates of Study Area chum stock size, 1993.

Week Ending	Total Stock (1)	U.S. (2)	Canadian Total	Fraser River	Mid Vancouver Island	Other Canadian
PRE-SEASON (3)	2,657,000	100,000	2,557,000	1,227,000	546,000	784,000
IN-SEASON (4) (Johnstone Strait fishery)						
02-Oct	2,200,000	100,000	2,117,000	1,016,000	452,000	649,000
09-Oct	2,600,000	100,000	2,502,000	1,201,000	534,000	767,000
16-Oct	2,780,000	100,000	2,675,000	1,284,000	571,000	820,000
23-Oct	3,200,000	100,000	3,080,000	1,478,000	658,000	944,000
30-Oct	4,000,000	100,000	3,849,000	1,847,000	822,000	1,180,000
(Estimates from Fraser River test fishing - terminal run size)						
15-Oct	-	-	-	430,000	-	-
22-Oct	-	-	-	540,000	-	-
05-Nov	-	-	-	670,000	-	-
19-Nov	-	-	-	680,000	-	-
20-Dec	-	-	-	540,000	-	-

(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 run size estimate for Johnstone Strait obtained from commercial and test fishery data. Fraser River provided from in-river test fishing.

Table 3. Catch of chum salmon by statistical area and week for commercial and test fishing vessels and by statistical area for Indian food and commercial native fisheries, 1993.

Week ending	Statistical Areas							Total
	11	12	13	14	15-19	20	28-29	
04-Sep	36	17,586	1,807	0	1,289	13	88	20,819
11-Sep	119	16,323	6,261	0	207	29	158	23,097
18-Sep	110	1,025	338	5	2	3	32	1,515
25-Sep	0	45,820	34,830	37	4	0	137	80,828
02-Oct	0	231	8,122	167	14	0	353	8,887
09-Oct	0	161	0	0	0	0	736	897
16-Oct	0	20,204	0	0	0	0	938	21,142
23-Oct	0	7,401	7,585	47,459	0	0	1,065	63,510
30-Oct	0	368,356	359,832	42,824	90	0	859	771,961
31-Oct to 27-Nov	0	144,304	217,287	291,006	175,224	0	74,561	902,382
28-Nov to 26-Dec	0	0	0	0	39,627	0	155	39,782
Commercial Total after week 9/1	265	621,411	636,062	381,498	216,457	45	79,082	1,934,820
Commercial Total prior week 9/1	4,803	17,050	1,539	7	117	91	872	24,479
Commercial Native Fishery				53,531	91,807		25,895	171,233
Indian Food Fishery		2,514	7,484	2,500	36,370			48,868
Grand total	5,068	640,975	645,085	437,536	344,751	136	105,849	2,179,400

Source: British Columbia Catch Statistics, 1993.

Table 4. Catch, effort, and catch per unit effort in Johnstone Strait test fisheries, 1993.

Week Ending	Stat Week	Weekly Catch	Effort (sets)	Catch per set
Upper Johnstone St.				
04-Sep	9/1	41	12	3.4
11-Sep	9/2	398	18	22.1
18-Sep	9/3	1,412	30	47.1
25-Sep	9/4	NA	NA	NA
02-Oct	10/1	17,980	36	499.4
09-Oct	10/2	17,182	42	409.1
16-Oct	10/3	15,273	34	449.2
23-Oct	10/4	13,457	36	373.8
30-Oct	10/5	38,658	30	1288.6
06-Nov	11/1	4,494	11	408.5
13-Nov	11/2	NA	NA	NA
	sub total	108,895	249	437.3
Mid Johnstone St.				
04-Sep	9/1	13	6	2.2
11-Sep	9/2	160	12	13.3
18-Sep	9/3	1,045	30	34.8
25-Sep	9/4	1,195	12	99.6
02-Oct	10/1	10,118	36	281.1
09-Oct	10/2	33,707	42	802.5
16-Oct	10/3	35,811	36	994.8
23-Oct	10/4	43,037	25	1721.5
30-Oct	10/5	32,820	36	911.7
06-Nov	11/1	6,140	14	438.6
13-Nov	11/2	401	7	57.3
	sub total	164,447	256	642.4
	Grand Total	273,342	505	541.3

Table 5. Weekly catch and catch per unit effort in the Fraser River chum test fishery, 1993.

Week Ending	Catch	CPUE
23-Sep	41	3.31
30-Sep	53	4.36
07-Oct	252	20.13
14-Oct	500	40.48
21-Oct	906	73.20
28-Oct	910	62.57
04-Nov	808	55.70
11-Nov	1,191	76.11
18-Nov	453	34.79
25-Nov	383	29.75
02-Dec	43	4.03
09-Dec	152	12.42
16-Dec	1	0.09
Total	5,599	409.27

Table 6. Number (thousands) of inside chum spawning in wild areas, and number spawning in enhanced facilities or otherwise utilized by hatcheries, in 1993, compared to spawning capacity of the previous nine year averages.

Spawning Areas by Stock Group	1993 Estimate	1983 - 92 Average	1993 as percent of 83-92 Avg
Wild Spawning Areas			
Upper Vancouver Island	0.8	0.4	200%
Kingcome Inlet	0.3	7.3	4%
Bond to Knight Inlet	17.1	27.7	62%
Johnstone Strait	61.2	68.6	89%
Loughborough/Bute Inlet	199.8	125	160%
Mid Vancouver Island	294.5	133.3	221%
Toba Inlet	0.8	7.4	11%
Jervis Inlet	168.3	107.6	156%
Lower Vancouver Island	91.9	68.9	133%
Southern Vancouver Island	219.7	172.5	127%
Howe Sound/Sunshine Coast	16.3	136.2	12%
Burrard Inlet	0	31.3	0%
Fraser River	694.0	612.8	113%
Boundary Bay		0.3	0%
WILD TOTAL	1798.6	1499.3	120%
Enhanced Spawning Areas			
Mid Vancouver Island (a)	155.7	147.2	106%
Fraser	94.8	50.1	189%
ENHANCED TOTAL	250.5	197.3	127%
GRAND TOTAL	2049.1	1696.6	121%

(a) 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 - 1993.

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%
1993 (1)	4,143,700	1,384,300	2,049,100	1,798,600	30.0%	33.4%

(1) Preliminary data
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, 1993.

Area	Weeks Sampled	Commercial Samples	Test fish Samples
Johnstone Strait	9	1,651	2,355
Qualicum	3	898	0
Nitinat	6	1,131	0
Total		3,680	2,355

Table 9. Post-season summary of Clockwork catch, escapement and harvest rate, 1993.

Fishery Type	Areas	Total Catch	Contribution to Clockwork	Clockwork Catch
Commercial and Test	11 to 13	1,249,737	100%	1,249,700
	14	373,380	3% a	12,700
	29	79,082	0%	0
	other	232,621	0%	0
	sub total	**1,934,820**		**1,262,400**
Indian Food				
	12 & 13	12,738	100%	12,700
	29	25,895	0%	0
	other	11,983	0%	0
	sub total	**50,616**		**12,700**
U.S.				
	7	78,487	70% b	54,900
	7A	57,198	95% b	54,300
	sub total	**135,685**		**109,200**
		Total Clockwork catch		1,384,300
		Total Escapement		2,049,100
		Total Clockwork Assessed Stock Size		4,143,700 c
		Clockwork Harvest Rate		33.4%
		Total Study Area Stock Size		4,258,300 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 - 1993.

CLOCKWORK ASSESSMENT 1983-93

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
1. IN-SEASON											
Inseason Assessment Total St	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	4,000,000
Date Assessed	-	-	Oct 18	Oct 20	Oct 19	Oct 17	Oct 18	Oct 19	Oct 21	Oct 16	Oct 29
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	4,011,000
Desired HR	10.0%	10.0%	20.0%	30.0%	10.0%	30.0%	20.0%	30.0%	10.0%	30.0%	30.0%
Apparent HR	11.9%	5.4%	25.6%	35.2%	6.7%	29.9%	18.5%	35.6%	13.0%	35.2%	34.5%
2. POST-SEASON											
Total Clockwork Assessed Stock	1,859,600	1,544,000	2,982,100	4,654,500	2,738,600	2,991,800	2,408,600	3,739,100	2,785,600	4,376,500	4,143,700
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	246,100	1,346,200	1,249,700
COMM & TF A29	7,900	2,100	52,500	99,000	10,000	(4)	(4)	(4)	(4)	(4)	(4)
COMM A 14 FR	36,300	15,800	33,200	59,900	18,000	4,500	8,100	8,700	42,100	10,200	12,700
IFF A11-13	20,300	39,500	18,600	28,900	48,600	24,700	23,000	23,700	28,200	22,100	12,700
US 7-7A (5)	2,000	1,300	138,600	76,900	21,200	108,500	64,100	157,300	121,800	99,100	109,200
Total	168,300	96,900	759,200	1,313,400	166,200	1,224,600	554,000	1,349,900	438,200	1,477,600	1,384,300
Desired HR	10.0%	10.0%	30.0%	30.0%	10.0%	20.0%	10.0%	30.0%	10.0%	30.0%	30.0%
Actual HR	9.1%	6.3%	25.5%	28.2%	6.1%	40.9%	23.0%	36.1%	15.7%	33.8%	33.4%
3. ESCAPEMENT (WILD)											
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	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	1,798,600
Difference (6)	(751,300)	(356,900)	667,400	65,000	(837,000)	(584,500)	(1,160,400)	(514,000)	(525,600)	(209,600)	(201,400)

(1) Total Clockwork Assessed Stock includes Total Clockwork Catch plus Escapement.

(2) Clockwork Assessed Catches for 1983-87 included 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 Areas 7 and 7A. Note: Clockwork Assessed Catch is based primarily on Johnstone Strait fishery (Areas 11-13).

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

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

(5) Prunes estimates

(6) Numbers in brackets are negative

Table 11. Weekly Nitinat commercial catch, 1993.

Stat Week	Seine	Gill Net	Total
Pre 9/2	0	0	0
9/3	0	0	0
9/4	0		0
10/1	0	40,977	40,977
10/2	0	69,723	69,723
10/3	0	67,775	67,775
10/4	56,883	0	56,883
10/5	364,873	33,881	398,754
11/1	101,945	13,812	115,757
11/2	11,194	2,415	13,609
11/3	0	0	0
11/4	0	0	0
Total	534,895	228,583	763,478
	70.1%	29.9%	

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

YEAR	AREA 22 SPAWNERS	AREA 21 CATCH	AREA 21 CATCH WCVI ONLY uncorrected	AREA 21 CATCH GSI, US uncorrected	AREA 22 INLAKE CATCH	LAKE MORTALITY	TOTAL NITINAT STOCK
1980	54,500	na	na		279,211	0	333,711
1981	115,000	na	na			0	115,000
1982	22,500	na	na			0	22,500
1983	7,960	na	na			0	7,960
1984	76,000	186,669	148,962	37,707		0	224,962
1985	210,000	1,609,364	1,081,422	527,942		0	1,291,422
1986	142,820	387,470	297,355	90,115	8,000	0	448,175
1987	50,200	395,397	316,994	78,403	8,576	150,000	525,770
1988	188,728	1,821,677	1,419,091	402,586	56,000	0	1,663,819
1989	116,300	294,660	249,136	45,524	31,553	0	396,989
1990	229,000	24,549	8,167	16,382	71,122	0	308,289
1991	300,000	494,750	466,599	28,151	71,000	50,000	887,599
1992	150,000	1,075,525	916,764	158,799	71,700	5,000	1,143,464
1993	259,000	764,740	642,806	121,934	216,000	0	1,117,806
AVERAGE 1984-present	177,205	705,501	554,747	150,754	66,744	20,500	805,847

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

Table 13. Nitinat hatchery releases.

BROOD YEAR	RELEASES			
	CHUM	CHINOOK	COHO SMOLTS	COHO FRY
1980	2,311,624	85,251		
1981	27,178,226	491,624		
1982	8,432,138	2,421,272		
1983	17,283,986	2,570,176		
1984	26,226,725	2,273,864		
1985	17,587,830	4,271,996		
1986	16,576,680	4,201,471		
1987	12,172,600	7,050,559		
1988	16,668,708	8,074,654		
1989	22,776,833	10,109,780		
1990	23,518,958	7,635,516		
1991	30,532,333	6,090,724	200,000	
1992	24,210,260	6,793,846	130,000	
1993	29,000,000	6,000,000	120,000	100,000

LITERATURE CITED

LeClair, L. and W. Beattie. 1995. Genetic Stock Identification Estimates of 1993 Chum Salmon Fisheries in the Strait of Juan de Fuca (Catch Area 5) and North Puget Sound (Catch Areas 7 and 7A). Washington Department of Fish and Wildlife and the Northwest Indian Fisheries Commission.

ATTACHMENT 1

CHAPTER 6 OF ANNEX IV OF THE PACIFIC SALMON TREATY

1991/1992 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;

HB

(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).

HB

ATTACHMENT 2

TREATY LETTER OF TRANSMITTAL

JUNE 25, 1993

PACIFIC SALMON COMMISSION

ESTABLISHED BY TREATY BETWEEN CANADA
AND THE UNITED STATES OF AMERICA
MARCH 18, 1985

600 - 1155 ROBSON STREET
VANCOUVER, B.C. V6E 1B5
TELEPHONE: (604) 684-8081
FAX: (604) 666-8707

Our File: 70103

Your File:

July 5, 1993

MEMORANDUM

TO: All Commissioners and Alternates
All Panel Members and Alternates
All Technical Committee Members
National Sections Correspondents

FROM: I. Todd, Executive Secretary

RE: Letters to governments for 1993 with recommended revisions to Annex IV

Enclosed for your record is a copy of the agreements reached by the Governments for 1993 fisheries.

Original letters of transmittal have been sent to the Honourable Ross Reid, Minister of Fisheries and Oceans and the Honourable Perrin Beatty, Secretary of State for External Affairs for Canada; and to the Honorable Warren M. Christopher, Secretary of State, and the Honorable Ronald H. Brown, Secretary of Commerce for the United States.

J C Woodey for

I. Todd
Executive Secretary

Encl.

PACIFIC SALMON COMMISSION

ESTABLISHED BY TREATY BETWEEN CANADA
AND THE UNITED STATES OF AMERICA
MARCH 18, 1985

600 - 1155 ROBSON STREET
VANCOUVER, B.C. V6E 1B5
TELEPHONE: (604) 684-8081
FAX: (604) 666-8707

Our File: 70103
X71001

Your File:

June 25, 1993

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

Dear Sir:

I have the honour to report to you on understandings reached by the Pacific Salmon Commission regarding certain of the fishery regimes specified in Annex IV of the Pacific Salmon Treaty.

In accordance with Article XIII, Paragraph 2 of the Treaty, the Commission recommends implementation of the following arrangements for 1993:

1. **Transboundary Rivers - Annex IV, Chapter 1.**

With respect to the Transboundary rivers, Canada and the U.S. agree to continue the expired annex provision through 1993. Discussions directed towards adjusting agreed fishing regimes to improve access to enhanced sockeye returns will continue prior to the 1994 season.

2. **Northern B.C. and S.E. Alaska - Annex IV, Chapter 2.**

With respect to Portland Canal chum salmon, Canada and the U.S. agree to prohibit net fisheries in relevant areas as recommended by the bilateral Northern Panel on February 15, 1993. In addition, they agree to continue discussion of restoration and enhancement programs for northern boundary chum salmon.

3. **Fraser River Sockeye and Pink Salmon - Annex IV, Chapter 4.**

Canada and the U.S. agree that the management regime for the Fraser sockeye and pink salmon fishery in 1993 is as follows:

.../2

a) For sockeye salmon:

i) When the estimated TAC is less than 12.062 million fish, the U.S. catch in the Panel area shall not exceed 20 percent of the TAC;

ii) When the estimated TAC is between 12.062 and 15 million fish, the U.S. catch in the Panel area shall not exceed 2.412 million fish plus 10 percent of the TAC between 12.062 and 15 million fish;

iii) When the estimated TAC is greater than 15 million fish, the U.S. catch in the Panel area shall not exceed 2.706 million fish plus 5 percent of the TAC above 15 million fish, but the catch shall not exceed 2.806 million fish;

iv) Differences concerning catches of Fraser sockeye caught outside of the Panel area remain unresolved and will be addressed in connection with negotiations on 1994 arrangements.

v) The U.S. will not fish in 1993 on the early Stuart run in order to provide adequate escapement and viable fisheries in the upper portion of the Fraser River drainage.

b) For pink salmon the total U.S. catch shall be 25.7% of the TAC, but shall not exceed 3.6 million fish.

c) Calculation of 1993 TACs for Fraser River sockeye and pink salmon, and any catch overages or underages in 1993, shall be as specified in Annex IV, Chapter 4 of the Treaty and as specified in previous agreements by the Fraser Panel.

d) The dispute referred to in Canada's note 189 of November 24, 1992 and the Department of State's Note of December 8, 1992 remains unresolved and will be addressed in connection with negotiations on 1994 arrangements.

e) Based on these arrangements, the Fraser Panel shall develop fishery management plans for the Fraser Panel area as soon as possible.

4. **Coho Salmon - Annex IV, Chapter 5.**

For 1993, Canada will limit its WCVI coho troll fishery to 1.7 million. Other coho Chapter provisions remain unchanged.

.../3

5. **Southern B.C. and Washington State Chum Salmon - Annex IV, Chapter 6.**

With respect to southern chum, Canada and the U.S. agree to continue the expired Annex provisions through 1993.

The Commission expects that the relevant management agencies will manage fisheries under their responsibility consistent with these agreements.

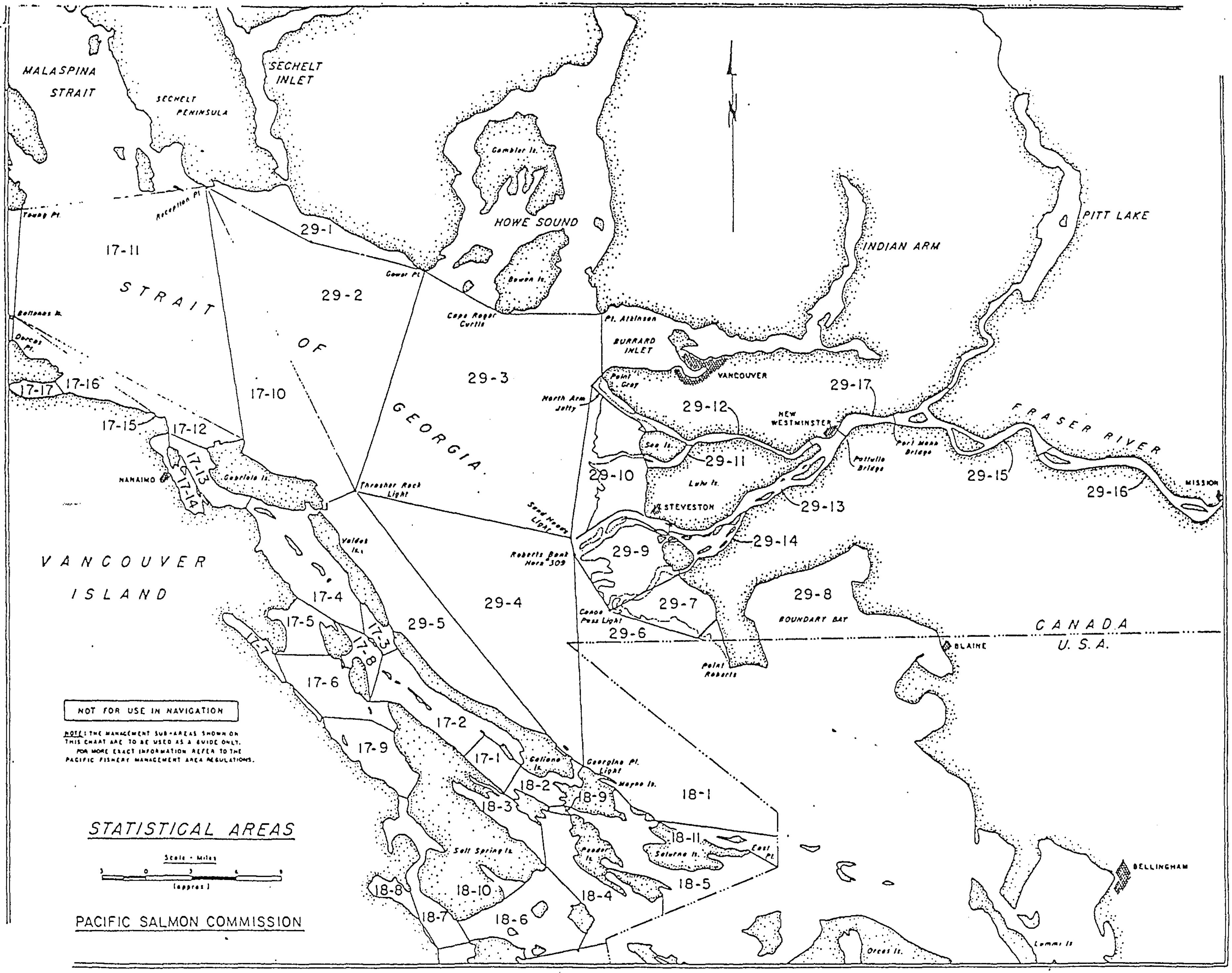
The Commission respectfully requests your early approval of these recommendations.

Yours truly,

Yves Fortier
Chair
Pacific Salmon Commission

ATTACHMENT 3

U.S. AND CANADIAN STATISTICAL AREA MAPS



MALASPINA STRAIT
SECHELT PENINSULA
SECHELT INLET
Gambier Is.
HOWE SOUND
Bowen Is.
INDIAN ARM
PITT LAKE
Reception Pt.
Young Pt.
Gower Pt.
Cape Roger Curtis
Pt. Atkinson
BURRARD INLET
VANCOUVER
Point Grey
North Arm Jetty
NEW WESTMINSTER
Port Mann Bridge
Pattullo Bridge
FRASER RIVER
MISSION
Sea Is.
Lulu Is.
STEVESTON
Sand Heads Light
Roberts Bank Hora 309
Canoe Pass Light
Point Roberts
BOUNDARY BAY
BLAINE
CANADA
U. S. A.
STRAIT OF GEORGIA
Ballenas Is.
Dorcas Pt.
NANAIMO
Gabriola Is.
Thrasher Rock Light
Valdes Is.
VANCOUVER ISLAND
Galiano Is.
Georgina Pt. Light
Mayne Is.
Salt Spring Is.
Pender Is.
Saturna Is.
East Pt.
Orcas Is.
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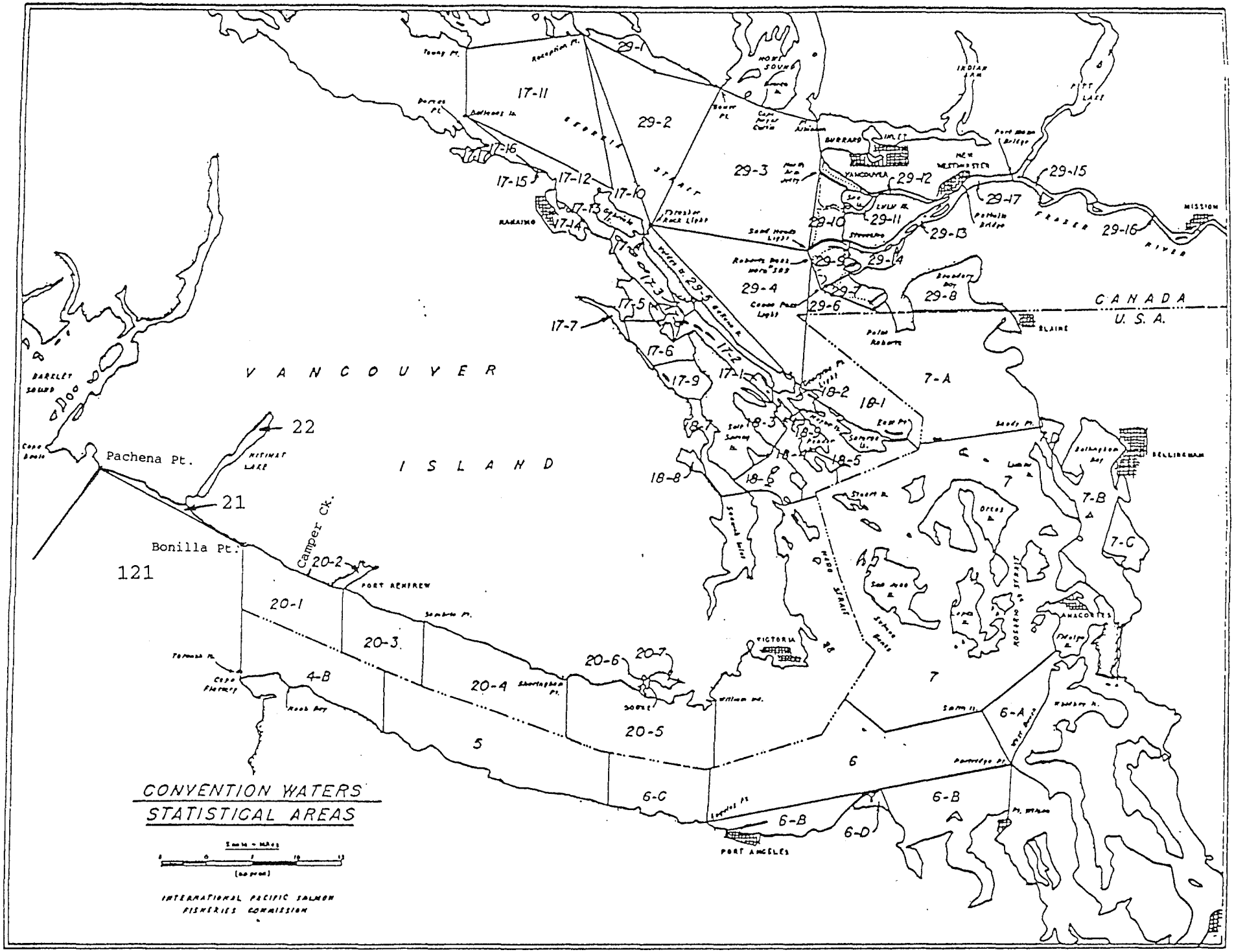
NOT FOR USE IN NAVIGATION
NOTE: THE MANAGEMENT SUB-AREAS SHOWN ON THIS CHART ARE TO BE USED AS A GUIDE ONLY. FOR MORE EXACT INFORMATION REFER TO THE PACIFIC FISHERY MANAGEMENT AREA REGULATIONS.
STATISTICAL AREAS
Scale - Miles
(approx.)
PACIFIC SALMON COMMISSION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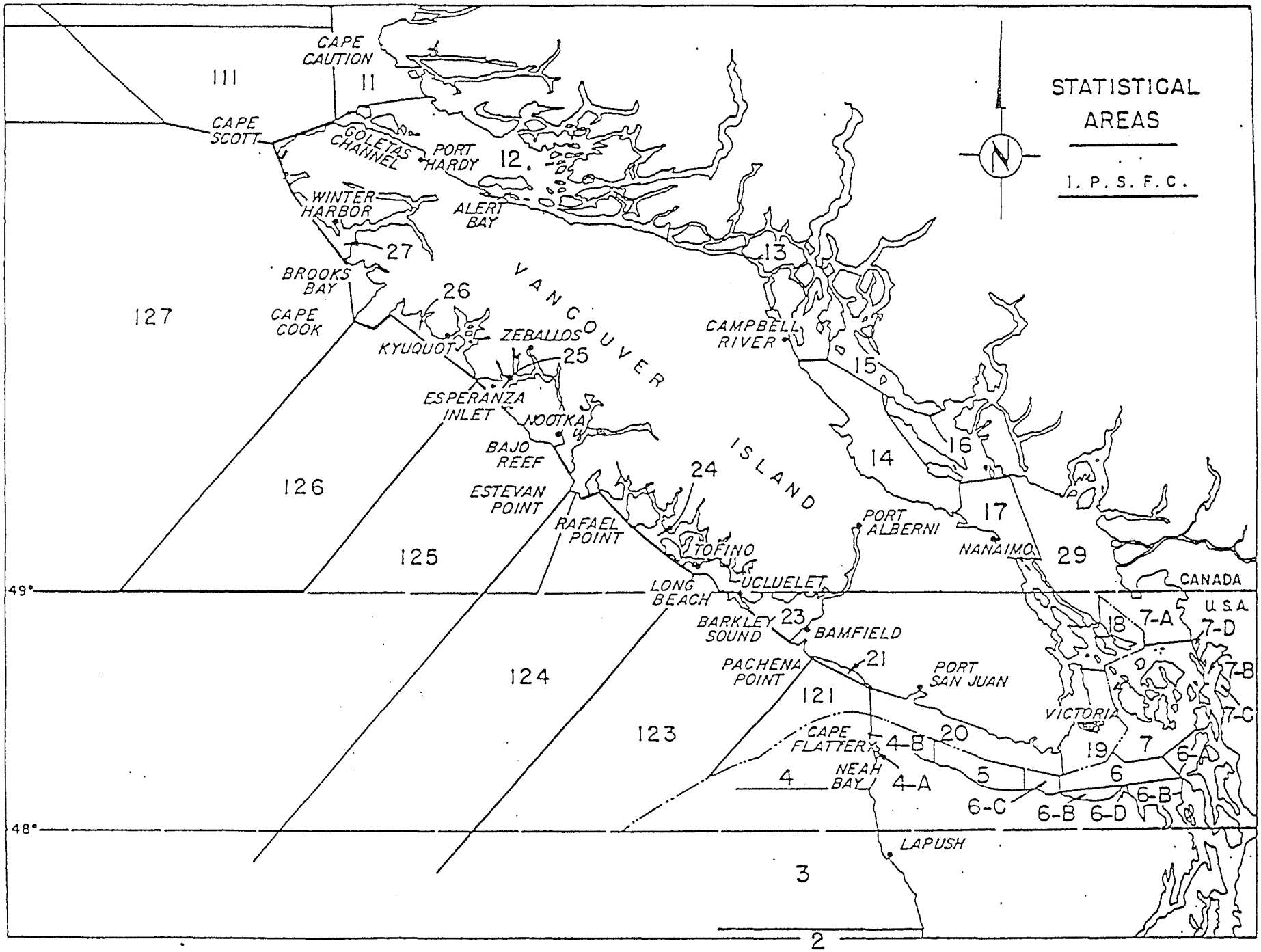
BLAINE
CONVENTION WATERS
STATISTICAL AREAS
INTERNATIONAL PACIFIC SALMON
FISHERIES COMMISSION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CAPE CAUTION
CAPE SCOTT
GOLETAS CHANNEL
PORT HARDY
WINTER HARBOR
ALERT BAY
BROOKS BAY
CAPE COOK
KYUQUOT
ZEBALLOS
ESPERANZA INLET
NOOTKA
BAJO REEF
ESTEVAN POINT
RAFAEL POINT
TOFINO
LONG BEACH
UCLUELET
BARKLEY SOUND
BAMFIELD
PACHENA POINT
PORT SAN JUAN
CAPE FLATTERY
NEAH BAY
LAPUSH
VANCOUVER ISLAND
CAMPBELL RIVER
PORT ALBERNI
NANAIMO
VICTORIA
CANADA
U.S.A.
49°
48°
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123
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7-A
7-B
7-C
7-D
6-A
6-B
6-C
6-D
5
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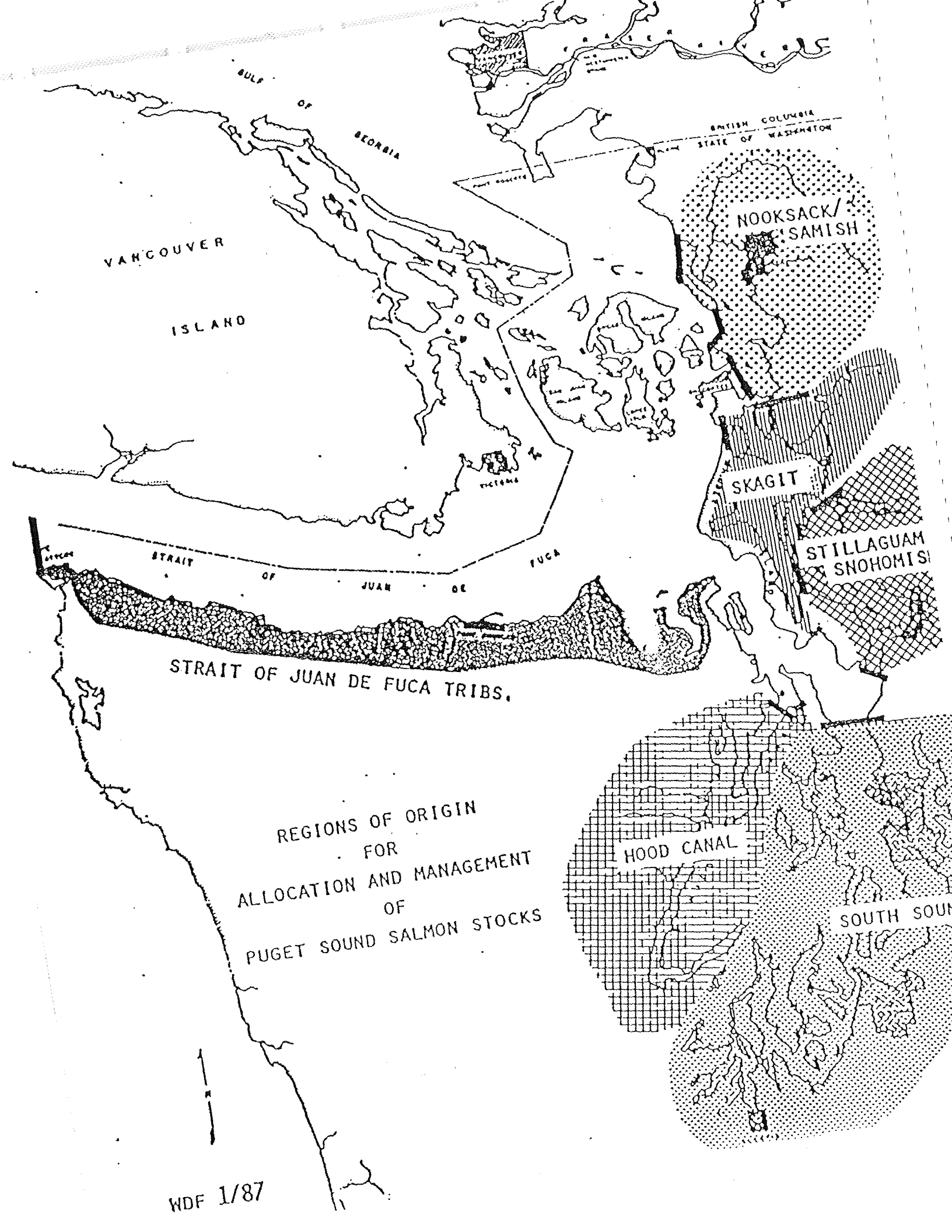
4-A
4-B
3
2


GULF OF GEORGIA
BRITISH COLUMBIA
STATE OF WASHINGTON
VANCOUVER ISLAND
NOOKSACK/ SAMISH
SKAGIT
STILLAGUAM
SNOHOMI
STRAIT OF JUAN DE FUCA
STRAIT OF JUAN DE FUCA TRIBS.
HOOD CANAL
SOUTH SOU
REGIONS OF ORIGIN
FOR
ALLOCATION AND MANAGEMENT
OF
PUGET SOUND SALMON STOCKS
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