

Pacific
Salmon
Commission



1998/99
Fourteenth Annual
Report

Pacific Salmon Commission

**Established by Treaty between Canada
and the United States March 18, 1985**

**for the
conservation, management and
optimum production of Pacific salmon**

Fourteenth Annual Report 1998/99

**Vancouver, B.C.
Canada**

October 1999



PACIFIC SALMON COMMISSION

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

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Letter of Transmittal

In compliance with Article II, Paragraph 14 of the Treaty between the Government of Canada and the Government of the United States of America concerning Pacific salmon, it is my pleasure as Chair of the Pacific Salmon Commission to present my compliments to the Parties and to transmit herewith the Fourteenth Annual Report of the Commission.

This report summarizes the activities of the Commission for the fiscal year April 1, 1998 to March 31, 1999.

Reports on the results of the 1998 fishing season presented by the Parties and on meetings of the Commission and the Standing Committee on Finance and Administration are presented in summary. Executive summaries of documents prepared by Pacific Salmon Commission staff and the joint technical committees during the period covered by this report are also presented.

The Auditors' report on financial activities of the Commission during the fiscal year April 1, 1998 to March 31, 1999, as approved by the Commission, is also included in this report.

Discussion by the Commission on fishery regimes for 1999 and beyond were limited during the 1998/99 meeting cycle in an attempt to reach agreement on an abundance-based approach to coastwide management of chinook stocks. While progress was made, agreement could not be reached during the Commission's meeting cycle. Further discussion on this and other fishery regime issues is, at the time of writing, being conducted at the government-to-government level.

Yours truly,

A handwritten signature in black ink, appearing to read "P.S. Chamut", is written over a faint, larger signature that is partially obscured.

P.S. Chamut
Chair

PACIFIC SALMON COMMISSION

OFFICERS for 1998/99

Chair	Mr. James Pipkin (to December 2, 1998) Patrick S. Chamut (from December 2, 1998)
Vice-Chair	Mr. Patrick S. Chamut (to December 2, 1998) Mr. W. Ron Allen (from December 2, 1998)

COMMISSIONERS

Canada

Mr. Patrick S. Chamut (Chair)
Mr. Dennis Brown (to February 5, 1999)
Mr. Hubert Haldane
Mr. Michael Hunter
Mr. Gerry Kristianson
Mr. Rich Chapple (from February 5, 1999)
Mr. C.C. (Bud) Graham (to November 12, 1998)
Mr. Gibby Jacob (from February 5, 1999)
Mr. Paul Sprout (from February 5, 1999)
Mr. Bill Valentine

United States

Mr. W. Ron Allen (Vice-Chair)
Mr. James Pipkin
Mr. David Benton
Mr. Curt Smitch
Mr. Jev Shelton
Mr. Rollie Rousseau
Mr. Larry Rutter
Mr. Ted Strong

SECRETARIAT STAFF

Executive Secretary
Administrative Officer
Chief Biologist

Mr. Ian Todd
Mr. Ken Medlock
Dr. Jim C. Woodey

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INTRODUCTION

Interception of Pacific salmon bound for rivers of one country in fisheries of the other has been the subject of discussion between the Governments of Canada and the United States of America since the early part of this century. Intercepting fisheries were identified through research conducted by the two countries on species and stocks originating from Alaska, British Columbia, Washington and Oregon. The results of this research identified that Alaskan fishers were catching salmon bound for British Columbia, Oregon and Washington. Canadian fishers off the West Coast of Vancouver Island were capturing salmon bound for rivers of Washington and Oregon. Fishers in northern British Columbia were intercepting salmon returning to Alaska, Washington and Oregon, and United States fishers were catching Fraser River salmon as they travelled through the Strait of Juan de Fuca and the San Juan Islands towards the Fraser River.

Management of stocks subject to interception became a matter of common concern to both Canada and the United States. A mechanism to enable the countries to reap the benefits of their respective management and enhancement efforts was required. That mechanism is now provided through the Pacific Salmon Treaty, which entered into force upon the exchange of instruments of ratification by the President of the United States of America and the Prime Minister of Canada on March 18, 1985.

The Pacific Salmon Commission, guided by principles and provisions of the Treaty, establishes general fishery management regimes for international conservation and harvest sharing of intermingling salmon stocks. Each country retains jurisdictional management authority but must manage its fisheries in a manner consistent with the provisions of the Treaty. Implementation of the principles of the Treaty should enable the United States and Canada, through better conservation and enhancement, to prevent overfishing, increase production of salmon, and ensure that each country receives benefits equivalent to its own production. The Commission also serves as a forum for consultation between the Parties on their salmonid enhancement operations and research programs.

The organizational structure of the Commission is focused on three geographically oriented panels. The Northern Panel's stocks of concern are those which originate in rivers situated between Cape Suckling in Alaska and Cape Caution in British Columbia, including the transboundary rivers. The Southern Panel's stocks of concern are those which originate in rivers located south of Cape Caution, other than Fraser River sockeye and pink salmon. The Fraser River Panel has special regulatory responsibilities for stocks of sockeye and pink salmon originating from the Fraser River.

The functions of panels are to review annual post-season reports, annual pre-season fishing plans, and ongoing and planned salmonid enhancement programs of each country and to provide recommendations to the Commission for development of annual fishery regimes in accordance with the objectives of the Treaty. These plans, once adopted by the Commission and the governments, are implemented by the management agencies in each country.

The Fraser River Panel, in addition, has been accorded special responsibility for in-season regulation of Fraser River sockeye and pink fisheries of Canada and the United States in southern British Columbia and northern Puget Sound, in an area designated as Fraser River Panel Area Waters. Scientific and technical work is conducted for the Panel by the Fishery Management Division of the Commission's Secretariat staff.

Negotiations designed to lead to agreed fishery regimes for 1998 were conducted at the government-to-government level during the spring of 1998. Agreement was not reached on interim arrangements for chinook coast wide, transboundary and northern boundary area fisheries.

For southern British Columbia and Washington State fisheries, however, conservation arrangements for Canadian coho and Washington State chinook stocks were reached in late June. On July 3, 1998, an interim agreement was reached on 1998 management of Fraser River sockeye stocks. Specifics of that arrangement, which empowered the Fraser River Panel to function bilaterally during the 1998 season, are presented in Appendix A.

For the purpose of continuity with past Annual Reports, the last fully negotiated Annex IV from 1991 is included here as Appendix B.

The Commission meets at least once annually and conducts its business between meetings through its permanent Secretariat located in Vancouver, British Columbia. In the period April 1, 1998 to March 31, 1999, the Commission met on three occasions:

1. Commission Executive Session
December 1-3, 1998 - Vancouver, B.C.
2. Post-Season Meeting of the Commission and Panels
January 11-15, 1999 - Vancouver, B.C.
3. Fourteenth Annual Meeting of the Commission
February 8-12, 1999 - Portland, Oregon

This, the Fourteenth Annual Report of the Pacific Salmon Commission, provides a synopsis of the activities of the Commission and its subsidiary bodies during its Fourteenth fiscal year of operation, April 1, 1998 to March 31, 1999.

Activities of the Commission

PART I

ACTIVITIES OF THE COMMISSION

A. EXECUTIVE SESSION OF THE PACIFIC SALMON COMMISSION **December 1-3, 1998 – Vancouver, B.C.**

The Commission met in executive session for a full day during this meeting period. Post-season fishery reports from Canada and the United States were exchanged (details are provided in Section IV of this report).

The office of the Chair of the Commission was transferred to Mr. P. Chamut of Canada and Mr. W.R. Allen of the United States was appointed Vice-Chair. A consolidated list of most officers for 1998/99 was exchanged (Appendix C).

The Commission received a presentation from the Chinook Technical Committee concerning its responses to questions raised by Commissioners regarding United States' and Canadian proposals for abundance-based regimes for chinook fisheries.

The Committee also reported on the outcome of a chinook workshop that had been conducted with the objective of developing biologically based escapement goals. Results from this workshop were superficial so the Committee is proceeding to try to establish escapement goals for 23 stocks using MSY or other biologically-based approaches.

The Commission received a report from the co-chairs of the Selective Fishery Evaluation Committee on the status of coho and chinook mass marking and selective fishery proposals.

The Commission established a selection committee to interview candidates for the position of Executive Secretary to replace Mr. Todd, who will be retiring April 30, 1999.

The Commission received its future meeting schedule, and agreed to meet in Ketchikan in December 1999; Portland in January 2000; Vancouver in February 2000; Vancouver in January 2001; and Seattle in February 2001.

The Commission received an update from the Northern Boundary Technical Committee on the progress of its assignment to review the status of coho stocks in the northern boundary area. The Committee reported that it expects to complete its report by mid-January 1999.

The Commission developed a draft agenda for its January 11-15, 1999 meeting containing the following subjects:

- a) Report by the Chinook Technical Committee;
- b) Update from agencies on mass marking/selective fishery proposals;
- c) Report from the Standing Committee on Finance and Administration; and
- d) Report of the Executive Secretary Selection Committee.

The Panels will also be expected to meet bilaterally to conduct their post-season reviews of 1998 fisheries.

* This report has since been published as TCCHINOOK (98)-1. See Section V of this report.

B. MEETING OF THE COMMISSION AND PANELS

January 11-15, 1999 – Vancouver, B.C.

The Commission met twice in bilateral executive session during this meeting. During the first session the Commission received and reviewed a report presented by the Chinook Technical Committee titled "Preliminary Retrospective Analysis of the U.S. and Canadian Proposals for Abundance-Based Regimes for Chinook Fisheries."^{*}

The Commission received a report from the Northern Boundary Technical Committee on progress toward completing its assignment to assess the status of coho stocks in the northern boundary area. The Committee expects to deliver its completed report to the Commission prior to the February 1999 Annual Meeting.

The Commission received an update report on mass marking and selective fisheries proposals developed by management agencies and made available through the Commission's Selective Fishery Evaluation Committee. The Committee expressed continuing concerns about the potential negative impact of proposed chinook mass marking on the Commission's coastwide coded wire tag program.

The Commission received a report from the Standing Committee on Finance and Administration. The Committee presented a balanced budget proposal for fiscal year 1999/2000. The Commission adopted this report, which is presented in its entirety in Section II of this report.

The Commission received a report from the Executive Secretary Selection Committee. It was later announced that Mr. Don Kowal (DFO-Ottawa) is the successful candidate for the position.

During the second executive session, the Commission continued discussions of the Chinook Technical Committee's report. The Commission agreed to establish a small working group with the following terms of reference:

"Use the two national proposals for abundance-based management of coastwide chinook salmon fisheries to create one working document that can constitute the basis for bilateral negotiations. In creating the new document, the drafters should take into account the information developed by the CTC. Every effort should be made to achieve consensus.

The individuals named to the small working group were Mr. Scott and Mr. Rutter from the U.S. and Dr. Riddell and Mr. Sprout from Canada.

In determining what to include in the document:

- On matters for which the information developed by the CTC indicates that one approach is preferable, incorporate that approach in the draft. The decision to select one approach should be noted, and the authors should be prepared to explain why the decision was made;
- On matters for which a preferable approach is not evident, the new draft should frame the issue and include both proposals (using bracketed language or otherwise)."

This task group is expected to produce a document in time for the February meeting.

^{*} This report has since been published as TCCHINOOK(99)-1. See Section V of this report.

The Commission developed an agenda and work plan for the Fourteenth Annual Meeting scheduled for Portland, February 8-12, 1999. It was agreed that negotiations on fishery regimes would not take place within the Panels, so delegation sizes could be reduced. Three topics were identified for the Commission's agenda:

- a) Report of the Northern Boundary Technical Committee on the status of coho stocks;
- b) Report of the Selective Fishery Evaluation Committee; and
- c) Chinook - review the document to be developed and try to work through the issues.

C. FOURTEENTH ANNUAL MEETING OF THE COMMISSION

February 8-12, 1999 – Portland, Oregon

At the Commission's first sitting, Mr. Chamut introduced three newly-appointed Canadian Commissioners: Mr. G. Jacob, Mr. R. Chapple, and Mr. P. Sprout.

The Commission received a preliminary report from the special chinook task group established during the January meeting. This report was discussed extensively by the Commission for the balance of this sitting. The sitting was adjourned to permit further discussion to take place within delegations.

The Commission received a report from the Selective Fishery Evaluation Committee's co-chair, Dr. Morishima. He reported that a draft document is under review but a completion date cannot be projected. He summarized the current status of proposals for mass marking and selective fisheries for coho and chinook. The Commission expressed concern that the impact of mass marking chinook on the coded wire tag program cannot be assessed.

The Commission received a report from the Northern Boundary Technical Committee. The Committee reported substantial progress in developing agreed databases for coho catch and escapement. The main work of run reconstruction and interpretation has not been completed. A completion date could not be projected.

The Commission returned to discussion of the special chinook task group's report. It was suggested that its efforts to develop a document melding the two management approaches into Annex language be continued. The sitting was adjourned to permit further discussion by the national sections.

This discussion was continued into the third and final sitting of the Commission during this meeting without resolution.

Activities of the Standing Committees

PART II

ACTIVITIES OF THE STANDING COMMITTEES

A. MEETINGS OF THE STANDING COMMITTEE ON FINANCE AND ADMINISTRATION

1. Committee Activities

(a) Meeting of December 3, 1998 - Vancouver, B.C.

The Committee met on December 3, 1998 to consider a range of financial and administrative issues. The Committee's deliberations were focused primarily on a review of the Commission's current financial status, budget proposals for FY 1999/2000, and a budget forecast for FY 2000/2001.

The financial review and projections prepared by staff for the current fiscal year indicates that income by the end of March will be about \$27,000 higher than budgeted. Expenditures by the end of March 1999 will be approximately \$126,000 lower than budgeted. This situation will occur primarily as a result of lower than forecast personnel salaries and secondary benefits costs. In addition, final results from FY 1997/98 as reported by staff in July 1998, increased the unencumbered balance to \$251,000. The unencumbered balance from regular programs by March 1999 is expected to total \$404,000. Net revenue from the Commission's test-fishing program is expected to reach \$366,000. These two totals bring the forecast grand total unencumbered balance to approximately \$770,000 for carry over into FY 1999/2000.

The Committee recommends that these funds be carried over for application against program costs in FY 1999/2000.

The Committee reviewed the budget proposed by staff for FY 1999/2000. The assumptions staff have used to develop this budget include the expectation that the Secretariat will provide service to the Commission and the Fraser River Panel as has been done in the past, and that the Parties will provide base contributions at \$800,000 (\$Can) each. Application of the forecast operating balance from FY 1998/99 against program costs for FY1999/2000 would result in a projected unencumbered operating balance of approximately \$33,000 at the end of FY 1999/2000.

The Committee recommends adoption of the proposed budget for FY 1999/2000 as detailed in Appendix D.

The Committee reviewed staff's budget forecast for FY 2000/2001. The Committee notes that staff have forecast a funding shortfall of approximately \$460,000 for that fiscal year. The Committee noted that funding shortfalls of this magnitude and greater have been forecast in the past, but that by the time the budget forecast has been translated into a firm budget proposal, deficits have tended to shrink dramatically. The Committee has instructed staff to provide an interim report at the end of June 1999 which would include final financial results from FY 1998/99, and could incorporate a second view of expected test fishing results for 1999. If it appears at that time that action needs to be taken for FY 2000/2001, the Committee will so inform the Commission.

The Committee also reviewed the Commission's future meeting schedule, and, following on the discussion that took place during the Commission's December 2, 1998 executive session, confirmed the following future meeting dates and locations:

- (a) December 1999 – Executive Session – Ketchikan
- (b) January 2000 – Commission and Panels – Portland
- (c) February 2000 – Annual Meeting – Vancouver
- (d) December 2000 – Executive Session – Vancouver
- (e) January 2001 – Commission and Panels – Vancouver
- (f) February 2001 – Annual Meeting - Seattle

The Commission, at its January 13, 1999 executive session, adopted the recommendations of the Standing Committee on Finance and Administration.

2. Secretariat Staffing Activities

A list of Secretariat staff employees as of March 31, 1999 is presented in Appendix E.

An updated membership list for panels, standing committees, joint technical committees and ad hoc working groups as of March 31, 1999 is presented in Appendix F.

B. MEETINGS OF THE STANDING COMMITTEE ON RESEARCH AND STATISTICS

The Standing Committee on Research and Statistics did not meet during the fiscal year 1998/99.

Activities of the Panels

PART III

ACTIVITIES OF THE PANELS

A. FRASER RIVER PANEL

An agreed fishery regime for 1998 was reached by the Parties on July 3, 1998 (Appendix A). The Panel was able to carry out its in-season fishery management responsibilities. Commission staff conducted its regular in-season assessment programs and reported results to the Panel.

The Panel met in bilateral session during the January 1999 meeting of the Commission to review the results of the 1998 fishing season and receive reports from Canada on spawning escapements. The Panel also agreed to conduct a further post-season review (scheduled for May 10-14, 1999) after thorough technical analyses had been completed.

B. NORTHERN PANEL

The Northern Panel met in bilateral session to review the conduct of 1998 fisheries. No negotiations for future fishery regimes occurred at the Panel level.

C. SOUTHERN PANEL

The Southern Panel met in bilateral session to review the conduct of fisheries in 1998. No negotiations for future fishery regimes occurred at the Panel level.

Review of 1998 Fisheries and Treaty-Related Performance

PART IV

REVIEW OF 1998 FISHERIES AND TREATY-RELATED PERFORMANCE

The following review has been drawn from a number of reports prepared by Commission staff, joint technical committees, and domestic agencies for presentation to the Commission. Source documents are referenced for each part of this review. All figures are preliminary and will be updated in future reports as more complete tabulations become available.

A. FRASER RIVER SOCKEYE SALMON

The Fraser River Panel managed commercial net fisheries and the Canadian "inside" troll fishery in the Panel Area in 1998 under the terms of a July 2, 1998, Agreement between Canada and the United States. Under the Agreement, the United States catch of Fraser River sockeye salmon in Panel Area waters was not to exceed 24.9% of the Total Allowable Catch (TAC). In addition, the Panel was to manage United States commercial net fisheries in a pre-set pattern with gillnet and purse seine fisheries in Areas 6, 7 and 7A open Monday through Friday of each week during the period July 27 through August 21; the reef net fisheries in Areas 7 and 7A open Saturdays and Sundays July 25 through August 23; and Treaty Indian fisheries in Areas 4B, 5 and 6C open noon Sundays through noon Fridays July 26 through August 21. This schedule could be modified by the Panel, if necessary, to achieve spawning escapement objectives and Aboriginal food, social and ceremonial requirements based on in-season information. As well, the schedule could be modified to ensure the 24.9% catch limit was not exceeded or to avoid taking an excessive portion of the United States harvest in any weekly time period. Canadian fisheries in Panel Area waters were to be managed as in prior years under a "Closed unless opened by the Panel" process. Panel Area fisheries in Canada and Canadian fisheries outside Panel waters were to be managed in a manner that anticipated and accommodated catches in United States fisheries.

Canada provided the Panel with Fraser River sockeye salmon run-size forecasts and a schedule for spawning escapement targets on May 6. The forecast return was 11,218,000 fish, with a spawning escapement target of 5,770,000 adults at the forecast level. On July 21, Canada provided the Panel with its position on gross escapement targets for the purposes of calculating the United States share of the TAC. In addition to spawning escapement and in-river catch allocations, the gross escapement target included a 51,000 fish management adjustment to the Early Stuart sockeye stock group gross escapement (approved by the Panel July 10) to compensate for potential en route and pre-spawning mortalities of up to 56%.

On July 10, the Panel adopted regulations for regulatory control of Panel Areas. On July 24, the Panel adopted a fishing schedule developed using the Fishery Simulation Model. The fishing plan was to target Summer-run sockeye. Restrictions early in the season were expected to be needed to protect Early Stuart and Early Summer sockeye stocks and restrictions late in the season to protect Late-run sockeye. United States fisheries were expected to harvest a significant portion of the TAC of Late-run sockeye. There was expected to be a narrow window of opportunity for marine area fisheries in Canada. Surplus Summer-run sockeye were expected to be harvested in the Fraser River after mid-August.

During the course of the 1998 management season, concerns developed over the potential for en route and pre-spawning mortality on sockeye stocks migrating upstream of Mission due to abnormally high water temperatures. DFO scientists made a series of weekly "forecasts" of potential pre-spawning mortalities associated with observed and forecast river water temperatures and the migration timing of key sockeye stocks. Canada requested that the Panel take into account the potential for elevated pre-spawning mortalities and approve increases to gross

escapement targets. A management adjustment to the gross escapement target for Summer-run sockeye to compensate for a projected 25% pre-spawning mortality was approved by the Panel on August 14.

United States fisheries in Panel Area waters were managed by the Panel to provide separate fishing times for Treaty Indian and non-Indian fishers and for non-Indian gillnet and purse seine fishers. Canadian Panel Area fishing times were restricted to two gillnet fisheries in the Fraser River portion of Area 29 and one troll fishery in Areas 18 and 29.

Catches of Fraser River sockeye salmon in all fisheries totalled 3,032,000 fish. Canadian catches amounted to 2,217,000 sockeye while United States fishers harvested 708,000 fish, 522,000 in Washington waters and 186,000 in Alaska. Test fishing catches totalled 107,000 sockeye. Canadian catches were 1,256,000 in commercial fisheries, 844,000 in First Nations fisheries, 18,000 in recreational fisheries and 99,000 in an "excess salmon to spawning requirements" (ESSR) fishery in the Harrison River for surplus Weaver Creek sockeye. Commercial fishery catches summed to 1,963,000 fish.

The total return of Fraser River sockeye salmon in 1998 was estimated at 10,850,000 fish, just 3% less than forecast by Canada. The return abundance was near the long-term average return of 11,470,000 sockeye on the cycle. However, abundance in 1998 was the lowest on the cycle since 1978. The commercial exploitation rate was 18.1%, the lowest on record since at least 1946.

The Stock Monitoring program provided in-season estimates of abundance, run timing and migration route proportions of Fraser River sockeye salmon throughout the fishing season. Due to the low abundance and consequent low harvest on Early Stuart, Early Summer and Late-run sockeye stock groups in 1998, commercial fishing opportunities were greatly restricted. The absence of regular commercial catch data limited the use of these data in run-size estimation during the season. In-season run-size estimates in 1998 relied largely on Mission hydroacoustic estimates of daily escapement and on Juan de Fuca and Johnstone Strait purse seine test fishing catches and "catch per unit effort" (CPUE). In-season estimates of Early Stuart sockeye returns were close to the pre-season forecast abundance of 175,000 fish. Initial estimates of Early Summer (450,000) and Summer-run (4,500,000) sockeye stock abundances were lower than pre-season forecasts, resulting in restricted fishing opportunities. Later, second modes of Summer-run sockeye arrived and led to substantial increases in the in-season run-size estimates. The final estimate of Early Summer abundance was 787,000 fish and the final estimate of Summer-run sockeye abundance was 5,600,000 fish. Late-run abundance estimates decreased from a provisional estimate of 3,000,000 set on August 7 to 2,500,000 on September 1, based on lower than expected troll test fishing catches in the Strait of Georgia. Larger than projected escapements at Mission led to an end-of-season estimate of 4,200,000 Late-run sockeye.

Run timing was near normal for Early Stuart sockeye (July 3 in Area 20). Summer-run stocks were approximately three days later than normal (August 6 in Area 20) and Late-run sockeye peaked in migratory areas three days earlier than normal (August 15). Early in the 1998 migration, the proportion of sockeye migrating via Juan de Fuca Strait was estimated to be near normal at approximately 75% of the run. However, by the beginning of August, the migration via Johnstone Strait (diversion rate) increased to 80-90% of the migration. The diversion rate moderated in late August but the weighted average diversion rate for the season was estimated at 78% of the run because a large fraction of the run migrated during the high diversion period in early through mid August.

The Racial Identification program provided estimates of stock composition for catches in commercial, Aboriginal and test fisheries. Linear discriminant function analysis (DFA) was used to establish standards from sockeye scale characteristics. For most of the period of active fishing, nine unique stock groups were incorporated into two categories of in-season models: a) models with Early Summer and Summer-run stock complexes, and b) models with Summer-run and

Late-run stock complexes. The incidence of the brain parasite *myxobolus articus*, was used to distinguish Quesnel Lake sockeye from stocks with similar scale characteristics.

The total return of Early Stuart sockeye (190,000) slightly exceeded the preseason forecast. However, the return of age 4₂ fish (28,000) was only 19% of the pre-season forecast (150,000), while the return of age 5₂ sockeye (162,000) was about six times the forecast. The estimate of the return of Early Summer sockeye was 745,000 fish, about 16% greater than the forecast (642,000). Summer-run sockeye abundance reached 6,003,000 fish approximately 600,000 fish less than forecast. The Quesnel/Chilko stock group predominated in the Summer-run return (4,547,000), of which the Quesnel Lake watershed stocks (Horsefly River and Mitchell River) produced approximately 2,920,000 fish. Late-run sockeye stock abundance was estimated at 3,903,000 fish. Adams River and Lower and Middle Shuswap River sockeye stocks predominated in this group with a return of 2,570,000 fish.

Preliminary estimates of spawning escapements to streams in the Fraser River watershed totalled 4,520,000 adult sockeye. The escapement was 45% larger than the brood year (1994) escapement of 3,129,000 adults and was the second largest escapement recorded on the cycle. Large increases were recorded in the Summer-run and Late-run stock group escapements. A small decline was observed in the Early Summer stock group. The Early Stuart sockeye escapement was unchanged from 1994.

Spawning success was quite variable in 1998. Early Stuart female sockeye suffered a 44% pre-spawning mortality. This was close to that predicted in-season based on river temperatures and arrival timing. Most other stocks had low pre-spawning mortality rates despite the abnormally high temperatures encountered during upstream migration. The weighted average success of spawning was 93.7% of the female population.

Adjusted gross escapement targets were nearly achieved or exceeded for each stock group based on lower river estimates. The Early Stuart and Late-run sockeye stock group gross escapements were both 1-2% below target but the Early Summer and Summer-run stock groups were 35% and 24% above target, respectively. The summed gross escapements exceeded the targets by a total of 917,000 fish. Most of that number (812,000) were Summer-run sockeye that escaped upriver in mid-late August when Late-run sockeye were present in the lower Fraser River.

Upriver estimates of gross escapement (catch plus spawning escapements) were significantly below the targets for Early Stuart, Early Summer and Late-run stock groups but was above the target for Summer-run stocks. The shortfalls in the Early Stuart, Early Summer and Late-run sockeye may be due, in part, to en route mortality.

In 1998, in-season management of commercial fisheries in United States waters was impacted by high Johnstone Strait diversion rate and, in Canada, by the Panel's inability to provide access to additional catch of Summer-run sockeye due to the overlap of Late-run stocks in marine and lower Fraser River fishing areas. At the last in-season meeting that dealt with United States Panel Area fishing times, the TAC was estimated at approximately 2,600,000 fish of which United States fishers were entitled to harvest 24.9% or 647,000 fish. In-season catch estimates for United States Panel Area fisheries had reached 579,000 fish at that point (22.2% of the available TAC). Subsequent revisions of United States catch estimates for over-estimation errors and a reduction of the TAC due to the inability to provide opportunity for further harvest of Summer-run in Canada resulted in a similar percentage harvest in the United States fishery. The final estimate of United States catch was 522,000 sockeye out of a TAC of 2,425,000 fish or 21.5%.

Domestic allocation goals for the commercial catch existed for both user groups and area or gear groups within user groups in United States Panel Area fisheries and for gear license areas in Canada. In United States waters, Treaty Indian fishers caught 32,000 fish more than their allocation and Non-Indians were under their allocation by the same amount. Among Treaty

Indians, fishers in Areas 4B, 5 and 6C harvested 26,000 fish or 8.9% of the Treaty Indian catch, which was below the maximum harvest share of 20%. Non-Indian fishers were to share the harvest as follows: 54% for purse seines, 41% for gillnets and 5% for reef nets. Purse seiners caught 53.7%, gillnetters 42.4% and reef nets 3.9%. Canadian gear license groups were to share the commercial fishery harvest of Fraser River sockeye as follows: Area F troll 75,000 fish; Area B purse seines 41%; Area D gillnets 11%; Area E gillnets 21%; Area G troll 16%; and Area F troll 8%. Actual catches were distributed as follows: Area F 82,000 fish; Area B 33.8%; Area D 12.4%; Area E 21.3%; Area G 17.0%; and Area F 8.0%.

(Source Document) *Draft Report of the Fraser River Panel to the Pacific Salmon Commission on the 1998 Fraser River Sockeye Salmon Fishing Season.* PSC Staff. June 1999.

B. PRELIMINARY 1998 POST-SEASON REPORT FOR UNITED STATES SALMON FISHERIES OF RELEVANCE TO THE PACIFIC SALMON TREATY

Northern Boundary Area Fisheries

District 104 Purse Seine Fishery

For the 1998 purse seine fishing season, no agreement had been reached with Canada on the conduct of the District 104 fishery. Past annex arrangements had governed the conduct of the fishery early in the season, pre-Statistical Week 31, when Nass and Skeena sockeye salmon are most abundant in the district and prior to the main body of the pink salmon run to southern Southeast Alaska. The management intent in 1998 was to maintain early season harvest and stock assessment opportunities, to manage based on the observed abundance of salmon, to allow fishermen the opportunity to harvest domestic stocks, and to coordinate purse seine fishing opportunities throughout Southeast Alaska in an effort to promote distribution of the fleet and an orderly fishery.

In order to achieve these objectives, pre-Week 31 openings in District 104 were based on the observed run strength of salmon and the number of vessels fishing in the district. Pre-season expectations for the 1998 season were that the fishing time would not exceed that allowed in Districts 101 and 102 nor exceed the 1985-97 average hours fished in District 104 prior to Statistical Week 31.

In 1998 there were three openings prior to Statistical Week 31 (Table 1) – an 8-hour opening on July 5 (Week 28), a 12-hour opening on July 12 (Week 29) and a 12-hour opening on July 19 (Week 30). During these three openings, 57, 35, and 38 boats harvested a total of 17,394 sockeye, 72,565 pink, 87,866 chum, and 20,906 coho salmon (Table 1). Catch rates and catches of pink and sockeye salmon were below 1985-1997 averages. The low catch rate on sockeye salmon was consistent with other fishery indicators in the northern boundary area that Skeena sockeye runs were relatively poor. Consequently, District 104 was managed conservatively and the hours opened in these early weeks were much less than that fished in Districts 101 and 102 which had five 15-hour seine openings in Weeks 28-30 and relatively good catch rates for pink salmon.

The average number of hours, boats, days, and boat-days fished pre-Week 31 in years 1985-1998 is down 43 to 69% compared to the 1980-1984 period (Table 2). The sockeye harvest is also down 15% despite an increase in sockeye availability in recent years; the average sockeye catch-per-boat-day has increased 180% since 1984.

After Week 30, District 104 was opened the same dates and hours as the purse seine openings in Districts 101, 102, and 103. Fifteen and 39-hour openings were fished in both Weeks 31 and 32 followed by five 39-hour openings in Weeks 33-35 fished on a two-day-on and two-day-off schedule. District 104 harvests in 1998 totalled 5,816,000 pink, 487,000 sockeye, 383,000 chum, 103,000 coho, and 7,000 chinook salmon (Table 1). Catch rates, and consequently effort, were relatively lower in District 104 than in recent years. Over 40% of the 487,000-sockeye harvest were taken in the 39-hour opening on August 5-6.

Table 1. Catch and effort in the Alaska District 104 purse seine fishery by opening, 1998.

Week/ Opening	Start Date	Chinook	Sockeye	Coho	Pink	Chum	Total	Boats	Hours
28	5-Jul	0	2,574	3,808	7,276	25,915	39,573	57	8
29	12-Jul	0	5,333	9,221	14,213	28,933	57,700	35	12
30	19-Jul	0	9,487	7,877	51,076	33,108	101,548	38	12
31	26-Jul	0	19,213	6,356	246,851	33,479	305,899	55	15
31B	29-Jul	0	22,428	5,163	251,109	30,232	308,932	35	39
32	2-Aug	2,657	49,387	11,396	407,429	36,376	507,245	75	15
32B	5-Aug	1	201,502	14,756	1,483,771	48,444	1,748,474	97	39
33	9-Aug	1,803	64,333	12,322	936,745	34,520	1,049,723	104	39
33B	13-Aug	9	52,633	14,668	1,028,294	31,440	1,127,044	93	39
34	17-Aug	1,419	31,004	6,729	703,903	26,557	769,612	59	39
34B	21-Aug	945	22,146	6,527	467,161	23,064	519,843	49	39
35	25-Aug	197	7,190	3,848	233,492	17,139	261,866	25	39
Total Wks 28-30		0	17,394	20,906	72,565	87,956	198,821	130	32
Total Wks 31-35		7,031	469,836	81,765	5,758,755	281,251	6,598,638	592	303
Total Season		7,031	487,230	102,671	5,831,320	369,207	6,797,459	722	335

Table 2. Fishing opportunity, effort, and sockeye harvests prior to Week 31 in the District 104 purse seine fishery, 1980 to 1998.

Year	Hours Fished	Days Fished (1d=1+hr)	Fraction Days Fished (1d=15hr)	Boat-Days Fished (Fraction Boats and Fraction Days)	Sockeye Harvest	Sockeye Catch/ Boat-Day (Cumulative Weeks. 28-30)
1980	207	10	9.750	1,897	266,198	415
1981	132	7	6.625	787	185,188	707
1982	117	6	6.000	1,034	212,851	636
1983	108	6	6.000	889	168,806	606
1984	108	7	7.000	513	103,319	793
1985	84	5	5.000	378	100,590	750
1986	108	6	6.000	694	91,320	406
1987	75	5	5.000	317	72,385	641
1988	108	6	6.000	673	248,759	1,051
1989	84	5	5.000	368	157,034	1,371
1990	42	4	3.250	307	169,943	2,467
1991	41	4	3.209	193	98,583	2,045
1992	29	3	2.330	162	79,643	1,705
1993	45	4	3.376	307	163,189	1,564
1994	55	6	4.542	174	158,524	2,345
1995	58	5	4.292	202	71,376	1,708
1996	31	4	2.793	133	215,144	3,833
1997	56	6	3.733	399	572,942	4,304
1998	32	3	2.130	89	17,394	588
Ave. 80-84	134	7	7.075	1,024	187,272	631
Ave. 85-97	61	5	4.047	314	158,345	1,770
% Change	-55%	-33%	-43%	-69%	-15%	180%

Tree Point Drift Gillnet Fishery

The Tree Point drift gillnet fishery opens by regulation on the third Sunday of June. During the early stages of the fishery, management is based on the run strength of Alaska wild stock chum and sockeye salmon and on the strength of the Nass River sockeye salmon. Beginning in the third week of July, when pink salmon stocks begin to enter the fishery in large numbers, management emphasis shifts by regulation to that species. The District 101 Pink Salmon Management Plan sets gillnet fishing time at Tree Point in relation to the District 101 purse seine fishing time when both fleets are concurrently harvesting the same pink salmon stocks. The U.S./Canada Pacific Salmon Treaty calls for an average annual harvest of 130,000 sockeye salmon.

In 1998, the Tree Point gillnet fishery was opened for three 4-day fishing weeks beginning June 21 (Week 26). Sockeye harvests during these three openings were above 1985-1997 averages, chum harvests were much higher than average, and the number of boats fishing the district, was a little below average. Nevertheless, fishing time was reduced to a 2.5 day (60 hour) opening in Week 29 in response to Canadian concerns over lagging sockeye escapements in the Nass River.

The fishery was managed according to the Pink Salmon Management Plan from Week 30 through Week 35. A 4-day opening was fished in Week 30 followed by 5-day openings in Weeks 31-35. During this time harvests of pink, chum, and coho salmon were well above Treaty

averages and sockeye harvest and effort were below average. In Weeks 30 and 31, the southern portion of the Tree Point area was closed to protect Nass River sockeye after Canadian Department of Fisheries and Ocean biologists determined that escapement levels were not being met.

Starting on August 30 (Week 36) and continuing through the close of the fishery on September 22 (Week 39), the fishery was managed on the strength of the fall chum and coho returns. Chum catches were above average and coho catches were well above average. Three-day fishing periods were allowed in each of these four weeks. Effort remained a little below average.

A total of 160,506 sockeye salmon were harvested in the District 101 drift gillnet fishery in 1998 (Table 3). This brings the 1985-1998 average annual harvest of sockeye salmon to 167,868 (Table 4).

Table 3. Weekly catch and effort in the Alaska District 101 commercial drift gillnet fishery, 1998.

Week/ Opening	Start Date	Chinook	Sockeye	Coho	Pink	Chum	Total	Boats	Hours
26	21-Jun	411	16,511	465	782	34,933	53,102	93	96
27	28-Jun	362	30,642	748	5,137	63,148	100,037	98	96
28	5-Jul	182	28,470	1,127	30,614	52,085	112,478	105	96
29	12-Jul	35	14,448	1,475	62,192	38,729	116,879	94	60
30	19-Jul	27	30,288	2,454	98,998	42,284	174,051	95	96
31	26-Jul	32	18,107	2,815	147,320	47,836	216,110	95	120
32	2-Aug	30	13,177	4,216	161,678	39,731	218,832	82	120
33	9-Aug	2	2,126	1,410	40,547	24,485	68,570	75	120
34	16-Aug	9	3,681	3,482	60,812	29,258	97,242	60	120
35	23-Aug	3	1,857	6,326	32,546	45,036	85,768	57	120
36	30-Aug	0	505	6,512	6,642	38,776	52,435	61	72
37	6-Sep	0	298	11,088	1,861	33,237	46,484	52	72
38	13-Sep	5	291	12,766	396	24,457	37,915	56	72
39	20-Sep	0	105	5,381	181	7,724	13,391	37	72
Total		1,098	160,506	60,265	649,706	521,719	1,393,294	1,060	1,332

Table 4. Annual harvest, and average annual harvest, of sockeye salmon in the Alaska District 101 drift gillnet fishery, 1985 to 1998.

Year	Annual Harvest	Average Annual Harvest	Deviation from 130,000 Annex Average
1985	172,863	172,863	42,863
1986	145,657	159,260	29,260
1987	107,595	142,038	12,038
1988	116,115	135,558	5,558
1989	144,936	137,433	7,433
1990	85,691	128,810	(1,191)
1991	131,492	129,193	(807)
1992	244,649	143,625	13,625
1993	394,098	171,455	41,455
1994	100,377	164,347	34,347
1995	164,294	164,342	34,342
1996	212,403	168,348	38,348
1997	169,474	168,434	38,434
1998	160,506	167,868	37,868

Escapements

Pink salmon escapement indices were well above the 1990-1997 average in most stock groups in Districts 101-104. Escapement indices for Portland Canal, West Behm Canal, and Moria Sound stock groups were particularly strong. Escapement indices to the 16 stock groups in Districts 105-108 were mixed - counts were above average in eight stocks and below average in eight stocks. When summed across Districts 101-108, escapement indices totaled 10.9 million and exceeded the 6.0 – 9.0 million goal range by 1.9 million.

Programs to estimate escapements of sockeye salmon were only in place for three systems in southern Southeast Alaska in 1998, Hugh Smith, McDonald, and Salmon (Karta) Lakes. The sockeye escapement to Hugh Smith Lake was 1,138 based on weir and mark-recapture estimates. The escapement of sockeye salmon into McDonald Lake was estimated to be 54,161 based on expanded foot surveys. Approximately 21,300 McDonald Lake sockeye were harvested in a directed seine fishery in Yes Bay. Salmon Lake escapement was estimated at 4,491 based on a mark-recapture study and expanded foot surveys. There was a relatively poor return of three-ocean sockeye in all three systems this year.

Escapements of summer and fall run chum salmon were generally well distributed and at high levels throughout southern Southeast Alaska. Wild stock chum escapement counts were the highest on record in many mainland District 101 streams. The District 102 fall chum harvest of 560,000 was over twice the 1994 record and escapements were correspondingly strong. Returns of hatchery chum salmon to Nakat, Neets, and Kendrick Bays were all at historical high levels.

Aerial and foot surveys for coho salmon indicated escapements were within acceptable ranges throughout southern Southeast Alaska. The Ketchikan area coho escapement index of 8,022 was above the 1987-1997 average of 7,701. Survey conditions were adequate for 13 of the 15 streams in the index. The escapement to Hugh Smith Lake was 893 which, although lower than the 1982-1997 average of 1,248, was in the upper portion of the 500-1,100 spawner goal range.

Transboundary Area Fisheries

Stikine River Area Fisheries

The 1998 harvest in the District 106 commercial gillnet fishery included 518 chinook, 113,435 sockeye, 273,197 coho, 502,655 pink, and 332,022 chum salmon (Table 5). District 106 catches of coho, pink, and chum salmon were above the 1988 to 1997 averages while the catches of chinook and sockeye salmon were below the averages. However, seven of the largest sockeye catches since statehood have occurred during the past 10 years. The coho salmon catch was the second highest since statehood and the chum salmon catch was the highest since statehood. An estimated 36.9% of the coho catch was of Alaskan hatchery origin. The U.S./Canada joint Tahltan and Tuya fry planting project contributed an estimated 8,245 fish to the District 106 sockeye catch.

Table 5. Weekly salmon catch in the Alaskan District 106 commercial drift gillnet fisheries, 1998. Catches do not include Blind Slough terminal area harvests.

Week	Start Date	Catch					Effort		
		Chinook	Sockeye	Coho	Pink	Chum	Permits	Days	Permit Days
26	21-Jun	152	7,296	4,933	749	8,617	66	3	198
27	28-Jun	116	7,624	10,697	1,031	15,585	80	2	160
28	5-Jul	51	15,328	16,626	3,511	31,192	100	2	200
29	12-Jul	45	15,735	18,348	8,721	29,968	131	2	262
30	19-Jul	32	16,382	19,779	29,679	46,307	131	2	262
31	26-Jul	32	19,294	11,803	51,920	54,820	120	3	360
32	2-Aug	27	15,457	17,796	128,394	51,129	127	3	381
33	9-Aug	15	7,882	16,156	118,181	27,028	123	3	369
34	16-Aug	9	5,352	19,661	116,601	21,694	132	4	528
35	23-Aug	3	2,240	22,830	33,897	8,535	109	3	327
36	30-Aug	2	272	21,852	8,635	9,069	106	3	318
37	6-Sep	1	441	26,473	758	8,580	104	3	312
38	13-Sep	10	87	37,559	563	11,234	112	3	336
39	20-Sep	22	42	20,482	11	6,364	95	3	285
40	27-Sep	1	3	7,969	4	1,824	42	2	84
41	4-Oct	0	0	233	0	76	8	2	16
Total		518	113,435	273,197	502,655	332,022		43	4,398

In the District 108 fishery, 460 chinook, 21,994 sockeye, 19,206 coho, 39,246 pink, and 41,057 chum salmon were harvested (Table 6). Catches of coho, pink, and chum salmon were above the 1988-1997 averages with coho catch being the fifth highest on record and the chum and pink catches being the third highest on record. Catches of chinook and sockeye salmon were below average. An estimated 15.9% of the coho catch was of Alaskan hatchery origin. The U.S./Canada joint Tahltan and Tuya Lake fry planting project contributed an estimated 6,118 sockeye salmon to the District 108 catch.

Table 6. Weekly salmon catch and effort in the Alaskan District 108 commercial drift gillnet fishery, 1998. Catches do not include Ohmer Creek terminal area harvests. The permit days are not adjusted for boats which did not fish the entire opening.

Week	Start Date	Catch					Effort		
		Chinook	Sockeye	Coho	Pink	Chum	Permits	Days	Permit Days
26	21-Jun	105	2,224	91	16	211	20	3	60
27	28-Jun	143	4,768	389	148	1,013	42	2	84
28	5-Jul	137	5,563	1,741	665	3,162	76	4	304
29	12-Jul	19	1,820	168	1,158	2,474	20	2	40
30	19-Jul	20	2,527	327	3,967	3,249	19	2	38
31	26-Jul	22	3,308	1,309	10,851	12,746	39	3	117
32	2-Aug	2	1,036	1,139	8,760	3,287	19	3	57
33	9-Aug	3	345	810	5,634	3,255	20	3	60
34	16-Aug	5	301	1,630	6,325	6,312	21	4	84
35	23-Aug	3	48	514	1,464	3,235	14	3	42
36	30-Aug	1	32	4,891	245	729	22	3	66
37	6-Sep	0	11	2,770	13	800	22	3	66
38	13-Sep	0	8	1,837	0	318	7	3	21
39	20-Sep	0	3	569	0	82	6	3	18
40	27-Sep	0	0	755	0	141	7	2	14
41	4-Oct	0	0	266	0	43	1	2	2
Totals		460	21,994	19,206	39,246	41,057		45	1,073

Harvest sharing of Stikine sockeye stocks is based on in-season abundance forecasts produced by the Stikine Management Model (SMM) (Table 7). The marine and in-river catches of planted Tuya fish were estimated from analysis of otoliths for thermal marks. Egg diameter analysis of in-river catches was used to estimate the relative abundances of Tahltan and Mainstem fish to Tuya fish in the Stikine River. The ratios of thermally marked Tuya fish to Tahltan and Mainstem fish in-river were applied to the marine catches of Tuya fish to estimate the harvests of Tahltan and Mainstem Stikine sockeye stocks. Based on these analyses and ratios, the Sumner Strait fishery (Subdistricts 106-41 & 42) harvested 21,959 Stikine sockeye salmon, 27.8% of the total sockeye harvest in that subdistrict; the Clarence Strait fishery (Subdistrict 106-30) took 1,531 Stikine fish, 4.5% of the catch in that subdistrict; and the District 108 fishery, near the mouth of the Stikine River, harvested 17,906 Stikine fish, 81.5% of the District 108 catch. An estimated 41,394 Stikine sockeye salmon were harvested in commercial gillnet fisheries from both districts, representing 30.6% of the total sockeye catch. Of these 41,394 Stikine sockeye salmon, an estimated 15,989 fish were produced by the joint U.S./Canada fry planting project on the Stikine River.

Table 7. Weekly forecasts of run size and total allowable catch for Stikine River sockeye salmon as determined in-season by the Stikine Management Model, 1998.

Stat. Week	Start Date	Forecasts Run Size ^a	TAC	TAC		Cumulative Catch	
				U.S.	Canada	U.S.	Canada
Model Runs Generated by the U.S.							
26	21-Jun	218,500	120,500	60,250	60,250	5,652	2,200
27	28-Jun	219,938	120,500	60,250	60,250	10,973	6,327
28	5-Jul	212,171	117,396	58,698	58,698	22,319	14,643
29	12-Jul	196,746	113,765	56,883	56,883	27,190	21,020
30	19-Jul	196,899	117,970	58,985	58,985	31,352	25,487
31	26-Jul	200,189	120,738	60,369	60,369	35,593	33,676
32	2-Aug	206,675	127,248	63,624	63,624	36,741	42,817
33	9-Aug	209,393	130,520	65,260	65,260	38,684	43,686
34	16-Aug	208,737	130,261	65,130	65,130	38,684	43,686

^a U.S. forecast were as follows: the preseason forecast was used for weeks 25 and 26; the in-river test fishery CPUE data for week 27, and the forecast based on in-river commercial fishery CPUE was used for the remainder of the sockeye season. (Canada independently generates forecasts that may use different criteria in some weeks.)

The estimated Stikine sockeye run was 129,094 fish (Table 8); the estimated spawning escapements of 9,149 Tahltan and 16,773 Mainstem fish were below the respective escapement goals.

Table 8. Preliminary run reconstruction for Stikine sockeye salmon, 1998.

	Tahltan	Tuya	Mainstem	Total
Escapement	12,638	14,295	16,733	34,074
Broodstock	3,099			
ESSR	0	6,103		
Otoliths	390			
Spawning	9,149	8,192	16,733	34,074
Canadian Harvest				
Indian Food	2,614	2,761	211	5,586
Upper Commercial	461	401	45	907
Lower Commercial	12,897	13,296	11,117	37,310
Total	15,971	16,458	11,373	43,803
Test Fishery Catch	56	70	65	190
In-river Run	28,665	30,823	28,211	87,700
U.S. Harvest				
106-41&42	7,417	7,530	7,012	21,959
106-30	718	627	186	1,531
108	5,591	5,948	6,367	17,905
Total ^a	13,838	13,992	13,565	41,394
Total Run	42,504	44,815	41,776	129,094
Escapement Goal	24,000		30,000	54,000
TAC	18,504	19,510	11,776	49,789
Canada TAC	9,252	9,755	5,888	24,895
Actual Catch	16,027	16,528	11,438	43,993
% of TAC	86.6%	84.7%	97.1%	88.4%
U.S. TAC	9,252	9,755	5,888	24,895
Actual Catch	13,838	13,992	13,565	41,394
% of TAC	74.7%	71.7%	115.2%	83.1%

^a U.S. test fishery catches of approximately 3,000 Stikine sockeye salmon is not yet included in this analysis.

The postseason estimates are likely to change when stock identification analyses are completed.

Taku River Area Fisheries

The 1998 commercial salmon harvests in the District 111 fishery totalled 794 chinook, 69,677 sockeye, 28,713 coho, 168,283 pink, and 296,111 chum salmon (Table 9). Catches of chinook, sockeye, and coho salmon were below average, but catches of pink and chum salmon were above average. Hatchery fish contributed significantly to the harvests of all species except pink salmon. The chinook salmon harvest of 794 fish was 77% below the 1988 to 1997 average and was the lowest on record. Alaskan hatchery fish contributed approximately 36% (285 fish) of the harvest (CWT estimate). The sockeye salmon harvest of 69,677 fish was 40% below the previous 10-year average of 115,947. Estimated contributions of sockeye salmon from joint U.S./Canada Taku River fry planting programs totalled 569 Trapper Lake and 251 Tatsamenie Lake fish. Additionally, an estimated 17,310 domestic U.S. hatchery sockeye salmon were taken in the Taku

Inlet and Stephens Passage fisheries. The percentage of the sockeye harvest that occurred in Taku Inlet (Subdistrict 111-32) was 68%, which is less than the 10-year average of 83% and the lowest since 1988. This was a reflection of the below average Taku sockeye run and the increased contribution of domestic hatchery fish in Stephens Passage (Subdistrict 111-31) catches. The coho catch of 28,713 fish was 34.3% of the previous 10-year average of 83,814 fish and included an estimated 5,931 fish of Alaska hatchery origin (20.6% of the catch). The summer chum catch of 291,416 fish was 75% higher than the 1988-1997 average and was the third highest on record. The majority of the summer chum harvest is of Alaska hatchery origin but quantitative contribution estimates are not available. The catch of 4,695 fall chum salmon (i.e. chum salmon caught after statistical week 33) was 25% of the previous 10-year average. The District 111 pink salmon harvest of 168,283 was 20% above the 1988 to 1997 average of 140,409 fish. Escapements of pink salmon to the Taku River and streams in Taku Inlet and Stephens Passage were good in 1998, but escapements to District 111 streams to the north of the Taku River were poor.

Table 9. Weekly catch and effort in the Alaskan District 111 commercial drift gillnet fishery, 1998.

Week	Start Date	Catch					Effort		
		Chinook	Sockeye	Coho	Pink	Chum	Boats	Days Open	Boat Days
26	21-Jun	329	2,319	2	20	1,902	51	3	153
27	28-Jun	175	4,597	32	2,357	16,242	80	3	240
28	5-Jul	101	5,144	131	9,147	62,471	74	4	296
29	12-Jul	43	9,626	285	14,619	81,727	86	4	344
30	19-Jul	59	11,566	517	33,692	71,733	93	5	465
31	26-Jul	47	16,459	1,497	39,872	37,078	97	4	388
32	2-Aug	21	10,141	1,440	35,604	14,619	80	4	320
33	9-Aug	6	5,558	2,431	19,293	5,644	56	4	224
34	16-Aug	10	2,826	1,977	12,171	1,461	47	4	188
35	23-Aug	0	895	3,040	1,448	1,136	38	3	114
36	30-Aug	1	267	3,619	59	760	32	3	96
37	6-Sep	0	173	6,736	1	872	40	2	80
38	13-Sep	2	103	6,524	0	441	42	3	126
39	20-Sep	0	3	482	0	25	18	2	36
Totals		794	69,677	28,713	168,283	296,111		48	3,070

Several other fisheries in the Juneau area harvested Taku river salmon stocks in 1998. Estimates of harvest in the U.S. personal use fishery are 20 chinook, 1,500 sockeye, 140 coho, 450 pink, and 0 chum salmon. The spring Juneau-area sport fishery harvested an estimated 2,547 chinook salmon of which 2,339 fish were large fish (28 inches or longer). Almost all of the 208 small chinook salmon were hatchery fish taken in terminal areas. Of the large chinook salmon an estimated 1,840 were mature wild spawners, 114 were immature wild chinook, and an additional 385 fish (16%) were of Alaska hatchery origin (CWT estimate). A number of wild stocks are thought to contribute to the sport fishery, including those from the Taku, Chilkat, and King Salmon rivers, but the major contributor of mature fish is believed to be the Taku River. The July Hawk Inlet shoreline purse seine fishery north of Point Marsden in Chatham Strait was not opened this year due to poor runs of early run pink salmon to the Juneau area.

The total Taku River sockeye run was an estimated 136,095 fish, which was 58% of the 1988-1997 average run size of 232,100 fish. Based on the escapement goal range of 71,000 to 80,000 fish, the TAC was 56,095 to 63,095 sockeye salmon of which the U.S. harvested 65% to 75%.

The estimated escapement of 74,901 sockeye salmon in 1998 was within the escapement goal range. Taku River sockeye salmon have comprised an average of 82% of the District 111 sockeye catch of wild fish from 1983 to 1997. This average was used in the preliminary run reconstruction (Table 10).

Table 10. Preliminary Taku sockeye salmon run reconstruction, 1998. Estimates do not include spawning escapements below the U.S./Canada border.

	Taku	Snettisham Stocks
Escapement	74,901	Not Available
Canadian Harvest		
Commercial		
Wild	18,472	
Planted	586	
Food Fishery	NA	
Total	19,058	
% Harvest	31.1%	
Test Fishery Catch	0	
Above Border Run	93,959	
U.S. Harvest		
District 111		
Wild	39,816	11,732
Enhanced	820	17,310
Personal Use	1,500	
Total	42,136	
% Harvest	68.9%	
Total Run	136,095	
Taku Harvest Plan	Minimum	Maximum
Escapement Goal	71,000	80,000
TAC	65,095	56,095
Canadian portion	29.3%	34.0%
U.S. Portion	64.7%	75.1%

Alsek River Area Fisheries

Although catch sharing of Alsek salmon stocks between Canada and the U.S. has not been specified, Annex IV of the Pacific Salmon Treaty does call for a co-operative attempt to rebuild depressed chinook and early-run sockeye stocks. Preseason expectations were for an average run of early sockeye salmon, an average run of late run sockeye salmon, and an above average run of chinook salmon. These expectations were based on parent-year escapements to the Klukshu River. The Alsek River was opened to commercial fishing on week 23, the first Monday in June (June 1). The initial opening was limited to 24 hours in order to evaluate the effectiveness of chinook conservation measures. Fishery performance during statistical weeks 26 and 27 indicated that the run was above average in strength and 3 days of fishing were allowed each week. Fishery performance dropped to below average in week 28 and only one day of fishing was allowed. An increase in CPUE in week 29 resulted in a one-day extension of the fishery. The

fishery was limited to one day per week for the remainder of the sockeye fishery (through week 35). The fishery targeted on coho stocks after late August and was open for 23 days during this period for a season total of 41 days, below the average of 46 days.

The Dry Bay commercial set gillnet fishery harvested 550 chinook, 15,008 sockeye, 4,924 coho, 1 pink, and 145 chum salmon (Table 11). The sockeye harvest of 15,008 fish was about 80% of the 1988-1997 average of 18,751. The chinook harvest of 550 fish was about 35.9% above the 1988-1997 average of 405 fish, but was lower than the catches of the last four years. The coho harvest of 4,924 was 84.5% of the 1988-1997 average of 5,799 coho while the pink and chum catches less than half of average.

The apparent above average run size of sockeye based on CPUE in the Dry Bay gillnet fishery during weeks 26, 27, and 29 was not confirmed by sockeye counts at the Klukshu weir. The early sockeye count of 597 fish was 16% of average for this run segment and the late sockeye count of 12,994 fish was 98% of average.

Table 11. Weekly catch and effort in the U.S. commercial fishery in the Alsek River, 1998.

Week	Start Date	Catch					Effort		
		Chinook	Sockeye	Coho	Pink	Chum	Permits	Days Open	Permit Days
23	31-May	90	300	0	0	0	19	1	19
24	7-Jun	231	503	0	0	0	21	1	21
25	14-Jun	141	758	0	0	0	22	1	22
26	21-Jun	65	2,180	0	0	0	20	3	60
27	28-Jun	15	3,738	0	0	0	21	3	63
28	5-Jul	0	559	0	0	0	15	1	15
29	12-Jul	6	1,762	0	0	0	20	2	40
30	19-Jul	0	1,125	0	0	0	21	1	21
31	26-Jul	0	564	0	0	0	20	1	20
32	2-Aug	1	2,539	0	0	0	17	1	17
33	9-Aug	1	672	17	0	1	10	1	10
34	16-Aug	0	123	18	0	0	^a	1	^a
35	23-Aug	0	40	80	1	1	^a	1	^a
36	30-Aug	0	70	477	0	13	4	3	12
37	6-Sep	0	27	508	0	0	3	3	9
38	13-Sep	0	29	1,360	0	50	5	5	25
39	20-Sep	0	19	1,840	0	80	5	5	25
40	27-Sep	0	0	474	0	0	3	4	12
41	4-Oct	0	0	150	0	0	^a	3	^a
Totals		550	15,008	4,924	1	145		41	399

^a Effort is not listed by week, but is included in the season total.

Transboundary River Joint Enhancement Activities

The transport of sockeye fry back to the Canadian lakes took place between June 7 and June 29, 1998. A total of 13 flights were taken with close to 6 million fry transferred. These fry were reared at Snettisham Hatchery from a collection of 7.9 million eggs taken on the spawning grounds in 1997. There was an overall survival of 86.3% during the rearing period (Table 12). This is an improvement over the five year average of 73.6%. However there were fewer number of planted fry than in years past due to the smaller egg take in Tahltan Lake (3.2 million) which resulted from poor escapement of the parent stock. Thermal marking took place after the fish hatched, and all release groups were successfully marked.

Table 12. Releases and survivals of 1997 brood sockeye salmon outplanted into Stikine and Taku systems in June 1998.

Brood Stock	System Stocked	# of Trips	# of Fry Released	Green to Eye % survival	Green to Release % Survival
Tahltan L.	Tahltan L. (Stikine)	4	1,900,417	82.2%	86.7%
Tahltan L.	Tuya L. (Stikine)	1	432,651	91.1%	91.2%
Tatsamenie L.	Upper Tats.L. (Taku)	7	3,596,593	91.0%	80.9%
	Total #/Ave %	13	5,929,661	88.1%	86.3%

In Tatsamenie Lake, the fry were released nearshore in an effort to improve in-lake survival. Of the seven groups delivered, one group was released directly into the lake and five were held in a netpens for 24 to 48 hours to monitor short term mortality rates. Another group, which had an accessory thermal mark, was held in netpen and fed for 15 days to determine if a larger size at release would improve survival. In Tahltan Lake, half the fry were held for short period in net pens to observe any transport mortality. None of those fish had accessory marks. In Tuya Lake the fry were released directly into the lake.

The 1998 egg take started on Sept 4th at Tahltan Lake and Sept 16th on Tatsamenie Lake. The 1,503 Tahltan females collected produced 4,358,700 green eggs. In Tatsamenie Lake, only 499 females were collected, which yielded 2,067,590. The reduced egg take from Tatsamenie Lake was primarily a response to low escapement. The egg take for the domestic releases near Snettisham Hatchery yielded over 3.9 million green eggs.

During the 1998 season, ADF&G port samplers collected approximately 13,500 otolith pairs from 110 separate commercial and test fisheries openings targeting the Taku River (District 111) and the Stikine River (District 106 and 108) sockeye stocks over an 11 week period. Of these, 6,690 otoliths were extracted from commercial fisheries openings near the Stikine River and 4,251 otoliths were taken from commercial fisheries near the Taku River. Additional otoliths were collected from test fishing operations in District 108 (1,571), Canadian test and commercial fisheries on the Stikine River (1,404) and on the Taku River (711) as well as the U.S domestic Port Snettisham cost-recovery fisheries (856). Of the otoliths collected, approximately 12,000 were processed for thermal marks and 3,340 marked fish were identified and classified as belonging to one of 26 marking groups. Contribution estimates on the percentage of enhanced fish in the commercial openings were provided to ADF&G and Canadian fisheries managers within 24 to 48 hours after sampling.

As part of quality control effort, second readers independently examined approximately 8,000 otoliths. Using latent class models to estimating accuracy rates from this data, preliminary results indicate the mean accuracy of detecting a hatchery fish from the Stikine River samples was 0.998 ± 0.004 s.e. and the mean accuracy of detecting a wild stock otolith was 0.990 ± 0.003 . For the Taku River stocks, including the U.S. domestic releases, the mean accuracy rate of detecting a hatchery fish was 0.950 ± 0.016 and the accuracy of detecting a wild fish was 0.996 ± 0.003 . The lower accuracy rate for the hatchery Taku stocks may reflect a training

period for a new reader as well as a more difficult suite of marks. Overall it appears that reader error was not a significant source of uncertainty with regards to the estimates of enhanced contributions.

Southeast Alaska Chinook Salmon Fishery

All Gear Harvest

The 1998 chinook salmon harvest level was based on bilateral estimates of chinook abundance and the U.S. Letter of Agreement on chinook management in Southeast Alaska. The preliminary estimate of the 1998 chinook salmon catch by all Southeast Alaska fisheries was 271,000 fish (Table 13). The base catch (total minus the add-on) was 244,800 fish. The 1998 fishery was managed to achieve a base catch of 260,000 chinook salmon.

Table 13. Chinook all-gear catches in Southeast Alaska, 1987 to 1998, and deviation from the ceiling for years for which there were ceilings. Catches in thousands.

Year	Total Catch	Add-on Catch	Ceiling	Base Catch	Deviation Number	Deviation Percent
1987	281.9	16.7	263	265.2	2.2	0.8%
1988	278.9	23.7	263	255.2	-7.8	-3.0%
1989	291.1	26.7	263	264.4	1.4	0.5%
1990	366.9	53.7	302	313.2	11.2	3.7%
1991	357.0	61.4	273	295.6	22.6	8.3%
1992	260.0	38.3	263	221.7	-41.3	-15.7%
1993	301.9	33.7	263	268.2	5.2	2.0%
1994	261.9	30.9		231.0		
1995	231.1	56.6		174.5		
1996	217.2	68.2		149.0		
1997	339.2	47.6		291.6		
1998	271.0	26.2	260	244.8	-15.2	-5.9%

Troll Fishery

The winter troll fishery harvested 32,800 chinook salmon from October 11, 1997 through April 14, 1998. A total of 2,400 fish were from Alaska hatcheries.

Terminal and experimental fisheries were conducted prior to the July general summer opening. The experimental fisheries are designed to increase the harvest of Alaskan hatchery produced chinook salmon by allowing trolling in small areas of the migratory path close to the hatchery. Terminal fisheries occurred directly in front of hatcheries or at remote release sites.

There is no limit on the number of chinook salmon harvested in the terminal and experimental fisheries. However, the experimental fisheries limit the take of Treaty chinook salmon according to the percentage of the Alaskan hatchery fish taken in the fishery. The catches in 1998 were: 1,300 fish in the terminal fishery and 20,500 fish in the experimental fishery. A total of 31% of the chinook salmon landed in these fisheries were from Alaska hatcheries.

The summer fishery began on July 1 and continued through July 7. The fishery harvested 103,000 chinook salmon of which 2,700 fish were from Alaska hatcheries. A second opening occurred from August 20 through September 30. A total of 35,900 chinook salmon were harvested with 1,000 fish from Alaska hatcheries. The total troll harvest was 192,000 fish.

Net Fisheries

Net fisheries have a guideline harvest of 8,600 chinook salmon, plus 4.3% of the annual harvest ceiling established by the Pacific Salmon Commission, plus Alaska hatchery add-on chinook. Catches of chinook salmon in the net fisheries are incidental to the harvest of other species and only constitute a small fraction (<1.0%) of the total net harvest of all species. In 1998, the net fisheries harvested 23,500 chinook salmon of which 10,700 were from Alaska hatcheries.

Recreational Fisheries

The recreational fishery had a harvest of 55,500 chinook salmon of which 9,500 were from Alaska hatcheries.

Southeast Alaska Coho Salmon Fisheries

There are no specific provisions in the Annex IV chapter on coho salmon that apply to Southeast Alaska fisheries. These fisheries are managed by the Alaska Department of Fish and Game to achieve coho salmon conservation objectives and gear allocation objectives established by the Alaska Board of Fisheries. No catch ceilings are used, rather fisheries are managed based on in-season assessment of run strength.

In 1998, the season opened by regulation on June 15, but few coho salmon were caught until the general summer season began on July 1. The late July assessment indicated that the run was projected to be greater than the conservation threshold of 1.12 million. A second assessment in early August indicated that a closure was necessary to move fish into the inside areas for harvest and escapement. An eight day closure of the troll fishery occurred beginning August 12.

In mid-September, the coho return was assessed to evaluate the return with respect to an extension of the trolling period beyond September 20. Returns to southern Southeast Alaska and outer Chichagof Island stocks were strong, based on catch rates in the troll and drift gillnet fisheries, escapement and coded-wire-tag information. Returns to the northern areas and Sitka Sound streams appeared adequate, but did not justify an extension of fishing time throughout the northern region. Furthermore, several thousand chinook salmon remained unharvested in the troll quota. Therefore, areas in southern southeast Alaska and the outer coast south of Surge Bay were extended to the retention of all salmon species from September 21 through September 30 to target coho salmon returning to southern Southeast Alaska and outer Chichagof Island streams.

The 1998 troll coho salmon harvest of 1,635,000 fish (preliminary) was the 9th highest since statehood (1960), and 500,000 fish more than 1997. The Alaska hatchery contribution was 20%. The BOF management plan allocates 61% of the long-term commercial catch to the troll fleet. In 1998, the troll portion was 60%, bringing the average since 1989 to 62%.

Table 14. Coho salmon harvest in Southeast Alaska in 1998 by gear type.

Gear Type	Harvest
Troll	1,635,200
Purse Seine	474,800
Drift Gill net	423,300
Set Gillnet	196,300
Recreational	180,000
Total	2,909,600

The biological escapement goals were met or exceeded for all four wild coded-wire-tagged indicator stocks. In addition, surveys and estimates for other systems indicated that escapements were very strong on the outer coast from north of Sitka to west of Yakutat. Escapements to most other systems in the remainder of the region were near or above the recent average.

Southern U.S. Chinook and Coho Fisheries

Ocean Fisheries off Central Oregon

The chinook harvest by fisheries off the Oregon coast is primarily comprised of stocks that do not significantly migrate into Canada. The Northern Oregon Coastal (NOC) stock is far north migrating and contributes substantially to southeast Alaskan and Canadian fisheries. This stock group is taken only to a minor degree by Oregon coastal fisheries (probably <5% of total catch). The Mid-Oregon Coastal (MOC) stock aggregate is harvested primarily along the west coast of Vancouver Island. Oregon ocean fisheries are believed to account for a much larger percentage of the total mortality of the MOC stock compared to the NOC stock, but catch data are readily available for only one population of this group in a pre-terminal fishery near the mouth of the Elk River. Both the NOC and MOC stock groups are harvested by recreational fisheries in estuary and freshwater areas as mature fish return to spawn. The 1998 recreational fishery is currently underway; in-season estimates are not made.

Columbia River

The state of Washington, in cooperation with other state, federal, and tribal fish managers in the Columbia River signed three-year (1996-1998) Management Agreements for in-river fisheries on upper Columbia River spring/summer and fall chinook stocks. These agreements were signed in 1996 and work in conjunction with the requirements of the Endangered Species Act to protect depressed chinook stocks while allowing for harvest of healthy stocks of chinook. Forecasts for 1998 hatchery stocks of spring chinook were below average and continued the recent year trend of poor returns. There were no directed commercial spring chinook fisheries in 1998, and a very reduced sport fishery in the mainstem Columbia River. Less than 100 fish were caught in each fishery. Treaty Indian fisheries occurred in the traditional time frame of February to mid-March, targeting sturgeon. There have been no directed summer chinook fisheries since 1964.

Fall season commercial fisheries in the Columbia River consisted of non-Indian fisheries below Bonneville Dam and treaty Indian fisheries above Bonneville Dam. Fall fisheries were constrained by conservation concerns for ESA listed steelhead and chinook stocks. The non-Indian commercial chinook fishery, which consisted of one 10-hour fishery in the area just below Bonneville Dam, harvested 1,300 chinook. This is the shortest commercial chinook season in the Columbia River on record. Chinook were also harvested during sturgeon commercial fisheries. Coho returns were poor in 1998 and there were no directed commercial fisheries.

Table 15. Preliminary 1998 landed chinook catches for Washington and Oregon fisheries of interest to the Pacific Salmon Commission (rounded to nearest 100).1/

Fishery	Gear	1998		Total
		Tribal	Non-Tribal	
Ocean Fisheries				
Troll				
Cape Flattery and Neah Bay (Areas 4 and 4B) 2/	Troll	13,600	4,200	17,800
Quillayute (Area 3)	Troll	0	1,700	1,700
Grays Harbor (Area 2)	Troll	0	100	100
Col. R. (OR Area 2 and WA Area 1)	Troll	100	0	100
Oregon Central Coast 3/	Troll	NA	NA	NA
Sport				
Cape Flattery and Neah Bay (Areas 4 and 4B)	Sport	0	0	0
Quillayute (Area 3)	Sport	0	100	100
Grays Harbor (Area 2)	Sport	0	1,700	1,700
Col. R. (OR and WA Areas 1) 4/	Sport	0	300	300
Oregon Central Coast Sport	Sport	0	NA	0
Inside Fisheries				
Troll				
Strait of Juan de Fuca 5/	Troll	500	0	500
San Juan Islands (Areas 6, 6A, 7, and 7A)	Troll	<50	0	<50
Sport				
Juan de Fuca (Areas 5 and 6)	Sport	0	0	0
San Juan Sport (Area 7)	Sport	0	NA	NA
Puget Sound Sport (Areas 8-13)	Sport	0	NA	NA
Columbia River Sport	Sport	0	13,600	13,600
Net				
Cape Flattery (Area 4)	Net	0	0	0
Makah Bay (Area 4A)	Net	0	0	0
North WA Coastal River	Net	9,500	0	9,500
Grays Harbor (Areas 2A-2D) 6/	Net	4,100	300	4,400
Willapa Bay (Areas 2G-2M)	Net	0	6,800	6,800
Columbia River Net	Net	50,800	2,600	53,400
Strait of Juan de Fuca	Net	300	0	300
Areas 6 and 6A	Net	0	0	0
Area 7	Net	900	<50	900
Area 7A	Net	1,800	<50	1,800
Puget Sound Marine	Net	25,200	11,900	37,100
Puget Sound River	Net	11,100	0	11,100

Note: A small recreational chinook fishery occurs in coastal and Puget Sound rivers. Catch numbers are not available for 1998.

1/ Includes catches from 1/1/98 through 11/1/98.

2/ Includes Area 4B catch during the PFMC management period (May 1-Sept. 30).

3/ Includes only late season fishery near Elk River mouth. 1998 catches are not currently available.

4/ Includes both Buoy 10 and mainstem sport catch from below Bonneville Dam.

5/ Includes Area 4B catch outside the PFMC management period (Oct. 1-April 30).

6/ Includes catch from the upper Chehalis (River+2A+2D) and Humptulips (River + 2C).

Table 16. Preliminary 1998 landed coho catches for Washington and Oregon fisheries of interest to the Pacific Salmon Commission (rounded nearest 100). 1/

Fishery	Gear	Tribal	1998 Non- Tribal	Total
Ocean Fisheries				
Troll				
Cape Flattery and Neah Bay (Areas 4 and 4B) 2/	Troll	600	0	600
Quillayute (Area 3)	Troll	0	0	0
Grays Harbor (Area 2)	Troll	7,100	0	7,100
Col. R. (OR Area 2 and WA Area 1)	Troll	100	0	100
Oregon Area 1 (N. of Leadbetter) 3/	Troll	0	0	0
Sport				
Cape Flattery and Neah Bay (Areas 4 and 4B) 4/	Sport	0	8,100	8,100
Quillayute (Area 3)	Sport	0	600	600
Grays Harbor (Area 2)	Sport	0	7,700	7,700
Col. R. (WA Area 1 and OR Area 2) 5/	Sport	0	4,400	4,400
Inside Fisheries				
Troll				
Strait of Juan de Fuca	Troll	<50	0	0
San Juan Islands (Areas 6, 6A, 7, and 7A)	Troll	100	0	100
Sport				
Juan de Fuca (Areas 5 and 6)	Sport	0	30,300	30,300
San Juan Sport (Area 7)	Sport	0	NA	0
Puget Sound Sport (Areas 8-13)	Sport	0	NA	0
Columbia River Sport 5/	Sport	0	8,600	8,600
Net				
Cape Flattery (Area 4)	Net	0	0	0
Makah Bay (Area 4A)	Net	0	0	0
North WA Coastal River	Net	24,000	0	24,000
Grays Harbor (Areas 2A-2D) 6/	Net	13,400	800	14,200
Willapa Bay (Areas 2G-2M)	Net	NA	13,100	13,100
Columbia River Net	Net	200	200	400
Strait of Juan de Fuca	Net	1,700	0	1,700
Areas 6 and 6A	Net	<50	0	0
Area 7	Net	1,500	2	1,502
Area 7A	Net	400	0	400
Puget Sound Marine	Net	100,400	12,410	112,810
Puget Sound River	Net	26,900	0	26,900

Note: A small recreational coho fishery occurs in coastal and Puget Sound rivers. Catch numbers are not available for 1998.

1/ Includes catches from 1/1/98 through 11/1/98

2/ Includes Area 4B catch both during and outside the PFMC management period (May 1-Sept. 30).

3/ Includes coho landed during the PFMC management period (May 1-Sept. 30).

4/ Includes coho landed during the State-managed 4B add-on fishery.

5/ Includes both Buoy 10 and mainstem sport catch from below Bonneville Dam.

6/ Includes catch from the upper Chehalis and Humptulips Rivers.

Treaty Indian fisheries above Bonneville Dam occurred during the month of September. A total of 48,300 chinook were landed during fall season tribal fisheries. As in the previous two years, a

large portion of the catch was not sold to commercial fish buyers, but to the public in an effort to maximize the economic benefits to the treaty fishers.

Sport fisheries in the Columbia River in 1998 consisted of a Buoy 10 fishery in the estuary and a mainstem fishery throughout the fall season. The Buoy 10 season lasted for two weeks with a catch of 3,400 fall chinook and 4,000 coho. The Buoy 10 fishery for coho permitted retention of only ad-clipped fish. The mainstem sport fishery occurred upstream of the Astoria-Megler Bridge and harvested an estimated 10,300 chinook and 4,600 coho.

Ocean Fisheries North of Cape Falcon

The U.S. ocean fisheries operating north of Cape Falcon, OR are typically constrained by coho and chinook ceilings developed through the domestic regulatory process of the Pacific Fisheries Management Council (PFMC).

The preliminary estimates of non-tribal harvest in the 1998 North of Falcon troll fishery are 5,900 chinook and zero coho. This represents 91% of the chinook harvest quota of 6,500 fish. The 1998 non-tribal sport fishery preliminary harvest estimates are 2,200 chinook and 14,900 coho, which represent 63% of the 3,500 chinook harvest quota and 99% of the 15,000 coho harvest quota.

The treaty troll fishery harvested 10,700 chinook of a 15,000 chinook quota and 7,900 coho of a 10,000 fish quota.

Washington Coast

Ocean escapements of south coast coho stocks – those originating from Willapa Bay and Grays Harbor – were predicted at or below minimum spawning levels in 1998. Criteria established through the annual regulatory Pacific Fisheries Management Council and North of Falcon processes limited ocean and terminal fishery catches of coho stocks of concern. The majority of hatchery coho returning to Grays Harbor and Willapa Bay in 1998 were marked with the adipose fin clip allowing for the selective retention of ad-clipped hatchery fish in terminal recreational fisheries. Time and area restrictions were also used to minimize impacts to natural coho stocks. Terminal net fisheries, both treaty and non-treaty, were scheduled to target harvestable chinook and hatchery coho. The preliminary 1998 estimate of total non-Indian net catch for Willapa Bay is 6,800 for chinook and 13,100 for coho. There is no tribal catch in Willapa Bay. Combined 1998 treaty and non-treaty net landings in Grays Harbor, including the Humptulips and Chehalis rivers, are 4,400 for chinook and 14,300 for coho. Recreational marine and freshwater chinook and coho catch data are not yet available. However, smaller run sizes and limited sport opportunity in 1998 are expected to result in lower than average sport catches.

In spite of indications of low ocean survival rates, coho were expected to return in 1998 at levels above minimum spawning goals in the north coast rivers. Chinook runs were forecast to come in slightly below recent averages, but still well above spawning goals. Indian and non-Indian fishing was scheduled at levels anticipated to provide adequate escapement. Tribal net fisheries in several systems were required to use large chinook mesh (8 inch plus) during the coho migration period to reduce retention of coho. Actual returns of wild coho in 1998 appear stronger than anticipated.

The North Coastal River Net harvest (all by tribal fisheries) includes catch for the Waatch, Sooes, Quillayute, Hoh, Queets, Quinault, Moclips, and Copalis rivers. The 1998 commercial net fisheries in north coastal rivers have harvested an estimated 9,500 chinook and 24,000 coho to date.

Strait of Juan de Fuca Net Fishery

The preliminary estimates of the 1998 catch in Strait of Juan de Fuca tribal net fisheries are 300 chinook and 1,700 coho.

Strait of Juan de Fuca Recreational Fishery

Estimates of the 1998 recreational harvest for most catch areas are not yet available.

Strait of Juan de Fuca Troll Fishery

The 1998 Strait of Juan de Fuca tribal troll fishery harvested an estimated 500 chinook through November 1. The tribal troll catch estimates from this area do not include tribal catches in Area 4B during the May 1-September 30 PFMC management period, which have been included in the North of Cape Falcon troll summary.

San Juan Islands Net Fisheries

Preliminary 1998 estimates of the incidental chinook catch in the San Juan Islands net fisheries total 2,800. The preliminary estimate of tribal net fishery catches in Areas 6, 7, and 7A is 1,800 coho during 1998; no harvest occurred in Area 6A. The non-tribal net fisheries in Areas 7 and 7A are estimated to have harvested two coho in 1998. Non-treaty purse seine and reef net gears were required to release all chinook and coho in catch areas 7 and 7A in 1998. Encounters of chinook in the non-treaty fishery were estimated at 7,600 to 9,800.

San Juan Islands Recreational

Catch estimates for the 1998 Area 7 recreational fishery are not available at this time.

Puget Sound Marine Net

Preliminary estimates of the 1998 tribal net fishery harvests in Puget Sound marine areas other than 4B, 5, 6, 6A, 7, and 7A are 25,200 chinook and 100,400 coho. The 1998 non-tribal net fishery harvested 11,900 chinook and 12,400 coho.

Puget Sound River Net

Preliminary harvest estimates for tribal river net fisheries in Puget Sound are 11,100 chinook and 26,900 coho in 1998. Coho catches decreased from 1997 levels in fisheries on the Elwha, Nooksack, Duwamish/Green, Puyallup, and Nisqually rivers. Chinook harvest levels increased from 1997 on the Duwamish/Green and Nisqually rivers and decreased on other streams. Coho harvest levels increased from 1997 on the Elwha, Skagit, Stillaguamish, Duwamish/Green, and Skokomish rivers and decreased slightly on the Nooksack and Puyallup rivers.

Puget Sound Recreational

Puget Sound recreational catch estimates for Areas 8-13 in 1998 are not available at the present time.

Chum Salmon Fisheries

Preliminary Review of 1997 Washington Chum Fisheries of Interest to the Pacific Salmon Commission

This summary report provides a preliminary review of the 1998 chum fishing season and is subject to correction and revision as additional information becomes available. Some Washington chum fisheries are still underway, and catch and run size information provided are preliminary data reported through mid-November. This report addresses in detail only those fisheries of concern under the Pacific Salmon Treaty. The mixed-stock fisheries in United States (U.S.) waters that are addressed in the chum annex of the Pacific Salmon Treaty are those in the western Strait of Juan de Fuca (areas 4B,5 and 6C), the San Juan Islands (area 7) and Point Roberts (area 7A). Other chum fisheries in Washington waters are primarily terminal fisheries which harvest runs of local origin.

Mixed Stock Fisheries

Areas 4B, 5, 6C

As in previous years, the chum fishery in areas 4B,5,6C was restricted to Treaty Indian gill net gear only. Chum fishing in these areas was delayed until the week of October 11 due to domestic coho conservation concerns. The commercial fishery began October 15 and remained open 7 days per week until November 14. No test fisheries for collection of GSI samples were conducted, and no samples for GSI analysis were collected from the commercial catch during 1998.

Incidental summer chum catches in fisheries prior to the fall chum management period totalled only 52 fish. Fall chum catches in the Strait of Juan de Fuca commercial fishery were significantly less than expected given the forecasted abundance of Puget Sound and Canadian chum runs. The lower than expected harvests were primarily due to very low prices resulting in low effort. The commercial harvest recorded from the fall chum management period was 18,800 chum bringing the total chum catch in areas 4B,5,6C, reported through November 18, to 18,852. Little, if any, additional harvest is expected to be reported.

Areas 7 and 7A

Preseason forecasts were for harvestable fall chum returns to both Southern B.C. and Puget Sound. The preseason forecast for the run returning to Johnstone Strait was 3.7 million chum. Test fishing in Johnstone Strait in early October indicated a strong chum return, likely exceeding the preseason forecast. On October 9, DFO notified Washington fisheries managers that the run size had been updated to 5.1 million chum and that purse seine fisheries were scheduled to begin in Johnstone Strait on October 12. The Johnstone Strait run size was later updated to 5.5 million chum.

The chum annex provides for a U.S. harvest in Areas 7 and 7A of 120,000 chum when the Johnstone Strait run size is greater than 3.0 million, and the catch in Johnstone Strait exceeds 225,000 chum; and for a U.S. harvest of 140,000 chum when the Johnstone Strait run size is greater than 3.7 million, and the catch in Johnstone Strait exceeds 640,000 chum. Based on the updated run size of 5.1 million and expected harvests in Johnstone Strait, the U.S. harvest quota in areas 7 and 7A was 140,000 chum, plus a carry-over from the 1995 season of approximately 73,000 chum.

Incidental catches of chum in sockeye fisheries prior to fall chum management, and in limited reef net fisheries in early October, totalled only 227 fish.

Gill net and purse seine fisheries in Areas 7 and 7A began on October 14 with a two day treaty Indian fishery. Due to low prices and effort the harvest from this opening was only 11,073 chum, with most of the harvest occurring in area 7. Additional treaty Indian fishing was scheduled the following week for approximately 3.5 days (10/19 - 10/22). Continued low effort resulted in a harvest of only 5,856 chum. Treaty fishing was re-opened for periods of 3.5 days, 7 days and 4.5 days for weeks of 10/25, 11/1 and 11/8, respectively. Effort was sporadic over these openings. Additional harvests of 17,748 chum have been reported to date from these openings. No additional treaty fisheries are planned at this time.

Non-treaty fisheries were delayed until November 1 to implement agreements to protect coho salmon. Non-treaty fisheries occurred for 4 days the week of 11/2 and 4 days the week of 11/8. No additional fisheries are planned. Effort in the non-treaty fisheries was also extremely low and catch reports to date indicate a chum harvest of only 4,858 fish. This brings the combined treaty and non-treaty harvest to 39,574 chum. Little, if any, additional harvest is expected to be reported.

Test fisheries to collect chum GSI samples were not conducted and no commercial fishery GSI samples were collected in 1998.

Table 17. Preliminary 1998 chum harvest in selected Puget Sound catch reporting areas.

Week	Areas 4B,5,6C Treaty Indian	Areas 7 & 7A Treaty Indian	Areas 7 & 7A Non-Indian	Areas 7 & 7A Total
Prior to 10/4	52	39	159	198
10/4 - 10/10	0	0	47	47
10/11 - 10/17	6,817	11,073	47	11,120
10/18 - 10/24	1,658	5,856	0	5,856
10/25 - 10/31	1,831	15,219	0	15,219
11/1 - 11/7	5,426	2,264	3,219	5,483
11/8 - 11/14	3,068	265	1,386	1,651
Season Totals	18,852	34,716	4,858	39,574

Puget Sound Terminal Area Fisheries and Run Strength

Pre-season forecasts for chum returns to Puget Sound were for a fall chum run totalling about 1.75 million. Many Puget Sound chum runs have been updated in-season, indicating overall returns about as expected pre-season. Some Puget Sound chum fisheries are still underway, and additional in-season estimates of abundance will be made in the coming weeks. At this time, it is far too early to assess spawning escapement.

U.S. Fraser River Sockeye Fisheries

1998 Season Review and Highlights

1998 Fishing Regime Agreement (Key Elements):

- U.S. fishery is open unless closed by the Fraser Panel.
 - U.S. gillnet and purse seine fisheries open Monday through Friday, July 27 through August 21 in Areas 6, 7 and 7A (note that the non-Indian fishery is not authorized in Area 6).
 - Non-Indian reefnet fishery opens Saturdays and Sundays, July 25 through August 23 (domestic managers agreed that the U.S. reef net fishery would not go beyond

August 21 unless there was U.S. TAC available and the non-Indian allocation was not being achieved).

- Treaty Indian gillnet fishery opens noon, Sundays through noon, Fridays, July 26 through August 21 in Areas 4B, 5 and 6C.
- Harvest ceiling - U.S. catch in Fraser Panel waters shall not exceed 24.9% of the Total Allowable Catch (TAC) of Fraser River sockeye.
- Early closure to protect Canadian coho - The U.S. agreed to close its commercial net fishery to protect coho while it was anticipated that substantial sockeye would still be present in the U.S. fishing area. It was expected, but not captured in the agreement, that Canada would have its fishery closed in adjacent waters after August 23. This became an issue during in-season management when Canada considered a fishery subsequent to August 23 and the following statement was read by the U.S. section chair:

"Federal negotiators accepted the deal on the Fraser fishery regime with the understanding that Canada might have a fishery beyond the August 23 U.S. cut-off-date. If Canada had such a fishery and three criteria were met, Canada would consider a U.S. fishery beyond August 23. The criteria are: 1) sockeye exist to be caught; 2) the U.S. will not reach its ceiling; and 3) coho are not yet a bycatch concern."

Canada agreed that this was also their understanding. Subsequently, Canada did not propose a fishery within Fraser Panel waters after August 23.

- Maximum weekly fishing periods - U.S. purse seine and gillnet fisheries were limited to a maximum of five days per week as noted above with the exception of reefnets which were limited to weekend fisheries. To achieve domestic allocation objectives and ensure that the U.S. could maximize its catch of its share of the TAC, non-Indian gillnets and purse seines fished concurrently after the first week of the fishery.
- Management priorities established - The Fraser River Panel was directed to manage Canadian net fisheries in Panel waters and Canada committed to manage its fisheries outside Panel waters in a manner that anticipates and accommodates catch in the U.S. fisheries so that conservation problems would not be created for U.S. fisheries.

Run Size: Final run size estimates were similar to pre-season forecasts.

	Early Stuart	Early Summer	Mid- Summer	Late	Total Sockeye
Pre-season forecast	175,000	642,000	6,647,000	3,754,000	11,218,000
In-season update	173,800	793,100	5,627,900	4,222,800	10,817,000

Escapements: Targets achieved but substantially less are reaching spawning grounds.

Potential gross esc.	167,800	598,600	4,166,800	3,531,700	8,464,900
Gross esc. target	170,000	445,000	3,355,000	3,622,000	7,592,000
Net esc. target	97,000	400,000	2,660,000	3,609,000	6,766,000

Catches: U.S. catch substantially less than 1.2 million expected pre-season

Management

PSC and Canadian Test Fisheries	106,600
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Canada

Commercial Net	1,294,500
First Nation	818,000
Recreational	18,400
SUBTOTAL	2,130,900

Alaska

186,000

Washington

Treaty Indian - Strait of Juan de Fuca	25,800	
7 & 7A	266,400	
SUBTOTAL	292,200	(56%)
Non-Indian - 7 & 7A - Purse Seines	123,000	
Gillnets	97,000	
Reefnets	9,000	
SUBTOTAL	229,000	(44%)
WASHINGTON TOTAL	521,200	(21.4% of TAC)

Bycatch: The following catches of chinook and coho have been recorded on fish receiving tickets.

	<u>Chinook</u>	<u>Coho</u>	<u>Chum</u>	<u>Pinks</u>	<u>Steelhead</u>
Treaty Indian	2,950	1,123	55	259	96
Non-Indian	65	2	4	259	n/a

For the non-Indian fishery, only gillnets were allowed to retain chinook and coho. An on-board purse seine bycatch monitoring program conducted by WDFW personnel estimated that this non-Indian fishery caught and released the permitted level of 10,000 chinook as the season concluded.

Highlights:

- Pre-season fishing plan (not adopted) - Using pre-season forecasts for run sizes, diversion rate and migration timing plus anticipated Canadian fisheries both inside and outside of the Fraser Panel waters, the bilateral Fraser Panel developed a pre-season fishing pattern for the U.S. commercial net fishery in Washington. This pre-season fishing schedule was adopted by the bilateral panel to provide guidance to PSC staff for in-season evaluation of fishing schedules based upon updated information on run size and timing, TAC and diversion. The fishing schedule did not anticipate the need to fish five days per week or use the full four week fishing period as allowed in the 1998 fishing regime agreement. The schedule emphasized harvest of the summer run, the most abundant run. The fishery in Areas 6, 7 and 7A was not expected to occur during the fourth week to provide protection for the Late Summer sockeye run, provide management flexibility and accommodate the optimum Canadian fishing pattern.
- Diversion - Entry via Johnstone Strait was forecast at 62% compared to 84% in 1997. Actual diversion rate was possibly near 80%, similar to 1997. The higher than forecast diversion rate impacted the U.S. ability to achieve its harvest allowance ceiling. After the first fishing week, it became obvious that the higher diversion rate required the U.S. to fish the maximum allowable five days per week.

- **Bimodal migration pattern** - With a bimodal migration pattern, the runs first appeared to be earlier timed and smaller than forecast. With the arrival of the second peak, the run sizes were updated to be similar to forecasted size and near normally timed, e.g. 50% passage was normally timed but did not represent the peak abundance period as would be expected with normal run migration distribution. Impact on management was that runs were less separated than normal and this resulted in early management actions that were conservative.
- **In-route mortality** - Early summer and mid-summer water temperatures in the Fraser River were abnormally high causing concern that in-route and pre-spawning mortalities would be higher than normal. Although Canada could not assure the U.S. that all fisheries would be closed, Canada initially proposed a 40% management adjustment to increase the target escapement objective. This proposal was made subsequent to major Johnstone Strait purse seine and in-river gillnet fisheries and was not achievable even if all fisheries were closed. The U.S. agreed to delay its fishery for 24 hours while an emergency meeting was held (Treaty Indian fishery in 6, 7 and 7A closed Monday, August 10). For the purposes of implementing our international agreement, the Fraser Panel agreed to a 25% management adjustment to the summer run escapement target due to its concern for the likely elevated in-route and pre-spawning mortalities that may occur due to the high river temperatures. While some are questioning the accuracy of the run size enumeration process conducted by PSC at Mission, substantial difference does now exist between potential escapement and the actual escapement being seen on the spawning grounds. These discrepancies indicate that substantial in-route mortality has occurred. Final analysis of this difference will not be available until January or February, 1999.
- **Late run timing** - The late run, of which the Adams River run is an important component, normally peaks in-river by mid- to late September. This year, there was substantial upstream migration that occurred in late August and a second peak in early September. The entire run entered the river and migrated earlier than ever before observed, completing its migration through the lower river before the normal peak migration period. The bimodal and early migration pattern also was observed on the spawning grounds. As a result of this unusual behaviour, Canada was unable to fully access the available summer run sockeye in order to provide the necessary protection for the Adams River run.

(Source document) *Preliminary 1998 Post-Season Report for United States Fisheries of Relevance to the Pacific Salmon Treaty*. United States Section of the Pacific Salmon Commission. December, 1998.

C. 1998 POST-SEASON REPORT FOR CANADIAN TREATY LIMIT FISHERIES

Catches reported below are based on in-season estimates (hailed statistics), on-the-grounds counts by DFO management staff and independent observers, logbooks, dockside tallies, and landing slips (aboriginal fisheries), fish slip data (commercial troll and net), and creel surveys, logbooks, observers (sport and commercial). The preliminary 1998 commercial catches were obtained from fish slip information to November 12 (Transboundary), November 2 (North/Central chinook), September 1 (North pinks), October 31 (WCVI troll chinook), November 15 (Southern chum), and in-season hails; sport catches are from creel survey data to September 30 (Georgia Strait) and logbooks (North/Central chinook).

Annex fisheries are reported in the order of the Chapters of Annex IV. Comments begin with expectations and management objectives, followed by catch results by species, and where available and appropriate, escapements. The expectations, management objectives, catches and escapements are only for those stocks and fisheries covered by the Pacific Salmon Treaty (PST); domestic catch allocations

have been excluded. Two tables attached at the end of this report summarize 1985-1998 catches in Canadian fisheries that have at some time been under limits imposed by the Pacific Salmon Treaty.

Transboundary Rivers

Stikine River

The Transboundary Chapter of Annex IV requires the Transboundary Rivers Technical Committee (TRTC) to prepare a pre-season sockeye salmon forecast to guide the initial fishing patterns of both countries. The pre-season forecast of returning Stikine sockeye salmon was 218,500 fish, including 63,500 Tahltan Lake origin sockeye (58,500 wild and 5,000 enhanced), 111,000 enhanced Tuya Lake origin sockeye, and 44,000 non-Tahltan wild sockeye. For comparison, the previous 10-year (1988-1997) average terminal run size was approximately 191,000 fish.

A total of 43,803 sockeye was caught in the combined Canadian commercial and aboriginal fishery; 87.2% of the catch occurred in the commercial fishery. The total catch was approximately 13% above the previous 10-year average (1988-1997) of 38,800 sockeye. The preliminary estimate of the total contribution of sockeye from the Canada/U.S. enhancement program to the combined Canadian aboriginal and commercial fisheries is 17,032 fish, close to 39% of the catch. An additional 6,103 sockeye salmon was taken by the Tahltan First Nation under an "Excess Salmon to Spawning Requirements Licence" (ESSR) which permitted the terminal harvest of enhanced sockeye in the Tuya River.

The preliminary post-season estimate of the terminal sockeye run size¹ is approximately 129,000 fish including 42,000 Tahltan Lake sockeye, 45,000 Tuya Lake sockeye, and 42,000 sockeye of the non-Tahltan stock aggregate. A Stikine run size of this magnitude is 32% below the 1988-1997 average terminal run size of 191,364 sockeye salmon. The preliminary post-season estimate of the TAC for 1998 is approximately 50,000 sockeye and of this, Canada was entitled to catch 25,000 sockeye, i.e. 50% of the TAC. The total escapement is estimated to be approximately 25,000 sockeye, 46% below the target of 54,000 fish. The post-season estimates of run size and TAC were well below in-season predictions. For example, the final in-season forecast generated by the Stikine Management Model (SMM) indicated a run size of approximately 209,000 sockeye and a TAC for Canada of approximately 65,000 sockeye. There was no indication from the SMM that the escapement goals would not be achieved. Although the combined Canadian aboriginal and commercial harvest was 33% below the in-season target, the catch exceeded the preliminary post-season estimate of the TAC by 75%. This was unexpected; analyses of the poor apparent performance of the SMM are in progress. It is possible that low water levels and elevated temperatures contributed to higher than normal pre-spawning mortality in 1998.

A total of 12,658 sockeye salmon was counted through the Tahltan Lake weir in 1998, which was 63% below the previous 10-year (1988-1997) average of 34,285 sockeye. An estimated 759 (6%) of the fish originated from the enhancement program. Of the total number of fish enumerated through the weir, 1,574 females and 1,525 males were collected for hatchery brood stock. In addition to the brood stock collection, 390 sockeye salmon were sacrificed for otolith collection leaving a spawning escapement of 9,169 fish. This escapement is well below the spawning escapement goal of 20,000 fish.

The spawning escapements for the non-Tahltan and Tuya sockeye stock groups are estimated indirectly by computing the ratio of Tahltan to non-Tahltan and Tahltan to Tuya components in the total in-river sockeye run. Preliminary post-season estimates include approximately 14,000 non-Tahltan fish and 9,800 Tuya fish based on egg diameter measurements and otolith thermal

¹ Terminal run size estimate excludes U.S. interceptions that occur outside of the District 108 and gillnet fisheries.

mark ratios. The preliminary estimate for non-Tahltan sockeye escapement is well below the 30,000 escapement goal for the non-Tahltan stock, and 77% below the previous 10-year (1988-1997) average of 43,300 sockeye. The final postseason estimate will be computed after the results from postseason stock identification studies have been completed. By contrast, aerial surveys of non-Tahltan sockeye escapement index areas indicated a slightly above average number of spawners in 1998. The 1998 cumulative spawning index count was 5% above the previous 10-year average.

Poor sockeye returns resulted in lower fishing effort and the second lowest catch of coho salmon since 1985. The total catch for the season was 726 coho, 74% below the 1988-1997 average of 2,798 coho. All of the coho were taken in the lower Stikine commercial fishery. To assess the relative abundance of salmon in the lower Stikine, a coho test fishery was re-established in 1998. The cumulative weekly coho catch per unit effort (CPUE) in the test fishery was 28.9% of the cumulative weekly sockeye salmon CPUE. Assuming the catchabilities of sockeye and coho salmon in the test fishery were similar, based on the preliminary estimate of the total in-river sockeye run size, i.e. approximately 87,700 fish, the in-river coho run size was estimated to be approximately 25,200 fish. The spawning escapement of Stikine River coho salmon was estimated to be approximately 24,000 fish, which is below the interim escapement goal range of 30,000 to 50,000 fish. The 1998 aerial survey index result of 1,093 coho salmon was 61 per cent below the previous 10-year (1988-1997) average of 2,771 coho salmon. However, the 1998 survey conditions were fair to poor.

The total gillnet catch of chinook salmon in the combined aboriginal and commercial fisheries included 2,164 adults and 423 jacks compared to 1988-1997 averages of 2,282 large chinook and 482 jacks. The count of 4,885 large chinook salmon at the Little Tahltan River weir was 17% below the previous 10-year (1988-1997) average of 5,875 large fish and 8% below the Little Tahltan escapement goal of 5,300 chinook salmon. The count of jack chinook salmon was 37 fish, well below the previous 10-year average of 178 fish. Results from aerial and foot surveys conducted on Stikine River tributaries also indicated below average chinook escapements in 1998.

Joint Canada/U.S. enhancement activities continued in 1998 with approximately 4.3 million sockeye eggs collected at Tahltan Lake and flown to the Port Snettisham hatchery in Alaska for incubation and thermal marking. The egg collection target was 6.0 million eggs. Approximately 1.900 million fry were out-planted into Tahltan Lake and 0.433 million fry into Tuya Lake in 1998. Most of the fry originated from the 1997 egg-take and were mass-marked in the hatchery with thermally induced otolith marks. A total of approximately 541,000 sockeye smolts was enumerated emigrating from Tahltan Lake in 1998, 59 % below the 1988-97 average smolt count of 1,247,329 sockeye. The contribution of enhanced sockeye to this count has not yet been determined.

Taku River

As with Stikine River issues, no progress was made with respect to re-negotiating harvest shares of Taku River salmon prior to the 1998 fishing season. As a result, Canada developed a fishing plan that did not numerically constrain harvests of sockeye and coho salmon. The basic objective of the management plan for each species was to manage according to conservation requirements, i.e. escapement goals that have been established by the TRTC for each species. This approach was similar to the plans implemented from 1994 through 1997. As with the Stikine River, chinook salmon were harvested as an incidental catch in the directed fishery for sockeye salmon; both Parties had previously agreed to rebuild chinook by 1995 however, the analysis of rebuilding efforts has not yet been completed.

The Canadian pre-season forecast was for a sockeye run of approximately 238,100 sockeye, 2% lower than the previous ten-year average run size of approximately 243,000 sockeye.

In-season projections of the total run size, TAC and total escapement, were made frequently throughout the season based on the joint Canada/U.S. mark-recapture program, the estimated interception of Taku sockeye in U.S. fisheries, the catch in the Canadian in-river fishery, and historical run timing information. The final in-season forecast indicated a total run of approximately 160,500 to 164,200 sockeye and a total spawning escapement of 74,000 to 76,000 sockeye. The preliminary post season estimate of the terminal run size² is 135,000 sockeye with a TAC of 55,000 to 64,000 sockeye.

The 1998 Canadian sockeye catch totalled 19,210 sockeye, 19,038 of which were caught in the commercial fishery. The commercial catch was 29% below the 1988-1997 average of 26,673 sockeye. Preliminary analysis indicates that the total Canadian sockeye catch in 1998 represented 30-35% of the TAC. The preliminary estimate of the contribution of sockeye from the Canada/U.S. enhancement program to Canadian fisheries is 586 fish. Enhanced sockeye returns were expected to be low in 1998.

The estimated total escapement of 75,100 sockeye in the Canadian section of the Taku River, derived from post-season analyses of Canada/U.S. mark-recapture data, is within the interim escapement goal of 71,000 to 80,000 fish. Based on weir counts, escapements to the Little Trapper and Tatsamenie lake systems were 8,717 and 7,371 sockeye, respectively. The Little Trapper count was 28% below the 1988-1997 average while the Little Tatsamenie count was 11% above average.

The commercial coho catch of 5,090 fish was approximately 9% below the 1988-1997 average catch of 5,582 coho salmon. Preliminary mark-recapture data indicates a spawning escapement of 40,500 coho in 1998. This estimate exceeds the interim escapement goal range of 27,500 to 35,000 coho.

The commercial catch of large chinook, 1,107 fish, was 33% below the 1988-1997 average of 1,665 fish; the catch of 227 chinook jacks was 16% higher than the average of 196 fish. Chinook escapement counts were below average in all six of the Taku River aerial index areas surveyed. The combined index count of 6,295 was 46% below the previous 10-year average of 11,707 chinook, and marked the lowest count since 1985. The chinook index escapement goal is 13,200 fish.

Joint Canada/U.S. enhancement activities continued in 1998 with 2.5 million sockeye eggs taken from the Tatsamenie Lake stock. The eggs were flown to the Port Snettisham hatchery in Alaska for incubation and thermal marking. Approximately 3.6 million sockeye fry were outplanted into Tatsamenie Lake in June of 1998 from the 1997 egg-takes. The fry were mass-marked with a thermally-induced otolith mark. For the second year, all fry were released in nearshore areas in 1998 to determine if this release strategy would improve the fry-to-smolt survival. Preliminary information suggests that the change in outplant strategy improved the fry to smolt survival for enhanced fry planted in 1997; the fry-to-smolt survival for enhanced fish was 9.2% compared to previous estimates of <2%. The contribution of enhanced fish to the estimated sockeye smolt run of 2.3 million fish in 1998 was 354,000 fish. Prior to 1997, all releases of enhanced fry occurred offshore, in deeper parts of this lake. Egg-takes at another Taku drainage location, Little Trapper Lake, were suspended in 1995 because juvenile production from the fry plants into Trapper Lake appeared to be well below expectations.

Alsek River

Although catch sharing of Alsek salmon stocks between Canada and the U.S. has not been specified, Annex IV does call for a co-operative attempt to rebuild depressed chinook and early-run sockeye stocks. Interim escapement goal ranges for Alsek sockeye and coho salmon were

² Terminal run size estimate excludes interceptions that occur outside of the District 111 gillnet fishery.

initially set by the TRTC at 33,000 to 58,000 sockeye salmon, and 5,400 to 25,000 coho salmon. However, stock assessment projects to determine system-wide escapements have not yet been developed. Instead, the principle escapement monitoring tool for chinook, sockeye and coho salmon stocks on the Alsek River is the Klukshu weir, operated by DFO and the Champagne-Aishihik First Nation. To make the management objectives of chinook and sockeye better defined in terms of Klukshu stocks, revised goals, expressed in terms of Klukshu stocks only, were tentatively established for 1998.

Canadian and U.S. managers agreed to a minimum escapement goal of 1,100 chinook for the Klukshu drainage for the 1998 season. Recognizing that some harvesting would occur upstream from the weir, managers also agreed to establish a minimum weir count objective of 1,500 chinook for 1998. For sockeye salmon, the following minimum escapement objectives were established: a) 2,000 sockeye salmon for the early run, i.e. sockeye migrating through the weir prior to August 15; and b) 8,500 sockeye for the late run. Minimum weir count objectives were 4,000 early, and 11,500 late, run sockeye. These targets were to be considered interim only and subject to further revision.

Due to unexpected weak returns of Alsek chinook and early sockeye salmon, the aboriginal fishery was seriously impacted in 1998. The aboriginal fishery harvested an estimated 154 chinook, 567 sockeye, and 72 coho salmon. The catch of chinook salmon was approximately 43% below the previous 10-year (1988-1997) average of 269 fish. The sockeye catch was the second lowest on record and was 67% below the previous 10-year average of 1,743 fish. The coho catch was above the previous ten-year average of 14 fish.

Catches in the recreational fishery were also well below average with an estimated 175 chinook, 18 sockeye, and 40 coho salmon being harvested. Compared to the previous 10-year (1988-1997) averages, the chinook catch was 56% below average, the sockeye catch was the lowest on record and was 95% below average, and the coho catch was 73% below average. The low catches were attributed to extensive closures that were implemented due to conservation concerns for both chinook and sockeye salmon.

The chinook weir count in 1998 was 1,364 fish, 54% below the previous 10-year (1988-1997) average of 2,956 fish. The spawning escapement of 1,347 chinook salmon above the weir achieved the minimum escapement goal of 1,100 Klukshu chinook salmon, but only because of the extensive closures in the aboriginal and sport fisheries. Aerial chinook surveys were again flown in 1998. The count of 136 chinook salmon in the Takhanne River was below the previous 10- average year (1988-1997) of 220 fish by 32%. An aerial count of 79 chinook salmon at the Blanchard River was 68% below the previous 10-year average of 244 chinook salmon. A total of 39 chinook salmon was observed at Goat Creek, 2% above the 10- average of 38 fish.

The weir count and total escapement of Klukshu River sockeye salmon was 13,591 and 13,580 fish, respectively. The early-run count of 587 sockeye was 84% below the previous 10-year (1988-1997) average of 3,754 fish, and the late-run count of 12,994 fish was 2% below the previous 10-year average of 13,238 sockeye salmon. The early run did not achieve the minimum spawning escapement goal of 2,000 sockeye established for 1998. However, the late run achieved the minimum escapement goal of 8,500 sockeye. The estimated Village Creek sockeye escapement was 826 sockeye salmon, 82% below the previous 10-year average of 4,932 fish.

The Klukshu weir count of 1,961 coho salmon was 29% below the 10-year average count (1988-1997) of 2,771 fish. The weir is usually removed prior to the completion of the coho return due to icing conditions and does not include fish that migrate after mid-October.

Northern British Columbia Pink Salmon

Areas 3-1 to 3-4 and 5-11 Pink Catch by Nets

A slightly above average return of pink salmon was anticipated for Canadian northern boundary area stocks as a result of good escapements in the brood year (1996). The actual return was much lower than forecast, producing an Area 3 to 5 pink net catch of only 375,000 (3.35 million in 1996 brood year).

The Canadian pink catch in 1998 was 60,696 in sub-areas 3(1-4); the 1985-97 average catch is 1.7 million. The percentage of the 1998 Area 3 net catch taken in sub-areas (1-4) was 17%, which is well below both the 1985-97 average of 67% and the pre-Treaty average of 74%.

Pink escapements to rivers and streams in Areas 3, 4 and 5 were below target for most systems.

Area 1 Pink Catch by Troll

The Canadian troll fishery in Area 1 was closed from July 8 through September 9 due to conservation concerns for Skeena River coho. On September 10, a small portion of Area 1 was opened to trolling on the north shore of Graham Island for pink, chum and chinook salmon. As a result there was no pink harvest in 1998 in the A-B line strip and none were caught in the remainder of Area 1 due to the lateness of the fishery. The Area 1 troll fishery was closed on October 6.

Chinook Salmon

North and Central Coasts (Areas 1 to 10, 101 to 111, 30-3, and 142 for Net and Sport; Troll includes above Areas plus 11 and 111)

The net catch of North Coast chinook (>5lb.) to November 2, 1998, based on fish slips, was 12,153. This net catch, plus the troll catch of 110,351 and the preliminary sport catch of 22,146 gives a total North/Central coast catch of 144,650. Subtracting a terminal exclusion gillnet catch of 2,182 yields a total catch of 142,468. Both the Bella Coola Gillnet Area (BCGNA) in Area 8, and the River/Gap/Slough (R/G/S) area had surpluses eligible for terminal exclusion in 1998. The BCGNA net catch of 4,673 provided a large mesh chinook catch of 3,665, of which 715 chinook are allocated to terminal exclusions (base catch is 2,950). The River/Gap/Slough catch of 4,367 (hails prorated with fish slips) provides a terminal exclusion of 1,467, when the base of 2,900 is deducted.

The 1998 North Coast total chinook catch of 144,650 is slightly lower than the 1997 catch of 151,511. The troll fishery was open for chinook salmon from July 8 to October 6.

Based on very preliminary information, chinook escapements to the Nass and Skeena are good, and slightly above the 1997 escapements. Escapements to the rest of the North and Central coasts continue to be average for most systems.

West Coast Vancouver Island Troll (Areas 21 to 27, 121 to 127 and 130-1)

There was no Pacific Salmon Treaty ceiling for chinook in 1998, however Canada's principal management objective for chinook was to address WCVI stock concerns by closely monitoring the daily catch and implementing time and area closures if necessary.

Severe coho conservation concerns limited all salmon fishing opportunities off the west coast of B.C in 1998, whereby coast wide mandatory non-retention and non-possession of coho was in effect for the year. Non-retention of coho and limitations on coho mortalities considerably reduced the effectiveness of the WCVI chinook fishery and the length of the chinook retention period. Measures to protect coho also protected chinook stocks. The WCVI (Areas 121, 123-

127) was declared a red zone outside of the surf line and closed to all salmon fishing from June 15 to October 1³. After October 1, WCVI was declared a yellow zone, which permitted fishing, but limited coho encounters to a very low level.

In 1998, four troll openings took place; the winter/spring chinook fishery off WCVI; the Early Summer sockeye fishery in Barkley Sound (inside the surf line of WCVI in Area 23); the mid summer sockeye fishery through upper Johnstone Strait where the majority of the sockeye run occurred; and finally, the chum/chinook fishery in the fall season off WCVI. The winter/spring chinook fishery off WCVI was an assessment fishery for chinook from April 19 to May 20. All vessels were required to carry observers to record and sample the catch. The minimum size limit for chinook was reduced from 67cm to 45cm. The fishery was limited by the magnitude of coho encounters, which resulted in the loss of fishable chinook areas due to extensive area closures. The Area 23 sockeye troll fishery lasted from July 1 to 24. During this fishery independent observers were placed randomly on a subset of vessels to record coho encounters and collect biological data from coho and chinook. The chinook size limit during this opening was set at 67cm. The Johnstone Strait sockeye fishery lasted from July 30 to August 21 with non-retention of both chinook and coho. The fall fishery for chum and chinook lasted from October 7 to November 30. The minimum size limit for chinook was reduced from 67cm to 45cm.

During the season, all troll vessels used single barbless hooks; had onboard, functional "revival tanks" for coho; carried log books; and vessel masters were required to hail their catch on a daily basis. DFO funded a monitoring program including independent onboard observers to record the by-catch of coho.

The preliminary estimate of the 1998 WCVI chinook troll catch, as based on hail and logbook data, was 10,284 fish.

Strait of Georgia Troll and Sport (Areas 13 to 19, 20-5 to 20-7, 28 and 29)

In response to conservation concerns for the Lower Georgia Strait (LGS) chinook stocks, Canada continued a series of area and gear-specific management actions to reduce the LGS harvest rate by 20 percent. Therefore, the Canadian management objectives in the Strait of Georgia for 1998 were to manage sport and troll fisheries for catches below the Treaty ceiling.

In 1998, there was no directed chinook troll fishery in the Strait of Georgia. However, chinook retention was permitted as an incidental catch during directed sockeye and chum fisheries. Non-retention of chinook was in effect during the mainland inlet pink fisheries.

Non-retention of coho and limitations on coho mortalities considerably reduced the effectiveness of directed commercial fisheries and the length of the chinook by-catch period. Measures to protect coho also protected chinook stocks.

Management actions for the troll fleet for 1998 consisted of single barbless hooks used during all directed fisheries; mandatory use of "revival tanks for coho"; mandatory logbooks and hailing catches on a regular basis; independent on-board observers on vessels when requested as part of the DFO monitoring program; and, test fishing prior to openings to identify areas with high coho encounters.

The preliminary estimate of the 1998 incidental chinook troll catch, as based on hail and logbook data, was 587 fish.

³ Red zones were areas/times where the fisheries management objective was zero mortality on coho stocks of concern. Directed salmon fishing in these areas was limited to experimental and test fisheries.

In the sport fishery, the chinook management plan implemented in 1989 in Georgia and Johnstone Straits was continued in 1998. This plan included an annual bag limit of 15, a daily bag limit of 2 and a size limit of 62 cm for Johnstone Strait and the Strait of Georgia, north of Cadboro Point. For the Canadian portion of Juan de Fuca Strait (Sheringham Point to Cadboro Point), a daily bag limit of 2, a size limit of 45 cm, and an annual bag of 20 were in effect.

In order to address southern B.C. coho conservation requirements, the Strait of Georgia was divided into red and yellow zones. Selected portions of the southern Strait of Georgia and the Strait of Juan de Fuca in Areas 19 and 20 were designated a red zone from June to September, when directed fishing for salmon was prohibited (experimental fisheries for salmon other than coho were allowed in several narrow inshore strips). The Fraser River mouth portion of Area 29 from the third week in August until mid October was also a red zone. After these dates, all areas in tidal waters switched to a yellow zone designation that permitted chinook retention but prohibited coho retention.

Non-retention of coho and limitations on coho mortalities considerably reduced the effectiveness of the sport fishery for chinook. Additional management actions directed at the sport fishery were single barbless hooks, monitors at boat ramps to check the catch, and observers onboard sport vessels to monitor the coho by-catch and collect biological data.

The 1998 sport catch for the Strait of Georgia to the end of September was 20,536 chinook, based on creel survey results. The 1998 creel survey lasted from April 1 until October 31. Sport effort in 1998 was only 61% of the 1997 level.

Fraser River Sockeye and Pink Salmon

The Fraser River Panel managed Panel Area fisheries in 1998 under the terms of an agreement reached on July 2, 1998 between Canada and the United States for the management of Fraser River sockeye and southern chum salmon in 1998. Fraser pink salmon were not a factor in 1998 salmon management since this was an off-cycle year.

The sharing arrangement limited U.S. catch in Panel Area fisheries to a maximum of 24.9% of the Fraser River sockeye salmon total allowable catch (TAC). Under agreement, U.S. gill net and purse seine fisheries in Areas 6, 7, and 7A were open Monday through Friday of each week during the period July 27 through August 21. U.S. reef net fisheries in Areas 7 and 7A were open Saturdays and Sundays from July 25 through August 23. The Treaty Indian fishery in Areas 4B, 5, and 6C was open noon Sundays through noon Fridays, during the period July 26 through August 21. The intent of this schedule, which could be modified to achieve spawning escapement objectives and Aboriginal food, social and ceremonial requirements, was to distribute the U.S. catch over the duration of the open period, to ensure that the 24.9% catch limit was achieved, and to avoid taking an excessive portion of the U.S. harvest in any weekly period.

The Fraser Panel developed a pre-season fishing plan that included a forecast Fraser River return of 11,218,000 sockeye and an escapement target of 5,770,000 sockeye. The pre-season forecast diversion through Johnstone Strait was 62%, and the run timing forecast indicated a slightly delayed return for the Early Stuart run and a near normal timed return for Summer and Late Run stock groups. The TAC calculation included management adjustments to account for natural, environmental, and stock assessment factors in order to increase the probability that escapement target levels were reached.

Additional elements of the Canadian fishing plan addressed conservation concerns for other species, a provision for fulfilling obligations to First Nations, a commercial allocation structure established by the DFO, and a provision for recreational fishing opportunities.

To address the continuing concern for southern B.C. coho in 1998, a series of restrictive measures was implemented in all fisheries that were expected to encounter coho salmon. Time, area, and gear

restrictions, and prescribed fishing practices were included in regulatory provisions of most fisheries. The Area G troll fishery was restricted to Statistical Area 12; Area B seine and Area E gillnet fisheries were excluded from Juan de Fuca Strait; and the Area E gillnet fishery in Georgia Strait and Fraser River was restricted to periods prior to early September. Recreational and aboriginal fisheries were also subjected to complementary restrictions. Conservation measures were also implemented in Johnstone Strait to address Nimpkish sockeye salmon concerns, and in the Fraser River to address steelhead and Harrison River chinook salmon concerns.

The majority of fishing opportunities was expected on the Mid-summer and Late Run stock groups in marine approach areas, and on Mid-summer run sockeye salmon in the Fraser River. Limited opportunities for Fraser River sockeye salmon were also expected for Area F troll fisheries in Northern B.C.

Management of fisheries during the season was affected by several unanticipated events. Extreme environmental conditions occurred in the Fraser River. Record high river temperatures created adverse migration conditions. En-route mortalities were anticipated and adjustments were made to the gross escapement objectives with the expectation that such actions would improve the prospect that sockeye would reach the spawning grounds at target levels. As well, in-season analyses indicated that returns of Mid-summer and Late Runs were overlapped and bimodal, creating difficulties for in-season assessment of run size.

Based on preliminary estimates of catch and the PSC staff's in-season assessment of gross escapement to the Fraser River, the sockeye return was 10,829,000, comprised of 174,000 Early Stuart, 787,000 Early Summer, 5,600,000 Summer, and 4,268,000 Late run sockeye.

Preliminary estimates of Fraser River sockeye catch totalled 2,944,900 fish: 1,294,500 fish in Canadian commercial fisheries (not including aboriginal pilot sales), 521,400 fish in U.S. Treaty Indian and non-Indian fisheries in Washington state, 186,000 in Alaska, and 818,000 fish in Canadian aboriginal fisheries. The remaining catch of 125,000 sockeye was accounted for in recreational fisheries (18,400) and test fisheries (106,600).

Canada has released preliminary information on sockeye spawning escapements. Preliminary estimates are: 31,000 Early Stuart, 230,700 Early Summer, and 2,359,900 Mid-summer Run sockeye. Preliminary escapements are not yet available for Late Run sockeye; however, the probable range within which the preliminary estimate is likely to be is 1,839,000 to 1,979,000. At these levels, the total escapement will be between 4,460,600 and 4,600,600.

Coho Salmon

The return of coho salmon produced from the many hundreds of Strait of Georgia, Fraser River and West Coast of Vancouver Island spawning streams was expected to be extremely poor in 1998. Recent large declines in marine survival combined with low numbers of spawning fish returning to many southern B.C. streams have created a serious conservation concern for several stocks. The proportion of fish harvested has been reduced in recent years, but the continued decline in marine survival rates offset the expected benefits of the actions taken to date. Habitat degradation and loss are long term concerns for coho but are not the primary reasons for the sharp decline in production in the past few years.

In six out of the last eight years Strait of Georgia and Fraser River coho have moved out of the Strait of Georgia sometime during their first year in the ocean, instead of remaining in the Strait for their entire ocean lives. In 1998, once again, Strait of Georgia and Fraser River coho migrated to the West Coast of Vancouver Island and were not available to Strait of Georgia fisheries until their spawning migration in the fall.

DFO determined that a total exploitation rate of 20% to 25% in 1997 would sustain coho populations (i.e. would expose wild coho populations to very low incremental risks of loss). This exploitation rate goal was a substantial reduction from the 55-60% goal applied in 1995 and 1996 and the 70% and greater exploitation rates applied prior to 1995. In terms of fishing impact (catch and incidental mortality), this meant a reduction from approximately 1.0 million total catch in 1996 to approximately 270K to 341K total mortality in 1997.

Canada's management plan for coho in 1998 was to substantially reduce exploitation from 1997 levels in order to address the increasingly severe conservation concerns for southern B.C. coho stocks. Coho were not allowed to be retained by any fishing gear in tidal waters coast-wide for the 1998 season. Barbless hooks were required for all hook and line gear. Independent observers monitored coho encounters and fisheries were actively managed to avoid coho. Fisheries were closed to salmon fishing if coho encounters could not be minimized.

Salmon fisheries in 1998 were managed with respect to two areas, or zones. The first, red zones, were areas where coho stocks-of-concern (e.g. Thompson River coho in southern B.C.) were expected to be prevalent. In these areas, the fisheries management objective was zero fishing mortality on stocks-of-concern, with only very limited test and experimental fisheries permitted. The second, yellow zones, were areas where stocks-of-concern were not prevalent. In these areas, restricted fisheries were allowed where the risk of coho by-catch mortality was minimal.

Preliminary estimates of coho encounters and coho mortalities for all fisheries that took place in red and yellow zones in southern BC are presented in Table 1. The estimates are 127K encounters and 19K mortalities to October 24, 1998. A summary of the preliminary estimates of coho encounters and mortalities by the commercial fisheries (troll, seine, and gillnet) is presented in Table 2. This table also presents the ratio of coho encountered to salmon caught in directed fisheries.

Area 20 Net Catch

There were no targeted commercial salmon fisheries in Area 20 in 1998.

West Coast Vancouver Island Troll (Areas 21 to 27, 121 to 127 and 130-1)

Red zone areas off the WCVI lasted from June 1 to September 30 outside the surf line, in western Juan de Fuca Strait, and, in outer Barkley Sound. No trolling took place in the WCVI (Area G) red zone areas during this period in 1998.

Southern British Columbia Chum Salmon

In 1998 a bilateral agreement for sharing of chum salmon was reached on July 2, 1998. Canada and the United States agreed to implement, without any prejudice to future agreements, the most recently expired sharing arrangement as outlined in Annex IV Chapter 6 of the Pacific Salmon Treaty. The essential sharing arrangements of Chapter 6 are as follows:

- When the catch in Johnstone Strait is 225,000 chum or less, the US 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.
- 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.
- 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.

Inside Net (Areas 11 to 19, 28 and 29)

The 1998 pre-season forecast for Study Area (inside) chum stocks was 3.8 million based on 1993-95 brood year returns. This forecast consisted of 1.9 million Fraser and 1.8 million non-Fraser (not including 100 thousand U.S.). The escapement goal for the Clockwork chum salmon stock is 2.0 million.

Johnstone Strait (Areas 12 and 13)

In 1998, the third week of September "Assessment Fishery" was not held due to conservation concerns for coho salmon. The cancellation of the "Assessment Fishery" was just one management action taken among a broad spectrum of measures taken in order to reduce exploitation on Southern B.C. coho stocks. However, this action forced total reliance upon test fishing in Johnstone Strait as the only means for assessing the returning chum run stock strength early in the season. Test fishing commenced on September 16 in Johnstone Strait. Test fishing catches were strong in the first week and continued strong into the second week. In fact one of the test vessels had the highest catches on record since test fishing commenced in 1965. Given the strong test fishing catches and the pre-season forecast, gill net and troll fisheries were initiated to harvest returning chum salmon.

On October 8 the run was reassessed. The reassessment resulted in a run size upgrade to 5.1 million from the pre-season forecast of 3.9 million. Under the Clockwork Strategy a run size of 3.9 to 5.2 million allows for a Johnstone Strait harvest rate target of 30%. After allowing for Aboriginal requirements of 35,000, 140,000 US catch as allowed under Annex IV, Chapter 6, and test fishing requirements, there was a commercial surplus of about 1.3 million chum salmon at a run size of 5.1 million. Under domestic sharing arrangements, Area H troll was allocated 6% and the remaining 94% was shared between Area B seine (82%) and Area D gill nets (18%).

The in-season run size assessment ranged from 5.1 million to the final in-season estimate of 5.5 million. At the 5.5 million run size estimate the harvest rate goal was 40% and the total Johnstone Strait catch target was 2.0 million. During the course of the 1998 Johnstone Strait chum run there were the following fisheries:

- Purse seines fished a total of 8 days spread over 5 weeks. Fleet size ranged from a high of 150 in the first opening October 12 to a low of 51 purse seines during the final fishery on November 9. The total catch for the eight days of seining is estimated to be 1,590,000.
- Gill nets fished a total of 26 days spread over 6 weeks. The first fishery was on October 5 and the last was November 13. Total catch for the 26 days was 100,000.
- Troll fishing for chum salmon in Johnstone Strait commenced on October 8 and was closed November 20. There was a total of 33 days of trolling for chum salmon in 1998. During this period the total troll catch was 104,000.

The total Johnstone Strait catch is 1,820,000. This is comprised of a commercial catch of 1,794,000 and a test fishery catch of 26,000. At this time escapements to the majority of terminal areas appear to have reached or exceeded goal. If the in-season estimate of 5.5 million is realized in post-season accounting of catch and escapement, this would be the largest Study Area run size since 1952.

The Nimpkish terminal area in Area 12 continues to be monitored. It is too early to forecast whether there will be a harvestable surplus of chum salmon for the Nimpkish River.

GSI Sample Collection

Two GSI sample collections for stock identification were undertaken in Johnstone Strait in 1998.

Strait of Georgia (Area 14 to 19)

Qualicum (Area 14)

With a preseason expected return to inside chum areas of 3.9 million, which later was upgraded to 5.1 million, a surplus was expected at Qualicum. Fishing commenced on October 19 for two days by gillnets. Fishing by gillnets resumed on October 26 for four days and on November 2 until further notice. Gillnet participation was low, with total catches to date (November 15) approximately 27,000.

Seine fishing occurred on November 1 and 2, and resumed November 8 until further notice. The number of vessel ranged from 0 to 34 for these fisheries. The total catch to date is estimated at 686,000 for seines. The major streams and enhancement facilities for this area have all exceeded their escapement requirements.

Jervis (Area 16)

Gillnets opened for two days commencing on November 3, and resumed again the following week for four days starting on November 8. Effort was minimal. Catches total approximately 3,000. Seines opened for two days commencing Nov 13. Catches totalled less than 1,000. Escapement estimates are incomplete, but several streams have already met or exceeded their escapement goals.

Nanaimo (Area 17)

A gillnet fishery occurred on November 2 for 24 hours. Effort was low and catches for this fishery were less than 1,000. Escapement estimates are incomplete.

Cowichan (Area 18)

A gillnet fishery occurred on November 9 and 10. Catches and effort were small. Chum returns continue to be monitored through test fishing and escapement enumeration.

Recreational catches in Areas 14 to 19 areas are negligible. Aboriginal catches to date are approximately 18,000.

Fraser River

Test fishing at Albion began on September 1. To November 15, test fishery catches totalled 10,700 chum. The run size appears to be above the pre-season forecast of 1.9 million. The total terminal run, including catch to November 11, is estimated at 2.2 million, with an early run component of 1.5 million and a late run component of 714,000. To November 15, fisheries by First Nations caught 16,000 chum, approximately 4,500 of which were taken in selective fisheries initiatives. Another 26,000 chum have been taken in an ESSR fishery. Area 29 commercial fisheries took place on November 9 and 12 resulting in a total catch of 32,000 chum. At least one more fishery is planned, the next scheduled for November 19.

Experimental fisheries designed to test methods of selectively harvesting chum while releasing other species are ongoing in the Fraser River. Of 10 proposed projects, some started as early as September 24 and, while others are starting in November, most will finish by mid-December. The majority of these projects are trials of non-retention equipment; the harvest from these experimental fisheries to November 15 is less than 2000 chum.

West Coast Vancouver Island Net (Areas 21 and 22)

Chum salmon returning to Area 22 (Nitinat Lake) are caught in Area 21, parts of Area 121 and potentially in Area 20-1. In 1998, the preseason forecast suggested a harvestable surplus of approximately 1 million chum salmon, based on good escapements in the brood years, high hatchery production levels in the brood years, and average ocean survival for the 1993 and 1994 brood years.

The Nitinat escapement objective was 250,000 to a maximum of 350,000. The additional 100,000 above the 250,000 target are utilized as hatchery broodstock requirements, increased distribution of spawners in the Nitinat River, and payment for in-lake test fishery/brood stock capture activities.

The 1998 fishing plan was again based on achieving weekly escapement goals into Nitinat Lake. In addition, the fishing plan addressed increased requirements to minimize by-catch of passing coho and steelhead, provide early opportunities for gillnets, provide a seine fishery to balance allocation, and then allow a combined seine and gillnet fishery at the peak of the run. Implementation of the plan was based on weekly assessment information from an in-lake test fishery/escapement surveys, a gillnet test fishery outside Nitinat Lake in the commercial fishing area, and a seine test fishery outside Nitinat Lake.

The outside gillnet test fishery, initiated in 1995, was continued in 1998 with some modification. The area was reduced to avoid passing steelhead, and not implemented until September 21 to avoid passing steelhead and coho. This test fishery included 7 vessels each fishing 2 nets in a systematic grid pattern with the objective to determine abundance and distribution of chum and other species.

To minimize encounters of passing stocks of coho and Thompson River steelhead, the first commercial gillnet fishery was delayed until October 4. In addition, the initial fishing area was reduced to within a one mile boundary between lines true south from Pachena and Dare Points, based on information from the gillnet test fishery. To reduce mortality of coho and steelhead and to improve catch data, the following measures were implemented for the entire season:

- non-retention of coho and steelhead (seine and gillnet)
- mandatory functional revival tanks (seine and gillnet)
- daylight fishing only (gillnet)
- onboard observers (seine and gillnet)
- logbooks and weekly hail-ins (seine and gillnet)
- mandatory brailing (seine, waived mid-afternoon on October 11)

The fishery was open to gillnets through October 10, when it closed for two days to allow a seine fishing opportunity. Gillnets re-opened on the morning of October 13 until further notice with the area expanded easterly to a line true south of Carmanah Point. On October 20 the area was further expanded to a line true south of Logan Creek to address safety and economic concerns. The fleet size remained small and fishing closed on November 8 (no gillnets fished after November 6).

The seine fishery opened within a one mile boundary between lines true south of Pachena and Carmanah Points at 0900 on October 11, after a brief delay due to concerns for poor weather. Later that day the brailing requirement was waived due to fears that brailing in the heavy sea would not increase the survival of incidental species yet would increase risk to crew safety. Observer information indicated a low incidence of coho. On October 20 the fishing area was expanded easterly to a line true south of Bonilla Point. The modest fleet size for seines was also due to the chum market situation and other chum fishing opportunities (Johnstone Strait). Seine openings continued through November 8, although no seines fished after October 29.

Fleet sizes were smaller than usual for both seines and gillnets throughout the fishery, likely due to poor prices and lack of buyers and fleet support on the grounds.

Total commercial catch was 832,000 including 152,000 by gillnet and 647,000 by seine plus 20,000 by gillnet test fisheries and 13,000 by seine test fisheries. Preliminary estimates of total Area 21 catch are shown in the following table.

Table 1. Preliminary estimates of total Area 21 catch.

	Total days	Boat days	Chum catch	Chinook catch	Released coho	Released chinook	Released steelhead
Gillnet total	34	942	151,583		95		100
Seine total	29	406	647,075	146	3,701	61	29
Total Commercial			798,658	146	3,796	61	129
GN test			20,300		64	8	38
SN test			13,000				
Total A21			832,000				

Table 2. Preliminary summary of 1998 Coho total mortality by sector for South Coast British Columbia [Note: estimates are until end of StatWeek 10/4 (or Oct. 24/98)].

Yellow Zone Fishery	Total Coho Encounters	Estimated Coho Mortalities
Commercial	19,448	6,868
Recreational	69,322	6,932
First Nations	70	18
Test Fisheries	3,561	978
Experimental	18,710	2,065
Yellow Total	111,111	16,861

Red Zone Fishery	Total Coho Encounters	Estimated Coho Mortalities
Test Fisheries	4,103	939
Experimental	11,832	1,183
Red Total	15,935	2,122

Yellow/Red Total	127,046	18,983
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Table 3. Preliminary estimates of 1998 coho encounters and mortalities in the commercial fisheries for South Coast British Columbia.

Commercial	Total Coho Encounters	Estimated Coho Mortalities	Preliminary Catch Estimates (pieces)				Non-Coho Total	Coho released to Fish Kept Ratio
			Sockeye	Pink	Chum	Chinook		
Troll - Area G	7,340	1,908	219,000	21,400	990	2,300	243,690	0.03
Troll - Area H	1,252	326	128,500	18,000	86,100	450	233,050	0.01
Troll Sub-Total	8,592	2,234	347,500	39,400	87,090	2,750	476,740	0.02
Seine - Area B	9,156	3,614	456,000	51,225	1,635,771	139	2,143,135	0.004
Seine Sub-Total	9,156	3,614	456,000	51,225	1,635,771	139	2,143,135	0.004
Gillnet - Area D	1,610	966	229,417	13,304	199,091	145	441,957	0.004
Gillnet - Area E	90	54	234,000	0	148,995	3,673	386,668	0.0002
Gillnet Sub-Total	1,700	1,020	463,417	13,304	348,086	3,818	828,625	0.002
Commercial Total	19,448	6,868	1,266,917	103,929	2,070,947	6,707	3,448,500	0.006

Total escapement into Nitinat Lake (Area 22) was estimated at 600,000 including:

- 200,000 chum spawners in the Nitinat River and other Nitinat Lake tributaries,
- 50,000 broodstock requirements for 40 million eggs,
- 25,000 in lake test fishery payment,
- 60,000 Ditidaht Band catch (including 10,000 scientific permit and 50,000 ESSR),
- 60,000 in lake mortality due to late season turnover,
- 200,000 surplus to Hatchery including 40,000 provided to First Nations and
- 160,000 sold under Hatchery ESSR.

The total Nitinat return is estimated to be approximately 1.4 million chum.

GSI Sample Collection

No electrophoretic samples were collected in Area 21.

(Source Document) *1998 Post-Season Report for Canadian Treaty Limit Fisheries.* Canada Department of Fisheries and Oceans. December 2, 1998.

Table 4. Preliminary 1985 to 1998 catches in Canadian Treaty Limit Fisheries. Prepared for the December 3, 1998 Meeting of the Executive Session of the PSC.

Fisheries/Stocks	Species	1998##	1997#	1996	1995	1994	1993	1992	1991	1990
<i>Stikine River</i> (all gears)	<i>Sockeye</i>	43,803	65,404	74,281	53,467	45,095	47,197	26,284	22,763	18,024
	<i>Coho</i>	726	401	1,404	3,418	3,381	2,616	1,855	2,648	4,037
	<i>Chinook-large</i>	2,164	4,483	2,741	1,646	1,790	1,803	1,840	1,511	2,250
	<i>Chinook-jack</i>	423	286	421	860	350	308	239	660	959
	<i>Pink</i>	55	269	25	48	90	29	122	394	496
	<i>Chum</i>	13	222	232	263	173	395	231	208	499
	<i>Steelhead</i>	209	33	183	270	84	67	132	71	199
<i>Taku River</i> (commercial gillnet)	<i>Sockeye</i>	19,038	24,246	41,665	32,640	28,762	33,217	29,472	25,067	21,100
	<i>Coho</i>	5,090	2,903	5,028	13,629	14,531	3,033	4,077	3,415	3,207
	<i>Chinook-large</i>	1,107	2,732	3,331	1,577	2,065	1,619	1,445	1,177	1,258
	<i>Chinook-jack</i>	227	84	144	298	235	171	147	432	128
	<i>Pink</i>	0	0	0	2	168	16	0	296	378
	<i>Chum</i>	2	3	0	1	18	15	7	2	12
	<i>Steelhead</i>	176	183	98	205	232	11	15	5	22
<i>Areas 3 (1-4) and 5-11</i> (commercial net)*	<i>Pink</i>	61,000	329,000	987,000	2,613,000	262,000	1,242,000	1,099,000	6,961,000	831,000
<i>Area 1</i> (commercial troll)	<i>Pink</i>	0	261,000	732,000	1,284,000	220,000	890,000	760,000	1,647,000	1,165,000
<i>North/Central Coast</i> (commercial/sport)**	<i>Chinook</i>	144,650	145,568	26,900	119,100	241,000	258,300	262,000	303,200	253,000
<i>West Coast Vancouver Island</i> <i>Area 12 (commercial troll)</i>	<i>Chinook</i>	10,284	51,400	0	81,000	146,000	275,000	345,500	202,900	298,000
	<i>Chinook</i>	0	2,600	0	0	2,200	4,200	2,600	1,000	2,000
<i>Georgia Strait</i> (sport) (troll)	<i>Chinook</i>	20,536	56,300	93,800	61,500	70,800	118,800	116,600	112,700	112,000
	<i>Chinook</i>	587	800	0	0	13,000	33,300	37,300	32,000	34,000
	<i>Total</i>		57,100	93,800	61,500	83,800	152,100	153,900	144,700	146,000
<i>Fraser River Stocks</i> (total Canadian commercial catch)	<i>Sockeye</i>	1,295,000	8,737,000	1,019,000	903,000	9,800,000	13,428,000	3,906,000	6,947,000	13,411,000
	<i>Pink</i>	0	3,660,000	0	3,777,000	0	3,731,000	0	6,405,000	0
<i>Fraser River Stocks</i> (total US commercial catch)	<i>Sockeye</i>	707,000	1,578,000	257,000	415,000	2,100,000	2,876,000	700,000	1,881,000	2,427,000
	<i>Pink</i>	0	1,565,000	0	1,919,000	0	1,725,000	0	2,789,000	0
<i>West Coast Vancouver Island</i> (commercial troll)	<i>Coho</i>	0	0	761,000	1,345,000	1,251,000	954,000	1,664,000	1,890,000	1,864,000
<i>Johnstone Strait</i> (clockwork catch)***	<i>Chum</i>	1,820,000	104,593	101,971	269,000	1,295,600	1,271,700	1,368,283	174,269	1,183,901

1998 catches are based on in-season hails, on-the-grounds counts, dockside tallies and Aboriginal landing slips, fish slip data to Nov 12 (transboundary), Nov 2 (north/central chinook), September 1 (north pinks), October 31 (WCVI troll chinook), November 15 (southern chum) and in-season hails, sport catches are from creel survey data to September 30 (Georgia Strait), and logbooks (north/central chinook)

1997 catches are preliminary

* Area 5-11 catches excluded in 1995, 1996, 1997, and 1998

** North Coast catch excludes terminal exclusion catches of 4,800 ('89), 5,500 ('90), 6,000 ('91), 6,100 ('92), 7,400 ('93), 6,400 ('94), 1,702 ('95), 16,000 ('96), 5,943 ('97), and 2,182 in 1998

*** Canadian clockwork catch includes commercial, IFF and test fish catches in Areas 11-13 and 29 for 1985-87 and in Areas 11-13 for 1988-92, 1993, 1994 and in Areas 12-13 for 1995, 1996, 1997, and 1998

Table 4. Preliminary 1985 to 1998 catches in Canadian Treaty Limit Fisheries. Prepared for the December 3, 1998 Meeting of the Executive Session of the PSC, continued.

Fisheries/Stocks	Species	1989	1988	1987	1986	1985
<i>Stikine River</i> (all gears)	<i>Sockeye</i>	20,032	15,291	9,615	17,434	25,464
	<i>Coho</i>	6,098	2,117	5,731	2,280	2,175
	<i>Chinook-large</i>	2,669	2,360	2,201	1,936	1,111
	<i>Chinook-jack</i>	289	444	444	975	185
	<i>Pink</i>	825	418	646	107	2,356
	<i>Chum</i>	674	733	459	307	536
	<i>Steelhead</i>	127	261	219	194	240
<i>Taku River</i> (commercial gillnet)	<i>Sockeye</i>	18,545	12,014	13,554	14,739	14,244
	<i>Coho</i>	2,876	3,123	5,599	1,783	1,770
	<i>Chinook-large</i>	895	555	127	275	326
	<i>Chinook-jack</i>	139	186	106	77	24
	<i>Pink</i>	695	1,030	6,250	58	3,373
	<i>Chum</i>	42	733	2,270	110	136
	<i>Steelhead</i>	24	86	223	48	32
<i>Areas 3 (1-4) and 5-11</i> (commercial net)	<i>Pink</i>	2,259,000	425,000	1,851,000	1,983,000	1,277,000
<i>Area 1</i> (commercial troll)	<i>Pink</i>	1,377,000	1,630,000	495,000	416,000	6,870,000
<i>North/Central Coast</i> (commercial/sport)	<i>Chinook</i>	301,200	245,600	282,800	261,000	275,000
<i>West Coast Vancouver</i> <i>Island</i>	<i>Chinook</i>	203,700	408,700	379,000	342,000	358,000
<i>Area 12 (commercial troll)</i>	<i>Chinook</i>	2,000	2,000	2,000	4,000	4,000
<i>Georgia Strait</i> (sport) (troll)	<i>Chinook</i>	133,000	119,000	121,000	182,000	235,000
	<i>Chinook</i>	29,000	20,000	39,000	44,000	56,000
	<i>Total</i>	162,000	139,000	160,000	226,000	291,000
<i>Fraser River Stocks</i> (total Canadian commercial catch)	<i>Sockeye</i>	12,776,000	1,615,000	3,776,000	9,372,000	8,754,000
	<i>Pink</i>	7,181,000	0	2,579,000	0	8,725,000
<i>Fraser River Stocks</i> (total US commercial catch)	<i>Sockeye</i>	2,439,000	679,000	1,932,000	2,755,000	2,925,000
	<i>Pink</i>	2,260,000	0	1,339,000	0	3,834,000
<i>West Coast Vancouver</i> <i>Island</i> (commercial troll)	<i>Coho</i>	1,953,000	1,596,000	1,821,000	2,157,000	1,389,000
<i>Johnstone Strait</i> (clockwork catch)***	<i>Chum</i>	481,803	1,111,559	90,668	1,060,903	529,100

1998 catches are based on in-season hauls, on-the-grounds counts, dockside tallies and Aboriginal landing slips, fish slip data to Nov 12 (transboundary), Nov 2 (north/central chinook), September 1 (north pinks), October 31 (WCVI troll chinook), November 15 (southern chum) and in-season hauls, sport catches are from creel survey data to September 30 (Georgia Strait), and logbooks (north/central chinook)

1997 catches are preliminary

* Area 5-11 catches excluded in 1995, 1996, 1997, and 1998

** North Coast catch excludes terminal exclusion catches of 4,800 ('89), 5,500 ('90), 6,000 ('91), 6,100 ('92), 7,400 ('93), 6,400 ('94), 1,702 ('95), 16,000 ('96), 5,943 ('97), and 2,182 in 1998

*** Canadian clockwork catch includes commercial, IFF and test fish catches in Areas 11-13 and 29 for 1985-87 and in Areas 11-13 for 1988-92, 1993, 1994 and in Areas 12-13 for 1995, 1996, 1997, and 1998

D. 1998 UPDATE REPORTS FOR SALMONID ENHANCEMENT PROGRAMS IN THE UNITED STATES AND CANADA

The Pacific Salmon Treaty between Canada and the United States requires that information be exchanged annually regarding operations of and plans for existing enhancement projects, plans for new projects, and views concerning the other country's enhancement projects. In 1988, a committee was formed to develop recommendations for the pre- and post-season and enhancement report formats. In summary, the committee proposed that:

- detailed reports on existing enhancement facilities of the type produced in 1987 be prepared every four years;
- the Parties will annually update information on eggs taken, fry or smolt released and adults back to the facility; significant changes in facility mission or production will be highlighted in narratives; and
- the Parties will provide periodic reports through the appropriate panels on new enhancement plans.

1. 1997 Annual Report on the Salmonid Enhancement Activities of the United States

The Pacific Salmon Treaty provides that, "2. Each year each Party shall provide to the other Party and to the Commission information pertaining, *inter alia*, to: (a) operations of and plans for existing projects; (b) plans for new projects;..." (Article V). The United States provided a report dated January 31, 1990 to Canada that combined under one cover all pertinent biological data for United States enhancement projects with a detailed account of plans for new projects. The 1997 Annual Report, the eighth in the series, incorporates updated information through the end of the 1996 calendar year for releases, numbers of adults returning to hatcheries, and the number of eggs taken.

Information is organized by hatchery managing agency or region, and by brood year of releases or calendar year of returns and egg takes. Each agency is to report

1. New production
2. Losses of production
3. Major trends in production
4. Brood year releases of juveniles by facility
5. Calendar year returns of adults to enhancement facilities
6. Calendar year takes of eggs by facility

In addition, a summary table of releases by species by year by agency or region appears below.

Agencies in Washington, Oregon and Idaho face the challenge of coordinating enhancement activities with recovery actions for endangered species. Recovery actions regarding enhancement activities will also lead to changes in the abundance of fish available for ocean fisheries.

Source Document) *1997 Annual Report on the Salmonid Enhancement Activities of the United States*. United States Section of the Pacific Salmon Commission. August, 1998.

2. 1998 Annual Report on the Salmonid Enhancement Activities of the United States

This report had not been received by March 31, 1999.

3. 1998 Update Report for the Salmonid Enhancement Program in British Columbia

The Pacific Salmon Treaty between Canada and the United States requires that information be exchanged annually regarding: operation of and plans for existing enhancement projects, plans for new projects, and views concerning the other country's enhancement projects. This report describes significant changes to the enhancement program since the previous report. Included are a series of appendices containing:

- 1) year-end status for facilities showing eggs taken, fry and smolt releases during 1998 and fish presently on hand (Appendices 1 and 2),
- 2) total releases from SEP for 1998, (Appendix 3).

Significant Changes in Program

Coastal Division

East Coast Vancouver Island

Big Qualicum - target escapement for chum was achieved in 1998. The female portion of the escapement is still lower than expected. Hatchery production goals were achieved for chinook and coho. Chinook escapement was low for jacks and 3-year-old fish for the second year in a row, indicative of weaker returns in the future. Coho escapement to the river was below expectations in light of the non-retention fishery, also the fish size at return was variable from small to very large. It was observed that the proportion of the adult return ratio of ventral clipped coho versus unclipped coho was lower than the ratio of clipped to unclipped jacks of the same brood year. Big Qualicum is now operating Rosewall Hatchery for strategic stock enhancement and other research oriented projects.

Chemainus - Chinook escapement was well below expectations, with very few females in the escapement. Very few chinook were seen in the river after many swims throughout the season. The chinook observed were all small. The enhancement program achieved 20% of their chinook egg target. The coho egg target was achieved.

Little Qualicum - has been experiencing similar returns as Big Qualicum.

Puntledge - Pink salmon returns were low. The chum escapement was very large with evidence of over-spawning (eggs being washed out of the gravel). The summer run chinook was improved over last year. A portion of the eggs will be taken to Rosewall for incubation and rearing, both to increase smolt growth and for a proposed adult brood program. The fall run chinook escapement was better than previous years (223 fish). Seventy-five fish spawned in the river but the eggs were heavily impacted by over-spawning by chum. Coho returns experienced a strong early component to the escapement. Similar to Big Qualicum, Puntledge ventral clipped adults represented 10% of the adult escapement while ventral clipped jacks the previous year (same brood) represented 65% of the jack return. Steelhead returns are improving, though very weak. A combination of a seal barrier fence and culling significantly decreased predation on downstream migrants in 1998. The decrease in predation on returning adults was not as dramatic. There are no plans to operate the fence in 1999.

Quinsam - Chinook adult escapement continues to improve. This may reflect the fishery closure at the mouth of the Campbell River. A good distribution of age classes within the coho escapement was evident, with strong early and late components but very few fish between. A

large number of jack coho returned to the system. Pink escapement was slightly below average. Chum escapement to the river was good. The hatchery is undertaking several programs with the community and B.C. Hydro to improve water flow control and productivity of the Campbell River system. An estuary management plan has been initiated with Campbell River municipality and is initiating several habitat improvement projects within the estuary.

Mainland Inlets

Kakweiken - Pink escapements were good to the river but very poor to the channel.

Glendale - Pink escapements were good to both the river and channel.

West Coast Vancouver Island

Conuma - Chum escapement was very large, with the hatchery achieving egg targets for all systems. The chinook escapement was good, though slightly below expectations for jack and 3 year old chinook. Coho returns were below average despite non-retention coho fisheries. The hatchery has undertaken a chinook program to raise yearling smolts for release in 1999 and a translocation program for chinook to avoid mackerel predation. This is achieved by towing a sea pen group of chinook to open water. This year the coho were marked for potential selective mark fisheries.

Nitinat - The facility continues to support a large chum fishery. Chinook escapement was very strong, though the jack and 3 year old component was lower than expected. The hatchery achieved all production egg targets. Coho escapements were excellent. The hatchery is incubating eggs for several satellite stocks in cooperation with various native groups. One item to note is the high incidence of bacterial kidney disease in the wild coho stocks from these areas. The hatchery egg targets have changed for the 1998 brood. Nitinat chinook production was reduced by 1 million to bring the program within budget and allow extra effort on other depressed chinook and coho stocks. The current target produces surplus Nitinat chinook, which are not harvested under current fisheries management. The Nitinat chum target was increased by 5 million which will be released into Klanawa River, contingent on the fall escapement program confirming the stock is extinct. Returning chum carcasses will provide nutrients to the Klanawa River, and increase the productivity of the system for coho and steelhead.

Robertson Creek - Total chinook escapement has improved. The hatchery achieved its egg target, though the jack and three-year-old components were poor, indicative of weak returns for the future. A low number of chinook females compared to males returned to the Somass river system. Coho returns were good, with a large number of jack coho present in the escapement. The hatchery is testing "translocation" release of chinook as an alternate release strategy to avoid predators during years of high mackerel predation. The yearling strategy has been cancelled due to fish health issues. The hatchery achieved a 600k egg take for Nahmint chinook in 1998.

Central Coast

Snootli - Good adult returns for chum and average returns for pink salmon. There was a fishery for chum salmon. The chinook are returning in good numbers though slightly below target escapement. The coho escapement was excellent for both the upper systems and the lower Bella Coola stocks. The number of net marked coho observed in the Atnarko was indicative of the value of the non-retention (coho) fisheries. The hatchery continues to support the community coho smolt program for lower Bella Coola stocks. This program has been expanded to include

Atnarko stock, a previously discontinued program. Sockeye escapement is improved from last year, though well below target escapement.

North Coast

Kitimat - The steelhead program continues to be a success. The chinook escapement is good though Dala River continues to show poor returns. Coho escapement was a record high to the Kitimat River. Chum escapement was very strong. This was the first year of a directed commercial fishery in the terminal area and a freshwater sport fishery on the chum.

Pallant - Chum and coho escapements were average. The hatchery is now operated by the Haida in partnership with DFO.

Fraser River and Northern B.C. Division

Lower Fraser

Chilliwack - The return of red chinook has been consistent for the last few years, with approximately 1,000 rack returns. Although a Creel Survey was not conducted, at least that many again were caught by Chilliwack River sport fishers. During the fall, river flows were low for a period up to November 13. The large escapement of fall white chinook and chum in 1998 pushed the coho into marginal holding areas and reduced returns to the hatchery rack, even in the absence of marine harvest. Winter steelhead returns have been good. In particular, the early run has been stronger than during the past few years. There is concern for wild coho stocks in tributary streams.

Inch - Chum escapements to Inch Creek and Stave River were record highs. Coho escapement to Inch Creek was higher than previous, due to increased smolt release; Stave and Norrish escapements were similar to 1997. Escapement of chinook to Stave River is building (transplant from Chilliwack Hatchery) and broodstock were all collected at Stave for the second year.

Upper Pitt - A successful fall program resulted in 8.0 M sockeye eggs being taken. The preliminary escapement estimate is 80.5K sockeye. The hatchery continued involvement with habitat restoration/enhancement projects on Mosquito Creek, Homestead Creek, and Fish Hatchery Creek.

Mainland

Capilano - Projected smolt release numbers for chinook, coho and steelhead were achieved. Capilano adult coho returns provided one of the few terminal tidal and non-tidal sports fishing opportunities in this year of coho conservation. Coho adult returns to the hatchery rack were less than average. This may have been caused by an unusually dry summer during which minimal water flows were released from the Cleveland Dam for a three-month period. This created very efficient fishing opportunities for sport anglers and the Squamish First Nation at the mouth of the river. The coho escapement was further complicated by a very low percentage of females in the hatchery rack population, however all egg targets were achieved. Chinook adult returns from Chilliwack white chinook egg transplants were as anticipated.

Chehalis - Following a number of poor years, for the second consecutive year returns of Harrison white chinook were relatively strong. Coho returns appeared average to slightly below average, while chum returns were well above average. For brood year 1998, chum production targets were dropped in half from 9.0 M to 4.5 M.

Tenderfoot - Chinook escapements were in line with expectations and egg targets were easily met. Coho escapements were very low, although eggs targets were met for all stocks with the exception of the Upper Squamish River.

Middle Fraser

Shuswap - Average to strong chinook escapements resulted in eggs targets for both the Middle and Lower Shuswap being met. The installation of a new river intake has allowed for the provision of ambient incubation temperatures to two new coho groups of conservation concern.

Spisus - For the third consecutive year, depressed coho returns to the Salmon and Coldwater rivers led to shortfalls in egg collection numbers. Two additional coho stocks of conservation concern were added to the facilities production targets. Chinook returns to the Nicola River was alarmingly low, thought to be due in part to elevated river temperatures.

Upper Fraser

Horsefly - Following a number of improvement activities (settling basin cleaning and redesign, partial gravel replacement) conducted in the summer of 1998, the channel was put back into operation for the fall's sub-dominant return. Similar to the river spawning population, elevated levels of prespawning mortality were observed amongst adults loaded into the channel from the front portion of the run.

Nadina - After experiencing a 39% prespawning mortality rate amongst the fall of 1997 adult returns, the brood year egg to fry survival rate was less than 20%. For the fall of 1998, another small escapement to the system resulted in just under 3 K adults being loaded into the channel. Again, the parasite Ich was documented as being present in the stock, although no unnatural elevation of prespawning mortality rate was seen.

Upper Skeena

Fulton and Pinkut - The spring programs for brood year 1997 resulted in total fry production from both sites of 146 M, 18% lower than the average for the previous twenty year period. The reduction was the result of elevated prespawning mortality that was parasite induced. For the fall of 1998, depressed returns to both systems resulted in reduced loading rates to both the channels and the rivers. With the assistance of a full time summer student and diagnostic staff from PBS, sampling activities for Ich and Loma continued. Although both parasites were documented to be present, no elevation in prespawning mortality was seen.

Northern

Transboundary - A small escapement of approximately 13K adult sockeye to Tahltan Lake (Stikine system) resulted in only 4.4M of the 6.0M sockeye egg target being achieved. At Tatsamenie Lake (Taku system), an average escapement allowed attainment of the 2.5M egg target. At Tatsamenie Lake, short term net pen rearing is being conducted in an attempt to increase fry survivals. Regarding enhanced fry survivals in general, it is felt that a recent move to earlier outplant timing will result in more favourable results.

Resource Restoration and Development Division

Habitat Restoration - The Resource Restoration Division, in concert with the Development Division, continues to implement habitat restoration projects throughout B.C. Funding for the

projects was derived, in part, from other programs such as the Fraser River Action Plan, Skeena River Green Plan, B.C. Hydro, Watershed Restoration Plan (Forest Renewal B.C.), Habitat Conservation Fund and Pacific Salmon Foundation. In total, over 6 million dollars has been spent on habitat initiatives this year. Included in this expenditure are several demonstration sites on the Squamish and Chilliwack Rivers. These will be used to promote the benefits of habitat restoration and the various techniques that can be utilized in the field.

In addition to project implementation, technical staff have assisted in training contractors and have participated in workshops that will set the direction for future habitat rehabilitation projects throughout B.C.

Community Involvement Division

SEP's Community Involvement Division (CID) continues to manage four parts of the Salmonid Enhancement Program: the Community Economic Development Program (CEDP), the Public Involvement Program (fish production projects), information dissemination concerning CID (public displays, brochures, newsletters, etc. on various topics including fish production techniques, habitat restoration and educational concerns) and the Education Program (including Salmonids in the Classroom). No major changes to the program occurred in 1998.

Lake Enrichment Program

Three sockeye salmon nursery lakes on Vancouver Island (Great Central, Henderson, Hobiton) were fertilized weekly from June to September 1998. For the second year in a row, the application work was carried out using twin-engine fixed-wing aircraft stationed at Port Alberni Airport. Two kinds of highly concentrated liquid fertilizer (one high in phosphorus, one high in nitrogen) were mixed together just prior to loading onto the aeroplane, and were sprayed using crop-dusting equipment over about half of the lakes' surface. Monitoring of nutrient levels, phytoplankton and zooplankton levels over many years in these lakes has indicated that the nutrients move quickly up the food chain to stimulate the productivity of the lake.

In 1998, the nutrient loading to Great Central Lake was doubled from the level that has been used for the last decade. Preliminary analysis indicates that the nutrients stimulated higher levels of food organisms and gave greater growth rates for the sockeye fry that were rearing in the lake. We are expecting to see a larger average size in the sockeye smolts that leave Great Central Lake in the spring of 1999, which should result in a higher marine survival rate for this stock.

(Source Document) *1998 Update Report for the Salmonid Enhancement Program in British Columbia*. Department of Fisheries and Oceans, Canada. March 19, 1999.

Reports of the Joint Technical Committees

PART V

REPORTS OF THE JOINT TECHNICAL COMMITTEES

Executive summaries of reports submitted to the Commission by the joint technical committees during the period April 1, 1998 to March 31, 1999 are presented in this section. Copies of the complete reports are available on request from the library of the Pacific Salmon Commission.

A. JOINT CHINOOK TECHNICAL COMMITTEE

Joint Chinook Technical Committee - Committee Response to Questions from the PSC Commissioners Regarding the U.S. and Canadian Proposals for Abundance-Based Regimes for Chinook Fisheries. TCCHINOOK (98)-1. December 2, 1998.

In February of 1998, the United States (U.S.) and Canada exchanged proposals for abundance-based management regimes for chinook salmon. While many aspects of the proposals are similar, conceptual and technical differences exist. To identify and determine the significance of those differences, the Commissioners asked a bilateral workgroup to develop a list of expository questions. A subgroup of the Chinook Technical Committee (CTC) was subsequently requested by the Commissioners to address these questions. This report was prepared by the Chinook Technical Committee (CTC) in response to that request.

Briefly, both the U.S. and Canadian proposals include: 1) an abundance-based management approach for chinook salmon that includes limits for mixed-stock ocean fisheries and constraints for remaining fisheries; 2) provisions for adjusting allowable harvests in response to stock status; 3) a list of technical assignments; 4) approaches to reduce incidental mortalities; and 5) provisions for terminal exclusions, hatchery add-ons, and overage /underage policies.

This report discusses significant differences between the Canadian and U.S. proposals, including:

- 1) provisions for individual stock-based management (pass-through);
- 2) harvest regimes based on catch indices versus total mortality indices;
- 3) aggregation of fisheries;
- 4) harvest rate reductions;
- 5) methods for computing the allowable harvest.

There are differences between the proposals that the report does not address. For example, whereas both proposals include adjustments in allowable harvests in response to stock status, the mechanism triggering the response differs. Also, the entire U.S. proposal takes effect immediately and the Canadian proposal is to be implemented in stages. These and other differences may be more appropriate for discussion within the PSC.

The commissioners also requested a retrospective comparison of the U.S. and Canadian proposals, with predictions of the catches, exploitation rates, and escapements that would have occurred if the proposed regimes would have been in effect from 1985 through 1996. The CTC has not yet completed that assignment, but will provide a complete report prior to the end of 1998.

Joint Chinook Technical Committee – Preliminary Retrospective Analysis of the U.S. and Canadian Proposals for Abundance-Based Regimes for Chinook Fisheries. TCCHINOOK (99)-1. January, 1998.

In February of 1998, the United States (U.S.) and Canada exchanged proposals for abundance-based management regimes for chinook salmon. While many aspects of the proposals are similar, conceptual and technical differences exist. To identify and determine the significance of those differences, the Commissioners asked a bilateral workgroup to provide responses to a list of expository questions (see TCCHINOOK (98)-1) and to conduct a retrospective analysis of the proposals. The retrospective analysis simulates the effects the proposed regimes would have had upon the fishing mortality, exploitation rates, and escapement of chinook salmon if the regimes had been in place from 1985 through 1996.

Briefly, both the U.S. and Canadian proposals include: 1) an abundance-based management approach for chinook salmon that includes limits for mixed-stock ocean fisheries [aggregate abundance-based management (AABM)] and constraints for the remaining fisheries (individual stock-based management (ISBM); 2) provisions for adjusting allowable harvests in response to stock status; 3) a list of technical assignments; 4) approaches to reduce incidental mortalities; and 5) provisions for terminal exclusions, hatchery add-ons, and overage/underage policies.

The Chinook Technical Committee (CTC) has developed a version of the Pacific Salmon Commission (PSC) chinook model that provides the capability to simulate many features of the U.S. and Canadian proposals for AABM and ISBM regimes. Most importantly, the model now allows the specification of a set of rules that establish fishery specific impact limits that vary by year in response to the abundance of chinook salmon. The rules used by the CTC in this analysis are based upon our interpretation of the proposals (as assisted by the Commissioners during bilateral deliberations in December, 1998). However, not all features of the proposed regimes are currently simulated, nor are all factors affecting chinook salmon fishing mortality and escapement considered. Important limitations of the analysis include the following:

Survival Rates. The retrospective analysis does not address the question “What will be the effects of the proposed regimes on fishery catches and escapement in future years”. Catch and escapement in the future will depend to a large extent on the effects of the freshwater and marine environment on chinook salmon survival rates. Survival rates for most stocks are currently substantially less than the rates for broods that were harvested in the late 1980s.

Stock Status. Provisions for adjusting fishery impacts in response to stock status are not simulated. This decision was driven by several factors: 1) the provision is not fully developed in the Canadian proposal; and 2) interpretation of the U.S. proposal is difficult, and implementation occurs “only for those stocks for which the escapement goal review has been completed and the escapement goal agreed to”. The escapement goal review has not yet been completed by the CTC.

Fishery Impacts. Simulated fishery impacts are identical to the target catch or mortality in each year. In practice, uncertainty in predictions and management error will result in impacts that differ from the target values.

Time Stratification. The PSC chinook model does not currently have the capability to assess changes in stock composition, abundance, or exploitation rates at a time step finer than one year. Therefore, analysis of the Canadian proposal for the West Coast Vancouver Island (WCVI) and North of Leadbetter Point (NLP) troll fishery was predicated on the understanding that the total allowable mortalities would be computed based on the aggregate

abundance of chinook available on an annual basis to the WCVI and NLP troll fisheries (see June 12, 1998 letter from the CTC to the chairs of the PSC).

Fishery Stratification. Fisheries in the PSC chinook model generally correspond to those identified in the U.S. and Canadian proposals. One exception is the NLP troll fishery referenced in the Canadian proposal. The closest approximation in the PSC chinook model, and the fishery used as a surrogate in the CTC analysis, is the U.S. south ocean troll fishery. This model fishery includes all troll fisheries off the coasts of the states of Washington, Oregon, and California that impact stocks from Puget Sound, the Washington Coast, the Columbia River, and far north migrating stocks from the Oregon coast (see June 12, 1998 letter from the CTC to the chairs of the PSC).

Joint Chinook Technical Committee - 1995 and 1996 Annual Report. TCCHINOOK (99)-2. March 19, 1999.

The Pacific Salmon Treaty (PST) established a system of fishery specific catch and harvest rate restrictions intended to:

“...halt the decline in spawning escapements of depressed stocks; and attain by 1998, escapement goals established in order to restore production of naturally spawning chinook stocks, as represented by indicator stocks identified by the Parties, based on a rebuilding program begun in 1984.” (Annex IV, Chapter 3)

This report of the Chinook Technical Committee (CTC) updates our previous comprehensive stock assessment report (TCCHINOOK (96)-1, data through 1994). We provide a summary of fishery catches and management actions in 1995 and 1996, and an assessment of escapement and exploitation rates through 1996. Key points in the report are summarized below.

1995 and 1996 Chinook Catch and Fishery Management (Chapter 1)

The Chinook Annex of the PST implemented in 1985 established ceilings for the catch of all gear types in Southeast Alaska (SEAK; 263,000) and North/Central British Columbia (NCBC; 263,000), the West Coast Vancouver Island (WCVI; 360,000) troll fishery, and the Strait of Georgia (GS; 275,000) sport and troll fishery. These provisions for catches (referred to as base ceilings) subsequently expired and, in 1995 and 1996, the parties were unable to reach agreement on suitable replacements. Catches in 1995 and 1996 (not including hatchery add-on and terminal exclusions) were lower than the base ceilings, and retention of chinook was not permitted in the WCVI troll fishery in 1996.

Area	Base Ceiling (1,000s)	1995 Catch (1,000s)	1996 Catch (1,000s)
SEAK (troll, net, sport) ¹	263	178.7	149.0
NCBC (troll, net, sport) ²	263	119.1	26.9
WCVI (troll)	360	81.0	0.0
GS (troll and sport)	275	61.5	74.9

¹ The total catch was 235,700 and 217,200 for 1995 and 1996, respectively. See Chapter 1 for a discussion of the computation of the hatchery add-on and terminal exclusion.

² The total catch was 120,800 and 43,000 for 1995 and 1996, respectively. See Chapter 1 for a discussion of the computation of terminal exclusion.

Escapement Assessment (Chapter 2)

The status of 42 naturally spawning escapement indicator stocks was assessed using prior CTC procedures and additional information presented by the relevant management agencies. This assessment indicates that:

- a) In 1995, the SEAK/TBR stocks completed their defined 15-year rebuilding period. Substantial progress has been made towards rebuilding these stocks. At the end of their rebuilding period, there is no evidence of escapement declines relative to the base period. Nine of the 10 stocks were Stable at Goal or had increased since the base period, and the other stock (Chickamin) had a recent escapement that was indistinguishable from base (Table 2-8). Five of the stocks (50%) were classified as Rebuilding or Stable at Goal, while 2 (20%) were Not Rebuilding in relation to the escapement goals the CTC used for the assessment (Table 2-9). The remaining 3 stocks (30%) were Indeterminate.
- b) The other escapement indicator stocks, located in Canada south of the SEAK/TBR rivers and in the Pacific Northwest have a target date of 1998 for completion of their 15-year rebuilding program. These stocks included 24 stocks with escapement goals and 8 without goals. Thirty-one of these stocks were evaluated for changes in escapement relative to their respective base period; one stock (WCVI) was excluded from this analysis due to significant changes in escapement methodology. Of the 31 stocks evaluated through 1996, most (77%) have been Stable at Goal, have increased, or have remained indistinguishable in escapement magnitude relative to the base period (Tables 2-4, 2-8). However, seven (22%) of these stocks have shown escapement declines after 13 years of the rebuilding program. Of the 24 of these stocks with escapement goals, 11 (46%) were Stable at Goal, Above Goal, or Rebuilding, while 12 (50%) were Not Rebuilding or Declined Below Goal (Table 2-9). One stock was Indeterminate.
- c) While assessment of progress toward attaining interim chinook escapement goals is the specific task of this chapter, some members of the CTC do not believe that application of the current algorithm results in an accurate assessment of rebuilding. The specific concerns of these members include: inconsistency in survey methodologies results in data sets of very different quality being treated equally; the numerous interim escapement goals may have no relevance to maximum sustained yield escapement goals; apparent erroneous conclusions may be reached if the algorithm is strictly applied; the current summarization of rebuilding progress does not distinguish between very small and very large stocks; and, the precision of the various escapement estimates has not been incorporated in the analysis.

In spite of these concerns, the CTC decided to use the available data and the escapement goals as presented by the agencies. However, in response to these concerns, the CTC has also presented information provided by the management agencies in addition to results from application of the assessment algorithm. The information appears under the escapement graph for each of the 44 chinook stocks. The information is included to assist the reader in understanding the relative quality of data and resultant assessment as well as to present the agency's assessment of stock status. In several instances this information was used by the CTC to adjust the rebuilding status derived from the CTC assessment algorithm.

Exploitation Rate Assessment (Chapter 3)

The 1996 season required that the CTC make several changes to the exploitation analysis methods. Prior to 1996, incidental mortalities during CNR fisheries were calculated using information from the chinook retention portion of the fishery. For the 1996 analysis, a new method was developed to estimate CNR mortality based on encounter rates during a base period (Section 3.2.1.2). In addition, the age 2-3 survival index for 1996 was converted to express all recoveries as spawner equivalents (AEQ). This conversion was implemented to compensate for

the under-estimation of cohort survival resulting from the closure of some Canadian fisheries (a substantial portion of the age-2 and age-3 chinook recoveries are usually catch recoveries). The cohort analysis was further modified in 1996 to incorporate the incidental mortality rates for troll and sport fisheries recommended by the CTC (TCCHINOOK (97)-1)(Section 3.2.1.1).

Examination of coded-wire tag data for 18 of the 39 exploitation rate indicator stocks (*Table 3-3*) indicated that:

- a) In 1996, fishery indices for both reported catch and total mortality were below base levels in all PSC ceiling fisheries (*Table 3-6, Figures 3-1 through 3-4*). Total mortality fishery indices for 1996 were reduced from base period levels by 52% in SEAK troll, 98% in NCBC troll, 95% in WCVI troll, and 17% in the Strait of Georgia troll and sport fisheries. Similarly, reported catch fishery indices for 1996 were reduced from base period levels by 61% in SEAK troll, 100% in NCBC troll, 99% in WCVI troll, and 32% in the Strait of Georgia troll and sport fisheries. The 1995 and 1996 total mortality and reported catch fishery indices for NCBC and WCVI troll were below the projected indices from the 1984 chinook model. The SEAK troll and Strait of Georgia total mortality indices were above the 1984 projected index in both 1995 and 1996. The total mortality and reported catch fishery indices for U.S. South ocean troll and sport were reduced 67 and 65% from the base period levels in the Columbia River stock group and increased 47 and 53% from base in the Puget Sound stock group.
- b) In 1995 and 1996 non-ceiling fisheries, harvest rates on wild stocks subject to the passthrough provision were below base period levels and therefore met the CTC's suggested interpretation of passthrough obligations (CTC 1991) (*Figures 3-7 through 3-14*). In 1995, non-ceiling fishery indices were at or near zero for Upper Georgia Strait, just below 1.0 for Skagit, Snohomish, and Stillaquamish Summer/Fall, and ranged from 0.3-0.8 for Columbia River Summer, Grays Harbor, and Quillayute Summer. In 1996, non-ceiling fishery indices were again near zero in the Strait of Georgia and ranged from 0.3-0.8 for the other fisheries.
- c) Brood year 1992 exploitation rates declined from brood year 1991 rates for both total mortality and reported catch for all five of the ocean type (age 0 migrant) stock groups (*Figures 3-15 through 3-21*). In all stock groups except SEAK/TBR-I, brood year 1992 exploitation rates based on total fishing mortalities indicate a 10-70% reduction in ocean exploitation rates relative to the base period. For SEAK/TBR, the 1991 brood year total exploitation rate is 30% above the base period. Similarly, in all stock groups except SEAK/TBR-I, exploitation rates based on reported catch indicated a 30-100% reduction in ocean exploitation rates relative to the base period. For SEAK/TBR, the 1991 brood year total exploitation rate based on reported catch is 10% above the base period. The 1992 brood total mortality exploitation rate index for LGS is higher than the 1984 projection from the CTC chinook model. The 1992 brood total mortality exploitation rate indices for the WACO and WCVI stock groups are lower than projections from the CTC chinook model.
- d) The age 2-3 survival indices are generally either declining or stable at levels indicating poor survival (*Appendix F*). An exception is the Columbia Upriver Bright index, which has been increasing from 1991 until 1993. However, the brood year 1994 age-2 index for this stock was not computed because there were no CWT recoveries reported in 1996. While it is true that major Canadian ocean-troll fisheries were closed to chinook retention in 1996, the CTC is concerned that a complete lack of CWT recoveries, including hatchery rack recoveries, may signal poor survival of the 1992 brood. Other stocks with no age-2 recoveries in 1996 include Robertson Creek, Hoko Fall Fingerling, White River Spring Yearling, Cowlitz Fall, and Stayton Pond.

Recommendations for Improved Stock Assessment

The 15-year rebuilding period for chinook salmon identified for the PST has or will soon conclude. Despite substantial reductions in fishery exploitation rates, 50% of the escapement indicator stock located in Canada south of the SEAK/TBR rivers and in the Pacific Northwest are currently classified as Not Rebuilding or Declined Below Goal. To evaluate and refine management options for these stocks, the CTC should:

- 1) improve the methods used to assess the status of the escapement indicator stocks;
- 2) identify the factors contributing to the status of stocks classified as Not Rebuilding or Declined Below Goal;
- 3) estimate the stock-recruit productivity relationship and escapement goals for the escapement indicator stocks; and
- 4) convene a workshop to foster understanding of recent developments in stock-recruit analysis and generate collaboration and consensus in CTC analyses.

Even with these improvements, the quality of the CTC assessments can be no better than the basic resource data collected by the management agencies. As previously noted by the CTC (1992):

“Without a greater realization of the need for more accurate data and, following that, a commitment to better and consistent data collection, we will not be able to answer the increasingly complex questions that are asked about responsible utilization of chinook resources. The costs of poor data will only become more and more evident, obvious examples being: extinction of some chinook populations; loss of less productive stocks; and increased disruption to traditional fisheries. Without improved information, controversy over the utilization and conservation of the resource will increase and resource benefits to both Parties will be lost.”

Appendices

Due to the limited scope of this report, stock catch distributions are not discussed in the text, but are presented in an appendix. Additional information on escapements, terminal runs, and the methods and data used to calculate the exploitation rate indices can be found in appendices.

B. JOINT NORTHERN BOUNDARY TECHNICAL COMMITTEE

Joint Northern Boundary Technical Committee. U.S./Canada Northern Boundary Area 1998 Salmon Fisheries Management Report and 1999 Preliminary Expectations. TCNB (99)-1. January, 1999.

This report reviews:

- 1) catch, effort, and management actions in the 1998 Northern Boundary Area troll and net fisheries of southern Southeast Alaska Districts 101 to 106 and northern British Columbia Areas 1, 3, 4, and 5;
- 2) management performance relative to Treaty requirements;
- 3) historical catches by area, gear (purse seine, gillnet, toll, trap), year, week, and species (sockeye, pink, chum, coho, and chinook salmon);
- 4) historical escapements; and,
- 5) preliminary expectations and fishing plans for 1999.

In southern Southeast Alaska, the run of pink salmon was slightly above average. The all-gear harvest was 23.8 million and the escapement indices were above 1990-1997 averages in all but Districts 105 and 108. Escapements were particularly strong in Portland Canal, West Behm Canal, and Moria Sound. The wild and hatchery chum run was exceptionally strong. Harvests totalled 5.8 million and escapements of both summer and fall runs were generally well distributed and at high levels. The District 102 fall chum harvest of 0.56 million was over twice the 1994 record. The coho run was reasonably strong. Harvests totalled 1.1 million and escapements were within goal ranges for the Hugh Smith Lake indicator stock and peak counts exceeded 1987-1997 averages in most of the 15 other index systems in District 101. The sockeye harvest of 0.9 million was below recent year averages as was the sockeye escapement into Hugh Smith and McDonald Lakes.

In Northern British Columbia pink runs were well below expected levels in all Statistical Areas: 140,400 pink salmon were harvested in the Area 1 net fishery, 356,905 pink salmon were harvested in Canadian Area 3, 17,223 in Area 4 and 1,470 in the Area 5 fishery. Pink escapements for most Skeena and Nass systems were much lower than target levels. Sockeye runs were also below expected levels, 106,534 were harvested in Area 3 and 84,803 in Area 4. The Nass escapement levels for sockeye were near target. Skeena sockeye escapements were below target levels for both enhanced and wild stocks. Chum runs in Areas 3, 4 and 5 were well above average with net harvests of 246,220 in Area 3, 11,136 in Area 4 and 1,158 in Area 5. Escapements of summer chum salmon were greatly improved over recent levels in all areas with many systems receiving near target escapements. Extensive management actions were taken this year in northern British Columbia commercial, sport, and first nation's fisheries to reduced coho exploitations, particularly in areas where Upper Skeena stocks are most prevalent. Non-retention and non-possession of coho was in effect in the limited areas opened for troll and net fishing in 1998.

For the 1998 fishing season, no agreement had been reached between Canada and the United States on the conduct of the Alaska District 104 purse seine fishery during Statistical Weeks 28-30 (July 5-25). Alaska Department of Fish and Game's management intent was to allow fishermen the opportunity to harvest domestic stocks, to allow for standard fishing periods, to distribute the fishing fleet, and to co-ordinate purse seine fishing opportunities throughout Southeast Alaska. In order to achieve these objectives pre-Week 31 openings in District 104 were based on the observed abundance of salmon and the number of vessels fishing in the district. The pre-season expectation was that the fishing time allowed would not exceed the amount allowed in District 101 and 102 nor exceed the 1985-96 average pre-Week 31 hours fished in District 104. Early season sockeye and pink salmon catches were below 1985-1997 averages. The low catch rate of sockeye salmon was consistent with other fishery indicators that Skeena sockeye runs were relatively poor. Consequently, District 104 was managed conservatively in hopes of shifting effort to Districts 101 and 102 where pink salmon were relatively more abundant. Prior to Week 31, when sockeye are historically most abundant, District 104 was open a total of only 32 hours versus 75 hours in Districts 101 and 102. The number of boats fishing in District 104 fell from 57 initially to 38 in Week 30 while in Districts 101 and 102 boats fishing rose from 54 to 144 during the same period. The catch of sockeye salmon in District 104 prior to Week 31 totalled 17 thousand fish or about 10% of the 1985-1997 average for this period.

In the Alaska District 101-11 (Tree Point) gillnet fishery the Pacific Salmon Treaty calls for an average annual harvest, beginning in 1985, of 130,000 sockeye salmon. In 1998, the Tree Point gillnet fishery was opened for three 4-day fishing weeks beginning June 21 (Week 26). In these

three initial openings sockeye catch was above 1985-1997 averages, chum catch was much higher than average, and the number of boats fishing the district was a little below average. Nevertheless, fishing time was reduced to a 2.5 day (60 hour) opening in Week 29 in response to Canadian concerns over lagging sockeye escapements in the Nass River. The fishery was managed according to the Pink Salmon Management Plan from Week 30 through Week 35. During this time abundance of pink, chum, and coho salmon were well above Treaty averages and sockeye abundance and effort were below average. In Weeks 30 and 31, the southern portion of the Tree Point area was closed to protect Nass River sockeye after Canadian Department of Fisheries and Ocean biologists determined that escapement levels were not being met. Starting on August 30 (Week 36) the fishery was managed on the strength of the fall chum and coho returns. Chum abundance was above average and coho was well above average. Effort remained a little below average. A total of 160,506 sockeye salmon were harvested in the District 101 drift gillnet fishery in 1998 bringing the 1985-1998 average annual harvest of sockeye salmon to 167,868.

Under the Pacific Salmon Treaty the outside portions of Canada's Statistical Areas 3 and 5 are to be managed such that an average annual pink harvest of 900,000 is achieved. In 1998, 60,696 pinks were harvested in Management Units 3(1-4). The current average annual pink harvest from 1985-1998 in the treaty area is 1,506,749.

In 1998 there were no specific annex arrangements under the Pacific Salmon Treaty governing the conduct of the Canadian Area 1 troll fishery for pink salmon. The Area 1 troll fishery was closed for the majority of the season with only a small area open from mid-September to early October to harvest chinook salmon. During this time no pink salmon were harvested in this fishery. The AB-line area was closed to trolling for the entire season.

Strong harvests are forecasted for Southeast Alaska pink salmon in 1999. The Alaska Department of Fish and Game forecasts a harvest of between 31 and 51 million pink salmon in all of Southeast Alaska in 1999. Separate forecasts for northern and southern Southeast were not made. Returns of coho, sockeye, and chum salmon are projected to be strong, comparable to the levels observed in recent years.

In Canada, average Nass sockeye returns and very poor Skeena sockeye returns are anticipated in 1999, while below average pink returns are predicted throughout Northern British Columbia.

C. JOINT TRANSBOUNDARY TECHNICAL COMMITTEE

Joint Transboundary Technical Committee. Transboundary River Sockeye Salmon Enhancement Activities - Final Report for Summer, 1992 to Spring, 1995. TCTR (98)-1. May, 1998.

Joint Canada/U.S. enhancement of transboundary river sockeye stocks began in 1989, when eggs were taken at Tahltan Lake on the Stikine River, incubated at Snettisham Central Incubation Facility (CIF) located near Juneau, Alaska, and the resulting fry back-planted to Tahltan Lake. In 1990, eggs were again taken at Tahltan Lake and enhancement of Taku River sockeye salmon stocks began, with egg-takes at Little Trapper and Little Tatsamenie lakes to produce fry for outplanting to Trapper and Tatsamenie lakes, respectively. Annual egg-takes were conducted at all sites from 1991 through 1995, with the exception of Little Trapper, where they were suspended in 1995. Under terms of the Pacific

Salmon Treaty,¹ brood years (BY's) 1991, 1992, 1993 and 1994 Tahltan Lake origin fry were divided between Tahltan and Tuya lakes. Activities up to the spring of 1992 have been previously reported (PSC 1994); the present report begins with the egg-takes in the fall of 1992 and continues through to smolt migrations and fry outplants in the spring of 1995. Results of the 1995 egg takes are included as well, for informative purposes. This report does not deal with adult returns, which began with the return of 4-yr-old Tahltan fish in 1993.

Methods are described, including egg-take and hatchery operations, otolith marking, fry outplanting, monitoring of outplants including hydroacoustic/limnological surveys and smolt sampling, and ancillary activities. Hatchery and otolith mark related activities are also described. Results are presented for each lake for the period from egg-take through smolt migration, followed by limnological observations and ancillary activities. No attempt was made to estimate benefit/cost ratios in this report. It is recommended these analyses should be done in the near future, using recently acquired adult return data and actual costs of the projects. The report concludes with a summary of major results and recommendations. Important results are summarized below.

Hatchery Operations

Major modifications to convert the existing hatchery building at Port Snettisham into central incubation facility (CIF) for sockeye were completed in August, 1993. In addition to more space and better stock isolation, the new facility has improved capability for water treatment. All eggs from brood year (BY) 93 and subsequent years will be incubated in this new facility. The new CIF is fully modularized, with four of ten modules committed to transboundary sockeye salmon incubation, allowing for much improved isolation of separate stocks. The physical plant is also much improved, with thermal marking, water quality, and egg and fry handling methods modernized.

Otolith Marking and Reading

A laboratory has been established in Juneau to examine thermal marking techniques and develop methods for mass processing of otoliths from returning adults. Marks have been recovered from Alaskan domestic sockeye stocks and transboundary sockeye juveniles and smolts arising from the outplants. In addition, marks from the first returns of sockeye salmon adults resulting from enhancement activities at Tahltan Lake were recovered in 1993 (BY 89). Initial problems regarding the clarity of some of the marks during the initial years of the program and the ability to identify these fish in mixed stock fisheries have been identified and are being worked on. At this time it is clear that in-season recovery and analysis of thermally marked fish is possible and that results of these analyses can be made available to fishery managers in a timely manner.

Tahltan Lake Outplant Project

There were no problems meeting egg-take goals and outplanted fry have grown and survived well. The maximum carrying capacity of Tahltan Lake has not been defined. The lake is capable of supporting current levels of outplanting, but abnormally high wild fry production could result in fry densities which may not be sustainable on a continued basis. Caution is therefore advised, and outplant numbers should be reviewed annually through analysis of data sets from ongoing limnological and fry and smolt monitoring programs.

¹ Within attachment 2 of the letters to government prepared by the Canadian and U.S. sections of the Pacific Salmon Commission it specifies that for a given brood year Tahltan Lake origin fry will be outplanted to Tuya Lake only when the escapement into Tahltan Lake for that year exceeds 15,000 adult sockeye (PSC 1989, Appendix 2).

Tuya Lake Outplant Project

Tahltan Lake provides a ready source of broodstock for fry outplants to Tuya Lake. As expected, growth of outplanted fry was exceptional. Survival, although not precisely determined, appears to be good. Final confirmation of this depends on adult returns. The lake appears capable of supporting outplants in excess of those to date. Current outplant levels are considerably below those allowed by the euphotic volume model. However, it may be prudent to proceed cautiously until changes in the observed zooplankton community structure induced by current fry outplant levels, stabilize .

Tatsamenie Lake Outplant Project

Escapement levels in several years have restricted availability of broodstock. Because of genetic concerns, the egg-take site was moved from Little Tatsamenie to Tatsamenie Lake in 1994. It is recommended that fishery management strategies be refined to allow greater escapements in the future. Outplanted fry grew well; survival has been difficult to determine but there are indications it is less than expected; confirmation by adult returns is required. Tatsamenie Lake appears capable of supporting fry outplants considerably in excess of those to date at current escapement levels; however, increased wild production in combination with outplants could conceivably tax nursery lake carrying capacity, The number of natural spawners may have to be considered in future when determining appropriate numbers for outplant.

Trapper Lake Outplant Project

Although there were no problems obtaining sufficient eggs, this stock appears to be more susceptible to Infectious Haematopoietic Necrosis Virus (IHNV) than others. Outplanted fry have grown well but it has not been possible to determine survival with any degree of accuracy. Egg-takes were suspended in 1995 because of survival uncertainty as well as concerns about the early outmigration of outplanted fry. The early out-migration of enhanced fry could have a detrimental affect on wild stocks of sockeye fry rearing in Little Trapper Lake. It is recommended this suspension remain in effect until adult returns from initial outplants are assessed. It is also recommended the lost production be replaced by increasing outplants to Tatsamenie, and/or by beginning outplants to other Taku drainage lakes, such as Nakina Lake.

Publications of the Pacific Salmon Commission

PART VI

PUBLICATIONS OF THE PACIFIC SALMON COMMISSION

Documents listed herein are available to domestic fishery agencies of Canada and the United States, research organizations, libraries, scientists and others interested in the activities of the Commission, through the offices of the Secretariat, 600 - 1155 Robson Street, Vancouver, B.C., V6E 1B5. Photocopying charges may be levied for documents which are out of print.

Documents listed here are those which were published during the period covered by this report. For previous publications, please refer to the Pacific Salmon Commission 1989/90 Fifth Annual Report and 1994/95 Tenth Annual Report, or contact the Pacific Salmon Commission Library.

A. ANNUAL REPORTS

13. **Pacific Salmon Commission 1997/98 Thirteenth Annual Report.** November, 1998.

This report contains a summary account of the Commission's thirteenth year of operation.

B. REPORTS OF JOINT TECHNICAL COMMITTEES

i. Joint Chinook Technical Committee

32. TCCHINOOK (98)-1 - *Committee Response to Questions from the PSC Commissioners Regarding the U.S. and Canadian Proposals for Abundance-Based Regimes for Chinook Fisheries.* December 2, 1998.
33. TCCHINOOK (99)-1 - *Preliminary Retrospective Analysis of the U.S. and Canadian Proposals for Abundance-Based Regimes for Chinook Fisheries.* January 28, 1999.
34. TCCHINOOK (99)-2 - *1995 and 1996 Annual Report.* March 19, 1999.

ii. Joint Chum Technical Committee

No reports were finalized for publication during this reporting period.

iii. Joint Coho Technical Committee

No reports were finalized for publication during this reporting period.

iv. Joint Northern Boundary Technical Committee

20. TCNB (99-1) - *U.S./Canada Northern Boundary Area 1998 Salmon Fisheries Management Report and 1999 Preliminary Expectations.* January, 1999.

v. Joint Transboundary Technical Committee

29. TCTR (98)-1 - *Transboundary River Sockeye Salmon Enhancement Activities - Final Report for Summer, 1992 to Spring, 1995*. May, 1998.

vi. Joint Technical Committee on Data Sharing

No reports were finalized for publication during this reporting period.

vii. Joint Interceptions Committee

No reports were finalized for publication during this reporting period.

C. REPORTS OF THE FRASER RIVER PANEL

10. *Report of the Fraser River Panel to the Pacific Salmon Commission on the 1996 Fraser River Sockeye Salmon Fishing Season*. PSC Staff. March, 1999.
11. *Report of the Fraser River Panel to the Pacific Salmon Commission on the 1997 Fraser River Sockeye and Pink Salmon Fishing Season*. PSC Staff. March, 1999.

**D. TECHNICAL REPORT SERIES OF THE
PACIFIC SALMON COMMISSION**

10. White, Bruce. *Fraser River Pink Salmon Catch and Exploitation Patterns: 1989-1995*. PSC Tech. Rep. No. 10, November, 1998.

**E. PUBLICATIONS BY PACIFIC SALMON COMMISSION
SECRETARIAT STAFF**

23. Peterman, Randall M., Brian J. Piper, Michael F. Lapointe, Milo D. Adkison and Carl J. Walters, *Patterns of covariation in survival rates of British Columbian and Alaskan sockeye salmon (*Oncorhynchus nerka*) stocks*, Can. J. Fish. Aquat. Sci., 55: 2503-2517, 1998.
24. Pyper, Brian J, Randall M. Peterman, Michael F. Lapointe and Carl J. Walters, *Patterns of covariation in length and age at maturity of British Columbia and Alaska sockeye salmon (*Oncorhynchus nerka*) stocks*, in press, Can. J. Fish. Aquat. Sci., 1999.

**F. REPORTS OF THE INTERNATIONAL
PACIFIC SALMON FISHERIES COMMISSION**

Responsibility for maintenance of the library of the International Pacific Salmon Fisheries Commission, on its termination December 31, 1985, was transferred to the Pacific Salmon Commission. Documents in the Library include historical archival papers which are available to researchers and other interested parties through contact with the Pacific Salmon Commission's Librarian.

Publication of John F. Roos' History of the International Pacific Salmon Fisheries Commission, and P. Gilhousen's Estimation of Fraser River Sockeye Escapements ended all publication series of the International Pacific Salmon Fisheries Commission. Copies of all in-print Progress Reports and Bulletins of the International Pacific Salmon Fisheries Commission are available

free of charge through the Library of the Pacific Salmon Commission. Copies of the History of the International Pacific Salmon Fisheries Commission may also be ordered through the Library of the Pacific Salmon Commission.

G. DOCUMENTS SUBMITTED BY THE PARTIES

In compliance with provisions of the Treaty, the Parties provide annual post-season fishery reports and updates on their respective salmonid enhancement programs to the Commission. Documents received during 1998/99 were:

1. *Preliminary 1998 Post-Season Report for United States Fisheries of Relevance to the Pacific Salmon Treaty.* United States Section, Pacific Salmon Commission. December, 1998.
2. *1998 Post-Season Report for Canadian Treaty Limit Fisheries.* Canada Department of Fisheries and Oceans. December 2, 1998.
3. *1997 Annual Report on the Salmonid Enhancement Activities of the United States in the Areas of the Pacific Salmon Treaty.* United States Section, Pacific Salmon Commission. August 1998.
4. *1998 Canadian Salmonid Enhancement Report.* Canadian Section, Pacific Salmon Commission. March 19, 1999.

Report of the Auditors for 1998/99

PART VII
AUDITORS' REPORT AND FINANCIAL STATEMENTS
FOR THE PERIOD APRIL 1, 1998 TO MARCH 31, 1999

AUDITORS' REPORT TO THE COMMISSIONERS

We have audited the statement of financial position of the Pacific Salmon Commission as at March 31, 1999 and the statements of financial activities and fund balances for the year then ended. These financial statements are the responsibility of the Commission's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by the Commission, as well as evaluating the overall financial statement presentation.

In our opinion, these financial statements present fairly, in all material respects, the financial position of the Commission as at March 31, 1999 and the results of its operations for the year then ended in accordance with the Financial Regulations of the Commission as described in note 1 to the financial statements.



Chartered Accountants

New Westminster, Canada

May 6, 1999

PACIFIC SALMON COMMISSION

Statement of Financial Position

March 31, 1999, with comparative figures for 1998

	General Fund	Working Capital Fund	Capital Asset Fund	1999 Consolidated	1998 Consolidated
Assets					
Current assets:					
Cash and cash equivalents	\$ 934,230	\$ 96,438	\$	\$ 1,030,668	\$ 1,038,112
Accounts receivable (note 3)	38,348			38,348	94,322
Interest receivable	2,522			2,522	2,710
Prepaid expenses	19,081			19,081	25,585
Capital assets (note 2)			183,224	183,224	195,091
	\$ 994,181	\$ 96,438	\$ 183,224	\$ 1,273,843	\$ 1,355,820

Yukon River Salmon Restoration
and Enhancement Fund:
Cash and term deposits

\$ - \$ -

Liabilities and Fund Balances

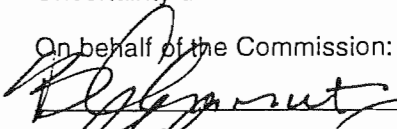
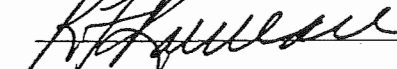
Current liabilities:					
Accounts payable and accrued liabilities	\$ 113,480	\$	\$	\$ 113,480	\$ 75,808
Deferred revenue	-			-	224,329
Fund balance (note 4)	880,701	96,438	183,224	1,160,363	860,592
Equity in capital assets	-	-	-	-	195,091
	\$ 994,181	\$ 96,438	\$ 183,224	\$ 1,273,843	\$ 1,355,820

Yukon River Salmon Restoration
and Enhancement Fund:
Fund balance

\$ - \$ -

Uncertainty due to the Year 2000 Issue (note 7)

On behalf of the Commission:

Chair, Standing Committee on Finance and Administration

Vice-Chair, Standing Committee on Finance and Administration

See accompanying notes to financial statements.

PACIFIC SALMON COMMISSION

Statement of Financial Activities and Fund Balances

Year ended March 31, 1999, with comparative figures for 1998

	General Fund	Working Capital Fund	Capital Asset Fund	1999 Consolidated	1998 Consolidated
Fund balance, beginning of year	\$ 768,189	\$ 92,403	\$ 195,091	\$ 1,055,683	\$ 1,094,495
Revenue:					
Contributions from contracting parties	1,600,000			1,600,000	1,600,000
Special contribution - stakeholder process	-			-	218,363
Interest	57,891	4,035		61,926	40,382
Gain on disposal of capital assets	7,175			7,175	-
Other	750			750	3,847
Test fishing	1,270,690			1,270,690	687,799
	2,936,506	4,035		2,940,541	2,550,391
Expenditures:					
Amortization			116,447	116,447	110,565
Salaries and employee benefits	1,427,346			1,427,346	1,428,086
Travel and transportation	62,618			62,618	97,970
Rents and communication	94,007			94,007	124,282
Printing and reproductions	11,579			11,579	14,033
Contract services	206,592			206,592	377,430
Materials and supplies	32,171			32,171	38,975
Loss on disposal of capital assets	-			-	2,880
Test fishing	885,101			885,101	586,126
	2,719,414	-	116,447	2,835,861	2,780,347
Excess of revenue over expenditures	217,092	4,035	(116,447)	104,680	(229,956)
Transfer to capital asset fund	(104,580)	-	104,580	-	-
Fund balance, end of year	\$ 880,701	\$ 96,438	\$ 183,224	\$ 1,160,363	\$ 864,539

See accompanying notes to financial statements.

PACIFIC SALMON COMMISSION

Yukon River Salmon Restoration and Enhancement Fund

Statement of Financial Activities and Fund Balances

Year ended March 31, 1999, with comparative figures for 1998

	1999	1998
Fund balance, beginning of year	\$ -	\$ 572,617
Revenue:		
Contributions	48,931	1,126,880
Foreign exchange on opening balance	-	5,127
Interest earned on term deposit	-	4,944
	48,931	1,136,951
Transfers to the Yukon River Panel	48,931	1,709,568
Fund balance, end of year	\$ -	\$ -

See accompanying notes to financial statements.

PACIFIC SALMON COMMISSION

Notes to Financial Statements

Year ended March 31, 1999, with comparative figures for 1998

Nature of organization:

The Pacific Salmon Commission was established by Treaty between the Governments of Canada and the United States of America to promote cooperation in the management, research and enhancement of Pacific salmon stocks. The Treaty was ratified on March 18, 1985 and the Commission commenced operations on September 26, 1985.

1. Significant accounting policies:

(a) Fund accounting:

The General Fund includes funds provided annually through contributions from the Contracting Parties and any net surplus obtained through the test fishing program. By agreement of the Parties, any unexpended balance remaining at the end of one fiscal year may be used to offset contributions in the following year or may be used to offset a shortfall between contributions and approved expenditures in the following year.

The Capital Assets Fund reflects the Commission's capital asset transactions. Amortization is charged to the Capital Fund.

The Working Capital Fund represents monies contributed by the Parties to be used temporarily pending receipt of new contributions from the Parties at the beginning of a fiscal year, or for special programs not contained in the regular budget but approved during the fiscal year. Any surplus above a pre-determined fixed limit in the account at the end of the fiscal year is transferred to the General fund and is treated as income.

The Yukon River Salmon Restoration and Enhancement Fund reflects funding provided on the creation of a separate entity, the Yukon River Panel.

(b) Basis of accounting:

The operations of the Commission are generally accounted for on an accrual basis except that purchase order expenditures are recognized at the time that the commitment for goods and services are made, rather than at the time that the goods or services are delivered.

(c) Capital assets:

Capital assets are stated at cost. Costs of repairs and replacements of a routine nature are charged as a current expenditure while those expenditures which improve or extend the useful life of the assets are capitalized. Amortization is provided using the straight-line method of rates sufficient to amortize the costs over the estimated useful lives of the assets. The rates of amortization used on an annual basis are:

Automobiles	20%
Boats	20%
Computer equipment and software	30%
Equipment	20%
Furniture and fixtures	10%

PACIFIC SALMON COMMISSION

Notes to Financial Statements (continued)

Year ended March 31, 1999, with comparative figures for 1998

1. Significant accounting policies (continued):

(d) Income taxes:

The Commission is a non-taxable organization under the Privileges and Immunities (International Organizations) Act (Canada).

(e) Foreign exchange translation:

Transactions originating in foreign currencies are translated at the exchange rate prevailing at the transaction dates. Assets and liabilities denominated in foreign currency at the balance sheet date are translated to equivalent Canadian amounts at the current rate of exchange.

(f) Statement of Cash Flows:

A statement of cash flows has not been provided as it would not provide any additional meaningful information.

2. Capital assets:

	Cost	Accumulated amortization	1999 Net book value	1998 Net book value
Automobiles	\$ 128,724	\$ 79,718	\$ 49,006	\$ 40,943
Boats	87,705	79,929	7,776	10,725
Computer equipment	436,723	395,615	41,108	58,055
Equipment	484,461	413,771	70,690	67,695
Furniture and fixtures	235,381	231,223	4,158	3,520
Computer software	116,184	105,698	10,486	14,153
	\$ 1,489,178	\$ 1,305,954	\$ 183,224	195,091

3. Related party transactions:

Included in accounts receivable is \$3,690 (1998 - \$27,067) receivable from the Government of Canada and \$Nil (1998 - \$27,067) receivable from the Government of United States.

PACIFIC SALMON COMMISSION

Notes to Financial Statements (continued)

Year ended March 31, 1999, with comparative figures for 1998

4. General fund balance:

The Commission has approved a carryover of the unexpended funds in the General Fund to be utilized as follows:

	1999	1998
(a) Continuing operations	\$ 861,620	\$ 742,604
(b) Reserve for prepaid expenses	19,081	25,585
	<u>\$ 880,701</u>	<u>\$ 768,189</u>

5. Pension plan:

The Commission maintains a defined benefit pension plan for its employees. Actuarial valuations of this pension plan are carried out triennially and provide estimates of present value of accrued pension benefits at a point in time, calculated on the basis of various assumptions with respect to pension plan costs and rates of return on investments.

At the date of the most recent actuarial valuation as amended, January 1, 1999, the present market value of related assets exceeds accrued benefits by \$160,000.

6. Financial instruments:

The financial instruments consist of cash and cash equivalents receivable and interest receivable, and accounts payable and accrued liabilities. The carrying amounts of these financial instruments are a reasonable estimate of the fair values.

7. Uncertainty due to the Year 2000 Issue:

The Year 2000 Issue arises because many computerized systems use two digits rather than four to identify a year. Date-sensitive systems may recognize the year 2000 as 1900 or some other date, resulting in errors when information using year 2000 dates is processed. In addition, similar problems may arise in some systems which use certain dates in 1999 to represent something other than a date. The effects of the Year 2000 Issue may be experienced before, on, or after January 1, 2000, and, if not addressed, the impact on operations and financial reporting may range from minor errors to significant systems failure which could affect an entity's ability to conduct normal business operations. It is not possible to be certain that all aspects of the Year 2000 Issue affecting the entity, including those related to the efforts of customers, suppliers, or other third parties, will be fully resolved.

Appendices

Appendix A

Letters of transmittal to governments regarding fishery regimes for 1998

July 9, 1998

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

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

The Honorable Madeleine Albright
Secretary of State
U.S. Department of State
2201 C Street N.W.
Washington, D.C. 20520

The Honorable William M. Daley
Secretary of Commerce
U.S. Department of Commerce
14th Street and Constitution Avenue N.W.
Washington, D.C. 20230

Dear Sir/Madam:

I have the honour to report to you understandings reached by representatives of the Governments of Canada and the United States regarding certain of the fishery regimes in Annex IV of the Pacific Salmon Treaty, and agreed to by the Chair and Vice-Chair of the Pacific Salmon Commission.

This interim agreement is for 1998 only, and reflects the Parties' interest in conservation and orderly fisheries while they continue negotiations to achieve their long-term objectives. The agreement set forth herein was reached without prejudice to any position to be taken by either Party on any fishery in the future, and shall not be construed as an indication of an acceptable long-term approach to either Parties' objectives.

With respect to Annex IV, Chapter 6 (southern chum), and without prejudice to any future agreements, Canada and the United States shall manage their respective fisheries in a manner that comports with the most-recently expired Annex arrangements.

With respect to Annex IV, Chapter 4 (Fraser sockeye and pink salmon) Canada and the U.S. have agreed for 1998:

1. The Fraser Panel shall manage U.S. commercial net fisheries in panel waters as follows:
 - a) U.S. gill net and purse seine fisheries in Areas 6, 7 and 7A will be open Monday through Friday of each week during the period July 27 through August 21, and will remain closed at all other times during the Panel control period;
 - b) U.S. reef net fishery in Areas 7 and 7A will be open Saturdays and Sundays July 25 through August 23, and will remain closed at all other times during the Panel control period;
 - c) The treaty Indian fishery in Areas 4B, 5 and 6C will be open noon Sundays through noon Fridays July 26 through August 21, and will remain closed at all other times during the Panel control period;
 - d) Notwithstanding the above schedule, the U.S. catch in Panel waters shall not exceed 24.9% of the TAC (Total Allowable Catch);

e) In implementing the above schedule, the Fraser Panel shall operate according to its usual policies and practices. This schedule may be modified by agreement of the panel if necessary to achieve spawning escapement objectives and Aboriginal food, social and ceremonial requirements, taking into account in-season information. In addition, the panel may modify the above schedule, if necessary, to ensure the 24.9% catch limit is not exceeded, and to avoid taking an excessive portion of the U.S. harvest in any weekly time period, the intent being to distribute the U.S. catch over the period during which the U.S. fishery is open.

2. The Fraser Panel shall manage Canadian net fisheries in panel waters and Canada shall manage Canadian fisheries outside panel waters in a manner that anticipates and accommodates catches in the U.S. fisheries described in the above schedule, i.e., does not result in harvest of the available TAC to the extent that those U.S. fisheries would need to be shortened for conservation reasons.

3. For the purpose of this Chapter, total allowable catch (TAC) shall be defined as the remaining portion of the annual aggregate Fraser River sockeye and pink runs after the spawning escapements, the agreed Fraser River Aboriginal Exemption, and the catch in Panel authorized test fisheries have been deducted. The following definitions apply to TAC calculation:

(a) For the purposes of in-season management by the Fraser Panel, the spawning escapement objective is the target set by Canada including any extra requirements that may be determined by Canada and agreed to by the Fraser Panel, for natural, environmental, or stock assessment factors, to ensure the fish reach the spawning grounds at target levels. Any additional escapement amounts believed necessary by Canada for reasons other than the foregoing will not affect the U.S. catch.

b) The agreed Fraser River Aboriginal Fishery Exemption is that number of sockeye which is subtracted from the total run size in determining the TAC. Any Canadian harvests in excess of these amounts count against the TAC, and do not affect the U.S. share. The agreed Fraser River Aboriginal Fishery Exemption is 400,000 sockeye for 1998.

(c) For computing TAC by stock management groupings, the Fraser River Aboriginal Fishery Exemption shall be allocated to management groups using the average proportional distribution of this harvest for the three cycles prior to 1985, unless otherwise agreed.

4. Canada and the U.S. agree that the dispute referred to in Canada's note 189 of November 24, 1992 and the U.S. Department of State's note of December 8, 1992, will be addressed in negotiations on arrangements for future years.

5. The Fraser Panel will develop fishing plans and in-season decision rules as may be necessary to implement the intent of this agreement.

The Pacific Salmon Commission expects that the relevant management agencies in Canada and the United States will manage fisheries under their responsibility consistent with these understandings.

The Commission respectfully requests your early approval of these recommendations.

Sincerely,

PACIFIC SALMON COMMISSION

J. Pipkin
Chair

Appendix B

Revised Annex IV to the Pacific Salmon Treaty effective May 17, 1991

Annex IV

Chapter 1

TRANSBOUNDARY RIVERS

1. Recognizing the desirability of accurately determining exploitation rates and spawning escapement requirements of salmon originating in the Transboundary Rivers, the Parties shall maintain a Joint Transboundary Technical Committee (Committee) reporting, unless otherwise agreed, to the Northern Panel and to the Commission. The Committee, inter alia, shall

- (a) assemble and refine available information on migratory patterns, extent of exploitation and spawning escapement requirements of the stocks;
- (b) examine past and current management regimes and recommend how they may be better suited to achieving preliminary escapement goals;
- (c) identify enhancement opportunities that:
 - (i) assist the devising of harvest management strategies to increase benefits to fishers with a view to permitting additional salmon to return to Canadian waters;
 - (ii) have an impact on natural Transboundary river salmon production.

2. The Parties shall improve procedures of co-ordinated or co-operative management of the fisheries on Transboundary River stocks.

3. Recognizing the objectives of each Party to have viable fisheries, the Parties agree that the following arrangements shall apply to the United States and Canadian fisheries harvesting salmon stocks originating in the Canadian portion of

(a) the Stikine River:

- (i) Assessment of the annual run of Stikine River sockeye salmon shall be made as follows:
 - a. A pre-season forecast of the Stikine River sockeye run will be made by the Transboundary Technical Committee prior to March 1 of each year. This forecast may be modified by the Transboundary Technical Committee prior to the opening of the fishing season.
 - b. In-season estimates of the Stikine River sockeye run and the Total Allowable Catch (TAC) shall be made under the guidelines of an agreed Stikine Management Plan and using a mathematical forecast model developed by the Transboundary Technical Committee. Both U.S. and Canadian fishing patterns shall be based on current weekly estimates of the TAC. At the beginning of the

season and up to an agreed date, the weekly estimates of the TAC shall be determined from the pre-season forecast of the run strength. After that date, the TAC shall be determined from the in-season forecast model.

- c. Modifications to the Stikine Management Plan and forecast model may be made prior to June 1 of each year by agreement of both Parties. Failure to reach agreement in modifications shall result in use of the model and parameters used in the previous year.
 - d. Estimates of the TAC may be adjusted in-season only by concurrence of both Parties' respective managers. Reasons for such adjustments must be provided to the Transboundary Technical Committee.
- (ii) Harvest sharing of naturally occurring Stikine River sockeye salmon for the period 1988 to 1992, contingent upon activities specified in the February 1988 Understanding between the United States and the Canadian Section of the Pacific Salmon Commission concerning Joint Enhancement of Transboundary River Salmon Stocks (Understanding) shall be as follows:
- a. When the estimated TAC of Stikine River sockeye salmon is zero or less:
 - 1. Canada may conduct its native food fishery but the catch shall not exceed 4,000 fish, there will be no commercial fishing;
 - 2. The United States shall not direct commercial fisheries at Stikine River sockeye salmon in District 108;
 - 3. The United States may fish in the commercial gillnet fisheries in the Sumner Strait portion of District 106 so long as the in-season estimate of the contribution of Stikine River sockeye salmon is less than 20 percent of the total catch to date of sockeye salmon in Sumner Strait.
 - b. When the estimated TAC of Stikine River sockeye salmon is between 1 and 20,000 fish:
 - 1. Canada shall conduct its commercial and native food fisheries so that the all gear catch is at least 10,000 fish and may increase its catch to include any surplus available in-river total allowable catch but not to exceed 15,000 fish;
 - 2. The United States shall not direct commercial fisheries at Stikine sockeye salmon in District 108;
 - 3. The United States may fish in the commercial gillnet fisheries in the Sumner Strait portion of District 106 so long as the in-season estimate of the contribution of Stikine River sockeye salmon is less than 25 percent of the total catch to date of sockeye salmon in Sumner Strait. If the contribution of Stikine River sockeye salmon is greater than 20 percent but less than 25 percent only one day of fishing per week will be permitted, if greater than 25 percent, no fishing will be permitted in Sumner Strait.
 - c. When the estimated TAC of Stikine River sockeye salmon is between 20,001 and 60,000 fish:
 - 1. Canada shall conduct its commercial and native food fisheries so that the all gear catch is at least 15,000 fish and may increase its catch to include any surplus total allowable catch but not to exceed 20,000 fish;
 - 2. The United States may direct commercial fisheries at Stikine River sockeye salmon in District 108 if the total TAC of Stikine River sockeye salmon is greater than the actual catch of Stikine River sockeye salmon in District 106 plus 20,000.

- d. When the estimated TAC of Stikine River sockeye salmon is greater than 60,000 fish:
 - 1. Canada shall conduct its commercial and native food fisheries so that the all gear catch is at least 20,000 fish and may increase its catch to include any surplus total allowable catch but not to exceed 30,000 fish;
 - 2. The United States may direct commercial fisheries at Stikine River sockeye salmon in District 108 if the total TAC of Stikine River sockeye salmon is greater than the actual catch of Stikine River sockeye salmon in District 106 plus 30,000.
- e. United States incidental catches of Stikine River sockeye salmon in District 108 shall not be counted when computing TAC available for the Canadian fishery. For the purpose of calculation, the Canadian in-river allowable catch of sockeye salmon will be based on a 10 percent harvest rate of Stikine River sockeye salmon in the District 106 drift gillnet fishery.
- (iii) Canada shall harvest no more than 4,000 coho salmon annually in the Stikine River from 1988 through 1992.
- (iv) Canadian harvests of chinook, pink, and chum salmon may be taken as an incidental harvest in the directed fishery for sockeye and coho salmon.
- (v) Both Parties shall take the appropriate management action to ensure that the necessary escapement goals for the chinook salmon bound for the Canadian portions of the Stikine River are achieved by 1995.
- (vi) If the United States unilaterally withdraws from mutually agreed enhancement goals and activities as specified in the Understanding, then the harvest sharing of naturally occurring Stikine River salmon as stated in sections (ii) through (iv) above shall remain in effect.
- (vii) If Canada unilaterally withdraws from mutually agreed enhancement goals and activities as specified in the Understanding, then the harvest sharing of naturally occurring Stikine River sockeye salmon shall be as follows:
 - a. When the estimated TAC of Stikine River sockeye salmon is zero or less:
 - 1. Canada may conduct its native food fishery but the catch shall not exceed 4,000 fish, there will be no commercial fishing;
 - 2. The United States shall not direct commercial fisheries at Stikine River sockeye salmon in District 108;
 - 3. The United States may fish in the commercial gillnet fisheries in the Sumner Strait portion of District 106 so long as the in-season estimate of the contribution of Stikine River sockeye salmon is less than 20 percent of the total catch to date of sockeye salmon in Sumner Strait.
 - b. When the estimated TAC of Stikine River sockeye salmon is between 1 and 20,000 fish:
 - 1. Canada shall conduct its commercial and native food fisheries so that the all gear catch is at least 4,000 fish and may increase its catch to include any surplus available in-river total allowable catch but not to exceed 7,000 fish;

2. The United States may direct commercial fisheries at Stikine sockeye salmon in District 108 if the total TAC of Stikine River sockeye salmon is greater than the actual catch of Stikine River sockeye salmon in District 106 plus 7,000;
 3. The United States may fish in the commercial gillnet fisheries in the Sumner Strait portion of District 106 so long as the in-season estimate of the contribution of Stikine River sockeye salmon is less than 25 percent of the total catch to date of sockeye salmon in Sumner Strait.
- c. When the estimated TAC of Stikine River sockeye salmon is between 20,001 and 60,000 fish:
1. Canada shall conduct its commercial and native food fisheries so that the all gear catch is at least 7,000 fish and may increase its catch to include any surplus total allowable catch but not to exceed 15,000 fish;
 2. The United States may direct commercial fisheries at Stikine River sockeye salmon in District 108 if the total TAC of Stikine River sockeye salmon is greater than the actual catch of Stikine River sockeye salmon in District 106 plus 15,000.
- d. When the estimated TAC of Stikine River sockeye salmon is greater than 60,000 fish:
1. Canada shall conduct its commercial and native food fisheries so that the all gear catch is at least 15,000 fish and may increase its catch to include any surplus total allowable catch but not to exceed 25,000 fish;
 2. The United States may direct commercial fisheries at Stikine River sockeye salmon in District 108 if the total TAC of Stikine River sockeye salmon is greater than the actual catch of Stikine River sockeye salmon in District 106 plus 25,000.
- e. United States incidental catches of Stikine River sockeye salmon in District 108 shall not be counted when computing TAC available for the Canadian fishery. For the purpose of calculation, the Canadian in-river allowable catch of sockeye salmon will be based on a 10 percent harvest rate of Stikine River sockeye salmon in the District 106 drift gillnet fishery.
- f. Canada shall harvest no more than 2,000 coho salmon annually.
- g. Canadian harvest of chinook, pink, and chum salmon may be taken as an incidental harvest in the directed fishery for sockeye and coho salmon.
- (b) the Taku River:
- (i) Harvest sharing of naturally occurring Taku River sockeye salmon for the period 1988 to 1992, contingent upon activities specified in the February 1988 Understanding concerning Joint Enhancement of Transboundary River Salmon Stocks (Understanding), shall be as follows:
 - a. Canada shall harvest no more than 18 percent of the TAC of the sockeye salmon originating in the Canadian portion of the Taku River each year.
 - b. Canada shall harvest no more than 3,000 coho salmon each year.
 - (ii) Canadian harvests of chinook, pink and chum salmon may be taken as an incidental harvest in the directed fishery for sockeye and coho salmon.
 - (iii) Both Parties shall take the appropriate management action to ensure that the necessary escapement goals for chinook salmon bound for the Canadian portions of the Taku River are achieved by 1995.

- (iv) If the United States unilaterally withdraws from mutually agreed enhancement goals and activities as specified in the Understanding, then the harvest sharing of naturally occurring Taku River salmon as stated in sections (i) and (ii) above shall remain in effect.
- (v) If Canada unilaterally withdraws from mutually agreed enhancement goals and activities as specified in the Understanding, then Canada's share of naturally occurring Taku River sockeye salmon shall be 15 percent of the TAC. Furthermore, Canada shall commercially harvest coho, chinook, pink, and chum salmon only incidentally during a directed sockeye salmon fishery.

4. The Parties agree that if the catch allocations set out in paragraph 3 are not attained due to management actions by either Party in any one year, compensatory adjustments shall be made in subsequent years. If a shortfall in the actual catch of a Party is caused by management action of that Party, no compensation shall be made.

5. The Parties agree that the following arrangements shall apply to United States and Canadian fisheries harvesting salmon stocks originating in Canadian portions of the Alsek River: Recognizing that chinook and early run sockeye stocks originating in the Alsek River are depressed and require special protection, and in the interest of conserving and rebuilding these stocks, the necessary management actions shall continue until escapement targets are achieved.

6. The Parties agree to consider co-operative enhancement possibilities and to undertake as soon as possible studies on the feasibility of new enhancement projects on the Transboundary Rivers and adjacent areas for the purpose of increasing productivity of stocks and providing greater harvests to the fishers of both countries.

7. Recognizing that stocks of salmon originating in Canadian sections of the Columbia River constitute a small portion of the total populations of Columbia River salmon, and that the arrangements for consultation and recommendation of escapement targets and approval of enhancement activities set out in Article VII are not appropriate to the Columbia River system as a whole, the Parties consider it important to ensure effective conservation of up-river stocks which extend into Canada and to explore the development of mutually beneficial enhancement activities. Therefore, notwithstanding Article VII, paragraphs 2, 3, and 4, during 1985, the Parties shall consult with a view to developing, for the transboundary sections of the Columbia River, a more practicable arrangement for consultation and setting escapement targets than those specified in Article VII, paragraphs 2 and 3. Such arrangements will seek to, inter alia,

- (a) ensure effective conservation of the stocks;
- (b) facilitate future enhancement of the stocks on an agreed basis;
- (c) avoid interference with United States management programs on the salmon stocks existing in the non-transboundary tributaries and the main stem of the Columbia River.

Chapter 2

NORTHERN BRITISH COLUMBIA SOUTHEASTERN ALASKA

1. Considering that the chum salmon stocks originating in streams in the Portland Canal require rebuilding, the Parties agree in 1990 and 1991 to jointly reduce interceptions of these stocks to the extent practicable and to undertake assessments to identify possible measures to restore and enhance these stocks. On the basis of such assessments, the Parties shall instruct the Commission to identify long-term plans to rebuild these stocks.

2. With respect to sockeye salmon, the United States shall

(a) with respect to District 4 purse seine fishery:

- (i) for the four year period, 1990 through 1993, limit its fishery in a manner that will result in a maximum four-year total catch of 480,000 sockeye salmon prior to United States Statistical Week 31;
- (ii) when the annual catch reaches 160,000 sockeye salmon, no further daily fishing periods in District 4 will be allowed prior to Statistical Week 31;
- (iii) all underages not to exceed 20% of the Annex ceiling will add to, and overages will subtract from, the subsequent four-year period.

(b) limit its drift gillnet fishery in Districts 1A and 1B in a manner that will result in an average annual harvest of 130,000 sockeye salmon.

3. With respect to pink salmon, Canada shall

(a) limit its net fishery in Areas 3-1, 3-2, 3-3, 3-4, and 5-11 in a manner that will result in an average annual harvest of 900,000 pink salmon;

(b) with respect to the Area 1 troll fishery:

- (i) for the four year period, 1990-1993, limit its Area 1 pink salmon troll catch to a total of 5.125 million;
- (ii) during the period 1990 through 1993, close the pink salmon troll fishery in the most northerly portion of Area 1 in management units 101-4, 101-8, 101-3 north of 54 degrees 37 minutes N. and 103 north of 54 degrees 37 minutes N to pink salmon trolling when the pink salmon fishery has lasted 22 days starting with the beginning of the troll season in Area 1, but no earlier than July 22, except that the most northerly portion of the area shall close to pink salmon trolling whenever the catch in that area reaches 300,000 pinks.
- (iii) limit the maximum harvest in the entire Area 1 in any one year to 1.95 million pink salmon; and,
- (iv) all underages, not to exceed 20% of the Annex ceiling, will add to, and overages will subtract from, the subsequent four-year period.

4. In 1987 and thereafter, in order to ensure that catch limits specified in paragraphs 2 and 3 are not exceeded, the Parties shall implement appropriate management measures which take into account the expected run sizes and permit each country to harvest its own stocks.

5. In setting pink salmon fisheries regimes for 1987 and thereafter, the Parties agree to take into account information from the northern pink tagging program.
6. The Parties shall at the earliest possible date exchange management plans for the fisheries described herein.
7. In order to accomplish the objectives of this Chapter, neither Party shall initiate new intercepting fisheries, nor conduct or redirect fisheries in a manner that intentionally increases interceptions.
8. The Parties shall maintain a Joint Northern Boundary Technical Committee (Committee) reporting, unless otherwise agreed, to the Northern Panel and the Commission. The Committee, inter alia, shall
- (a) evaluate the effectiveness of management actions;
 - (b) identify and review the status of stocks;
 - (c) present the most current information on harvest rates and pattern on these stocks, and develop a joint data base for assessments;
 - (d) collate available information on the productivity of stocks in order to identify escapements which produce maximum sustainable harvests and allowable harvest rates;
 - (e) present historical catch data, associated fishing regimes, and information on stock composition in fisheries harvesting these stocks;
 - (f) devise analytical methods for the development of alternative regulatory and production strategies;
 - (g) identify information and research needs, including future monitoring programs for stock assessments; and,
 - (h) for each season, make stock and fishery assessments and recommend to the Northern Panel conservation measures consistent with the principles of the Treaty.

Chapter 3

CHINOOK SALMON

1. Considering the escapements of many naturally spawning chinook stocks originating from the Columbia River northward to southeastern Alaska have declined in recent years and are now substantially below goals set to achieve maximum sustainable yields, and recognizing the desirability of stabilizing trends in escapements and rebuilding stocks of naturally spawning chinook salmon, the Parties shall

- (a) instruct their respective management agencies to establish a chinook salmon management program designed to meet the following objectives:
 - (i) halt the decline in spawning escapements in depressed chinook salmon stocks; and,
 - (ii) attain by 1998, escapement goals established in order to restore production of naturally spawning chinook stocks, as represented by indicator stocks identified by the Parties, based on a rebuilding program begun in 1984;
- (b) continue the chinook working group to clarify policy issues relating to the execution of this Chapter; for example, the definition of pass-through, and the development of common procedures for adjusting catch ceilings in response to changes in abundance, positive incentives and enhancement add-ons; the chinook working group will develop options for consideration by the Commission and Panels as appropriate;
- (c) jointly initiate and develop a co-ordinated chinook management program;
- (d) maintain a Joint Chinook Technical Committee (Committee) reporting, unless otherwise agreed, to the Northern and Southern Panels and to the Commission, which inter alia, shall
 - (i) evaluate management actions for their consistency with measures set out in this Chapter and for their potential effectiveness in attaining these specified objectives;
 - (ii) evaluate annually the status of chinook stocks in relation to objectives set out in this Chapter and, consistent with paragraph (d) (v) beginning in 1986, make recommendations for adjustments to the management measures set out in this Chapter;
 - (iii) develop procedures to evaluate progress in the rebuilding of naturally spawning chinook stocks;
 - (iv) recommend strategies for the effective utilization of enhanced stocks;
 - (v) recommend research required to implement this rebuilding program effectively; and,
 - (vi) exchange information necessary to analyze the effectiveness of alternative fishery regulatory measures to satisfy conservation objectives;
- (e) ensure that
 - (i) in 1991, the all-gear catch in Southeast Alaska shall not exceed the base ceiling of 263,000 chinook salmon plus 10,000; in 1992, the all-gear catch in Southeast Alaska shall not exceed 263,000 chinook salmon; these catches exclude the Alaska hatchery add-on as described in the letter of transmittal; in 1991 and 1992 Alaska shall open its general summer troll fishery on July 1; the June fishery shall not exceed 40,000 chinook salmon (excluding the Alaska hatchery add-on) taken in a manner similar to

1989 and 1990; and areas of high chinook abundance shall be closed during chinook non-retention periods to reduce incidental mortalities;

- (ii) in 1991, the all-gear catch in Northern and Central B.C. shall not exceed the base ceiling of 263,000 chinook salmon plus 10,000; in 1992, the all-gear catch in Northern and Central B.C. shall not exceed 263,000 chinook salmon; these catches exclude a portion of the catch in extreme terminal areas as described in the letter of transmittal;
 - (iii) in 1991 and 1992, the annual troll catch off the west coast of Vancouver Island shall not exceed 360,000 chinook salmon;
 - (iv) in 1991 and 1992, the total annual catch by the sport and troll fisheries in the Strait of Georgia shall not exceed 275,000 chinook salmon; Canada will undertake management measures to achieve the target of rebuilding Lower Georgia Strait and Fraser River chinook stocks by 1998;
 - (v) adjustments to the ceilings may be made in response to reductions in chinook abundance so that the indicator stocks are rebuilt by 1998;
 - (vi) fishing regimes are reviewed by the Committee and structured so as not to affect unduly or to concentrate disproportionately on stocks in need of conservation;
 - (vii) starting with the 1987 season, a 7.5 percent management range is established above and below a catch ceiling. On a continuing basis, the cumulative deviation (in numbers of fish) shall not exceed the management range. In the event that the cumulative deviation exceeds the range, the responsible Party shall be required in the succeeding year, to take appropriate management actions to return the cumulative deviation, plus any penalty assessed, to a level within the established management range. Negative cumulative deviations shall not accumulate below the management range. It is the intent of this section to insure that, on average, the annual catch in ceilinged fisheries is equal to the agreed target ceiling; and,
 - (viii) in 1987 and thereafter, the United States will continue to monitor fisheries in Juan de Fuca Strait (Areas 4B, 5, 6A, 6C) and the outer portions of Puget Sound (6B, 7, 7A, 9) so as to assess the levels and trends in the interceptions of Canadian chinook salmon;
- (f) maintain the following program, recognizing that associated fishing mortalities can affect the rebuilding schedule. The Parties shall
- (i) minimize the effects of such mortalities;
 - (ii) monitor, assess, and report associated fishing mortalities;
 - (iii) provide the information required by the Chinook Technical Committee to estimate the magnitude and assess the impacts of associated mortalities on an on-going basis;
 - (iv) beginning in 1989, the Chinook Technical Committee shall
 - a. review reports provided by the Parties on an annual basis, unless directed by the Commission, and estimate the magnitude of all quantifiable sources of associated fishing mortalities;
 - b. evaluate their impact on the rebuilding schedule and recommend management actions that will achieve the objectives of the chinook rebuilding program, taking into account the effects of all fishing mortalities; and

c. develop technical procedures and standardize methodologies to quantify the magnitude of associated fishing mortalities, including savings of fish, and assess their impacts upon the rebuilding program, including pass-through commitments;

(v) the Commission shall annually take into account, starting in 1988, the impacts of fishing mortalities, as determined by the Chinook Technical Committee, in establishing regional fishing regimes and may adjust allowable catches accordingly, to assure rebuilding by 1998;

(g) manage all salmon fisheries in Alaska, British Columbia, Washington and Oregon, so that the bulk of depressed stocks preserved by the conservation program set out herein principally accrue to the spawning escapement;

(h) establish, at the conclusion of the chinook rebuilding program, fishery regimes to maintain the stocks at optimum productivity and provide fair internal allocation determinations. It is recognized that the Parties are to share the benefits of coastwide rebuilding and enhancement, consistent with such internal allocation determinations and this Treaty; and,

(i) exchange annual management plans prior to each season.

2. The Parties agree that enhancement efforts designed to increase production of chinook salmon would benefit the rebuilding program. They agree to consider utilizing and redirecting enhancement programs to assist, if needed, in the chinook rebuilding program. They agree that each region's catches will be allowed to increase above established ceilings based on demonstrations to the Commission and assessment by it of the specific contributions of each region's new enhancement activities, provided that the rebuilding schedule is not extended beyond 1998, and provisions of Subsection 1(e)(vi) of this Chapter are adhered to.

3. The Parties shall submit a report to the Commission by December 1991 which presents

(a) joint recommendations for chinook salmon escapement goals in the transboundary rivers;

(b) given the goals recommended in 3(a), a jointly accepted assessment of progress toward rebuilding chinook stocks in these transboundary rivers based on escapement data available through 1991, and the likelihood of achievement of these goals by 1995; and,

(c) co-operatively developed management options to be identified by December 1991 and initiated in 1992 and following seasons to ensure rebuilding of chinook stocks in the transboundary rivers which are identified in 3(b) as requiring further management actions.

FRASER RIVER SOCKEYE AND PINK SALMON

1. In order to increase the effectiveness of the management of fisheries in the Fraser River Area (hereinafter the Area) and in fisheries outside the Area which harvest Fraser River sockeye and pink salmon, the Parties agree

(a) that the preliminary expectations of the total allowable catches of Fraser River sockeye and pink are:

	<u>Sockeye</u>	<u>Pink</u>
1985	6.6 million	11.0 million
1986	12.5 million	
1987	3.1 million	12.0 million
1988	3.6 million	
1989	7.1 million	14.0 million
1990	13.0 million	
1991	3.1 million	14.0 million
1992	3.6 million	

(b) that

(i) based on these preliminary expectations, the United States shall harvest as follows:

	<u>Sockeye</u>	<u>Pink</u>
1985	1.78 million	3.6 million
1986	3.0 million	
1987	1.06 million	3.6 million
1988	1.16 million	

(ii) the United States catches referred to in paragraph 1(b)(i) herein shall be adjusted in proportion to any adjustments in the total allowable catches set out in paragraph 1(a) herein that are due to any agreed adjustments in pre-season or in-season expectations of run-size. When considering such adjustment, the Parties shall take into account all fisheries that harvest Fraser River sockeye and pink salmon including annual Fraser River Indian food fish harvests in excess of 400,000 sockeye. The United States catches shall not be adjusted to any adjustments in the total allowable catch that may be caused by changes in escapement goals that form the basis for the agreed total allowable catches set out in paragraph 1(a) herein;

(iii) notwithstanding the agreed United States and Canadian catch levels for Fraser River sockeye and for coho off the west coast of Vancouver Island, as provided in paragraph 1(b)(i) herein and in Chapter 5, respectively, and subject to paragraph 1(b)(ii), in 1985 the United States catch of Fraser River sockeye shall be 1.73 million and the Canadian catch of coho off the west coast of Vancouver Island shall not exceed 1.75 million; and in 1986, the United States catch of Fraser River sockeye shall be 2.95 million and the Canadian catch of coho off the west coast of Vancouver Island shall not exceed 1.75 million;

(c) in 1985, to instruct the International Pacific Salmon Fisheries Commission to develop regulatory programs in the Area to give effect to the provisions of paragraph 1(b);

- (d) to instruct the Fraser River Panel for 1986 through 1992 to develop regulations to give effect to the provisions of paragraphs 1(b) and 1(f);
 - (e) to instruct the Fraser River Panel that if management measures fail to achieve such sockeye and pink catches, any difference shall be compensated by adjustments to the Fraser fishery in subsequent years;
 - (f) in the period 1989 to 1992, the Fraser River Panel shall determine the annual United States catch level so that the total United States catch in this period shall not exceed 7 million sockeye in the aggregate. In the years 1989 and 1991, the United States harvest shall not exceed 7.2 million pink salmon, in the aggregate. Notwithstanding the foregoing, these levels shall be reduced in proportion to any decreases in the total allowable catches set out in paragraph 1(a) herein that are due to any agreed decreases in pre-season or in-season expectations of run size. When considering such reductions, the Parties shall take into account all fisheries that harvest Fraser River sockeye and pink salmon including annual Fraser River Indian food fish harvests in excess of 400,000 sockeye. The United States catches shall not be reduced due to any decreases in the total allowable catch that may be caused by changes in escapement goals that form the basis for the agreed total allowable catches set out in paragraph 1(a) herein;
 - (g) to consider no sooner than 1989 adjusting the regime in accordance with the principles of Article III;
 - (h) to instruct the Fraser River Panel that in managing Fraser River sockeye and pink salmon, it shall take into account the management requirements of other stocks in the Area.
2. Notwithstanding the provisions of Paragraphs 1(b) and 1(f), and to ensure that Canada receives the benefits of any Canadian-funded enhancement activities undertaken following entry into force of this Treaty, any changes in the total allowable catch due to such activities shall not result in adjustment of the United States catch.
 3. The Parties shall establish data-sharing principles and processes which ensure that the Parties, the International Pacific Salmon Fisheries Commission, the Commission and the Fraser River Panel are able to manage their fisheries in a timely manner consistent with this Chapter.
 4. The Parties may agree to adjust the definition of the Area as necessary to simplify domestic fishery management and ensure adequate consideration of the effect on other stocks and species harvested in the Area.
 5. In managing the fisheries in the Area, the Parties, the Commission, and the Fraser River Panel shall take into account fisheries inside and outside the Area that harvest Fraser River sockeye and pink salmon. The Parties, the Commission, and the Fraser River Panel shall consider the need to exercise flexibility in management of fisheries outside the Area which harvest Fraser River sockeye and pink salmon.
 6. The Parties shall establish a technical committee for the Fraser River Panel:
 - (a) the members shall co-ordinate the technical aspects of Fraser River Panel activities with and between the Commission staff and the national sections of the Fraser River Panel, and shall report to their respective national sections of the Panel. The committee may receive assignments of a technical nature from the Fraser River Panel and will report results directly to the Panel.
 - (b) membership of the committee shall consist of up to three such technical representatives as may be designated by each national section of the Commission.
 - (c) members of the technical committee shall analyze proposed management regimes, provide technical assistance in the development of proposals for management plans, explain technical reports and provide information and technical advice to the respective national sections of the Panel.

- (d) the technical committee shall work with the Commission staff during pre-season development of the fishery regime and management plan and during in-season consideration of regulatory options for the sockeye and pink salmon fisheries of Fraser Panel Area waters to ensure that:
 - (i) domestic allocation objectives of both Parties are given full consideration;
 - (ii) conservation requirements and management objectives of the Parties for species and stocks other than Fraser River sockeye and pink salmon in the Fraser River Panel Area during periods of Panel regulatory control are given full consideration; and,
 - (iii) the Commission staff is timely informed of management actions being taken by the Parties in fisheries outside of the Fraser River Panel Area that may harvest sockeye and pink salmon of Fraser River origin.
- (e) the staff of the Commission shall consult regularly in-season with the technical committee to ensure that its members are fully and timely informed on the status of Fraser River sockeye and pink salmon stocks, and the expectations of abundance, migration routes and proposed regulatory options, so the members of the technical committee can brief their respective national sections prior to each in-season Panel meeting.

Chapter 5

COHO SALMON

1. Recognizing that for the past several years some coho stocks have been below levels necessary to sustain maximum harvest and that recent fishing patterns have contributed to a decline in some Canadian and United States coho stocks, and in order to prevent further decline in spawning escapements, adjust fishing patterns, and initiate, develop, or improve management programs for coho stocks, the Parties shall

- (a) instruct their respective management agencies to continue to develop coho salmon management programs designed to meet the following objectives
 - (i) prevent overfishing; and,
 - (ii) provide for optimum production;
- (b) maintain a Joint Coho Technical Committee (Committee), reporting, unless otherwise agreed, to the Panels and the Commission. The membership of the Committee shall include representation from the Northern and Southern Panel Areas. The Committee, inter alia, shall, at the direction of the Commission and relevant Panels
 - (i) evaluate management actions for their consistency with measures set out in this Chapter and for their potential effectiveness in attaining the objectives established by the Commission;
 - (ii) annually identify, review, and evaluate the status of coho stocks in relation to the objectives set out in this Chapter and make recommendations for adjustments to the management measures consistent with those objectives;
 - (iii) present the most current information on exploitation rates and patterns on these stocks, and develop a joint data base for assessments;
 - (iv) collate available information on the productivity of coho stocks in order to identify the management objectives necessary to prevent overfishing;
 - (v) present historical catch data and associated fishing regimes;
 - (vi) estimate stock composition in fisheries of concern to the Commission and Panels;
 - (vii) devise analytical methods for the development of alternative regulatory and production strategies;
 - (viii) identify information and research needs, including future monitoring programs for stock assessments;
 - (ix) investigate the feasibility of alternative methodologies for implementing indicator stock programs in all areas;
 - (x) for each season, make stock and fishery assessments and recommend to the Commission conservation measures consistent with the principles of the Treaty;
 - (xi) develop programs to assure the attainment of spawning escapement goals and prevent overfishing;

(xii) exchange information necessary to analyze the effectiveness of alternative fishery regulatory measures in achieving conservation objectives; and,

(xiii) work to develop, under the direction of the Joint Northern and Southern Panels, standard methodologies for coho stock and fishery assessment; and,

(c) unless otherwise agreed, in any area where fisheries of one Party may intercept coho stocks originating in the rivers of the other which require conservation action or such other action as the Commission may determine, that Party will endeavour to limit incidental coho catches in fisheries targeting on other species.

2. For coho stocks shared by fisheries of the United States and Canada, recommendations for fishery regimes shall be made by the Northern Panel for coho salmon originating in rivers with mouths situated between Cape Caution and Cape Suckling and by the Southern Panel for coho salmon originating in rivers with mouths situated south of Cape Caution, as provided in Annex I. At the direction of the Commission, each Party shall establish regimes for its troll, sport, and net fisheries consistent with management objectives approved by the Commission.

3. The Parties agree

(a) for 1991 and 1992, the west coast of Vancouver Island (Canadian Management Areas 21, 23, 24, 25, 26, 27, 121, 123, 124, 125, 126, 127, and 130-1) annual troll harvest shall not exceed 1.8 million Coho;

(b) for 1991 and 1992, the Swiftsure Bank area will be closed to chinook and coho salmon trolling in order to address conservation concerns expressed by both Parties. Troll fishing for sockeye and pink salmon shall, upon appropriate prior notice, be permitted only in order to attain Canadian domestic troll allocation objectives on sockeye and pink;

(c) to avoid any alterations in coho fisheries along the west coast of Vancouver Island that would increase the proportional interception of U.S. coho stocks;

(d) that in 1991 and 1992, for Canadian Area 20, and U.S. Areas 7 and 7A, fisheries directed at coho salmon will be permitted. Notwithstanding this agreement, if the Commission determines that conservation concerns expressed by either Party warrant further restrictions, then the Parties shall limit their catch of coho salmon to that taken incidentally during fisheries under the control of the Fraser Panel and those permitted under the provisions of Annex IV, Chapter 6. Both Parties agree that in 1987, due to conservation concerns expressed by both Parties and agreed to by the Commission, coho fisheries in Canadian Area 20 and U.S. Areas 7 and 7A shall be limited by the levels of incidental coho catch anticipated during fisheries conducted under the control of the Fraser Panel and provisions of Annex IV, Chapter 6;

(e) for 1991 and 1992, the United States shall adhere to presently agreed management objectives in Strait of Juan de Fuca Areas 4B, 5, and 6C; and,

(f) to develop in 1993 and thereafter, troll fishery regimes for the west coast of Vancouver Island that

(i) implement conservation measures approved by the Commission and take into account any increased contributions by the Parties to the fishery; and,

(ii) provide for the sharing of benefits of coho production of each Party consistent with the principles of Article III.

4. Notwithstanding any other provisions of this Chapter, the Commission, for 1993 and thereafter, may set specific fishery regimes as appropriate, which may include troll harvest ceilings, for coho salmon in the intercepting fisheries restricted under this Chapter that

- (a) implement conservation measures approved by the Commission;
- (b) take into account increased production;
- (c) provide for the recognition of benefits of coho production of each Party consistent with the principles of Article III;
- (d) take into account actions taken by each Party to address its conservation concerns; and,
- (e) take into account time and area management measures which will assist either Party in meeting its conservation objectives while avoiding undue disruption of fisheries.

5. Starting with the 1987 season, a 7.5 percent management range is established above and below a catch ceiling. On a continuing basis, the cumulative deviation (in numbers of fish) shall not exceed that management range. In the event that the cumulative deviation exceeds the range, the responsible Party shall be required, in the succeeding year, to take appropriate management actions to return the cumulative deviation, plus any penalty assessed, to a level within the established management range. Negative cumulative deviations shall not accumulate below the management range. It is the intent of this section to insure that, on average, the annual catch in ceilinged fisheries is equal to the agreed target ceiling.

6. The Parties agree that enhancement efforts designed to increase production of coho salmon would, when combined with catch ceilings and/or time/area management measures, aid in rebuilding depressed natural stocks by reducing the exploitation rates on these stocks. They agree that utilizing this opportunity in the future to rebuild natural stocks is, in most cases preferable to reductions in fishing levels. A major objective of enhancement is to lay the foundation for improved fisheries in Annex areas in the future.

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.
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;
 - (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).

Chapter 7

GENERAL OBLIGATION

With respect to intercepting fisheries not dealt with elsewhere in this Annex, unless otherwise agreed, neither Party shall initiate new intercepting fisheries, nor conduct or redirect fisheries in a manner that intentionally increases interceptions.

Chapter 8

YUKON RIVER

DEFINITIONS

1. For the purposes of this Chapter,
 - (a) "Restoration" means returning a wild salmon stock to its natural production level;
 - (b) "Enhancement" means expanding a wild salmon stock beyond its natural production level;
 - (c) "Yukon River" means the entire Yukon River drainage in Canada and the United States;
 - (d) "Yukon River in Canada" means the entire Yukon River drainage in Canada, including the Porcupine River drainage; and
 - (e) "Mainstem Yukon River in Canada" means the Yukon River drainage in Canada, excluding the Porcupine River drainage.

ADMINISTRATION

2. This Chapter applies to salmon originating in the Yukon River.
3. The Parties shall seek to ensure the effective conservation of stocks originating in the Yukon River. The Parties shall implement agreed research and management programs, as provided for in memoranda of understanding and this Chapter, further develop co-operative research and management programs, and shall identify potential restoration and enhancement opportunities.
4. Article II, paragraphs 7, 8, 18, 19, and 20, Article IV, Article V, Article VII, and Article XIII, paragraph 2, shall not apply to salmon referred to in paragraph 2. With regard to Article XII, for matters related to the Yukon River, the Yukon River Panel shall substitute for the Commission.
5. Subject to the approval of the Parties, the Yukon River Panel shall make such by-laws and procedural rules, for itself, as may be necessary for the exercise of its functions and the conduct of its meetings.
6. Each Party shall designate the responsible management entity for the harvest of salmon referred to in paragraph 2.
7. The Yukon River Panel shall make recommendations to the management entities concerning the conservation and management of salmon originating in the Yukon River in Canada.
8. The responsible management entities shall take into account the proposals of the Yukon River Panel in the adoption of regulations, and shall ensure the enforcement of these regulations.

9. The Parties shall maintain the Yukon River Joint Technical Committee ("JTC") established by paragraph C.2 of the Memorandum of Understanding dated 28 January 1985, reporting to the Yukon River Panel. The JTC shall meet at least once a year to, inter alia:

- (a) assemble and refine information on migratory patterns and the extent of exploitation in fisheries harvesting Yukon River origin salmon;
- (b) review existing assessment techniques and investigate new ways for determining total return and escapement and make recommendations on optimum spawning escapement objectives;
- (c) examine past and current management regimes and recommend how they may be better formulated to achieve escapement objectives;
- (d) exchange information on proposed and existing restoration and enhancement programs, identify restoration and enhancement opportunities and evaluate the management consequences of harvests of restored or enhanced fish;
- (e) develop and recommend restoration and enhancement programs to be funded by the Yukon River Salmon Restoration and Enhancement Fund;
- (f) monitor and coordinate agreed research programs and recommend research required in order of priority to enable the Parties to effectively implement this Chapter;
- (g) evaluate annually the status of Canadian origin chum and chinook salmon stocks and make recommendations for adjustments to the rebuilding programs set out in this Chapter;
- (h) use existing procedures and investigate new ways to evaluate progress in rebuilding salmon stocks where necessary;
- (i) investigate and recommend stock separation studies that would assist in developing specific fishery management programs for individual salmon stocks;
- (j) review and analyze the effectiveness of alternate fishery regulatory measures to satisfy conservation objectives;
- (k) submit an annual report to the Yukon River Panel on fishery performance, including harvests and fishing effort of all user groups, fish values made available by either side and biological status of stocks;
- (l) review information available on coho salmon originating in the Yukon River, and undertake assessments of such stocks;
- (m) report on the condition of salmon habitat and measures to be taken to protect or enhance salmon habitat; and
- (n) undertake other assignments as agreed by the Yukon River Panel, which may include analysis of socio-economic characteristics of the fishery.

10. The Yukon River Panel shall make recommendations to the responsible management entities to coordinate management of the Yukon River fisheries that affect Canadian-origin salmon stocks. These entities shall exchange annual fishery management plans prior to each season. It is understood that co-ordinated management of coho salmon is not being considered at this time.

MAINSTEM YUKON RIVER

CHUM SALMON

11. With respect to chum salmon originating in the Yukon River in Canada, the Parties agree that spawning escapements have declined in recent years and are now substantially below levels necessary to achieve optimum sustained yield. Recognizing the desirability of rebuilding the stock, the Parties shall, through their respective management entities, implement a brood year rebuilding program for the Canadian mainstem chum stock to attain by 2001 the agreed escapement objective of more than 80,000 chum salmon for each brood year. The rebuilding program shall take into account the relative health of the brood years and endeavour to rebuild the stronger brood years in one cycle and the weaker brood years in three cycles in equal increments. The Yukon River Panel shall establish and modify as necessary the escapement objectives based on recommendations of the JTC.

12. During the rebuilding program for the Canadian mainstem chum stock, Canada will endeavour to manage the harvest of chum salmon in the mainstem Yukon River in Canada within a guideline harvest range of 23,600 in years of weak returns and 32,600 in years of strong returns. The United States will endeavour to deliver to the Canadian border on the mainstem Yukon River the number of chum salmon necessary to meet with spawning escapement objective for that year in the rebuilding program, and provide for a Canadian harvest within the agreed Canadian guideline harvest range. For the years 1992 to 1995, the United States will endeavour to deliver to the Canadian border on the mainstem Yukon River numbers of chum salmon within the following ranges:

1992	74,600	-	112,600
1993	74,600	-	112,600
1994	84,600	-	112,600
1995	103,600	-	112,600

If spawning escapements from 1992 to 1995 reach the levels anticipated, the United States will, for the remainder of the rebuilding period, endeavour to deliver annually between 88,600 and 112,600 chum salmon to the Canadian border on the mainstem Yukon River. However, if the spawning escapement objective is not achieved for any brood year, the Panel shall establish a new rebuilding program for that brood year to complete the rebuilding program by 2001.

13. During the rebuilding program, for any year when a strong return is anticipated, the Yukon River Panel shall consider recommending a spawning escapement objective substantially above 80,000. If the Panel makes such a recommendation for that year, the United States will endeavour, for that year, to deliver to the Canadian border on the mainstem Yukon River the number of chum salmon necessary to meet with spawning escapement objective recommended by the Panel, plus the Canadian harvest range for the rebuilding program.

14. These arrangements regarding border escapement and Canadian guideline harvest range set out above for the rebuilding period will terminate not later than the end of 2001.

15. The responsible management entities shall consult closely and where possible coordinate pre-season management planning and in-season responses to run assessments. If during pre-season discussion within the Yukon River Panel consideration is being given to not conducting a directed commercial fishery in Alaska because of serious conservation concerns, Canada will also consider taking such a measure. If it is determined in-season that pre-season management measures agreed to by the Panel are insufficient to achieve agreed spawning escapement levels, the Parties agree to consider taking further conservation measures to meet the escapement objectives.

CHINOOK SALMON

16. With respect to chinook salmon originating in the Yukon River in Canada, the Parties agreed that spawning escapements declined substantially below levels necessary to achieve optimum sustainable yields. Recognizing the desirability of arresting the decline, the Parties agree to a minimum spawning escapement objective of 18,000 for

the Canadian mainstem chinook stock for six years beginning in 1990. Recognizing the difficulty of managing selectively Yukon River chinook salmon stocks, the Parties will endeavour to meet the spawning escapement objective. During this six-year period, the Panel shall develop a rebuilding program that will result in optimum sustained yields from the stock and recommend measures to implement this program.

17. During the period 1990 to 1995 inclusive for the Canadian mainstem chinook stocks, the United States will endeavour to deliver annually between 34,800 and 37,800 chinook salmon to the Canadian border on the mainstem Yukon River and Canada will endeavour to manage the harvest of chinook salmon in the mainstem Yukon River in Canada within a guideline harvest range of 16,800 in years of weak returns and 19,800 in years of strong returns.

18. In years of very strong returns the United States agrees to consider, with a view to increasing, the border escapement in order to allow spawning escapement above the stabilisation level.

19. The responsible management entities shall consult closely and where possible coordinate pre-season management planning and in-season responses to run assessments. If during pre-season discussion within the Yukon River Panel, consideration is being given to not conducting a directed commercial fishery in Alaska because of serious conservation concerns, Canada will also consider taking such a measure. If it is determined in-season that pre-season management measures agreed to by the Panel are insufficient to achieve agreed spawning escapement levels, the Parties agree to consider taking further conservation measures to meet the escapement objectives.

PORCUPINE RIVER

20. The Parties recognize that limited information currently exists for salmon stocks spawned in the Porcupine River drainage in Canada. Information available for the Fishing Branch fall chum salmon stock indicates that spawning escapements for this stock are below interim escapement objectives.

21. The Parties further recognize that the agreed rebuilding program for salmon spawned in the mainstem Yukon River in Canada is expected to contribute increased escapements to Porcupine River stocks.

22. To ensure that maximum benefits accrue to Porcupine River spawning escapements from the rebuilding program for mainstem stocks, the Parties agree:

- (a) not to initiate new fisheries on Canadian-origin stocks within the Porcupine River drainage before December 31, 1999; and
- (b) if after this period either Party intends to initiate a new fishery on the Porcupine River, that Party shall inform the Yukon River Panel, which shall have to authority to make recommendations for management arrangements to the Parties.

23. The JTC shall compile existing information on the status of these stocks and the benefits accruing to Porcupine River salmon stocks and on management and research tools available for management of these stocks. Based on this information, the JTC shall:

- (a) advise the Yukon River Panel regarding the status of these stocks and the benefits accruing to Porcupine River salmon spawning escapements from the mainstem rebuilding program;
- (b) prepare a range of potential rebuilding options for the Fishing Branch River fall chum salmon, including the option of allowing these stocks to rebuild as a result of the rebuilding program agreed to for the Yukon River mainstem fall chum salmon stock; and
- (c) recommend to the Yukon River Panel ways to improve and expand information needed to better manage these stocks for optimum production.

24. Based on information and recommendations provided by the JTC, the Yukon River Panel shall consider making recommendations to the Parties regarding rebuilding, restoration and improved management of these Porcupine River stocks.

GENERAL

25. If information becomes available that indicates that the catch records that provided the basis for the Canadian guideline harvest range in paragraphs 12 (Chum Salmon) and 17 (Chinook Salmon) are erroneously low, at Canada's request the Yukon River Panel may recommend increasing the ranges set out in these paragraphs to reflect the adjusted figures for the Aboriginal Fishery and the sport fishery catch.

26. With respect to coho salmon originating in the Yukon River in Canada, the Parties agree that the status of these stocks is not known with certainty.

27. The Parties agree that efforts designed to increase in in-river return of Yukon River origin salmon by reducing the marine catches and by-catches of Yukon River salmon would benefit the status of the Yukon River stocks. The Parties agree to identify, quantify and undertake efforts to reduce these catches and by-catches.

28. The Parties agree that the numbers of Canadian-origin Yukon River salmon in U.S. marine catches are presently unknown.

29. The Parties agree that, in light of their respective receipt of benefits from the salmon originating in their territories:

- (a) salmon should be afforded unobstructed access to and from, and use of, existing migration, spawning and rearing habitats;
- (b) water quality standards should be maintained and enforced;
- (c) it is essential to maintain the productive capacity of the salmon habitat on both sides of the boundary in order to achieve the objectives of this Chapter; and
- (d) should access be obstructed, water quality standards be degraded or productive capacity of the salmon habitat be diminished to a degree that affects the objectives of this Chapter, the Panel may recommend corrective actions which may include adjustments to fishing patterns, border escapement objectives and guideline harvest ranges.

30. The Parties agree to endeavour, subject to budgetary limitations, to implement the fisheries research and management programs recommended by the JTC for co-ordinated management of the Yukon River chinook and chum salmon stocks.

RESTORATION AND ENHANCEMENT FUND

31. It is understood that the Parties' implementation of Article III(1)(b) as it pertains to the Yukon River must recognize factors unique to the Yukon River drainage system.

32. The Parties agree that further discussion is required regarding Article III(1)(b) and the percentage of the U.S. harvest of each species of salmon originating in Canadian sections of the river that shall be deemed to be of U.S. origin in order to conclude a long-term agreement. Pending resolution the Parties agree that:

- (a) there shall be established a Yukon River Salmon Restoration and Enhancement Fund, hereinafter referred to as "the Fund", to be managed by the Yukon River Panel;

- (b) the Fund shall be used for programs and directly associated research and management activities on either side of the border which are based on recommendations by the JTC and are directed at the restoration and enhancement of Canadian origin salmon stocks;
- (c) the United States shall seek to provide annually to the Fund by December 31 of each year beginning in 1995 a financial contribution, subject to the availability of appropriated funds. In the event that the annual contribution is not made this agreement shall be suspended until the contribution for that year is made;
- (d) the Parties shall assist the Yukon River Panel in the development and implementation of these programs and shall, in particular, provide from their own budgetary resources, essential support as required for programs in their territories;
- (e) during rebuilding as specified in this Chapter, unless the Parties jointly decide otherwise on the basis of recommendations by the Yukon River Panel:
 - (i) the Parties shall endeavour to allow spawning escapements to increase as a result of the fish produced from restoration activities, taking into account the desirability of avoiding disruption of existing fisheries;
 - (ii) the agreed Canadian guideline harvest levels during rebuilding will not change; and
 - (iii) harvest shares for salmon produced by enhancement activities will be recommended by the Yukon River Panel, taking into account the objectives of the rebuilding programs and the desire to avoid disruptions of existing fisheries.

Following the rebuilding period the catch shares for the fish produced through these programs shall be recommended by the Yukon River Panel; and

- (f) the Fund shall be open for additional financial contributions from any source.

33. The Parties shall jointly develop and implement policies and procedures for planning, feasibility studies and operational methods. As a first step, the Parties shall undertake comprehensive co-operative regional planning and field surveys for possible salmon restoration and enhancement programs, the results of which shall be provided to the JTC. As part of this planning process, both Parties should incorporate fish genetic and health guidelines developed by the JTC.

34. The Parties understand that the financial contributions to the Fund shall be used for the programs described in Paragraph 32(b) to provide benefits for U.S. and Canadian fishermen in the Yukon River.

PRINCIPLES AND GUIDELINES FOR THE RESTORATION AND ENHANCEMENT FUND

PRINCIPLES

35. Restoration and enhancement activities shall be consistent with the protection of the existing wild salmon stocks and the habitats upon which they depend.

36. Given the wild nature of the Yukon River and its salmon stocks, and the substantial risks associated with large scale enhancement through artificial propagation, these enhancement activities are in appropriate at this time.

37. Artificial propagation shall not be used as a substitute for effective fishery regulation, stock and habitat management or protection.

GUIDELINES

38. The priorities for implementing projects with the Fund shall be in this order: (a) restoring habitat and wild stocks; (b) enhancing habitat; and (c) enhancing wild stocks.
39. Careful planning is necessary before undertaking any restoration or enhancement projects that might impact any wild stock. Projects shall be evaluated by the Yukon River Panel based on a Yukon River basin wide stock rebuilding and restoration plan. A careful assessment and inventory of wild stocks and their health, habitat, and life history must be an integral part of restoration and enhancement planning.
40. The most stringent of the fish genetics and fish disease policies in place by the responsible management entity of either Party will be applied to salmon restoration or enhancement projects.
41. The JTC shall develop a standard proposal format and implement a procedure for reviewing project proposals for use of the Fund. The JTC shall also develop and implement standard procedures for evaluating proposals for use of the Fund. When appropriate, the JTC will provide an evaluation of the ecological and genetic risks, and socio-economic impacts, and will identify alternative actions including but not restricted to fishery management actions. The JTC shall establish levels for restored stocks consistent with natural habitat capacity.
42. Following JTC evaluation of proposed projects, each Party shall provide an opportunity for public comment and review of the proposed projects, along with the JTC evaluation.
43. The Yukon River Panel shall then decide which projects to fund, based on these guidelines, the JTC evaluation and any public comments received.

Appendix C

Appointment of Officers for 1998/99

Effective December 2, 1998, a new slate of officers for the Pacific Salmon Commission was identified as follows:

(a) Commission Chair	Can.	P.S. Chamut
(b) Commission Vice-Chair	U.S.	W.R. Allen
(c) Fraser River Panel Chair	Can	W. Saito
(d) Fraser River Panel Vice-Chair	U.S.	A.D. Austin
(e) Northern Panel Chair	Can.	D. Einarson
(f) Northern Panel Vice-Chair	U.S.	K. Duffy
(g) Southern Panel Chair	U.S.	P. Pattillo
(h) Southern Panel Vice-Chair	Can.	G. Savard
(i) Standing Committee on F&A - Chair	Can.	P.S. Chamut
(j) Standing Committee on F&A - Vice-Chair	U.S.	R. Rousseau
(k) Standing Committee on R&S - Chair	U.S.	
(l) Standing Committee on R&S - Vice-Chair	Can.	B. Valentine

Appendix D

Approved Budget FY 1999/2000

1. INCOME

A. Contribution from Canada	\$800,000
B. Contribution from U.S.	\$800,000
Sub total	<u>\$1,600,000</u>
C. Carry-over from 1998/99	\$769,911
D. Interest	\$23,820
E. Other income	\$0
F. Total Income	<u>\$2,393,731</u>

2. EXPENDITURES

A. 1. Permanent Salaries and Benefits	\$1,367,143
2. Temporary Salaries and Benefits	\$220,347
3. Total Salaries and Benefits	\$1,587,490
B. Travel	\$92,560
C. Rents, Communications, Utilities	\$118,808
D. Printing and Publications	\$23,700
E. Contractual Services	\$329,144
F. Supplies and Materials	\$42,358
G. Equipment	\$166,873
H. Total Expenditures	<u>\$2,360,933</u>

3. BALANCE (DEFICIT)	\$32,798
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4. TEST FISHING PROGRAM

A. Forecast Revenues	\$832,308
B. Forecast Expenditures	<u>\$740,244</u>
C. Forecast Balance	<u>\$92,064</u>

5. TOTAL BALANCE (DEFICIT)	<u>\$124,862</u>
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Appendix E

Pacific Salmon Commission Secretariat Staff as of March 31, 1999

EXECUTIVE OFFICE

Ian Todd
Executive Secretary

Teri Tarita
Records Administrator/Librarian

Vicki Ryall
Meeting Planner

Janice Bakas
Secretary

FINANCE & ADMINISTRATION

Kenneth N. Medlock
Finance and Administration

Bonnie Dalziel
Accountant

FISHERY MANAGEMENT

James C. Woodey
Chief Biologist

Jim Gable
Head, Racial Identification Group

Jim Cave
Head, Stock Monitoring Group

Mike Lapointe
Project Biologist, Sockeye

Peter Cheng
Project Biologist, Acoustics

Bruce White
Project Biologist, Pinks

Yunbo Xie
Hydroacoustics Scientist

Keith Forrest
Racial Data Biologist

Ian Guthrie
Head, Biometrics

Jullie Andersen
Senior Scale Analyst

Doug Stelter
Statistician

Maxine Reichardt
Scale Analyst

Kathy Mulholland
Computer Systems Manager

Holly Derham
Assistant Scale Analyst

Andrew Gray
Hydroacoustics Biologist (temp)

Appendix F

Membership Lists for Standing Committees, Panels, Joint Technical Committees and other Appointments as of March 31, 1999

UNITED STATES

CANADA

1. STANDING COMMITTEE ON FINANCE AND ADMINISTRATION

Mr. Patrick S. Chamut (Chair)
Mr. A.W. (Sandy) Argue

Mr. Rollie Rousseau (Vice-Chair)
Mr. David Benton
Mr. Charles K. Walters
Mr. James Heffernan
Mr. W. Ron Allen

Staff: I. Todd (ex. officio)

Editorial Board

Mr. A.W. (Sandy) Argue

Dr. Norma Jean Sands

Staff: I. Todd (ex. officio)

2. STANDING COMMITTEE ON RESEARCH AND STATISTICS

Mr. Bill Valentine (Chair)
Dr. Brian Riddell
Mr. David Peacock
Mr. Ron Kadowaki
Mr. Sandy Johnston
Dr. Max Stocker
Ms. Susan Bates
Mr. Al Macdonald
Mr. Paul Ryall

Dr. Norma Jean Sands
Mr. Ben Van Alen
Dr. Jack H. Helle
Dr. Gary S. Morishima
Mr. Gary R. Graves
Mr. Michael Grayum
Mr. James B. Scott

Staff: I. Todd (ex. Officio)

Research and Statistics Working Group

Mr. A.W. (Sandy) Argue
Ms. Frances Dickson

Dr. Norma Jean Sands
Mr. Michael Grayum
Mr. Lee H. Blankenship
Mr. Charles K. Walters
Mr. Mike Matylewich

Ad Hoc Joint Interceptions Committee

Mr. A.W. (Sandy) Argue
Ms. Barb Snyder

Dr. Gary S. Morishima (Co-Chair)
Dr. Norma Jean Sands

Ad Hoc Joint Objectives and Goals Committee

Mr. A.W. (Sandy) Argue

Ms. Teresa Scott (Co-Chair)
Mr. Larry Rutter
Mr. Kevin C. Duffy

3. FRASER RIVER PANEL

Mr. Wayne Saito (Chair)
Mr. Mike Forrest
Mr. Larry Wick
Ms. Diane Bailey
Mr. Mike Griswold
Mr. William Otway
Mr. Mike Medenwaldt (deceased February 7, 1999)

Mr. A. Dennis Austin (Vice-Chair)
Ms. Lorraine Loomis
Mr. William L. Robinson
Mr. Robert Suggs

Fraser River Panel Alternates

Mr. Vince Fiamengo
Mr. Terry Lubzinski
Mr. Murray Chatwin
Ms. Christine Hunt

Mr. Craig Burley
Mr. Dave Cantillon
Mr. Ronald G. Charles
Mr. Rob Zuanich

4. SOUTHERN PANEL

Mr. Paul Sprout (Chair)
Mr. Ron Fowler
Mr. John Legate
Mr. Richard Watts
Ms. Geraldine (Danni) Tribe

Mr. Terry R. Williams (Vice-Chair)
Mr. Patrick Pattillo
Mr. Burnell Bohn
Mr. Peter Dygert
Mr. James E. Harp
Mr. Larry Carpenter

Southern Panel Alternates

Dr. Donald O. McIsaac
Mr. Eugene Greene, Sr.
Mr. Michael A. Peters
Ms. Teresa Scott
Mr. Keith E. Wilkinson
Mr. Robert Wunderlich

Mr. Roy Alexander
Mr. Basil Ambers
Ms. Patricia Guiguet
Mr. John Sutcliffe
Mr. Ron Parke
Mr. Ed Lockbaum

5. NORTHERN PANEL

Mr. Don Radford (Chair)
Mr. Mark Forand
Mr. William Kristmanson
Mr. Alan Ronneseth
Mr. Russ Jones
Ms. Lynn Christie

Mr. Kevin C. Duffy (Vice-Chair)
Ms. Deborah A. Lyons
Mr. Arnold Enge
Mr. William Foster
Mr. James E. Bacon
Mr. William Hines

Northern Panel Alternates

Mr. Rick Haugan
Mr. Ray Kendel
Mr. Robert H. Hill
Ms. Joy Thorkelson
Mr. Mike O'Neil
Mr. Burt Hunt

Mr. Scott Marshall
Mr. Thomas Jacobson
Mr. Robert M. Thorstenson
Mr. James D. Becker
Mr. Andrew W. Ebona
Mr. Ronald J. Berg

6. JOINT CHINOOK TECHNICAL COMMITTEE

Dr. Brian Riddell (Co-Chair)
Ms. Barb Snyder
Mr. Wilf Luedke
Dr. Jim Irvine
Mr. Bill Shaw
Dr. Brent Hargreaves
Mr. Din Chen

Mr. James B. Scott (Co-Chair)
Mr. Gary R. Freitag
Mr. Edward Bowles
Mr. Alex C. Wertheimer
Dr. Robert Kope
Mr. Kurt Reidinger
Dr. Douglas M. Eggers
Mr. Ronald H. Williams
Dr. Gary S. Morishima
Ms. Phaedra Budy
Ms. Elisabeth A. Wood
Mr. Gregg Mauser
Mr. Dave Gaudet
Mr. John Carlile
Dr. John Burke
Ms. Marianne McClure
Dr. John H. Clark
Mr. Scott McPherson
Mr. C. Dell Simmons
Ms. Marianna Alexandersdottir
Mr. Shijie Zhou
Mr. David Bernard

Joint Chinook Working Group

Ms. Teresa Scott
Mr. Dave Gaudet
Mr. Thomas Jacobson
Mr. Burnell Bohn
Mr. Terry R. Williams
Ms. Deborah Lyons
Mr. Keith E. Wilkinson
Mr. William L. Robinson
Mr. James E. Harp
Mr. Eugene Greene Sr.

Mr. Ed Lochbaum (Co-Chair)
Mr. A.W. (Sandy) Argue
Dr. Brian Riddell
Mr. Wilf Luedke
Mr. Alan Ronneseth
Mr. Russ Jones
Mr. William Otway
Mr. Dave Einarson
Ms. Frances Dickson
Mr. Ron Fowler
Mr. Bill Shaw
Mr. Ron Parke
Mr. Roy Alexander
Mr. Mike O'Neil
Ms. Patricia Guiguet

Joint Chinook Working Group – Alternates

Dr. Brent Hargreaves

Mr. James B. Scott
Mr. Kevin C. Duffy
Mr. James E. Bacon
Mr. William Foster
Dr. Norma Jean Sands
Dr. Donald O. McIsaac

7. JOINT COHO TECHNICAL COMMITTEE

Mr. Ron Kadowaki (Co-Chair)
Dr. Blair Holtby
Mr. Richard Bailey
Mr. Bill Shaw

Dr. Gary S. Morishima (Co-Chair)
Mr. James B. Scott
Mr. Robert A. Hayman
Dr. Peter W. Lawson
Mr. Robert Wunderlich
Mr. Bill Tweit
Mr. Roger Peters
Ms. Marianna Alexandersdottir
Ms. Kristin Nason

Northern Coho

Dr. John H. Clark
Ms. Michele Masuda
Mr. Leon D. Shaul
Mr. Dave Gaudet

8. JOINT CHUM TECHNICAL COMMITTEE

Mr. Paul Ryall (Co-Chair)
Mr. Wilf Luedke
Mr. Leroy Hop Wo
Mr. Clyde Murray

Mr. Gary R. Graves (Co-Chair)
Mr. Nick Lampsakis
Ms. Carrie Cook-Tabor
Mr. Jon Anderson
Mr. Randy Hatch
Dr. Gary Winans

9. JOINT NORTHERN BOUNDARY TECHNICAL COMMITTEE

Mr. David Peacock (Co-Chair)
Mr. Les Jantz
Ms. Barb Snyder
Mr. R.S. Hooton
Dr. Chris Wood
Mr. Skip McKinnel la
Mr. Blair Holtby

Mr. Ben Van Alen (Co-Chair)
Dr. Jack H. Helle
Mr. Phillip S. Doherty
Mr. Glen T. Oliver
Mr. Gary R. Freitag
Dr. Jim Blick
Dr. Jerome J. Pella
Mr. Paul Suchanek

10. JOINT TRANSBOUNDARY TECHNICAL COMMITTEE

Mr. Sandy Johnston (Co-Chair)
Mr. Pat Milligan
Mr. Pete Etherton

Dr. Norma Jean Sands (Co-Chair)
Mr. Andrew J. McGregor
Mr. John H. Eiler
Mr. William R. Bergmann
Ms. Kathleen A. Jensen
Mr. Keith Pahlke
Mr. Brian Lynch
Mr. Joe J. Muir
Mr. Alan Burkholder

Enhancement Sub-Committee

Mr. Pat Milligan
Dr. Kim Hyatt

Mr. Ron Josephson (Co-Chair)
Mr. Eric Prestegard
Mr. Pete Hagen
Mr. David Barto
Mr. Steve Reifenhstuh

11. JOINT TECHNICAL COMMITTEE ON DATA SHARING

Ms. Susan Bates (Co-Chair)
Ms. Sue Lehmann
Mr. Marc Hamer
Mr. Louis Lapi
Ms. Lia Bijsterveld

Dr. Norma Jean Sands (Co-Chair)
Dr. Ken Johnson
Dr. Gary S. Morishima
Mr. Mike Matylewich
Mr. Dick O'Connor

Working Group on Mark-Recovery Statistics

Dr. John Schnute (Co-Chair)
Ms. Carol Cross

Dr. Ray Hilborn (Co-Chair)
Dr. John Skalski
Mr. Rich Comstock
Mr. Robert Conrad
Dr. Peter W. Lawson

Working Group on Data Standards

Mr. Marc Hamer
Ms. Brenda Adkins
Ms. Susan Bates

Dr. Ken Johnson
Mr. Ron Olson
Mr. John Leppink
Mr. William Kinney
Ms. Barbara Haar

Catch Data Exchange Working Group

Ms. Lia Bijsterveld (Co-Chair)
Mr. Louis Lapi
Ms. Brenda Adkins

Mr. Scott Johnson (Co-Chair)
Dr. Ken Johnson
Ms. Susan Markey
Mr. Gerald Lukas

12. FRASER RIVER PANEL TECHNICAL COMMITTEE

Mr. Al Macdonald (Co-Chair)
Mr. Paul Ryall
Mr. Al Cass
Mr. Neil Schubert

Mr. Michael Grayum (Co-Chair)
Mr. Jon Anderson
Mr. Dave Cantillon

13. NATIONAL CORRESPONDENTS

Mr. A.W. (Sandy) Argue

Mr. Charles K. Walters