Report of the Fraser River Panel to the Pacific Salmon Commission on the 1986 Fraser River Sockeye Salmon Fishing Season

Prepared by

Pacific Salmon Commission

May, 1988

REPORT OF THE
FRASER RIVER PANEL
TO THE
PACIFIC SALMON COMMISSION
ON THE
1986 FRASER RIVER SOCKEYE SALMON
FISHING SEASON

1986 PANEL MEMBERS AND ALTERNATES

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PACIFIC SALMON COMMISSION
MAY, 1988

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I. EXECUTIVE SUMMARY

1. Under the terms of the Pacific Salmon Treaty, management of the Fraser River sockeye and pink salmon fisheries became the responsibility of the Fraser River Panel beginning in 1986. On March 7, the Commission approved the Fraser River sockeye salmon Fishery Regime for 1986, which detailed the sharing of the summer-run sockeye catch and the estimated payback for the 1985 sockeye catch shortfall by United States fishermen.

2. Regulations and a management plan, based on forecasts of sockeye abundance, escapement requirements and the Johnstone Strait diversion rate of sockeye, were formulated by the Panel and adopted by the Commission in May, 1986. The allocation of fishing times, and hence catch, was to be according to Treaty objectives, Commission agreements and domestic catch-allocation goals.

3. The Panel met 28 times in-season for frequent review of catches and escapements and for management decisions. Regulatory decisions implementing or adjusting the management plan and issued as Panel Orders were made on the basis of the best data on stock sizes, migratory routes, catches and escapements available at the time. Regulatory Orders of the Panel were adopted and enforced by the Parties in their respective sections of the Panel Area, as provided in the Treaty.

4. Total return of Fraser River sockeye in 1986 was 15,898,000 salmon, 14% above the preseason forecast of 14.0 million sockeye, and was the second-largest run since 1913. International shares, based on preliminary data, showed commercial harvests of 8,795,000 Fraser River sockeye taken by Canadian fishermen and 2,745,000 caught by United States fishermen. Non-commercial catches, including Canadian Indian subsistence catches, totalled 576,000 sockeye in Canada and 1,000 in United States test fisheries; Commission test fishing accounted for 64,000 sockeye. The total catch was 12,181,000 sockeye, the second largest since 1913. Total spawning escapement was estimated at 3,717,000 sockeye, the third-largest escapement since 1913.

5. Computation of the total allowable catch (TAC) and the Parties' shares of the TAC was contingent, in part, upon Canada's acceptance of the responsibility for providing an additional 146,000 summer-run sockeye to the escapement, that is, counting those fish as part of the Canadian commercial catch. The Panel agreed in June, 1987, to exclude from the calculated TAC those fish caught in Panel-approved test fisheries and the number of jack sockeye salmon estimated to be in the escapement. Thus, the computed TAC was 11,856,000 sockeye. Based on the sharing formula and adjustments for the coho-for-sockeye exchange (Annex IV, Chapter 4 of the Treaty) and the payback of the 1985 shortfall of United States catch (88,000), the United States share was calculated, preliminarily, to be 2,883,000 sockeye. Canada's share was estimated at 8,973,000 Fraser River sockeye. The TAC computation resulted in a shortfall of 137,000 sockeye in the United States catch and an equal overage in Canada.

6. Domestic allocation objectives of the Parties were closely met. United States Treaty Indian catches totaled 1,350,000 sockeye while non-Indian catches in Washington State reached 1,383,000 fish. Canadian catch by gear type approximated the Minister's Advisory Council (MAC) allocation objectives with trollers harvesting 24% (vs. 23.9% per MAC guidelines), purse seines - 46.1% (vs. 46.8%) and gill nets - 30.0% (vs. 29.3%).

7. Record single-day catches in Canadian Areas 20 and 29 were the result of: a) large abundances of fish, b) compact run timing which caused very large peak daily abundances, and c) fishing of the migration peaks. Fisheries on late-run sockeye in the Strait of Georgia (Area 29) by Canadian purse seines and gill nets and fishing in northern Area 7A by United States fishermen were permitted when the best available estimates of gross escapement upriver approached the desired goal; large catches resulted from those fisheries.

8. The preseason goal for escapement of spawning adults was revised in-season by Canada, based on the larger-than-expected return of certain stocks, particularly those destined

for the Quesnel Lake area. Post-season estimates of the net escapement totaled 836,000 adult summer-run sockeye salmon versus the revised goal of 895,000 fish. During the season, the gross escapement of late-run stocks was overestimated due to the lack of timely data on fish behaviour at the echo sounding site. The estimates by Canada of actual spawning escapements, place the total at 2,822,000 adult spawners, 17% below the goal.

II. INTRODUCTION

Management of the commercial fishery for sockeye in Fraser River Panel Area waters (Figures 1 and 2) came under the control of the Fraser River Panel beginning in 1986 by authority of the Pacific Salmon Treaty. Treaty provisions and agreements reached by negotiation at Panel and Commission meetings in February and March, 1986 established a set of goals for international allocation of the catch. Internal treaties and sharing agreements provided the framework for domestic allocation. Escapement requirements and these harvest objectives guided the Panel in establishing a preseason Management Plan and in regulating the respective fisheries through in-season adjustments to that Plan. Paramount considerations in the preseason period were:

a) Canada's forecast of a 14.0 million total return of Fraser River sockeye; Canada's net escapement goal of 4.0 million adult spawners (Appendix A); and a Fraser River Indian food fishery catch objective of 500,000 sockeye. The total allowable catch (TAC) was forecast at 9.5 million sockeye: 1,453,000 summer-run and 8,047,000 late-run fish.

b) The Commission agreement (March 7, 1986) that the United States share of the total allowable catch be 2,337,000 Fraser River sockeye including adjustments for a coho: sockeye exchange of 50,000 fish, as provided in Annex IV, and the payback of the 1985 United States shortfall estimated in the preseason at 107,000 sockeye. Canada's share was to be 7,163,000 sockeye.

c) The requirement that the harvest of summer-run sockeye be managed to provide the United States with 29.93% of the TAC of those stocks, plus a pro rata share of the adjustments (March 7, 1986 Commission agreement). The remainder of the United States allocated catch was to be taken from late-run stocks.

d) The domestic allocation objectives of the Parties. In the United States, Treaty Indian and non-Indian fishermen were each to receive 50% of the United States' share of the TAC. In Canada, the Minister's Advisory Council (MAC) recommendations for sharing of Fraser River sockeye catch by the three gear types were to be implemented in Panel Areas.

e) That the migration of sockeye via Johnstone Strait, forecast to be approximately 50% of the run, could cause the availability of sockeye in the respective fishing areas to deviate from the expected, thus, requiring adjustments to fishing times to maintain harvest rates and to achieve international and domestic allocation objectives.

Consideration of the many and diverse objectives led the Panel to adopt a management scheme, in which Panel Area waters were "closed unless opened" by in-season order of the Fraser River Panel. The Commission approved and submitted to the Parties the preseason Regulations (Appendix B) which defined the areas, gear types and times of regulatory control. A management plan, appended to the Regulations, was to be the framework for in-season management actions. During the fishing season, regulations were developed at 28 in-person and telephone conference meetings, taking into account the actual run sizes, timing, migration routes, escapement and the catch allocation objectives. The resultant in-season changes in the regulations (Appendix C) were documented through Orders of the Panel and implemented in the Panel Area by the Parties.

Canada Department of Fisheries and Oceans regulated Canadian net and troll fisheries outside the Panel Area where harvest of Fraser River sockeye occurs. As well, Canada regulated that portion of the west coast of Vancouver Island troll fishing area within the Panel Area to provide consistency in troll regulations. Coordination of Canadian management action in these areas with the Panel provided the means by which the international and Canadian domestic allocation goals were achieved.

The results of fishing activities in Canada and the United States are presented in Appendix D (Tables 1 to 6) for the catches of Fraser River sockeye. An evaluation of how well the management objectives were achieved is found in the following review of catch allocation and escapement.

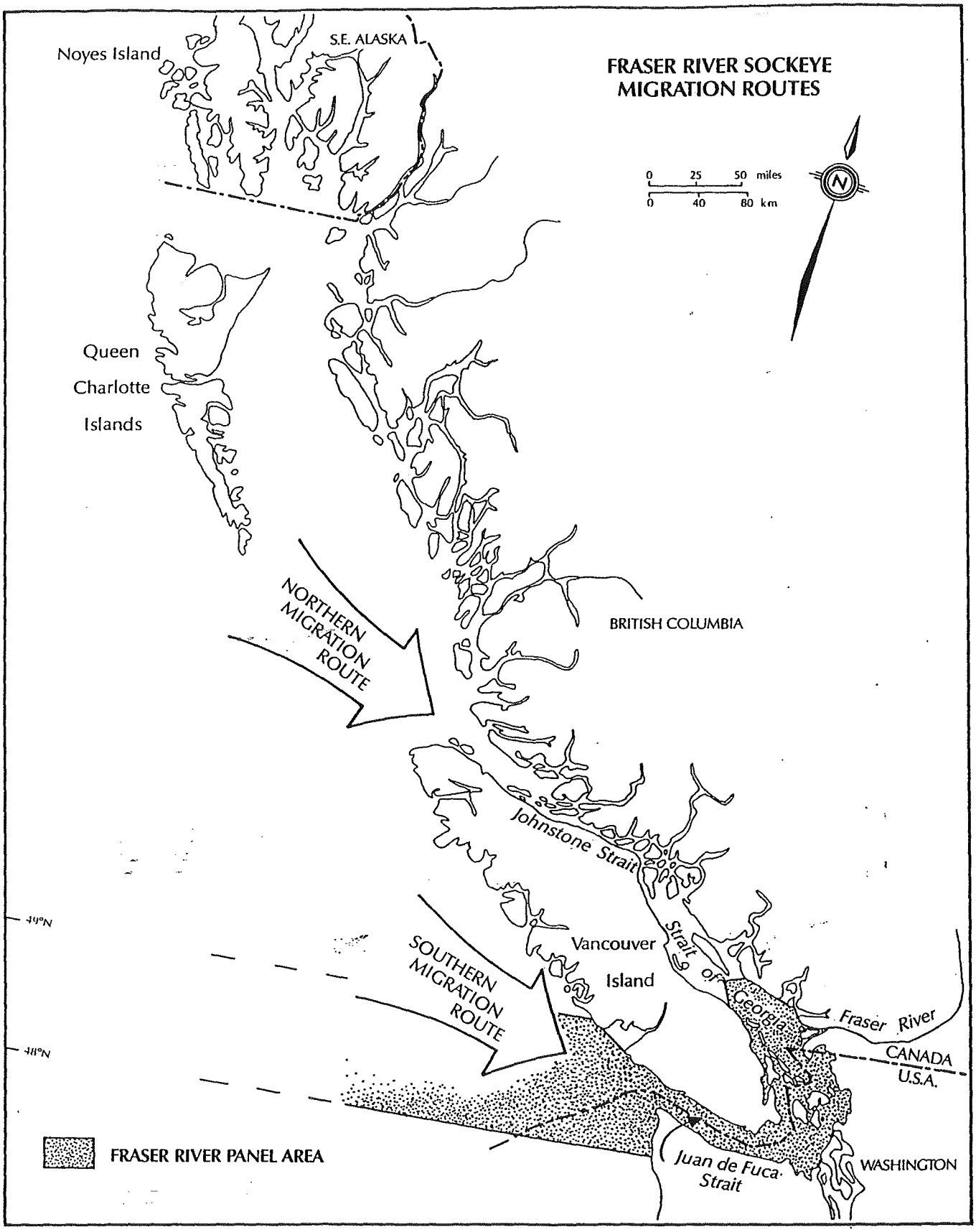

FIGURE 1. The Fraser River Panel Area in relation to the coast of British Columbia and northern Washington. The northern (Johnstone Strait) and southern (Juan de Fuca Strait) routes for sockeye and pink salmon migrating to the Fraser River are shown.

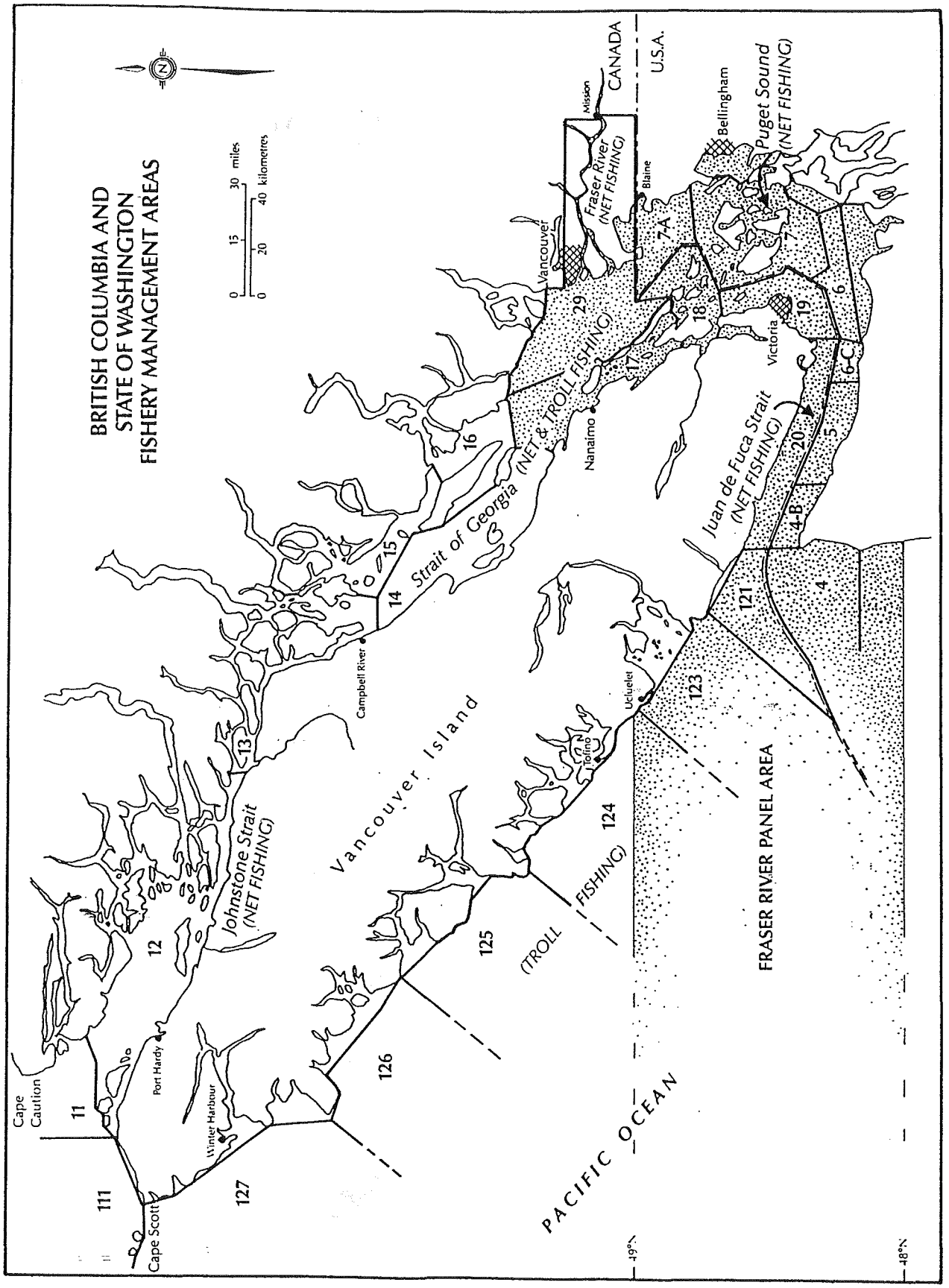

FIGURE 2. Fishery management areas in the Fraser River Panel Area, along Canada's south coast and in United States waters. The type of fishery (net or troll) that operates in each area is also indicated.

III. MANAGEMENT ACTION

The preseason Management Plan was based on the expectation of approximately 14.0 million total sockeye, a 50% migration via Johnstone Strait (Figure 1) and normal timing of the stocks. The plan was retained despite a forecast for significantly later-than-normal timing for summer-run stocks. The collection of data needed to ascertain actual timing in-season was considered adequate to identify conservation needs should on-shore arrival timing be late.

The timing of individual sockeye stocks was, indeed, later than normal, particularly for summer-run stocks. Consequently, most fisheries were delayed in their respective first openings to the latest dates for recent cycle years. The greater relative lateness of summer-run stocks compared with late-run sockeye also produced a shorter duration, more highly peaked run. The tendency toward a short, compact run affected catches and computation of run parameters based on catch data.

The lateness of summer-run sockeye made it difficult to achieve the goal of providing a high proportion of Canada's share of summer-run sockeye catch to Area 29 (Figure 2) gill net fishermen. This goal was difficult to attain because the migratory area fisheries (Areas 20, 12 and 13) had to be opened when the summer-run stocks were still present in order to harvest late-run stocks (Table 1). Delayed first openings in United States waters and Canadian Area 29 allowed an adequate escapement of early-timed stocks prior to the commencement of fishing. Restriction of Canadian Area 20 fishing time to one day in the first week (August 10-16) was implemented in order to increase the number of summer-run sockeye reaching Area 29. Non-consecutive 2-day openings in Area 29 further increased the catch in that area by making more fish available for catch. In total, over 1.6 million fish, mainly summer-run stocks, were harvested by Area 29 gill net fishermen accounting for 62% of the total Canadian gill net catch of Fraser sockeye.

TABLE 1. Proposed versus actual fishing times (days) in major Canadian net fisheries in the Fraser River Panel Area.

	AREA 20		AREA 29	
Week	Proposed	Actual	Proposed	Actual
6/22-7/19	Closed	Closed	Closed	Closed
7/20-7/26	Closed	Closed	Closed	Closed
7/27-8/2	Closed	Closed	1	Closed
8/3-9	Closed	Closed	1	1
8/10-16	1	1	2	1
8/17-23	1	3	2	2
8/24-30	1	2	1	1 + 1
8/31-9/6	Closed	2	1* + 1*	1 + 1
9/7-13	Closed	Closed	1* + 1*	1
9/14-20	Relinq.	Relinq.	1* + 1*	Closed
9/21-27	—	—	Closed	1* + 1 (+PS)
9/28-10/4	—	—	Closed	1 + 1* (+PS)
10/5-11	—	—	Closed	Closed
10/12-18	—	—	Relinq.	Relinq.
TOTAL	3	8	13	13

* Restricted to Area 29-1 to 7, 9 and 10 or Area 29-1 to 6.

PS Purse seine fishing in Area 29-3 and 4 September 26 and 29.

The actual Johnstone Strait diversion rate of sockeye in 1986 was estimated at 25% of the run. This rate was considerably lower than the preseason forecast of diversion (50%). Whereas the management plan provided for only three days of fishing in Canadian Area 20 between August 10 and 30, the higher proportion of the run arriving via Juan de Fuca Strait resulted in an allotment of eight fishing days in the period August 10 to September 9 (Table 1). Conversely, United States fishermen were reduced in fishing time as larger catches resulted from the increased proportion of the run available in United States waters. Treaty Indian fishermen in Areas 6, 7 and 7A were reduced from 21 to 10 days during the summer fishery (July to early September) while non-Indian fishermen were reduced from 6 to 5 days of fishing in this period (Table 2). Canadian regulation of non-Panel Areas was also affected by the arrival of the majority of sockeye via Juan de Fuca Strait. Canadian troll fishermen operating off the west coast of Vancouver Island in Panel Area waters (Areas 121-124) and non-Panel waters (Areas 124-127) attained their catch allocation in 17 days of fishing whereas a much longer period of fishing had been anticipated.

Late-run sockeye abundance, estimated in-season as the run arrived in late August and early September, indicated a slightly small total return than had been forecast. During late September, however, acoustic monitoring of the upstream migration at Mission, B.C. provided escapement estimates which suggested that the run was larger than previously estimated and that the escapement goal would be exceeded without additional harvest. Consequently, the Panel met by telephone conference seven times in the period, September 23 to October 2, to design a strategy to achieve the harvest of those sockeye considered to be excess to escapement needs. Canadian purse seine fishermen were permitted to fish in Area 29 on September 26 and 29 for the first time since 1971. United States fishing was permitted in the northern portion of Area 7A for three days, September 27- 30. A cumulative catch of 1,538,000 sockeye or about 13.3% of the commercial harvest occurred in this period.

TABLE 2. Proposed versus actual fishing times (days) in major United States net fisheries in the Fraser River Panel Area.

	TREATY INDIAN				ALL-CITIZEN	
	AREAS 4B, 5 & 6C		AREAS 6, 7 & 7A		AREAS 7 & 7A[1]	
Week	Proposed	Actual	Proposed	Actual	Proposed	Actual
6/22-7/19	Closed	Closed	Closed	Closed	Closed	Closed
7/20-7/16	7	2	Closed	Closed	Closed	Closed
7/27-8/2	7	7	2	Closed	Closed	Closed
8/3-9	7	7	2	2	1	Closed
8/10-16	7	7	2	3	Closed	2
8/17-23	7	6	5	3	2	1
8/24-30	7	6	5	2	1	1
8/31-9/6	6	Closed	5	Closed	2	1
9/7-13	Closed	Closed	Closed	Closed	Closed	Closed
9/14-20	Relinq.	Relinq.	Closed	Closed	Closed	Closed
9/21-27	—	—	Relinq.	Closed	Relinq.	Closed
9/28-10/4	—	—	—	3*	—	3*
10/5-11	—		—	Relinq.	—	Relinq.
TOTAL	48	35	21	10 + 3*	6	5 + 3*

[1] All-Citizen fishing times in Areas 4B, 5, 6, and 6C from 6/22 to 8/23 were the same as in Areas 7 and 7A, but these areas were closed after 8/24.

* Fishing September 27-30 in Area 7A north of a line from Birch Point to East Point.

IV. CATCH SUMMARY

An estimated total of 15,898,000 Fraser River sockeye returned to coastal fisheries in 1986. The total was the second largest since the last of the "dominant" cycle-year runs in 1913 and the largest since 1958. Cycle-year abundance of sockeye has increased each return since the failure of the 1958 Adams River run to successfully reproduce (Figure 3).

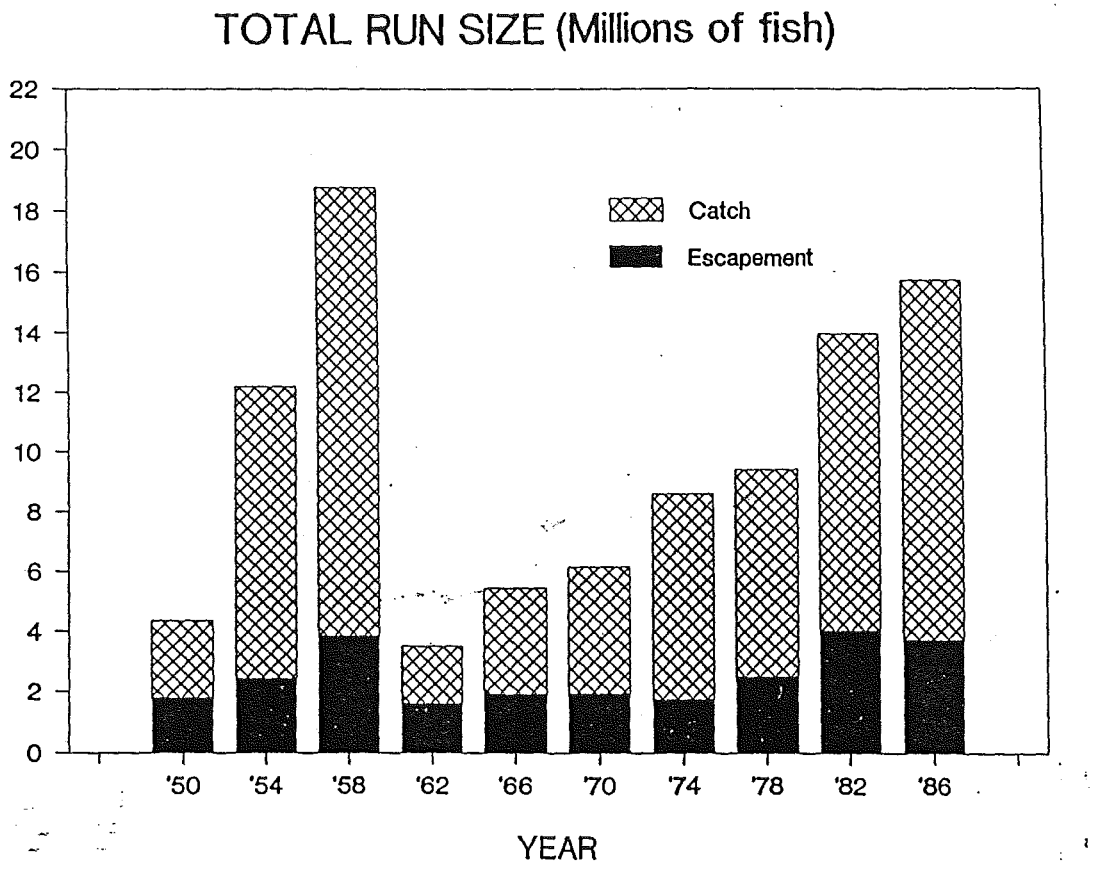

FIGURE 3. Total run sizes for the 1950 cycle of Fraser River sockeye salmon for cycle years 1950-1986.

Commercial catches of Fraser River sockeye were preliminarily estimated at 11,540,000 fish (Table 3), with a landed value of approximately $160 million (Canadian). The international distribution of these catches was: Canada - 8,795,000, and the United States - 2,745,000 fish. In addition, Canadian non-commercial catches, including Fraser River Indian food fishery catches, totalled 576,000 sockeye while United States non- commercial catches amounted to 1,000 fish. Commission test fishing accounted for 64,000 sockeye - 51,000 in Canada and 13,000 in United States waters. The sum of all catches totalled 12,181,000 Fraser River sockeye. This was the second largest catch recorded in the 73-year period, 1914-1986.

TABLE 3. Preliminary estimates of catches of Fraser River sockeye salmon during the 1986 fishing season.

	No. of Fish	% of Run
COMMERCIAL CATCH:		
CANADA		
Fraser River Panel Area:		
Areas 121-124 Troll	206,000	1.30
Area 20 Net	2,003,000	12.60
Area 29 Net	2,535,000	15.95
Areas 17-18, 29 Troll	209,000	1.30
Subtotal	4,953,000	31.15
Non-Panel Area:		
Areas 1-10 Net and Troll	37,000	0.23
Areas 11-12, 124-127 Troll	1,610,000	10.13
Areas 13-16 Troll	72,000	0.45
Areas 11-16 Net	2,123,000	13.36
Subtotal	3,842,000	24.17
TOTAL	8,795,000	55.32
UNITED STATES		
Fraser River Panel Area:		
Areas 4B, 5 and 6C	132,000	0.83
Area 6 and 7	1,648,000	10.37
Area 7A	953,000	5.99
Subtotal	2,733,000	17.19
Non-Panel Area:		
Alaska	12,000	0.08
TOTAL	2,745,000	17.27
COMMERCIAL TOTAL	11,540,000	72.59
NON-COMMERCIAL CATCH:		
CANADA		
Areas 12-13, 123,124 Indian F.F.	21,000	0.13
Areas 125-127, 12 Test Fishing	7,000	0.04
Areas 12, 20 Charter	14,000	0.09
Fraser River Indian Food Fishery	534,000	3.36
Subtotal	576,000	3.62
UNITED STATES		
Area 5 Test Fishing	1,000	0.01
COMMISSION		
Areas 121-124, 20, 29 Test Fishing	51,000	0.32
Areas 7, 7A Test Fishing	13,000	0.08
Subtotal	64,000	0.40
NON-COMMERCIAL TOTAL	641,000	4.03
TOTAL CATCH	12,181,000	76.62
ESCAPEMENT	3,717,000	23.38
TOTAL RUN	15,898,000	100.00

In Canada, 4,953,000 sockeye of the commercial harvest (56.3%) were taken in Panel Area waters, including troll catches off Vancouver Island south of 49°N. latitude. Of the United States catch, 2,733,000 (99.6%) were taken in the Area. The total commercial catch in the Area, including test fishing and charter catches, totalled 7,758,000 Fraser River sockeye. This was the largest catch in the Area since 1958 and the fifth largest since 1913.

Commercial catches, including test and charter fishing, taken in non-Panel Areas summed to 3,868,000 sockeye and were the third largest on record. Non-Area catches in 1958 and 1978 were greater, the latter due to high migration via Johnstone Strait.

A. United States Catch

Catches of Fraser River sockeye in United States waters (Washington) by Treaty Indian and non-Indian fishermen were near their 50% shares of the United States catch although neither user group reached the catch allocation computed for each at the end of the season. To achieve the Treaty Indian catch allocation goal the Panel allotted greater fishing time to Treaty fishermen than to non-Indian fishermen (Table 2) because of the smaller Treaty Indian fleet. Treaty Indian catches summed to 1,350,000 fish while non-Indian fishermen harvested 1,383,000 Fraser River sockeye (Table 4). Alaskan fisheries in District 104 (Noyes Island) harvested approximately 12,000 Fraser River sockeye as estimated by racial analysis of scales supplied by Alaska Department of Fish and Game and collected by observers in Canadian ports.

TABLE 4. United States catch[1] of Fraser River sockeye salmon by user group and gear (Washington State waters only).

TREATY INDIAN

	GILL NET		PURSE SEINE		REEF NET		TOTAL
AREA	CATCH	%	CATCH	%	CATCH	%	CATCH
Areas 4B, 5, 6C	127,000	9.41	0	0.00	0	0.00	127,000
Areas 6, 7, 7B	489,000	36.22	358,000	26.52	1,000	0.07	848,000
Area 7A	277,000	20.52	98,000	7.26	0	0.00	375,000
TOTALS	893,000	66.15	456,000	33.78	1,000	0.07	1,350,000

NON-INDIAN

	GILL NET		PURSE SEINE		REEF NET		TOTAL
AREA	CATCH	%	CATCH	%	CATCH	%	CATCH
Areas 4B, 5, 6C	5,000	0.36	0	0.00	0	0.00	5,000
Areas 6, 7, 7B	368,000	26.61	383,000	27.70	49,000	3.54	800,000
Area 7A	225,000	16.27	353,000	25.52	0	0.00	578,000
TOTALS	598,000	43.24	736,000	53.22	49,000	3.54	1,383,000
GRAND TOTALS	1,491,000	54.56	1,192,000	43.61	50,000	1.83	2,733,000
UNITED STATES TEST FISHING:							1,000
ALASKA (DIST. 104) CATCH:							12,000
UNITED STATES TOTAL CATCH:							2,746,000

[1] Preliminary Washington catch data from WDF fish ticket totals, plus unreported catches.

Total catch by gear type in United States waters (Washington) was as follows (Table 4): gill net - 1,491,000 (54.6%) sockeye; purse seine 1,192,000 (43.6%); and reef net - 50,000 (1.8%). The Treaty Indian harvest was 66.2% by gill net, 33.8% by purse seine and 0.1% by reef nets. Non-Indian catches were 43.2% by gill nets, 53.2% by purse seines and 3.5% by reef nets. Alaskan catches were taken by purse seines.

An agreed, earlier start by Treaty Indian fishermen on summer-run sockeye, which are more vulnerable to gill nets (Table 3), and the preponderance of gill nets in this fleet were the main reasons for the larger gill net catches by Treaty Indian fishermen. A significant portion of this gill net catch (127,000 of 893,000 sockeye) was made in Areas 4B, 5 and 6C.

Lower vulnerability of late-run Adams and Lower Shuswap sockeye to gill nets, owing to fish migrational behaviour characteristics, led to the higher percentage catch by non-Indian purse seine fishermen in the All-Citizen fishery. This has been the pattern for many years on the cycle. However, the contribution of nearly one-half of the 1986 season catch by Treaty Indian fishermen yielded the larger total catch by gill nets, compared with purse seines, for the first time on the cycle (1946-86). The previous high percentage catch by gill nets (46.7%) was taken in 1978. The non-Indian catch percentage taken by purse seines (53.2%) was the lowest observed for this segment of the fleet and was directly attributable to a reduced purse seine fleet size (Table 5; of the total, there was a maximum of 168 non-Indian purse seines).

The United States Treaty Indian fleet was more effective than had been anticipated, particularly on late-run stocks. The agreed pattern of fishing was expected to lead to a larger early catch by Treaty Indian fishermen, while non-Indian fishermen were to take a larger catch during fisheries for late-run sockeye to balance the respective catches at the end of the season. This equalization did not occur and resulted in the need to provide non-Indian only fishing time in early September. Data from the four days of competitive fishing during the season (All-Citizen and Treaty Indian) showed that Treaty Indian fishermen harvested an average of 28% of the catch on those days.

TABLE 5. Maximum number of fishing units operating in the Fraser River Panel Area.

	1974	1982	1986
Canadian Fraser River Panel Area			
Purse Seines (Area 20)	133	201	182
Gill Nets	1,000	693	1,010
TOTALS	1,133	894	1,192
United States Fraser River Panel Area			
Purse Seines	272	246	198
Gill Nets	1,140	992	1,172
Reef Nets	54	43	45
TOTALS	1,466	1,281	1,415

B. Canadian Catch

The Minister's Advisory Council (MAC) established Fraser River sockeye catch allocation goals (outside troll = 20.5%; inside troll = 2.3%; purse seines = 47.5%; gill nets = 29.7%) which were then modified by the Minister of Fisheries via the allocation of an extra 100,000 sockeye to "inside" trollers fishing in the Strait of Georgia. Given the actual total commercial catch, the allocation would have been as follows:

	Allocation	% of Total
Troll:		
Outside	1,803,000	20.5%
Inside	302,000	3.4%
	2,105,000	23.9%
Purse Seine:	4,116,000	46.8%
Gill Net:	2,574,000	29.3%
TOTAL	8,795,000	100.0%

Catches in Canada totalled 8,795,000 sockeye of which trollers harvested 2,122,000 (24.1%), purse seines - 4,054,000 (46.1%) and gill nets - 2,619,000 (29.8%) (Table 6). All catches were within 0.7% of the goals and the actual catches deviated a maximum of 62,000 fish (for purse seines) from the final allocation.

The balance of catch between Canadian Panel Areas (4,953,000 sockeye or 56.3%) and non-Area waters (3,842,000 or 43.7%) was heavier in Panel Areas compared with recent past years. This occurred due to the strong Juan de Fuca Strait migration (or southern approach, Figure 1), which placed more fish in Panel Areas for harvest, and to changes in fishing patterns brought on by the MAC allocation.

Unusually large daily catches were taken in several Canadian fisheries. On August 5, the Canadian Area 29 fishery opened on a peak of migration and produced the largest single-day gill net catch on record for the area, 449,000 sockeye, taken by 619 gill nets. On August 25, 182 purse seines and 320 gill nets in Canadian Area 20 harvested an estimated 492,000 sockeye. This was the largest single-day total sockeye catch in Area 20 for all years of record although catch per boat was not as high as in some past years.

Harvest of Adams-Lower Shuswap and Weaver sockeye in the Strait of Georgia by purse seines on September 26 resulted in the largest single-day sockeye catch in any Canadian fishery. A total of 709,000 sockeye were harvested by 320 purse seines in 2.5 hours in this unusual fishery.

Record level catches were produced in these areas because of the very large return and compression of the return timing. Increased gear effectiveness compared to prior years of large returns also played a role in the large catches.

TABLE 6. Canadian catch[1] of Fraser River sockeye salmon by gear type.

AREA	TROLL CATCH	TROLL %	PURSE SEINE CATCH	PURSE SEINE %	GILL NET CATCH	GILL NET %	TOTALS CATCH	TOTALS %
Areas 1-10	25,000	0.29	9,000	0.10	3,000	0.03	37,000	0.42
Areas 11-16 *	53,000	0.60	1,487,000	16.91	636,000	7.23	2,176,000	24.74
Areas 121-127	1,763,000	20.05	0	0.00	0	0.00	1,763,000	20.05
Area 20	0	0.00	1,669,000	18.97	334,000	3.80	2,003,000	22.77
Area 29 **	281,000	3.19	889,000	10.11	1,646,000	18.72	2,816,000	32.02
TOTALS	2,122,000	24.13	4,054,000	46.09	2,619,000	29.78	8,795,000	100.00

* - Troll catch includes Areas 11 and 12 only

** - Troll catch includes Area 29 and Areas 13-18

Outside Indian food fishery:	
Areas 12-13:	14,000
Areas 123-124:	7,000
TOTAL	21,000
Fraser River Indian food fishery:	534,000
Canada test fishing:	7,000
Canada charters:	14,000
TOTAL Non-Commercial Catch:	576,000
TOTAL Canadian Catch:	9,371,000

[1] Preliminary catch data from DFO fish ticket totals, plus unreported catches.

V. TOTAL ALLOWABLE CATCH

Under the terms of the Pacific Salmon Treaty, Canada is to establish the escapement goal prior to the season. For 1986, Canada set a 4.0 million sockeye escapement goal (increased by 100,000 to allow for anticipated inadvertent escapement of Weaver sockeye). An increase of that goal in-season raised the issue of the payment formula for these additional escapements below the Treaty-defined limitation of 5.0 million spawners. Under agreements reached in March 1987, Canada absorbed the added escapement of 146,000 adult sockeye and will derive benefits from these spawners in the future. Retroactive Panel agreements reached in 1987 excluded jack sockeye from the escapement limitation referred to in Annex IV, Chapter 4. Panel-approved test fishing catches were similarly excluded from the total allowable catch. The computation (Table 7) resulted in a TAC estimate of 11,856,000 Fraser River sockeye and a United States share of 2,883,000 sockeye, including a payback of 88,000 sockeye for United States catch shortfall in 1985 (recalculated on the basis of 1987 agreements). Canada's share of the TAC amounted to 8,973,000 sockeye.

TABLE 7. Computation of the total allowable catch, which is based on post-season agreements in which Canada is responsible for increased net escapement of summer-run sockeye. Jack sockeye escapement and Panel-approved test fishery and research charter catches were deducted from the total run.

TOTAL RUN	15,898,000
DEDUCTIONS:	
Adult Escapement (for allocation computation)	3,511,000
Jack Escapement	60,000
Fraser River Indian Food Fishery Catch	400,000
Panel-Approved Test Fishing Catch	71,000
TOTAL DEDUCTIONS	4,042,000
TAC (for allocation computation)	11,856,000
UNITED STATES ALLOCATION	
(3,000,000/12,500,000 x 11,856,000)	2,845,000
−50,000 Coho: sockeye exchange	−50,000
+88,000 Payback of the 1985 U.S. shortfall	+88,000
UNITED STATES TOTAL SHARE	2,883,000
CANADA ALLOCATION	8,973,000

VI. ASSESSMENT

A. International Catch Allocation

The United States catch of Fraser River sockeye (2,746,000) was approximately 137,000 fish short of the final estimate of the TAC share (2,883,000) computed after the season. The United States catch shortfall was the result of large catches in Canada in late September at a time when insufficient sockeye remained in the United States waters to balance the international allocation. United States fishermen harvested 104,000 late-run sockeye in Area 7A (Point Roberts) while Canadian purse seine, gill net and troll fishermen caught 2,434,000 sockeye in Area 29 between September 24 and October 1.

An objective of the management season was to achieve a differential allocation of the summer-run and late-run sockeye catch. The United States was to receive 29.93% of the summer-run sockeye TAC (plus a pro rata share of adjustments). The preseason expectation was that this catch would reach 445,000 sockeye. In-season management focused on the objective of summer-run allocation until mid-August when the management of the more abundant late-run stocks predominated in the decisions on fishery regulations. The actual TAC of summer-run sockeye was estimated at 2,856,000 fish after adjustment for post-season agreements. Using the agreed upon formula for obtaining the international allocation of these fish, the United States share was calculated at 861,000 fish. Total United States catch of summer-run stocks was approximately 964,000 fish or 12% above the target level.

B. Gross Escapement

Canada set a preseason Fraser River sockeye net escapement goal of 4.0 million adult spawners (4.1 million including inadvertent Weaver escapement) based on the expectation that the return would total 14.0 million fish. The goal provided for a spawning (net) escapement of 695,000 adult summer-run sockeye of the forecast return of 2.4 million fish. Addition of Fraser River Indian catch expectations brought the gross escapement goal to 1,050,000 adult summer-run sockeye (Table 8). Late-run stocks were expected to produce 11.6 million fish of which 3,550,000 adults were to be allowed to migrate upriver and which would yield a net adult escapement of 3,405,000 fish, mostly of the Adams-Lower Shuswap stock complex. Thus, the preseason goal was for a gross escapement of 4.6 million of the 14.0 million forecast return of adult sockeye.

TABLE 8. Comparison of the 1986 gross escapement goals and estimated actual migration for adult sockeye salmon.

	Preseason	In-season	Actual
Summer-run Stocks			
Net Escapement	695,000	895,000	836,000
Indian F.F.	355,000	405,000	352,000
Gross Escapement	1,050,000	1,300,000	1,188,000
Late-run Stocks			
Net Escapement	3,405,000	3,405,000	2,822,000
Indian F.F.	145,000	145,000	182,000
Gross Escapement	3,550,000	3,550,000	3,004,000
TOTALS	4,600,000	4,850,000	4,192,000

During the season, stronger than expected returns of early-timed summer-run stocks, particularly Quesnel area (Horsefly) stocks, and a modest return to Stellako River prompted Canada to raise the gross escapement goal for summer-run sockeye stocks to 1,300,000 fish (Table 8) of the 3,896,000 million run eventually realized. Although the goal was increased by 250,000 fish, the new goal was only 33% of the actual return compared to the original gross escapement goal which was 44% of the preseason forecast.

Commission staff monitored the summer-run sockeye migration by test fishing in the lower Fraser River and by echo sounding at Mission, B.C. The daily escapement estimate was allocated to the stocks or stock groups on the basis of the racial composition estimates from analysis of scale characters of jacks (3-year-old fish) which had been collected at each spawning area in 1985. The in-season gross escapement of summer-run stocks was estimated at 1,293,000 adult sockeye (Table 9). The major stocks (or stock groups) in the in-season analysis were: Chilko, Quesnel, Stellako and Seymour (Table 9). Revised stock composition estimates based on scale characters obtained from adult sampling on the various spawning grounds in the fall of 1986 produced post-season estimates somewhat different from the in-season analysis. Particularly, larger Seymour, Scotch and miscellaneous South Thompson area gross escapements and smaller Chilko Lake and River numbers were estimated after revision of the racial analysis. These revised estimates were more comparable to the actual gross escapements obtained from spawning ground data and analysis of Indian fishery catches. In summary, 1,188,000 adult summer-run sockeye were accounted for in spawning ground surveys and Indian food fishery catches (Table 9). The in-season estimate was, therefore, 8.8% higher than the final gross escapement estimate.

TABLE 9. In-season, post-season revised and actual gross escapement estimates for adult sockeye salmon by stock grouping (stocks with similar timing and racial characteristics).

Summer-run stocks:	In-season Estimates	Post-season Revised	Actual
Early Stuart	39,000	36,000	42,000
Pitt/Nadina/Raft	26,000	22,000	37,000
Gates/Fennell/Bowron	98,000	42,000	23,000
Quesnel/Late Stuart	291,000	277,000	280,000
Seymour/Scotch, etc.	108,000	266,000	213,000
Chilko River and Lake, etc.	611,000	472,000	460,000
Stellako	120,000	182,000	133,000
Subtotals	1,293,000	1,297,000	1,188,000
Late-run stocks:			
Birkenhead, etc.	329,000	398,000	358,000
Adams/Lower Shuswap, etc.	3,268,000	3,237,000	2,501,000
Weaver/Portage	195,000	147,000	131,000
Cultus/Harrison, etc.	36,000	42,000	14,000
Subtotals	3,828,000	3,824,000	3,004,000
TOTALS	5,121,000	5,121,000	4,192,000

The late-run sockeye migration peaked at Mission, B.C. September 18-26 when Commission staff initially estimated that approximately 3.0 million fish migrated in 9 days. These late-run sockeye had entered the Strait of Georgia from mid-August to early September after passing through marine fishing areas. Total gross escapement of late-run stocks was estimated inseason at 3,828,000 (Table 9) including 3,268,000 fish of the Adams-Lower Shuswap stock complex. Minor revisions to these estimates were obtained in the post-season analysis based on adult spawner scale characters (Table 9). However, spawning ground surveys and estimates of Indian food catches placed the actual total gross escapement of late-run stocks at only 3,004,000 adult sockeye. The difference of 824,000 fish was 27.4% of the recorded number and was the largest deviation, in both numbers and percentage, between in-season sockeye escapement estimated by echo sounding and final accounted totals since the program was started in 1973. Post-season analysis of experimental, fixed-location echo sounding target data showed a significant number of fish were moving downstream at the Mission bridge. Evaluation of the available data suggested that "milling" or drop-back of migrating fish, associated with the low river levels, resulted in multiple counting of individual fish and, consequently, inflated escapement estimates. Unfortunately, these data were not available during the season.

Visual counts of late-run sockeye migrating through the Fraser Canyon at Hell's Gate normally help to evaluate the Mission escapement estimates. However, very low flows in 1986 during the late-run sockeye passage restricted the migration to the low-level fish pass on the east bank at Hell's Gate. Due to the low design capacity of the fish pass, Adams-Lower Shuswap sockeye were not able to pass Hell's Gate as quickly as they were arriving there. As a result, the migration curve for Hell's Gate (Figure 4) was significantly different from the lower-river escapement pattern because many fish were delayed for several days below the fishways. The normal relationship between the visual count above the Hell's Gate fishways and the final escapement number was also affected by the confinement of fish to the left bank. Thus, while visual counts indicated an escapement similiar to that estimated at Mission, both were higher than obtained by enumeration of fish on the spawning grounds.

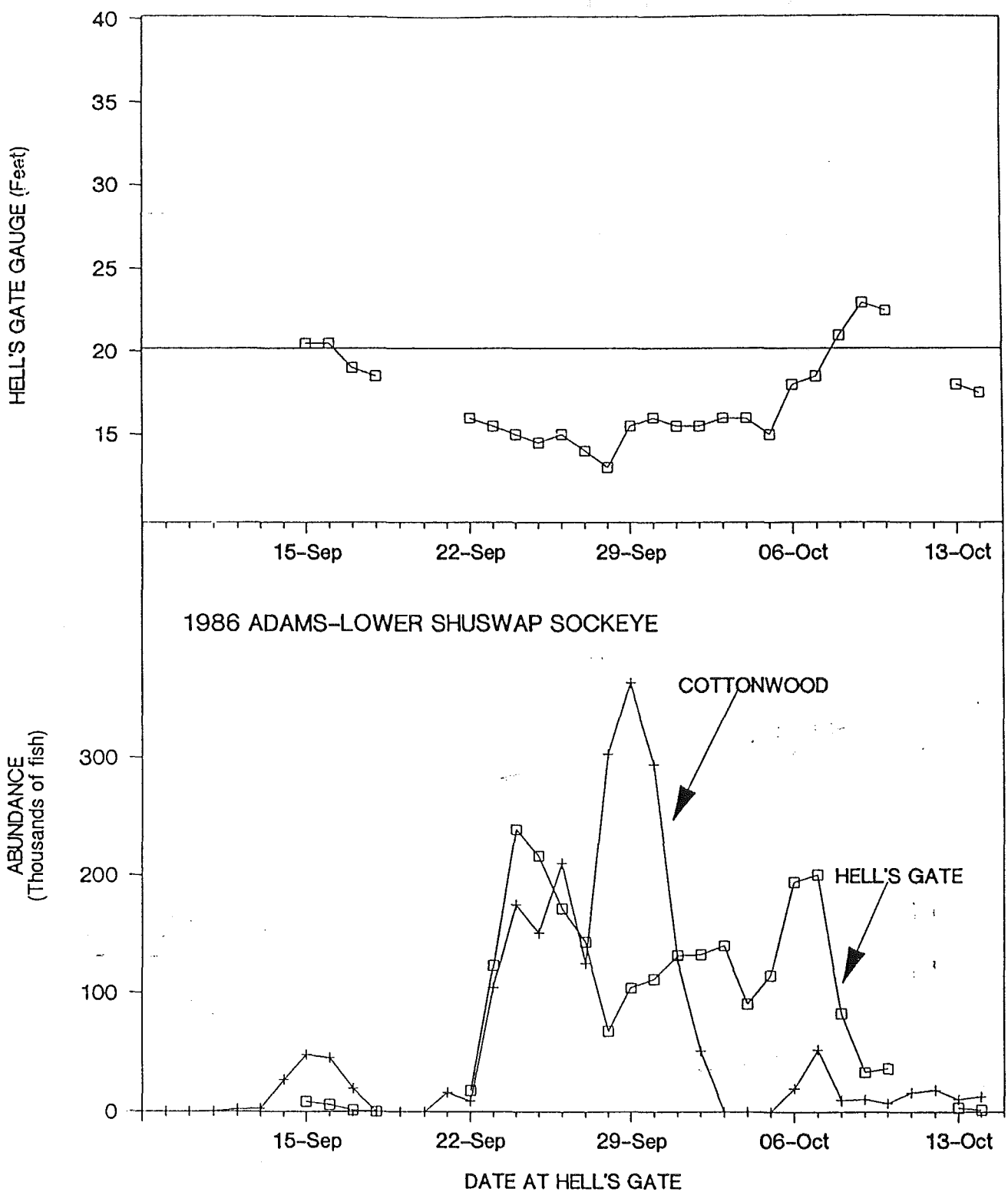

FIGURE 4. Comparison of the daily abundance of migrating Adams-Lower Shuswap sockeye salmon at the Cottonwood (Lower Fraser) test fishing site (+) and at Hell's Gate (□). The Cottonwood data are offset 7 days to compensate for the time it takes sockeye salmon to migrate from Cottonwood to Hell's Gate. The Hell's Gate gauge height (top figure) shows that low flows (i.e., less than 20 feet) occurred from mid-September to October 7, 1987.

VII. STOCK PRODUCTION

Six stocks: Chilko River, Stellako River, Birkenhead River, Adams River, Lower Shuswap River and Weaver Creek sockeye were forecast in sum at 12.8 million (91%) of the 14.0 million total adult sockeye return in 1986 (Table 10) and were the target stocks for harvest. Early-timed summer-run stocks such as Gates Creek, Nadina River, Pitt River, Horsefly River and Seymour River were expected to produce modest total returns (total = 917,000). The commercial fisheries were managed to provide for lower harvest rates for these early-timed stocks and for complete protection for the Early Stuart stock. Current estimates for production for those early-timed stocks was approximately 1.8 million (Table 10), nearly double the forecast. Of this, Horsefly River and other Quesnel Lake area stocks produced 622,000 sockeye, a three-fold increase from 1982. Seymour River, Scotch Creek and other early-timed stocks in the South Thompson watershed produced about 750,000 sockeye.

TABLE 10. Forecasts and estimated actual run sizes for Fraser River sockeye salmon stocks during 1986.

Stock	Forecast Return	Preliminary Estimate of Total Return	Percent Deviation
Early Stuart	35,000	45,000	+29%
Early Summer-run Stocks:			
Pitt Group	53,000	50,000	−6%
Gates Group	49,000	149,000	+204%
Seymour Group	310,000	750,000	+142%
Quesnel Group	260,000	622,000	+139%
Miscellaneous Stocks	245,000	207,000	−16%
Subtotal	917,000	1,778,000	+94%
Main-run Stocks:			
Chilko River	1,210,000	1,593,000	+32%
Stellako	375,000	457,000	+22%
Birkenhead	525,000	1,277,000	+143%
Adams	8,000,000	6,757,000	−16%
Lower Shuswap	2,000,000	2,422,000	+21%
Weaver	720,000	966,000	+34%
Subtotal	12,830,000	13,472,000	+5%
Miscellaneous Late-run Stocks:			
Middle Shuswap	150,000	325,000	+117%
Portage	50,000	125,000	+150%
Harrison	25,000	86,000	+244%
Cultus	75,000	42,000	−44%
Miscellaneous Stocks	10,000	25,000	+150%
Subtotal	310,000	603,000	+94%
TOTALS	14,092,000	15,898,000	+12%

Of the major producing stocks, Chilko River returns totalled 1.6 million sockeye or about 32% above the forecast level. This was the largest production on the cycle for Chilko sockeye. Stellako sockeye production was 22% higher than forecast with 457,000 fish. Certainly, the most unexpected return was that of the Birkenhead River run. Approximately 1,277,000 fish returned compared to the forecast of 525,000 sockeye. The return was the largest Birkenhead River run in the years from 1952 to 1986 where racial analysis data are available and was likely the largest since the 1920's when hatchery activities adversely affected Birkenhead sockeye production.

Adams River and Lower Shuswap River are the largest producing sockeye stocks of those which spawn in the South Thompson River watershed on the 1986 cycle. Included in the Adams-Lower Shuswap stock complex as well, are sockeye which spawn in Little River, South Thompson River, Shuswap Lake beach areas, small tributaries to Adams Lake and Shuswap Lake and the Middle Shuswap River. Similarities in timing and racial characteristics require that these stocks must be treated as a management-unit in regulation of the fisheries. The 1986 preseason forecasts for these stocks were for a return of 10,150,000 sockeye. The preliminary estimates of actual returns total 9,503,000 fish of which approximately 6,990,000 were harvested in commercial fisheries. Adams sockeye abundance was 16% below forecast at 6,757,000 fish while Lower Shuswap was 21% above the preseason estimate with 2,422,000 sockeye.

Weaver Creek sockeye produced a large return on the cycle in 1982 coincident with a large return to Birkenhead River. In 1986 again, the Weaver sockeye stock was strong with approximately 966,000 fish returning.

In total, 3,873,000 summer-run sockeye and 12,025,000 late-run fish returned. The vast majority (95.2%) were 4-year-old adults produced by the modern-day record escapement of 4,008,000 adult spawners in 1982.

VIII. ESCAPEMENT

(Provided by Canada Department of Fisheries and Oceans)

Preseason goals for spawning escapements of Fraser River sockeye salmon in 1986 totalled 4.0 million adults (Appendix A), plus a 100,000 escapement overage was expected at Weaver Creek. During the season, Canada raised the goal for summer-run stocks by 200,000 spawners. The actual escapement of fish to spawning grounds in the Fraser River watershed reached 3,717,000 fish, which included 60,000 jack sockeye (Appendix D, Table 7). Total adult spawners was 3,658,000 fish. This number was 9% lower than the brood year escapement of 4,008,000 adults in 1982, however, the 1986 spawning was more evenly distributed between summer-run and late-run spawners. Summer-run stocks increased from 481,000 adult spawners in 1982 to 836,000 in 1986. The adult escapement of late-run stocks declined from 3,527,000 to 2,822,000 fish.

The earliest sockeye stock to arrive in the Fraser River, the Early Stuart stock (A; Figure 5), rebounded from the very low escapement of 4,600 fish in the brood year to an escapement of 29,000 spawners. Severe fishing restrictions, agreed to by both commercial and Fraser River Indian food fishermen, provided the reduced harvest rate needed to produce this recovery. The number of females successfully spawning in 1986 was seven times as large as in 1982.

Late Stuart sockeye spawn primarily in Middle and Tachie Rivers (A; Figure 5), which connect the large lakes in the Stuart River watershed. These stocks generally do not produce well on

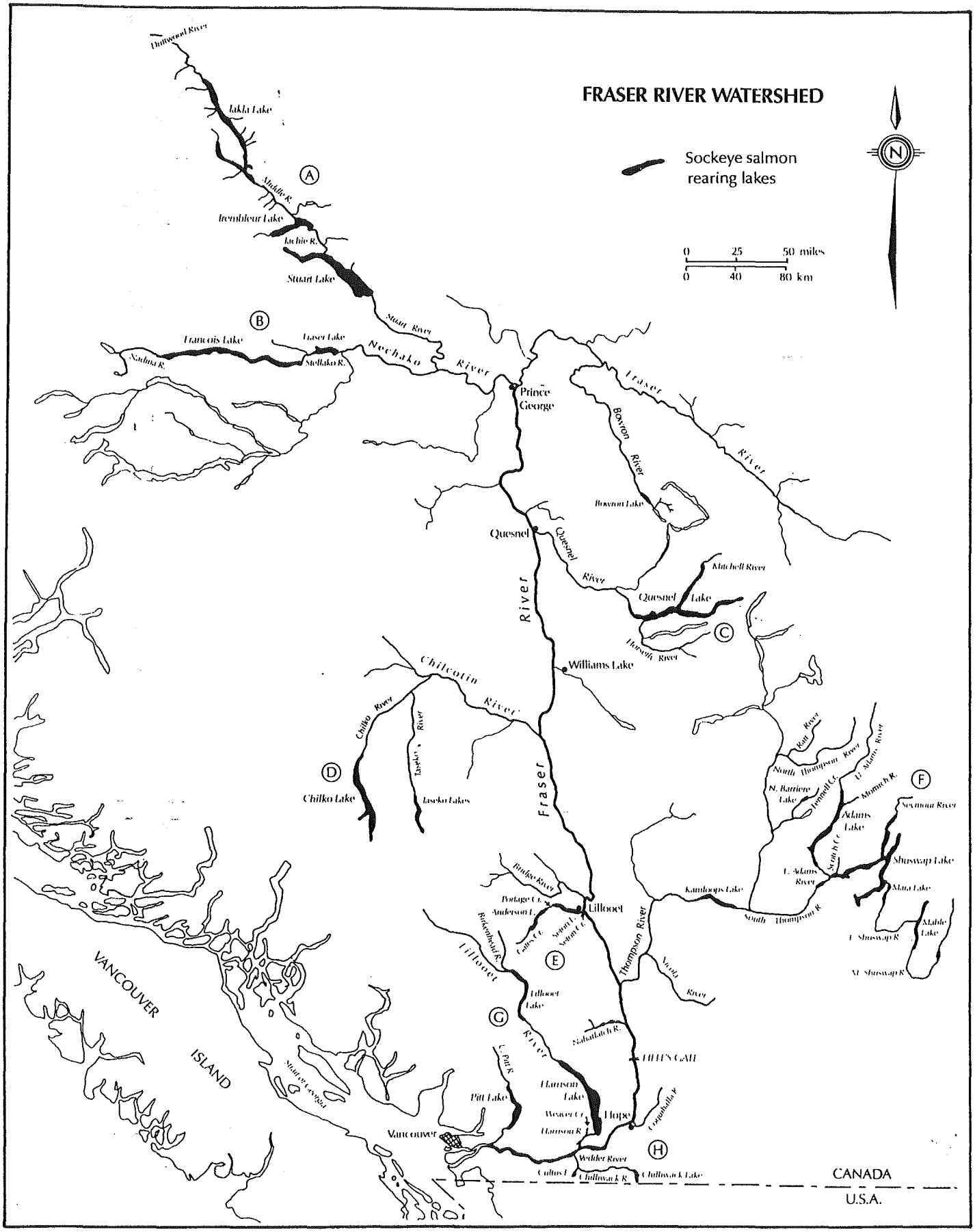

FIGURE 5. Sockeye salmon spawning grounds in the Fraser River watershed.

the 1986 cycle. However, escapements totalled 29,000 spawners, the largest on the cycle for the years on record. One-half of these fish were 5-year-old sockeye produced by the successful 1981 brood.

Nechako River watershed stocks include Nadina River and Stellako River sockeye (B; Figure 5). The Late Nadina escapement was 3,500 spawners, a slight increase over the 1982 level. Stellako River sockeye produced well in 1986, which resulted in an escapement of 77,000 spawners, an 11% increase over the brood year.

One highlight of the 1986 escapement was the large increase over brood year levels in Quesnel area spawning populations (C; Figure 5). Horsefly River and McKinley Creek sockeye escapements totalled 150,000 adults, which was over four times the 1982 level. The Mitchell River population rose to 31,000 from 3,800 in the brood year. While 24% of the 1986 spawners were 5-year-old fish of the 1981 brood, the large majority were 4-year-olds produced by the 1982 spawning. The total escapement of 181,000 fish should provide for continued growth of this important sockeye population on its sub-dominant cycle.

The Chilko River has been the major summer-run sockeye stock on this cycle for many years. In 1986, sockeye escapements to Chilko River and Lake (D; Figure 5) totalled 294,000 spawners. The contribution of the Chilko River stock to this total was 282,000, which was the largest escapement recorded for the cycle. This strong escapement provides the potential for continued good production. The Chilko Lake spawning population was 12,000 fish.

In the Seton-Anderson watershed (E; Figure 5), the Gates Creek sockeye population increased four-fold to 3,600 spawners. The Portage Creek run is dominant on this cycle and while the escapement of 14,000 spawners was adequate, it was a 40% decline from the 1982 level. Fishing in the Strait of Georgia in late September appeared responsible for the lower escapement.

Thompson River stocks (F; Figure 5) provided much (65%) of the Fraser River sockeye return in 1986. Predominant among these stocks were the late-run Adams and Lower Shuswap sockeye. Summer-run stocks contributed to a lesser degree. In the North Thompson area, Raft River escapements declined to 2,100 spawners from 3,000 in the brood year. Fennell Creek sockeye, however, increased five-fold to 6,000 spawners, the largest on the cycle.

The cumulative escapement of summer-run stocks in the South Thompson drainage was the largest recorded. Seymour River had a spawning population of 126,000 fish, double the brood year level. The dominant cycle for Scotch Creek sockeye appears to have shifted to the 1986 cycle, with a return of 27,000 spawners to the spawning grounds. This was the largest escapement on record to Scotch Creek and was an increase from 4,700 in 1982. Spawning escapements to the Eagle and Anstey Rivers were 4 to 9 times those observed in 1986. The Upper Adams River population was estimated at 567 fish, the largest recorded on the cycle. This increase may signal the development of a larger population on the 1986 cycle, independent of the recent increase observed on the 1984 cycle.

Most of the decline in late-run sockeye spawning in 1986 was centered in the Adams population, including Little River and miscellaneous late-run stocks. The escapement in the Adams River area declined from 2,497,000 adults in 1982 to 1,663,000 in 1986. The Lower Adams River proper held 1,325,000 adults and 10,000 jack sockeye. The Little River population was estimated at 227,000 adults, while other areas including the South Thompson River and beach spawning sites in Shuswap Lake provided for 112,000 spawners.

Although the Adams River population was lower than the brood population in 1982, escapements to the Lower and Middle Shuswap stocks increased. Lower Shuswap sockeye reached a record high abundance of 600,000 spawners, an increase of 17% from 1982. The Middle Shuswap River stock doubled in size from 40,000 in 1982 to 81,000 in 1986. Juvenile sockeye salmon from the Middle Shuswap stock rear in Mable Lake. Adams and Lower Shuswap juvenile sockeye rear in Shuswap, Mara and Little Shuswap Lakes.

Water levels were extremely low in the Thompson River watershed during the spawning of late-run stocks in October and early November. However, it is unlikely that water flows in the winter were substantially lower. This likely prevented significant exposure of spawning gravel and resulting egg loss from freezing as sometimes occurs in the Lower Adams River.

Besides the lower total escapement compared to 1982, the spawning potential of the late-run spawning populations in the South Thompson district in 1986 was reduced by an unbalanced sex ratio. Forty-six percent of late-run spawners were females, compared to 52-59% in most years. As a result, fewer eggs were available for deposition than would normally be expected from an escapement of the observed size. The unbalanced sex ratio occurred because late-September fisheries in the Strait of Georgia harvested a disproportionately large number of female adults from these stocks. A large fraction of the fishery catch was from the later-timed segment of the Adams and Lower Shuswap run, which were mainly females.

In the Harrison-Lillooet system (G; Figure 5), the Birkenhead River spawning population reached a record high of 336,000 spawners. This was nearly triple the previous maximum for the 1938-1985 period.

Weaver Creek sockeye also inhabit the Harrison system, with the fry migrating upstream through the Harrison River to rear in Harrison Lake. Late-September fisheries in the Strait of Georgia harvested nearly two-thirds of the Weaver sockeye present at that time. Nevertheless, the Weaver sockeye escapement reached 111,000 spawners. Although the sex ratio of adults was unbalanced with 55% males, the total number of spawners was high enough to allow a large escapement of 45,000 into the spawing channel.

Lower Fraser River stocks (H; Figure 5) include the Upper Pitt River and Cultus Lake sockeye. The Upper Pitt run is an early-timed stock that was protected from heavy fishing by early season closures. The escapement, at 29,000 fish, was up from 8,700 in 1982. Most of the Upper Pitt sockeye mature as 5-year-old fish, with 89% of the escapement in 1986 being 5-year-olds. The Cultus Lake escapement suffered from the extensive late September Strait of Georgia fisheries and totalled only 3,300 spawners, down from 17,000 in 1982.

While the total watershed spawning of 1,762,000 females represented a 13% decline from 1982, the distribution of escapement between summer-run stocks (25%) such as Chilko, Quesnel and Stellako, and late-run (75%) stocks such as Adams-Lower Shuswap and Birkenhead was more evenly balanced than in 1982. A more even distribution of spawners among the spawning areas reduces the likelihood of an environmental or biological catastrophe in one area severely reducing run size and catch in subsequent years. Particularly noteworthy in this regard were the larger escapements to Quesnel Lake tributaries and to early runs in the Thompson River area. As well, the distribution of late-run spawners in the Thompson River watershed was more evenly balanced between Adams and Lower Shuswap stocks.

Success of spawning was good in all areas. Overall, 97.4% of females spawned. The low prespawning mortalities observed on the spawning grounds were likely due to the later-than-average time of coastal arrival and to lower-than-normal water temperatures during upstream migration of summer-run stocks. Both arrival timing and water temperature appear to influence the success of spawning for Fraser River sockeye. Also, below-normal river flows during upstream migration of summer-run sockeye in July and August may have allowed these fish to migrate rapidly, thereby avoiding stress from delays and from fighting high water velocities. The very low water levels during migration of late-run sockeye in September and October delayed, but did not disrupt the passage of these stocks at Hell's Gate and their timely arrival at the spawning grounds.

The 1986 adult spawning escapement of 3.7 million fish, although less than the revised goal of 4.2 million fish, represents a generally successful accomplishment of the preseason objectives. The escapement total was the third largest reaching the spawning grounds in the Fraser River watershed since 1909 and should provide for the long-term growth of stocks on the cycle.

IX. APPENDICES

APPENDIX A: 1986 FRASER RIVER SOCKEYE FORECAST AND ESCAPEMENT REQUIREMENTS[1]

By Time of Arrival	1986 Forecast Total Return	1986 Escapement Goals	1982 Escapement	Optimum Cycle Escapement	Comments
Early Stuart	35,000	35,000	4,557	50,000	Conservation concern
Bowron	12,000	10,000	1,647	10,000	Stock growth desired
Chilliwack Lake	8,000	5,000	3,980	5,000	
Upper Pitt	30,000	25,000	8,708	25,000	Conservation concern
Gates	12,000	10,000	930	20,000	Stock growth desired
Late Nadina	15,000	15,000	2,349	50,000	Conservation concern
Fennell	15,000	5,000	1,132	5,000	Stock growth desired
Chilko Lake	100,000	50,000	9,675	50,000	Stock growth desired
Horsefly/Mitchell	260,000	100,000	39,841	100,000	Stock growth desired
Raft	10,000	5,000	2,992	10,000	Stock growth desired
Seymour	255,000	40,000	70,806	40,000	
Scotch	55,000	10,000	4,709	10,000	
Late Stuart	105,000	20,000	16,758	10,000	
Chilko River	1,210,000	275,000	239,903	250,000	
Stellako	375,000	85,000	69,420	150,000	Stock growth desired
Birkenhead	525,000	120,000	119,738	120,000	
Adams/Little River	8,000,000	2,400,000	2,506,038	2,000,000	
Lower Shuswap	2,000,000	600,000	513,897	1,000,000	Stock growth desired
Middle Shuswap	150,000	50,000	40,300	100,000	Stock growth desired
Weaver	720,000	80,000	294,083	50,000	
Portage	50,000	15,000	23,867	20,000	
Harrison	25,000	10,000	9,189	20,000	Stock growth desired
Cultus	75,000	25,000	16,725	25,000	
Miscellaneous	50,000	10,000	6,476	7,000	
TOTALS	14,092,000	4,000,000	4,007,720	4,127,000	

[1] Provided by Canada Department of Fisheries and Oceans

APPENDIX B: 1986 REGULATIONS

The Fraser River Panel approved Regulations for the management of the Fraser River sockeye fishery in Panel Area waters at a meeting held April 21, 1986 and submitted these to the Pacific Salmon Commission. The Commission approved the Fishery Regime and Regulations and submitted these to the respective national governments for approval on May 16, 1986. The United States Government informed the Commission of its approval on June 6, 1986. The recommendations for Canadian waters were implemented under the Fisheries Act, Pacific Commercial Salmon Fishery Regulations.

The recommendations of the Commission were as follows:

Canadian Fraser River Panel Area

In accordance with Article VI, Paragraph 5 of the Pacific Salmon Treaty, the Commission recommends to Canada the adoption of the following Fishing Regime developed by the Fraser River Panel as per Annex IV, Chapter 4 (1) (d) of the Treaty, namely:

1. a) No person shall fish for sockeye or pink salmon in Pacific Fishery Management Area 20-1, 3 and 4 with nets from the 22nd day of June, 1986 to the 13th day of September, 1986, both dates inclusive.

   b) No person shall troll commercially for sockeye or pink salmon in Pacific Fishery Management 20-1, 3 and 4 from the 10th day of August, 1986 to the 13th day of September, 1986, both dates inclusive.

2. a) No person shall fish for sockeye or pink salmon in Pacific Fishery Management Areas 17 and 18 with nets from the 22nd day of June, 1986 to the 27th day of September, 1986, both dates inclusive.

   b) No person shall troll commercially for sockeye or pink salmon in Pacific Fishery Management Area 18-1 from the 27th day of July, 1986 to the 27th day of September, 1986, both dates inclusive.

3. a) No person shall fish for sockeye or pink salmon with nets in Pacific Fishery Management Area 29 from the 22nd day of June, 1986 to the 11th day of October, 1986, both dates inclusive.

   b) No person shall troll commercially for sockeye or pink salmon in Pacific Fishery Management Area 29 from the 27th day of July, 1986 to the 11th day of October, 1986, both dates inclusive.

4. The following Fraser River Panel Area waters are excluded:

   a) High Seas westerly of the Bonilla Point-Tatoosh Island Lighthouse Line.

   b) Pacific Fishery Management Area 19, Area 20-1 and 5 to 7 and Area 29-8.

   c) Commercial troll fishing in Pacific Management Areas 17 and 18-2 to 11, provided that regulations formulated by the Canada Department of Fisheries and Oceans conserve sockeye by requiring the release of sockeye taken by commercial troll gear during the period June 22 to July 26, inclusive.

   d) Commercial troll fishing in Pacific Fishery Management Area 20-1, 3 and 4 prior to August 10, provided that regulations formulated by the Canada Department of Fisheries and Oceans conserve sockeye by requiring the release of sockeye taken by commercial troll gear during the period, June 22 to August 9, inclusive.

   e) Commercial troll fishing in Pacific Fishery Management Area 18-1 and Area 29 prior to July 27, provided that regulations formulated by the Canada Department of Fisheries and Oceans conserve sockeye by requiring the release of sockeye taken by commercial troll gear during the period, June 22 to July 26, inclusive.

The Fraser River Panel will develop In-Season Orders during the fishing season based on the proposed 1986 Management Plan, attached, to achieve Treaty mandated international allocation of the catch and domestic goals of the Parties.

United States Fraser River Panel Area

In accordance with Article VI, Paragraph 5 of the Pacific Salmon Treaty, the Commission recommends to the United States Government the adoption of the following Fishing Regime developed by the Fraser River Panel as per Annex IV, Chapter 4 (1) (d) of the Treaty, namely:

Treaty Indian Fisheries:

1 No Treaty Indian shall fish for sockeye or pink salmon in Puget Sound Salmon Management and Catch Reporting Areas 4B, 5 and 6C with gill nets and purse seines from the 22nd day of June, 1986 to the 13th day of September, 1986, both dates inclusive.

2. No Treaty Indian shall fish for sockeye or pink salmon in Puget Sound Salmon Management and Catch Reporting Area 6A with nets from the 22nd day of June, 1986 to the 13th day of September 1986, both dates inclusive.

3. No Treaty Indian shall fish for sockeye or pink salmon in Puget Sound Salmon Management and Catch Reporting Areas 6, 7 and 7A with nets from the 22nd day of June, 1986 to the 20th day of September, 1986, both dates inclusive.

4. No Treaty Indian shall fish for sockeye or pink salmon with nets in that portion of the Puget Sound Salmon Management and Catch Reporting Area 7A lying westerly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia from the 21st day of September, 1986 to the 27th day of September, 1986, both dates inclusive.

All-Citizen Fishery:

1. No person shall fish for sockeye or pink salmon in Puget Sound Salmon Management and Catch Reporting Areas 4B, 5, 6, 6A and 6C with nets from the 22nd day of June, 1986 to the 13th day of September, 1986, both dates inclusive.

2. No person shall fish for sockeye or pink salmon in Puget Sound Salmon Management and Catch Reporting Areas 7 and 7A with nets from the 22nd day of June, 1986 to the 20th day of September, 1986, both dates inclusive.

3. No person shall fish for sockeye or pink salmon with nets in that portion of Puget Sound Salmon Management and Catch Reporting Area 7A lying westerly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia from the 21st day of September, 1986 to the 27th day of September, 1986, both dates inclusive.

Treaty Indian and All-Citizen Fisheries:

The following Fraser River Panel Area Waters are excluded:

1. High Seas westerly of the Bonilla Point-Tatoosh Island Lighthouse Line.

2. Puget Sound Salmon Management and Catch Reporting Areas 6B, 6D, 7C, 7D and 7E.

3. Puget Sound Salmon Management and Catch Reporting Area 7B, provided that regulations formulated by the Washington Director of Fisheries and Tribal authorities conserve sockeye by requiring 7-inch minimum mesh for gill nets and by requiring the release of sockeye taken by other gear during the period, June 22 to July 19, inclusive.

The Fraser River Panel will develop In-Season Orders during the fishing season based on the proposed 1986 Management Plan, attached, to achieve Treaty mandated international allocation of the catch and domestic goals of the Parties.

APPENDIX C: FRASER PANEL ORDERS

In order to provide for adequate escapement of the various stocks of Fraser River sockeye salmon and for the prescribed allocation of catch (a) internationally, to the fishermen of the United States and Canada and (b) domestically, to the commercial user groups in Canada and the United States, Fraser River Panel approved Orders were promulgated as follows:

July 24, 1986

For the harvest of summer-run sockeye appearing in Juan de Fuca Strait, the Panel approved opening United States Areas 4B, 5 and 6C for Treaty Indian drift gill net fishing commencing 12:00 p.m. (noon) July 25 until further notice.

August 1, 1986

For the harvest of Chilko River and other summer-run sockeye stocks, the Panel approved the following regulations for the week commencing August 3: 1) Canadian Area 29-1 to 7 and 9 to 17 open for gill nets August 5 for 1 day of fishing; 2) Canadian Area 29-1 to 5 open for trolling August 3 until further notice and Area 29-6 open August 6 for 1 day of trolling; and 3) United States Areas 6, 7 and 7A open for Treaty Indian net fishing August 5 for 1 day.

August 5, 1986

To provide for additional United States catch of summer-run sockeye, the Panel approved: 1) A 1-day extension to Treaty Indian net fishing in United States Areas 6, 7 and 7A making a total of 2 days for the week; and 2) United States Areas 7 and 7A open for All-Citizen reef nets August 8 for 1 day of fishing.

August 8, 1987

For the harvest of summer-run sockeye and for domestic allocation purposes, the Panel approved the following regulations for the week commencing August 10: 1) Canadian Area 20-1, 3 and 4 open August 11 for 1 day of fishing; 2) Canadian Area 29-1 to 7 and 9 to 17 open to gill nets August 10 for 1 day of fishing; 3) Canadian Area 29-1 to 4 and 6 and Area 18-1 closed to commercial trolling effective 12:00 a.m. (midnight) August 10; 4) United States Areas 6, 7 and 7A open for Treaty Indian nets August 10 for 2 days of fishing; and 5) United States Areas 4B, 5, 6, 6C, 7 and 7A open for All-Citizen net fishing August 12 for 1 day.

August 11, 1986

In order to meet the international allocation goal for summer-run sockeye catch by United States fishermen, the Panel approved the following regulations: 1) Extension of United States Treaty Indian net fishing in Areas 6, 7 and 7A by 1 day making a total of 3 days for the current fishing period; and 2) Extension of United States All-Citizen net fishing in Areas 4B, 5, 6, 6C, 7 and 7A by 1 day making a total of 2 days for the current fishing period.

August 15, 1986

For the harvest of Adams River sockeye in marine areas and summer-run sockeye in the Fraser River, the Panel approved the following regulations for the period commencing August 16: 1) Canadian Area 20-1, 3 and 4 open August 18 for 2 days of net fishing but remaining closed to trolling until further notice; 2) Canadian Area 29-I to 7 and 9 to 17 open to gill nets August 17 for 2 days of fishing; 3) Canadian Areas 29-1, 2 and 18-I open for trolling August 19 for 2 days of fishing; 4) United States Areas 4B, 5 and 6C closed to Treaty Indian drift gill nets August 18 for 1 day and reopen August 19 until further notice; 5) United States Areas 6, 7 and 7A open for Treaty Indian nets August 17 for 2 days of fishing; and 6) United States Areas 4B, 5, 6, 6C, 7 and 7A open for All-Citizen nets August 17 for 1 day of fishing.

August 18, 1986

In order to harvest Adams River and other late-run sockeye, the Panel approved the following regulations: 1) Extension of net fishing in Canadian Area 20-1, 3 and 4 by 1 day for a total of 3 days in the current week; and 2) Extension of United States Areas 6, 7 and 7A by 1 day for Treaty Indian net fishing making a total of 3 days for the current fishing period.

August 22, 1986

For the harvest of Adams River sockeye and further catch of summer-run sockeye, the Panel approved the following regulations for the week commencing August 24: 1) Canadian Area 20-1, 3 and 4 open August 25 for 2 days of net fishing; 2) Canadian Area 29-1 to 7 and 9 to 17 open for gill nets August 25 for 1 day of fishing; 3) Canadian Areas 29-1 to 4 and 6 and 18-1 open to trolling August 26 for 4 days of fishing; 4) United States Areas 6, 7 and 7A open for Treaty Indian net fishing August 24 for 2 days; and 5) United States Areas 7 and 7A open for All-Citizen nets August 25 for 1 day of fishing.

August 26, 1986

For the harvest of Birkenhead sockeye, the Panel approved reopening Canadian Area 29-1 to 7 and 9 to 17 to gill nets on August 27 for 1 day of fishing.

August 29, 1986

For continued harvest of late-run sockeye and to meet international and domestic allocation objectives, the Panel approved the following regulations for the week commencing August 31: 1) Canadian Area 20-1, 3 and 4 open September 2 for 1 day of net fishing; 2) Canadian Area 29-1 to 7 and 9 to 17 open September 1 for gill nets for 1 day of fishing; 3) Canadian Area 29-1 to 7, 9 and 10 of Canadian waters open to gill nets September 3 for 1 day of fishing; 4) United States Areas 4B, 5 and 6C closed to Treaty Indian drift gill net fishing 12:00 p.m. (noon) August 30; and 5) United States Areas 7 and 7A open for All-Citizen net fishing September 2 for 1 day, except in those waters westerly of a straight line drawn from the low water range marker in Boundary Bay through the east tip of Point Roberts to the East Point Light on Saturna Island which remain closed.

September 2, 1986

In the interest of continued harvest of Adams River sockeye for domestic allocation purposes, the Panel approved a 1 day extension of net fishing in Canadian Area 20-1, 3 and 4 making a total of 2 days for the current week.

September 12, 1986

In order to harvest surplus Birkenhead River sockeye, the Panel approved opening Canadian Area 29-11 to 17 for gill nets on September 13 for 12 hours of fishing. Regulatory control of Canadian Area 20-1, 3 and 4 and United States Areas 4B, 5, 6A, and 6C was relinquished effective 12:01 a.m. September 14.

September 23, 1986

For the harvest of Adams-Lower Shuswap sockeye, the Panel approved opening Canadian Area 29-1 to 7, 9 and 10 for gill nets on September 24 for 1 day of fishing.

September 25, 1986

The Panel extended until further notice regulatory control in that portion of United States Area 7A lying westerly of a straight line drawn from the low water range marker at Boundary Bay on the International Boundary through the east tip of Point Roberts to the East Point Light on Saturna Island. In the interest of harvest of Adams River sockeye and for domestic allocation, the Panel approved the opening of Canadian Area 29-3 and 4 for purse seines September 26 for 12 hours.

September 27, 1986

In order to harvest additional Adams-Lower Shuswap River sockeye, the Panel approved the following regulations: 1) Canadian Area 29-1 to 7 and 9 to 17 open for gill nets on September 27 for 38 hours of fishing; 2) Canadian Area 29-3 and 4 open for purse seine fishing September 29 by announcement by Canada Department of Fisheries and Oceans; 3) Canadian Area 29-1 to 6 open for trolling September 28 for 2 days of fishing; and 4) Reassumption of regulatory control in that portion of United States Area 7A lying north of a line from Birch Point to East Point on Saturna Island until further notice and the opening of this area to Treaty Indian and All-Citizen nets on September 28 for 1 day of fishing.

September 28, 1986

For the further harvest of Adams-Lower Shuswap River sockeye, the Panel approved extension of Treaty Indian and All-Citizen net fishing in United States Area 7A north of a line from Birch Point to East Point on Saturna Island by 2 days making a total of 3 days for the current fishing period.

September 29, 1986

In the interest of additional harvest of Adams-Lower Shuswap River sockeye, the Panel approved extension of trolling in Canadian Area 29-1 to 6 by 1 day making a total of 3 days in the current fishing period.

September 30, 1986

Due to the declining numbers of sockeye, the Panel approved relinquishment of regulatory control in those United States waters remaining under Panel control effective 7:01 p.m. September 30. In order to obtain additional harvest of late-run sockeye, the Panel approved opening Canadian Area 29-1 to 7 and 9 and 10 for gill nets September 30 for 12 hours of fishing and for trolling October 1 for 12 hours of fishing.

The Panel relinquished regulatory control of Canadian Area 29 effective October 12 as scheduled, thus completing the Panel's regulatory responsibility for Fraser River Panel Area waters for 1986.

APPENDIX TABLE 1. Canadian Area 20 (Juan de Fuca Strait) Fraser River commercial sockeye catches by week-ending period, for cycle years 1974-1986.

Week Ending	1974	1978	1982	1986
June 28	1,724			
July 4	880	533	433	
11	677	533	279	
18	242	787	1,029	
25	2,623	1,506	3,105	
Aug. 1	262,011	69,745	6,346	
8	376,771	70,885	6,631	
15	3,785	63,553	401,208	207,802
22	401,005	352,750	568,843	960,793
29	135,870	2,376	691,379	719,264
Sept. 5	23,077	823	717	114,952
12	2,861	185	1,737	616
19	309			
26				
Oct. 3				
10				
TOTALS	1,211,835	563,676	1,681,707	2,003,427

APPENDIX TABLE 2. Canadian Areas 17, 18 and 29 (Strait of Georgia and lower Fraser River) Fraser River commercial sockeye catches by week-ending period for cycle years 1974-1986.

Week Ending	1974	1978	1982	1986
June 28	3,456	711	7	0
July 5	13,693	3,002	38	26
12	42,742	343	282	22
19	7,200	942	334	107
26	6,728	21,882	531	151
Aug. 2	20,403	19,722	25,299	2,017
9	60,410	1,322	33,254	507,677
16	40,160	22,399	161,233	306,452
23	107,026	130,666	134,323	138,769
30	269,216	127,501	62,490	178,654
Sept. 6	87,396	109,140	11,634	142,838
13	246,678	53,760	41,341	33,141
20	2,595	3,889	194	177
27	862	2,359	171,077	966,569
Oct. 4	25,438	59,842	156,725	466,966
11	101	2,032	63,583	337
TOTALS	934,104	559,512	862,345	2,743,903

APPENDIX TABLE 3. Canadian Areas 121 to 127 (west coast of Vancouver Island) Fraser River commercial sockeye catches by week-ending period for cycle years 1974-1986.

Week Ending	1974	1978	1982	1986
June 28	1,952			6
July 5	4,567	643	91	0
12	5,557	732	1,586	2,401
19	11,730	1,158	4,967	4,147
26	52,247	14,120	21,491	735
Aug. 2	171,931	84,633	342,824	27,742
9	180,747	308,544	297,065	344,216
16	168,708	164,269	658,570	1,029,864
23	184,991	44,127	644,175	328,516
30	34,732	56,903	97,384	25,039
Sept. 6	3,689	8,135	19,117	
13	148	8,286	4,902	
20	357	10,331	8,350	
27	163	7,485	12,780	
Oct. 4			4,981	
11	11		1,047	
TOTALS	821,530	709,366	2,119,329	1,762,666

APPENDIX TABLE 4. Canadian Areas 11 to 16 (Johnstone Strait and northern Strait of Georgia) Fraser River commercial sockeye catches by week-ending period for cycle years 1974-1986.

Week Ending	1974	1978	1982	1986
June 28	3,970	8,595		83
July 5	9,638	10,680		3
12	11,459	10,821	5,226	1,464
19	11,573	15,709	3,858	798
26	24,124	182,729	32,762	3,164
Aug. 2	139,471	179,130	120,148	3,895
9	310,502	348,026	32,052	118,136
16	300,805	962,760	520,000	353,781
23	363,084	1,451,597	659,000	858,425
30	29,863	197,991	273,000	800,190
Sept. 6	279	14,358	31,050	98,638
13	2,977	83,824		1,457
20	33	7,455		5,193
27	863	1,364		463
Oct. 4	17			117
11	59			2,498
TOTALS	1,208,717	3,475,039	1,677,096	2,248,305

APPENDIX TABLE 5. United States Areas 4B, 5, 6, 6C, 7, 7A and 7B (Juan de Fuca Strait and northern Puget Sound) Fraser River commercial sockeye catch by week-ending period for cycle years 1974-1986.

Week Ending	1974	1978	1982	1986
June 28	62	134		92
July 4	5	5,003	51	87
11	25	1,228		70
18	9,512	153		88
25	7,761	18,982	36,309	3,607
Aug. 1	230,170	44,160	132,061	6,203
8	378,379	69,633	465,841	387,454
15	502,504	48,120	479,521	551,520
22	685,415	416,484	712,833	714,143
29	546,380	649,632	509,586	592,643
Sept. 5	55,432	88	469,198	372,299
12	24,453	29,564	52,512	749
19	17,501	53,368	184	103
26	2,206	14,250		7
Oct. 3	195	2,681		104,340
10	75	882		
TOTALS	2,460,075	1,354,362	2,858,096	2,733,405

APPENDIX TABLE 6. Fraser River Indian food fishery catch of sockeye salmon by area during 1978, 1982 and 1986.*

	1978 Catch	1982 Catch	1986 Catch
FRASER RIVER MAINSTEM			
Steveston	4,877	41,973	25,162
Deas to Mission	8,821	9,023	12,406
Mission to Hope	71,405	113,876	142,406
Hope to North Bend	54,845	101,976	165,181
North Bend to Churn Creek	38,625	67,395	86,393
Churn Creek to Hixon	4,588	20,465	13,826
Above Hixon	704	3,591	4,190
Subtotals	183,865	358,299	449,497
TRIBUTARIES			
Harrison/Lillooet System	14,910	10,230	10,794
Thompson System	16,950	31,480	9,675
Chilcotin System	8,450	14,950	41,709
Nechako System	6,248	11,798	16,810
Stuart System	7,129	3,042	5,374
Subtotals	53,687	71,500	84,362
TOTALS	237,552	429,799	533,859

* Fraser River Indian food fishery catch statistics provided by Canada Department of Fisheries and Oceans.

APPENDIX TABLE 7. Summary of the sockeye salmon escapement to the Fraser River spawning areas during 1974[1], 1978[1], 1982[1] and 1986, as estimated by Canada Department of Fisheries and Oceans.

DISTRICT Stream/Lake	1986 Period of Peak Spawning	Estimated Number of Adult Sockeye				1986 Jacks
		1974	1978	1982	1986	
NORTHEAST						
Upper Bowron River	Aug.28-Sept.3	1,850	3,141	1,647	3,118	13
STUART						
Early Runs						
Forfar Creek	Aug. 1-6	5,480	9,557	676	4,909	37
Gluske Creek	Aug. 4-8	5,540	4,293	452	3,449	19
Kynoch Creek	Aug. 1-6	10,604	10,606	1,167	6,854	146
Rossette Creek	Aug. 1-6	5,657	7,433	1,300	4,670	93
Takla Lake Streams	Aug. 1-8	6,973	10,350	438	4,820	69
Trembleur Lake Streams	Aug. 1-8	5,264	7,765	524	3,882	56
Early Stuart Totals		(39,518)	(50,004)	(4,557)	(28,584)	(420)
Late Runs						
Middle River	Sept. 17-20	8,716	3,971	7,450	9,940	0
Tachie River	Sept. 17-20	4,545	7,850	7,528	13,617	0
Late Stuart Totals		(14,190)	(12,738)	(16,758)	(28,715)	(0)
NECHAKO						
Nadina River (Late)	Sept. 23-25	2,857	211	194	130	1
Nadina Channel (Late)	Sept. 22-26	873	2,373	2,155	3,415	25
Stellako River	Sept.29-Oct.3	41,275	58,898	69,420	77,177	201
QUESNEL						
Horsefly River (Area)	Sept. 6-12	4,459	7,377	35,974	150,386	6
Mitchell River	Sept. 18-20	—	1,237	3,829	30,827	0
CHILCOTIN						
Chilko	Sept.28-Oct.4	109,563	143,402	239,903	281,771	28,626
Chilko Lake South End	Late Sept.	463	3,440	9,675	12,033	1,541
SETON-ANDERSON						
Gates Creek	Sept.4-7	6	111	101	394	169
Gates Channel	Sept. 1-8	64	147	829	3,178	1,075
Portage Creek	Nov. 2-8	8,475	9,978	23,867	14,291	156
SOUTH THOMPSON						
Summer Runs						
Seymour River	Sept. 5-9	44,588	62,808	63,271	126,166	2,331
Scotch Creek	Sept. 1-5	447	2,056	4,709	26,624	0
Anstey River	Sept. 2-6	657	884	767	7,080	0
Eagle River	Sept.7-11	258	189	1,642	7,138	14
Late Runs						
Lower Adams River	Oct.19-Nov.2	884,256	1,491,338	2,069,979	1,325,089	9,501
Little River	Oct.19-Nov.2	121,541	80,423	239,179	226,778	1,141
Lower Shuswap River	Oct. 16-20	85,950	187,134	513,897	600,370	125
Middle Shuswap River	Oct. 16-20	3,048	10,890	40,300	80,529	0
Misc. Late Runs	—	70,443	127,568	196,880	112,464	267
NORTH THOMPSON						
Raft River	Sept. 3-7	2,383	2,493	2,992	2,095	31
Fennell Creek	Aug.29-Sept.2	140	107	1,132	6,024	96
HARRISON-LILLOOET						
Birkenhead	Oct. 3-10	119,637	94,782	119,738	335,630	12,664
Harrison River	Nov. 17-21	16,920	19,717	9,189	7,265	25
Weaver Creek	Oct. 27-31	40,032	43,227	236,288	65,846	637
Weaver Channel	Oct. 15-21	24,061	31,944	57,795	44,892	221
LOWER FRASER						
Nahatlatch River	Aug. 30-Sept. 4	—	600	2,734	8,996	93
Cultus Lake	Late Nov.	8,984	5,076	16,725	3,256	277
Upper Pitt River	Sept. 9-19	20,581	24,786	8,708	29,177	18
ADULTS *		1,656,552	2,484,805	4,007,720	3,657,738	
JACKS *		100,922	29,513	16,541	59,706	
TOTAL *		1,757,474	2,514,318	4,024,261	3,717,444	

[1] 1974, 1978 and 1982 data from files of the Pacific Salmon Commission.

* Totals include small numbers of fish in tributaries not listed in the table.