REPORT OF THE CANADA/UNITED STATES

TRANSBOUNDARY TECHNICAL COMMITTEE

Final Report

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Prepared for Members
of the Pacific Salmon Commission
and Northern Panel

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2.1 Stikine

Based on a projection for a below average sockeye return to the Stikine, U.S. drift gillnet and Canadian in-river fisheries were restricted in the early portion of the run. By early July, test fishing and stock separation results as well as fishery performance indicated that an above average run was occurring. Through the remainder of the run both countries targeted extensive fishing effort on Stikine sockeye. Post run escapement counts and stock separation studies indicate that additional Stikine sockeye could have been harvested as the sockeye escapement was well above the goal. A record of 67,400 sockeye was recorded at the Tahltan Lake weir. For the sockeye harvested, the sharing formula provided by the Treaty was met. August coho availability in the District 106 U.S. drift gillnet fishery was considerably above average, however the District 108 U.S. drift gillnet fishery in Fredrick Sound was below average. The proportion of Stikine coho in U.S. gillnet and troll fisheries is not known. Due to a lack of known usable coho escapement index areas and generally poor survey conditions, few surveys are made. An evaluation of in-river abundance of coho relative to the sockeye population is pending results of the 1985 Canadian test fishing program. Chinook escapement surveys indicated a good return to index streams.

2.2 Taku River

An above average return of sockeye provided larger than expected harvests in both Alaskan and Canadian gillnet fisheries. Escapement counts of sockeye in the Taku drainage and the preliminary mark and recapture population estimate indicates that the overall Taku escapement was above the preliminary goal. A strong coho run was indicated by good catches in the District 111 Alaskan gillnet fishery and good escapement counts on select lower river tributaries; however, available information suggests that coho escapement to some headwater areas was weak. An average fall chum run occurred based on availability in the District 111 gillnet fishery. A limited survey of fall chum salmon spawning areas was conducted due to poor weather conditions. Based on escapement counts, the 1985 chinook return to the Taku River was well above average for recent years. An exceptionally large pink run to the Nakina River was evident.

2.3 Alsek

The 1985 return of sockeye to the Alsek River was poor as expected. Despite severe restrictions in U.S. and Canadian fisheries the early run sockeye escapement to Klukshu Lake did not improve over the 1980 level. Some improvement to late run escapements were observed, but overall escapement goals were not met in Canadian systems. A very poor return of chinook salmon to the Alsek in 1985 resulted in the escapement goal not being met despite very low chinook harvests in in-river fisheries. The Alsek coho run appeared to be

average although low effort in the Dry Bay fishery resulted in a below average in-river catch.

Forecasts for 1986

3.1 Stikine

It is anticipated that only sockeye salmon will have potential for a directed fishery in 1986. The escapement of sockeye in 1981, the predominant brood year for the 1986 return, was much higher than average, consequently a good return of sockeye is anticipated for 1986. If good production occurs for the 1981 brood year a total allowable catch in excess of 100 thousand may be expected.

Stikine coho returns in 1986 are expected to be below average and no allowable harvest is anticipated. The 1986 Stikine chinook return is expected to be above average but no harvestable surplus is expected to return to the terminal net fishing areas and the river. Terminal and in-river commercial gillnet fisheries should be managed to minimize the incidental harvest of chinook salmon.

3.2 Taku River

Taku River stocks of sockeye, coho, chum and pink salmon are anticipated to return at below average levels. Conservation actions may have to be taken to achieve coho escapement goals and, therefore, careful in-season monitoring of terminal areas will be required. Chinook returns may be above average but efforts should continue to rebuild these stocks.

3.3 Alsek River

An above average return of sockeye salmon to the Alsek River is expected for 1986. Management actions implemented in 1984 to improve early run sockeye escapements should continue. A below average return of coho is expected. Conservation measures for the rebuilding of chinook runs should continue.

4.0 Review of Research Program

Research on the Transboundary rivers has been conducted primarily on sockeye stock identification and escapement since 1982 on the Stikine and Taku rivers. Some work has also been accomplished to evaluate escapement of other species. Accomplishments and findings include:

1. Sockeye scale pattern analysis and parasite prevalence can be used to reasonably identify Stikine and Taku River stocks and other Alaskan and Canadian stocks.

2. On the Stikine River, Tahltan and non-Tahltan sockeye can be identified by scale characteristics, parasite prevalence, egg diameter and electrophoretic traits.

3. Timing of some sockeye runs through Sumner Strait and District 111 have been determined by tagging and/or scale studies.

4. Sockeye stock identification using electrophoresis and occurrence of a brain parasite warrants further investigation for specific application.

5. Hydroacoustic (sonar) techniques used with test net catches for species allocation show some promise for estimating escapement of all species. Testing has been done on the Stikine River.

6. On the Taku River, mark-recapture methods are being used to provide escapement estimates for sockeye, chum, coho and pink salmon in 1985.

7. Separation of Taku and Snettisham sockeye in the District 111 fishery was investigated by scale pattern analysis.

8. Radio tagging was used in 1984 on the Taku River to increase understanding of sockeye migration and spawning distribution.

9. Alsek River studies have received lower priority but annual catch monitoring is done and spawning ground surveys and weir counts are conducted.

5.0 Enhancement

A number of potential enhancement opportunities have been identified in the Transboundary river drainages. A number of these involve increasing the available habitat to salmon through the removal of blockages or providing passage facilities above barrier falls. Other projects would provide better utilization of existing habitat through lake fertilization and by conducting fry plants in systems that are lacking spawning areas. In 1985, Tahltan Lake in the Stikine watershed was fertilized on an experimental basis in an effort to increase smolt size and survival to adults.

The State of Alaska and Alaskan private nonprofit hatchery operators have constructed several hatchery facilities that will contribute salmon to Alaskan fisheries that are partially managed for Transboundary River stocks. The siting of these fisheries was planned with the goal of minimizing the impact of hatchery production on natural stocks. In some instances, new management approaches will be needed to insure that this goal can be met.

6.0 Data and Program Needs

The Committee identified four general program areas as relevant and important to the development of management programs. These are: (1) establish escapement goals for each species and stock; (2) identify conservation concerns by developing accurate run projections; (3) develop management systems that will achieve escapement goals and meet required catch allocations; and (4) achieve ability to reconstruct annual runs by enumerating catches and escapements by evaluating biological parameters. Specific data and program needs for each river are presented.

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1.0 TERMS OF REFERENCE

Transboundary River Technical Committee - Terms of Reference

In order to implement the concept of cooperative management of Transboundary stocks for 1985 and beyond with the view to:

(a) optimizing natural production with shared benefits;
(b) examining enhancement potential;
(c) developing a biological data base;
(d) determining methodology for future in-season management;

the Transboundary Technical Committee will undertake the following:

(1) compile and evaluate, to the extent possible, all relevant fisheries performance data and determine the current status of Transboundary salmon stocks;

(2) identify the total allowable catch and proposed management strategies for 1985 and beyond including:

(i) escapement needs and how they will be determined,
(ii) run expectations and how they will be determined,
(iii) sampling design for stock separation on the Stikine and Taku rivers and in District 106 and District 111;

(3) provide an updated list of current and proposed enhancement opportunities and their impact on natural Transboundary fish stocks;

(4) provide an updated priorized list of research needs;

(5) review and interpret to the extent possible results from biological programs;

(6) report to the Governments of the United States and Canada annually.

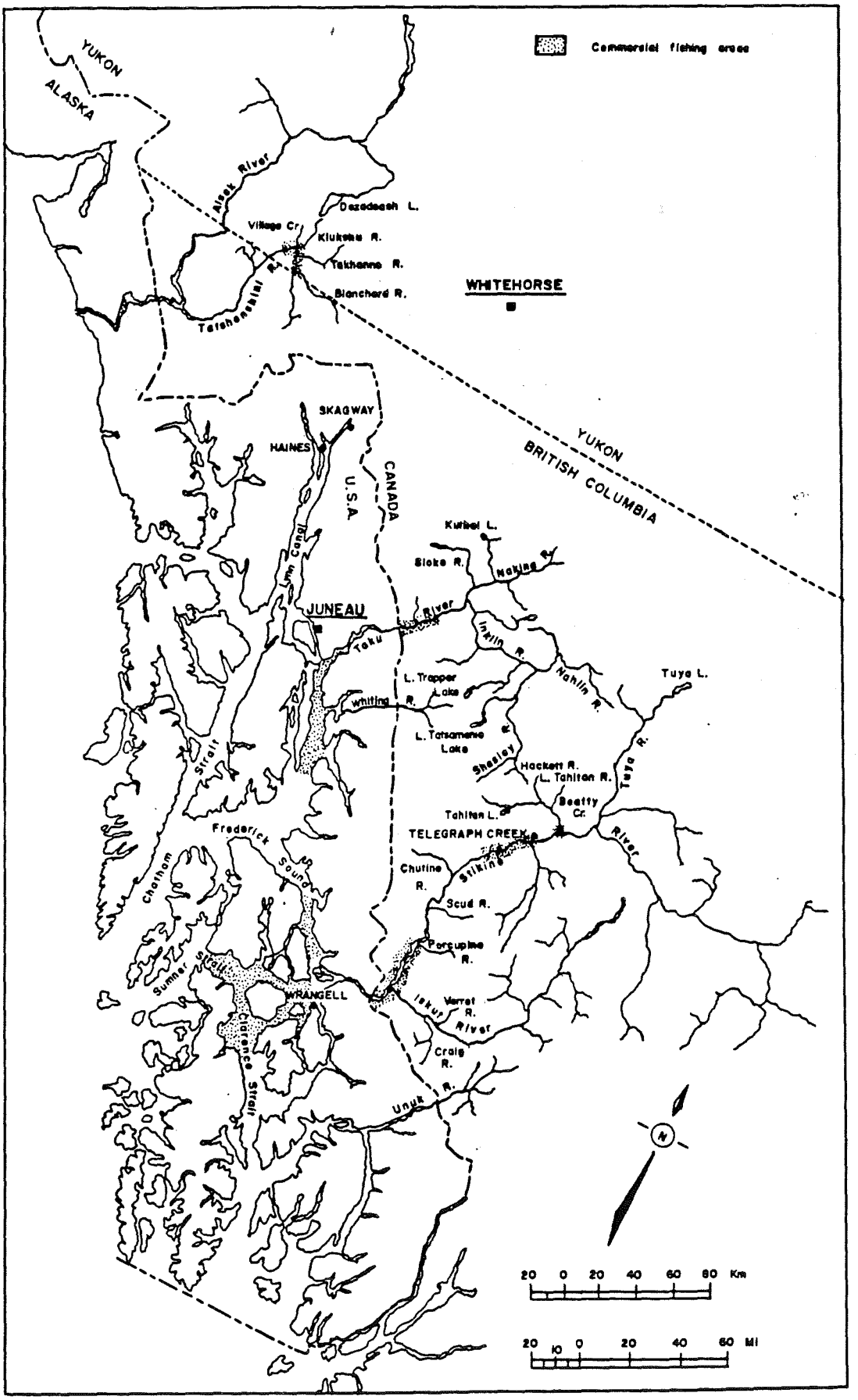


Figure 1: Southeast Alaska - Canada Transboundary Areas

2.0 1985 Review of Fisheries and Stock Status

2.1 Stikine River

Salmon fisheries for Stikine River salmon include: the Alaskan drift gillnet fisheries located in District 106, 108 and to a lesser extent in District 104; Alaskan troll fisheries primarily located in the northern portions of S.E. Alaska; and, the Alaskan sport fisheries centered near Wrangell and Petersburg. In Canada, Stikine salmon are harvested in the lower river commercial fishery (lower 60 km of river in Canada), a small commercial fishery and an Indian food fishery located near Telegraph Creek, and a sport fishery which accesses only a limited number of headwater locations.

The Stikine River produces significant numbers of chinook, sockeye and coho salmon and steelhead; comparatively lower production of pink and chum salmon originates from the Canadian portion of the drainage.

Management efforts in Alaskan gillnet fisheries harvesting Stikine stocks are directed towards all five species of salmon but concentrate on sockeye, pink and coho salmon. The Canadian commercial gillnet management regimes focus primarily on sockeye and coho, whereas the Indian food fishery targets on chinook and sockeye salmon. The Alaskan troll and sport fisheries are directed at chinook and coho salmon. Canadian sport fishermen though currently comprising a relatively small effort target on chinook and steelhead.

Harvest sharing and management objectives for Transboundary stocks are outlined in Annex iv, Chapter 1 of the Treaty. Provisions for the Stikine River were established for 1985 and 1986 which: i) permit Canada to annually harvest 35% of the total allowable catch of sockeye originating in the Canadian portions of the Stikine River, or 10,000 such sockeye, whichever is greater; ii) allow Canada to annually harvest 2,000 coho; iii) obligate both parties to take appropriate management action to rebuild chinook salmon stocks to an escapement goal of 19,800 to 25,000 by the year 1995; iv) recommend a conservative management strategy in 1985 in anticipation of a below average sockeye return; and v) allow Canada to incidentally harvest chinook, pink and chum salmon in the commercial fisheries.

The basic management objectives of the Alaskan District 106 and District 108 drift gillnet fisheries were as follows:

1) Minimize the harvest of chinook salmon to rebuild the stocks and achieve the treaty escapement goal by 1995 and stay within the Board of Fisheries guidelines for Southeast Alaska chinook catch limitations.

2) Manage the sockeye fisheries to at least achieve the escapement goal of 35,000 to 40,000 fish at Tahltan Lake and harvest Alaskan sockeye stocks while achieving desired escapements.

3) Provide for existing subsistence fisheries, primarily on sockeye salmon.

4) Manage hatchery returns of chinook and coho salmon in a manner that prevents overharvesting of wild stocks. Conduct hatchery harvests in terminal areas that maximize the harvest of hatchery fish.

5) Manage the pink fishery to provide for optimum spawning escapement.

6) Manage the coho fishery to provide for good escapements in index systems.

The management objectives of the Alaskan Troll fishery near the terminal area of the Stikine River were as follows:

1) Minimize the harvest of spawning chinook salmon returning to the Stikine River in order to rebuild the stocks and achieve the Treaty escapement goal by 1995.

2) Provide for a limited troll fishery in a portion of Wrangell Narrows in District 106 and in District 110 on hatchery chinook. Provide for troll fisheries in Districts 106 and 108 in terminal hatchery harvesting areas for coho.

The management of the District 106 and District 108 gillnet fisheries is directed at sockeye early in the season, pink salmon in mid-season and coho at the end of the season. Occasionally management actions are taken to minimize the harvest of adult or feeder chinook salmon and to have directed fisheries on summer chum salmon. Sockeye management is based upon pre-season expectations, Stikine River index fishery, test fishing, stock separation though scale and parasite analysis, fishing effort, Canadian fishery performance and catch per unit effort (CPUE). Pink salmon management is based upon predicted run strength, CPUE and observed escapements in and off the mouth of salmon streams. Coho salmon management is based upon catch rates in the troll fishery, incidential harvest of coho during the pink salmon fishery, CPUE and the in-season estimates of hatchery fish in the non-terminal gillnet fisheries.

The primary objective of the Canadian Stikine salmon management in 1985 was to achieve a minimum harvest of 10,000 sockeye or 35% of the total allowable catch (whichever was greater), while providing for an escapement of 58,300 to 65,000. Weekly telephone conferences with ADF&G were held in-season to obtain estimates of U.S. interceptions in Alaskan gillnet fisheries. Harvest guidelines for the Canadian fishery were developed for succeeding weeks based on the following formula:

$$\frac{(C6A(x) + (C6B(x) \times f_2 + (C8(x)\ f_3)}{0.65^A} \times 0.35^B = Cc\ (x+1)$$

Where: C6A(x) = Alaskan catch in Sumner Str. in week x
f_1 = proportion of Stikine stocks in week x as determined by scale patterns analysis (SPA)
C6B(x) = Alaskan catch in Clarence Str. in week x

f_2 = proportion of Stikine stocks in week x - initially a factor of 0.05 was used (based on ADF&G estimate) but later changed in season whenever SPA results became available.

C8(x) = Alaskan catch in District 108 in week x

f_3 = proportion of Stikine stocks arbitrarily set at 0.90

A = expansion factor applied to weekly estimated U.S. interception to determine T.A.C.

B = proportion of T.A.C. to which Canada was entitled

Cc (x+1) = guideline harvest for Canadian fishery in week x+1

The Canadian fisheries were monitored on a daily basis in both upper and lower river locations by resident assistant Fishery Officers who relayed catch information to the DFO office in Whitehorse.

During the 1985 season the District 106 drift gillnet fishery was open from June 16 to September 23 for 38 days of fishing and produced a record total harvest of 1,012,670 fish. This fishing time and harvest compares to the respective 1979-84 averages of 28 days and 471,255 total harvest. An additional 10,397 fish were harvested in 1985 in the Crystal Lake Hatchery terminal areas.

The District 108 gillnet fishery in 1985 was open in part of Frederick Sound for two days each week for six weeks. The fishery was opened in late July for one week to help monitor the sockeye return and in mid August through mid September to harvest surplus pink salmon and also to monitor the Stikine coho return.

The Canadian fishery in the lower Stikine opened on June 24 and closed on September 3 during which time a total of 22.5 days were fished. This was 53% decrease in fishing time over the 1979-83 average of 48 days. A total catch of 22,696 was recorded which was 21% below the 1979-83 average.

In the upper Stikine, the Indian food fishery commenced during the week of June 8-15 and continued through the end of August. A record total subsistence catch of 8,225 was taken compared to the 1979-84 average of 5,060. The upper Stikine commercial fishery netted 1,146 salmon during the six days it was open over the period from June 24 to August 12.

2.1.1 Sockeye

The 1985 harvest expectation for Stikine sockeye was 15,000 to 35,000. This was based upon the below average Tahltan escapement of the major brood year of only 11,000 in 1980.

The harvests of sockeye in the District 106, District 108, and the Canadian food and commercial fisheries and the Tahltan Lake weir count for recent years are shown below:

	1985	1979-1984	1971-1978
Canadian Commercial Harvest	17,093	16,747*	1,200**
Canadian Food Harvest	7,287	4,221	2,875
Alaska District 108 Harvest***	1,060	5,566	17,165
Alaska Section 6A Harvest****	172,107	65,600	36,048
Alaska Section 6B, C and D Harvest	93,195	49,506	18,945
Tahltan Lake Weir Escapement	67,326	25,718	22,508

* 1984 commercial fishery closed-average is 1979-83
** 1975-78 average only-no commercial harvest prior to 1975
*** 1974, 75, 76, 78, 83, 84, 85 Directed sockeye fishery closed for at least 5 weeks
**** 1978, 1984 Fishery closed first 5 weeks

The return of Stikine River sockeye was much greater than expected in 1985. Directed commercial harvests occurred on Stikine stocks in both Alaska and Canada. The Section 6A fishery in Sumner Strait was open one week (statistical week 25) and closed the next week (week 26) to allow additional escapement into the Stikine in anticipation of expected below average returns. A record harvest of 265,302 sockeye was harvested in all of District 106 of which 172,107 were landed in Sumner Strait. This exceeded the previous record by approximately 38% and was roughly twice the 1979-84 average. A harvest of 1,060 sockeye was taken in District 108 during the one week in July it was open.

The Canadian lower river commercial fishery harvested 17,093 sockeye. The fishery was closed during the second week of the season (week 27) to allow additional up-river escapement due to the expected weak return. Preliminary early season stock separation results in District 106A had indicated a weak Stikine run. The fishery was re-opened during week 28 and remained open through September 3. A record 7,287 sockeye were caught in the upper Stikine Indian food fishery (1979-84 average = 4,221). An additional 1,084 sockeye were recorded in the upper commercial fishery.

The post-season analysis of the 1985 Stikine sockeye stock separation data is not yet complete. However, a preliminary estimate of total run size is provided based on results of the catch and escapement data analysed to date.

The available information suggests the following:

1. a total Canadian in-river harvest of 25,500;

2. a Tahltan sockeye escapement of 67,300 (weir count) and a total watershed escapement estimate of 198,000 sockeye based on Canadian stock separation results from parasite frequency, electrophoretic and age composition data;

3. an Alaskan interception estimate for Districts 106 and 108 totalling 44,500 sockeye based on Alaskan scale patterns analysis.

The implied total stock size of Stikine sockeye in 1985 from the above information is 267,500 of which a total of 69,500 (36.7% to Canada) were harvested, and 198,000 escaped. At this stock magnitude and with an interim escapement goal of 58,300 to 65,000, the total allowable catch (T.A.C.) should have ranged from 202,500 to 209,200. According to the provisions of the Treaty, Canada's entitlement at 35% of the T.A.C. should have amounted to 70,900 to 73,200. The actual Canadian harvest 25,500 represented approximately 13% of the estimated T.A.C. The estimated U.S. catch of 44,500 Stikine sockeye represented approximately 22% of the estimated T.A.C. although the U.S. entitlement should have been 131,600 to 136,00; ie. 65% of the T.A.C. If this total return is correct, it would have been the largest return ever recorded.

The fact that both countries did not harvest the number of sockeye to which they were entitled greatly benefitted the escpapement. The 1985 total escapement estimate of 198,000 Canadian origin Stikine sockeye is approximately three times the interim goal. It must be emphasized that the existing escapement goals were developed from incomplete data and therefore will be subject to revision as the data base improves. Fundamental to improving escapement goals will be the examination of stock:recruitment data compiled from a wide range of escapements. The record escapement in 1985 will contribute a key element to this analysis.

2.1.2 Coho

The pre-season expectation for Stikine coho was for a below average run with total stock projection of 34,000 to 50,000.

The following gillnet harvests of coho were recorded in the Stikine River and its approaches in recent years:

	1985	1979-1984	1971-1978
Canadian Commercial Harvest	2,172	8,434*	17**
Alaska District 108 Harvest***	1,926	6,753	15,737
Alaska District 106 Harvest****	91,074	37,496	41,754
Alaska terminal sport catch	N/A	N/A	N/A

* 1984 commercial fishery closed - average is 1979-83
** 1975-78 average only; no commercial harvests occurred prior to 1975
*** 1975, 1979 Directed fishery closed
**** 1973, 1979 Directed fishery closed

The 1985 coho return to the Stikine River drainage was mixed with indications of both above and below average returns present. In District 108, only a portion of Frederick Sound was open for two days per week and catches were some of the lowest on record. The District 106 fishery was restricted to two days per week. The harvest in Section 6A was 50,509 coho and in Section 6B and 6C 40,565 coho were caught. An additional 9,569 coho were harvested in the Crystal Lake Hatchery terminal areas. The total District 106 coho catch constituted a record harvest and was substantially above the 1979-84 average.

The directed commercial fishery in District 106 began on September 1 when the fishery was reduced to two days per week. Approximately 17,000 coho were harvested during the directed fishery. Hatchery contributions in southern southeastern Alaska, which occurred from all the inside hatcheries in 1985 are believed to have been high. Estimates of hatchery contributions will be made when final results of the tag recovery data are available.

A total of 2,172 coho were caught in the Canadian commercial fishing, of which 1,490 were harvested during the last week of the fishery. The coho first started to show in the fishery around the first of August and the fishery ended the first week in September. The Treaty assigned a 1985 catch of 2,000 fish to the Canadian fishery. The relative abundance of coho in-river in 1985 will be evaluated upon analysis of the Canadian test fishery data.

2.1.3 Chinook

The pre-season expectaton for Stikine chinook salmon was for a below optimum escapement. Restrictions in commercial gillnets were recommended to reduce incidental harvests. The harvest of chinook salmon in the terminal area and in-river during recent years are as follows:

	1985	1979-1984	1971-1978
Canadian Comm. Fishery (Lower River)	347	924	144[a]
Canadian Food Fishery	887	760	378
Canadian Sport Fishery	N/A	N/A	N/A
Alaska District 108[b]	19	341	3,350
Alaska District 106[c]	1,689	1,382	1,761
Alaska Sport Fishery (all areas combined)[d]	2,659	1,769	N/A
Little Tahltan River Index Escapement	1,598[e]	1,892	633[f]

[a] No commercial harvest prior to 1975
[b] Directed Fishery eliminated in 1978
[c] Primarily immature feeders
[d] Creel census data only available for 1983, 1984 and 1985
[e] From aerial survey. Fence count in 1985 was 3,146.
[f] 1975-78 average

The 1985 escapement of chinook salmon to the major index tributary, the Little Tahltan River, continued to be less than the recent five year average.

2.1.4 Chum and Pink

Pink or chum expectations were not developed for 1985.

The harvests of chum and pink salmon in District 108 and the Canadian fishery for recent years are list below:

	Chum Salmon 1985	1979-1984	1971-1978
Canadian Commercial Harvest	532	664*	0
Canadian Food Harvest	4	4	0
Alaska District 108 Harvest	1,892	2,293	4,521

	Pink Salmon 1985	1979-1984	1971-1978
Canadian Commercial Harvest	2,321	1,854*	0
Canadian Food Harvest	35	57	0
Alaska District 108 Harvest	5,325	7,996	8,482

* 1979-83 average. Fishery not opened 1984

No fisheries are targeted on the small stocks of pink and chum salmon that occur in the Canadian portion of the Stikine River. Four days of fishing occurred during the middle of August on good pink returns that were observed in the Frederick Sound portion of District 108 and the North Arm of the Stikine.

2.2 Taku River

The Taku River produces significant numbers of all five species of Pacific salmon and steelhead trout. Alaskan fisheries for Taku River salmon include: the District 111 drift gillnet fishery; troll fisheries primarily located in Icy Straits and outer coastal areas (Districts 113, 114, 116); a sport fishery located around the Juneau area; and, the lower Taku River subsistence fishery. The principal Canadian harvest occurs in the lower river commercial set and drift gillnet fishery. Sport harvests of chinook, coho and steelhead occur in a number of headwater tributaries. A native food fishery operates intermittently in the Canadian portion of the river and harvests are usually small. Management efforts directed on the Alaskan gillnet fishery focus primarily on sockeye and chum salmon and frequently on coho salmon as well. Canadian gillnet management regimes have focused on sockeye and coho salmon. Regulations for the Alaskan troll fishery to conserve chinook and coho salmon are in place as are regulations to conserve chinook in the sport fisheries of both countries.

Conservation and harvest sharing objectives for Transboundary rivers Pacific salmon stocks are outlined in Annex IV, Chapter 1 of the Treaty. Provisions for the Taku River are established for 1985 and 1986 which:

1) permit Canada to annually harvest 15% of the total allowable catch of sockeye originating from the Canadian portion of the Taku River;

2) allow Canada to incidentally harvest chinook, pink, chum and coho salmon during the directed sockeye salmon fishery;

3) obligate both parties to take appropriate management actions to rebuild chinook salmon stocks to an escapement level of 25,600 to 30,000 by the year 1995.

The management regime of the District 111 gillnet fishery consists of two basic components: 1. management of sockeye salmon; and 2. fall chum salmon management. Each component is managed on the basis of catch per unit effort with weekly fishing effort determined by comparing current data with an historic data base. Above average CPUE values may justify extensions in fishing time, whereas below average values generally result in restricted openings. At times, special measures for coho, chinook and pink salmon conservation are implemented.

The basic management objectives of the Alaskan District 111 drift gillnet fishery in 1985 were as follows:

1. to achieve a spawning escapement goal of 71,000 to 80,000 Canadian origin Taku sockeye salmon while harvesting 85% of the total allowable catch;

2. to conserve Snettisham sockeye in order to achieve an escapement goal of 34,000 (12,000 Speel plus 22,000 Crescent);

3. to provide for a Taku River subsistence fishery in the Alaskan portion of the river;

4. to provide, on an experimental basis, extended openings for pink salmon with specific mesh size regulations imposed to restrict incidental sockeye salmon catches; and

5. to provide U.S. fishermen with opportunities to selectively harvest hatchery-produced summer chum and coho salmon from Port Snettisham.

Complex regulations were also imposed in the Alaskan sport and troll fisheries with the objective of increasing escapements of Taku chinook and coho salmon. These included delayed troll openings in the chinook salmon season, closures in the Taku Inlet sport fishery and mid-season troll closures during the coho season.

The objective of Canadian Taku salmon management in 1985 was to achieve a harvest share of 15% of the total allowable catch of sockeye while providing for a minimum escapement goal of 71,000 to 80,000. Weekly telephone conferences with ADF&G were held in-season to obtain estimates of the U.S. sockeye catch in the District 111 gillnet fishery. Harvest guidelines for the Canadian fishery were developed for succeeding weeks based on the pre-arranged harvest sharing regime, and accounting for the estimated contribution of U.S. origin sockeye to the District 111 catch. Canadian managers developed weekly guideline harvests based on the following formula:

$$\frac{C11(x) \times 0.85}{0.85^{A}} \times 0.15^{B} = Cc(x+1)$$

where: C11(x) = Alaskan gillnet catch in District 111 in week x. This figure was discounted by 15% to account for U.S. origin production.
A = expansion factor applied to U.S. interception to determine estimate of total allowable catch (T.A.C.)
B = proportion of T.A.C. to which Canada is entitled.
Cc = Canadian in-river guideline harvest for week x+1.

The Canadian fishery was monitored on a daily basis by a resident assistant Fisheries Officer who relayed information to the DFO Whitehorse office. This information was then collated and exchanged with ADF&G during the weekly telephone contacts. The Canadian fishery was subsequently regulated on a weekly basis to maintain a 85:15 U.S./CAN catch sharing arrangement.

During the 1985 season the District 111 drift gillnet fishery was open from June 16 to Sept. 25 for a total of 46 days. The total harvest was 563,034 salmon. This is the most time allowed during any season since 1972 and was partially attributed to average to above average returns combined with a below average fleet size. The highest effort during any single week was 114 boats, similar to the 1979-84 average of 115 boats. Additional fishing time in restricted areas was provided this year to harvest Snettisham Hatchery coho and chum salmon stocks, and Taku River pink salmon.

The Canadian in-river fishery was open from June 24 to August 20 with a total of 16 days of fishing (1979-84 average = 43). An average of 11 fishermen particapated in each opening. Total effort was substantially below average i.e. 178 boat days compared to the 1979-84 average (excluding 1982) of 399 boat days. A total catch of 19,905 was recorded which is approximately 56% below the 1979-84 average (excluding 1982) of 45,600.

2.2.1 Sockeye

The pre-season expectation for Taku sockeye salmon was for an above average return with a total allowable catch in the 75,000 to 115,000 range and a preliminary escapement goal of 71,000 to 80,000.

Canadian and Alaskan catches of Taku area sockeye recorded in 1985 are presented below alongside recent average values:

	1985	1979-1984	1971-1978
Canadian Fishing Harvest	14,244	18,280*	0
Alaskan District 111 Harvest	87,100	81,212	58,165
Alaska Taku R. Subsistence	1,000-2,000	0	0

* Excludes 1982 because of restricted fishery

The District 111 sockeye harvest of 87,100 is the third largest since Alaskan statehood. The peak of the sockeye fishery occurred during July 14-17 when 20,000 sockeye were caught by 79 boats. By that date approximately 52% of the total sockeye catch had been landed. Preliminary estimates of Snettisham

contribution to the District 111 fishery based on 1983 and 1984 scale patterns analysis, parasite prevalence and comparative escapement data varied from 10 to 25%. This range translates into a catch of Snettisham stocks in District 111 of 8,800 to 22,000 sockeye. Port Snettisham was closed to fishing during the period from July 7 to August 11 to increase escapements into depressed Speel and Crescent Lake systems. Despite these efforts the desired escapement levels for Speel and Crescent Lakes of 12,000 and 22,000 sockeye salmon respectively, were not met.

Compared to previous years, the 1985 Canadian catch of 14,244 Taku sockeye was 22% below the 1979-84 average (excluding 1982) of 18,280. Catches were high for a relatively prolonged period from late July through mid-August.

Escapement counts at weired systems in the Taku and Snettisham drainages for 1983 through 1985 are as follows:

	1983	1984	1985
Little Trapper Lake (Taku)	7,502	13,084	14,889
Little Tatsamenie lake (Taku)	N/A	N/A	13,015
Hackett River (Taku)	N/A	N/A	2,309
Nakina carcass weir (Taku)	N/A	N/A	1,150
Crescent Lake (Snettisham)	14,456	6,707	7,249
Speel Lake (Snettisham)	10,362	9,764	7,073

The preliminary estimate of total 1985 Taku sockeye salmon spawning escapement upstream of Canyon Island determined by adult mark-recapture program was 108,000 (Schaefer population estimate of 122,000 minus the Canadian catch). This is above the preliminary escapement goal of 71,000 to 80,000 sockeye. By comparison, total escapement estimates as determined by previous tagging studies are listed below:

YEAR	POPULATION EST.	CANADIAN CATCH	POTENTIAL SPAWNING ESCAPEMENT
1981	36,300-43,600	10,900	25,400-32,700
1983	127,000-148,000	17,100	109,900-130,900
1984	134,000-135,000	27,200	106,800-107,800
1985	122,000	14,200	107,800

Extensive aerial surveys for sockeye were not conducted in 1985 as emphasis shifted to monitoring by counting weirs. A total of 3,528 sockeye were caught in the Canyon Island test wheels.

Post-season analysis of the total return of Taku sockeye indicates the following:

1. a total escapement of 108,000 (Schaefer population estimate minus Canadian catch);

2. an Alaskan commercial gillnet catch of 65,000 to 78,000 (based on Snettisham contribution estimates of 10-25% to the District 111 fishery - 1985 parasite prevalence data and comparative escapement data suggest

a 10% contribution whereas the 1984 scale patterns analysis indicated a 25% contribution);

3. an Alaskan in-river subsistence harvest of 1,000-2,000;

4. a Canadian catch of 14,000.

These data suggest a total run size of 188,000 to 202,000. With an interim escapement objective of 71,000 to 80,000 the actual total allowable catch (T.A.C.) of sockeye at this stock size could have been in the range of 108,000 to 131,000. Under the provisions of the Treaty, Canada was entitled to 15% of the T.A.C. or 16,200 to 19,700 of the above stated range. The actual Canadian harvest of 14,200 therefore represented 10.8%-13.1% of the 1985 T.A.C. of the Taku sockeye.

On the other hand, Alaskan fisheries were entitled to 85% of the T.A.C. of Taku sockeye. The suggested U.S. harvest range is 91,800 to 111,400. The estimated U.S. catch of 66,000 to 80,000 Taku sockeye actually represented from 50% to 74% of the post-season estimate of the T.A.C.

The fact that the actual catches in both countries were below respective entitlements (as determined by the post-season analysis) benefited escapement. Although the total estimated escapement was above the interim escapement goal range of 71,000-80,000 it must be emphasized that this range is an interim goal which will be revised once more spawner:return data becomes available. Estimation of the optimum goal will be possible with escapements which cover a broad range of values in conjunction with associated total run estimates.

2.2.2 Coho

The pre-season expectation for Canadian origin Taku River coho was for a total run of 34,000 to 50,000, although it was acknowledged that our ability to predict coho returns is hindered by lack of good escapement information.

During 1985, the following gillnet catches of coho salmon were recorded in Taku Inlet and Taku River fisheries:

	1985	1979-84	1969-78
Canadian Fishery	1,770	5,953*	0
Alaska District 111 Gillnet	52,329	28,007	35,577

* excludes 1982

The 1985 District 111 harvest of 52,329 coho salmon was the highest on record and almost double the 1979-84 average of 28,000. Considering the relatively light fishing effort the coho catch was exceptionally good. Coho salmon were available to the District 111 fishery from the Salmon Creek and Port Snettisham hatchery production. This year six additional fishing days were allowed in Speel Arm to target on Snettisham hatchery stocks. We are currently unable to estimate the contribution of Canadian origin Taku coho in the District 111 catch.

The Canadian fishery harvested 1,770 coho salmon incidentally in the directed sockeye salmon fishery. This catch was substantially below the 1979-84 average of 5,953 (excluding 1982).

Programs to enumerate sockeye at Little Trapper Lake, Litte Tatsamenie Lake and Hackett River weirs were extended to cover the period of coho salmon migration. Extremely low counts were recorded at the Little Trapper weir; with less than 50 coho salmon observed in the vicinity (actual weir count was only two). A long-time resident of the area who operated the weir reported the 1985 coho return to this area was the poorest he had ever observed. Similar results, though not quite as dramatic, were recorded at Little Tatsanemie were a total coho escapement of 201 was observed (weir count = 106). Sport fishermen knowledgable of the area judged the return below average. Although one must be cautious in relying heavily on anecdotal information, it need not be disregarded altogether. Unfortunately, the lack of comparative weir data does not permit verification of these observations. The Hackett River weir count was 931 coho salmon; however, the lack of comparative data makes it difficult to judge whether this represents a good, average or poor return.

By contrast to the relatively poor headwater coho salmon escapements, lower river escapements appeared to be good, although only limited surveys were conducted. An aerial count of 2,200 coho was obtained from Flannigan's Slough which is located just upstream of the U.S./Canada border. A total of 1,208 coho salmon were captured in the Canyon Island test fishwheels. The preliminary in-river coho salmon population estimate based on tagging data is 46,600 (adjusted Schaefer estimate). Port Snettisham was not surveyed for coho escapements.

2.2.3 Chinook

A strong return of six-year-old chinook salmon and a below average five-year-old component was expected in 1985. The target escapement range of 25,600 to 30,000 was not expected to be achieved and therefore efforts to minimize terminal area catches were implemented:

Catch information for 1985 appears below:

	1985	1979-84
Alaskan District 111 Gillnet	2,950*	2,260*
Alaskan Sport	N/A	N/A
Canadian In-river Gillnet (adults)	326	186
Canadian Sport	N/A	N/A
Canadian Subsistence	N/A	N/A

*majority immature

Alaskan and Canadian chinook salmon catches occur incidentally in the sockeye gillnet fisheries. Usually only a small portion of the latter half of the chinook run is subjected to gillnet harvest; most of the chinook salmon spawners have migrated through the gillnet fishing areas prior to the season opening.

Returns of three and four ocean (5 and 6 year old) chinook salmon to Taku spawning tributaries were above average in 1985 (third highest observed since 1958) based on comparative aerial survey results and weir counts. Record or near record aerial estimates were recorded in all Inklin River tributaries. The Nakina carcass weir count was 2,588 (894 females, 1,644 males) compared to a 1979-84 average of 2,222 (523 females, 1,699 males). The number of chinook counted through the Little Tatsamenie and Hackett River weirs were 332 and 434 respectively.

The management escapement goal for the Taku River is 11,500 3 and 4 ocean chinook salmon observed during aerial surveys of the Nadina and Nahlin rivers. Enumeration of chinook salmon spawning in index areas of these two clearwater rivers are probably the best annual indicators of chinook salmon abundance because of water clarity and ease of surveying. In spite to above average escapement in 1985 the observed escapement in these two index rivers was only 42.5% of the management goal.

2.2.4 Chum

An above average chum return was anticipated in 1985 although it was recognized that historically chum returns to the Taku have been somewhat erratic.

Catches in District 111 and in the Canadian in-river fishery were as follows:

	1985	1979-84	1969-78
Canadian Fishery Harvest	136	8767*	0
Alaskan District 111 Harvest (Total)	107,854	78,204	

* excludes 1982 because of restricted fishery
** excludes 1975 when fall fishery was not opened

The summer chum salmon catch of 57,000 in District 111 is the second highest since Alaskan statehood, and is believed to be a result of a combined contribution of 20,000 Port Snettisham Hatchery returns and an extremely large wild stock contribution of 37,000. The majority of the summer chum salmon were caught incidentally to the sockeye salmon fishery in District 111. Five additional 24 hour fishing periods were allowed on an experimental basis during July to shift effort to lower 111B and 111C fishing sub-districts. This was done to evaluate the extent of the Snettisham hatchery contribution in areas not normally fished for sockeye salmon. During these five special periods only 5,249 chum were harvested indicating the majority of the 1985 hatchery returns migrated in from the north passing through the traditional sockeye salmon fishing areas.

The District 111 fall chum salmon harvest (beginning statistical week 34) of approximately 48,000 was above the historical 25 year average of 41,600. Higher catches could have occurred; however, effort level decreased during the fall fishing weeks when most of the fleet had moved to District 115.

The Canadian fishery harvested only 136 chum salmon which were taken incidentally during the latter part of the sockeye salmon season. This number is substantially below the previous five year average of 8,800 but was not unexpected due to Treaty-imposed restrictions.

Limited escapement information for Taku chum salmon suggests an above average number of spawners occurred in 1985. Approximately 50,000 chum were observed during aerial surveys in a mainstem river channel located opposite the King Salmon River. A total of 1,476 chum were caught in the Canyon Island fishwheels of which 859 were tagged. A preliminary population estimate of 40,500 (0.95 ci=26,700-54,400) was generated; the wide confidence interval is the result of a low number of tag returns.

2.2.5 Pink

A large pink salmon return to the Taku River was forecast in 1985 with an allowable catch of a quarter million fish.

Pink salmon catches in Alaskan and Canadian gillnet fisheries in 1985 were as follows:

	1985	1979-84	1969-78
Alaskan District 111 Harvest	312,801	170,157	72,637
Canadian Harvest	3,373	12,018	0

The 1985 pink salmon harvest in District 111 was the largest in the history of this fishery. Most of the catch was taken during the normal sockeye salmon openings and during later openings in Stephens Passage. Additional fishing time in Taku Inlet was permitted this year to harvest pink salmon with a maximum mesh size of 5 inches (12.7 cm). Two 24 hour openings were allowed in July during which time a total of 13,353 pink salmon and 4,710 sockeye salmon were harvested. The ratio of pink to sockeye in this fishery was 2.8:1 compared to a ratio of 3.7:1 (pink:sockeye) in the July openings during weeks 28 through 30.

The Canadian in-river harvest of 3,373 pink salmon occurred incidentally to the sockeye salmon fishery.

Escapements into the Taku River and the local Stephan Passage streams were very large in 1985. It was estimated that more than 1.0 million pink salmon spawned in the Nakina River - the major pink salmon spawning stream in the Taku (based on tag recovery and carcass pitch information). A total of 45,111 pink salmon carcasses were counted at the Nakina carcass weir. The test fishwheels at Canyon Island caught 27,671 pink salmon in 1985.

2.3 Alsek River

Salmon fisheries for Alsek River salmon include an Alaskan set net fishery in Dry Bay at the mouth of the Alsek, and Canadian Indian food and sport fisheries in the Tatshenshini River and tributaries. Sockeye and coho are the predominant species taken in the Dry Bay fishery while sockeye and chinook comprise the majority of the Canadian catch. Under the terms of the Treaty, both countries were required to take appropriate management actions in 1985 to continue the

process of rebuilding early sockeye and chinook stocks to achieve escapment goals. In the event of a below average sockeye return additional conservation measures would be required.

In Alaska, the Dry Bay fishery was open a total of 33 days, well below the 1976-1984 average of 46 days. The total salmon catch of 11,300 was only 48% of the 1984 catch of 23,600 and 29% of the 1976-1984 average of 39,400.

In Canada, restrictions in the sport and Indian food fisheries, including delayed openings, weekly closures and reduced bag limits were implemented to protect early sockeye and chinook. The 1985 salmon catch by Canada was only 1,900 or 54% of the 1984 catch of 3,500 and 36% of the 1976-1984 average of 5,350. Specific catches and escapements are discussed under the species headings below.

2.3.1 Sockeye

The 1985 outlook for sockeye returns to the Alsek River system based on brood year spawning escapements, sex composition and assumptions about productivity and age composition of returns was for a below average run of 46,000. This forecast return fell within the agreed escapement goal range of 33,000 to 58,000. On this basis a conservative management regime was recommended with particular emphasis on rebuilding the early segment of the run.

Restrictions in both Canadian and Alaskan fisheries were continued for the third year during 1985 to help rebuild early run sockeye escapement. In Alaska, the opening in the Dry Bay set gillnet fishery was delayed by two weeks, until June 17. Effort levels in Dry Bay were below average during the 1985 sockeye season. Fishing time was limited to one day per week during the first four weeks and the fishery was closed for two weeks in late July. A total of 33 days was fished in the Alaskan fishery compared to the 1976-1984 average of 46 days. The 1985 Alaskan setnet harvest of 5,600 was approximately 39% of the 1984 harvest and 19% of the 1976-1984 average. A minor subsistence catch of less than 100 sockeye is taken annually in the Dry Bay area. In Canada, retention of sockeye in the sport fishery prior to September 14 was prohibited. The Indian Food fishery was closed until July 21 and then most tributaries where food fishing is allowed were open with additional weekly fishing time permitted toward the end of the season. The estimated sockeye catch in Canada was 1,450 including 1,300 in the food fishery and 150 in the sport fishery. The 1985 catch was only 54% of the 1984 catch and 30% of the 1976-1984 average.

The 1985 Alsek River sockeye return was extremely poor as projected, and the following harvests and escapements were recorded compared to historic levels:

	1985	1980-84 Average	1976-84 Average
Alaska Commercial Dry Bay Fishery	5,600	22,100	29,000
Alaskan Subsistence	100	100	100
Canadian Sport Fishery	150	600	600
Canadian Subsistence Fishery	1,300	2,400	4,300
Klukshu River Weir Index Escapement	17,300	17,400	15,400

Conservation measures to increase the early run sockeye escapement resulted in no increase into Klukshu Lake over the 1980 brood year. Only 397 sockeye were counted through the weir by August 13, 1985, while 984 were passed by that date in 1980. The escapement of later returning sockeye in 1985 was above parent year returns. The weir count of sockeye after August 13 was 18,222 in 1985 compared to 10,766 in 1980. The late spring appeared to delay most salmon river entries in 1985 so differences in early and late stocks are less defined than normal.

The final 1985 weir count at Klukshu was 18,620 sockeye. The potential spawning escapement is calculated by subtracting the subsistence catch from this figure (18,600-1,300 = 17,300). Assuming Klukshu represents 60% of the total Alsek escapement in Canada, the total Alsek escapement approximated 29,000. This escapement estimate falls short of the escapement goal range of 33,000 - 58,000. The estimated return (catch plus escapement) in 1985 appears to have been in the order of 36,000 implying an overall harvest rate of 19%. This return fell short of the projected return of 46,000.

2.3.2 Coho

The coho run to the Alsek River in 1985 was predicted to be average to above average although information on which to base a forecast is extremely limited.

The 1985 Dry Bay coho harvest of 5,100 was below average. Fishing effort was normal with 14 fishermen participating and normal three-day weekly fishing periods were allowed from late August until the season ended on October 3. As with chinook, interception levels of coho outside of terminal net areas are unknown. Tag returns in 1986 from adjacent Yakutat foreland streams may give some insight to the Alsek coho ocean exploitation. Canadian harvest was light with sport coho catches not exceeding 100 fish. Escapement to the Klukshu Weir in 1985 was average with a count of 350 being recorded. Unfortunately, the coho count at Klukshu is severely hampered by snow and ice accumulations which precludes complete enumeration during the coho migration. Coho escapements are presumed to be good considering the low fishing effort in Dry Bay in late September. Most fishermen quit fishing on September 19 when the Dry Bay processing plant closed for the season, although the area remained open until October 3.

2.3.3 Chinook

Brood year escapement for chinook suggested that the 1985 return would be

average to above average. However, since recent average escapements have been lower than the goal range of 7,200 to 12,500 it was recommended that efforts to rebuild the runs be continued.

The two-week delay in the Alaskan Dry Bay fishery and the restricted sport fishing season in Canada undertaken in 1985 combined to maintain low in-river exploitation of early Alsek salmon runs. In spite of these efforts, 1985 chinook escapement through the Klukshu Weir was only 1,458, well below the 1976-84 average of 2,600 and far below expectations from an escapement of 2,500 fish in 1980. The actual escapement is calculated by subracting the subsistence catch from the weir count (1,400-100 = 1,300). The 1985 Alsek River chinook harvest and historical comparison are as follows:

	1985	1980-84 Average	1976-84 Average
Alaska Commercial Dry Bay Fishery	200	600	1,100
Alaskan Subsistence Fishery	50	50	50
Canadian Sport Fishery	150	300	300
Canadian Subsistence Fishery	150	100	100
Klukshu River Weir Index Escapement	1,300	2,200	2,500

Additional harvest of Alsek chinook is believed to have occurred outside the terminal fishery; however, no details are known about those interceptions.

3.0 1986 EXPECTATIONS AND MANAGEMENT RECOMMENDATIONS

Forecasts of returns of salmon to the Transboundary rivers, in most cases, were made as projections of returns by age class from respective parent escapement levels. Here the projected return of each age class was the product of parent escapement level, average production or return per spawner, and the average proportion of the respective age class in the historical returns. In some cases, where quantitative estimates of parent escapement were not available, qualitative projections of the 1986 return (i.e. average, below average, etc.) were made based on the relative magnitude of the run strength in the predominant brood year of the 1986 return.

Estimates of parent escapement, age composition of return, and production are required to make accurate forecasts of salmon returns. The sources and estimation procedures for this information are described below:

Four methods have been used to provide estimates of escapement of salmon for the Transboundary rivers. Those are: 1. expansion of weir counts, 2. expansion of in-river catches, 3. expansion of peak escapements estimated by aerial survey, and 4. expansion of tagged to untagged ratios in catch samples.

The method of expansion of weir counts was used for Stikine sockeye and Alsek sockeye. Here accurate estimates of escapement were available for only one stock. These were expanded to total river escapement based on estimates of the proportion of the respective stock in the return to the river. The stocks for which the weir count was available generally have attributes that can be identified in samples of the total river population.

The method of expansion of in-river catches were used for Stikine coho, Taku sockeye, coho and chum, and Alsek coho. There was almost no in-river monitoring of escapement for these species and rivers. Catch magnitudes were the only available indicator of run strength. Here the catches in the parent year were multiplied by $(1 - U)/U$, where U = the appropriate rate of exploitation, to give an estimate of escapement. Some estimates of U were based upon limited mark recapture studies . The rates of exploitation were extrapolated between brood years. These represent only qualitative estimates of parent escapement, since the assumed rate of exploitation was very subjective and cannot be verified without estimates of escapement.

The method of expansion of aerial survey estimates of peak escapement was used for Stikine chinook, Taku chinook, and Alsek chinook. Here peak counts were multiplied by an "availability factor" and reflect the inverse of the proportion of population thought to be seen by the surveyor. In some cases, only a part of the escapement was available to aerial surveys. For these cases the aerial survey estimates were further expanded based on estimates of stock distribution.

Mark-recapture methods were used to provide estimates of escapements for Taku sockeye and pink salmon. Tags were applied to the escapement population and subsequently recovered in the in-river fisheries. The catches for these fisheries were expanded to total escapement based on tagged to untagged ratios in the catch samples.

Age composition of returns is highly variable among brood years. The average proportion of age classes in the returns were used to apportion the projected return from brood year escapement to return year. The best available data were used to derive estimates of age at return but these were from a limited number of brood years and from limited sampling programs.

Estimates of return per female spawner based on standards developed by DFO were used to project returns from escapements to Transboundary rivers. Values of 6, 4.46, 5.7, 4.41, 3.9 were used for chinook, sockeye, coho, chum, and pink salmon, respectively.

3.1 Stikine River

3.1.1 Sockeye

The annual returns of sockeye to the Stikine River have consisted of three to six year old fish, with age 5 being the most important component (average of 70.3%). Sockeye escapements to the Stikine River have been indexed since 1959 through operation of an enumeration weir at the outlet of Tahltan Lake. Counts have averaged 21,000 sockeye (1959-85), and have ranged from a low of 1,500 in 1965 to a high of 67,000 in 1985. Recent five and ten year averages were 40,000 and 31,000, respectively. These are much higher than the long term average, indicating a trend of increasing returns.

The sockeye escapement to Tahltan Lake in 1981 was 51,000, third highest on record. Stock separation research conducted during the past three years suggested that, on the average, Tahltan Lake stocks compose 40% of the total Stikine sockeye population. Based on this average, the 1981 sockeye escapement was in the order of 120-130,000, and was considerably higher than the 1976-85 average of 78,000. Thus an above average return is expected in 1986. Assuming an average production from the 1980, 1982 and 1983 brood years, the total return could approach 260,000 fish.

3.1.2 Coho

Stikine coho contribute to catches in Alaskan troll and gillnet fisheries and to the Canadian in-river gillnet fishery. Unfortunately, stock separation techniques have not yet evolved to enable us to determine the degree to which Stikine coho are intercepted in Alaskan waters. Besides inadequate catch information, escapement data was also poor due to the lack of stock monitoring programs. Thus the only recent indicators of in-river run strength have been Canadian in-river catch and effort data.

In-river sampling of coho indicates that on average, the coho run was composed of roughly equal numbers of three and four year old fish. The 1986 coho return should originate from the 1982 and 1983 brood years. In 1982, the Canadian fishery recorded a catch of 16,000 coho, the highest on record. These in-river catches were expanded to total escapement based on an estimated rate of exploitation achieved by the in-river fishery on sockeye in 1982 (15.6%) and 1983 (19.3%). Because of lower water levels during the entry period of coho and

greater body size the coho were thought to be more vulnerable to the in-river fishery, accounting for the higher (20 - 25%) rate of exploitation assumed for coho.

Applying the assumed rate of exploitation to the 1982 and 1983 catches gave an estimate of total escapement for those years of 48,000 to 64,000 and 19,000 to 25,000, respectively. The female proportions in the 1982 and 1983 samples from the in-river fisheries, were 30% and 33%, respectively. Assuming these apply to the escapement and that the average production was 5.7 fish per female the projected 1986 return of coho is 58,000 to 77,000. An escapement requirement of 38,000 to 50,000 leaves 20,000 to 27,000 fish available for harvest. Considering that the majority of this harvest will be intercepted in the Alaska troll fishery, gillnet catches are likely to be below average.

3.1.3 Chinook

Extensive escapement monitoring of chinook salmon in the Stikine watershed has not been conducted. There does exist a good record of index aerial estimates of peak escapement for the Little Tahltan River. This system is believed to be one of the major chinook spawning areas and may represent up to 25% of the Canadian escapement. Comparison of aerial survey estimates with actual weir counts, indicate that peak aerial counts constitute roughly 50% of total escapement. Thus the peak aerial survey estimates of escapement to the Little Tahltan River were multiplied by 8 to give estimates of total escapement.

Based on historical age composition, the progeny from 1980 - 82 brood years will be the major contributors to the 1986 return. Using the above assumptions, the respective escapement estimates for 1980, 1981 and 1982 brood years are 16,800, 26,400 and 22,400 fish, respectively. These represent "above average" escapements. Using average sex composition and assuming an average production of 6 returns per female spawner, the estimate of the 1986 return is 64,500 (age 4 - 6). The Technical Committee interim escapement goal is 19,000 to 25,000. There is, therefore, the potential for above average return of chinook in 1986.

3.1.4 Management Recommendations

The strong return of sockeye anticipated suggests that harvestable surpluses will be available for the commercial fishery. However, the returns should be carefully monitored in-season to estimate run strength and the fishing patterns adjusted to meet escapement goals and allocation requirements. Conservation measures to rebuild chinook stocks should be continued and a conservative approach to coho management should be taken in consideration of the relatively low return expected.

3.2 Taku River

3.2.1 Sockeye

Based on the historical age composition of the Taku sockeye returns, the 1986 return will be from the progeny of 1980 - 83 escapement, with the returns from

the 1981 brood predominant. No estimates of total escapements were available from stock monitoring activities for these brood years. However, a feasibility study was undertaken by DFO in 1981 to examine the potential for mark-recapture estimation of total escapement for the Taku River. In the study, 595 tags were applied to the sockeye population, of which 25% - 30% were recovered from the Canadian fishery. Assuming that the tag recovery rate was indicative of the in-river rate of exploitation, the 1981 catch of 10,900 produced an escapement estimate of 25,400 to 32,700. This is considerably less than the preliminary escapement goal of 71,000 to 80,000. The District 111 catch in 1981 was 49,800, considerably below recent five and ten year average catches for the district of 72,200 and 70,000, respectively.

Expanding the in-river catch to escapement estimates for the other contributing brood years (1980, 1982, 1983), assuming an average production of 4.46 returns per female, and historical age compositions gave an estimated 1986 total return of 110,000 fish. If the minimum escapement goal is achieved then the total allowable catch is expected to be 39,000 fish, considerably below average levels.

3.2.2 Coho

Escapement information for the 1986 Taku coho brood years (i.e. 1982-83) was inadequate due to the absence of in-river stock monitoring programs. The only available indicators of relative run strength have been the Canadian in-river and Alaska District 111 gillnet catches. Additional catches occur in the Alaska troll fishery, however, interception estimates are not available.

In 1982, the Canadian fishery was excluded from harvesting coho and therefore no in-river information was available. Population estimates were available from tagging studies conducted in 1981 and from 1983 to 1985, and indicated an average Alaskan sockeye exploitation rate of 38% to 42%. The 1982 District 111 catch of 29,000 was expanded based on an exploitation rate of 35% to 45%, giving an estimated escapement of 36,000 to 54,000. Assuming that at least one half of the estimated number of coho escaping the District 111 fishery were bound for the Taku, with the other half bound for other systems, gave a minimum Canadian escapement of 18,000 to 27,000.

In 1983 the Canadian in-river fishery harvested 8,400 coho. Tagging studies have indicated that the in-river rate of exploitation was roughly 20% to 25%. Based on this range of exploitation, the estimated 1983 escapement was 25,200 to 33,500.

The 1986 forecast was developed from the above escapement estimates, combined with brood year sex composition data, average age composition, and an assumed productivity of 5.7 returns per female spawner. The forecast 1986 return is 59,000 to 82,000, with an escapement goal of 27,500 to 35,000, and an expected T.A.C. of 32,000 to 47,000 coho. This constitutes a below average return to the gillnet fisheries considering that perhaps in excess of 50% of this catch will be harvested in the Alaskan troll fishery. Conservation actions in terminal areas may be required to meet escapement goals.

3.2.3 Chinook

An above average run of Taku chinook salmon is anticipated in 1986 as a result of the above average escapements observed during aerial surveys conducted 1980 - 1982 (i.e. the three principal brood years). Peak survey counts were multiplied by 2 giving estimates of total escapements for 1980, 1981 and 1982 of 15,000, 19,600 and 9,600, respectively. These were well above the recent five and ten year averages of 7,000 and 7,500, respectively. Combining the brood year escapement estimates with sex and age composition estimates, and assuming an average production of 6 returns per female spawner, gave an estimated 1986 return of approximately 40,000 chinook (age 4 to 6).

3.2.4 Chum

As with coho, there is little brood year escapement data available (except for the 1981 DFO tagging study) for Taku chum salmon. The only other available indicators of escapement were the catch data for the District 111 fishery, since the Canadian in-river fishery has not been directed at chum salmon and therefore a poor indicator of relative run strength.

The commercial catch of Taku chum salmon was, on the average, composed of roughly 75% four and 25% five year old fish. Therefore, the 1986 return should originate from the 1981 and 1982 brood years. The District 111 gillnet catch in 1981 was 76,100, very similar to the recent five and ten year catches of 79,500 and 64,200 fish, respectively. The 1981 tagging program conducted by DFO gave chum salmon escapement estimate of 104,500 to 147,300. However, in 1982 the District 111 catch was 37,500, well below the historical average catch. Assuming a harvest rate of 40% to 50%, and 60% contribution of Taku chum stocks to the District 111 fishery, the 1982 escapement estimate was 22,000 to 33,000.

These escapements estimates, combined with sex and age composition, and average production of 4.41 returns per female spawner, gave a total return estimate in 1986 of 71,000 to 103,000. With escapement requirements of 50,000 to 80,000, the T.A.C. is estimated to be 21,000 to 43,000 fish. This represents a below average chum return largely attributable to the low 1982 escapement.

3.2.5 Pink

Pink salmon return at age 2, therefore the 1986 return is from the 1984 brood year. The estimate of pink salmon escapement based on the 1984 program was 135,900 fish. Assuming an average production of 3.9 returns per female spawner and an even sex ratio, the expected 1986 return is 265,000. The T.A.C. is expected to be 115,000 based on the escapement goal of 150,000. This is below the recent year average.

3.2.6 Management Recommendations

Given the forecast for a below average sockeye return to the Taku River a conservative management approach is recommended. Careful monitoring of the run in-season must be undertaken with fishing patterns adjusted as appropriate. As

the coho and chum returns are also expected to be below average conservation measures may be required. Conservation actions to continue the process of rebuilding chinook stocks should again be implemented.

3.3 Alsek River

3.3.1 Sockeye

The primary contribution to the 1986 Alsek sockeye return will originate from the 1981 and 1982 brood years. In these years, Klukshu weir counts of 20,300 (1981) and 33,700 (1982) were recorded, both of which exceed the 1976-84 average of 19,600. An above average return is therefore anticipated with a total stock size of approximately 83,000. With an escapement requirement of 33,000-58,000, the T.A.C. should be maintained within the 25,000-50,000 range. The forecast was derived by expanding total escapement (as 1.67 times the Klukshu weir counts) in 1981 and 1982 brood years based on brood year specific sex composition, production factors and average age composition.

Early season restrictions in fishing time and/or effort should be continued in 1986 to continue the rebuilding program of early run sockeye. Less than 900 sockeye had migrated through the weir by July 31 in 1981. This indicates the likelihood of a depressed early run in 1986.

3.3.2 Coho

Very little escapement information exists for Alsek River coho salmon. Only a partial count of coho escapement has been obtained at the Klukshu weir due to ice formation and the onset of winter prior to the completion of coho migration. The coho count at Klukshu has averaged 950 during the period 1976-1984. The 1986 brood year counts were 200 (1982) and 300 (1983) suggesting the possibility of a below average run in 1986.

The other rough indicator of coho run strength is the Dry Bay commercial catch which averaged 7,700 over the ten year period 1975-84 and 7,600 from 1980-84. Catches in 1982 and 1983 were 6,400 and 5,300 respectively, again suggesting that the 1986 return may be below average.

3.3.3 Chinook

The chinook escapement in the Tatshenshini River estimated by expanding Klusku escapements by a factor of 2.0 has averaged 5,100 during the period 1976-1984. Escapements for the principal brood years of the 1986 return (1980-82) were below this average. Consequently, a below average return of chinook is anticipated in 1986. With a total return of about 9,900 and an escapement requirement of 7,200 to 12,500, opportunities for directed harvests may be limited.

Recent chinook returns have been well below expectations. Reasons for this are unclear, particularly when one considers that major restrictions have been imposed in both the U.S. Alsek River fishery and the Canadian fishery. This

situation has led to the assumption that major interceptions of Alsek stocks are occurring outside of existing Alsek River fisheries. Stock identification studies are badly needed to examine this hypothesis.

3.3.4 Management Recommendations

Restrictions to protect the early timing segment of the sockeye run to the Alsek River should be continued in 1986. The chinook run also requires rebuilding and conservation measures directed at this species should be continued.

4.0 RESEARCH PROGRESS REPORT

4.1 Stikine River

4.1.1 Sockeye

i) Review of the 1984 and 1985 Sumner-Clarence Straits Sockeye Salmon Allocation based on Scale Pattern Analysis.

Stock separation based on scale characteristics continued to be a highly useful technique; accuracy for 1984 models in separating Alaska, Nass/Skeena, Tahltan and Stikine stocks averaged 79%. Of the 92,000 sockeye harvested in the Sumner-Clarence Straits (District 6) commercial gillnet fishery in 1984 approximately 66% (63,000) were of Alaskan origin, 27% (26,000) were of Canadian Nass and Skeena River origin, 3% (3,000) were of Tahltan Lake origin, and 4% (4,000) were of non-Tahltan, Stikine River origin. The low interception rate of Tahltan Lake stocks was partly due to the closure of the Sumner Straits portion of the fishing district until mid-July when most Tahltan Lake stocks had passed. Scale pattern analysis of commercial and test fishery samples during the closure indicated that significantly higher proportions of Tahltan Lake fish were present in Sumner Strait during this period than were found in the commercial fishery in Clarence Strait. Weekly stock composition estimates for the 1984 Sumner-Clarence Straits commercial fishery are presented in Table 18.

In 1985 discrete samples were collected from both the Sumner and Clarence Straits portions of the fishery. In-season analysis performed through late July indicated significantly higher proportions of Tahltan Lake stocks were present in both areas. These samples will be re-analyzed using current year models and final results will be available in late spring of 1986.

ii) Review of 1984 and 1985 In-season Stock Composition Analysis in Sumner and Clarence Straits.

In 1984 a test gillnet fishery operated in the Sumner Strait portion of District 106 from June 17 to July 14. Opening of the commercial fishery was delayed until July 15 to minimize U.S. interceptions of an expected poor return to the Stikine River. In-season stock composition analyses of the testfish catch and the first two weeks of the commercial catch was conducted using historical scale pattern models (mean classification accuracy = 81%). The assumption behind the use of historical models is that the interannual variation in the scale patterns of a particular stock are less than the variations between stocks. In-season analysis confirmed the low return of Tahltan Lake stocks. Samples were re-analyzed when 1984 escapement samples became available. Results of in-season and post-season analyses were quite similar with only 3 of the 24 stock proportions 90% confidence intervals failing to overlap. In-season analysis tended to allocate slightly lower proportions to Nass/Skeena, Tahltan and Stikine stocks than did the post-season analysis.

In 1985 a poor return of Tahltan Lake stocks was again expected. No preseason forecast was available for non-Tahltan sockeye returns. In 1985 separate inseason scale pattern based stock composition estimates using historical models (avg. accuracy 79%) were provided for the first time from commercial and test fisheries in both the Sumner Strait (subdistrict 106-41) and Clarence Strait (subdistrict 106-30) portions of District 106. Stock composition estimates were usually available within 48 hours of the fish being landed from Sumner Strait. Results available in mid-June indicated that the Tahltan Lake stock was present in a higher proportion than anticipated. The high proportion of Tahltan Lake fish plus the unexpectedly high catch per effort in both the commercial and test fisheries indicated a much higher than expected return of these fish. Contributions of the Tahltan Lake stock to catches in Sumner Strait peaked in the last week in June and remained high through mid-July, falling to trace levels by late July. Relative contribution of the Tahltan Lake stock in catches and the catch per effort in Clarence Strait were also much higher than anticipated although generally lower than in Sumner Strait. This differed significantly from past adult tagging data. This information facilitated timely revision of return estimates and allowed some in-season adjustment of management strategies to take advantage of the unexpectedly large returns. The analysis indicated that Stikine River sockeye required approximately two weeks to travel from the Sumner-Clarence Straits fishery to the Canadian in-river fishery. Tahltan Lake fish required an additional two weeks to reach the weir. These travel times are very similar to that estimated by the 1983 tagging results.

The stock composition of catches in the Sumner Strait (subdistrict 106-41) commercial fishery was also estimated post-season based on the prevalence of the brain parasite, Myxobolus neurobius. All Alaskan sockeye stocks sampled to date, except Chilkat, Chilkoot and Naha have the parasite at prevalences exceeding 85%. Most but not all, Canadian sockeye stocks are unparasitized. Thus the parasite prevalence should provide a maximum estimate of Alaskan contibutions to the Sumner Straits catch. Estimates of Alaskan/Canadian contribution using this technique compared well with the in-season estimates from the scale pattern analysis for weeks 24 through 28 and week 30. However, the parasite method suggested that the Alaskan contribution may have been overestimated by 18% during week 29 (Table 19). Hopefully this discrepancy will be resolved by the revised post-season scale analysis. The presence of an unparasitized Alaskan stock may also account for this discrepancy. These results indicate that a combined scale-parasite stock identification procedure should be adopted for in-season analysis in 1986.

iii) Review of 1984 and 1985 Stikine River in-river stock analysis and total return estimate based on stock separation techniques

The stock composition, run timing, spawning escapement and total return estimates of Tahltan Lake and other Stikine River stocks contributing to the Canadian inriver fishery have been estimated for returns since 1979 using age composition and scale pattern analysis techniques. Since no commercial

in-river fishery was permitted in 1984, test fishery samples were used in the analysis. Run timing in 1984 was similar to previous years with Tahltan Lake fish returning earlier than mainstem stocks. The 1984 spawning escapement of Stikine River sockeye was estimated to be approximately 64,000 (58-62% Tahltan, 38-42% non-Tahltan) using scale and age composition data and 95,000 (39% Tahltan, 16% glacial lakes and 43% river stocks) using combined brain parasite, scale and age composition data. The egg diameter index indicated a Tahltan contribution of 40% resulting in an overall escapement estimate of 93,000.

Preliminary estimates of escapement of all Stikine River sockeye stocks in 1985 range from 126,000 (63% Tahltan, 37% non-Tahltan) using scale and age composition data to 198,000 (36% Tahltan, 11% glacial lakes and 53% river stocks) using electrophoretic, brain parasite and age composition data. The (uncorrected) egg diameter index provided an overall escapement estimate of 143,000 (49% Tahltan, 51% non-Tahltan). The discrepancy between the latter two estimates is explained by anomalous sex ratios in the test fishery catches and by the fact that only female fish are considered with the egg diameter index. It is not known whether estimates based on the total catch or only the female fraction of the catch provide the best estimates for 1985. Otherwise, the egg diameter index has been demonstrated to provide satisfactory estimates for in-season use. The higher estimates for the Tahltan stock provided by scale pattern analysis are most likely due to the presence of mainstem stocks with Tahltan type scale patterns. This error should be resolved with the use of multi-attribute separation techniques.

iv) Blind Test of 1983 Discriminant Function Models

A blind test of the accuracy of models used to allocate 1983 commercial catches was performed by using these models to classify scales collected at the time sockeye salmon were tagged in mixed stock interception fisheries. Scales from tagged fish which were recovered in escapements were processed using standard techniques by personnel who had no knowledge of their origin. As in previous tests, the models proved to be highly accurate. In tests of the nine models, the true stock proportions fell within the 90% confidence interval boundaries of the models estimate. Complete details of this experiment are in the ADF&G final report on 1984 U.S.-Canada research.

v) Tahltan Lake and sockeye smolt and adult enumeration

A total of 67,326 adult sockeye were enumerated at the Tahltan Lake weir in 1985. This return represents a record escapement. The Tahltan Lake smolt counting program was continued in 1985. From May 23 to early July, two inclined plane wolf traps were positioned at the outlet stream below the flow control to live-trap all smolts migrating from the lake. A total of 613,531 smolts were enumerated. This total was substantially higher than the 1984 count of 219,597 smolts. The 1985 count is believed to be representative of the 1983 brood production. In 1983, a total of 21,256 adult sockeye entered the lake to spawn. Of these 53.8% (11,435) were females with a potential egg deposition of 3.697×10^7. The preliminary calculated egg to smolt survival was 1.66%.

4.1.2 Coho

Coho test fisheries were conducted from Sept. 1 - Oct. 21, 1985 at three locations upstream of the Alaska-Canada boundary -- one on each side of the river at Boundary House and another in the lower Iskut River just above it's confluence with the Stikine River. Two fixed gillnets (5 1/4 and 6" mesh) were fished for 24 hours each on two consecutive days per week. Catch rates for coho declined steadily throughout September. Head samples were collected from 10% of the catch for examination for the brain parasite, Myxobolus neurobius; it is possible that variation in the prevalence of this parasite will enable identification of coho stocks in the future. A survey conducted in 1984 indicated that juvenile coho are found in many parts of the Stikine drainage, but are confined almost exclusively to tributaries and tributary backwaters.

4.1.3 Chinook

Some spring chinook runs that spawn and rear in the Stikine drainage have been coded microwire tagged as smolts and sampled for scales. Recovery of coded wire tags indicates that Stikine River chinook are harvested mainly in areas 113 (35%) and 109-110 (40%). It appears that the majority of the upriver Stikine chinook rear offshore and are caught by Alaskan fisheries primarily during their spawning migration.

A chinook weir was operated on the Little Tahltan River in 1985. A total of 3,164 adult and 316 jack chinook salmon were enumerated. Comparative aerial escapement surveys of the Little Tahltan index area accounted for 51% (average) of the adult weir count. Aerial escapement surveys of other Stikine index area indicate that chinook escapement was above average.

4.2 Taku River

4.2.1 Sockeye

Stock separation based on analysis of scale patterns has proven to be an accurate (mean classification accuracy in 1983 - 1984 = 91.6%) method for separating weighted composite samples of Taku and Snettisham runs of sockeye salmon harvested in the District 111 gillnet fishery. However, differences in run timing of sub-stocks within the Taku run may decrease the accuracy of this technique in practice. Stock composition estimates generated using this technique in 1983 and 1984 indicated that in each year 76% of the catch was bound for the Taku River, with the remaining 24% destined for the Whiting and Speel River drainages. The percent contribution of Taku River sockeye salmon to the fishery was highest both years in the initial fishing period of the season, decreasing through the fifth fishing period in mid-July. Concurrently, CPUE of the Taku River stocks was moderate to high during these early fishing periods. The contribution of Snettisham fish was highest in mid-July. A second peak in the Taku River contribution occurred during the fourth week of July; after this time catches of both Taku and Snettisham stocks decreased. From these results we have concluded that the

timing of the Taku River run is more protracted than the Port Snettisham run; the Taku run begins earlier and continues longer than the Port Snettisham run. During June and early July determination of harvestable surplus can be based principally on the strength of the Taku run. Since Port Snettisham stocks are most available during mid-to late July, this time window is available to regulate the fishery in response to run strength of Crescent and Speel Lake stocks. The closure of Port Snettisham to fishing from mid-July to mid-August (implemented by ADF&G in recent years) appears well timed to allow increased passage of fish into Speel and Crescent Lakes. During August, an important fraction of the Taku run is still available to the fishery and regulations could again focus on this run.

Differences in scale patterns for the composite Taku and Snettisham samples were consistent in 1984 and 1985. This consistency of scale patterns indicates a historical model could be developed to estimate, in-season, the interception rates of Taku and Snettisham fish.

Scale analysis of the 1985 District 111 catch is underway and should be completed by late spring. Additional effort will be expended this spring to evaluate scale pattern analysis as a tool for separating stocks within the Taku River drainage. Observed differences in age composition and scale patterns among stocks indicate that the major stocks can be accurately discriminated.

The prevalence of the brain parasite, Myxobolus neurobius, was also used to estimate the Taku and Snettisham contribution to the District 111 catch in 1985. Snettisham stocks have a parasite prevalence exceeding 90% whereas a composite sample from the Taku River test fishery showed a prevalence of only 20%. This analysis suggests that 92% of the catch was of Taku origin. As with the scale analysis, this estimate may be biased due to differences in run timing of Taku stocks; also, samples were only available from weeks 25-30 (61% of the total catch).

Spawning stocks within the Taku River drainage exhibited an extreme diversity in age composition, particularly between mainstem spawners and lake spawners. Zero freshwater check (fish which do not spend a winter in freshwater after emergence) comprised 35% of all ageable scales taken from river and slough spawners in 1984, but were absent from fish that spawned in lake systems.

The mark-recapture program conducted on the Taku River in 1983-84 was continued in 1985. A total of 3,167 sockeye were captured by fishwheel and tagged with spaghetti tags at Canyon Island, Alaska. Tag recoveries from the Canadian in-river fishery were used to estimate abundance, escapement, and exploitation rates. Preliminary analysis of the 1985 data indicates an escapement of 122,000 sockeye at Canyon Island of which 14,244 (11.7%) were harvested in the Canadian fishery. The 1985 tag application effort was relatively uniform for all major stock components. Tagged:untagged ratios for the Canadian in-river fishery, Little Trapper Lake weir and Little Tatsamenie Lake weir all ranged from 1:37.8 to 1:38.3.

The 1985 tagging project was used to develop weekly in-season estimates of the number of sockeye passing Canyon Island. In future years, weekly population estimates should be available within a 10 day period.

Sockeye escapement to Port Snettisham was determined through weirs operated at Crescent and Speel Lakes. The 1985 returns to these areas totaled 7,249 and 7,073 sockeye, respectively.

Four weirs were operated within Canadian portions of the Taku watershed in 1985. Sockeye escapements to the Little Trapper Lake and Little Tatsamenie Lake weirs totaled 14,889 and 13,015, respectively. A total of 2,309 sockeye were enumerated at the Hackett River weir and 1,150 were counted at the Nakina River weir.

Migration timing information was derived from tag recoveries at weir sites. The peak migration of Little Trapper Lake stocks (at Canyon Island) occurred during the week of July 7-13; approximately 70% of the Little Trapper Lake tag recoveries were applied between June 30 and July 20. Sockeye bound for Little Tatsamenie Lake migrated later and were distinct from Little Trapper Lake bound sockeye. Peak migration at Canyon Island occurred during the week of August 11-17. Eighty four percent of the tags recovered at Little Tatsamenie Lake were applied between July 28 and August 24.

The peak timing of Little Trapper Lake and Little Tatsamenie Lake stocks corresponds to early and late season peaks which are evident in the Canyon Island fishwheel catches. The timing of mainstem spawners in the lower Taku River appears to overlap that the the Tatsamenie Lake run.

Radio tagging in 1984 provided additional information on mainstem, slough and tributary spawning. Sockeye that migrated upstream past Canyon Island prior to 16 July were not represented in the radio tagging study due to program delays. By that date 37% of the total fishwheel sockeye catch had occurred. Fifty five sockeye were tracked to their final destination. Thirty (54%) remained in the main-stem Taku River. Seventeen (31%) travelled to lakes within the drainage: four (7%) to Little Trapper Lake; 13 (24%) to Tatsamenie Lake -- distances of approxmately 170 km to 190 km from the tagging site. Two (4%) sockeye were followed to the upper reaches of the Sheslay River, a distance of over 200 km. Six (11%) sockeye travelled to portions of the Nakina and Sloko rivers, 80 km to 90 km form the tagging site.

Sockeye were observed spawning in numerous small tributaries (and associated sloughs) flowing onto the mainstem of the Taku River, including the lower reaches of the King Salmon River. Sockeye also utilized side channels of the main river for spawning. In many areas, sockeye were spawning in the same areas used by chum salmon. Several radio-tagged fish were still in the main channel of the Taku River when survey work ended in the fall. It is not known whether these fish were spawning in main channel areas, or holding in the river prior to moving on to the spawning grounds.

Sockeye salmon were observed spawning in tributaries and side channels of the Sloko and Nakina rivers. Fish were also observed spawning in the main channel of the Nakina River. Sockeye salmon that traveled to the Kowatua system spawned in the stream between Little Trapper Lake and Trapper Lake, and just below the outlet of Little Trapper Lake. Sockeye salmon in the Tatsatua system were observed spawning in the stream between Little Tatsamenie Lake and Tatasamenie Lake, and along the shoreline of Tatsamenie Lake. As of September 17, many of the radio-tagged fish in Tatsamenie Lake were located in the lake (not along the shore); relatively few fish were observed during surveys along the shoreline. It is not known whether lake spawning occurs (in addition to that along the shoreline) or if the fish were holding in the lake prior to moving on to the spawning grounds. Sockeye salmon were observed spawning in areas of slow moving water in the upper reaches of the Sheslay and Hackett Rivers.

Mainstem Taku River stocks of sockeye salmon had a significantly slower in-river migration rate than non-mainstem stocks. Movement rates for mainstem Taku sockeye averaged .04 km/hr; movement rates for non-mainstem stocks ranged form .11 km/hr (Sloko River) to .26 km/hr (Kowatua Creek). Movement upstream was not constant, particularly in the mainstem Taku River. Fish often held in areas for varying periods of time prior to resuming upstream movement.

4.2.2 Coho

A total of 1,007 coho salmon were marked with spaghetti tags at Canyon Island, Alaska in 1985. Tags were recovered in the Canadian in-river fishery and in a coho test fishery conducted after the last commercial fishing period. Coho tagging was terminated on Sept. 23 due to poor fishwheel catches and low water conditions. A preliminary coho population estimate of 36,635 was determined; however, this should be regarded as a conservative estimate since it does not cover the entire run.

A limited number of aerial escapement surveys were conducted in 1985. A total of 2,680 coho were observed in U.S. streams. The coho return to Flannigan's Slough in Canada totaled 2,170 fish. The return to the Hackett River weir was 931 coho. Returns to other weirs, however, were lower than anticipated. Available information suggests that the coho escapement to headwater spawning areas was below average to poor.

Age, sex and length information was collected from the District 111 fishery, Canyon Island tagging site, Canadian in-river fishery, and the head water weirs.

In addition, the feasability of tagging coho salmon with radio transmitters was evaluated in a small stream system near Juneau, Alaska (where the fish could be monitored closely) during 1984 and 1985 to determine what response the fish exhibited after being tagged. Methods for capturing coho salmon in the lower Taku River were also evaluated in 1985.

4.2.3 Chinook

Chinook salmon enter the river from late April to mid-June before a significant number of sockeye salmon are present at the river mouth. This timing difference permits chinook conservation measures without affecting the exploitation of the early sockeye run. Delayed opening in the S.E. Alaska troll fishery, District 111 fishery and Canadian in-river fishery have effectively reduced direct chinook harvests.

In 1985, chinook aerial escapement counts were approximately 70% higher than the previous 5-year average for all of the Inklin tributaries surveyed. The return to the Nakina River, however, was lower than anticipated. The count for this river totaled only 2,647 chinook.

Age, sex, and length information was obtained from the District 111 fishery, Canadian in-river fishery, Canyon Island tagging site, spawning areas, and at all weirs.

Coded-wire tags were recovered in various ocean fisheries and at the Nakina carcass weir. The majority of the ocean recoveries were made in the Juneau area sports fishery. C.W.T. information indicates that Taku chinook salmon are not available to the S.E. Alaska troll fishery as immature fish and that harvest occurs in S.E. Alaska only during their final year of life as they are returning to spawn.

Scale patterns and genetic markers are being examined as stock separation techiques in mixed-stocks fisheries. The result of these studies are unavailable at present time.

4.2.4 Chum

A total of 859 chum salmon were marked with spaghetti tags at Canyon Island, Alaska, in 1985. Tag recoveries were primarily made in the Canadian in-river fishery. A preliminary chum population estimate was determined, however, it should be noted that the mark-recovery effort did not cover the full migration period.

Approximately 50,000 chum were observed in a mainstem river channel located opposite the King Salmon River.

Age, sex and length information was collected on a weekly basis form the District 111 fishery and the Canyon Island fishwheels.

4.2.5 Pink

The 1985 pink salmon return was exceptional. A total of 27,671 pink salmon were captured by fishwheel and 3,707 were tagged with spaghetti tags. Tags were recovered in the Canadian in-river fishery and on the Nakina River where a carcass pitch was conducted. An additional 45,111 pink carcasses were examined for tags at the Nakina weir.

Preliminary analysis of the 1985 tag return information indicates that the Nakina pink salmon escapement exceeded 1 million fish. The Nakina River has been identified as the principal pink spawning area within the Taku watershed.

4.3 Alsek River

The current Alsek River stock status monitoring program consists of: 1) monitoring in-river catches of all species; 2) sampling of commercial catches for age, sex, and size; 3) enumeration of the escapemnts into the Klukshu River; 4) sampling of Klukshu escapement for age, sex, and size; and 5) aerial surveys of some tributary escapements.

Chinook, sockeye and coho smolts were trapped and tagged using coded wire tags in the Dry Bay estuary in 1985 in an effort to determine migratory routes and contributions of these stocks to various fisheries such as Yakutat Bay, Copper and Bering Rivers and the outside troll fishery. Few fish were captured, possibly either due to abnormal climatic conditions or lack of suitable rearing habitat in the Dry Bay estuary. A total of 643 sockeye, 105 coho, and 48 chinook were tagged. If the tagging program operates in 1986 capture sites may be located further upriver.

5.0 ENHANCEMENT PROGRAMS AND OPPORTUNITIES FOR TRANSBOUNDARY RIVER STOCKS

Before realistic enhancement recommendations can be made, detailed surveys of the spawning and rearing areas are needed. If the spawning and rearing capabilities of the rivers are vastly underutilized, the approach to enhancement would be different than if these areas are being fully utilized. These inventories of spawning and rearing areas should receive high priority.

5.1 Stikine River

5.1.1 Tahltan Lake Fertilization

A lake enrichment program was initiated by DFO at Tahltan Lake in 1985 under direction of the Lake Enrichment Unit of the Pacific Biological Station in Nanaimo. Limnological sampling conducted since 1978 combined with more recent smolt enumeration and sampling data provided background information which suggested that Tahltan Lake was a good potential candidate for lake enrichment.

The effects of controlled application of nitrate and phosphate fertilizer on sockeye nursery lakes in British Columbia have been studied extensively since the 1960's. The basic objective has been to increase primary production and subsequently transfer this production through the food chain to augment smolt size. There is a direct relationship between smolt size and marine survival. Results throughout British Columbia have been mixed though generally favourable and substantial increases in sockeye production have occurred in some lakes (eg. Great Central Lake); uncertain effects have also been found in lakes such as Long Lake. No cases of detrimental effects have appeared.

Over a period of 11 weeks from June 14 to August 23, a total of 5.5 tonnes of ammonium nitrate and 0.825 tonnes of ammonium phosphate was introduced into Tahltan Lake. Each week four batches of 487 kg ammonium nitrate and 62.5 kg ammonium phosphate dissolved in 1,015 litres of water, were dispersed from a Beaver aircraft from Telegraph Creek. The dissolved fertilizer was applied in a nitrogen phosphate ratio of 25:1 and a loading rate of 3.75 mg P per m^2 of lake surface/week.

The lake was sampled once monthly from June to September for a variety of physical, chemical and biological variables in order to ensure that no deleterious fertilizer effects occurred. Some estimate of the success of the fertilization will be available upon completion of the 1986 smolt enumeration and sampling programs. Comparison of smolt size and survival will be made at that time with data collected since 1984. Attempts will also be made to obtain a hydro-acoustic estimate of fry production from the 1985 brood year.

The collected data which have been analyzed to date indicate a number of interesting features of Tahltan Lake. These include:

1. the presence of a deep epiliminion (17-19m).
2. a highly favourable environment for plankton production.

3. the lack of strong thermal barriers which would prevent vertically migrating sockeye fry from entering the epiliminion.
4. little seasonal variation in mean epilimnetic total phosphorus and chlorophyll concentrations.
5. a high zooplankton biomass.

Data analyses are continuing with the goal of providing a preliminary assessment of factors limiting sockeye abundance in Tahltan Lake such as zooplankton abundance, spawning habitat availability and predation.

5.1.2 Fry Plants to Supplement Low Cycle Years - Sockeye

Potential enhancement opportunities exist through "satelliting" or remote fry releases of sockeye. Two basic techniques could be developed to accomplish this: a) the construction of incubation boxes in known spawning areas, or b) the utilization of existing hatcheries to incubate eggs taken from spawning stocks with subsequent planting of fry back at the egg-take sites. Preliminary examinations of Tahltan Lake suggest that there is a good opportunity to test remote incubation box design near the lake outlet. Colonization of the Tuya River might be possible using a hatchery facility to supply fry for release into the system.

5.1.3 Tuya Block Removal

The Salmonid Enhancement Program (SEP) of the Department of Fisheries and Oceans, Canada, has explored the possibility of removing the Tuya River obstruction and determined that although it would be feasible, it would be quite costly. Chinook, sockeye, steelhead, and coho may currently return to the Tuya River mouth although not in large numbers. As mentioned previously, it may be possible to colonize the upper Tuya watershed; however, sockeye may have difficulty establishing themselves in lakes occupied by other species. More technical advice is needed before experimenting in these drainages. Managers could be better acquainted with the Tuya blockage by the production of a low cost video film of the obstruction.

5.1.4 Stream Improvement

A catalogue of Stikine tributaries currently exhibiting fish passage problems is being developed by the Northwest Enhancement Society. Following field investigations conducted in 1984, several small enhancement projects regarding stream improvement may be identified by this work.

5.2 Taku River

5.2.1 Ladder to Open Sockeye Access to Trapper Lake

This lake is larger than Little Trapper lake and spawning ground potential appears to be present. No cost estimate has been made but the use of a steep pass fishway may be possible. Additional research on potential spawning and rearing habitat in Trapper Lake is required.

5.2.2 Increase Tatsamenie Lake Production Through Incubation Boxes, Plants, and/or Lake Fertilization

Sockeye currently reach this large lake, but production appears to be limited by a lack of suitable spawning area. Preliminary investigations of current sockeye utilization of the lake and limnological studies are needed.

5.2.3 Open Access to King Salmon Lake

Sockeye have been recently documented in this lake but an outlet blockage currently limits access. Fry plants may be required to restore this run once access is improved. Stream rehabilitation would be relatively inexpensive and should be contemplated soon before the brood stock disappears.

5.2.4 Open Sockeye Access to Small Lakes

Kennicott and Hackett Lakes are currently blocked to salmon access by beaver dams. Sockeye, chinook, coho, and steelhead utilize lower sections of the Hackett River with upstream spawning distribution being limited by beaver dams. A small scale stream enhancement program (barrier removal) could be co-ordinated with the operation of the Hackett River weir.

5.3 Alsek River

5.3.1 Klukshu Lake Fertilization

Preliminary feasibility studies conducted in the mid-1970's indicated that Klukshu Lake would be an excellent candidate for enrichment. Limnological conditions seem appropriate and easy road access exists which makes this project very attractive. Rearing capacity and potential predation should be examined prior to embarking on this opportunity. The feasibility of obtaining an out-migrant smolt count at the outlet of Klukshu Lake should be examined.

5.3.2 Smolt/Fry Plant Dezadeash Lake

Salmon runs to the Dezadeash Lake drainage have been eliminated during the past century or so by glacial advances across the Alsek River. It is unknown whether the hydraulics of Turnback Canyon currently impose a velocity barrier. Determination would be possible through the transplant of sockeye, chinook, or coho smolts or fry to Dezadeash Lake and monitoring of subsequent adult returns both above and below the canyon.

5.3.3 Fry Plant Howard Lakes

These lakes are drained by the Takhanne River and are blocked to salmon access but continued fry planting may be possible to utilize potential rearing area. Chinook, sockeye and possibly coho currently ascend the Takhanne River to the base of Million Dollar Falls.

Fry planting of coho and chinook is also a possibility, but specific recommendations should await the outcome of ongoing experiments.

5.3.4 Remote Incubation Box Enhancement

Several chinook, sockeye, and coho spawning areas with road access could be potential sites for incubation boxes. Experimentation of proper design should be initiated and tested under the severe climatic conditions prevalent in these areas.

5.4 Current and Planned Enhancement Projects that will Contribute to Fisheries that Harvest Transboundary River Stocks

Several state and private non-profit hatchery facilities have been sited in locations that will result in their returning adults mixing with adults originating from Transboundary rivers in common property marine fisheries. These facilities are in various stages of construction and brood stock development. If these facilities are successful in generating large returns, managers will be presented with management problems. If the hatchery stocks, which can be fished at a much higher exploitation rate than the wild stocks, are harvested efficiently, the fish returning to the transboundary rivers will be over-harvested. Research on migration routes and timing of returning hatchery stocks should be given high priority. Likewise, these problems of mixed stock fishing should be given careful consideration in siting of hatcheries.

The following are brief descriptions of the hatcheries sited near the terminus of the Taku and Stikine Rivers. For each facility two maps are provided, one to show its general location and the second to indicate the harvest areas where hatchery stocks will be terminally harvested in areas that are relatively free of natural stocks. In the case of private non-profit hatcheries, operators are allowed to harvest up to a level where costs are recovered in a designated special harvest area. Thereafter, salmon excess to cost recovery and brood stock requirements are available for harvest by common property fisheries. Where state hatcheries are involved, terminal harvests are usually conducted by the gear type that is allowed by regulation to harvest fish in the surrounding district. State hatcheries currently do not harvest fish for cost recovery purposes. Also included are tables showing the targeted production number of eggs for each facility by species and estimates of the subsequent number of returning adults. All of the hatcheries discussed are incubation facilities with varying capacity to handle rearing species and to feed fry prior to release.

5.4.1 Hatcheries in the Taku Vicinity

1. Gastineau Channel Hatcheries:

A. The Salmon Creek facility was constructed by the Northern Southeastern Aquaculture Association (private non-profit) and until the 1984 season, pink, chum, and coho broodstock had been taken from nearby streams. In the spring of 1984, the Association decided to discontinue operation of the facility due to

technical problems. The fish released by the facility will contribute salmon to the common property fisheries through 1987. A significant production of 30,000 coho from this facility was expected in 1985 only. Many of those fish were harvested in mixed stock troll fisheries prior to reaching the Taku Inlet-Gastineau Channel area.

B. The Kowee Creek and Sheep Creek hatcheries are operated by Douglas Island Pink and Chum, Inc. (private non-profit) and in combination are permitted for 50 million pink and/or chum eggs. The primary emphasis is currently on pink salmon, and production capacity, utilizing this species, should be achieved in 1985 and 1986. Gastineau Channel offers a large terminal area in which hatchery returns can be harvested without impacting natural stocks. Pink and chum salmon from those hatcheries have not been tagged, but contributions to the District 111 gillnet fishery may be significant if chum production is expanded or if the District 111 gillnet fishery targets additional effort on pink salmon in future years.

2. The large state operated Snettisham hatchery is located at the head of Speel Arm in Port Snettisham. The majority of the planned production of this facility will be summer run chum salmon and at capacity an average adult return of 1.2 million fish is expected. Most of these fish are expected to be harvested in the District 111 gillnet fishery. The management of the fishery in the Taku Inlet and Stephens Passage area will continue to be based on sockeye salmon and/or pink salmon run strength. Speel Arm and, at certain times, outer Port Snettisham will be used as a terminal harvest area.

The Snettisham facility will produce chinook and coho salmon at the numbers indicated in the attached table. Many of these fish will be harvested in distant troll fisheries. Chinook that return to Port Snettisham will be harvested in the terminal area once brood stocks needs are met. The returning coho salmon will mix with natural Taku and Stikine stocks and the hatchery contribution rate will have to be carefully tracked through microwire tagging to ensure that managers can maintain the natural stocks.

5.4.2 Hatcheries in the Stikine Vicinity

1. Crittenden Creek Hatchery site is located in Eastern Passage near Wrangell and is approximately 5 miles from the Stikine River flats. The hatchery permit is held by a private individual; however, no construction has started to date. The pink and summer chum salmon production planned for this facility would contribute to the gillnet fishery in Districts 106 and 108. Test fishing conducted in 1983 indicated that the portion of Eastern Passage that will be used for special and terminal harvest areas is relatively free of natural stocks and should provide a good segregated harvest area if the hatchery is built.

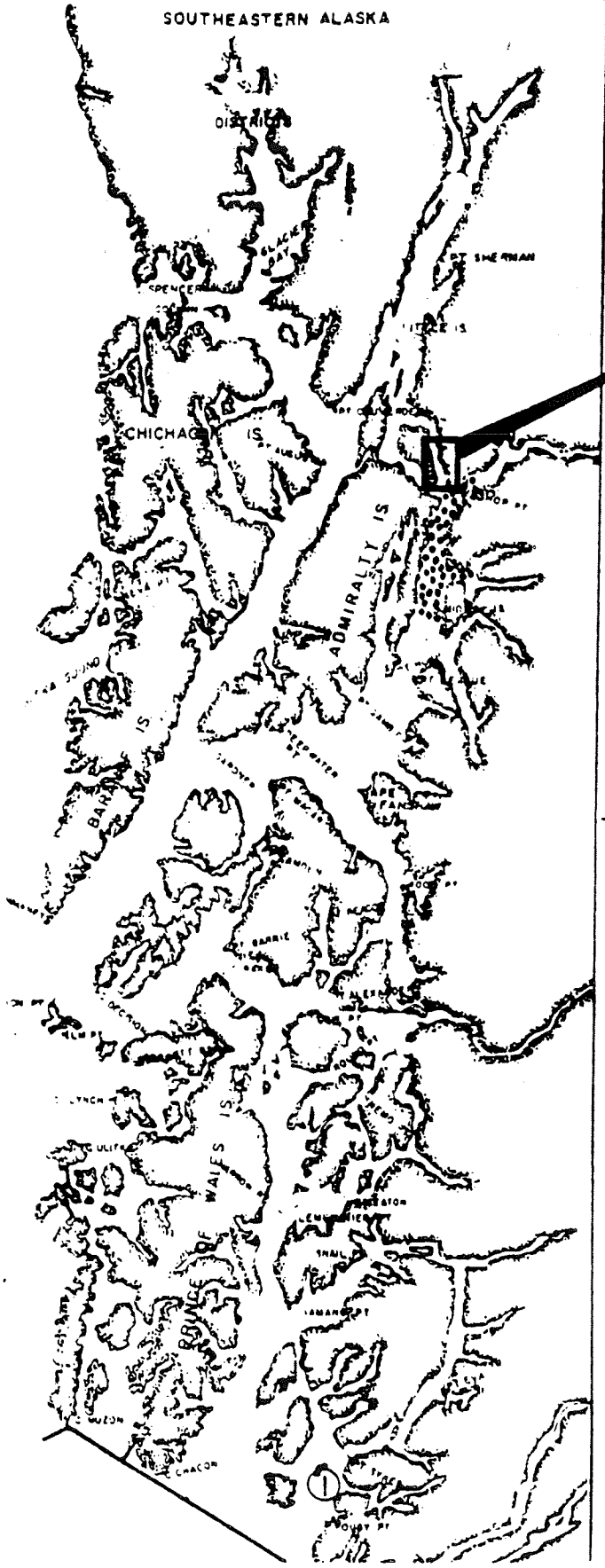
2. Santa Anna Hatchery, a private non-profit permitted facility located in Ernest Sound, will contribute some of its pink and summer chum production to the District 106 gillnet fishery. A portion of the production will probably

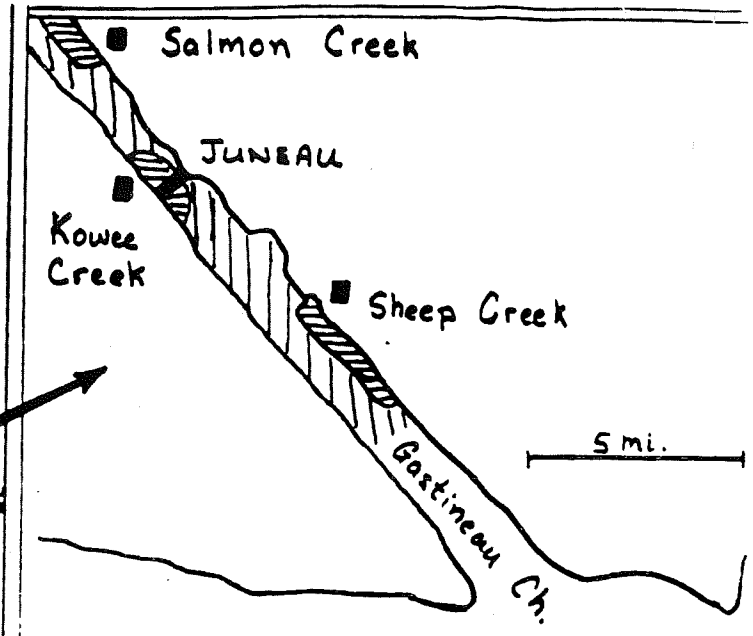
return from the south through lower Clarence Strait. At this time no construction has begun on this facility.

3. Burnett Inlet Hatchery, a private non-profit permitted facility located on the west side of Etolin Island, is located within District 106. This facility is in the brood stock building phase and has requested capacity increases as noted in the accompanying table. The pink and summer chum produced by this facility are expected to contribute significantly to the District 106 gillnet fishery. A portion of the production will probably return from the south through lower Clarence Strait. Coho production will contribute to distant troll fisheries as well as the District 106 gillnet fishery.

4. The state owned Crystal Lake Hatchery is located on Blind Slough which drains into Wrangell Narrows and can be reached by road from Petersburg. Chinook production is currently the major goal of this facility. The recovery of microwire tagged chinook from this facility to date indicates that it will contribute well to the harvests of chinook in the central and northern inside waters of Southeastern Alaska. The small numbers of summer chum produced should contribute to the District 106 gillnet fishery. Coho production should also contribute to the District 106 gillnet fishery, as well as to the troll fishery over an extensive area. Some remote releasing of chinook and coho smolts has occurred in Ohmer Creek which drains into District 108 on the southern end of Mitkof Island. Returns from these releases will contribute to the District 106 and District 108 gillnet fisheries when they are open and will be harvested in a terminal area near Ohmer Creek. Smolt production capacity at this facility is currently maximized due to successful recent year brood stock acquisition programs. The chinook donor stock was obtained from Andrews Creek, a U.S. Stikine River tributary.

5. General Points. Hatchery operators have been notified that no more than current levels of pink salmon eggs will be permitted in facilities that will return pinks through the District 106 gillnet fishery. The ceiling has been established to ensure that management of the mixed stock gillnet fishery for pinks in District 106 in late July and August will not be rendered less effective due to the presence of hatchery stocks. The ceiling may be altered after the actual effects on management precision of currently permitted pink production is evaluated.





S ADJACENT FISHERY (MIXED WILD & HATCHERY STOC

TERMINAL AREA = SPORT; NET IS UNCERTAIN

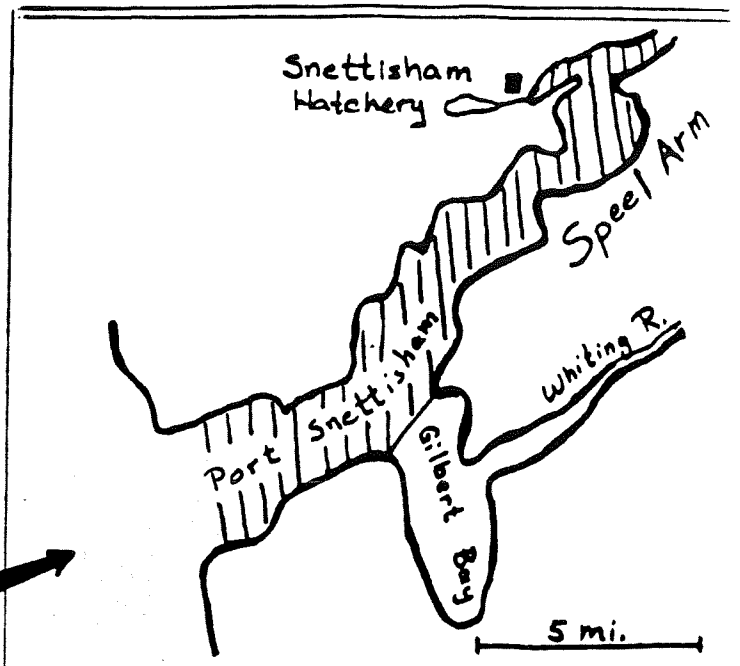
SPECIAL HARVEST AREA = SEINE; GILLNET; BEACH SEINE; FYKE

PLANNED MAX. CAPACITY PRODUCTION

SPECIES	EGGS ($\times 10^6$)	ADULTS	BY YEAR [1]
PINKS OR CHUMS	50.0	400,000	1983

[1] FIRST YEAR OF CAPACITY EGG TAKES - ESTIMATE

FIGURE 2. Gastineau Channel Hatcheries (PNP).



ADJACENT FISHERY (MIXED WILD & HATCHERY STOC

TERMINAL AREA = GILLNET; SPORT; TROLL

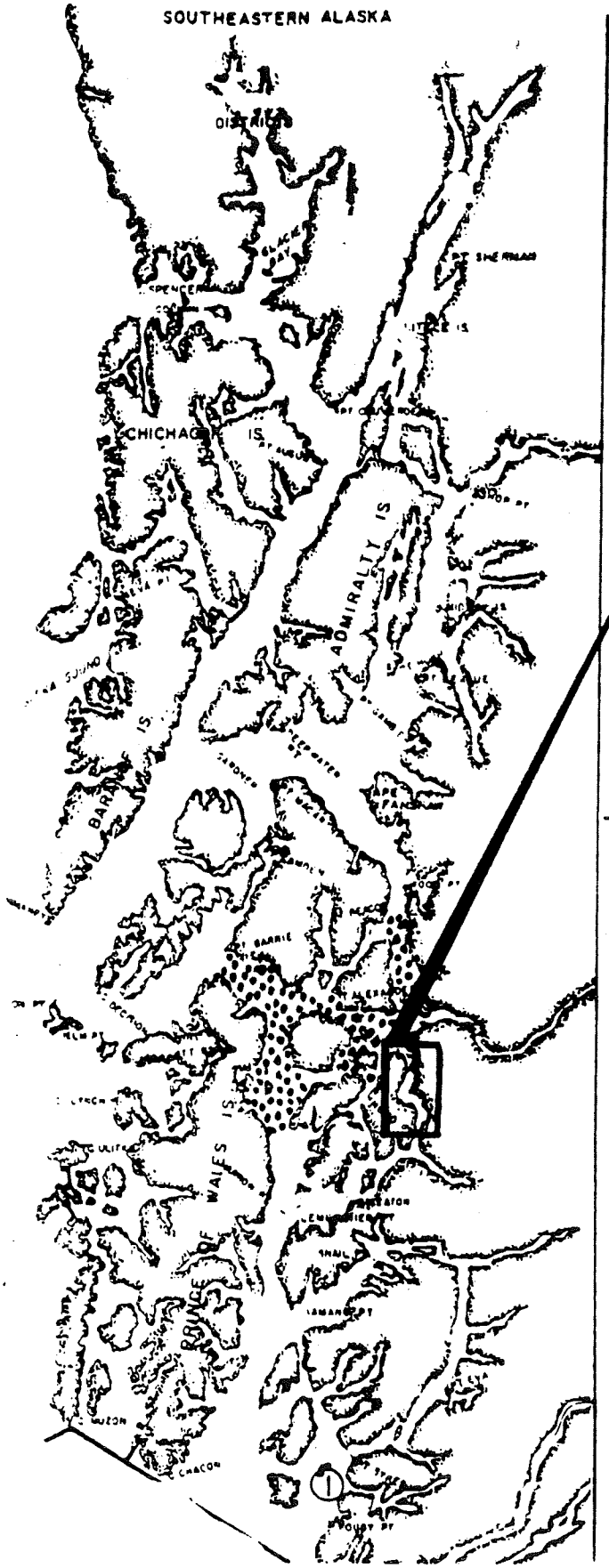
SPECIAL HARVEST AREA = NOT RELEVANT

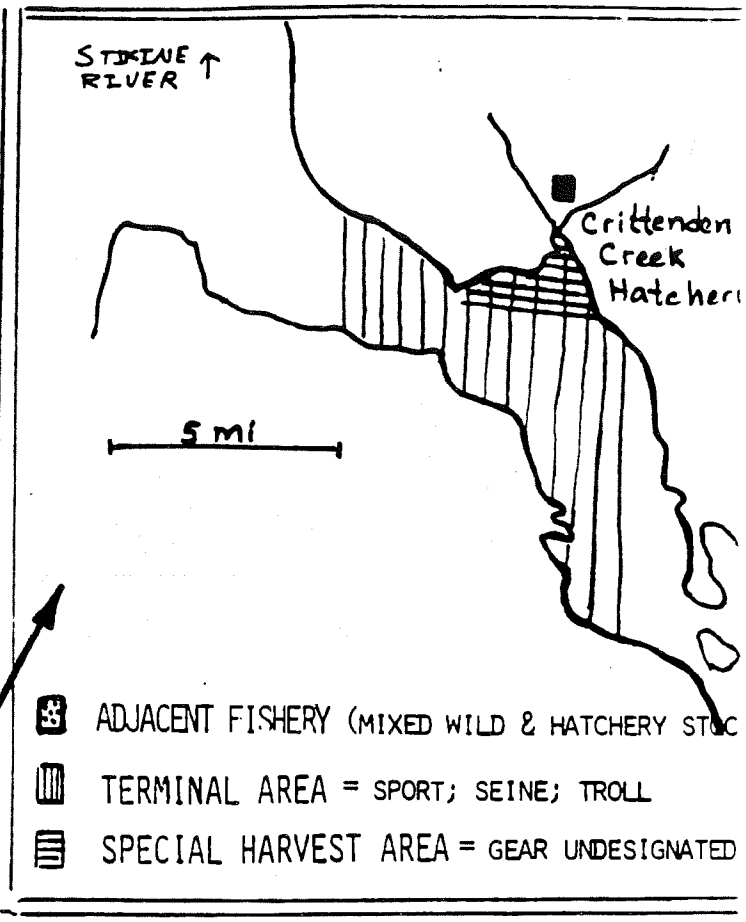
PLANNED MAX. CAPACITY PRODUCTION

SPECIES	EGGS ($\times 10^6$)	ADULTS	BY YEAR [1]
CHUM (SUMMER)	71.5	1.2×10^6	1991
CHINOOK	4.2	68,700	1992
COHO	1.4	20,000	1988

[1] FIRST YEAR OF CAPACITY EGG TAKES - ESTIMATE

FIGURE 3. Snettisham Hatchery (State).



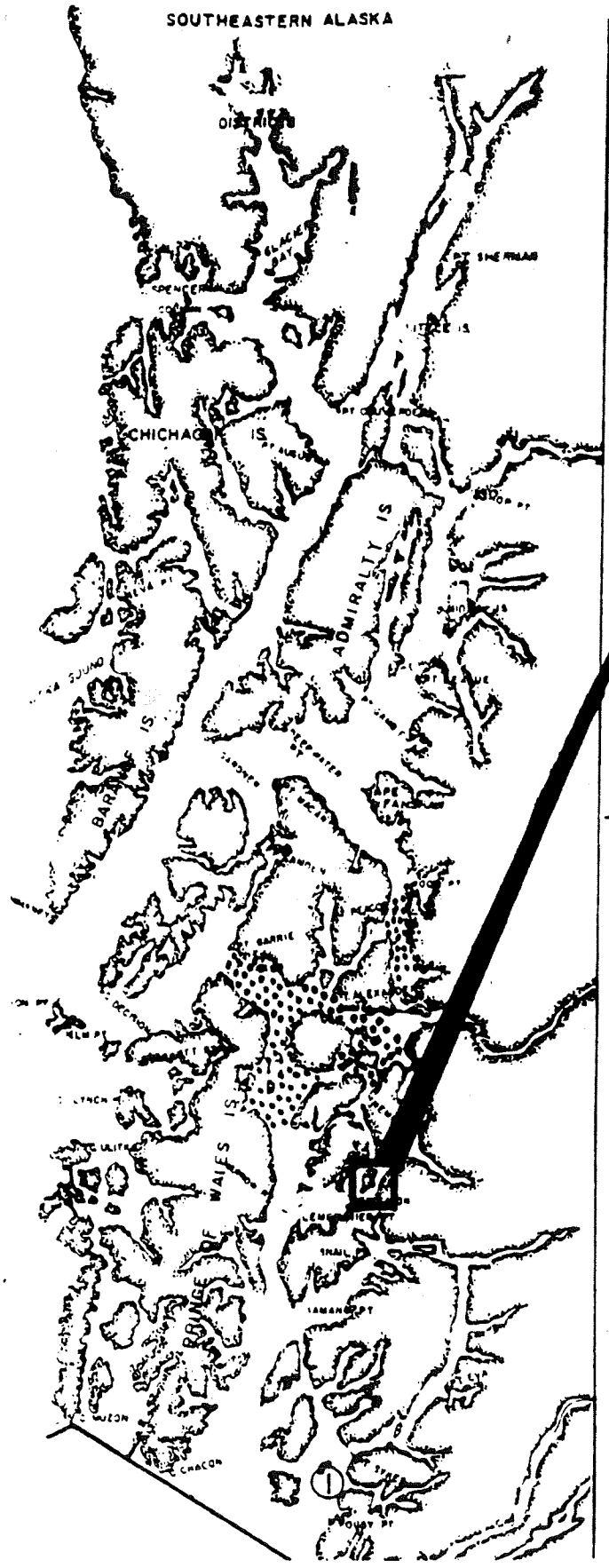


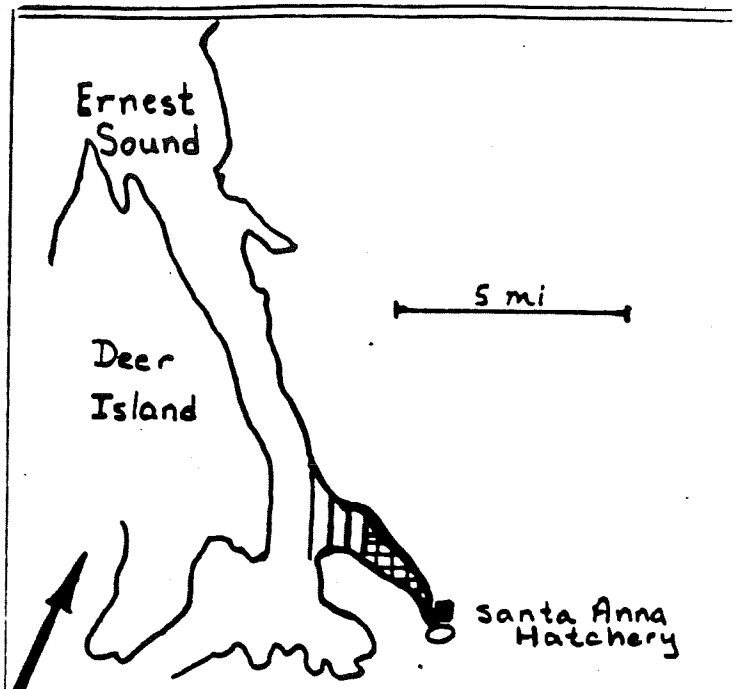
PLANNED MAX. CAPACITY PRODUCTION

SPECIES	EGGS (x10⁶)	ADULTS	BY YEAR [1]
PINK	3.0	24,000	?
CHUM (SUMMER)	12.0	96,000	?

1 FIRST YEAR OF CAPACITY EGG TAKES DIFFICULT TO PROJECT DUE TO UNCERTAINTY OVER HATCHERY CONSTRUCTION SCHEDULE.

FIGURE 4. Crittenden Creek Hatchery (PNP).



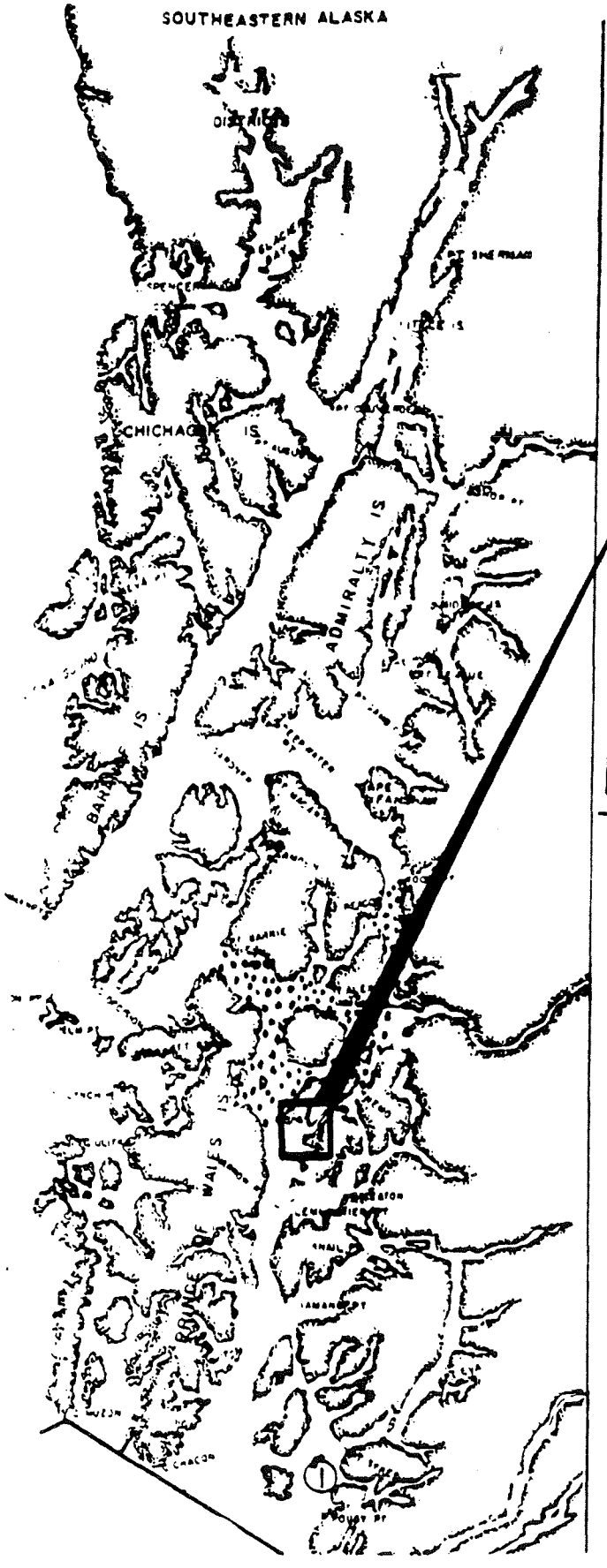


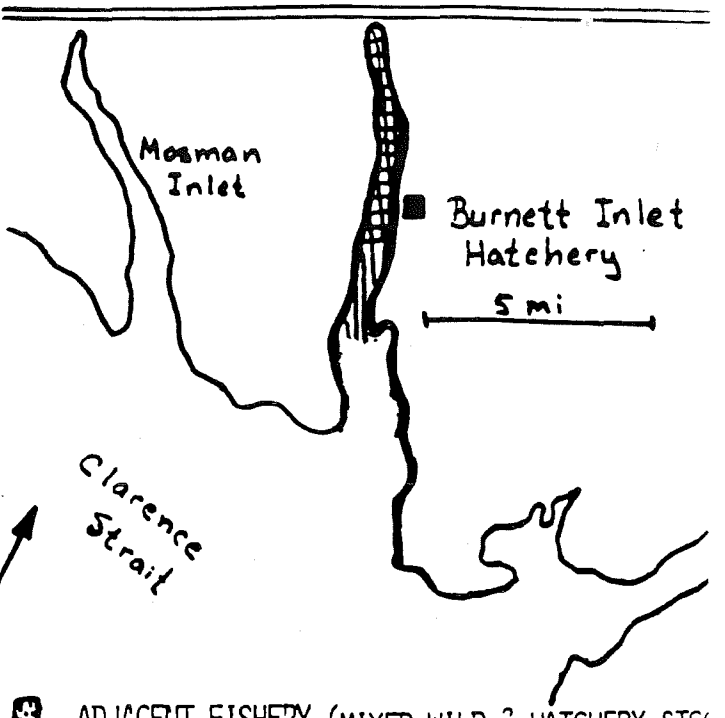
PLANNED MAX. CAPACITY PRODUCTION

SPECIES	EGGS (x10^6)	ADULTS	BY YEAR[1]
PINK	3.0	24,000	1988
CHUM (SUMMER)	10.0	80,000	1994

[1] FIRST YEAR OF CAPACITY EGG TAKES - ESTIMATE

FIGURE 5. Santa Anna Hatchery (PNP).





ADJACENT FISHERY (MIXED WILD & HATCHERY STO

TERMINAL AREA = SEINE; SPORT

SPECIAL HARVEST AREA = SEINE; GILLNET; BEACH SEINE

PLANNED MAX. CAPACITY PRODUCTION

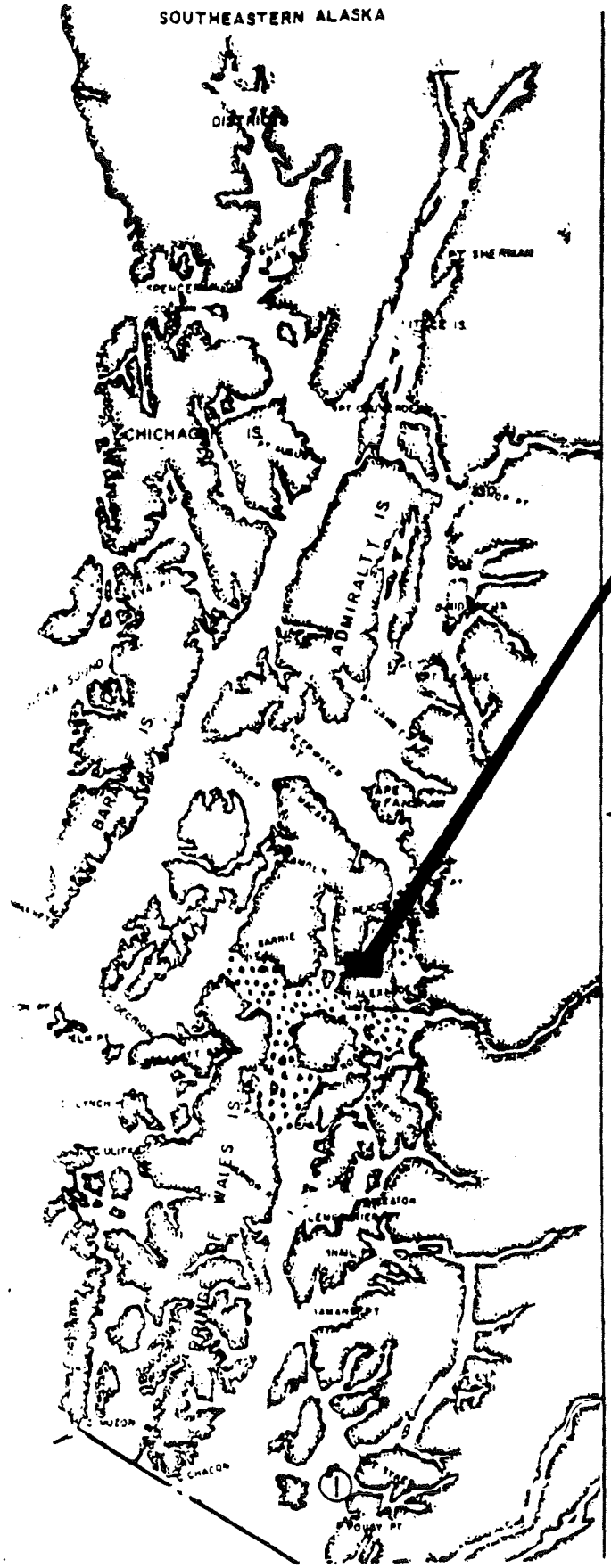
SPECIES	EGGS ($\times 10^6$)	ADULTS	BY YEAR[1]
PINKS	10.0	80,000	1986
CHUMS (SUMMER)	5.0[2]	40,000	1988
COHO	0.1[3]	6,200	1990

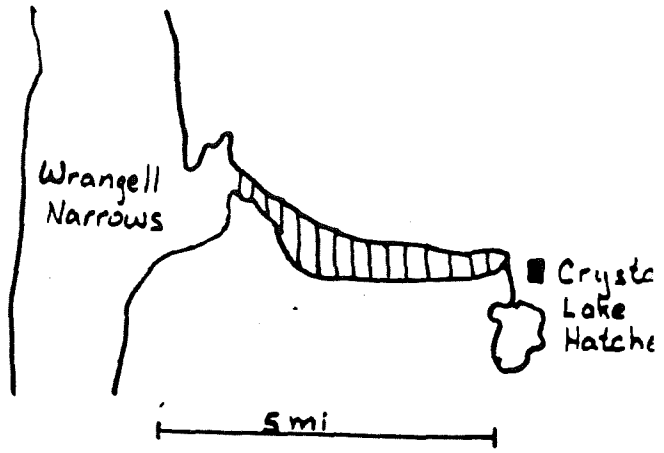
1 FIRST YEAR OF CAPACITY EGG TAKES - ESTIMATE

2 INCREASE TO 15 MILLION TO BE REQUESTED IN 1985.

3 INCREASE TO 0.25 TO BE REQUESTED IN 1985.

FIGURE 6. Burnett Inlet Hatchery (PNP).





ADJACENT FISHERY (MIXED WILD & HATCHERY STOCK)

TERMINAL AREA = SPORT; GILLNET

SPECIAL HARVEST AREA = NOT RELEVANT

PLANNED MAX. CAPACITY PRODUCTION

SPECIES	EGGS ($\times 10^6$)	ADULTS	BY YEAR [1]
CHINOOK	2.2	50,000	1992
COHO	0.5	12,000	1978
CHUM (SUMMER)	1.1	18,000	1992

[1] FIRST YEAR OF CAPACITY EGG TAKES

FIGURE 7. Crystal Lake Hatchery (State).

6.0 DATA AND PROGRAM NEEDS FOR THE TRANSBOUNDARY RIVERS

In the 1984 report, four classes of activities were identified as important to the development of management programs as specified by the Treaty - these principles still apply. First is the need to establish escapement goals for each species and stock. Second, accurate forecasts of run size are required to identify conservation concerns and to inform industry of probable fishing patterns. Third, management systems need to be developed and implemented to achieve escapement goals and negotiated catch allocations among fisheries. Last, we require the ability to reconstruct the annual runs through counting of catches and escapements, sampling for biological parameters (e.g. age by sex), and separating catches and escapements into component stocks to provide the basic data needed to accomplish these objectives of management. Using this approach, we reviewed the current research and management program for each river by species. Next, we identified and priorized new projects that would enhance achievement of management goals.

6.1 Stikine River

6.1.1 Sockeye Salmon

Run Reconstruction: The Committee currently recognizes two stock groups of sockeye salmon within the Stikine drainage; Tahltan and non-Tahltan (for convenience, non-Tahltan are refered to as mainstem stocks recognizing that they are a mixture of river and lake spawning stocks). Catch statistics by stock and age are available for both nations' fisheries with existing programs. We believe, however, that improvement of the accuracy and precision of estimates for Alaska's catch of mainstem stocks is required. While a weir provides accurate estimates of escapement for the Tahltan stock, we question the assumption of equal exploitation rates among stocks that is required to estimate escapement of Mainstem stocks. Direct estimation of inriver escapement (through refinement of test fishing and hydroacoustic methods) and further resolution of mainstem stock structure would permit examination of this assumption and is recommended.

Escapement Goals: Insufficient data exists to conduct spawner - recruit analysis for either the Tahltan or Mainstem Stock. Programs currently in place will provide these data but not for many years. An interim goal of 58,000 to 65,000 for the entire river are only professional judgments and need refinement. Documentation and analysis of the quantity and quality of spawning and rearing habitat in conjunction with analysis of historic catch statistics is recommended to refine these interim goals. We rate this as a high priority activity.

Forecasts: Data from which forecasts can be made are limited to escapements in parent years, expected maturity schedules and expected return per spawner. While estimates of escapement by stock are available beginning in 1979, little data have accumulated on maturity schedules. Furthermore, expected return per spawner data used comes from other river systems. These data constraints currently make accurate forecasts fortuitous and we

recommend caution in their use. Once accumulated, data on catch and escapements by stock and age will provide a basis for sibling forecasts. We expect such forecasts will be a substantial improvement and place a high priority on collection of data that will permit such analysis.

Management Systems: Although the basic components of a management system to achieve negotiated catch allocations among fisheries and meet escapement goals were in place in 1985 a number of improvements could be made. For example, development and implementation of concurrent analysis of scale patterns and parasite data is recommended. Such data should substantially improve precision and accuracy of estimates for the mainstem stock in Alaska's fisheries. Regulation by both nations to meet interim escapement goals and respective harvest entitlements is weak because we lack methods to accurately assess run strength in-season. Continuation of test fisheries initiated in 1985 and hydroacoustic counting of the escapement may provide a means to eliminate this problem. Partitioning of the escapement into component stocks is also necessary. When in-river fisheries occur a gonadosomatic index can be used to partition escapement into Tahltan and Mainstem components; otherwise, scale patterns and parasite analysis of test fishery catches is required.

The following recommendations are made:

1. Continue sampling of all transboundary area sockeye salmon stocks for scales, parasites and associated biological data. It is necessary to continue to sample Stikine River stocks not bound for Tahltan Lake to determine the abundance and run timing of stocks with lake type scale patterns and egg sizes. Increase brain parasite sampling in Alaskan systems to estimate contribution to transboundary fisheries. Systems with scale patterns similar to Canadian stocks should be priorized.

2. Research and develop stock separation techniques combining scale pattern analysis and the presence or absence of brain parasites. Combined use of these techniques should increase the precision of stock contribution estimates. Develop and test alternate scale pattern techniques to estimate interception rates in-season.

6.1.2 Coho Salmon

Run Reconstruction: We currently have no programs to annually estimate the catch of Stikine coho salmon in Alaska's fisheries or to estimate the spawning escapement. To assess in-river run strength we recommend that the hydroacoustic and test fishing programs mentioned previously for sockeye salmon be extended into the fall to count coho. To account for Stikine coho salmon in Alaska's net and troll fisheries we recommend a coded microwire tag program that includes in-river sampling so that exploitation rates can be calculated. Spawning distribution and relative abundance in United States and Canadian portions of the river needs to be determined.

Escapement Goals: Only preliminary escapement goals have been set for Stikine coho salmon since we lack information with which to accurately set such goals. To provide information on exploitation rates we recommend that enumeration of escapements and coded microwire tagging be given high priority. With such statistics interim goals can be improved.

Forecasts: Insufficient data exists to forecast Stikine coho returns based on year specific production. Data needs summarized in the section on "Run Reconstruction" will assist in developing forecasts.

Management Systems: Our ability to achieve escapement goals is poor because little is known about this resource. Catch sharing based simply on in-river harvest quotas is easy to achieve providing realistic quotas are established.

6.1.3 Chinook Salmon

Run Reconstruction: Recoveries of coded wire tags, though limited, indicate that Stikine River chinook salmon are mostly harvested in the spring of their final year of life as they return to spawn. Because of low numbers of recoveries it is difficult to estimate the catch of Stikine chinook salmon in Alaska's fisheries.

Low incidence of Stikine chinook in non-terminal fisheries makes catch estimates unjustified this time. Escapement estimates of Stikine chinook should be continued and expanded. We recognize that run reconstruction for Stikine chinook is unlikely in the near future; therefore, our ability to establish optimum escapement goals, to forecast and to account for harvest by nation will impaired.

Escapement Goals: The Treaty escapement goal to the Canadian portion of the Stikine River has been established at 19,000 to 25,000 with provisions to achieve this goal by 1995. No escapement goal has been established for the Alaskan portion of the river.

Forecasting: Indices of spawner abundance coupled with age composition data have permitted sibling forecasts. Evaluation of such forecasts is recommended.

Management Systems: Neither Canadian commercial nor Alaskan commercial fisheries target on Stikine chinook. Time, area and gear restrictions currently adopted by each nation appear, at this time, to be sufficient to rebuild this resource.

6.1.4 Pink and Chum Salmon

Because pink and chum salmon runs of the Stikine River are extremely small, we did not address programmatic needs at this time for these species.

6.2 Taku River

6.2.1 Sockeye Salmon

Run Reconstruction: Programs in place provide estimates of catch and escapement by age of adults returning to the Taku River. Accuracy and precision of stock composition estimates may be improved by incorporating parasite prevalence with scale characteristics; we recommend this activity in 1986. Habitat and biological differences among stocks strongly indicate differential productivity and hence the need to regulate the fisheries to distribute the escapement. Also, data from adult mark - recapture, scale patterns, parasite prevalence and radio tagging indicate that differences exist in the migratory timing of some component stocks through the lower river. We conclude that opportunities to identify and manage component stocks within the Taku exist. To realize this opportunity, we recommend that a pilot program be initiated to determine the degree of resolution among stocks that is possible and the annual costs and benefits of initiating and maintaining a more stock specific data base.

Escapement Goals: Insufficient data exists to estimate optimum escapement for Taku River sockeye salmon. An interim goal of 71,000 to 80,000 has been set; like that for the Stikine, this goal is a professional judgement. Goal refinement is possible based on quantity and quality of spawning and rearing areas. Research in this area also needs to consider distribution among stocks and opportunities to manage for distribution by partitioning goals through time. We rate this as a high priority activity.

Forecasts: The development of stock identification techniques, in-river abundance estimators, and age and sex composition sampling programs has improved our ability to forecast Taku sockeye returns. However, a limited historical data base of good catch and escapement data hinders the development of forecasts with a high degree of confidence. Further examination of existing data such as time series analysis of catch data and age composition may be useful. We rate this activity as a medium priority.

Management Systems: Our ability to achieve catch allocations among fisheries appears to be good judged by the 1985 performance which was based on application of historic contribution rates of Port Snettisham stocks in Alaska's District 111 catch. The degree that these contributions vary in subsequent years will play a major role in our ability to achieve allocations based on percentages of allowable harvest. In-season scale patterns/parasite analysis is possible and can be implemented if needed. To date no method has been developed to ascertain in-season estimates of total stock size and total allowable catch in the District 111 fishery. Estimates of escapement and associated confidence intervals from the in-river mark-recapture program if made available rapidly after each in-river fishing period might be useful in this regard. We rate the determination of T.A.C. as a high priority activity.

6.2.2 Coho

Run Reconstruction: We currently have no program to annually identify and

estimate the catch of Taku River coho salmon in Alaska's fisheries; furthermore, estimates of escapement based on in-river adult coho mark - recapture studies are currently imprecise. Two problems exist with our escapement estimation project. First, we have had difficulty tagging sufficient numbers of fish throughout the run. Second, recoveries have been few because of the lack of sufficient fishing effort in the river. To reconstruct this run we need to first solve technical problems associated with our escapement program. Next, coded microwire tagging needs to be implemented so that exploitation rates in Alaska's fisheries can be computed. Run reconstruction is further complicated for Taku coho salmon because spawning populations are known to occur downstream of the tagging site at the Canada - U.S. border. To estimate contribution rates for these stocks will require that weirs be erected and coded microwire tagging be conducted. The technical difficulties and cost associated with these projects resulted in our rating of these activities as a medium priority.

Escapement Goals: Only a preliminary escapement goal has been set for Taku River coho salmon. We lack information with which to accurately set spawning goals. An interim goal of 28,000 to 35,000 is a professional judgement. With the program outlined in our run reconstruction section, an optimum goal can be established.

Forecasts: Insufficient data exist to forecast Taku coho salmon returns based on year specific survival. Improvements to forecasting may be realized with implementation of the program outlined in the run reconstruction section.

Management Systems: Our ability to achieve spawning goals is unknown because little is known about this resource. Once again, development of programs to estimate escapement and catch in Alaska's fisheries is required.

6.2.3 Chinook Salmon

Run Reconstruction: Recoveries of coded wire tags suggest that Taku River chinook salmon are only harvested in Southeast Alaska fisheries in the spring of the final year of life as they return to spawn. Because of the delayed openings in the Southeast Alaska troll fishery only small numbers are thought to have been harvested in recent years. Catches are monitored in the Juneau sport fishery and U.S. and Canadian gillnet fisheries and extensive escapement monitoring is conducted in the Taku River. Thus run reconstruction is possible. Current programs to monitor the harvest in the Juneau sport fishery and U.S. and Canadian gillnet fisheries should continue. In addition, escapement estimates of Taku chinook should be continued and expanded. Research should focus on attempting to determine the percentage of total escapement observed during helicopter surveys in index areas.

Escapement Goals: An escapement goal to the Canadian portion of the Taku River has been established at 25,600 to 30,000 with provisions set out in the Treaty to achieve this goal by 1995. No escapement goal has been established for the Alaskan portion of the river, but few spawners have been observed in U.S. tributaries.

Forecasting: Indices of spawner abundance coupled with age composition data have permitted sibling forecasts. Evaluation of such forecasts is recommended.

Management Systems: Neither Canadian commercial nor Alaskan commercial fisheries target on Taku chinook salmon. Time, area and gear restrictions currently adopted by each nation appear, at this time, to be sufficient to rebuild this resource.

6.2.4 Chum Salmon

Run Reconstruction: The Committee recognizes two stocks of chum salmon within the Taku River drainage; summer and fall. The summer run is minor and not considered in detail. We do not currently have a program in place to reconstruct the annual return. We believe that a feasibility study to explore alternative methods of identifying these fish in Alaska's commercial fishery should be given a high priority. Little is known about when and where these fish spawn and thus stock structure is poorly defined. Radio telemetry would assist in locating spawning populations, but we rate this activity as a low priority for 1986.

Escapement Goals: The interim escapement goal 65,000 to 80,000 may be refined from analysis of historic catch statistics. We are many years away from estimating an optimum escapement goal based on spawner - recruit analysis.

Forecast: Data are just beginning to accumulate that will permit forecasting based on year specific survival.

Management Systems: Two obstacles exist to the development of management regimes to achieve escapement goals. First, is knowledge about contribution rates in Alaska's fisheries. Second, is timely data on escapement; the current mark-recapture program has not been designed to provide estimates inseason. Re-design of the tagging project to provide such statistics may be possible.

6.2.5 Pink Salmon

Run Reconstruction: Except for estimates of the contribution of Taku pink salmon in Alaska's fisheries, existing programs provide data necessary to partially reconstruct this run. Substantial research and development would be necessary to identify Taku pink salmon in Alaska's fisheries. Because no conservation concern exists at this time, we believe that this activity should be given a low priority.

Escapement Goal: We have little data with which to set optimum escapement goals for this stock. Without estimates of contribution rates in Alaska's commercial fisheries, return per spawner analysis will likely be imprecise and biased. The interim goals of 150,000 to 250,000 may be refined by evaluation of spawning area and to some extent analysis of historic catch statistics.

Forecasts: Since escapement data are available beginning with the 1981 brood year forecasts can be made using average return per spawner.

Management Systems: Lack of contribution rates in Alaska's fisheries may hinder development of management systems in Alaska to deliver escapement goals.

The mark-recapture program currently relies on spawning ground surveys; to estimate the escapement in-season will require examination of other techniques. While these programs would enhance management precision, we rate them as low priority at this time.

6.3 Alsek River

6.3.1 Sockeye Salmon

Run Reconstruction: No program currently exists to estimate the total escapement of Alsek River sockeye salmon although a significant portion of the escapemnt is enumerated through the Klukshu weir and by aerial surveys. It is recommended that other techniques be examined to incorporate the existing escapement monitoring results into total escapement estimations. Methods for in-season determination of escapement from the Alaska fishery are also required to provide management direction so that escapement goals can be achieved. Techniques worthy of consideration include hydroacoustic enumeration, test fishing and stock separation analysis.

As a first step to annual accounting of the harvest of Alsek sockeye in the marine fisheries of Yakutat, we recommend that a stock identification feasibility study be undertaken. We rate escapement enumeration as a high priority and stock identification as a medium priority.

Escapement Goals: An interim escapement goal of 33,000 to 58,000 has been established for the entire river system.

Forecasts: Using Klukshu River as an indicator stock has provided an interim approach to forecasting. Escapement information has been combined with age and sex composition data to estimate returns from specific brood years. More information is required regarding productivity and the relative contribution of Klukshu stocks to total production to improve the existing forecast.

Management Systems: Lack of timely total escapement estimates severely limits the ability of Alaskan managers to provide for escapement goals. Unknown contributions of Alsek River sockeye to other Alaskan fisheries further complicates current management regimes.

6.3.2 Coho Salmon

Run Reconstruction: Alsek River coho salmon runs are poorly understood. The degree to which Canadian origin stocks contribute to both the Dry Bay gillnet fishery and other gillnet and troll fisheries in approach waters is unknown. In addition, little information exists on annual escapements. The Committee recommends the investigation of techniques such as coded wire tagging to determine contributions to various fisheries. Furthermore, spawning stocks need to be inventoried and methods of determining in-season escapement require development.

Escapement Goals: Catch and escapement data are lacking to establish optimum

escapement goals for Alsek coho salmon. The Committee has established an interim goal for the Canadian portion of the drainage of 5,400 to 25,000; the wide range reflecting a high degree of uncertainty.

Forecasts: Data are also lacking to accurately forecast returns. Refinement of catch data, escapement estimates, age and sex composition and productivity estimates, would greatly assist in forecast development.

Management Systems: Lack of knowledge regarding the catch contribution of Alsek coho, particularly to outside Alaska fisheries, makes establishment of an escapement goal extremely difficult. The lack of escapement monitoring makes it impossible to determine whether or not goals have been achieved. We believe that research to provide these data is a high priority.

6.3.3 Chinook Salmon

Run Reconstruction: Estimates of escapement are available for a number of headwater tributaries in Canada. Since 1976, a counting weir has monitored escapements into the Klukshu River. Methods to determine total escapement and its relationship to index escapements require development. Little is known regarding the degree to which Alsek chinook are intercepted in non-terminal gillnet and troll fisheries. Without such information reconstruction of annual returns is not possible. Coded microwire tagging offers promise to assess contribution rates in non-terminal fisheries. Available information indicates that contribution to non-terminal fisheries is probable, and, therefore, we recommend coded microwire tagging as a first priority for this species.

Escapement Goal: An interim escapement goal of 7,200 to 12,500 has been set for the entire river. We do not foresee a definitive analysis of optimal spawning goals until ability to reconstruct annual returns improves and a suffiently long data base is available.

Forecast: Index escapement data is currently combined with age and sex composition data to develop annual forecasts. Reliability of these forecasts should increase once details regarding total escapement, productivity and interception are determined.

Management Systems: Conservative in-river management regimes are currently employed by both countries in an attempt to increase chinook escapement. Unfortunately the success of these regimes has only been marginal with recent returns falling far below expectations. Reasons for this are unclear; however, identification of intercepting fisheries will provide useful information to enable improved management of this resource.

6.3.4 Pink and Chum Salmon

Pink and chum salmon are insignificant contributors to the Alsek River fisheries and were therefore not considered.

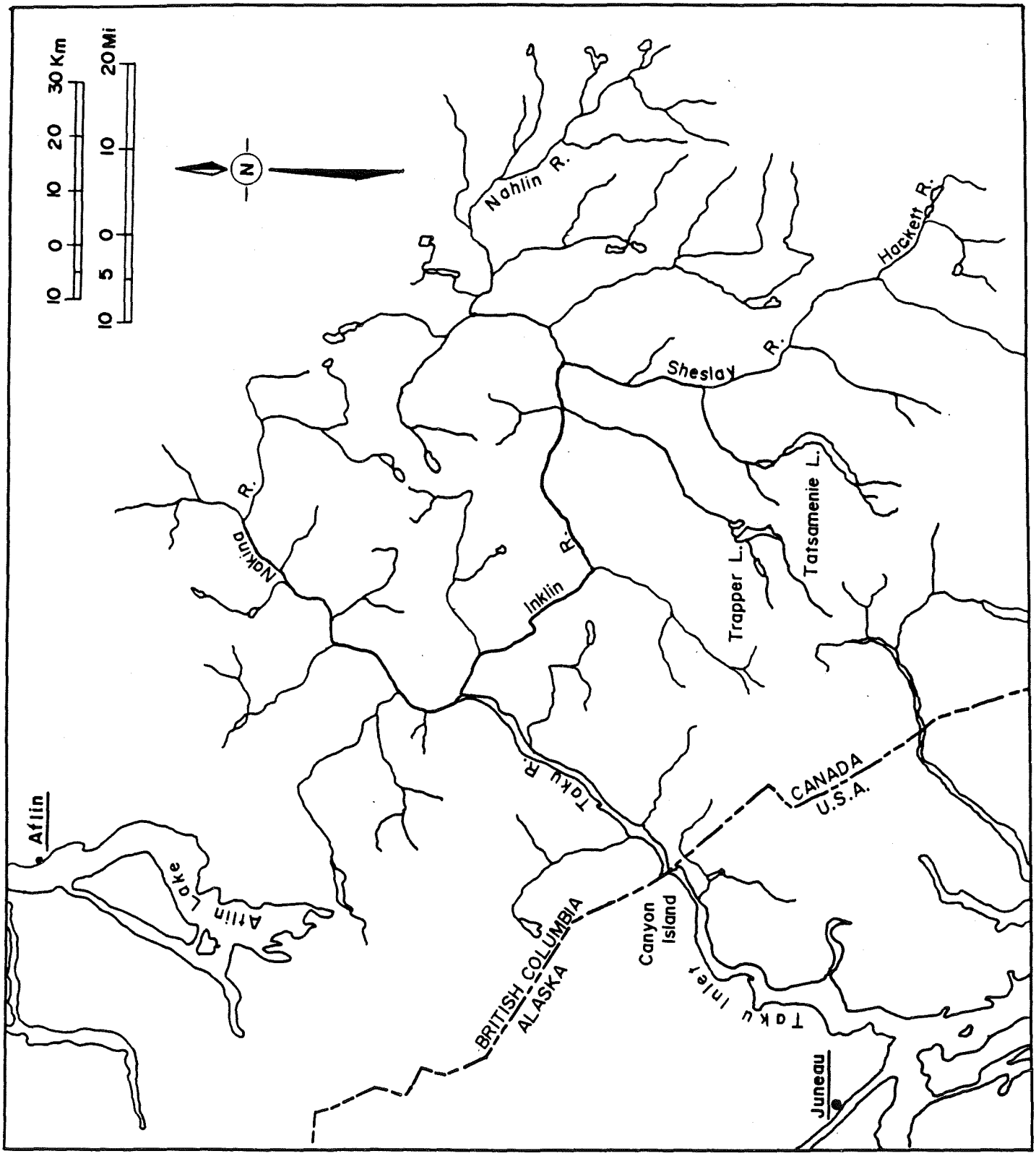


Figure 8: Taku River Drainage

7.0 Selected Data Summaries

Table 1. Annual Prince of Wales (District 106) Drift Gillnet Catches in Numbers of Fish From 1961-1985.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Days Open	Maximum Number of Boats Fishing any Week
1961	461	21,036	16,646	130,527	77,459	246,129	57	63
1962	1,427	47,440	49,049	294,801	76,386	469,103	53.5	113
1963	1,524	80,893	52,175	515,609	90,217	740,418	51	187
1964	2,082	76,504	64,726	443,318	44,221	630,851	49	130
1965	1,802	89,939	75,728	628,146	27,658	823,273	52.25	131
1966	1,666	89,855	63,528	405,525	42,331	602,905	74.25	115
1967	1,318	86,385	17,670	91,609	26,370	223,352	27	131
1968	1,324	64,758	68,027	172,976	62,931	370,016	53	135
1969	877	70,477	10,277	197,455	10,930	290,016	31	103
1970	785	42,778	35,470	94,851	32,231	206,115	41	66
1971	1,336	53,202	48,085	527,975	37,680	668,278	50	131
1972	2,573	101,338	93,427	89,467	72,382	359,187	41	123
1973	1,931	72,030	38,449	303,665	87,849	503,924	26	190
1974	1,924	57,423	45,677	104,209	50,370	259,603	28	153
1975	2,587	32,051	30,962	203,015	23,968	292,583	17	133
1976	384	15,481	19,126	139,439	6,868	181,298	22	86
1977	671	67,023	8,401	419,107	13,300	508,502	28	158
1978	2,682	41,565	55,546	224,629	16,484	340,906	26.5	120
1979	2,720	66,373	31,177	648,212	35,507	783,989	31.4	193
1980	580	107,418	16,580	45,560	26,269	196,407	25	153
1981	1,565	182,906	22,613	435,272	34,571	676,927	26	154
1982	1,672	193,618	44,965	25,550	18,845	284,650	22	125
1983	567	48,942	62,430	208,167	20,144	340,250	32	93
1984*	890	91,863	41,028	338,157	70,560	542,498	32	84
1985*	1,689	265,323	91,074	584,946	69,638	1,012,670	38	149

* Preliminary data (January 1985).

Table 2. Annual Stikine (District 108) Drift Gillnet Catches in Numbers of Fish From 1960-1985.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Days Open	Maximum Number of Boats Fishing any Week
1960	7,824	13,635	27,479	5,584	8,189	62,711	60.5	69
1961	7,243	21,557	36,858	52,295	12,535	130,488	63	62
1962	7,491	27,514	38,386	36,325	20,290	130,006	57	78
1963	2,107	9,995	11,697	10,340	11,155	45,294	71	43
1964	2,911	20,299	29,388	114,555	10,771	177,924	80	70
1965	3,106	21,419	8,301	4,729	2,480	40,035	63	39
1966	4,516	36,710	16,493	61,908	17,730	137,357	78	57
1967	6,361	29,226	4,747	4,713	5,955	51,002	58	57
1968	4,604	14,594	36,407	91,028	14,537	161,170	78	89
1969	5,015	19,211	5,791	11,910	2,318	44,245	55	47
1970	3,207	15,120	18,403	20,523	12,305	69,558	54	44
1971	3,717	18,143	14,876	21,806	4,665	63,207	57	42
1972	9,332	51,734	38,520	17,153	17,363	134,102	64	71
1973	9,253	21,373	5,831	6,581	6,674	49,712	39	74
1974	8,197	2,428	16,021	4,188	2,107	32,941	31	65
1975	1,534	-	-	-	1	1,535	8	49
1976	1,123	18	6,056	722	124	8,043	20	35
1977	1,443	48,374	14,405	16,253	4,233	84,708	23	54
1978	531	56	32,650	1,157	1,001	35,395	12	54
1979	91	2,158	234	13,478	64	16,025	5	17
1980	631	14,053	2,946	7,224	6,910	31,764	22	24
1981	283	8,833	1,403	1,466	3,594	15,579	9	27
1982	1,014	6,553	20,261	16,993	744	45,565	21	39
1983	47	178	15,484	4,171	675	20,555	17	26
1984*	14	1,290	531	4,535	1,892	8,262	5	9
1985*	19	1,060	1,926	5,325	1,892	10,222	18	7

* Preliminary data (January 1986).

Table 3 SUMMARY OF CANADIAN COMMERCIAL SALMON CATCHES - LOWER STIKINE RIVER, 1979 to 1985

YEAR	CHINOOK		SOCKEYE	COHO	PINK	CHUM	STEELHEAD	TOTAL CATCH	DAYS FISHED	BOATS DAYS	AVERAGE NO. FISHERMEN
	JACKS	ADULTS									
1979	63	712	10,534	10,720	1,994	424	264	24,711	42		
1980		*1,488	18,119	6,629	736	771	362	28,105	41	701	17
1981		*664	21,551	2,667	3,713	1,128	280	30,003	32	522	16
1982		*1,693	15,397	15,904	1,782	722	828	36,326	71	1,093	15
1983	430	492	15,857	6,170	1,043	274	667	24,933	54	458	8
1984	fishery closed										
1985	91	256	17,093	2,172	2,321	532	231	22,696	22.5	145.5	6
AVERAGES***											
1979-84		**1,108	16,292	8,418	1,854	664	480	28,816	48	693	14

* JACKS NOT SEGREGATED

** AVERAGE TOTAL CHINOOK CATCH

*** EXCLUDES 1984

Table 4 SUMMARY OF CANADIAN COMMERCIAL SALMON CATCHES - UPPER STIKINE RIVER, 1975 to 1985

YEAR	CHINOOK JACKS	CHINOOK ADULTS	SOCKEYE	COHO	PINK	CHUM	STEELHEAD	TOTAL CATCH	DAYS FISHED	BOATS DAYS	AVERAGE NO. FISHERMEN
NO COMMERCIAL FISHING PRIOR TO 1975											
1975		178	270	0	0	0	0	448			
1976		236	733	25	0	0	0	994			
1977		62	1,975	32	0	0	0	2,069			
1978		100	1,500	0	0	0	0	1,600			
1979*											
1980		156	700	40	20	0	0	916			
1981		154	769	0	0	0	0	923	5	11	2
1982		76	195	0	0	0	0	271	4	8	2
1983		75	614	0	0	4	1	694	8	10	1
1984	FISHERY CLOSED										
1985		62	1,084	0	0	0	0	1,146	6	14	2
AVERAGES**											
1975-84		129	844	12	2	0	0	989			
1980-84		115	569	10	5	1	0	701			

* NUMBERS NOT SEGREATED BETWEEN UPPER AND LOWER RIVER

** EXCLUDES 1979 and 1984

Table 5 SUMMARY OF CANADIAN SUBSISTENCE CATCHES - UPPER STIKINE RIVER, 1972 to 1985

YEAR	CHINOOK			SOCKEYE	COHO	PINK	CHUM	STEELHEAD	TOTAL
	JACKS	ADULTS	TOTAL						
1972			0	230	0	0	0	0	230
1973			200	3,670	0	0	0	0	3,870
1974			0	3,500	0	0	0	0	3,500
1975			1,024	1,982	0	0	0	0	3,011
1976			924	2,911	0	0	0	0	3,835
1977			100	4,335	0	0	0	0	4,435
1978			400	3,500	0	0	0	0	3,900
1979			850	3,000	0	0	0	0	3,850
1980			587	2,100	0	0	0	0	2,687
1981			740	5,304	8	144	0	4	6,200
1982			618	4,948	40	60	0	0	5,666
1983			1,066	4,649	3	77	26	46	5,867
1984			702	5,327	1	62	0	2	6,094
1985	94	793	887	7,287	3	35	4	9	8,225
AVERAGES									
1972-84			555	3,497	4	26	2	4	4,088
1980-84			743	4,466	10	69	5	10	5,302

Table 6. Tahltan Lake Adult Sockeye Timing and Weir Counts, 1959 to 1985

YEAR	WEIR INSTALLED	FIRST SOCKEYE ARRIVAL	DATE WHEN 50% PASSED WEIR	DATE WHEN 90% PASSED WEIR	TOTAL ESCAPEMENT
1959	1/7	3/8	13/8	17/8	4,311
1960	15/7	2/8	24/8	27/8	6,387
1961	21/7	10/8	12/8	17/8	16,619
1962	2/8*	3/8	6/8	9/8	14,508
1963	4/8	5/8	**	**	1,780
1964	23/7	26/7	16/8	25/8	18,353
1965	20/7	19/8	3/9	8/9	1,471
1966	13/7	4/8	14/8	22/8	21,580
1967	12/7	15/7	22/7	29/7	38,801
1968	11/7	21/7	25/7	8/8	19,726
1969	8/7	12/7	19/7	1/8	11,805
1970	6/7	26/7	2/8	12/8	8,419
1971	13/7	20/7	29/7	13/8	18,523
1972	13/7	13/7	19/7	31/8	52,545
1973	11/7	25/7	31/7	7/8	2,877
1974	4/7	29/7	4/8	18/8	8,101
1975	11/7	26/7	9/8	18/8	8,159
1976	16/7	29/7	1/8	6/8	24,111
1977	7/7	12/7	17/7	11/8	42,960
1978	11/7	11/7	21/7	30/7	22,788
1979	10/7	24/7	2/8	12/8	10,211
1980	4/7	16/7	24/7	12/8	11,018
1981	1/7	17/7	25/7	4/8	50,790
1982	3/7	11/7	20/7	30/7	28,257
1983	28/6	6/7	23/7	6/8	21,256
1984	20/6	21/7	26/7	3/8	32,777
1985	29/6	19/7	1/8	7/8	67,326
* QUESTION AS TO DATE INSTALLED					
** DAILY COUNTS UNAVAILABLE					
*** SLIDE YEAR					
AVERAGES					
1959-85		22/7	01/8	11/8	20,915
1980-84		14/7	24/7	5/8	28,825

Table 7. Peak Aerial Escapement Counts of Adult Chinook Salmon in the Stikine River Index Tributaries, 1975-1985

Year	Little Tahltan	Mainstem Tahltan	Beatty Creek	Andrew Creek	Total
1975	700 L	2,908 E	NS	260*	3868
1976	400	120 L	NS	468	988
1977	800	0 G	NS	534	1,334
1978	632	756 G	NS	400	1,788
1979	1,166	2,118 PG	NS	382	3,666
1980	2,137	960 G	122	362	3,581
1981	3,334	1,852 PG	558	629	6,373
1982	2,830	1,690 PG	567	910	5,997
1983	594	453 PG	83	444	1,574
1984	1,294	NS	126	355	1,773
1985	1,598	1,490 PG	147	319*	3,554

* 1975, 1985 figure = foot/aerial count
1976-1984 = weir count + spawner count + Crystal Lake brood stock

NS = not surveyed
E = clear
L = late
G = glacial
PG = partly glacial

Table 8. Annual Taku-Snettisham (District 111) Drift Gillnet Catches in Numbers of Fish from 1970 to 1985.

YEAR	CHINOOK	SOCKEYE	COHO	PINK	CHUM	TOTAL
1970	2,553	50,922	44,960	197,017	110,390	405,842
1971	4,621	66,168	41,623	31,484	90,906	234,802
1972	8,758	80,081	49,780	144,279	147,943	430,841
1973	6,726	85,151	35,451	58,186	109,234	294,748
1974	2,556	38,676	38,404	57,732	86,591	223,959
1975	1,759	32,513	1,185	9,567	2,677	47,701
1976	1,757	61,749	41,729	14,962	81,803	202,000
1977	1,068	70,097	54,917	88,578	61,102	275,762
1978	1,926	55,398	31,944	51,385	36,254	176,907
1979	3,702	122,376	16,192	152,410	61,200	355,880
1980	2,422	123,117	41,515	295,553	192,750	655,357
1981	1,720	49,765	26,803	255,029	76,092	409,409
1982	3,057	83,479	29,072	109,385	37,310	262,303
1983	888	31,627	21,443	66,080	15,188	135,226
1984	1,770	76,907	33,636	145,031	86,685	344,029
1985*	2,950	87,101	52,329	312,801	107,854	566,211
1980-1984 Average	1,971	72,979	30,494	174,216	81,605	361,265

* Preliminary Data (November 1985)

Table 9 SUMMARY OF CANADIAN COMMERCIAL SALMON CATCHES - TAKU RIVER, 1979 to 1985

YEAR	CHINOOK		SOCKEYE	COHO	PINK	CHUM	STEELHEAD	TOTAL	DAYS	BOATS	AVERAGE NO.
	JACKS	ADULTS							FISHED	DAYS	FISHERMEN/WK
1979		97	13,578	6,006	13,661	15,474	254	48,070	50	599	12
1980		225	22,602	6,405	26,821	18,516	457	75,026	39	476	12
1981		159	10,922	3,607	10,771	5,591	108	31,158	31.25	242.75	8
1982		54	3,144	51	202	3	1	3,455	13	38	3
1983	400	156	17,056	8,390	1,874	1,760	213	29,849	64	390	6
1984	221	294	27,242	5,357	6,964	2,492	367	42,937	30	288	10
1985	24	326	14,244	1,770	3,373	136	32	19,905	16	178	11
AVERAGES*											
1979-84		186	18,280	5,953	12,018	8,767	280	45,608	43	399	10

* excludes 1982, a year when the Canadian fishery was restricted by international agreement.

Table 10. Total Counts of Taku River - Port Snettisham Counting Weirs

Year	Speel Lake		Crescent Lake		Little Trapper Lake	Little Tatsamenie Lake		Hackett River		Nakina River
	Sockeye	Coho	Sockeye	Coho	Sockeye	Sockeye	Coho	Sockeye	Coho	Sockeye
1977	--	--	1,173	11	--					
1978	196	1,300	1,048	--	--					
1979	--	1,811	758	1,579	--					
1980	--	746	--	--	--					
1981	--	1,937	--	--	--					
1982	--	1,183	--	--	--					
1983	10,362	1,788	--	--	7,502					
1984	9,764	--	6,707	33	13,084					
1985	7,073		7,249		14,889*	13,015**	106	2,309	931	1,150

* 12,397 sockeye were counted; and addition (est.)
2,492 moved through holes in the weir.

** 12,700 sockeye were counted; and additional (est.)
315 moved through holes in the weir.

Table 11. Peak Aerial Escapement Counts of Adult Chinook Salmon in the Taku River Index Tributaries, 1951-1985.

Year	Nakina	Kowatua	Tatsamenie	Dudidontu	Tseta	Nahlin	Total
1951	5,000	...	...	400	100	1,000	6,500
1952	9,000	...	...	...	...	...	9,000
1953	7,500	...	...	...	...	...	7,500
1954	6,000	...	...	...	...	...	6,000
1955	3,000	...	...	...	...	...	3,000
1956	1,380	...	...	...	...	...	1,380
1957	1,500*	...	...	...	...	...	1,500
1958	2,500*	...	...	4,500	...	2,500	9,500
1959	4,000*	...	...	...	...	...	4,000
1960	Poor	...	...	...	...	...	Poor
1961	Poor	...	...	...	...	...	Poor
1962	...	...	...	25	81	216	322
1963	...	...	...	...	...	...	...
1964	...	...	...	...	...	...	...
1965	3,050	200 G	50 G	100	18	37	3,455
1966	...	14 G	150 G	267	150	300	881
1967	...	250 G	...	600	350	300	1,500
1968	...	1,100 E	800 E	640	230	450	3,220
1969	...	3,300 E	800 E	...	...	...	4,100
1970	...	1,200 E	530 E	10	25	26	1,791
1971	...	1,400 E	320 E	165	...	473	2,358
1972	1,000	130 G	170 G	103	80	280	1,763
1973	2,000	100 G	200 G	200	...	300	2,800
1974	1,800	235 G	120 G	20	4	900	3,079
1975	1,800	...	...	15	...	274	2,089
1976	3,000	341 G	620 E	40	...	725	4,726
1977	3,850	580 G	573 E	18	...	650	5,671
1978	1,620	490 G	550 E	...	21	624	3,305
1979	2,110	430 G	750 E	9	...	857	4,156
1980	4,500	450 G	905 E	158	...	1,531	7,544
1981	5,110	560 G	839 E	74	258	2,945	9,786
1982	2,533	289 E	387 E	130	228	1,246	4,813
1983	968	171 E	236 E	117	179	391[b]	2,062
1984	1,887	279 E	616 E	...	176[a]	951[b]	3,909
1985	2,647	699 E	848 E	476	303	2,236	7,209

a = surveyed only upper 2 miles - partial survey
b = surveyed only above beaver dam valley - total enumerated = 521 - adjustment made for total area, using spawner distribution data collected in past years as follows: above dams = 54.8%, in dams = 23.2%, and below dams to Telegraph Trail = 22.0%.
G = water glacial
E = water clear
* = Counts of total river not conducted - comparison made from carcass weir enumeration
Index Escapement Goal = 11,500 (Aerial - Nakina + Nahlin)
Survey Expansion Factor = 1/.75
Tributary Expansion Factor = 1/.60
Total Escapement Goal = 25,556

Table 12. Annual Alsek River (Dry Bay area) set gillnet catches in numbers of fish from 1959 to 1985.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Days Open	Maximum Number of Boats Fishing Any Week
1959	969	22,060	19,599	76	146	42,850		
1960	525	16,502	5,932	53	109	23,121	66	18
1961	2,120	23,393	7,679	84	86	33,303	80	35
1962	2,276	14,475	8,362	93	133	25,339	76	20
1963	125	5,199	7,012	12	35	12,383	72	14
1964	591	14,127	9,760	144	367	24,989	68	9
1965	719	28,487	9,638	10	72	38,926	72	20
1966	934	29,091	2,688	22	240	32,975	68	13
1967	225	11,108	10,090	107	30	21,560	68	14
1968	215	26,918	10,586	82	240	38,041	68	13
1969	685	29,259	2,493	38	61	32,536	61	19
1970	1,128	22,654	2,188	6	26	26,002	55.3	16
1971	1,222	25,314	4,730	3	120	31,389	61	15
1972	1,827	18,746	7,296	37	280	28,186	65.5	14
1973	1,754	26,515	4,395	26	283	32,973	52	27
1974	1,162	16,747	6,745	13	106	24,773	46	36
1975	1,379	13,842	2,230	16	261	17,728	58	14
1976	512	19,741	4,483	0	368	25,504	58	20
1977	1,402	40,780	11,817	689	483	55,171	57	20
1978	2,441	50,580	13,913	59	233	67,226	57	29
1979	2,525	41,449	6,158	142	263	50,537	51	38
1980	1,328	25,589	7,866	1,945	1,124	37,906	42	40
1981	761	24,680	10,614	25	472	36,552	33	21
1982	532	27,389	6,534	6	358	34,819	36	24
1983	94	18,546	5,253	20	432	23,688	37	20
1984	60	14,251	7,868	24	1,493	23,627	33	22
1985*	212	5,595	5,085	10	423	11,325	33	27

*Preliminary (December 1985).

Table 13. Canadian Sport and Subsistence Harvests of Alsek-Tatshenshini Salmon, 1976-1985

Year	Sockeye			Chinook			Coho			Total
	Subsistence	Sport	Total	Subsistence	Sport	Total	Subsistence	Sport	Total	Salmon
1976	3,500	600	4,100	100	200	300	0	100	100	4,500
1977	11,700	500	12,200	100	300	400	0	200	200	12,800
1978	7,700	500	8,200	200	300	500	0	200	200	8,900
1979	3,500	500	4,000	100	200	300	0	100	100	4,400
1980	1,100	400	1,500	100	200	300	0	200	200	2,000
1981	1,800	800	2,600	100	200	300	0	100	100	3,000
1982	4,200	800	5,000	100	100	200	0	0	0	5,200
1983	2,400	700	3,100	100	500	600	0	100	100	3,800
1984	2,400	300	2,700	200	500	700	0	100	100	3,500
1985	1,300	150	1,450	150	150	300	50	100	150	1,900
1976-84	4,256	567	4,822	122	278	400	-	122	122	5,344
1980-84	2,380	600	2,980	120	300	420	-	100	100	3,500

Table 14. Klukshu Weir Counts of Chinook, Sockeye and Coho Salmon, 1976 to 1985

YEAR	CHINOOK	SOCKEYE	COHO
1976	1,244	11,691	1,572
1977	3,144	26,791	2,758
1978	2,976	26,867	30
1979	4,403	12,311	175
1980	2,637	11,750	704
1981	2,113	20,348	1,170
1982	2,369	33,699	189
1983	2,537	20,492	303
1984	1,672	12,727	1,402
1985	1,458	18,620	350
AVERAGES			
1976-85	2,455	19,530	865
1980-84	2,266	19,803	754

Table 15. Preliminary Estimates for Required Salmon Escapement Levels in the Canadian Portion of the Stikine, Taku, and Alsek Rivers

Species	River	U.S. Estimate	Canadian Estimate
Chinook	Stikine	19,800	25,000
	Taku	25,600	30,000
	Alsek	7,200	12,500
Sockeye	Stikine	58,300	65,000
	Taku	71,000	80,000
	Alsek	33,000	58,000
Coho	Stikine	38,000	50,000
	Taku	27,500	35,000
	Alsek	5,400	25,000
Pink	Stikine	5,000	6,500
	Taku	150,000	250,000
	Alsek	500	500
Chum	Stikine	3,000	10,000
	Taku	50,000	80,000
	Alsek	500	500

Table 16.. Estimated contribution of sockeye salmon stocks originating in Alaska and Canada to the drift gillnet fishery in Alaska District 106, 1982.

Dates	Group	Catch 1.2	1.3	2.2	2.3	Other	Total	Percent
06/13-06/19	Alaska	66	3,876	82	102	0	4,126	57.7
(week 25)	Naa/Skna	70	2,639	186	2	0	2,897	40.5
	Stikine	28	0	0	101	0	129	1.8
	Total	164	6,515	268	205	0	7,152	
06/20-06/26	Alaska	627	16,018	416	1,461	103	18,625	50.3
(week 26)	Naa/Skna	662	10,112	948	26	58	11,806	32.0
	Stikine	271	4,973	0	1,441	35	6,540	17.1
	Total	1,560	30,923	1,364	2,928	196	36,971	
06/27-07/03	Alaska	621	23,385	431	1,541	0	25,978	57.6
(week 27)	Naa/Skna	655	11,575	982	28	0	13,240	29.3
	Stikine	268	4,145	0	1,519	0	5,932	13.1
	Total	1,544	39,105	1,413	3,088	0	45,150	
07/04-07/10	Alaska	340	13,260	355	1,318	45	15,318	40.9
(week 28)	Naa/Skna	358	10,974	809	24	32	12,197	32.6
	Stikine	147	8,426	0	1,299	28	9,900	26.5
	Total	845	32,660	1,164	2,641	105	37,415	
07/11-07/17	Alaska	163	7,995	170	782	0	9,110	50.9
(week 29)	Naa/Skna	172	3,536	386	14	0	4,108	22.9
	Stikine	70	3,844	0	772	0	4,686	26.2
	Total	405	15,375	556	1,568	0	17,904	
07/18-07/24	Alaska	286	10,205	558	4,586	146	15,781	45.4
(week 30)	Naa/Skna	302	9,316	1,270	0	87	10,975	31.6
	Stikine	124	7,404	0	393	69	7,990	23.0
	Total	712	26,925	1,828	4,979	302	34,746	
07/25-09/18	Alaska	280	2,572	248	2,103	46	5,249	36.8
(wks 31-38)	Naa/Skna	296	5,663	565	0	49	6,573	46.0
	Stikine	121	2,137	0	180	20	2,458	17.2
	Total	697	10,372	813	2,283	115	14,280	
	Alaska	2383	77,311	2,258	11,893	340	94,187	48.6
Fishery	Naa/Skna	2515	53,815	5,146	94	226	61,976	32.0
Total	Stikine	1029	30,749	0	5,705	152	37,635	19.4
	Total	5927	161,875	7,406	17,692	718	193,618	

1/ Based on scale pattern analysis

Table 17.. Estimated contribution of sockeye salmon stocks originating in Alaska and Canada to Alaska's District 106 drift gillnet fishery, 1983.

Dates	Group	Catch 1.2	1.3	2.2	2.3	Other	Total	Percent
06/19-06/25	Alaska	206	2,165	321	451	13	3,155	58.9
(week 26)	Na/Sk/sma	185	820	226	350	6	1,587	29.7
	Stikine	0	0	0	103	0	104	1.9
	Tahltan	0	377	0	128	2	507	9.5
	Total	391	3,362	546	1,033	21	5,353	
06/26-07/02	Alaska	480	2,855	394	280	28	4,037	57.2
(week 27)	Na/Sk/sma	431	578	277	350	12	1,647	23.3
	Stikine	0	0	0	51	0	51	0.7
	Tahltan	0	1,263	0	54	9	1,327	18.8
	Total	911	4,696	671	734	49	7,061	
07/03-07/09	Alaska	566	3,211	339	241	31	4,389	72.2
(week 28)	Na/Sk/sma	76	291	239	301	6	913	15.0
	Stikine	0	0	0	44	0	44	0.7
	Tahltan	142	542	0	47	5	736	12.1
	Total	785	4,045	578	633	43	6,082	
07/10-07/16	Alaska	634	1,811	414	515	38	3,411	80.1
(week 29)	Na/Sk/sma	65	0	93	90	3	250	5.9
	Stikine	0	183	0	55	3	240	5.6
	Tahltan	4	322	0	26	4	355	8.3
	Total	702	2,316	507	685	47	4,257	
07/17-07/23	Alaska	1,074	6,968	465	605	139	9,251	74.6
(week 30)	Na/Sk/sma	834	0	490	106	22	1,451	11.7
	Stikine	0	0	0	64	1	65	0.5
	Tahltan	0	1,571	0	31	24	1,626	13.1
	Total	1,909	8,539	954	806	186	12,393	
07/24-07/30	Alaska	680	2,808	454	624	32	4,599	57.8
(week 31)	Na/Sk/sma	1,374	1,404	350	76	23	3,227	40.5
	Stikine	0	0	0	0	0	0	0.0
	Tahltan	0	135	0	0	1	136	1.7
	Total	2,054	4,347	804	701	56	7,962	
07/31-08/06	Alaska	64	496	66	253	4	883	62.9
(week 32)	Na/Sk/sma	85	160	79	31	2	357	25.4
	Stikine	0	36	0	0	0	36	2.6
	Tahltan	0	128	(0)	0	1	129	9.2
	Total	149	821	145	284	7	1,405	
08/07-08/13	Alaska	217	1,093	86	143	22	1,561	61.7
(week 33)	Na/Sk/sma	288	322	96	44	11	762	30.1
	Stikine	0	73	0	0	1	74	2.9
	Tahltan	0	131	0	0	2	133	5.3
	Total	506	1,619	182	187	35	2,529	
08/14-08/20	Alaska	112	548	56	65	9	790	80.1
(week 34)	Na/Sk/sma	105	0	32	4	2	143	14.5
	Stikine	0	0	0	2	0	2	0.2
	Tahltan	0	51	0	0	1	51	5.2
	Total	217	599	88	72	11	986	
08/21-09/17	Alaska	104	372	52	61	7	595	65.1
(week 35)	Na/Sk/sma	97	140	30	4	3	274	29.9
	Stikine	0	13	0	2	0	16	1.7
	Tahltan	0	30	0	0	0	30	3.3
	Total	201	555	81	67	10	914	
Fishery Total	Alaska	4,139	22,326	2,645	3,238	322	32,670	66.8
	Na/Sk/sma	3,539	3,715	1,911	1,356	88	10,610	21.7
	Stikine	0	305	0	321	6	633	1.3
	Tahltan	146	4,549	0	286	49	5,030	10.3
	Total	7,824	30,896	4,556	5,201	465	48,942	

1/ Based on scale pattern analysis

Table 18. Estimated contribution of sockeye salmon stocks originating in Alaska and Canada to Alaska's District 106 gillnet fishery, 1984.

Dates	Group	Catch 1.2	1.3	2.2	2.3	Other	Total	90% C.I. Lower	Upper	Percent
06/17-06/23	Alaska	386	752	61	158	7	1,364	1,256	1,472	80.9
(week 25)	Nass/Skeena	0	119	62	19	1	201	138	264	11.9
	Tahltan	0	110	0	1	1	112	18	206	6.6
	Stikine	0	0	0	8	0	8	-16	32	0.5
	Total	386	981	123	186	9	1,685			100.0
06/24-06/30	Alaska	572	1,446	235	380	38	2,671	2,428	2,914	72.3
(week 26)	Nass/Skeena	71	200	238	45	8	562	421	703	15.2
	Tahltan	114	160	0	2	4	280	83	477	7.6
	Stikine	158	0	0	19	3	180	54	306	4.9
	Total	915	1,806	473	446	53	3,693			100.0
07/01-07/07	Alaska	1,290	2,906	444	822	13	5,475	4,962	5,988	71.0
(week 27)	Nass/Skeena	254	331	404	86	3	1,078	781	1,375	14.0
	Tahltan	366	476	0	0	2	844	403	1,285	10.9
	Stikine	295	0	0	16	1	312	34	590	4.0
	Total	2,205	3,713	848	924	19	7,709			100.0
07/08-07/14	Alaska	1,208	4,323	529	813	11	6,884	6,128	7,640	64.8
(week 28)	Nass/Skeena	722	1,271	481	85	4	2,563	2,019	3,107	24.1
	Tahltan	363	769	0	0	2	1,134	477	1,791	10.7
	Stikine	35	0	0	15	0	50	-189	289	0.5
	Total	2,328	6,363	1,010	913	17	10,631			100.0
07/15-07/21	Alaska	2,194	7,857	1,297	1,929	37	13,314	12,000	14,628	69.4
(week 29)	Nass/Skeena	1,207	956	850	113	9	3,135	2,311	3,959	16.3
	Tahltan	239	0	0	67	1	307	-210	824	1.6
	Stikine	1,351	947	0	116	6	2,420	1,257	3,583	12.6
	Total	4,991	9,760	2,147	2,225	53	19,176			100.0
07/22-07/28	Alaska	2,068	9,673	1,063	2,216	15	15,035	13,846	16,224	67.2
(week 30)	Nass/Skeena	2,778	3,088	974	90	7	6,937	5,770	8,104	31.0
	Tahltan	0	0	0	0	0	0			0.0
	Stikine	416	0	0	0	0	416	-85	917	1.9
	Total	5,262	12,761	2,037	2,306	22	22,388			100.0
07/29-08/04	Alaska	922	5,936	517	963	50	8,388	7,515	9,261	54.3
(week 31)	Nass/Skeena	2,067	2,743	888	916	40	6,654	5,805	7,503	43.1
	Tahltan	0	0	0	0	0	0			0.0
	Stikine	52	0	0	347	2	401	10	792	2.6
	Total	3,041	8,679	1,405	2,226	92	15,443			100.0
08/05-08/11	Alaska	517	2,841	206	465	13	4,042	3,775	4,309	70.1
(week 32)	Nass/Skeena	735	373	354	164	5	1,631	1,382	1,880	28.3
	Tahltan	0	0	0	0	0	0			0.0
	Stikine	0	0	0	97	0	97	6	188	1.7
	Total	1,252	3,214	560	726	18	5,770			100.0
08/12-08/18	Alaska	524	420	687	175	6	1,812	1,642	1,982	60.2
(week 33)	Nass/Skeena	496	138	380	62	4	1,080	924	1,236	35.9
	Tahltan	0	0	0	0	0	0			0.0
	Stikine	83	0	0	37	0	120	8	232	4.0
	Total	1,103	558	1,067	274	10	3,012			100.0
08/19-09/22	Alaska	315	601	148	227	91	1,382	1,275	1,489	60.6
(weeks 34-38)	Nass/Skeena	340	218	176	51	35	820	731	909	35.9
	Tahltan	0	0	0	0	0	0			0.0
	Stikine	43	34	0	0	3	80	3	157	3.5
	Total	698	853	324	278	129	2,282			100.0
Fishery	Alaska	9,996	36,755	5,187	8,148	281	60,367	58,131	62,603	65.8
Total	Nass/Skeena	8,670	9,437	4,807	1,631	116	24,661	22,845	26,477	26.9
	Tahltan	1,082	1,515	0	70	10	2,677	1,706	3,648	2.9
	Stikine	2,433	981	0	655	15	4,084	2,681	5,487	4.4
	Total	22,181	48,688	9,994	10,504	422	91,789			100.0

1/ Allocations for statistical weeks 25 to 28 are for District 106-30 only. Allocations for statistical weeks 29 to 38 are for all of District 106.

Table 19. Comparison of Scale Pattern and Parasite Based Nation of Origin Stock Contribution Estimates of Sockeye Salmon in Sumner Strait (Subdistrict 106 - 41), 1985.

STAT Week	PROPORTION ALASKA Scale Est.	PROPORTION ALASKA Parasite Est.[1]	PROPORTION CANADA Scale Est.	PROPORTION CANADA Parasite Est.[1]
24 (6/6-6/15)	.584	ND [3]	.365	ND
25 (6/16-6/22)	.508	.54	.492	.46
26[2] (6/23-6/29)	.437	.45	.508	.55
27 (6/30-7/6)	.430	.47	.570	.53
28 (7/7-7/13)	.378	.39	.622	.61
29 (7/14-7/20)	.491	.31	.509	.69
30 (7/21-7/27)	.463	.49	.537	.51
31[4] (7/28-8/3)	ND	.27	ND	.73
32 (8/4-8/10)	ND	.34	ND	.66

1 Parasite estimates of maximum Alaskan and minimum Canadian contributions.

2 No commercial fishery operated in weeks 24 and 26. Estimates derived from test fishery samples.

3 No parasite samples taken in week 24.

4 Scale pattern based estimates are not currently available after week 30.