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SALMON MANAGEMENT PLAN FOR THE
STIKINE, TAKU, AND ALSEK RIVERS, 1989

April 1989

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EXECUTIVE SUMMARY

Management of the transboundary Stikine, Taku, and Alsek rivers to achieve conservation and allocation objectives stipulated by the Pacific Salmon Treaty requires close cooperation between Canada and the United States. To assure each party has a clear understanding of objectives and procedures used in managing relevant fisheries, this plan has been developed.

Organization of this report is by river and species. Within each section the pre-season forecast, spawning escapement goals, and management procedures are presented. For sockeye salmon stocks of the Stikine River, details of the stock assessment program are also presented.

The pre-season forecast for the Stikine River sockeye salmon return in 1989 is 80,850 fish. This is an average level return from which a total allowable catch of 20,850 fish could be shared by the two parties. The escapement goal of 60,000 sockeye salmon has not been changed. In-season prediction of run size determined by the Stikine Management Model will be based on historical data from 1982 to 1988. The stock assessment program for the river is similar to last year although sampling programs have been reduced due to budget cuts within each party.

There are no major changes to the management plans for coho salmon in the Stikine River or for any species in the Taku and Alsek rivers. It is expected that returns of sockeye and pink salmon to the Taku River will be above average, of coho and chum, about average, and chinook, below average. Returns of all species to the Alsek River are expected to be below average.

INTRODUCTION

Management of transboundary river salmon to achieve conservation and allocation objectives, as stipulated by the Pacific Salmon Treaty, requires a cooperative approach by Canada and the United States. It is important that both parties have a clear understanding of the objectives and agree upon the procedures to be used in managing the fisheries, including the criteria upon which modifications of fishing patterns will be based. This document is designed to facilitate cooperative management by presenting the 1989 forecasts, summarizing the goals, and outlining the procedures to be used during conduct of the 1989 fisheries for the Stikine, Taku, and Alsek rivers.

STIKINE RIVER

Sockeye Salmon

Pre-season Forecast

For 1989, the average (80,850) of a smolt and spawner-recruit model forecast (93,700) and a sibling forecast (68,000) will be used as the pre-season forecast of a total return of Stikine River sockeye. Therefore, the pre-season expectation of total allowable catch (TAC) is 20,850 sockeye. A brief description of each of these forecasts follows.

Smolt Model Forecast. The forecast of total Stikine River run size by the Department of Fisheries and Oceans (DFO), Canada, is the sum of separate forecasts for Tahltan and non-Tahltan stocks. The Tahltan forecast assumes a 10% smolt-to-adult survival for smolts enumerated at the Tahltan Lake weir in 1986 and gives an estimated 1989 return of 24,400 fish. The non-Tahltan forecast relies on a stock-recruitment relationship derived from historical escapements and returns (excluding catch) to Tahltan Lake and the estimated non-Tahltan escapement for 1984. Thus, it is assumed that the Tahltan and non-Tahltan stocks have a similar stock-recruitment relationship. The forecast non-Tahltan return is 69,400 fish giving the total return forecast as 97,700 sockeye salmon.

Sibling Model Forecast. Age 1.3 sockeye salmon comprise about three-quarters of the Tahltan run. Therefore, it seems reasonable to try and predict the return of 1.3 fish in a given year by the number of returning age 1.2 fish in the previous year. For the years 1984 to 1988, linear regression of age 1.3 fish on age 1.2 fish from the previous years explains 90% of the total variation ($r^2 = 0.9$). For predicting the total Tahltan run (all ages) from the number of age 1.2 fish from the previous year, linear regression again explains 90% of the total variation. Given a return of 3,706 age 1.2 fish in 1988, it is predicted that the total return of Tahltan fish in 1989 will be 34,000 fish. Doubling this to include mainstem Stikine sockeye salmon gives a predicted total Stikine River return of 68,000 fish for 1989. Doubling is used since, from 1979 to 1987, the average proportion of Tahltan stocks in the Stikine sockeye run was 47% (range 33 to 60%).

Spawning Escapement Goals

Two sockeye run components are recognized for the Stikine River for the purposes of fishery management: the Tahltan Lake stock which spawns in Tahltan Lake, and the non-Tahltan component which is a conglomerate of stocks which spawn elsewhere throughout the drainage. The two management components are considered to be independent. Surpluses or deficits in escapement realized in one component shall not be used to balance deficits or surpluses in the other.

Spawning escapement goals have been established as ranges which reflect biological data regarding stock productivity, the ability of existing management systems to deliver established goals, the accuracy and precision of estimates of escapement generated by stock assessment programs, and the degree of risk considered acceptable.

At present our best judgment of escapement goals for these stocks is:

Tahltan Lake Stock		mid-point				
Fish (x 1000)	0	18	20	30	40	50
		<hr/>				
Mgmt. Category	red	Yellow	Green	Yellow	Red	->
Non-Tahltan Stocks		mid-point				
Fish (x 1000)	0	15	20	30	40	75
		<hr/>				
Mgmt. Category	red	Yellow	Green	Yellow	Red	->

A post-season estimate of escapement that falls within the Green Range shall be considered fully acceptable; one that falls within the Yellow Range shall be considered acceptable but not desired; and one that falls within the Red Range shall be considered undesirable.

The following data bases for the Tahltan Lake component will be developed and exchanged for use in determining escapement goals:

1. total returns from various levels of spawning escapements;
2. smolt production as a function of the number of spawners;
3. adult production as a function of the number of smolts;
4. a limnological model based on euphotic volume and surface area; and
5. estimates of the amount and quality of spawning habitat.

The following data bases for the non-Tahltan stock will be developed and exchanged for use in determining escapement goals:

1. total returns from various levels of spawning escapements;
2. inventory and assessment data regarding the historic pattern of distribution, abundance and timing of spawning fish; and

3. inventory and assessment data regarding the distribution, abundance, size and condition factors of rearing juvenile fish.

Methodology for analyses of the above named data bases will be developed by the Transboundary Technical Committee.

Stock Assessment Program

This section summarizes agreements regarding the data which will be collected by each National Section and, when appropriate, procedures that will be used for analysis.

Catch Statistics. The U.S. shall report catch and effort in the following strata for each statistical week: 1) Subdistricts 106 - 41 & 42 (Sumner Strait); 2) Subdistricts 106 - 30 (Clarence Strait); 3) Subdistricts 108 - 10 through 40 (Stikine - Wrangell side); 4) Subdistricts 108 - 50 & 60 (Stikine - Frederick Sound side); and 5) test fisheries conducted in Districts 106 and 108. Canada shall report catch and effort statistics in the following strata for each statistical week: 1) the lower river commercial fishery; 2) the upper river commercial fishery; 3) the upper river subsistence fishery; and, 4) the lower Stikine River test fishery near the international border.

Age Composition of Sockeye in Catches. Scales will be collected and used to age fish. Associated fish length and sex composition data will also be collected. The U.S. shall provide scale samples, up to 350 per week, for each of Sumner Strait, Clarence Strait, and District 108. It is recognized that small catches in District 108 similar to previous years may preclude temporal stratification at the desired level. Canada shall provide scale samples from the lower river commercial fishery each week. The desired sample size for the season is 700 fish. Scale samples need not be collected from the upper river commercial and subsistence fisheries. Instead, samples collected at the Tahltan Lake weir will be used to characterize the age composition of these upper river catches. Sockeye salmon caught in the lower Stikine test fishery will be sampled for scale, sex and length data.

Stock Composition of Alaska Catches. During the fishing season scale pattern analysis (SPA) will be used to estimate the contribution of Tahltan and non-Tahltan stocks to the catches made each week in each subdistrict of District 106 (Clarence Strait and Sumner Strait) and in Frederick Sound (District 108). Priority for in-season analysis is: 1) Sumner Strait, 2) Clarence Strait; and, 3) Frederick Sound. Test fisheries will operate in Sumner Strait and in Frederick Sound during June and July. When a commercial fishery does not operate, stock composition estimates will be made using samples collected from the test fishery. Post-season estimates of stock composition will be updated based on revised standards.

Stock Composition of the Inriver Canadian Catch. Egg diameter data will be used to estimate the Tahltan versus non-Tahltan contribution to the lower Stikine catches during the fishing season. This will

also be the estimate used post-seasonally. Canada shall sample up to 100 female fish each week to obtain the egg diameter data from sockeye salmon caught in the lower river commercial fishery.

Stock Composition and Run Timing Past the Lower Stikine Test Fishery.

The proportion of Tahltan and non-Tahltan fish in test net catches will be determined in-season based on egg diameter data. In addition, up to 200 fish per week from the test fishery will be sampled for brains, livers, and scales for subsequent electrophoretic analyses. Post-season, the stock composition of test fishery catches will be made using Parasite-Genetic Analysis (PGA).

Spawning Escapement Estimates. Weir counts will be used to estimate Tahltan escapements. The age composition will be estimated from scale samples. Approximately 800 fish will be sampled during the season for scales, length, and sex. A current standard for the Tahltan stock for SPA will be made from these scale samples. The non-Tahltan escapement will be estimated using migratory timing information obtained from catch-per-unit-effort (CPUE) data from the test fishery located near the international border.

In order to determine a current scale pattern standard for the mainstem stock conglomerate, scale samples will be taken from the inriver test fishery. The fish will be identified as either Tahltan or non-Tahltan origin using egg diameter and parasite data. A non-Tahltan scale pattern standard will be determined from those fish identified as non-Tahltan origin. In addition, scale samples will be collected from a test fishery in the Iskut River to augment the non-Tahltan sample.

Data Evaluation Procedures

Historical Data Base. A historical data set beginning in 1979 is appropriate since that is when Canadian commercial fishing began in the lower Stikine River. Methodology for estimating run size was fairly well standardized beginning in 1982. Therefore, estimates of run size after this time are considered to be better than those made prior to 1982. The historical data base used as input to the Stikine Management Model for 1989 is presented in Tables 1-3. The estimated run size used here for 1988 is based on preliminary data. The run size estimate will be updated in the fall of 1989 for use in future years.

Stikine Management Model. A model based on the linear relationship between CPUE and run size has been constructed to make weekly in-season predictions of the total run and the TAC. A description of the model is given in the Appendix of the "Salmon Management Plan for the Transboundary Rivers 1988" (PSC report TCTR (88)-2). The purpose of the model is to aid managers in making weekly harvest decisions to meet US/Canada treaty obligations for harvest sharing and conservation of Stikine River sockeye salmon.

A summary of the performance of the Stikine Management Model is presented in Table 4. The pre-season forecast of 123,500 returning Stikine sockeye salmon for 1988 was about 20% above the average run

size. However, in-season low CPUE during the first weeks of the fisheries resulted in very low predictions of run size. These low run forecasts early in the season were contrasted by progressive increases in the forecasts later in the season, after statistical week 30 (week ending July 23). The in-season forecasts of TAC jumped from 0 to 22,445 over a period of three weeks and the model predicted a significant and growing surplus owing to an apparently much stronger non-Tahltan run. By the end of the fishing season, the Stikine Management Model had predicted a total run of 96,045 Stikine sockeye salmon with a TAC for the U.S. of 16,405 Stikine sockeye salmon and for Canada, 20,000 sockeye salmon (Table 4). Both parties caught less than their respective TAC with Canada taking 15,291 and the U.S. taking an estimated 2,884 Stikine River sockeye salmon.

The preliminary estimate of the total run of Stikine River sockeye salmon is 48,946, of which 41,674 are non-Tahltan stocks and 7,272 are Tahltan stock (Table 1). This is one of the lowest total sockeye runs on record for the Stikine River and is much lower than that predicted by the Stikine Management Model. However, the model was correct in indicating a poor run in the beginning and limiting fishing then when the early Tahltan stock was present, although it was still overestimating this component of the run. More fishing time was indicated in the latter half of the season when the non-Tahltan stocks were more abundant.

The model for 1989 is based on eight years of historical CPUE data from District 106 and eight years from the Canadian commercial inriver fishery. A FORTRAN program has been written to determine the coefficients of the linear model of run size regressed on cumulative CPUE for each week of the fisheries beginning in week 25 for the U.S. (Sumner Strait) fishery, and week 26 for the Canadian inriver fishery. The parameters from the linear regressions are presented in Table 5. The cumulative CPUE from subdistrict 106-41 and 42 in Sumner Strait predicts the total Stikine River sockeye run. Cumulative CPUE from the Canadian lower river commercial fishery is used to predict the inriver Stikine River sockeye run. The total run is then determined as the inriver run plus the catch of Stikine River sockeye salmon in District 106, which is estimated as 10% of the total run (i.e. inriver estimate /0.9), plus the projected Stikine River sockeye catch in District 108.

The part of the model which determines total and weekly TAC levels for the U.S. and Canadian fisheries has been written on a Lotus worksheet for use by managers in-season. This part of the model uses the coefficients from the linear regression model, the established escapement goal, and Annex provisions of harvest sharing to determine the TAC and associated allowable harvest for each country. Weekly estimates of TAC and effort are provided as guidelines for the managers and are derived from average (1979-88) run timing of the stocks and average (1979-88) CPUE levels of each fishery.

The estimates of TAC made each week are based on CPUE data from the commercial fisheries. In the event that either commercial fishery is closed for a given week, the CPUE data from the associated test fishery will be used. In the case of the Lower Stikine River test

fishery, the average test fishery CPUE from Monday through Wednesday will be used.

The TAC will be determined each week from run size estimates according to the following schedule:

1. Week 25 and 26 (6/18-7/1): the pre-season forecast of run size will be used.
2. Week 27 (7/2-7/8): estimates of run size of the Tahltan stock made by 1) cumulative CPUE from District 106-41/42 (weeks 25 and 26) and 2) CPUE from inriver commercial fishery (week 26) will be averaged and then doubled (to account for the non-Tahltan component) to represent the total sockeye run.
3. Week 28 and after (7/9-end of season): an estimate of run size each week will be determined from the cumulative CPUE of all sockeye in the inriver commercial fishery.

Separate projections of run size will be made for the Tahltan stock (for which we have tighter confidence intervals on the estimates) and for the entire Stikine sockeye run. This information will be used post-season to help evaluate the performance of the model.

In-season Use. For 1989, the model predictions will set the TAC levels, however, managers may use additional information on which to make decisions on the openings of their respective fisheries. They will evaluate the output of the model and look for discrepancies with other information they may have on run strength. The information and evaluation will be used to improve the model for the next year.

Post-season Evaluation. After the fishing season is over, the Transboundary Technical Committee will evaluate how well the model did in predicting the entire run, where discrepancies occurred, and what might have caused them. The Committee will also determine whether escapement goals were met according to the Spawning Escapement Goals section of this report.

Management Procedures

United States. The fishery in Section 6-A (Sumner Strait) opens on the third Sunday in June (Statistical Week 25). It is managed for returning Stikine sockeye salmon during the first four weeks of the fishery. After that time, other sockeye stocks and salmon species greatly overshadow Stikine sockeye salmon in the catch. District 108 is generally managed through mid-July with Stikine sockeye salmon as the primary management consideration. Subsequent openings in Districts 106 and 108 will be based upon run sizes determined from the Stikine Management Model plus other jointly agreed to measurements of abundance. Initial openings in District 108 will be restricted to the outer areas of the district in order to minimize the interception of adult chinook salmon. Chinook salmon catches will also be a management concern in District 106 throughout the season and, if large numbers of small feeder chinook are caught, night closures will be instituted.

Announcements for fishery openings throughout Southeast Alaska are made on Thursday afternoons for gill net fisheries, which begin the following Sunday. The U.S. fishery has historically fished these districts for one to three days per week with occasional closures or longer fishing periods during extremes in stock abundance. If weekly CPUE is above average, extensions in fishing time could occur. Weekly fishing time is regulated on gross evaluations of run strength. Achieving the desired escapement goal into the Stikine River and into major Alaskan sockeye systems is the primary objective. The secondary objective is achieving the harvest sharing arrangement in effect. Fishing gear used in Districts 106 and 108 is similar; common sockeye net sizes are between 5 1/8 and 5 1/2 inches stretched mesh, 60 meshes deep and 300 fathoms long.

Management responses that will be used to reduce the sockeye harvest would begin with restrictions in fishing time in District 108. Next, closures of that district would be used, followed by restrictions in fishing time in Sumner Strait. Finally the most complete restriction would be the additional closure of Sumner Strait. The management responses for more liberal fisheries would start with increases in fishing time in District 108 and would extend to increases in time in District 106. When both districts are open, the fishing times in each would coincide, if possible.

A number of domestic considerations are involved in the District 106 and 108 fisheries. In District 108, chum salmon returns into Frederick Sound are a management consideration beginning the end of June. Chum salmon run strength assessments are based upon CPUE in test fishery catches. Pink salmon are occasionally a consideration in District 108 beginning in July. Pink salmon run strength assessments are based upon escapement surveys and CPUE in the test fisheries. Beginning in mid-June and occasionally extending to early August, sockeye returns in U.S. systems are a management consideration. Run strengths are based upon commercial and test fishery CPUE, weir counts, and scale pattern analysis to determine stock composition. Beginning in mid-July pink salmon run strength may be a management consideration in the District 106 fishery. Assessments of pink run strength are based upon the predicted return, CPUE and total catches in the commercial and test fisheries. A commercial troll fishery opening for chinook salmon will occur in the inside waters of S.E. Alaska on June 5-7. An additional opening will occur on June 21-23 if fewer than 25,000 chinook salmon of non-Alaskan hatchery origin are caught during the June 5-7 opening.

Canada. The Canadian lower river Stikine fisheries will be managed on a weekly basis with management actions driven by results of stock, catch and escapement projections derived from the Stikine Management Model. Weekly inputs to the model will include: stock identification results from Alaskan Districts 106 and 108 and Canadian lower river gill net fisheries; CPUE data from targeting fisheries; catch data; and escapement requirements. Consideration for Tahltan stock management objectives should persist from the fishery opening June 26 to the end of July. Thereafter, the management attention will be focused primarily on non-Tahltan component objectives. Actual time frames of responses to specific stock compositions will be fine-tuned

in-season according to the weekly results of the stock identification program.

The achievement of escapement objectives is the foremost priority in management considerations. Inriver allocation priority will be to fulfil the requirements of the traditional Indian food fishery located near Telegraph Creek. The commercial fisheries, therefore, will be managed to accommodate these fundamental priorities. The area of most intense management will be within the lower Stikine commercial fishery.

Fishing time in the lower Stikine fishery will depend upon stock assessment and international and domestic catch allocation considerations. Normal fishing periods of one to two days per week will be adjusted accordingly. Traditional gear limitations of one net per fisherman with a maximum length of 135 meters will be in effect. Fishing boundaries will remain unchanged from those established in previous years, i.e. from the border upstream to boundary markers located near the Stikine-Porcupine confluence, and in the Iskut River to a marker located approximately 2 km. upstream from the mouth. In the upper Stikine commercial fishery, one day of fishing will be permitted each week. As in past years, weekly fishing time in the upper Stikine Indian food fishery will not normally be restricted.

Restrictive measures in the lower Stikine commercial fishery, in order of implementation, will include:

1. fishing gear: mesh sizes restricted to less than 146 mm (5.75 in.) to mid-July;
2. fishing time: the major tool used in the regulation of the fishery; and
3. fishing area: boundaries may be relocated to protect isolated spawning populations.

In the upper Stikine Indian food fishery, reductions in fishing time would be considered if no other adjustments could be made in the lower and upper river commercial fisheries.

In the event that a more liberal management regime is justified, extensions to fishing time in the lower Stikine fishery for up to 24 hours would be granted. Additional fishing time beyond this would be dependent on stock escapement and catch considerations. Another factor that has affected fishing time decisions in past years has been abnormal water conditions. Flooding or high debris loading has infrequently shut down the fishery. Compensation for this anomaly usually results in postponement of the remainder of the fishing period to later in the week.

Summary. Attainment of the escapement goals for the Tahltan and non-Tahltan portions of the run is the primary objective of Stikine sockeye management. Harvest sharing will be based upon TAC estimate derived from the model. The total TAC forecast will likely change from week to week as the Stikine Management Model estimates a new total run size from the cumulative CPUE. Variations in the TAC estimate will be larger early in the season when CPUE is high rather

than later in the season. Management actions will reflect these week to week changes in the TAC estimates. The fisheries managers from the two countries will keep in weekly contact in order to evaluate the output from the Stikine Management Model and the outcome of their respective management actions. If the model projection moves the TAC into a different harvest range for the following week, and the change is due to a difference of 2,000 or less sockeye, managers may decide to wait for two similar consecutive weekly results before altering fishing time.

In-season Data Exchange and Review

Canada and the U.S. will conduct data exchanges by telephone on Wednesday afternoon or Thursday morning of each week during the fishing season. At that time, current catch statistics and stock assessment data will be updated, exchanged, and reviewed. The next week's management plans for each country will be discussed at this time. It is anticipated that additional communications will be required each week. Weekly decision deadlines will be: a) for Districts 106 and 108: 11:00 a.m., Thursday, Alaska Daylight Time; b) for the Canadian Stikine fishery: 10:00 a.m., Friday, Pacific Daylight Time.

Coho Salmon

Pre-season Forecast

The lack of information on the escapement or smolt production precludes specific numerical forecasts. A qualitative estimate of the return is that it will be average.

Escapement Goal

The interim escapement goal for Stikine River coho salmon is 30,000 to 50,000.

Stock Assessment Program

Each country shall: 1) report catch statistics for the same strata as sockeye are reported; 2) sample its fisheries for coded-wire-tags; and, 3) conduct escapement programs as it deems necessary.

Management Procedures

United States. If there is a conservation concern, the District 108 fishery will be restricted.

Canada. If there is a conservation concern, the Canadian fishery will be restricted. The Canadian harvest allocation of 4,000 coho,

as specified in the Transboundary Annex of the Treaty, will be the basic management guide in the inriver fishery.

TAKU RIVER

Pre-season Forecasts

Sockeye and pink salmon returns are expected to be above average. The return of coho salmon is expected to be average to above average. Chum salmon returns should be about average and chinook returns, below average.

Management Goals

Interim escapement goals set by the Transboundary Technical Committee for salmon spawning in Canadian portions of the Taku River are:

Sockeye	-	71,000 to	80,000
Chinook	-	25,600 to	30,000
Coho	-	27,500 to	35,000
Pink	-	150,000 to	250,000
Chum	-	50,000 to	80,000

Annex IV of Pacific Salmon Treaty provides for the following harvest sharing arrangements for salmon originating in Canadian portions of the Taku River:

Species	Canadian Share	United States Share
Sockeye	18% of TAC	82% of TAC
Coho	3,000 fish	
Chinook	Incidental harvest	
Pink	Incidental harvest	
Chum	Incidental harvest	

Both parties agree to take appropriate management actions to ensure that the necessary escapement goals for chinook salmon bound for Canadian portions of the Taku River are achieved by 1995.

Collateral United States management goals for the District 111 Fishery:

1. Provide for an orderly fishery while harvesting those fish in excess of spawning escapement needs and harvest sharing obligations.
2. Promote the harvest and processing of good quality fish within the constraints dictated by run size.

3. Manage, in conjunction with other drift gill net fisheries in the region, for a combined, all District catch of 7,600 chinook salmon (exclusive of new Alaska hatchery produced fish).
4. Minimize, to the extent practical, the incidental harvest of chinook salmon.
5. Provide for sufficient salmon spawning escapements to the Port Snettisham and Stephens Passage stocks.

Management Procedures

United States

Section 11-B will initially open for a 72-hour period on the third Sunday of June (June 18). The strength of the sockeye salmon return will be evaluated using CPUE analysis and weekly escapement estimates derived from the Taku River fish wheel mark-recapture project. Scale pattern analysis will be used to estimate the contributions of Taku River and Port Snettisham sockeye salmon to the District 111 catch.

Protection of Port Snettisham sockeye salmon will be attempted again this year in order to rebuild production of these stocks to historical levels. To accomplish this and to provide protection to chinook salmon returning to the Snettisham Hatchery that are needed for brood stock, Port Snettisham will be closed inside a line from Point Amner to Point Styleman through approximately August 13. Portions of Stephens Passage may also be closed in July to provide adequate Snettisham Hatchery chum salmon brood stock. This additional closure will further protect the Snettisham sockeye salmon stocks.

To minimize the harvest of mature chinook salmon, Taku Inlet will be closed north of the latitude of Jaw Point during the initial fishing weeks. In addition, night closures will be imposed if catches of juvenile chinook salmon (feeders) are above average levels. Based on catch rates in previous years, night closures could be expected through the end of July.

Although the Taku River pink salmon run is anticipated to be very strong this year, additional fishing time will not be allowed to target on this species within Taku Inlet. Based on earlier gill net mesh size studies conducted by the Alaska Department Fish and Game (ADF&G), it would not be possible to target on pink salmon without also significantly impacting the sockeye salmon return. Additional fishing time may be warranted to harvest pink salmon in Section 11-C depending on the magnitude of pink salmon returns in lower Stephens Passage, Seymour Canal, and the northern portions of District 10.

Beginning in mid-August, management emphasis will switch to fall chum and coho salmon. Fishing time and area will then be dependent upon the developing run strengths of the wild stocks of fall chum salmon and coho salmon. Management will be based on evaluation of catch, CPUE, and fishing effort. The coho salmon catches and escapement estimates developed by the Taku River mark-recapture project will also be considered.

This past spring, the Alaska Board of Fisheries directed that an extension of the purse seine fishing area in northern Chatham Strait be allowed during the month of July. The area encompasses waters along the western shore of Admiralty Island north of Point Marsden. If large numbers of pink salmon are available for harvest in this area, short fishery openings to target on this species will occur. Sockeye salmon bound for Lynn Canal, Taku River, Port Snettisham, and Alaskan island systems are believed to be present in this area. To limit the incidental harvest of sockeye salmon in the July fishery, fishing will be stopped if the catch of sockeye salmon reaches 15,000 fish.

The Board made two additional changes in regulations that will affect Taku River salmon stocks. For the first time since 1975, sport fishing for chinook salmon will be allowed between April 15 and June 15 in selected marine waters around Juneau and near the mouth of the Taku River. The daily bag limit is two chinook salmon per person. A personal use fishery was established for U.S. portions of the Taku River. The fishery will operate during the month of July. A seasonal bag limit of five sockeye salmon per person or ten sockeye salmon per family will be allowed.

Canada

Canadian management decisions will be based on weekly projections of total run size and total allowable catch (TAC). The weekly projection of the seasonal TAC will be made using the following calculation:

$$TAC = \frac{E(w) + CC(w) + AC(w-1)(0.85)}{p^{RT}(w)} - E_g$$

Where: TAC = projected total allowable catch for season.
 E(w) = total escapement to date, i.e., to week (w).
 CC(w) = total Canadian catch to date, i.e., to week (w).
 AC(w-1) = total Alaskan catch in all Districts to the preceding week (w-1). This is multiplied by 0.85 to allow for a discount of 0.15 to account for Snettisham contribution and adjustments in catch data.
 $p^{RT}(w)$ = estimated proportion of run through to week (w) determined from the average in-river run timing (based on CPUE data from the Canadian fishery). Run timing estimates will be adjusted in-season according to in-season CPUE data relative to historic data in both U.S. and Canadian fisheries.
 E_g = system-wide escapement goal. A value of 75,000 will be used reflecting the midpoint in the interim range of 71,000 to 80,000.

Weekly total allowable catch projections for sockeye salmon will be used to develop the total Canadian guideline harvest by applying the 18% allocation specified in Annex IV of the Treaty. Run timing will

be used to apportion the projected total season catch into weekly harvest guidelines.

The Canadian fishery will be monitored daily by a resident DFO Fisheries Officer and/or Patrolman who will collect catch and tag recovery information. Catch information will be relayed to the DFO office in Whitehorse, collated, and exchanged with a designated ADF&G contact person during weekly telephone contacts. Tag recovery information will be forwarded to the DFO/ADF&G tagging crew located at Canyon Island, Alaska.

Weekly and cumulative sockeye population and escapement estimates will be developed from catch and tag recovery information using both the Schaefer and Stratified Petersen algorithms. Examination of these factors will be used to determine if the Canadian sockeye catch is on target; adjustments will be made to weekly fishing time to compensate for deficit/surplus situations.

Conservation measures for the protection of chinook salmon will include a 5.75 inch mesh restriction during the initial weeks of the fishery.

The management coordination between Canadian and U.S. fishery managers will involve the naming of designated managers and alternatives.

ALSEK RIVER

Pre-season Forecasts

Returns of Alsek River salmon in 1989 are expected to be below average.

Management Goals

Interim escapement goals set by the Transboundary Technical Committee for salmon spawning in Canadian portions of the Alsek River are:

Sockeye -	33,000 to	58,000
Chinook -	7,200 to	12,500
Coho -	5,400 to	25,000

Annex IV of Pacific Salmon Treaty requires that the parties take necessary management actions to rebuild chinook and early sockeye salmon stocks.

Management Procedures

United States

The Alsek River fishery will initially open on June 12 for 24 hours. An extension of fishing time may be allowed if sockeye salmon run strength is sufficient and the harvest of chinook salmon can be kept low. The duration of fishing periods during the remainder of the sockeye salmon season will be based on evaluation of sockeye salmon catches and effort levels. Gill nets will be restricted to a maximum mesh size of 6 inches through July 2 to minimize incidental chinook salmon harvests.

After the first several weeks of the fishing season, U.S. managers will use an in-season sockeye salmon abundance model to predict total catch and the escapement through the Klukshu River weir. This model has been used for the past 5 years and has proven valuable in estimating the total run size as early as the third week of the season. The calculations are performed as follows:

1. Project the total effort (boat-hours) through statistical week 31. The number of boats has historically remained very constant within any given year and can be accurately estimated after the first fishing period.
2. Estimate the total exploitation rate that will be realized given this amount of effort, using a regression equation between exploitation rate and effort that has been developed from historical data.
3. Predict the total catch by dividing the cumulative-catch-to-date by the historical cumulative proportion of the catch-to-date.
4. Predict the total escapement past the Klukshu weir by dividing the predicted total catch by the estimated exploitation rate and then subtracting the predicted catch as follows:
$$(\text{Catch/Exploitation Rate}) - \text{Catch} = \text{Escapement}$$

The Alsek River sockeye salmon run in the lower river is nearly over by early to mid-August. Management emphasis will then be switched to coho salmon. Fishing time during the coho salmon fishery will be based on a comparison of current year fishery performance with historical performance.

The Alsek River surf fishing area will likely be open during the same time period as the inriver fishery. The surf fishery areas include the shoreline, 3/4 of a mile in each direction from the river mouth to the outermost bar where the surf breaks.

Canada

Management of both the sport and Indian food fisheries will be similar to that of the last several years with conservation measures in place to protect chinook salmon and early-timed sockeye salmon.

Final plans for the Indian food fishery will be made after discussions between the Department of Fisheries and Oceans and the Champagne/Aishihik Indian Band-the primary user of the resource. The fishing pattern in recent years has involved a closure early in the season followed by a period during which the fishery opened for only one day per week. Thereafter, the fishery was permitted to operate three days per week. The escapement of sockeye through the Klukshu Weir serves as an in-season indicator of stock strength and adjustments to the fishery may be made on the basis of weir counts, if warranted.

Table 1. Stikine River sockeye run size, 1979 to 1988.

ALL SOCKEYE SALMON

Year	Inriver Run Estimates			Marine Catches	Total Run Size	Escapement
	Canada	U.S.	Average			
1979		34,116	34,116	8,299	42,415	20,582
1980		62,744	62,744	23,206	85,950	41,825
1981		138,503	138,503	27,538	166,041	110,879
1982		68,442	68,442	42,527	110,971	47,902
1983	66,000	65,719	65,860	5,751	71,610	44,740
1984	84,544	59,169	71,856	7,867	79,723	66,530
1985	207,739	137,695	172,717	29,089	201,806	145,913
1986			63,548	7,194	70,742	45,702
1987	46,398	35,543	40,970	3,584	44,554	27,979
1988			46,062	2,884	48,946	29,523

TAHLTAN STOCK

Year	Inriver Run Estimates 1/			Marine Catches	Total Run Size	Escapement
	Canada	U.S.	Average			
1979		14,772	14,772	5,076	19,848	10,211
1980		19,137	19,137	11,239	30,376	11,018
1981		65,789	65,789	16,189	81,978	50,790
1982		42,297	42,297	24,785	67,082	28,257
1983	27,921	32,137	30,029	5,015	35,044	21,256
1984	33,277	37,572	35,424	2,754	38,178	32,777
1985	75,306	85,509	80,408	25,176	105,584	67,826
1986			28,549	2,725	31,274	20,280
1987	11,406	12,085	11,746	1,959	13,705	6,958
1988			6,254	1,018	7,272	2,536

1/ Canadian in-river run estimates are based on PGA; U.S. estimates, on SPA. The 1987 U.S. inriver run estimates are from preliminary in-season data. The 1986 estimates are based on combined PGA and SPA. Total run size equals the average inriver run size plus the district catch.

Table 2. CPUE for all sockeye salmon and the proportion of Tahltan stock in the catch from the Canadian lower Stikine River commercial fishery. For periods with no fishing, values were filled in with averaging and interpolation techniques.

CPUE OF ALL SOCKEYE						
WEEK	1982	1983	1985	1986	1987	1988

26	13.3	12.8	67.6	2.8	3.0	3.0
27	49.5	39.3	75.0	18.8	11.9	21.8
28	46.9	62.2	100.1	79.8	10.6	35.5
29	24.0	72.8	260.0	58.1	57.9	69.2
30	29.1	53.3	147.9	84.7	68.8	71.9
31	13.6	92.0	104.7	81.9	27.6	61.9
32	20.5	64.3	73.6	55.6	76.6	89.2
33	7.7	54.7	58.6	34.4	32.3	33.3
34	3.6	14.7	18.2	25.9	16.5	23.1
35	1.3	11.9	10.3	9.4	5.4	11.0

PROPORTION TAHLTAN STOCK IN CATCH						
WEEK	1982	1983	1985	1986	1987	1988

26	0.93	0.83	0.89	0.73	0.87	0.71
27	0.93	0.86	0.90	0.77	0.87	0.71
28	0.89	0.83	0.90	0.83	0.91	0.53
29	0.67	0.62	0.79	0.73	0.67	0.31
30	0.42	0.48	0.42	0.52	0.31	0.03
31	0.16	0.24	0.29	0.19	0.09	0.01
32	0.20	0.14	0.20	0.09	0.04	0.00
33	0.21	0.11	0.20	0.02	0.00	0.00
34	0.21	0.09	0.20	0.01	0.00	0.00
35	0.21	0.02	0.20	0.00	0.00	0.00

Table 3. CPUE of all sockeye salmon and the proportion of Stikine River Tahltan and Non-Tahltan stocks in the catch from the District 106-41/42 commercial fishery. For periods with no fishing, values were estimated using averaging and interpolation techniques.

CPUE OF ALL SOCKEYE							
WEEK	82	83	84	85	86	87	88
25	101.9	38.2	45.3	91.0	14.1	19.3	16.5
26	119.1	57.7	69.6	126.9	16.9	29.1	22.9
27	124.9	38.4	89.4	162.9	63.0	52.2	58.7
28	156.9	65.9	80.9	117.4	75.5	103.9	66.8
29	160.5	76.1	79.7	113.3	88.0	83.9	155.4
30	164.1	69.9	148.3	108.7	100.6	155.9	87.6
31	137.3	44.4	53.0	189.1	105.8	106.6	59.3
32	95.2	40.5	45.6	69.0	82.1	115.4	92.2
33	53.1	18.2	14.9	100.5	60.1	88.3	67.6
34	11.1	6.2	5.4	37.8	28.3	45.9	20.5
35	4.4	5.7	1.1	5.9	8.6	3.4	11.0

PROPORTION TAHLTAN STOCK IN CATCH							
WEEK	82	83	84	85	86	87	88
25	0.01	0.04	0.07	0.12	0.00	0.02	0.01
26	0.15	0.09	0.08	0.13	0.02	0.02	0.07
27	0.11	0.19	0.11	0.27	0.07	0.05	0.06
28	0.19	0.12	0.11	0.17	0.03	0.00	0.00
29	0.17	0.08	0.02	0.16	0.00	0.04	0.002
30	0.06	0.13	0.00	0.00	0.00	0.00	0.00
31	0.08	0.02	0.00	0.00	0.02	0.00	0.00
32	0.00	0.09	0.00	0.00	0.00	0.00	0.00
33	0.00	0.05	0.00	0.00	0.01	0.00	0.00
34	0.00	0.05	0.00	0.00	0.00	0.00	0.00
35	0.00	0.03	0.00	0.00	0.00	0.00	0.00

PROPORTION NON-TAHLTAN STOCKS IN CATCH							
WEEK	82	83	84	85	86	87	88
25	0.01	0.00	0.01	0.00	0.00	0.03	0.00
26	0.03	0.02	0.05	0.02	0.00	0.00	0.00
27	0.02	0.01	0.04	0.01	0.02	0.01	0.06
28	0.08	0.01	0.01	0.01	0.01	0.00	0.01
29	0.09	0.06	0.13	0.01	0.00	0.02	0.05
30	0.17	0.01	0.02	0.03	0.00	0.00	0.004
31	0.09	0.00	0.03	0.00	0.00	0.00	0.00
32	0.00	0.03	0.02	0.00	0.00	0.00	0.00
33	0.00	0.03	0.04	0.01	0.00	0.00	0.00
34	0.00	0.00	0.04	0.02	0.00	0.00	0.00
35	0.00	0.02	0.00	0.00	0.00	0.00	0.00

Table 4. Evaluation of the Stikine Management Model for the 1988 season. Weekly forecasts of run size for 1988 are given along with the total allowable catch for Stikine River sockeye salmon.

Week	Start Date	Forecasts		--- Fishing Regimes ---				Cumulative Catch	
		Run Size	TAC	--- U.S. ---			CANADA TAC	U.S.	CANADA
				6	8	TAC			
26	19-Jun	123,500 ^a	63,500	I	D	33,500	30,000	0	0
27	26-Jun	123,500 ^a	63,500	I	D	33,500	30,000	187	0
28	03-Jul	60,003 ^b	3	I	N	I	10,000	687	450
29	10-Jul	47,540 ^c	0	I	N	I	4,000	1,389	1,028
30	17-Jul	69,391 ^c	9,391	I	N	I	10,000	2,587	4,894
31	24-Jul	73,316 ^c	13,316	I	N	3,316	10,000	2,884	8,523
32	31-Jul	82,445 ^c	22,445	I	D	7,445	15,000	2,884 ^e	12,408
33	07-Aug	93,673 ^c	33,673	I	D	13,673	20,000	2,884 ^e	14,430
34	14-Aug	94,634 ^c	34,634	I	D	14,634	20,000	2,884 ^e	14,885
35	21-Aug	96,405 ^c	36,405	I	D	16,405	20,000	2,884 ^e	15,137
End of Fishing Season									
39	18-Sep	96,405 ^d	36,405			16,405	20,000	2,884 ^e	15,291

- a. Pre-season forecast.
- b. Model forecast based on twice the average predicted run of Tahltan stock (district and inriver predictions).
- c. Model forecast based on inriver cumulative CPUE of all sockeye salmon.
- d. Final model forecast.
- e. No more Stikine fish found in catches according to scale pattern analysis.
- I. Incidental catch allowed.
- D. Directed catch allowed.
- N. No directed fishing at Stikine sockeye salmon.

Table 5. Model parameters from the linear regression of run size on cumulative CPUE for the 1989 Stikine Management Model.

Canadian inriver commercial fishery catch of sockeye salmon

WEEK	R ²	RUN F.	INTERCEPT	SLOPE	SD(R.F)	SD(INT)	SD(SLOPE)	AVG.CPUE
26.	.88	.03	48930.82	1808.44	.030	9502.05	331.51	17.07
27.	.83	.09	30538.09	927.33	.074	14556.86	212.03	36.05
28.	.93	.13	10609.79	634.92	.067	10958.36	85.51	55.85
29.	.94	.17	18249.23	308.81	.060	9471.06	38.95	90.33
30.	.93	.16	11149.64	249.39	.039	11191.92	34.52	75.95
31.	.90	.13	7043.18	214.69	.050	13853.76	35.38	63.62
32.	.84	.15	-457.12	199.55	.066	19782.43	43.89	63.30
33.	.81	.08	-1040.83	184.14	.027	21798.74	44.52	36.83
34.	.80	.04	-2489.56	180.45	.019	23054.86	45.56	17.00
35.	.79	.02	-2659.90	177.62	.008	23694.72	46.06	8.21

Canadian inriver commercial fishery catch of Tahltan sockeye salmon

WEEK	R ²	RUN F.	INTERCEPT	SLOPE	SD(R.F)	SD(INT)	SD(SLOPE)	AVG.CPUE
26.	.82	.05	19061.70	1111.16	.039	6555.79	257.29	14.97
27.	.86	.17	8664.36	584.74	.093	7275.69	119.03	31.25
28.	.96	.24	-685.35	392.91	.089	4237.85	37.82	46.36
29.	.89	.28	6077.75	192.04	.118	6592.63	33.29	61.62
30.	.89	.16	4532.14	169.90	.064	6870.22	29.76	29.19
31.	.89	.05	4643.40	158.58	.036	7008.10	28.42	12.39
32.	.89	.03	4563.87	154.16	.010	7014.30	27.61	6.13
33.	.89	.01	4871.64	150.15	.012	7009.01	27.04	3.34
34.	.89	.00	4958.90	149.00	.003	6992.64	26.82	1.00
35.	.89	.00	5032.36	148.34	.002	6984.02	26.71	.43

District 106-41 fishery catch of Stikine River sockeye salmon

WEEK	R ²	RUN F.	INTERCEPT	SLOPE	SD(R.F)	SD(INT)	SD(SLOPE)	AVG.CPUE
25.	.87	.04	53726.06	13512.03	.040	10044.23	2299.58	2.67
26.	.84	.10	44337.56	4224.65	.062	12749.12	835.54	8.09
27.	.96	.27	39963.58	2027.61	.128	6018.83	174.49	13.81
28.	.84	.21	39083.49	1345.19	.125	13329.86	262.40	13.11
29.	.70	.20	43286.89	920.61	.160	18153.29	266.89	12.81
30.	.55	.11	49794.81	679.86	.102	22100.79	275.71	8.31
31.	.47	.05	54276.53	564.89	.070	23448.76	268.51	4.03
32.	.47	.02	53723.03	565.86	.034	23698.62	269.88	.87
33.	.47	.01	53210.71	568.98	.013	23646.38	267.90	.55
34.	.48	.00	52995.94	570.55	.003	23569.13	266.37	.20
35.	.48	.00	52975.03	570.51	.002	23583.63	266.46	.04

Table 5. Continued.

District 106-41 fishery catch of Tahltan sockeye salmon

WEEK	R ²	RUN F.	INTERCEPT	SLOPE	SD(R.F)	SD(INT)	SD(SLOPE)	AVG.CPUE
25.	.71	.05	24518.82	7472.37	.043	9066.61	2115.44	2.42
26.	.94	.11	14240.45	3139.13	.064	4579.84	345.96	6.61
27.	.93	.33	14343.92	1321.47	.137	4901.11	156.49	12.34
28.	.95	.24	11111.90	993.67	.136	4608.84	104.55	10.30
29.	.91	.16	12364.06	757.98	.171	5946.86	106.08	8.20
30.	.88	.04	12044.78	718.57	.079	7033.38	119.34	2.63
31.	.84	.05	12733.17	670.15	.087	7976.40	128.98	2.04
32.	.84	.01	12399.09	669.66	.032	8117.12	130.52	.53
33.	.84	.00	12241.23	670.36	.015	8145.95	130.77	.19
34.	.84	.00	12216.29	670.23	.003	8160.53	130.94	.05
35.	.84	.00	12201.69	670.15	.002	8169.32	131.04	.03