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SALMON MANAGEMENT PLAN FOR THE STIKINE, TAKU, AND ALSEK RIVERS, 1990

April 1990

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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 system and species. Within each section the preseason forecast, spawning escapement goal, and management procedures are presented. For sockeye salmon stocks of the Stikine River, details of the stock assessment program are also presented.

The preseason forecast for the Stikine River sockeye salmon return in 1990 is 94,000 fish. This is an average level return from which a total allowable catch of 34,000 fish could be shared by the two Parties. The escapement goal of 60,000 sockeye salmon has not been changed. The in-season predictions of run size during the 1990 season, as determined by the Stikine Management Model, will be based on historical data from 1982 to 1989. The stock assessment program for the river is similar to last year although genetic stock identification sampling has been eliminated due to budget cuts.

There are no major changes to the management plans for other species of salmon in the Stikine River or for any salmon species in the Taku and Alsek Rivers. Returns of coho salmon to the Stikine River are expected to be below average. It is expected that returns of sockeye and coho salmon to the Taku River will be average to above average; of chinook salmon, about average; and of pink and chum salmon, below average. Returns of chinook, coho, and early-run sockeye salmon to the Alsek River are expected to be below average. The return of late-run sockeye salmon is expected to be about 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 1990 forecasts, summarizing the goals, and outlining the procedures to be used by the Canadian Department of Fisheries and Oceans (DFO) and the Alaska Department of Fish and Game (ADF&G) during the conduct of the 1990 fisheries for the Stikine, Taku, and Alsek Rivers.

STIKINE RIVER

Sockeye Salmon

Preseason Forecast

For 1990, the total run forecast for Stikine River sockeye salmon is 94,000 fish. This prediction is derived by rounding up the average of two sibling forecasts for Tahltan sockeye salmon, (30,200 sockeye - DFO estimate; 25,300 sockeye - ADF&G estimate) and adding this to expected return of 66,000 non-Tahltan sockeye salmon based on non-Tahltan stock-recruitment data. The preseason forecast of the total allowable catch (TAC) is 34,000 sockeye salmon.

Tahltan Forecast: Younger age classes from a given brood escapement can be used to forecast the return of subsequent age classes (i.e. older siblings) and total returns. DFO and ADF&G forecasts of the 1990 Tahltan sockeye run were based on sibling forecast techniques; brief descriptions of the two forecasts methods are given below.

The DFO sibling forecast was based on data from 1979 through 1989. Estimates of Tahltan sockeye salmon in the marine and lower Stikine catch for this period were obtained from the preliminary Transboundary Technical Committee catch and escapement report for 1989. It was assumed that 90% of the upper Stikine commercial and Indian food fisheries catches were comprised of Tahltan sockeye stock. The age composition of all catches was assumed to be the same as that of Tahltan sockeye salmon sampled at the Tahltan Lake weir. Linear regression analysis indicated a significant correlation between the return of four-year- old Tahltan sockeye salmon and the total return of Tahltan sockeye salmon (all ages) in the next year (r^2=0.61 for data from 1979 to 1989). Based on the equation describing this relationship, the 1990 forecast for Tahltan sockeye salmon is 30,200 fish.

The ADF&G sibling forecast was based on data from 1983 through 1989 and used age-specific data from the catches of Tahltan fish in the Alaskan Districts 106 and 108, the inriver test fishery, and the Canadian commercial fishery in the lower river. For years in which test fishery catches were not sampled, catches in the Alaskan District 106 and 108 test fisheries were assumed to have the same age-specific stock composition as the commercial catches in the same district. The catches in the Canadian commercial fishery in the upper river and in the Indian food fishery were estimated to be 90% Tahltan fish and of the same age composition as the Tahltan escapement. Linear regression was used to predict the total estimated run (catch and escapement, all ages) from the return (catch and escapement) of Tahltan age-1.2 (four-year-old fish) in the previous year ($r^2 = 0.92$). Using this method, the preseason forecast for the 1990 Tahltan sockeye run is 25,300 fish.

While smolt outmigration is not being used to predict the 1990 Tahltan run due to limited time series of data, it should be noted that the 1987 and 1988 smolt outmigrations were high, 810,432 and 1,170,136 fish, respectively. The 1987 smolts would be returning in 1990 as age-1.3 and -2.3 adults and the 1988 smolts, as age-1.2 and -2.2 fish. While smolt survival from the Stikine River has been quite variable, these record high outmigrations suggest a much larger run in 1990 than that predicted by the sibling forecast.

Non-Tahltan Forecast: The non-Tahltan forecast for 1990 of 66,000 sockeye salmon is based on stock-recruitment data for non-Tahltan sockeye salmon for the 1975 to 1984 brood years. Brood year escapements for 1975 to 1978 were estimated by assuming a fixed ratio of Tahltan:non-Tahltan escapements equivalent to the average ratio from 1979 to 1986 (ie. 0.86:1). [Note: Tahltan escapement data have been tabulated since 1959]. Returns from the 1975 to 1984 brood years were reconstructed from annual catch and escapement data as reported in the preliminary 1989 catch and escapement report by the Transboundary Technical Committee, and from age composition data from the lower Stikine commercial fishery. A Ricker stock-recruitment curve fitted to the brood year return data explained 49% of the variation in adult returns ($r^2=0.49$), and was statistically significant ($p<0.025$). The 1990 forecast was calculated by applying the stock-recruitment equation to the principal brood year escapements for 1990 (1984-1986) and apportioning the expected returns from each brood year by the average age composition.

Spawning Escapement Goals

Two sockeye stocks are recognized for the Stikine River: the Tahltan stock which spawns in Tahltan Lake and the non-Tahltan stock which is a conglomerate of stocks which spawn throughout the drainage. These stocks are considered to be independent. Surpluses or deficits in escapement realized in one stock 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
Mgmt. Category	| Red	|Yellow	| Green		|Yellow	| Red ->

Non-Tahltan Stocks			mid-point			
				|		
Fish (x 1000)	0	15	20	30	40	75
Mgmt. Category	| Red	|Yellow	| Green		|Yellow	| Red ->

A postseason 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 databases for the Tahltan Lake stock will be developed and exchanged for use in evaluating 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 databases for the non-Tahltan stock will be developed and exchanged for use in evaluating 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 the analysis of the above named databases will be developed by the Transboundary Technical Committee and will be used in reviewing escapement goals during the fall 1990 meeting of the 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) Subdistrict 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 Indian food 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 from Subdistricts 106-41&42, Subdistrict 106-30 and District 108 for each fishing week. Canada shall provide scale samples, matched with length and egg diameter data, from the lower river commercial fishery each week. 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 scales and for egg diameter, sex, and length data. All scale samples will be provided to ADF&G for aging.

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 subsection of District 106 (Clarence Strait and Sumner Strait) and in Frederick Sound (District 108). Priority for in-season analysis is 1) Sumner Strait, 2) Frederick Sound, and 3) Clarence Strait. The desired sample size from each of these strata is 700 fish per week. It is recognized that small catches in District 108 similar to previous years may preclude temporal stratification at the desired level. 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. Postseason, the 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 catches during the fishing season. This will also be the estimate used postseasonally. The desired sample size is up to 350 sockeye scales and 100 egg diameter samples per week.

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. This will also be the estimate used postseason. Canada shall sample all fish for scales and all females for egg diameter (data to be matched with scale samples).

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. 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 combined with weekly stock compositions estimated from the combined drift and set net catches.

A 1990 standard for the Tahltan stock for SPA will be made from weir scale samples combined with scale samples from females with small egg diameters from the test and commercial catches. In order to construct a 1990 scale pattern standard for the mainstem stock conglomerate, scale samples will be taken from the inriver commercial and test fisheries. The fish will be identified as either Tahltan or non-Tahltan origin using egg diameter data. A non-Tahltan scale pattern standard will be determined from those fish identified as non-Tahltan origin.

Data Evaluation Procedures

Historical Database. Although Canadian commercial fishing began in the Stikine River in 1975, methodology for estimating run size was not well standardized until 1982. Therefore, estimates of run size after this time are considered to be better than those made prior to 1982. The historical database from 1982 to 1989 used as input to the Stikine Management Model for 1990 is presented in Tables 1 to 3. The 1990 run size estimate by the model at the end of the fishing season will be updated in the fall of 1990 using postseason stock composition data for use in the database in future years.

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

The model for 1990 is based on eight years of historical CPUE data from District 106 and seven years from the Canadian commercial fishery in the lower river (there was no commercial fishing inriver in 1984). 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 district fishery and week 26 for the lower river fishery. The parameters from the linear regressions are presented in Table 4. District 106 cumulative CPUE 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 goals, and annex provisions of harvest sharing to determine the total TAC for each country. Weekly estimates of TAC and effort are provided as guidelines for the managers and are derived from average (1982 to 1989) run timing of the stocks and average (1982 to 1989) 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 of Stikine sockeye salmon will be determined each week from run size estimates according to the following schedule:

1. Week 25 and 26 (6/17-6/30): the preseason forecast of run size will be used.
2. Week 27 (7/1-7/7): an estimate of run size will be made by averaging estimates made from 1) the cumulative CPUE from District 106-41/42 (weeks 25 and 26) and 2) the CPUE from lower river commercial fishery (week 26).
3. Week 28 and after (7/8-end of season): an estimate of run size will be determined each week from the cumulative CPUE of sockeye salmon in the lower river commercial fishery.

Separate projections of run size will be made for the Tahltan stock and for the entire Stikine sockeye run. This information will be used postseason to help evaluate the performance of the model.

In-season Use. For 1990, 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.

Postseason 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. This information is presented in the annual catch and escapement reports put out by the committee. For 1989, this evaluation may be found in "Preliminary salmon catches, escapements, and enhancement activities in the Transboundary Rivers in 1989" by the Transboundary Technical Committee, November 1989. The table summarizing the output of the Stikine Management Model during the 1987 fishing season is presented here in Table 5.

Management Procedures

United States. The fishery in Section 6-A (Sumner Strait, Figure 1) opens on the third Sunday in June (June 17, 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, restrictions in fishing time in Sumner Strait would follow next, and 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 runs 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. Availability of pink and chum salmon in Districts 106 and 108 is expected to be only mediocre in 1990.

Troll fishery regulations for 1990 are the same as in 1989. In 1989, a commercial troll fishery opening for chinook salmon occurred in the inside waters of Southeast Alaska on June 5-7. An additional opening occurred on June 21-23, since fewer than 25,000 chinook salmon of non-Alaskan hatchery origin were caught during the June 5-7 opening. These openings will hold for 1990 unless the Board of Fisheries decides to meet following the conclusion of the annual PSC meeting, in which case dates may change.

Canada. The Canadian lower river Stikine fisheries (Figure 1) 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 25 to the end of July. Thereafter, the management attention will be focused primarily on non-Tahltan stock 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 fulfill 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 management responses that could be used to reduce the sockeye harvest in the lower Stikine commercial fishery, in order of implementation, include: reducing fishing time, the major tool used in the regulation of the fishery, and reducing the fishing area by relocating boundaries 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. Conservation measures for the protection of chinook salmon include restricting mesh sizes to less than 146 mm (5.75 in.) through mid-July.

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 occasionally 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 derived from the model. The total TAC estimate 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 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 salmon, 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. A final summary of the week's fisheries will be done Friday afternoon through a conference call between management offices of DFO and ADF&G.

Coho Salmon

Preseason Forecast

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

Preseason Forecasts

The sockeye and coho runs are expected to be average to above average in 1990. The chinook run is expected to be average. Pink and chum salmon runs 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 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 The 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, to minimize chinook catches in District 111 and to keep the all-district catch below 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

The management coordination between U.S. and Canadian fishery managers will involve weekly conferences between designated managers or alternates.

United States

Section 11-B (Stephens Passage, Figure 2) will initially open for a 72-hour period on the third Sunday of June (June 17). The strength of the sockeye salmon run 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 18. 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 return is expected to be poor, additional fishing time may be warranted to harvest pink salmon in Section 11-C depending on the magnitude of pink salmon runs in lower Stephens Passage, Seymour Canal, and the northern portions of District 110.

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.

The Chatham Strait purse seine fishery is expected to open in late July during the 1990 season. Early northbound pink salmon runs are not expected to produce a harvestable surplus as in 1989. Openings in late July south of Point Marsdon will be directed primarily toward southbound pink salmon runs that are expected to produce a small harvest.

The chinook sport fishing season will be open in the marine waters near Juneau throughout the year. However, Taku Inlet, north of a line from Point Bishop to Dorothy Creek, will be closed to sport fishing from April 16 through June 14 to protect returning Taku River chinook salmon. The daily bag and possession limits are two chinook salmon per person.

A personal use fishery in U.S. portions of the Taku River was established by the Alaska Board of Fisheries in 1989 and will operate during the month of July in 1990. A seasonal bag limit of five sockeye salmon per person or ten sockeye salmon per household will be allowed to be taken using set gill nets.

Canada

Canadian management decisions for the Taku inriver fishery (Figure 2) 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:

$$TAC = \frac{E(w) + CC(w) + AC(w-1)\ (0.85)}{PRT(w)} - Eg$$

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],
- PRT(w) = estimated proportion of run through to week (w) determined from the average inriver 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], and
- Eg = 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 TAC 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 146 mm (5.75 inch) mesh restriction during the initial two weeks of the fishery.

ALSEK RIVER

Preseason Forecasts

Returns of chinook, coho, and early-run sockeye salmon in 1990 are expected to be below average. The return of late-run sockeye salmon is expected to be about 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 initial opening for the Alsek River fishery (Dry Bay, Figure 3) for the 1990 season will be for twenty-four hours on the third Monday in June (June 18), a delay of two weeks relative to fishery openings prior to 1982 and one week later than in 1989. This conservative management approach is designed to reduce harvest rates on the expected weak returns of chinook and early-run sockeye salmon. 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 1 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 six 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.

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:

(Catch/Exploitation Rate) - Catch = 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 in the Alsek River (Figure 3) 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 salmon 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 1989.

Year	Inriver run size estimates: Canada	U.S.	Average	Marine Catch[a/]	Total Run	Escapement
All Stikine Sockeye						
1979		40,353	40,353	8,299	48,652	26,819
1980		62,743	62,743	23,206	85,949	41,824
1981		140,029	140,029	27,538	167,567	112,405
1982		68,761	68,761	43,329	112,090	48,221
1983	77,260	66,838	71,683	5,810	77,493	50,563
1984	95,454	59,168	76,211	7,928	84,139	70,884
1985	237,261	138,498	184,747	29,747	214,494	157,943
1986			69,036	6,420	75,456	51,190
1987			44,173	4,077	48,251	32,890
1988			41,915	3,181	45,096	25,377
Averages						
1979 - 1988			79,965	15,954	95,919	61,812
1980 - 1988			84,367	16,804	101,171	65,700
1989			75,061	15,335	90,396	53,422
Tahltan Sockeye Stock						
1979			17,472	5,076	22,548	10,211
1980			19,137	11,239	30,376	11,018
1981			66,514	16,189	82,703	50,790
1982			42,493	24,785	67,278	28,257
1983			32,684	5,187	37,871	21,256
1984			37,571	3,295	40,866	32,777
1985			86,008	25,197	111,205	67,326
1986			31,015	2,757	33,771	20,280
1987			13,413	2,255	15,668	6,958
1988			7,222	2,129	9,351	2,536
Averages						
1979 - 1988			35,353	9,811	45,164	25,141
1980 - 1988			37,340	10,337	47,677	26,800
1989			14,111	1,556	15,667	8,316

a/ The marine catch includes test fishery catches.

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 Salmon in Catch

Week	1989	1988	1987	1986	1985	1983	1982
26	25.5	*3.0*	*3.0*	2.8	67.6	12.8	13.3
27	48.1	21.8	11.9	18.8	*75.0*	39.3	49.5
28	23.1	35.5	10.6	79.8	100.1	62.2	46.9
29	105.5	69.2	57.9	58.1	260.0	72.8	24.0
30	140.8	71.9	67.8	84.7	147.9	53.3	29.1
31	73.9	61.9	27.6	81.9	104.7	92.0	13.6
32	60.8	89.2	76.6	55.6	73.6	64.3	20.5
33	28.4	33.3	32.3	34.1	58.6	54.7	7.7
34	16.4	23.1	16.5	25.9	18.2	14.7	3.6
35	6.2	11.0	5.4	9.4	10.3	11.9	1.3

Proportion Tahltan Stock in Catch

Week	1989	1988	1987	1986	1985	1983	1982
26	0.65	0.77	0.74	0.73	0.89	0.83	0.93
27	0.49	0.77	0.74	0.77	0.90	0.86	0.93
28	0.38	0.69	0.88	0.83	0.90	0.83	0.89
29	0.21	0.42	0.66	0.73	0.79	0.62	0.67
30	0.03	0.27	0.24	0.52	0.42	0.48	0.42
31	0.02	0.10	0.11	0.19	0.29	0.24	0.16
32	0.02	0.04	0.05	0.09	0.20	0.14	0.20
33	0.00	0.07	0.04	0.02	0.20	0.11	0.21
34	0.00	0.09	0.07	0.01	0.20	0.09	0.21
35	0.00	0.00	0.08	0.00	0.20	0.02	0.21

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 Salmon in Catch

Week	1989	1988	1987	1986	1985	1984	1983	1982
25	46.8	*16.5*	*19.3*	14.1	91.0	45.3	38.2	101.9
26	51.9	22.9	29.1	16.9	126.9	69.6	57.7	119.1
27	66.1	58.7	52.2	63.0	162.9	89.4	38.6	124.9
28	147.1	66.8	103.9	*75.5*	117.4	80.9	65.9	156.9
29	109.4	103.6	83.9	*88.0*	113.3	79.7	76.1	160.5
30	89.4	87.6	155.9	100.6	108.7	148.3	69.9	164.1
31	93.4	59.3	106.6	105.8	189.1	53.0	44.4	137.3
32	36.2	92.2	115.4	82.1	69.0	45.6	40.5	95.2
33	33.5	67.7	88.3	60.1	100.5	14.9	18.2	53.1
34	7.7	20.5	*45.9*	28.8	37.8	5.4	6.2	11.1
35	2.9	11.0	3.4	8.9	5.9	1.1	5.7	4.4

Proportion Tahltan Stock in Catch

Week	1989	1988	1987	1986	1985	1984	1983	1982
25	0.03	0.04	0.04	0.00	0.10	0.07	0.04	0.01
26	0.09	0.09	0.01	0.02	0.11	0.08	0.10	0.15
27	0.03	0.07	0.01	0.09	0.35	0.11	0.19	0.11
28	0.00	0.05	0.05	0.11	0.24	0.11	0.12	0.19
29	0.00	0.01	0.01	0.06	0.13	0.02	0.08	0.17
30	0.00	0.01	0.01	0.00	0.00	0.00	0.13	0.06
31	0.00	0.00	0.00	0.04	0.00	0.00	0.02	0.08
32	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00
33	0.00	0.00	0.00	0.01	0.00	0.00	0.05	0.00
34	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00
35	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00

Proportion Non-Tahltan Stock in Catch

Week	1989	1988	1987	1986	1985	1984	1983	1982
25	0.06	0.00	0.00	0.00	0.00	0.01	0.01	0.01
26	0.10	0.00	0.00	0.00	0.03	0.05	0.02	0.03
27	0.16	0.00	0.00	0.03	0.01	0.04	0.01	0.02
28	0.05	0.00	0.00	0.02	0.01	0.01	0.01	0.08
29	0.01	0.00	0.00	0.04	0.01	0.13	0.06	0.09
30	0.00	0.00	0.02	0.01	0.03	0.02	0.01	0.17
31	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.09
32	0.01	0.01	0.00	0.00	0.00	0.02	0.03	0.00
33	0.01	0.00	0.00	0.00	0.02	0.04	0.03	0.00
34	0.01	0.00	0.00	0.00	0.04	0.04	0.00	0.00
35	0.01	0.00	0.00	0.00	0.05	0.04	0.02	0.00

Table 4. Model parameters from the linear regression of run size on cumulative CPUE for the 1990 Stikine Management Model.

Canadian lower river commercial fishery catch of sockeye salmon

WEEK	R^2	RUN F.	INTERCEPT	SLOPE	SD(R.F)	SD(INT)	SD(SLOPE)	AVG.CPUE
26.	.94	.03	42541.25	2013.63	.028	6656.01	235.77	18.27
27.	.87	.09	22016.43	1022.74	.068	12157.58	175.23	37.77
28.	.93	.11	5338.18	690.17	.069	10462.77	84.27	51.17
29.	.97	.18	10972.99	342.33	.056	6214.99	26.14	92.49
30.	.92	.18	3353.60	266.83	.051	11841.59	36.22	85.06
31.	.88	.13	-368.27	227.84	.047	15217.87	38.50	65.07
32.	.82	.14	-8696.05	213.27	.062	20181.89	44.40	62.95
33.	.81	.08	-9755.48	198.71	.027	21465.18	43.64	35.57
34.	.79	.04	-11005.66	194.18	.017	22957.06	45.17	16.91
35.	.78	.02	-11174.15	191.28	.008	23542.23	45.59	7.91

Canadian lower river commercial fishery catch of Tahltan sockeye salmon

WEEK	R^2	RUN F.	INTERCEPT	SLOPE	SD(R.F)	SD(INT)	SD(SLOPE)	AVG.CPUE
26.	.79	.07	14736.15	1157.22	.072	6552.64	268.64	15.16
27.	.87	.18	4039.17	623.79	.100	6437.52	109.91	30.11
28.	.97	.22	-3235.54	408.24	.092	3610.65	34.17	41.72
29.	.91	.28	3222.01	201.91	.110	5316.87	28.61	56.91
30.	.90	.14	2295.04	176.19	.064	5824.78	26.90	26.27
31.	.89	.05	2440.43	164.18	.033	6044.59	26.14	11.56
32.	.89	.03	2331.47	159.66	.011	6067.23	25.46	5.83
33.	.89	.01	2536.44	155.75	.011	6088.22	25.04	3.39
34.	.88	.00	2536.73	154.69	.007	6127.19	25.03	1.30
35.	.88	.00	2592.75	154.06	.002	6117.35	24.92	.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.	.84	.05	48166.85	16258.65	.037	11601.31	2929.15	2.78
26.	.74	.13	42664.70	4561.87	.080	16118.25	1104.58	8.34
27.	.97	.24	42425.80	1946.23	.131	5014.39	137.54	15.08
28.	.89	.25	39544.18	1331.88	.104	10127.55	188.10	14.25
29.	.75	.15	43501.02	964.89	.094	15586.31	227.43	11.29
30.	.59	.10	50605.57	725.57	.111	19598.60	247.10	7.28
31.	.50	.04	55140.51	608.89	.054	21125.58	246.11	3.86
32.	.50	.02	54520.09	610.52	.036	21390.93	247.98	.85
33.	.51	.00	53978.28	613.56	.010	21324.99	245.81	.57
34.	.52	.00	53684.65	615.57	.004	21177.28	243.16	.27
35.	.52	.00	53609.64	615.96	.002	21159.13	242.73	.08

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.	.69	.07	20677.27	9319.44	.062	9089.43	2528.30	2.23
26.	.84	.17	10316.87	3690.45	.173	7527.40	653.34	6.21
27.	.93	.25	15088.23	1262.77	.130	4637.81	145.62	12.44
28.	.96	.28	11318.17	932.27	.164	3413.67	73.63	11.45
29.	.94	.12	11405.15	762.76	.084	4328.62	76.94	7.07
30.	.92	.06	10792.75	730.14	.079	5255.86	89.12	2.60
31.	.89	.03	11184.69	688.75	.062	6164.13	100.06	1.95
32.	.89	.01	10844.24	689.19	.030	6217.06	100.42	.47
33.	.89	.00	10683.31	689.88	.010	6227.18	100.41	.19
34.	.89	.00	10657.43	689.84	.003	6234.27	100.48	.04
35.	.89	.00	10642.24	689.81	.002	6238.61	100.52	.02

Table 5. Evaluation of the Stikine Management Model for the 1989 season. Weekly forecasts of run size for 1989 are given along with the total allowable catch for Stikine River sockeye salmon.

Model runs generated in U.S. management office in Petersburg

Week	Start Date	Forecasts		U.S. Fishing Regime			Canada TAC	Cumulative Catch	
		Run Size	TAC	6	8	TAC		U.S.	Canada
25	18-Jun	80,850	20,850	I	D	5,850	15,000	575	0
26	25-Jun	80,850	20,850	I	D	5,850	15,000	786	788
27	02-Jul	88,201	28,201	I	D	8,820	19,381	2,727	1,510
28	09-Jul	109,769	49,769	I	D	29,769	20,000	10,075	2,445
29	16-Jul	95,919	35,919	I	D	15,919	20,000	16,351	7,430
30	23-Jul	94,734	34,734	I	D	14,734	20,000	18,576	15,877
31	30-Jul	121,302	61,302	I	D	31,302	30,000	19,690	17,551
32	06-Aug	119,973	59,973	I	D	39,973	20,000		
postseason estimate		90,396	30,396						

Model runs generated in Canadian management office in Whitehorse

Week	Start Date	Forecasts		U.S. Fishing Regime			Canada TAC	Cumulative Catch	
		Run Size	TAC	6	8	TAC		U.S.	Canada
25	18-Jun	80,850	20,850	I		5,850	15,000	531	19
26	25-Jun	80,850	20,850	I		5,850	15,000	928	822
27	02-Jul	89,647	29,647	I	D	9,647	20,000	2,949	1,752
28	09-Jul	106,954	46,954	I	D	26,954	20,000	13,415	2,991
29	16-Jul	97,852	37,852	I	D	17,852	20,000	18,896	11,363
30	23-Jul	101,844	41,784	I	D	21,784	20,000	19,639	16,957
31	30-Jul	118,009	58,009	I	D	38,009	20,000	19,693	18,297
32	06-Aug	119,975	59,975	I	D	39,975	20,000	19,702	18,936
33	13-Aug	117,663	57,663	I	D	37,663	20,000	19,719	19,192
34	20-Aug	114,215	54,215	I	D	34,215	20,000	19,742	19,585
35	27-Aug	113,729	53,729	I	D	33,729	20,000	19,748	19,801
postseason estimate		90,396	30,396						

I indicates indirect fishery allowed; **D** indicates directed fishery allowed.

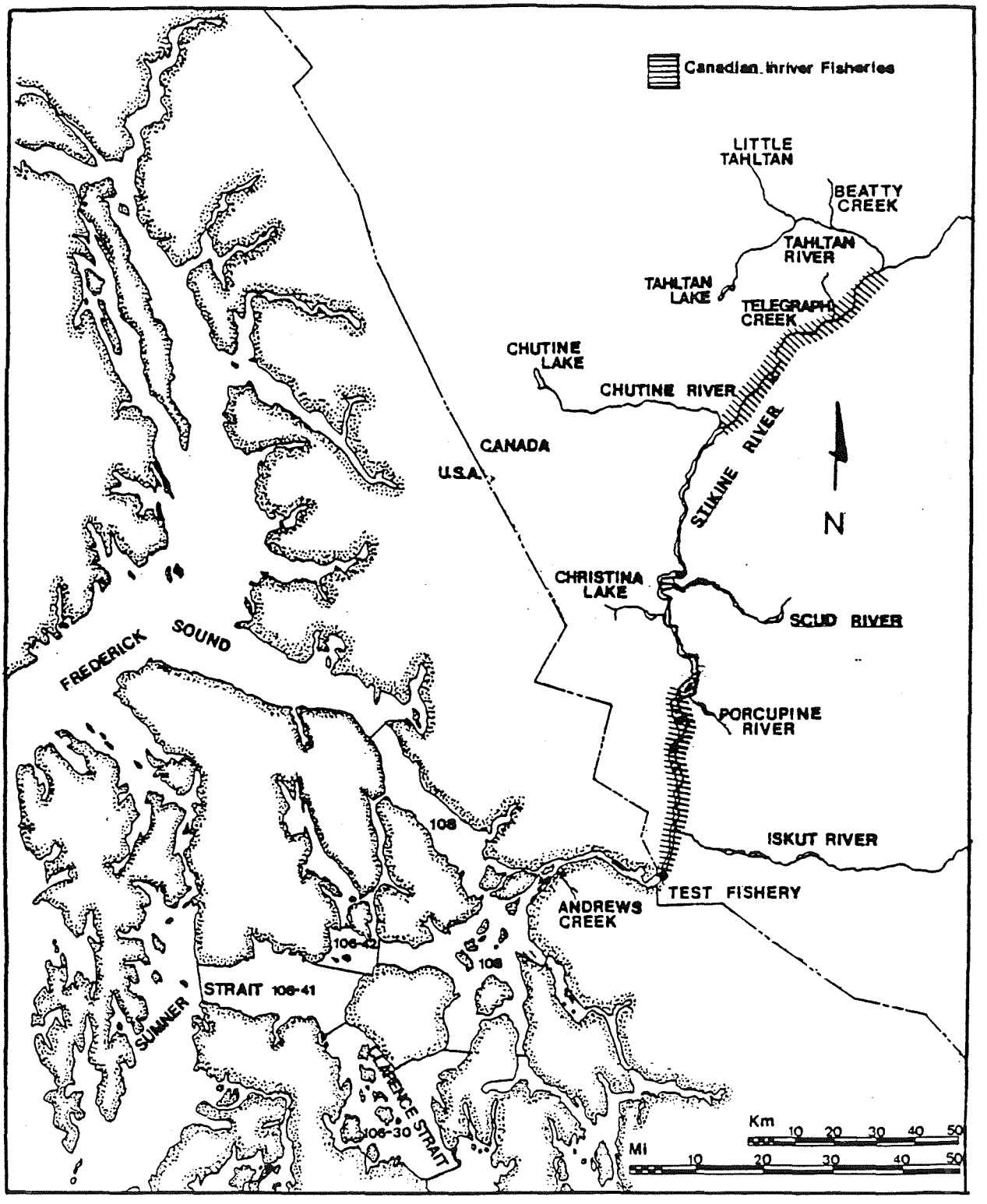

Figure 1. The Stikine River and principal U.S. and Canadian fishing areas.

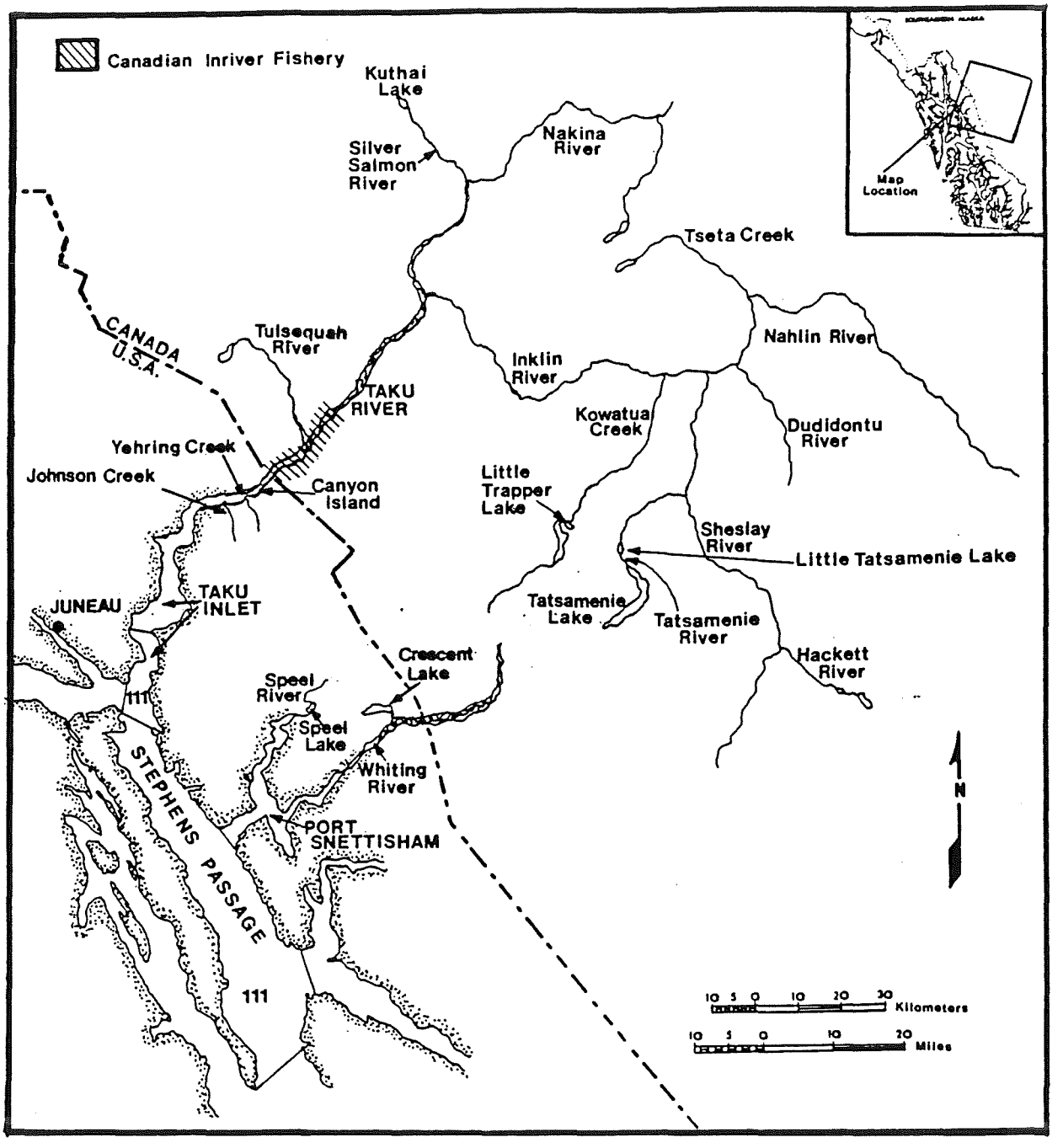

Figure 2. The Taku River and principal U.S. and Canadian fishing areas.

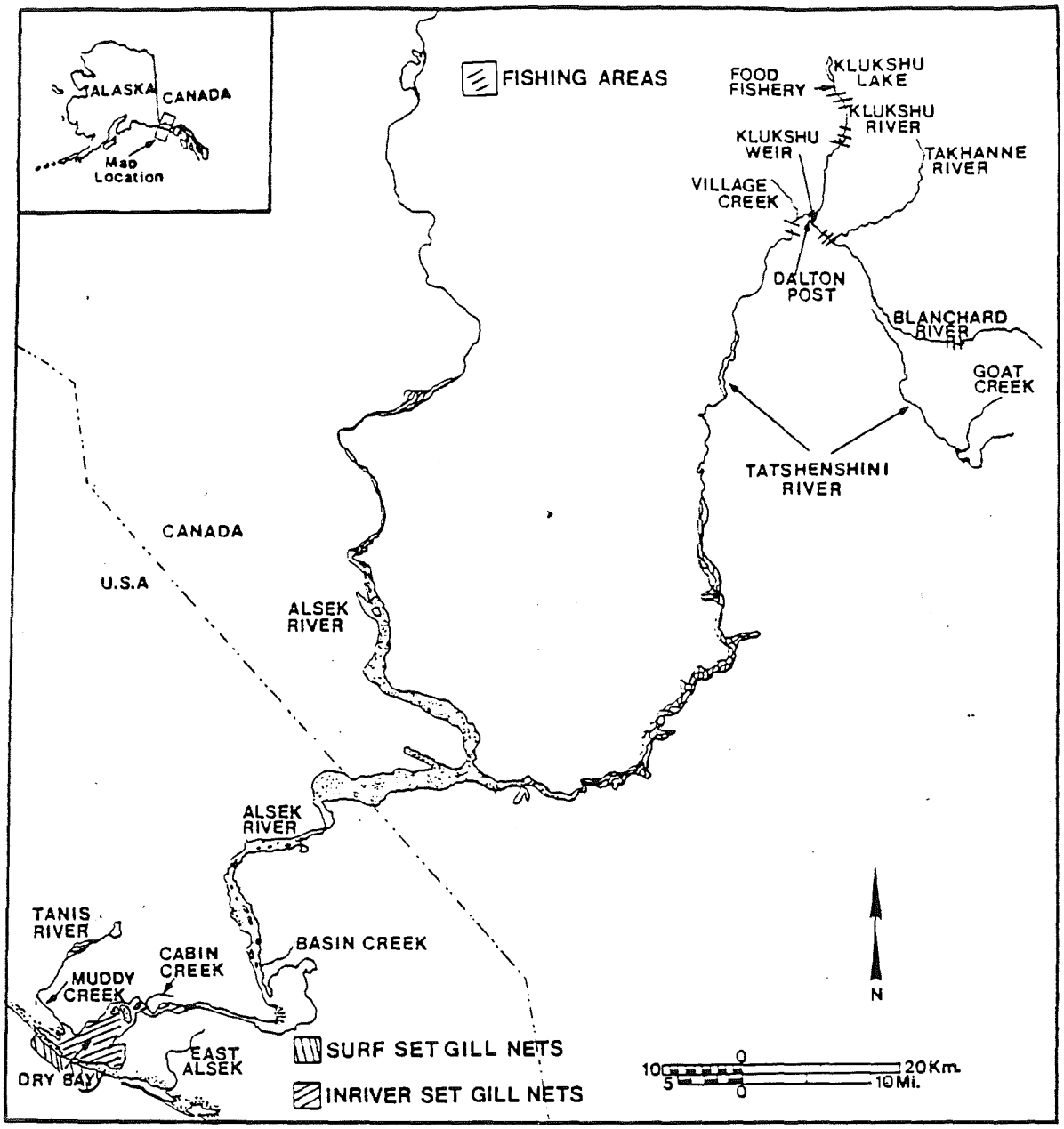

Figure 3. The Alsek River and principal U.S. and Canadian fishing areas.