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PACIFIC SALMON COMMISSION
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SALMON MANAGEMENT PLAN FOR
THE TRANSBOUNDARY RIVERS
1988

May 1988

TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES	iii
LIST OF FIGURES	iv
EXECUTIVE SUMMARY	v
INTRODUCTION	1
STIKINE RIVER	1
Sockeye Salmon	1
Preseason Forecast	1
Smolt Model Forecast	1
Time Series Forecast	2
Spawning Escapement Goals	2
Stock Assessment Program	4
Catch Statistics	4
Age Composition of Sockeye in Catches	4
Stock Composition of Alaska Catches	5
Stock Composition of the Inriver Canadian Catch	5
Stock Composition and Run Timing Past the Lower Stikine Test Fishery	6
Spawning Escapement Estimates	6
Data Evaluation Procedures	7
Historic Data Base	7
Stikine Management Model	7
In-season Use	8
Postseason Evaluation	9
Management Procedures	9
United States	9
Canada	10
Summary	12
In-season Data Exchange and Review	13

TABLE OF CONTENTS (Continued)

	<u>Page</u>
Coho Salmon	13
Preseason Forecast	13
Escapement Goal	13
Stock Assessment Program	13
Management Procedures	14
United States	14
Canada	14
TAKU RIVER	14
Preseason Forecasts	14
Management Goals	14
Management Procedures	16
United States	16
Canada	17
ALSEK RIVER	19
Preseason Forecasts	19
Management Goals	19
Management Procedures	20
United States	20
Canada	20
APPENDIX: STIKINE RIVER SOCKEYE MANAGEMENT MODEL	22

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1. Source code listing for FORTRAN program timing		30
2. Stikine River sockeye run size, 1979 to 1987		37
3. CPUE for all sockeye salmon and the proportion of Tahltan stock in the catch from the Canadian Lower River commercial fisheries		38
4. 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		39
5. Example of an input file to program TIMING		40
6. Example of an output file from program TIMING		41
7. Results from the linear regression model (TIMING) as input into the Lotus worksheet Allocation Model		43
8. Source code for Lotus worksheet MMST.WK1		44
9. Average CPUE of all sockeye salmon and average proportions of Stikine River Tahltan and Non-Tahltan stocks in the catch from the District 108 fishery		57
10. Header for the Lotus worksheet Allocation Model		58
11. Input fields to the Lotus worksheet Allocation Model		59
12. Output tables from the Lotus worksheet Allocation Model		60

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Inriver run size of Stikine sockeye salmon regressed against cumulative CPUE from the Canadian lower river commercial fishery for weeks 26 through 31	61
2. Inriver run size of Tahltan sockeye salmon regressed against cumulative CPUE from the Canadian lower river commercial fishery for weeks 26 through 31	64
3. Total run size of Stikine sockeye salmon regressed against cumulative CPUE from the U.S. District 106-41/42 commercial fishery for weeks 25 through 30	67
4. Total run size of Tahltan sockeye salmon regressed against cumulative CPUE from the U.S. District 106-41/42 commercial fishery for weeks 25 through 30	70

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 goal and management procedures are presented. For sockeye salmon stocks of the Stikine River details of the stock assessment program is also presented.

A management model for Stikine River sockeye salmon has been developed to provide a single estimate of total allowable catch (TAC) of these stocks for the U.S. District 106 and 108 fisheries and the Canadian inriver fisheries. Allocation of TAC between the U.S. and Canadian fisheries is based on Annex IV of the Pacific Salmon Treaty, as revised in February 1988. The model is designed to incorporate the basic method of fishery managers of using catch per unit effort (CPUE) to predict run strength and then to use past performances of the fisheries to determine the amount of fishing to allow each week both to achieve the TAC and to spread the catches over the entire period of the sockeye run.

The model has two parts. The first part determines the linear regression parameters needed to predict run strength from cumulative CPUE. The second part predicts the run strength and determines harvest sharing by the U.S. and Canadian fisheries on an in-season weekly basis.

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 1988 forecasts, summarizing the goals, and outlining the procedures to be used during conduct of the 1988 fisheries for the Stikine, Taku and Alsek Rivers.

STIKINE RIVER

Sockeye Salmon

Preseason Forecast

For 1988 the average (123,500) of a smolt and spawn-recruit model forecast (122,000) and a time series forecast (125,000) will be used. For 1989 further evaluation of forecasting methods will be undertaken. 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 1985. The non-Tahltan forecast relies on a stock-recruit relationship

derived from historical escapements and returns (excluding catch) to Tahltan Lake and the estimated non-Tahltan escapement for 1983. Thus, it is assumed that the Tahltan and non-Tahltan stocks have a similar stock-recruit relationship.

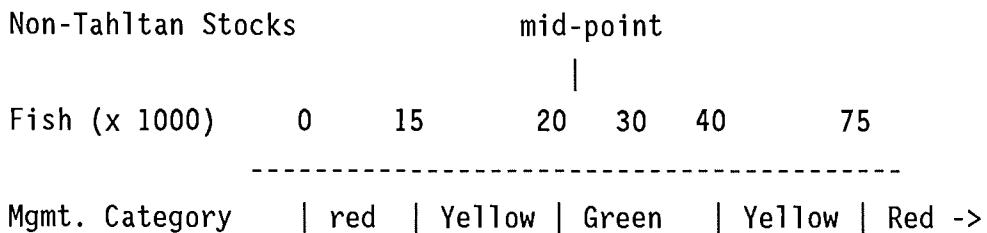
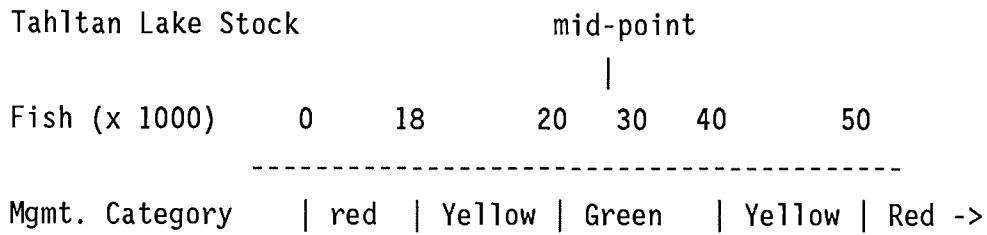
Time Series Forecast. One estimate of run size for Stikine River sockeye was based on time series analysis. First Tahltan escapement was regressed on itself four and five years previous to predict escapement in the future. The total run was then regressed on Tahltan escapement four years previous (which gave the highest predictive value) and the results were used to predict the run size in the future.

Spawning Escapement Goals

Two sockeye stocks are recognized for the Stikine River: the Tahltan Lake 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.

As of May 3, 1988 our best judgment of escapement goals for these stocks is:



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 data bases for the Tahltan Lake stock 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 from its fisheries stratified by areas listed in the section above, for each fishing week. The desired sample size from each stratum is 700 fish. 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 number sample size from each stratum is 400 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. In addition, 50 fish per week from the test fishery will be sampled for brain, liver and nematode parasites.

All scale samples will be provided to the Alaska Department of Fish and Game (ADF&G) on a weekly basis and ADF&G will provide data summaries of age composition in-season through the beginning of August. Priorities for analyzing the in-season data will first be the U.S. fisheries and then Canadian lower river commercial fisheries. Most test fisheries samples will be aged after the end of the fishing season unless no commercial catches are available for a particular week under such circumstances they will be done in-season, for that week.

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. 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 standards made from scale samples collected from escapements in the current year.

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. Canada shall sample 100 fish each week, when

available, to obtain the egg diameter data. Postseason, the contribution of Tahltan and non-Tahltan stocks to the catches each week will be computed using SPA and parasite-genetic-age analysis (PGA). These two estimates will be combined into a single estimate by weighting each by the inverse of their variances, unless other procedures are agreed to.

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. Postseason, the stock composition of test fishery catches will be made by combining estimates made using SPA and PGA by weighting each by the inverse of their variances, unless other procedures are agreed to.

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.

Scale samples from the escapements of non-Tahltan stocks are required to form a current standard for this stock conglomerate. A total of 600 to 700 samples will be collected by ADF&G from Chutine Lake, Chutine River, and the mainstem Stikine River to the confluence of the Skud River. DFO will collect 200 samples from the Iskut River and 200 from the mainstem Stikine River above the border.

Data Evaluation Procedures

Historic Data Base. A historical data set beginning in 1979 is appropriate since that is when Canadian commercial fishing began in the 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. An agreed upon historical data base and run size estimates will be developed during the coming year. The historical data base used as input to the Stikine Management Model for 1988 is presented in the Appendix.

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. 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.

The model is based on nine years of historical CPUE data from District 106 and eight years from the 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. 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 escapements goal, and annex pro-

visions 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 (1979-87) run timing of the stocks and average (1979-87) 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 26 and 27 (6/19-7/2): the preseason forecast of run size will be used.
2. Week 28 (7/3-7/9): 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 29 and after (7/10-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 postseason to help evaluate the performance of the model.

In-season Use. For 1988, 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.

Management Procedures

United States. The fishery in Section 6-A (Sumner Strait) opens on the third Sunday in June. 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 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. Terminal fisheries will occur on Crystal Lake Hatchery chinook salmon returns in Districts 106 and 108 beginning in early June.

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 27, 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 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 July 26;

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 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, 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

Preseason 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

Preseason Forecasts

Except for pink salmon, for which a poor return is expected, returns in 1988 for other species of salmon are expected to be about 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 19), beginning the summer sockeye salmon season. The strength of the sockeye salmon return will be evaluated using CPUE analysis and weekly escapement estimates derived from the Taku River fish wheel tagging and recovery project.

The contribution of the Port Snettisham sockeye salmon returns will be monitored each week using scale pattern analysis. During the past 5 years Port Snettisham sockeye salmon contributed an average of 23% of the total sockeye salmon catch according to scale pattern analysis.

Protection of Port Snettisham sockeye salmon will be attempted again this year in order to rebuild production of these stocks to historic levels. To accomplish this and to provide protection to Snettisham Hatchery chinook salmon brood stock, Port Snettisham will be closed inside a line from Point Anmer to Point Styleman through approximately August 13.

The current regulations allow ADF&G to establish a minimum six inch gill net mesh restriction by emergency order. If there is a need to direct more effort at chum salmon while protecting sockeye salmon it may become necessary to utilize the mesh restriction.

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 are above average levels. Based on catch rates in previous years, night closures could be expected through the end of July.

Special fishing periods beyond the sockeye salmon directed periods to harvest pink salmon in lower Stephens Passage are not anticipated, as poor pink

returns are forecast. Gillnetting in Section 11-C will depend on the availability of local returns of pink salmon in addition to returns to Seymour Canal and the northern portions of District 110.

Returns to the Port Snettisham hatchery are expected to contribute the major portion of the summer chum salmon harvest. However, it is expected that all the available surplus fish will be taken during the general summer sockeye salmon fishery openings and no directed fishing for these hatchery chum salmon will be needed.

Beginning in mid-August, management emphasis will switch to the fall chum and coho salmon. Fishing time and area will then be dependent upon the developing run strength of the fall chum salmon and coho salmon wild stocks. Management will be based on evaluation of catch, catch per unit of effort, and fishing effort. The coho salmon catches and escapement estimates developed by the Taku River fish wheel project will also be considered. Since the fall chum and coho salmon returns are both expected to be average, differential management for these two returns is not anticipated.

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:

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

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) (0.85) = total Alaskan catch in all Districts to the preceding week (w-1) discounted by 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.
- 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 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 involve a late opening in the commercial fishery (June 27) and a 5.5 inch mesh restric-

tion during the first two weeks of the fishery. Possession limit and size restrictions will be used to limit chinook catches in the sport fishery.

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

ALSEK RIVER

Preseason Forecasts

Returns in 1988 of Alsek River salmon are 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 Alsek River fishery will open on June 13 for 24 hours. An extension of time may be permitted if sockeye run strength is sufficient and the harvest of chinook salmon kept low. The duration of future fishing periods will be based on evaluation of sockeye salmon catches and effort. Gill nets will be restricted to a maximum mesh size of six inches through July 3 to minimize incidental chinook harvests.

In early to mid-August, management emphasis will switch to coho salmon. Fishing time during the coho fishery will be based on a comparison of current year fishery performance with historic performance.

The surf fishery will probably 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 Klukhu 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.

Retention of sockeye salmon by anglers will be prohibited until August 15 to conserve the early run. The daily limit for chinook retention is one per day throughout the season. The salmon sport fishery will be open for only 3.5 days each week to ensure that the harvest rate does not become excessive. Gear restrictions and area closures will also be applied.

APPENDIX: STIKINE RIVER SOCKEYE MANAGEMENT MODEL

Introduction

A management model for Stikine River sockeye salmon has been developed to provide a single estimate of total allowable catch (TAC) of these stocks for the U.S. District 106 and 108 fisheries and the Canadian inriver fisheries. Allocation of TAC between the U.S. and Canadian fisheries is based on Annex IV of the Pacific Salmon Treaty, as revised in February 1988. The model is designed to incorporate the basic method of fishery managers of using catch per unit effort (CPUE) to predict run strength and then to use past performances of the fisheries to determine the amount of fishing to allow each week both to achieve the TAC and to spread the catches over the entire period of the sockeye run.

The model has two parts. The first part determines the linear regression parameters needed to predict run strength from cumulative CPUE. The second part predicts the run strength and determines harvest sharing by the U.S. and Canadian fisheries on an in-season weekly basis.

Linear Regression Model

Description

This model, written in FORTRAN (Table 1), determines the parameters needed to predict run strength from cumulative CPUE using linear regression. Separate regressions are made for each week the fishery is in operation so that a new prediction of run strength may be made each week. This approach is based on Barth's (1984) work using cumulative catch to predict annual yield of a fishery; that will, of course, result in perfect prediction by the end of the season since final cumulative catch equals yield. The difference between

Barth's work and this application is that we are interested in predicting total run size rather than yield, this is because we wish to control yield by setting a TAC. TAC is determined by subtracting the desirable spawning escapement level from a predicted run size. Even by the end of the fishery we will only have an estimate of total run size, it will not have been determined exactly. During development of the Stikine Management Model, several variables were examined for making predictions of the run size including CPUE, catch, and spawning size of the parent population. We found that cumulative CPUE gave the best predictions. Adequate predictions could be made for the total sockeye run and for the Tahltan stock run but not for the non-Tahltan stocks portion of the run.

We have estimates of run size for Stikine River sockeye salmon from 1979 to the present. It should be remembered that our estimates of run size are just that, estimates, and, therefore contain a degree of uncertainty. Thus, the accuracy of the model is dependent, not only on how well CPUE predicts abundance, but on how well our estimates of run size reflect the true run sizes. In 1987, we decided to use only data from 1982 through 1986 to predict the 1987 run size since these were the years our estimation techniques of run size were best. However, following the very low run in 1987, we re-examined all data from 1979 through 1987 and decided that the variation displayed in the early years was not out of line and may reflect actual variation that should be incorporated in the model.

While there are several fisheries that harvest Stikine River sockeye salmon, we have used CPUE data from the U.S. Subdistrict 106/41-42 fishery to generate the linear model used to predict the total return of Stikine River sockeye salmon and CPUE data from the Canadian lower river commercial fishery to predict the inriver return. The data, from 1979 to 1987, used as input for the 1988 predictive regression model include total and inriver Stikine River sockeye run sizes (Table 2), CPUE and proportion of Tahltan in the catch for the Canadian lower river commercial fishery (Table 3), and CPUE and proportion of both Tahltan and non-Tahltan stocks in the catch for the U.S. Subdistrict 106/41-42 fishery (Table 4).

Raw data and the linear regression equations used to predict the Stikine inriver run size each week are shown in Figure 1 for all sockeye salmon and in Figure 2 for the Tahltan stock. Similar plots for estimating total run size each week are shown in Figure 3 for all Stikine River sockeye salmon and in Figure 4 for the Tahltan stock. These are based on the fishery opening in District 106 in week 25 and in the Canadian inriver commercial fishery in week 26. The regressions should be run starting with the week the fishery begins since cumulative CPUE's are utilized. The data set for the regression analyses should be updated each year.

User's Guide

The regression part of the Stikine Management Model, written in FORTRAN (Table 1) and invoked by typing "TIMING", asks the user for two file names; first the name of an input file and second the name of a file on which to write the output. Be sure that no file with the name of the output file exists prior to running the program.

The input file contains the CPUE data by week and year and the run sizes by year that will be used to determine the regression equations (Table 5). The first line of the input file contains a title for identification. The first 64 characters are printed on the output file, the rest of the line is ignored by the program. The second line presents the format of the remaining data; it must be placed in parentheses. The number in front of the F is the number of data items per line and the number after, is the number of columns used per data item. The number after the decimal point in the format statement indicates the number of places after the decimal unless the decimal is explicitly given, as in this example. The third line of input has two numbers, the first is the number of years and the second is the number of weeks of data. The fourth line contains the years. The years are followed by the CPUE data. The first column is the week and the following are the CPUE values for that week and that year. Note that the years in line number four must line up with the correct CPUE data underneath. The last line is the corresponding run size for each year. The run size data must also be in

the correct columns with the first field (under a week designation) blank. The input file example given in Table 5 is for the Tahltan stock CPUE in the Canadian lower river commercial fishery and for inriver run size estimates. The CPUE was calculated by multiplying the proportion of Tahltan stock by the total CPUE given in Table 3. The inriver run sizes are found in Table 2.

The output from program TIMING is written to a file that may then be printed or it may just be examined on a computer screen. An example of the output from the Canadian lower river commercial fishery CPUE for the Tahltan stock is given in Table 6. First, the title read from the input file is printed. Next, in blocks 1 and 2 of Table 6, the input CPUE data and the cumulative CPUE values, respectively are printed. Third, the proportions of the CPUE occurring each week for each year are given (block 3), followed by cumulative proportion of the run (block 4). Next, the mean, standard deviation (S.D.), coefficient of variation (C.V.), and number of years (N) over all years is given for each of the four data sets (block 5). Next, under the title "Regression Model", comes the results of the linear regression; the r-squared value giving proportion of variance explained by linear regression, the intercept and slope of the regression equation, and the standard deviations for the intercept and slope (block 6). Also, repeated from above in the output, are the run fraction and its standard deviation and the average CPUE values for each week. This output is ordered so that the section from the run fraction to the average CPUE (7 columns of data) may be lifted out of the file and placed in the Lotus worksheet of the second part of the model (Table 7).

Finally, weekly predictions of run size are made for each year using the derived linear regression equations and are reported along with the actual run size (block 7, Table 6). This gives an indication of the accuracy of the models, but, it must be remembered, that each year is being predicted using a linear equation model built on data including that year's CPUE data. A more sensitive test would be to use the jackknife technique of leaving one year out of the model and using that model to predict the left out year. A second FORTRAN program has been written to do this and is available (TIMING2).

Allocation Model

Description

A Lotus worksheet model was developed to estimate, during each week of the fisheries, 1) the total sockeye run size, 2) the total season's TAC for each country, and 3) how the seasonal TAC's should be distributed over the fishing season. The model is written to take into account the current harvest sharing stipulations of the Transboundary Rivers Annex.

First, the model estimates total run size from cumulative CPUE using the coefficients from the TIMING model. Next it determines the total TAC by subtracting the escapement goal of 60,000 sockeye set by the Transboundary Technical Committee from the total run size estimate. For the 1988 season we decided that for the first two weeks of the fishery, the predicted run size would be set equal to the preseason forecast of 123,500 sockeye salmon. For the third week the mean of the Tahltan run sizes made by the two fisheries would be doubled (to account for the non-Tahltan stock) estimate to the total run size. From the fourth week to the end of the fishery, run size will be estimated from the Canadian fishery estimate of inriver run size of all sockeye salmon plus a projected catch of Stikine sockeye salmon from District 108 (the minimum of cumulative catch divided by cumulative run fraction and surplus U.S. TAC estimated from the previous week) and an assumed 10% harvest of the Stikine sockeye total run by District 106. This regime may be changed each year and appropriate formulas must be changed in column D and rows 48 to 58 (Table 8).

Next, the model determines the U.S. and the Canadian share of the TAC according to the current stipulations of the Transboundary Rivers Annex. A provision has been made in the model to subtract off a set level of food fishery harvest from the Canadian TAC before determining weekly commercial TAC. Weekly TAC for both countries is determined by subtracting the cumulative catch from the season's total TAC and multiplying this by the ratio of the average fraction of the run occurring in the week in question to the

fraction of the run left in the season. Weekly effort is determined by dividing weekly TAC by the average CPUE for the week in question. The average fraction of the run and average CPUE for each week over the years 1979 to 1987 is determined by the above linear regression model. For the U.S. fishery, catch of Stikine River sockeye salmon will mostly be incidental. When the U.S. has a TAC in surplus of this incidental catch, fishing may occur in District 108. In order to determine the recommended distribution of the surplus TAC in District 108, average CPUE (1961 to 1978) and average run timing (1985 to 1987) for these stocks are used (Table 9).

User's Guide

The Lotus worksheet Allocation Model is invoked by retrieving file MMST.WK1. An opening screen appears as illustrated in Table 10. Input values that may be added or changed in-season are highlighted on the screen. This includes the data on the opening screen that would, under normal circumstances, be added once at the beginning of the season and the weekly input data, e.g. catches, effort, and stock proportions from the various fisheries. The linear regression parameters (Table 7) are entered with global protection off. Their location starts at cell address Y41. When global protection is enabled (key sequence: /WGPE) the non-highlighted portions of the worksheet, which includes the linear regression parameters, are protected from inadvertent erasures or changes.

Never use the Lotus function 'move' to move items about in the input fields as this will change and invalidate formulas in the worksheet, even if global protection is on.

The six input items on the opening screen (Table 10) include: 1) preseason forecast, 2) the escapement goal, 3) the allotment to the Canadian food fisheries (this is used for management purposes only, not for computation of TAC), and 4-6) the proportion Tahltan stock in each of the first three components.

A menu appears on the opening screen shows the key sequences that allow the user to go to different parts of the worksheet or print out various parts of the worksheet. The keys indicated in the menu are pressed with the Alt key held down to invoke the preprogrammed key sequences (called macros). These macros include:

- <Alt> i go to the weekly catch and effort input area.
- <Alt> w print out the input field (printer must be on).
- <Alt> o go to the output tables.
- <Alt> p print the output tables (all eleven).
- <Alt> r return to screen one (also may use home key).
- <Alt> s save the entries made and quit (lotus will ask if the user really wants to leave Lotus).

The weekly input field is shown in Table 11. For the District 106 and 108 catches, total sockeye catch is entered and in-season estimates of proportion of those catches being Tahltan stock and remaining mainstem Stikine stocks. For Canadian catches, total sockeye numbers are entered and the proportion that is Tahltan stock. For District 106-41/42 and Canadian lower river commercial fisheries effort in boat-days is also entered. If there is no fishing for a particular week, enter test fish data using boat-days for effort. The catch and effort data from test fisheries may be scaled down to keep the catch low without changing the CPUE. This is because the catch will be added to the cumulative catch of that country and subtracted from the total TAC to determine weekly TAC's.

There are eleven output tables produced by this worksheet (Table 12). The first four deal with all Stikine sockeye salmon, the next four with the Tahltan stock only, and the final three with the remaining non-Tahltan stocks. Tables are given 1) comparing the various estimates of run size made and giving the total TAC and projected escapement, 2) giving the cumulative catches of Stikine sockeye salmon for each fishery, and 3) presenting the weekly TAC's and amount of effort for the major fisheries. For the non-Tahltan stock it is not possible to give estimates for weekly TAC and effort, however, total TAC and remaining TAC (total TAC minus cumulative catch) is

given. Invoking the <Alt> p keys will print out all eleven tables one after the other (not as displayed in Table 11). Invoking the <Alt> o keys will place the cursor at the top left corner of the first output table so that the user may move around viewing the tables. The tables are arranged in the worksheet as displayed in Table 11.

Reference

Barth, E.J. 1984. An intraseason forecasting system for commercial marine fisheries. Ph.D. dissertation, Old Dominion University, Norfolk, Virginia. 92 pp.

Table 1. Source code listing for FORTRAN program TIMING.

```

PROGRAM TIMING
C-PURPOSE-----
C   Timing model for predicting fish run,
C   uses linear regression relationship of run size on
C   either catch or CPUE.
C   Also graphs c.v.s for cumulative percent.
C
C-Written by Norma Jean Sands REVISED May 6, 1988
C
C-SUBROUTINES CALLED-----
C   subroutine STAT
C   subroutines from GRAPHS and STLNRG from Scientific Subroutine
C   Library (Wiley).
C   all three subroutines found on SCIMIN.LIB
C
C-GLOBAL VARIABLES-----
REAL      C(20,20,4),RUN(20),AVG(20,4),SD(20,4),CV(20,4)
REAL      REGR(20,5)
INTEGER   NY,NW,LS(20,4)
REAL      YEAR(20),WEEK(20)
CHARACTER Q
CHARACTER*15 FIL1IN, FILEOUT
CHARACTER*64 INFORM,LABEL(4)

C
C DEFINITIONS
C   C(J,I,K) = Catch or CPUE, J=week, I=year, K=1=raw, =2=cumulative
C               =3= proportion,     =4= cumulative proportion
C   RUN = estimated run for year
C   REGR(I,K) = K=1=intercept, =2=slope, =3=r**2, =4=var(inter),
C               =5=var(slope)
C   NY = number of Years;    NW = number of weeks
C   LS(J,K) = number of years there was fishing for week j
C   YEARS = years           ;   WEEK = stat week
C   INFORM = Format for reading from input file
C
C-LOCAL VARIABLES-----
REAL X(20),S(4),Y(20),ANS(16),XY(40)
CHARACTER*64 TITLE

C
C DEFINITIONS
C
C-CONSTANTS-----
INTEGER MONE(20)
DATA MONE/20*1/
C-INPUT/OUTPUT FILES-----
WRITE(*,'(A)')' Input file name?'
READ(*,'(A)') FIL1IN
WRITE(*,'(A)')' Output file name?'
READ(*,'(A)') FILEOUT
OPEN(4,FILE=FIL1IN)
OPEN(5,FILE=FILEOUT,STATUS='NEW')

C
C-CONSTANTS-----
DATA LABEL//'RAW DATA','CUMULATIVE VALUE','PROPORTION',
.          'CUMULATIVE PROPORTION'/

C
C-INITIALIZATION-----
WRITE(*,'(A)')' Do you want to print graph of c.v.s?'
READ(*,'(A)') Q
C

```

Table 1. Continued.

```

C-START-----
      READ(4,'(A)') TITLE
      WRITE(5,'(1X,A64)') TITLE
      WRITE(5,811)
      READ(4,'(A)') INFORM
      READ(4,*) NY, NW
      WRITE(*,'(2I4,6H Y,W )') NY,NW
      READ(4,INFORM) DMY,(YEAR(I),I=1,NY)
      WRITE(5,808) (YEAR(I),I=1,NY)
      DO
        .701          J=1,NW
                      READ(4,INFORM) WEEK(J),(C(J,I,1),I=1,NY)
      C           END J
      701 CONTINUE   READ(4,INFORM) DMY,(RUN(I),I=1,NY)
      C
      C Determine cumulative catch and percentage
      C
      DO
        .704          I=1,NY
                      C(1,I,2) = C(1,I,1)
                      DO
        .705          J=2,NW
                      C(J,I,2) = C(J-1,I,2) + C(J,I,1)
      C           END J
      705 CONTINUE   DO
        .706          J=1,NW
                      C(J,I,3) = C(J,I,1)/C(NW,I,2)
                      C(J,I,4) = C(J,I,2)/C(NW,I,2)
      C           END J
      706 CONTINUE   END I
      704 CONTINUE
      C
      DO
        .723          K=1,4
                      DO
        .724          J=1,NW
                      WRITE(5,807) WEEK(J),(C(J,I,K),I=1,NY)
      C           END J
      724 CONTINUE   WRITE(5,811)
      C           END K
      723 CONTINUE
      C
      C Determine means, s.d. and c.v. for the four variables
      C
      DO
        .708          K=1,4
                      DO
        .710          J=1,NW
                      L = 0
                      DO
        .711          I=1,NY
                      IF (C(J,I,K) .GE. 0.0) THEN
                        L = L + 1
                        X(L) = C(J,I,K)
                      ENDIF
      C           END I
      711 CONTINUE   LS(J,K) = L
                      CALL STAT(L,X,S)

```

Table 1. Continued.

```

                AVG(J,K) = S(1)
                SD(J,K) = S(2)
                CV(J,K) = S(3)
C                           END J
    710 CONTINUE
C                           END K
    708 CONTINUE
C
        WRITE(5,'(1X,A64)') TITLE
        DO
.713          K=1,4,2
            WRITE(5,800) LABEL(K),LABEL(K+1)
            WRITE(5,801)
            DO
.714          J=1,NW
            WRITE(5,802) WEEK(J),AVG(J,K),SD(J,K),CV(J,K),
                           LS(J,K),AVG(J,K+1),SD(J,K+1),CV(J,K+1)
.
C                           END J
    714 CONTINUE
C                           END K
    713 CONTINUE
C
C-Graph c.v. of cumulative percent vs week
C
        DO
.730          J=1,NW
            Y(J) = CV(J,4)
        END J
    730 CONTINUE
        IF (Q .EQ. 'Y') THEN
            CALL GRAPHS(NW,WEEK,Y)
        ENDIF
C
C-Linear regression of total run predicted on weekly catch
C
        WRITE(5,803)
        DO
.732          J=1,NW
            DO
.733          I=1,NY
                II = 2*I
                III = II -1
                XY(III) = C(J,I,2)
                XY(II) = RUN(I)
                WRITE (*,'(2F9.2)') XY(III),XY(II)
            END I
    733 CONTINUE
        CALL STLNRG(NY,MONE,XY,ANS)
        REGR(J,1) = ANS(5)
        REGR(J,2) = ANS(2)
        XX = (ANS(2)*ANS(10))/ANS(11)
        REGR(J,3) = XX*XX
        REGR(J,4) = ANS(15)
        REGR(J,5) = ANS(14)
        WRITE(5,809) WEEK(J),REGR(J,3),AVG(J,3),REGR(J,1),
                           REGR(J,2),SD(J,3),REGR(J,4),REGR(J,5),
                           AVG(J,1)
.
C                           END J
    732 CONTINUE
C
C-Predicting the run from cpue for each year of input.
        WRITE(5,804) (YEAR(I),I=1,NY)
        WRITE(5,805) (RUN(I),I=1,NY)

```

Table 1. Continued.

```

        WRITE(5,810)
        DO
.740          J=1,NW
            DO
.742              I=1,NY
                  Y(I) = REGR(J,1) + REGR(J,2)*C(J,I,2)
C          END J
    742 CONTINUE
            WRITE(5,806) WEEK(J), (Y(I),I=1,NY)
C          END I
    740 CONTINUE
            STOP
C
C-FORMATS-----
 800 FORMAT(/10X,2A37)
 801 FORMAT('      WEEK      MEAN      S.D.      C.V.      N',
           '           MEAN      S.D.      C.V.')
 802 FORMAT(1X,F9.0,3F9.2,I4,5X,3F9.2)
 803 FORMAT('/'REGRESSION MODEL of total run on cumulative catch; '',
           ' INPUT TO LOTUS WORKSHEET',/
           ' WEEK R^2 RUN F. INTERCEPT      SLOPE SD(R.F)',/
           ' SD(INT) SD(SLOPE) AVG.CPUE')
 804 FORMAT('/' Predictions on the run per week'/' YEAR',12F9.0)
 805 FORMAT(' RUN ',12F9.0)
 806 FORMAT(1X,F4.0,12F9.0)
 807 FORMAT(1X,F4.0,12F9.2)
 808 FORMAT(5X,12F9.0)
 809 FORMAT(1X,F4.0,2F5.2,2F11.2,F6.3,2F11.2,F9.2)
 810 FORMAT(' WEEK')
 811 FORMAT(2X)
C
        END
C-END-----
C
C-SUBROUTINES-----
C      found on SCIMIN2.LIB

```

C-From SCIMIN2.LIB

```

SUBROUTINE STAT(N,X,S)
C
C      This subroutine computes the mean, standard deviation and
C      coefficient of variation for a string of numbers.
C
C      Written by Norma Jean Sands 4-6-87
C
        DIMENSION X(1), S(3)
        SUM = 0.0
        SUM2 = 0.0
        DO
.701          I=1,N
                  SUM = SUM + X(I)
                  SUM2 = SUM2 + X(I)*X(I)
    701 CONTINUE
C          END DO I
C
        XN = N
        S(1) = SUM/XN
        Y = (SUM2-(SUM*SUM/XN)) / (XN-1.0)
        IF (Y .LT. 0.0) THEN
                  WRITE(*,'(2F16.9)') S(1),Y
                  Y = 0.0
        ENDIF

```

Table 1. Continued.

```

S(2) = SQRT(Y)
S(3) = S(2)/S(1)*100
RETURN
END
C-END-----
C
C-----

---


SUBROUTINE GRAPHS (N,X,Y)
C
C THIS SUBROUTINE WILL PLOT A ONE PAGE GRAPH ON THE PRINTER.
C
C from FORTRAN SCIENTIFIC SUBROUTINE LIBRARY (Wiley & Sons)
C
DIMENSION K(105),X(1),Y(1),XWRD(11),YWRD(11)
CHARACTER *1 K,BLANK
CHARACTER *5 IDOT,IDSHE
DATA BLANK //' '/,IDOT/' |'/,IDSHE/' -'/
CALL SORT2 (X,Y,N)
XRNGE = X(N) - X(1)
YMAX = Y(1)
YMIN = Y(1)
DO 50 I = 2,N
IF (Y(I).LT.YMIN) YMIN = Y(I)
IF (Y(I).GT.YMAX) YMAX = Y(I)
YRNGE = YMAX - YMIN
XWRD(1) = X(1)
XWRD(11) = X(N)
YWRD(1) = YMIN
YWRD(11) = YMAX
AY = 0.1*YRNGE
AX = 0.1*XrngE
DO 60 I = 2,10
XI = I-1
XWRD(I) = XWRD(1) + XI*AX
60 YWRD(I) = YWRD(1) + XI*AY
DO 65 I= 1,105
65 K(I)=BLANK
DO 70 I = 10,100,10
70 K(I) = '|'
C
C OPEN THE PRINTER AS FILE 3
CLOSE(3)
OPEN(3,FILE='PRN')
C
SET THE PRINTER TO COMPRESSED PRINT= 132 CHAR PER LINE
    WRITE (3,75) CHAR(27),CHAR(15)
75   FORMAT('+',A1,A1)
    WRITE (3,80) (YWRD(I),I=2,10,2),(YWRD(I),I = 1,11,2),
&(K(I),I=1,100),IDOT
80   FORMAT (1H1/19X,5(8X,E12.6)/9X,6(8X,E12.6)/14X,100A1,5X,A5)
J = 1
J1 = 0
JJ = 1
XL = 0.2*AX
90   XJ = J1
DO 100 I = 1,104
100 K(I) = BLANK
K(105)=' '
110 IF(J.GT.N) GO TO 200
IF ((XWRD(1) + XJ*XL).LT.X(J)) GO TO 200
B = (Y(J) - YWRD(1))/AY*10.
JB = IFIX(B)
LOC = JB + 1
IF (LOC.GT.101) LOC = 101

```

Table 1. Continued.

```

J = J + 1
IF(K(LOC).NE.BLANK) GO TO 190
K(LOC) = '+'
GO TO 110
190 K(LOC) = '**'
GO TO 110
200 IF (J1.EQ.0) GO TO 250
210 MJ = J1
220 IF(MJ-5) 270,240,230
230 MJ = MJ - 5
GO TO 220
240 JJ = JJ + 1
250 WRITE (3,260) XWRD(JJ),IDSH,(K(I),I=1,105)
260 FORMAT (E18.6,A5,105A1)
GO TO 290
270 WRITE (3,280) IDSH,(K(I),I=1,105)
280 FORMAT (18X,A5,105A1)
290 J1 = J1 + 1
IF (J.GT.N) GO TO 300
GO TO 90
300 IF (JJ.EQ.11) GO TO 320
305 DO 310 I = 1,104
310 K(I) = BLANK
GO TO 210
C
C      SET THE PRINTER BACK TO NORMAL SPACING = 80 CHAR PER LINE
320   WRITE (3,330) CHAR(27),CHAR(18)
330   FORMAT(1X,A1,A1)
RETURN
END
C
C_____
SUBROUTINE SORT2(A,B,N)
C
C      THIS SUBROUTINE PERFORMS AN IN PLACE SORT OF A
C      ONE DIMENSIONAL ARRAY USING THE SHELL-METZNER
C      METHOD. THEN MATCHES THAT ORDER IN A SECOND ARRAY
C
C      from FORTRAN SCIENTIFIC SUBROUTINE LIBRARY (Wiley & Sons)
C
C      A = THE ARRAY TO BE SORTED TO ASCENDING ORDER
C      B = THE SECOND ARRAY TO BE ORDERED AS THE FIRST
C      N = THE NUMBER OF ELEMENTS IN THE ARRAY
C      T = TEMPORARY ELEMENT HOLDER FOR SWAP
C
C      DIMENSION A(1),B(1)
C
C      K=N
5     IF (K.LE.1) GOTO 30
      K=K/2
      DO 20 J=1,N-K
         DO 10 I=J,1,-K
            IF (A(I).LE.A(I+K)) GO TO 10
C      FIRST ARRAY CONTROLS ORDER
            T=A(I)
            A(I)=A(I+K)
            A(I+K)=T
C      SECOND ARRAY
            T=B(I)
            B(I)=B(I+K)
            B(I+K)=T
10    CONTINUE
20    CONTINUE

```

Table 1. Continued.

```

GOTO 5
C
30    RETURN
END
C
C-----  

SUBROUTINE STLNRG(K,NYVAL,XY,ANS)
C
C THIS SUBROUTINE COMPUTES THE SLOPE AND OTHER STATISTICS
C FOR A LINEAR REGRESSION WITH SEVERAL Y VALUES FOR EACH X
C VALUE OR WITH ONE INDEPENDENT VARIABLE.
C
C from FORTRAN SCIENTIFIC SUBROUTINE LIBRARY (Wiley & Sons)
C
DIMENSION NYVAL(1), XY(1), ANS(16)
SUMX = 0.0
SUMX2 = 0.0
SUMY = 0.0
ANS(6) = 0.0
SUMXY = 0.0
N = 0
NX = 1
NY = 2
DO 20 J = 1,K
M = NYVAL(J)
N = N + M
DO 10 I = 1,M
SUMX = SUMX + XY(NX)
SUMX2 = SUMX2 + XY(NX)*XY(NX)
SUMY = SUMY + XY(NY)
ANS(6) = ANS(6) + XY(NY)*XY(NY)
SUMXY = SUMXY + XY(NX)*XY(NY)
10   NY = NY + 1
NX = NX + NYVAL(J) + 1
20   NY = NY + 1
EN = N
ANS(1) = EN
S1 = ANS(1)*SUMX2 - SUMX*SUMX
S2 = ANS(1)*SUMXY - SUMX*SUMY
EN1 = EN - 1.0
EN2 = EN1 - 1.0
ANS(2) = S2/S1
ANS(3) = SUMY/EN
ANS(4) = SUMX/EN
ANS(5) = ANS(3) - ANS(2)*ANS(4)
ANS(7) = ANS(3)*SUMY
ANS(8) = ANS(2)*S2/EN
ANS(9) = ANS(6) - ANS(7) - ANS(8)
S4 = ANS(9)/(EN - 2.0)
ENDS1 = EN/S1
ANS(10) = SQRT(1.0/(EN1*ENDS1))
ANS(11) = SQRT((ANS(6) - ANS(7))/EN1)
ANS(12) = SQRT(S4)
A13 = S4/EN
ANS(13) = SQRT(A13)
A14 = S4*ENDS1
ANS(14) = SQRT(A14)
ANS(15) = SQRT(A13 + A14*ANS(4)*ANS(4))
ANS(16) = ANS(8)/S4
RETURN
END

```

Table 2. Stikine River sockeye run size, 1979 to 1987.

ALL SOCKEYE SALMON

Year	In-river Run Estimates			District Catch	Total Run Size
	Canada	U.S.	Average		
1979		34,116	34,116	8,299	42,415
1980		62,744	62,744	23,206	85,950
1981		138,503	138,503	27,538	166,041
1982		68,442	68,442	42,527	110,971
1983	66,000	65,719	65,860	5,751	71,610
1984	84,544	59,169	71,856	7,867	79,723
1985	207,739	137,695	172,717	29,089	201,806
1986			63,548	7,194	70,742
1987	46,398	35,543	40,970	3,584	44,554

TAHLTAN STOCK

Year	In-river Run Estimates 1/			District Catch	Total Run Size
	Canada	U.S.	Average		
1979		14,772	14,772	5,076	19,848
1980		19,137	19,137	11,239	30,376
1981		65,789	65,789	16,189	81,978
1982		42,297	42,297	24,785	67,082
1983	27,921	32,137	30,029	5,015	35,044
1984	33,277	37,572	35,424	2,754	38,178
1985	75,306	85,509	80,408	25,176	105,584
1986			28,549	2,725	31,274
1987	11,406	12,085	11,746	1,959	13,705

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 3. CPUE for all sockeye salmon and the proportion of Tahltan stock in the catch from the Canadian lower River commercial fisheries.

CPUE OF ALL SOCKEYE								
WEEK	1987	1986	1985	1983	1982	1981	1980	1979
26	3.0	2.8	67.6	12.8	13.3	30.0	22.4	9.2
27	11.9	18.8	75.0	39.3	49.5	82.5	76.7	26.6
28	10.6	79.8	100.1	62.2	46.9	95.5	71.7	50.1
29	57.9	58.1	260.0	72.8	24.0	45.6	69.6	30.4
30	68.8	84.7	147.9	53.3	29.1	40.7	37.8	43.6
31	27.6	81.9	104.7	92.0	13.6	48.4	45.9	4.1
32	76.6	55.6	73.6	64.3	20.5	23.4	43.7	12.8
33	32.3	34.4	58.6	54.7	7.7	24.1	18.5	10.6
34	16.5	25.9	18.2	14.7	3.6	12.9	14.3	5.7
35	5.4	9.4	10.3	11.9	1.3	4.7	4.1	1.7
36	0.01		10.8	6.1	0.5	5.0	2.4	0.3
37	0.2			3.3	0.6	5.0	0.6	0.1
38	0.2			0.1	0.3	1.6	0.5	0.04
39	0.01			0.2	0.1		0.1	

PROPORTION TAHLTAN STOCK IN CATCH								
WEEK	1987	1986	1985	1983	1982	1981	1980	1979
26	0.87	0.73	0.89	0.83	0.93	0.85	0.84	0.84
27	0.87	0.77	0.90	0.86	0.93	0.86	0.86	0.86
28	0.91	0.83	0.90	0.83	0.89	0.67	0.82	0.82
29	0.67	0.73	0.79	0.62	0.67	0.63	0.69	0.69
30	0.31	0.52	0.42	0.48	0.42	0.34	0.44	0.44
31	0.09	0.19	0.29	0.24	0.16	0.25	0.23	0.23
32	0.04	0.09	0.20	0.14	0.20	0.20	0.17	0.17
33	0.00	0.02	0.20	0.11	0.21	0.20	0.15	0.15
34	0.00	0.01	0.20	0.09	0.21	0.20	0.14	0.14
35	0.00	0.00	0.20	0.02	0.21	0.20	0.13	0.12
36	0.00		0.20	0.02	0.22	0.20	0.13	0.14
37	0.00			0.03	0.22	0.20	0.13	0.11
38				0.00	0.20	0.20	0.12	0.00
39				0.00	0.20		0.11	

For periods with no fishing, values were filled in with averaging and interpolation techniques.

Table 4. 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.

CPUE OF ALL SOCKEYE									
WEEK	79	80	81	82	83	84	85	86	87
25	56.8	30.2	38.3	101.9	38.2	45.3	91.0	14.1	19.3
26	75.9	76.8	89.8	119.1	57.7	69.6	126.9	16.9	29.1
27	140.8	130.1	86.7	124.9	38.4	89.4	162.9	63.0	52.2
28	50.2	128.8	132.7	156.9	65.9	80.9	117.4	75.5	103.9
29	45.8	129.1	155.1	160.5	76.1	79.7	113.3	88.0	83.9
30	44.8	98.9	78.4	164.1	69.9	148.3	108.7	100.6	155.9
31	27.6	57.4	49.9	137.3	44.4	53.0	189.1	105.8	106.6
32	17.5	35.4	31.3	95.2	40.5	45.6	69.0	82.1	115.4
33	7.0	13.4	19.0	53.1	18.2	14.9	100.5	60.1	88.3
34	4.0	2.6	19.1	11.1	6.2	5.4	37.8	28.3	45.9
35	1.5	1.1	6.3	4.4	5.7	1.1	5.9	8.6	3.4
36	1.1	0.1	2.0	1.5	1.9	1.0	1.6	2.4	1.3
37	0.0	0.0	0.0	0.6	0.6	0.3	0.3	0.5	0.2
38	0.0	0.0	0.0	0.3	0.2	0.1	0.0	0.2	0.0
39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PROPORTION TAHLTAN STOCK IN CATCH									
WEEK	79	80	81	82	83	84	85	86	87
25	0.05	0.05	0.05	0.01	0.04	0.07	0.12	0.00	0.02
26	0.09	0.09	0.09	0.15	0.09	0.08	0.13	0.02	0.02
27	0.15	0.15	0.15	0.11	0.19	0.11	0.27	0.07	0.05
28	0.12	0.12	0.12	0.19	0.12	0.11	0.17	0.03	0.00
29	0.09	0.09	0.09	0.17	0.08	0.02	0.16	0.00	0.04
30	0.04	0.04	0.04	0.06	0.13	0.00	0.00	0.00	0.00
31	0.02	0.02	0.02	0.08	0.02	0.00	0.00	0.02	0.00
32	0.02	0.02	0.02	0.00	0.09	0.00	0.00	0.00	0.00
33	0.01	0.01	0.01	0.00	0.05	0.00	0.00	0.01	0.00
34	0.01	0.01	0.01	0.00	0.05	0.00	0.00	0.00	0.00
35	0.01	0.01	0.01	0.00	0.03	0.00	0.00	0.00	0.00
36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PROPORTION NON-TAHLTAN STOCKS IN CATCH									
WEEK	79	80	81	82	83	84	85	86	87
25	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.03
26	0.02	0.02	0.02	0.03	0.02	0.05	0.02	0.00	0.00
27	0.02	0.02	0.02	0.02	0.01	0.04	0.01	0.02	0.01
28	0.02	0.02	0.02	0.08	0.01	0.01	0.01	0.01	0.00
29	0.06	0.06	0.06	0.09	0.06	0.13	0.01	0.00	0.02
30	0.05	0.05	0.05	0.17	0.01	0.02	0.03	0.00	0.00
31	0.02	0.02	0.02	0.09	0.00	0.03	0.00	0.00	0.00
32	0.01	0.01	0.01	0.00	0.03	0.02	0.00	0.00	0.00
33	0.02	0.02	0.02	0.00	0.03	0.04	0.01	0.00	0.00
34	0.01	0.01	0.01	0.00	0.00	0.04	0.02	0.00	0.00
35	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

For periods with no fishing, values were filled in with averaging and interpolation techniques. For 1979 through 1981, when no stock composition was done, average values from the other years is used.

Table 5. Example of an input file to program TIMING. The line number is not part of the input file. See text for explanation of input.

LINE	Canadian Lower river commercial (10F9.0)	CPUE	Tahltan Sockeye					
1	8	14						
2	1987	1986	1985	1983	1982	1981	1980	1979
3	26	2.55	2.04	60.12	10.62	12.37	25.35	18.91
4	27	10.31	14.48	67.50	33.80	46.04	70.95	66.27
5	28	9.69	66.23	90.09	51.63	41.74	63.99	59.08
6	29	39.02	42.41	205.40	45.14	16.08	28.73	47.90
7	30	21.40	44.04	62.12	25.58	12.22	13.84	16.46
8	31	2.48	15.56	30.36	22.08	2.18	12.10	10.37
9	32	3.06	5.00	14.72	9.00	4.10	4.68	7.26
10	33	0.00	0.69	11.72	6.02	1.62	4.82	2.74
11	34	0.00	0.26	3.64	1.32	0.76	2.58	2.03
12	35	0.00	0.00	2.05	0.24	0.27	0.94	0.52
13	36	0.00	0.00	2.16	0.12	0.11	1.00	0.31
14	37	0.00	0.00	0.00	0.10	0.13	1.00	0.08
15	38	0.00	0.00	0.00	0.00	0.06	0.32	0.06
16	39	0.00	0.00	0.00	0.00	0.02	0.00	0.01
17		12075	37299	84090	32137	42297	65789	19137
18								14519
19								

Table 6. Example of an output file from program TIMING. Block numbers are not part of the output. See text for an explanation of the output.

BLOCK	Canadian Lower river commercial		CPUE	Tahltan Sockeye					
---	1987.	1986.	1985.	1983.	1982.	1981.	1980.	1979.	
26.	2.55	2.04	60.12	10.62	12.37	25.35	18.91	7.73	
27.	10.31	14.48	67.50	33.80	46.04	70.95	66.27	22.95	
28.	9.69	66.23	90.09	51.63	41.74	63.99	59.08	41.25	
29.	39.02	42.41	205.40	45.14	16.08	28.73	47.90	20.89	
30.	21.40	44.04	62.12	25.58	12.22	13.84	16.46	19.01	
31.	2.48	15.56	30.36	22.08	2.18	12.10	10.37	.93	
1	32.	3.06	5.00	14.72	9.00	4.10	4.68	7.26	2.13
	33.	.00	.69	11.72	6.02	1.62	4.82	2.74	1.57
	34.	.00	.26	3.64	1.32	.76	2.58	2.03	.81
	35.	.00	.00	2.05	.24	.27	.94	.52	.21
	36.	.00	.00	2.16	.12	.11	1.00	.31	.04
	37.	.00	.00	.00	.10	.13	1.00	.08	.00
	38.	.00	.00	.00	.00	.06	.32	.06	.00
---	39.	.00	.00	.00	.00	.02	.00	.00	.00
---	26.	2.55	2.04	60.12	10.62	12.37	25.35	18.91	7.73
	27.	12.86	16.52	127.62	44.42	58.41	96.30	85.18	30.68
	28.	22.55	82.75	217.71	96.05	100.15	160.29	144.26	71.93
	29.	61.57	125.16	423.11	141.19	116.23	189.02	192.16	92.82
	30.	82.97	169.20	485.23	166.77	128.45	202.86	208.62	111.83
	31.	85.45	184.76	515.59	188.85	130.63	214.96	218.99	112.76
2	32.	88.51	189.76	530.31	197.85	134.73	219.64	226.25	114.89
	33.	88.51	190.45	542.03	203.87	136.35	224.46	228.99	116.46
	34.	88.51	190.71	545.67	205.19	137.11	227.04	231.02	117.27
	35.	88.51	190.71	547.72	205.43	137.38	227.98	231.54	117.48
	36.	88.51	190.71	549.88	205.55	137.49	228.98	231.85	117.52
	37.	88.51	190.71	549.88	205.65	137.62	229.98	231.93	117.53
	38.	88.51	190.71	549.88	205.65	137.68	230.30	231.99	117.53
---	39.	88.51	190.71	549.88	205.65	137.70	230.30	232.00	117.53
---	26.	.03	.01	.11	.05	.09	.11	.08	.07
	27.	.12	.08	.12	.16	.33	.31	.29	.20
	28.	.11	.35	.16	.25	.30	.28	.25	.35
	29.	.44	.22	.37	.22	.12	.12	.21	.18
	30.	.24	.23	.11	.12	.09	.06	.07	.16
	31.	.03	.08	.06	.11	.02	.05	.04	.00
3	32.	.03	.03	.03	.04	.03	.02	.03	.02
	33.	.00	.00	.02	.03	.01	.02	.01	.01
	34.	.00	.00	.00	.00	.00	.01	.00	.00
	35.	.00	.00	.00	.00	.00	.00	.00	.00
	36.	.00	.00	.00	.00	.00	.00	.00	.00
	37.	.00	.00	.00	.00	.00	.00	.00	.00
	38.	.00	.00	.00	.00	.00	.00	.00	.00
---	39.	.00	.00	.00	.00	.00	.00	.00	.00
---	26.	.03	.01	.11	.05	.09	.11	.08	.07
	27.	.15	.09	.23	.22	.42	.42	.37	.26
	28.	.25	.43	.40	.47	.73	.70	.62	.61
	29.	.70	.66	.77	.69	.84	.82	.83	.79
	30.	.94	.89	.88	.81	.93	.88	.90	.95
	31.	.97	.97	.94	.92	.95	.93	.94	.96
4	32.	1.00	1.00	.96	.96	.98	.95	.98	.98
	33.	1.00	1.00	.99	.99	.99	.97	.99	.99
	34.	1.00	1.00	.99	1.00	1.00	.99	1.00	1.00
	35.	1.00	1.00	1.00	1.00	1.00	.99	1.00	1.00
	36.	1.00	1.00	1.00	1.00	1.00	.99	1.00	1.00
	37.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	38.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
---	39.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 6. Continued.

BLOCK

	Canadian Lower river commercial					CPUE	Tahltan	Sockeye	
	RAW DATA					CUMULATIVE VALUE			
	WEEK	MEAN	S.D.	C.V.	N	MEAN	S.D.	C.V.	
	26.	17.46	18.94	108.48	8	17.46	18.94	108.48	
	27.	41.54	24.74	59.56	8	59.00	40.94	69.39	
	28.	52.96	23.45	44.29	8	111.96	60.24	53.81	
	29.	55.70	61.58	110.57	8	167.66	112.33	67.00	
	30.	26.83	17.42	64.91	8	194.49	125.26	64.41	
	31.	12.01	10.44	86.98	8	206.50	134.03	64.91	
	32.	6.24	4.07	65.23	8	212.74	137.80	64.77	
	33.	3.65	3.84	105.41	8	216.39	141.34	65.32	
	34.	1.43	1.24	87.27	8	217.82	142.42	65.39	
	35.	.53	.69	129.75	8	218.34	143.06	65.52	
	36.	.47	.76	162.53	8	218.81	143.77	65.71	
	37.	.17	.34	206.87	8	218.98	143.77	65.66	
	38.	.05	.11	200.82	8	219.03	143.77	65.64	
	39.	.00	.00	198.41	8	219.03	143.77	65.64	
5	PROPORTION					CUMULATIVE PROPORTION			
5	WEEK	MEAN	S.D.	C.V.	N	MEAN	S.D.	C.V.	
5	26.	.07	.04	53.04	8	.07	.04	53.04	
5	27.	.20	.10	48.72	8	.27	.12	46.37	
5	28.	.26	.08	32.86	8	.53	.16	31.19	
5	29.	.24	.11	48.78	8	.76	.07	9.51	
5	30.	.14	.07	50.89	8	.90	.04	4.96	
5	31.	.05	.03	67.78	8	.95	.02	1.82	
5	32.	.03	.00	28.13	8	.98	.02	1.63	
5	33.	.01	.00	68.72	8	.99	.00	.80	
5	34.	.00	.00	62.53	8	1.00	.00	.47	
5	35.	.00	.00	80.78	8	1.00	.00	.34	
5	36.	.00	.00	122.66	8	1.00	.00	.19	
5	37.	.00	.00	190.69	8	1.00	.00	.05	
5	38.	.00	.00	186.08	8	1.00	.00	.00	
5	39.	.00	.00	218.47	8	1.00	.00	.00	
---	REGRESSION MODEL of total run on cumulative catch; INPUT TO LOTUS WORKSHEET								
---	WEEK	R^2	RUN F.	INTERCEPT	SLOPE	SD(R.F.)	SD(INT)	SD(SLOPE)	AVG.CPUE
6	26.	.72	.07	17146.90	1113.55	.036	7008.90	281.74	17.46
6	27.	.67	.20	7241.52	497.46	.098	9943.87	141.37	41.54
6	28.	.71	.26	-2402.40	348.27	.085	11256.29	89.80	52.96
6	29.	.66	.24	6445.97	179.80	.115	10369.70	52.41	55.70
6	30.	.63	.14	5922.49	157.69	.069	11116.55	48.96	26.83
6	31.	.63	.05	6238.12	146.99	.033	11103.91	45.96	12.01
6	32.	.63	.03	6278.52	142.48	.008	11183.66	44.96	6.24
6	33.	.63	.01	6453.80	139.27	.010	11067.67	43.65	3.65
6	34.	.63	.00	6444.53	138.40	.004	11033.81	43.21	1.43
6	35.	.63	.00	6484.88	137.88	.002	11003.00	42.97	.53
6	36.	.63	.00	6540.11	137.34	.002	10962.14	42.68	.47
6	37.	.63	.00	6475.04	137.53	.001	10941.64	42.58	.17
6	38.	.64	.00	6454.17	137.59	.000	10935.34	42.55	.05
6	39.	.64	.00	6453.12	137.59	.000	10935.41	42.55	.00
---	Predictions on the run per week								
---	YEAR	1987.	1986.	1985.	1983.	1982.	1981.	1980.	1979.
---	RUN	11746.	28549.	80408.	30029.	42297.	65789.	19137.	14772.
7	WEEK								
7	26.	19986.	19419.	84094.	28973.	30922.	45375.	38204.	25755.
7	27.	13639.	15460.	70727.	29339.	36298.	55147.	49615.	22504.
7	28.	5451.	26417.	73420.	31049.	32477.	53423.	47840.	22649.
7	29.	17516.	28950.	82521.	31832.	27344.	40432.	40996.	23135.
7	30.	19006.	32603.	82436.	32220.	26177.	37911.	38819.	23556.
7	31.	18798.	33396.	82023.	33997.	25439.	37835.	38427.	22812.
7	32.	18890.	33316.	81839.	34469.	25475.	37574.	38515.	22648.
7	33.	18781.	32978.	81943.	34847.	25444.	37715.	38346.	22673.
7	34.	18695.	32839.	81967.	34844.	25421.	37868.	38418.	22675.
7	35.	18689.	32781.	82006.	34810.	25427.	37920.	38410.	22683.
7	36.	18696.	32732.	82059.	34770.	25423.	37987.	38382.	22680.
7	37.	18648.	32703.	82100.	34758.	25402.	38104.	38372.	22639.
7	38.	18632.	32694.	82113.	34750.	25398.	38141.	38374.	22625.
7	39.	18632.	32694.	82113.	34749.	25400.	38141.	38375.	22624.

Table 7. Results from the linear regression model (TIMING) as input into the Lotus worksheet Allocation Model.

PARAMETER ESTIMATES BASED ON HISTORICAL DATA 1979-87
TOTAL SOCKEYE SALMON

STAT WEEK	DISTRICT			HISTORICAL			RIVER			HISTORICAL			
	RUN FRACTION	-BARTH'S COEFF.- INTERCEPT	--STANDARD DEVIATION-- SLOPE	CPUE FR.	STAT INT.	106-41 SL.	RUN FRACTION	-BARTH'S COEFF.- INTERCEPT	--STANDARD DEVIATION-- SLOPE	CPUE FR.	STAT INT.	106-41 SL.	LOWER R.
25	0.04	63576.71	12142.17	0.034	18640.37	4598.86	2.76	25					
26	0.12	44343.88	4336.41	0.047	21779.36	1449.98	9.40	26	0.04	39091.41	2076.48	0.027	11025.90
27	0.28	43185.74	1845.02	0.127	22953.57	645.21	17.05	27	0.12	18777.18	917.76	0.075	17171.70
28	0.18	39506.16	1321.42	0.078	23233.29	444.60	14.36	28	0.17	-278.89	613.52	0.073	19033.58
29	0.22	41188.13	954.00	0.137	24374.88	347.64	15.02	29	0.16	11505.96	330.97	0.055	15961.49
30	0.08	50816.43	694.94	0.071	26193.38	322.90	7.99	30	0.15	9468.37	261.72	0.053	18546.04
31	0.05	56767.28	572.74	0.061	26605.61	304.84	3.82	31	0.11	9883.56	218.36	0.056	19904.96
32	0.02	56084.17	574.75	0.029	26958.13	306.77	0.94	32	0.11	8179.18	195.71	0.060	23136.24
33	0.01	55457.05	579.05	0.011	26982.36	305.45	0.55	33	0.07	9033.00	178.91	0.027	24097.72
34	0.00	55138.21	581.70	0.003	26926.64	304.05	0.22	34	0.03	8463.35	174.26	0.014	24819.41
35	0.00	55107.15	581.79	0.002	26942.56	304.14	0.04	35	0.01	8705.59	171.17	0.006	25069.00
TOTAL	1.00				TOTAL		0.97						

TAHLTAN STOCK

STAT WEEK	DISTRICT			HISTORICAL			RIVER			HISTORICAL			
	RUN FRACTION	-BARTH'S COEFF.- INTERCEPT	--STANDARD DEVIATION-- SLOPE	CPUE FR.	STAT INT.	106-41 SL.	RUN FRACTION	-BARTH'S COEFF.- INTERCEPT	--STANDARD DEVIATION-- SLOPE	CPUE FR.	STAT INT.	106-41 SL.	LOWER R.
25	0.05	30383.20	6594.10	0.038	10334.05	2609.82	2.52	25					
26	0.13	16045.40	3047.13	0.048	9871.40	764.34	7.64	26	0.07	17146.90	1113.55	0.036	7008.90
27	0.32	18161.74	1142.16	0.124	11745.75	368.77	15.09	27	0.20	7241.52	497.46	0.098	9943.87
28	0.21	12862.88	920.23	0.093	11136.26	246.24	11.85	28	0.26	-2402.40	348.27	0.085	11256.29
29	0.18	13154.94	725.14	0.140	10790.31	188.50	9.58	29	0.24	6445.97	179.80	0.115	10369.70
30	0.05	12890.07	687.42	0.068	11498.37	190.80	2.95	30	0.14	5922.49	157.69	0.069	11116.55
31	0.05	13911.22	641.64	0.075	11876.36	189.10	1.95	31	0.05	6238.12	146.99	0.033	11103.91
32	0.01	13525.28	641.85	0.028	12048.22	190.57	0.58	32	0.03	6278.52	142.48	0.008	11183.66
33	0.00	13331.47	643.13	0.013	12095.10	190.94	0.20	33	0.01	6453.80	139.27	0.010	11067.67
34	0.00	13271.41	643.47	0.002	12099.42	190.85	0.07	34	0.00	6444.53	138.40	0.004	11033.81
35	0.00	13251.13	643.51	0.001	12105.90	190.89	0.03	35	0.00	6484.88	137.88	0.002	11003.00

Table 8. Source code for Lotus worksheet MMST.WK1. The entire worksheet is shown as it appears on the screen. Letters across the top indicate columns and numbers down the right indicate rows. Cells for input data are indicated. Formulas are given for appropriate cells. The remaining cells contain labels as shown.

Cells C8 to C10 and D8 to D10 are data input

	BI	BJ	BK	BL	BM	BN	BO	BP	
1									MACROS:
2		/O	{HOME}			/W	(GOTO)A21~		
3			{GOTO)F12~				/PPRA21.H40~AG		
4							R(ESC)I21.Q40~AG		
5	/I						R(ESC)R21.W40~AG		
6							Q		
7							{GOTO)A21~		
8		/R	{HOME}						
9			{GOTO)F12~			/S	{HOME}		
10							/FS~R		
11	/O						/Q		
12									
13	/P								
14			{GOTO)BJ81~						
15			/PPRBJ81.BR160~AG						
16			R(ESC)BT81.CB160~AG						
17			R(ESC)CD81.CL140~AG						
18			Q						
19			{HOME}						
20			{GOTO)F12~						

Table 8. Continued.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
21 INPUT:	Catches and stock composition																						
22	Todays date:	14-May																					
23	STAT	DISTRICT 108			DISTRICT 106/30																		
24	WEEK	CATCH p TAHLTAN p M.STEM			CATCH p TAHLTAN p M.STEM																		
25	25	30	0.9	0.1	644	0	0															0.9	25
26	26	14	0.7	0.3	642	0	0															0.9	26
27	27	0	0.6	0.3	4295	0.01	0														0.9	27	
28	28	0	0.4	0.5	0	0.01	0														0.9	28	
29	29	0	0.2	0.6	7899	0.001	0														0.9	29	
30	30	2009	0.2	0.6	8515	0	0.001														0.9	30	
31	31	1676	0.06	0.8	14339	0	0.003														0.9	31	
32	32	788	0	0.7	10045	0	0.006														0.9	32	
33	33	451	0	0	5796	0	0														0.9	33	
34	34	165	0	0	5588	0	0.003														0.9	34	
35	35	33	0	0	2119	0	0														0.9	35	
36																							
37																							
38																							
39	TOTAL	5166			59882																		
40																							
41	ESTIMATES: OF TOTAL RUN, TOTAL TAC, AND TAC FOR THE FOLLOWING WEEK																						
42	TOTAL SOCKEYE FROM STIKINE RIVER																						
43																							
44	PREDICT	TOTAL RUN			ALL DISTRICT																		
45	FOR	D.EST.	R.EST.	USED	TAC	US	WEEKLY	WEEKLY	DAYS	DISTRICT	108			RIVER	PREDICT	PREDICT			CANADIAN CATCH				
46	WEEK				TAC	TAC	TAC	EFFORT	6 / 8	FISH	SURPLUS	WEEKLY	WEEKLY	CAN COMM	WEEKLY	WEEKLY	FOR	FOR	10% OF RUN	MIN	MAX	RIVER RUN	
47										TAC	TAC	TAC	TAC	TAC	TAC	TAC	WEEK	WEEK					
48	PSE	25			123500	63500	33500	1340	486	I D	21150	2587	216	25000	0	0	25	PSE	25	12350	20000	30000	
49	PSE	26	63577		123500	63500	33500	4184	445	I D	21150	9110	246	25000	1000	50	26	PSE	26	12350	20000	30000	
50	D&R	27	44641	49993	38056	0	0	0	0	I O	0	0	0	0	0	0	27	D&R	27	3806	4000	44906	
51	R	28	66648	42955	42955	0	0	0	0	I O	0	0	0	0	0	0	28	R	28	4295	4000	38615	
52	R	29	76838	68890	68890	8890	0	0	0	I O	0	0	0	5000	155	2	29	R	29	6889	10000	61957	
53	R	30	75887	71491	71491	11491	0	0	0	I O	0	0	0	5000	0	0	30	R	30	7149	10000	15000	
54	R	31	76447	83356	83356	23356	8336	2416	632	I D	0	0	0	10020	439	8	31	R	31	8336	15000	20000	
55	R	32	80402	93519	93519	33519	13519	4517	4805	I D	4167	0	0	15000	1366	29	32	R	32	9352	15000	20000	
56	R	33	79802	96121	96121	36121	16121	8766	15938	I D	6509	0	0	15000	1030	34	33	R	33	9612	15000	20000	
57	R	34	79783	96718	96718	36718	16718	0	0	I D	7047	0	0	15000	663	47	34	R	34	9672	15000	20000	
58	R	35	79719	98957	98957	38957	18957	0	0	I D	9061	0	0	15000	1211	199	35	R	35	9896	15000	20000	
59																							
60	PSE = preseas	DT = district	R = river estimate	D=directed I=incidental O=none l=1 day																			
61																							
62																							
63																							
64	PREDICT	TOTAL RUN			DISTRICT					DISTRICT	108			RIVER	PREDICT								
65	FOR	D.EST.	R.EST.	USED	TAC	US	WEEKLY	WEEKLY	SURPLUS	WEEKLY	WEEKLY	WEEKLY	WEEKLY	CAN COMM	WEEKLY	WEEKLY	FOR						
66	WEEK				TAC	TAC	TAC	EFFORT	10575	TAC	TAC	TAC	TAC	TAC	TAC	TAC	WEEK	WEEK	10% OF RUN	MIN	MAX	RIVER RUN	
67																							
68	PSE	25			61750	31750	16750	838	332	10575	151	114	10500	0	0	25	PSE	25	6175	10000	15000		
69	PSE	26	30383		61750	31750	16750	2288	300	10575	1828	115	10500	735	42	26	PSE	26	6175	10000	15000		
70	D&R	27	16254	21802	19028	0	0	0	0	0	0	0	0	0	0	0	27	D&R	27	1903	2000	19423	
71	R	28	27822	17225	17225	0	0	0	0	0	0	0	0	0	0	0	28	R	28	1722	2000	15466	
72	R	29	30543	29407	29407	0	0	0	0	0	0	0	0	500	0	0	29	R	29	2941	5000	7500	
73	R	30	31503	32210	32210	2210	0	0	0	0	0	0	0	500	0	0	30	R	30	3221	5000	7500	
74	R	31	30284	36712	36712	6712	0	0	0	0	0	0	0	3000	0	0	31	R	31	3671	7500	10000	
75	R	32	32891	37704	37704	7704	204	0	0	0	0	0	0	3000	0	0	32	R	32	3770	7500	10000	
76	R	33	32511	37615	37615	7615	115	0	0	0	0	0	0	3000	0	0	33	R	33	3761	7500	10000	
77	R	34	32834	37238	37238	7238	0	0	0	0	0	0	0	3000	0	0	34	R	34	3724	7500	10000	
78	R	35	32784	37084	37084	7084	0	0	0	0	0	0	0	3000	0	0	35	R	35	3708	7500	10000	
79																							
80	PSE = preseas	DT = district	R = river estimate																				

Table 8. Continued.

```

B69: (F0) +Z68+(AA68*AT68)
D69: (F0) +$C$8*$D$8
E69: (F0) @MAX(D69-($C$9*$D$9),0)
F69: (F0) @MAX(0,E69-N69-($C$10*$D$10))
G69: (F0) @MAX(0,(F69-AU68-AV68)*(Y69/(@IF(AN26>0,AN26,0.001))))
H69: (F0) @IF(AE69>0,G69/AE69,0)
K69: (F0) @MAX(F69-S69,0)
L69: (F0) @MAX(0,(K69-AV68)*(AH26/(@IF(AQ26>0,AQ26,0.001))))
M69: (F0) @IF(AF26>0,L69/AF26,0)
N69: (F0) @MAX(0,(@IF(E69-S69<T69,T69-$C$10*$D$10,@MIN(E69-S69,U69)-$C$10*$D$10)))
O69: (F0) @MAX(0,(N69-BA68)*(AG69/(@IF(AO26>0,AO26,0.001))))
P69: (F0) @IF(AM69>0,O69/AM69,0)
Q69: 26
R69: ' PSE 26
S69: (F0) +D69*0.1
T69: +$D$8*@VLOOKUP($E49,$T$5..$V$8,1)
U69: +$D$8*@VLOOKUP($E49,$T$5..$V$8,2)
B70: (F0) +Z69+(AA69*AT69)
C70: (F0) (V70+(@IF(K69=0,AV69,@MIN(K69,(AV69/@SUM(AH$25..AH26))))))/0.9
D70: (F0) (B70+C70)/2
E70: (F0) @MAX(D70-($C$9*$D$9),0)
F70: (F0) @MAX(0,E70-N70-($C$10*$D$10))
G70: (F0) @MAX(0,(F70-AU69-AV69)*(Y70/(@IF(AN27>0,AN27,0.001))))
H70: (F0) @IF(AE70>0,G70/AE70,0)
K70: (F0) @MAX(F70-S70,0)
L70: (F0) @MAX(0,(K70-AV69)*(AH27/(@IF(AQ27>0,AQ27,0.001))))
M70: (F0) @IF(AF27>0,L70/AF27,0)
N70: (F0) @MAX(0,(@IF(E70-S70<T70,T70-$C$10*$D$10,@MIN(E70-S70,U70)-$C$10*$D$10)))
O70: (F0) @MAX(0,(N70-BA69)*(AG70/(@IF(AO27>0,AO27,0.001))))
P70: (F0) @IF(AM70>0,O70/AM70,0)
Q70: 27
R70: ' D&R 27
S70: (F0) +D70*0.1
T70: +$D$8*@VLOOKUP($E50,$T$5..$V$8,1)
U70: +$D$8*@VLOOKUP($E50,$T$5..$V$8,2)
V70: (F0) +AH69+(AI69*AZ69)
B71: (F0) +Z70+(AA70*AT70)
C71: (F0) (V71+(@IF(K70=0,AV70,@MIN(K70,(AV70/@SUM(AH$25..AH27))))))/0.9
D71: (F0) +C71
E71: (F0) @MAX(D71-($C$9*$D$9),0)
F71: (F0) @MAX(0,E71-N71-($C$10*$D$10))
G71: (F0) @MAX(0,(F71-AU70-AV70)*(Y71/(@IF(AN28>0,AN28,0.001))))
H71: (F0) @IF(AE71>0,G71/AE71,0)
K71: (F0) @MAX(F71-S71,0)
L71: (F0) @MAX(0,(K71-AV70)*(AH28/(@IF(AQ28>0,AQ28,0.001))))
M71: (F0) @IF(AF28>0,L71/AF28,0)
N71: (F0) @MAX(0,(@IF(E71-S71<T71,T71-$C$10*$D$10,@MIN(E71-S71,U71)-$C$10*$D$10)))
O71: (F0) @MAX(0,(N71-BA70)*(AG71/(@IF(AO28>0,AO28,0.001))))
P71: (F0) @IF(AM71>0,O71/AM71,0)
Q71: 28
R71: ' R 28
S71: (F0) +D71*0.1
T71: +$D$8*@VLOOKUP($E51,$T$5..$V$8,1)
U71: +$D$8*@VLOOKUP($E51,$T$5..$V$8,2)
V71: (F0) +AH70+(AI70*AZ70)

```

The formulas in row 71 column B to V are copied to rows 72 to 78.

Table 8. Continued.

```

F50: (F0) @MAX(0,E50-N50-$C$10)
G50: (F0) @MAX(0,(F50-AU49-AV49)*(Y50/(@IF(AL27>0,AL27,0.001))))
H50: (F0) @IF(AE50>0,G50/AE50,0)
I50: [W3] @IF(E50<=$T$5,@IF(AU26<$W$5,$V$11,$T$11),@IF(E50<$T$7,@IF(AU26<$W$6,$V$11,@IF(AU26<$X$6,$U$11,$T$11)), $V$11))
J50: [W3] @IF(E50<$T$7,$T$11,@IF(E50>=$T$8,@IF(E50>AU49+$V$8,$W$11,$V$11),@IF(E50>AU49+$V$7,$W$11,$V$11)))
K50: (F0) @MAX(F50-S50,0)
L50: (F0) @MAX(0,(K50-AV49)*(AG27/(@IF(AP27>0,AP27,0.001))))
M50: (F0) @IF(AE27>0,L50/AE27,0)
N50: (F0) @MAX(0,(@IF(E50-S50<T50,T50-$C$10,@MIN(E50-S50,U50)-$C$10)))
O50: (F0) @MAX(0,(N50-BA49)*(AG50/(@IF(AM27>0,AM27,0.001))))
P50: (F0) @IF(AM50>0,O50/AM50,0)
Q50: 27
R50: ' D&R 27
S50: (F0) +D50*0.1
T50: @VLOOKUP($E50,$T$5..$V$8,1)
U50: @VLOOKUP($E50,$T$5..$V$8,2)
V50: (F0) +AH49*(AI49*AZ49)
B51: (F0) +Z50+(AA50*AT50)
C51: (F0) (V51+(@IF(K50=0,AV50,@MIN(K50,(AV50/@SUM(AG$25..AG27))))))/0.9
D51: (F0) +C51
E51: (F0) @MAX(D51-$C$9,0)
F51: (F0) @MAX(0,E51-N51-$C$10)
G51: (F0) @MAX(0,(F51-AU50-AV50)*(Y51/(@IF(AL28>0,AL28,0.001))))
H51: (F0) @IF(AE51>0,G51/AE51,0)
I51: [W3] @IF(E51<=$T$5,@IF(AU27<$W$5,$V$11,$T$11),@IF(E51<$T$7,@IF(AU27<$W$6,$V$11,@IF(AU27<$X$6,$U$11,$T$11)), $V$11))
J51: [W3] @IF(E51<$T$7,$T$11,@IF(E51>=$T$8,@IF(E51>AU50+$V$8,$W$11,$V$11),@IF(E51>AU50+$V$7,$W$11,$V$11)))
K51: (F0) @MAX(F51-S51,0)
L51: (F0) @MAX(0,(K51-AV50)*(AG28/(@IF(AP28>0,AP28,0.001))))
M51: (F0) @IF(AE28>0,L51/AE28,0)
N51: (F0) @MAX(0,(@IF(E51-S51<T51,T51-$C$10,@MIN(E51-S51,U51)-$C$10)))
O51: (F0) @MAX(0,(N51-BA50)*(AG51/(@IF(AM28>0,AM28,0.001))))
P51: (F0) @IF(AM51>0,O51/AM51,0)
Q51: 28
R51: ' R 28
S51: (F0) +D51*0.1
T51: @VLOOKUP($E51,$T$5..$V$8,1)
U51: @VLOOKUP($E51,$T$5..$V$8,2)
V51: (F0) +AH50+(AI50*AZ50)

```

The formulas in row 51 column B to V are copied to rows 52 to 58.

In cells B68 to V71 the following formulas are used (where no cell is listed the cell is empty):

```

D68: (F0) +$C$8*$D$8
E68: (F0) @MAX(D68-($C$9*$D$9),0)
F68: (F0) @MAX(0,E68-N68-($C$10*$D$10))
G68: (F0) @MAX(0,(F68-AU67-AV67)*(Y68/(@IF(AN25>0,AN25,0.001))))
H68: (F0) @IF(AE68>0,G68/AE68,0)
K68: (F0) @MAX(F68-S68,0)
L68: (F0) @MAX(0,(K68-AV67)*(AH25/(@IF(AQ25>0,AQ25,0.001))))
M68: (F0) @IF(AF25>0,L68/AF25,0)
N68: (F0) @MAX(0,(@IF(E68-S68<T68,T68-$C$10*$D$10,@MIN(E68-S68,U68)-$C$10*$D$10)))
O68: (F0) @MAX(0,(N68-BA67)*(AG68/(@IF(AO25>0,AO25,0.001))))
P68: (F0) @IF(AM68>0,O68/AM68,0)
Q68: 25
R68: ' PSE 25
S68: (F0) +D68*0.1
T68: +$D$8*@VLOOKUP($E48,$T$5..$V$8,1)
U68: +$D$8*@VLOOKUP($E48,$T$5..$V$8,2)

```

Table 8. Continued.

In row 39 columns B to U the following formulae are used:

B39: @SUM(B27..B37)
E39: @SUM(E27..E37)
I39: [W3] 'TOTAL
K39: @SUM(K27..K37)
L39: @SUM(L28..L37)
O39: @SUM(O27..O37)
P39: @SUM(P27..P37)
R39: 'TOTAL
S39: @SUM(S27..S37)
U39: @SUM(U27..U37)

In cells F22, Q22, and V22 the following formula is used:

F22: (D2) @DATEVALUE (@NOW)

Cells B27 to G37, K27 to Q37, and S27 to U37 are data input.
In cells V27 to V37 the same following formula is used:

V27: +\$D\$10

In cells B48 to V51 the following formulae are used:

D48: (F0) +\$C\$8
E48: (F0) @MAX(D48-\$C\$9, 0)
F48: (F0) @MAX(0, E48-N48-\$C\$10)
G48: (F0) @MAX(0, (F48-AU47-AV47)*(Y48/(@IF(AL25>0, AL25, 0.001))))
H48: (F0) @IF(AE48>0, G48/AE48, 0)
I48: [W3] @IF(E48<=\$T\$5, @IF(AU24<\$W\$5, \$V\$11, \$T\$11), @IF(E48<\$T\$7, @IF(AU24<\$W\$6, \$V\$11, @IF(AU24<\$X\$6, \$U\$11, \$T\$11)), \$V\$11))
J48: [W3] @IF(E48<=\$T\$7, \$T\$11, @IF(E48>=\$T\$8, @IF(E48>AU47+\$V\$8, \$W\$11, \$V\$11), @IF(E48>AU47+\$V\$7, \$W\$11, \$V\$11)))
K48: (F0) @MAX(F48-S48, 0)
L48: (F0) @MAX(0, (K48-AV47)*(AG25/(@IF(AP25>0, AP25, 0.001))))
M48: (F0) @IF(AE25>0, L48/AE25, 0)
N48: (F0) @MAX(0, (@IF(E48-S48<T48, T48-\$C\$10, @MIN(E48-S48, U48)-\$C\$10)))
O48: (F0) @MAX(0, (N48-BA47)*(AG48/(@IF(AM25>0, AM25, 0.001))))
P48: (F0) @IF(AM48>0, O48/AM48, 0)
Q48: 25
R48: ' PSE 25
S48: (F0) +D48*0.1
T48: @VLOOKUP(\$E48, \$T\$5..\$V\$8, 1)
U48: @VLOOKUP(\$E48, \$T\$5..\$V\$8, 2)
B49: (F0) +Z48+(AA48*AT48)
D49: (F0) +\$C\$8
E49: (F0) @MAX(D49-\$C\$9, 0)
F49: (F0) @MAX(0, E49-N49-\$C\$10)
G49: (F0) @MAX(0, (F49-AU48-AV48)*(Y49/(@IF(AL26>0, AL26, 0.001))))
H49: (F0) @IF(AE49>0, G49/AE49, 0)
I49: [W3] @IF(E49<=\$T\$5, @IF(AU25<\$W\$5, \$V\$11, \$T\$11), @IF(E49<\$T\$7, @IF(AU25<\$W\$6, \$V\$11, @IF(AU25<\$X\$6, \$U\$11, \$T\$11)), \$V\$11))
J49: [W3] @IF(E49<=\$T\$7, \$T\$11, @IF(E49>=\$T\$8, @IF(E49>AU48+\$V\$8, \$W\$11, \$V\$11), @IF(E49>AU48+\$V\$7, \$W\$11, \$V\$11)))
K49: (F0) @MAX(F49-S49, 0)
L49: (F0) @MAX(0, (K49-AV48)*(AG26/(@IF(AP26>0, AP26, 0.001))))
M49: (F0) @IF(AE26>0, L49/AE26, 0)
N49: (F0) @MAX(0, (@IF(E49-S49<T49, T49-\$C\$10, @MIN(E49-S49, U49)-\$C\$10)))
O49: (F0) @MAX(0, (N49-BA48)*(AG49/(@IF(AM26>0, AM26, 0.001))))
P49: (F0) @IF(AM49>0, O49/AM49, 0)
Q49: 26
R49: ' PSE 26
S49: (F0) +D49*0.1
T49: @VLOOKUP(\$E49, \$T\$5..\$V\$8, 1)
U49: @VLOOKUP(\$E49, \$T\$5..\$V\$8, 2)
B50: (F0) +Z49+(AA49*AT49)
C50: (F0) (V50+(@IF(K49=0, AV49, @MIN(K49, (AV49/@SUM(AG\$25..AG26))))))/0.9
D50: (F0) (B70+C70)
E50: (F0) @MAX(D50-\$C\$9, 0)

Table 8. Continued.

AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU
<hr/>																				
21	D108	SOCKEYE			—CPUE—		—RUN FRACTION—													
22	WEEK	CPUE	%TAHLTAN	%MAINSTEM	STIKINE	TAHLTAN	STIKINE	TAHLTAN												
23																				
24	25	13.29	0.9	0.1	11.96	1.33	0.12	0.01												
25	26	52.89	0.7	0.3	37.02	15.87	0.38	0.17												
26	27	39.80	0.6	0.3	23.88	11.94	0.24	0.13												
27	28	33.59	0.4	0.5	13.44	16.80	0.14	0.18												
28	29	33.54	0.2	0.6	6.71	20.12	0.07	0.22												
29	30	20.70	0.2	0.6	4.14	12.42	0.04	0.13												
30	31	10.68	0.06	0.8	0.64	8.54	0.01	0.09												
31	32	5.33	0	0.7	0.00	3.73	0.00	0.04												
32	33	2.00	0	0.7	0.00	1.40	0.00	0.02												
33	34	0.72	0	0.6	0.00	0.43	0.00	0.00												
34	35	0.82	0	0.4	0.00	0.33	0.00	0.00												
35	36																			
36	TOTAL	213.36			97.79	92.91	1.00	1.00												
37	CPUE	= AVG(61-78)			*STOCKS FROM (85-87)															

Cells AB25 to AD35 are input data. Formulas for cells AE25 to AH25 are as follows:

AE25: (F2) +\$AB25*AC25
 AF25: (F2) +\$AB25*AD25
 AG25: (F2) +AE25/AE37
 AH25: (F2) +AF25/AF\$37

Formulas for rows 26 to 35 for columns AE to AH are copied from AE25 to AH25.

Formulas for cells AB37 to AH37 are as follows:

AB37: (F2) @SUM(AB25..AB35)
 AE37: (F2) @SUM(AE25..AE35)
 AF37: (F2) @SUM(AF25..AF35)
 AG37: (F2) @SUM(AG25..AG35)
 AH37: (F2) @SUM(AH25..AH35)

Formulas for cells AL25 to AU 25 are as follows:

AL25: (F2) @SUM(Y48..Y\$58)
 AM25: (F2) @SUM(AG48..AG58)
 AN25: (F2) @SUM(Y68..Y\$78)
 AO25: (F2) @SUM(AG68..AG78)
 AP25: (F2) @SUM(AG25..AG35)
 AQ25: (F2) @SUM(AH25..AH35)

Formulas for rows 26 to 35 for columns AL to AQ are copied from AL25 to AQ25.

Formulas for cells AT25 to AU26 are as follows:

AT25: +K27
 AU25: (F2) @IF(AT25>0,AR48/AT25,0)
 AT26: +AU25+K28
 AU26: (F2) @IF(AT26>0,AR49/AT26,0)

Formulas for rows 27 to 35 for columns AT to AU are copied from AT26 to AU26.

CALCULATE THE FRACTION OF THE RUN LEFT BY WEEK i								STAT WEEK	—DISTRICT 106/41—	
WEEK	SOCKEYE		TAHLTAN		SOCKEYE		TAHLTAN		CUM.CATCH	%STIKINE
	DISTRICT	IN-RIVER	DISTRICT	IN-RIVER	D108	D108	D108			
25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	25	1946	0.00
26	0.96	1.00	0.95	1.00	0.88	0.99	0.99	26	4993	0.00
27	0.84	0.96	0.82	0.93	0.50	0.81	0.81	27	18086	0.14
28	0.56	0.84	0.50	0.73	0.25	0.69	0.69	28	18564	0.14
29	0.38	0.67	0.29	0.47	0.12	0.51	0.51	29	18767	0.14
30	0.16	0.51	0.11	0.23	0.05	0.29	0.29	30	31436	0.09
31	0.08	0.36	0.06	0.09	0.01	0.16	0.16	31	50682	0.07
32	0.03	0.25	0.01	0.04	0.00	0.06	0.06	32	65456	0.05
33	0.01	0.14	0.00	0.01	0.00	0.02	0.02	33	79522	0.05
34	0.00	0.07	0.00	0.00	0.00	0.01	0.01	34	84449	0.04
35	0.00	0.04	0.00	0.00	0.00	0.00	0.00	35	85486	0.04
36										

Table 8. Continue

X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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46 STAT RUN -BARTH'S COEFF.- --STANDARD DEVIATION-- CPUE STAT RUN -BARTH'S COEFF.- --STANDARD DEVIATION-- CPUE	WEEK FRACTION INTERCEPT SLOPE FR. INT. SL.	106-41	26	47 WEEK FRACTION INTERCEPT SLOPE FR. INT. SL.	106-41	26	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	8010	8011	8012	8013	8014	8015	8016	8017	8018	8019	8020	8021	8022	8023	8024	8025	8026	8027	8028	8029	8030	8031	8032	8033	8034	8035	8036	8037	8038	8039	8040	8041	8042	8043	8044	8045	8046	8047	8048	8049	8050	8051	8052	8053	8054	8055	8056	8057	8058	8059	8060	8061	8062	8063	8064	8065	8066	8067	8068	8069	8070	8071	8072	8073	8074	8075	8076	8077	8078	8079	8080	8081	8082	8083	8084	8085	8086	8087	8088	8089	8090	8091	8092	8093	8094	8095	8096	8097	8098	8099	80100	80101	80102	80103	80104	80105	80106	80107	80108	80109	80110	80111	80112	80113	80114	80115	80116	80117	80118	80119	80120	80121	80122	80123	80124	80125	80126	80127	80128	80129	80130	80131	80132	80133	80134	80135	80136	80137	80138	80139	80140	80141	80142	80143	80144	80145	80146	80147	80148	80149	80150	80151	80152	80153	80154	80155	80156	80157	80158	80159	80160	80161	80162	80163	80164	80165	80166	80167	80168	80169	80170	80171	80172	80173	80174	80175	80176	80177	80178	80179	80180	80181	80182	80183	80184	80185	80186	80187	80188	80189	80190	80191	80192	80193	80194	80195	80196	80197	80198	80199	80200	80201	80202	80203	80204	80205	80206	80207	80208	80209	80210	80211	80212	80213	80214	80215	80216	80217	80218	80219	80220	80221	80222	80223	80224	80225	80226	80227	80228	80229	80230	80231	80232	80233	80234	80235	80236	80237	80238	80239	80240	80241	80242	80243	80244	80245	80246	80247	80248	80249	80250	80251	80252	80253	80254	80255	80256	80257	80258	80259	80260	80261	80262	80263	80264	80265	80266	80267	80268	80269	80270	80271	80272	80273	80274	80275	80276	80277	80278	80279	80280	80281	80282	80283	80284	80285	80286	80287	80288	80289	80290	80291	80292	80293	80294	80295	80296	80297	80298	80299	80300	80301	80302	80303	80304	80305	80306	80307	80308	80309	80310	80311	80312	80313	80314	80315	80316	80317	80318	80319	80320	80321	80322	80323	80324	80325	80326	80327	80328	80329	80330	80331	80332	80333	80334	80335	80336	80337	80338	80339	80340	80341	80342	80343	80344	80345	80346	80347	80348	80349	80350	80351	80352	80353	80354	80355	8035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Table 8. Continue

	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH
41	PROGRAM CALCULATIONS																		
42	TOTAL STIKINE SOCKEYE SALMON																		
43	<hr/>																		
44	DISTRICT 106/41----- D106 D108																		
45	STAT	STIKINE	CUM.	CUM.	CUM.	CUM.	CUM.	CUM.	L. RIVER-----			COM.R.	FOR	ST.DEVIA-TION-----					
46	WEEK	CATCH	CATCH	CPUE	CPUE	CATCH	CATCH	CATCH	CATCH	CPUE	CPUE	CUM.	STAT	DISTRICT	RIVER	R. EST.	TAC	ESCAPE-	
47												CATCH	WEEK	TOTAL	RUN	TOTAL	TAC	MEN-T	
48	25	0	0	0.00	0.00	0	30		0	0.00	0.00	0	26	18640	0	0	63500	60000	
49	26	12	12	0.07	0.07	12	44		42	2.80	2.80	42	27	21780	11080	12311	63500	60000	
50	27	2606	2618	12.65	12.72	2661	44		757	18.82	21.62	857	28	24376	17785	19761	19761	0	
51	28	62	2680	15.54	28.25	2723	44		3950	79.83	101.44	4350	29	26411	23086	25652	25652	0	
52	29	16	2696	8.12	36.37	2747	44		5692	58.07	159.51	6492	30	27459	19086	21207	21207	8890	
53	30	63	2759	0.51	36.88	2819	1651		7385	84.65	244.16	8585	31	28774	23543	26159	11491	54342	
54	31	789	3549	4.38	41.27	3651	3093		10496	81.87	326.03	11896	32	29430	26505	29450	23356	60000	
55	32	0	3549	0.00	41.27	3711	3644		11441	55.59	381.61	12941	33	29782	31341	34823	33519	60000	
56	33	127	3675	0.74	42.01	3838	3644		11952	34.07	415.68	13452	34	29878	32777	36419	36121	60000	
57	34	25	3700	0.25	42.26	3879	3644		12289	25.92	441.60	13769	35	29835	34230	38033	36718	60000	
58	35	20	3719	0.20	42.45	3899	3644		12411	9.38	450.99	13911		29877	34685	38538	38957	60000	
59																			
60																			
61																			
62	TAHLTAN STOCK																		
63	<hr/>																		
64	STAT	STIKINE	CUM.	CUM.	CUM.	CUM.	CUM.	CUM.	D106	D108	L. RIVER-----			COM.R.	ST.DEVIA-TION-----				
65	WEEK	CATCH	CATCH	CPUE	CPUE	CATCH	CATCH	CATCH	CATCH	CPUE	CPUE	CUM.	STAT	DISTRICT	RIVER	R. EST.	TAC	ESCAPE-	
66												CATCH	WEEK	TOTAL	RUN	TOTAL	TAC	MEN-T	
67																			
68																			
69	25	0	0	0.00	0.00	0	27		0	0	0.00	0.00	0	25	10334	0	0	31750	30000
70	26	12	12	0.07	0.07	12	37		31	31	2.04	2.04	31	26	9872	7033	7814	31750	30000
71	27	1728	1740	8.39	8.46	1783	37		551	14.49	16.53	671	27	12153	10215	11350	11350	0	
72	28	43	1783	10.75	19.21	1826	37		2650	3231	66.25	82.79	3591	28	12100	13490	14989	14989	0
73	29	12	1796	6.09	25.30	1847	37		1272	4503	42.39	125.18	5223	29	11797	12271	13634	13634	0
74	30	0	1796	0.00	25.30	1847	439		880	5383	44.02	169.19	6463	30	12471	13864	15404	15404	2210
75	31	770	2566	4.28	29.58	2616	539		591	5975	15.56	184.75	7235	31	13128	13978	15532	15532	6712
76	32	0	2566	0.00	29.58	2616	539		85	6060	5.00	189.75	7410	32	13302	14066	15629	15629	7704
77	33	127	2692	0.74	30.32	2743	539		10	6070	0.68	190.43	7420	33	13410	13842	15380	15380	76353
78	34	0	2692	0.00	30.32	2743	539		3	6073	0.26	190.69	7423	34	13412	13771	15301	15301	7238
79	35	0	2692	0.00	30.32	2743	539		0	6073	0.00	190.69	7423	35	13419	13719	15243	15243	7084
80																			

Formulas for cells AQ48 to BH50 and AQ68 to BH70 are as follows:

AQ48: (F0) +K27*(M27+N27)
 AR48: (F0) +AQ48
 AS48: (F2) @IF(L27>0, AQ48/L27, 0)
 AT48: (F2) +AS48
 AU48: (F0) (E27*(F27+G27)) + (K27*(M27+N27))
 AV48: (F0) +B27*(C27+D27)
 AX48: +O27
 AY48: (F2) @IF(P27>0, O27/P27, 0)
 AZ48: (F2) +AY48
 BA48: +O27+S27
 BB48: ^26
 BC48: (F0) @SQRT(+AC48^2+(AD48^2*AT48^2))
 BD48: (F0) @SQRT(+AK48^2+(AL48^2*AZ48^2))
 BE48: (F0) @SQRT((BD48/0.9)^2)
 BG48: (F0) +E48
 BH48: (F0) +D48-(@MAX(F48, S48))-N48-\$C\$10
 AQ49: (F0) +K28*(M28+N28)
 AR49: (F0) +AR48+AQ49
 AS49: (F2) @IF(L28>0, AQ49/L28, 0)

AQ68: (F0) +K27*M27
 AR68: (F0) +AQ68
 AS68: (F2) @IF(L27>0, AQ68/L27, 0)
 AT68: (F2) +AS68
 AU68: (F0) (E27*F27) + (K27*M27)
 AV68: (F0) +B27*(C27)
 AW68: (F0) +O27*Q27
 AX68: +AW68
 AY68: (F2) @IF(P27>0, AW68/P27, 0)
 AZ68: (F2) +AY68
 BA68: (F0) +AW68+(S27*T27)
 BB68: ^25
 BC68: (F0) @SQRT(+AC68^2+(AD68^2*AT68^2))
 BD68: (F0) @SQRT(+AK68^2+(AL68^2*AZ68^2))
 BE68: (F0) @SQRT((BD68/0.9)^2)
 BG68: (F0) +E68
 BH68: (F0) +D68-(@MAX(F68, S68))-N68-(\$C\$10*\$D\$10)
 AQ69: (F0) +K28*M28
 AR69: (F0) +AR68+AQ69
 AS69: (F2) @IF(L28>0, AQ69/L28, 0)

Table 8. Continue

AT49: (F2) +AT48+AS49	AT69: (F2) +AT68+AS69
AU49: (F0) (E28*(F28+G28))+(K28*(M28+N28))+AU48	AU69: (F0) (E28*F28)+(K28*M28)+AU68
AV49: (F0) (+B28*(C28+D28))+AV48	AV69: (F0) (B28*(C28))+AV68
	AW69: (F0) +O28*Q28
AX49: +AX48+O28	AX69: (F0) +AW69+AX68
AY49: (F2) @IF(P28>0,O28/P28,0)	AY69: (F2) @IF(P28>0,AW69/P28,0)
AZ49: (F2) +AZ48+AY49	AZ69: (F2) +AZ68+AY69
BA49: +O28+S28+BA48	BA69: (F0) +AW69+(S28*T28)+BA68
BB49: ^27	BB69: ^26
BC49: (F0) @SQRT(+AC49^2+(AD49^2*AT49^2))	BC69: (F0) @SQRT(+AC69^2+(AD69^2*AT69^2))
BD49: (F0) @SQRT(+AK49^2+(AL49^2*AZ49^2))	BD69: (F0) @SQRT(+AK69^2+(AL69^2*AZ69^2))
BE49: (F0) @SQRT((BD49/0.9)^2)	BE69: (F0) @SQRT((BD69/0.9)^2)
BG49: (F0) +E49	BG69: (F0) +E69
BH49: (F0) +D49- (@MAX(F49,S49))-N49-\$C\$10	BH69: (F0) +D69- (@MAX(F69,S69))-N69- (\$C\$10*\$D\$10)
AQ50: (F0) +K29*(M29+N29)	AQ70: (F0) +K29*M29
AR50: (F0) +AR49+AQ50	AR70: (F0) +AR69+AQ70
AS50: (F2) @IF(L29>0,AQ50/L29,0)	AS70: (F2) @IF(L29>0,AQ70/L29,0)
AT50: (F2) +AT49+AS50	AT70: (F2) +AT69+AS70
AU50: (F0) (B29*(F29+G29))+(K29*(M29+N29))+AU49	AU70: (F0) (B29*F29)+(K29*M29)+AU69
AV50: (F0) (+B29*(C29+D29))+AV49	AV70: (F0) (B29*(C29))+AV69
	AW70: (F0) +O29*Q29
AX50: +AX49+O29	AX70: (F0) +AW70+AX69
AY50: (F2) @IF(P29>0,O29/P29,0)	AY70: (F2) @IF(P29>0,AW70/P29,0)
AZ50: (F2) +AZ49+AY50	AZ70: (F2) +AZ69+AY70
BA50: +O29+S29+BA49	BA70: (F0) +AW70+(S29*T29)+BA69
BB50: ^28	BB70: ^27
BC50: (F0) @SQRT(+AC50^2+(AD50^2*AT50^2))	BC70: (F0) @SQRT(+AC70^2+(AD70^2*AT70^2))
BD50: (F0) @SQRT(+AK50^2+(AL50^2*AZ50^2))	BD70: (F0) @SQRT(+AK70^2+(AL70^2*AZ70^2))
BE50: (F0) @SQRT((BD50/0.9)^2)	BE70: (F0) @SQRT((BD70/0.9)^2)
BF50: (F0) +BE50	BF70: (F0) +BE70
BG50: (F0) +E50	BG70: (F0) +E70
BH50: (F0) +D50- (@MAX(F50,S50))-N50-\$C\$10	BH70: (F0) +D70- (@MAX(F70,S70))-N70- (\$C\$10*\$D\$10)

Formulas for rows 51 to 58 for columns AQ to BH are copied from row 50.

Formulas for rows 71 to 78 for columns AQ to BH are copied from row 70.

Table 6. Continue

BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL								
79		I																																		
80																																				
81	OUTPUT TABLES	Todays date:	14-May																																	
82	Table 1.	Run Size and Total Allowable Catch and Projected Escapement																																		
83	For All Stikine Sockeye	(I = incidental catches)																																		
84																																				
85	IN-RIVER	TOTAL RUN																																		
86	WEEK	R.EST.	D.EST.	USED	TOTAL	U.S.	CANADA	MENT																												
87																																				
88	25				123500	63500	33500	30000																												
89	26	44906	49993	44641	38056	0	I	4000																												
90	27	38615	42955	66648	42955	0	I	4000																												
91	28	61941	76833	68890	76833	8890	I	10000																												
92	29	61941	75887	71491	11491	1491	1491	10000																												
93	30	64298	71491	75887	11491	3350	8334	15020																												
94	31	73369	83356	76447	83356	23356	8334	15020																												
95	32	81075	93519	80402	93519	3350	10000	20000																												
96	33	86853	96121	79783	96121	36121	10000	20000																												
97	34	83402	96718	79783	96718	36718	16718	20000																												
98	35	85417	98957	79719	98957	38957	18957	20000																												
99																																				
100																																				
101																																				
102	Table 2.	Cumulative Catches	All Stikine Sockeye																																	
103																																				
104																																				
105	WEEK	D106	D108	U.S.	L.RIVER	U.RIVER	CANADA	FOOD																												
106					COMM.	COMM.	COMM.	FISH																												
107								CANADA																												
108	25	0	30	30	0	0	0	0																												
109	26	12	44	56	42	0	42	100																												
110	27	2661	44	2705	757	100	857	400																												
111	28	2723	44	2767	3950	400	4350	1100																												
112	29	2747	44	2791	5692	800	6492	2000																												
113	30	2819	1651	4470	7385	1200	8585	2900																												
114	31	3651	3093	6743	10496	1400	11896	3500																												
115	32	3711	3644	7355	11441	1500	12941	3900																												
116	33	3638	3644	7482	11952	1500	13452	4000																												
117	34	3879	3644	7523	12289	1500	13789	4100																												
118	35	3899	3644	7543	12411	1500	13911	4100																												
119																																				
120																																				
121																																				
122	Table 3.	Fishing Regimes for U.S. on all Stikine Sockeye																																		
123																																				
124																																				
125																																				
126	SEASON	ALL DISTRICTS																																		
127	WEEK	TAC	TAC	EFFORT	106/108	TAC	TAC	EFFORT																												
128	25	33500	1340	486	I/ D	21150	2587	216																												
129	26	33500	4184	445	I/ D	21150	9110	246																												
130	27	0	0	0	I/ 0	0	0	0																												
131	28	0	0	0	I/ 0	0	0	0																												
132	29	0	0	0	I/ 0	0	0	0																												
133	30	1491	0	0	I/ 0	0	0	0																												
134	31	8336	2416	632	I/ D	0	0	0																												
135	32	13519	4517	4805	I/ D	4167	0	0																												
136	33	16121	8766	15938	I/ D	6509	0	0																												
137	34	16118	0	0	I/ D	7047	0	0																												
138	35	18957	0	0	I/ D	9061	0	0																												
139																																				
140																																				
141																																				
142	Table 4.	Fishing Regimes for Canada on all Stikine Sockeye																																		
143																																				
144	SEASONAL	SEASONAL	WEEKLY	WEEKLY																																
145	TOTAL	COMM.	COMM.	COMM.																																
146	WEEK	TAC	TAC	TAC	EFFORT																															
147																																				
148	25	30000	25																																	

Table 8. Continue

The necessary formulas in the output tables are as follows, with formulas for weeks 29 through 35 being copied from week 28 for the corresponding columns:

BL79: (F0) ' I	BK128: (F0) +F48
BP81: (D2) [W8] @DATEVALUE(@NOW)	BL128: (F0) +G48
BN88: (F0) +D48	BM128: (F0) +H48
BO88: (F0) [W8] +E48	BN128: (F0) +" "&I48&"/*&J48
BP88: (F0) [W8] @IF(F48=0,\$BLS79,F48)	BO128: (F0) [W8] +K48
BQ88: (F0) [W8] @MAX(0,(@IF(E48-S48<T48,T48,@MIN(E48-S48,U48))))	BP128: (F0) [W8] +L48
BR88: (F0) [W8] +BH48	BQ128: (F0) [W8] +M48
BM89: (F0) +B49	BK129: (F0) +F49
BN89: (F0) +D49	BL129: (F0) +G49
BO89: (F0) [W8] +E49	BM129: (F0) +H49
BP89: (F0) [W8] @IF(F49=0,\$BLS79,F49)	BN129: (F0) +" "&I49&"/*&J49
BQ89: (F0) [W8] @MAX(0,(@IF(E49-S49<T49,T49,@MIN(E49-S49,U49))))	BO129: (F0) [W8] +K49
BR89: (F0) [W8] +BH49	BP129: (F0) [W8] +L49
BK90: (F0) +V50	BQ129: (F0) [W8] +M49
BL90: (F0) +C50	BK130: (F0) +F50
BM90: (F0) +B50	BL130: (F0) +G50
BN90: (F0) +D50	BM130: (F0) +H50
BO90: (F0) [W8] +E50	BN130: (F0) +" "&I50&"/*&J50
BP90: (F0) [W8] @IF(F50=0,\$BLS79,F50)	BO130: (F0) [W8] +K50
BQ90: (F0) [W8] @MAX(0,(@IF(E50-S50<T50,T50,@MIN(E50-S50,U50))))	BP130: (F0) [W8] +L50
BR90: (F0) [W8] +BH50	BQ130: (F0) [W8] +M50
BK91: (F0) +V51	BK131: (F0) +F51
BL91: (F0) +C51	BL131: (F0) +G51
BM91: (F0) +B51	BM131: (F0) +H51
BN91: (F0) +D51	BN131: (F0) +" "&I51&"/*&J51
BO91: (F0) [W8] +E51	BO131: (F0) [W8] +K51
BP91: (F0) [W8] @IF(F51=0,\$BLS79,F51)	BP131: (F0) [W8] +L51
BQ91: (F0) [W8] @MAX(0,(@IF(E51-S51<T51,T51,@MIN(E51-S51,U51))))	BQ131: (F0) [W8] +M51
BR91: (F0) [W8] +BH51	
	BK148: (F0) +BQ88
	BL148: (F0) +N48
	BM148: (F0) +O48
	BN148: (F0) +P48
	BK149: (F0) +BQ89
	BL149: (F0) +N49
	BM149: (F0) +O49
	BN149: (F0) +P49
	BK150: (F0) +BQ90
	BL150: (F0) +N50
	BM150: (F0) +O50
	BN150: (F0) +P50
	BK151: (F0) +BQ91
	BL151: (F0) +N51
	BM151: (F0) +O51
	BN151: (F0) +P51
	BX88: (F0) +D68
	BY88: (F0) [W8] +E68
	BZ88: (F0) [W8] @IF(F68=0,\$BLS79,F68)
	CA88: (F0) [W8] @MAX(0,(@IF(E68-S68<T68,T68,@MIN(E68-S68,U68))))
	CB88: (F0) [W8] +BH68
	BW89: (F0) +B69
	BX89: (F0) +D69
	BY89: (F0) [W8] +E69
	BZ89: (F0) [W8] @IF(F69=0,\$BLS79,F69)
	CA89: (F0) [W8] @MAX(0,(@IF(E69-S69<T69,T69,@MIN(E69-S69,U69))))
	CB89: (F0) [W8] +BH69
	BU90: (F0) +V70
	BV90: (F0) +C70
	BW90: (F0) +B70
	BX90: (F0) +D70
	BY90: (F0) [W8] +E70
	BZ90: (F0) [W8] @IF(F70=0,\$BLS79,F70)
	CA90: (F0) [W8] @MAX(0,(@IF(E70-S70<T70,T70,@MIN(E70-S70,U70))))

Table 8. Continue

CB90: (FO) [W8] +BH70	BU148: (FO) +CA88
BV91: (FO) +V71	BV148: (FO) +N68
BV91: (FO) +C71	BW148: (FO) +O68
BW91: (FO) +B71	BX148: (FO) +P68
BX91: (FO) +D71	BU149: (FO) +CA89
BY91: (FO) [W8] +E71	BV149: (FO) +N69
BZ91: (FO) [W8] @IF(F71=0,\$BLS79,F71)	BW149: (FO) +O69
CA91: (FO) [W8] @MAX(0,(@IF(E71-S71<T71,T71,@MIN(E71-S71,U71))))	BX149: (FO) +P69
CB91: (FO) [W8] +BH71	BU150: (FO) +CA90
BU108: (FO) +AU68	BV150: (FO) +N70
BV108: (FO) +AV68	BW150: (FO) +O70
BW108: (FO) +BU108+BV108	BX150: (FO) +P70
BX108: (FO) +AX68	BU151: (FO) +CA91
BY108: (FO) [W8] +BZ108-BX108	BV151: (FO) +N71
BZ108: (FO) [W8] +BA68	BW151: (FO) +O71
CA108: (FO) [W8] (U27*\$D\$10)+CA107	BX151: (FO) +P71
CB108: (FO) [W8] +CA108+BZ108	CH88: (FO) +BN88-BX88
BU109: (FO) +AU69	CI88: (FO) [W8] +BO88-BY88
BV109: (FO) +AV69	CJ88: (FO) [W8] @IF(BP88-BZ88=0,\$BL\$79,BP88-BZ88)
BW109: (FO) +BU109+BV109	CK88: (FO) [W8] +BQ88-CA88
BX109: (FO) +AX69	CL88: (FO) [W8] +BR88-CB88
BY109: (FO) [W8] +BZ109-BX109	CG89: (FO) +BM89-BW89
BZ109: (FO) [W8] +BA69	CH89: (FO) +BN89-BX89
CA109: (FO) [W8] (U28*\$D\$10)+CA108	CI89: (FO) [W8] +BO89-BY89
CB109: (FO) [W8] +CA109+BZ109	CJ89: (FO) [W8] @IF(BP89-BZ89=0,\$BL\$79,BP89-BZ89)
BU110: (FO) +AU70	CK89: (FO) [W8] +BQ89-CA89
BV110: (FO) +AV70	CL89: (FO) [W8] +BR89-CB89
BW110: (FO) +BU110+BV110	CE90: (FO) +BK90-BU90
BX110: (FO) +AX70	CF90: (FO) +BL90-BV90
BY110: (FO) [W8] +BZ110-BX110	CG90: (FO) +BM90-BW90
BZ110: (FO) [W8] +BA70	CH90: (FO) +BN90-BX90
CA110: (FO) [W8] (U29*\$D\$10)+CA109	CI90: (FO) [W8] +BO90-BY90
CB110: (FO) [W8] +CA110+BZ110	CJ90: (FO) [W8] @IF(BP90-BZ90=0,\$BL\$79,BP90-BZ90)
BU111: (FO) +AU71	CK90: (FO) [W8] +BQ90-CA90
BV111: (FO) +AV71	CL90: (FO) [W8] +BR90-CB90
BW111: (FO) +BU111+BV111	CE91: (FO) +BK91-BU91
BX111: (FO) +AX71	CF91: (FO) +BL91-BV91
BY111: (FO) [W8] +BZ111-BX111	CG91: (FO) +BM91-BW91
BZ111: (FO) [W8] +BA71	CH91: (FO) +BN91-BX91
CA111: (FO) [W8] (U30*\$D\$10)+CA110	CI91: (FO) [W8] +BO91-BY91
CB111: (FO) [W8] +CA111+BZ111	CJ91: (FO) [W8] @IF(BP91-BZ91=0,\$BL\$79,BP91-BZ91)
BU128: (FO) +F68	CK91: (FO) [W8] +BQ91-CA91
BV128: (FO) +G68	CL91: (FO) [W8] +BR91-CB91
BW128: (FO) +H68	CE108: (FO) +BK108-BU108
BY128: (FO) [W8] +K68	CF108: (FO) +BL108-BV108
BZ128: (FO) [W8] +L68	CG108: (FO) +BM108-BW108
CA128: (FO) [W8] +M68	CH108: (FO) +BN108-BX108
BU129: (FO) +F69	CI108: (FO) [W8] +BO108-BY108
BV129: (FO) +G69	CJ108: (FO) [W8] +BP108-BZ108
BW129: (FO) +H69	CK108: (FO) [W8] +BQ108-CA108
BY129: (FO) [W8] +K69	CL108: (FO) [W8] +BR108-CB108
BZ129: (FO) [W8] +L69	CE109: (FO) +BK109-BU109
CA129: (FO) [W8] +M69	CF109: (FO) +BL109-BV109
BU130: (FO) +F70	CG109: (FO) +BM109-BW109
BV130: (FO) +G70	CH109: (FO) +BN109-BX109
BW130: (FO) +H70	CI109: (FO) [W8] +BO109-BY109
BY130: (FO) [W8] +K70	CJ109: (FO) [W8] +BP109-BZ109
BZ130: (FO) [W8] +L70	CK109: (FO) [W8] +BQ109-CA109
CA130: (FO) [W8] +M70	CL109: (FO) [W8] +BR109-CB109
BU131: (FO) +F71	CE110: (FO) +BK110-BU110
BV131: (FO) +G71	CF110: (FO) +BL110-BV110
BW131: (FO) +H71	CG110: (FO) +BM110-BW110
BY131: (FO) [W8] +K71	CH110: (FO) +BN110-BX110
BZ131: (FO) [W8] +L71	CI110: (FO) [W8] +BO110-BY110
CA131: (FO) [W8] +M71	CJ110: (FO) [W8] +BP110-BZ110

Table 8. Continue

```
CK110: (FO) [W8] +BQ110-CA110
CL110: (FO) [W8] +BR110-CB110
CE111: (FO) +BK111-BU111
CF111: (FO) +BL111-BV111
CG111: (FO) +BM111-BW111
CH111: (FO) +BN111-BX111
CI111: (FO) [W8] +BO111-BY111
CJ111: (FO) [W8] +BP111-BZ111
CK111: (FO) [W8] +BQ111-CA111
CL111: (FO) [W8] +BR111-CB111

CE128: (FO) +BK128-BU128
CF128: (FO) @MAX(0,CE128-CG107)
CH128: (FO) +BK148-BU148
CI128: (FO) [W8] @MAX(0,CH128-CL107)
CE129: (FO) +BK129-BU129
CF129: (FO) @MAX(0,CE129-CG108)
CH129: (FO) +BK149-BU149
CI129: (FO) [W8] @MAX(0,CH129-CL108)
CE130: (FO) +BK130-BU130
CF130: (FO) @MAX(0,CE130-CG109)
CH130: (FO) +BK150-BU150
CI130: (FO) [W8] @MAX(0,CH130-CL109)
CE131: (FO) +BK131-BU131
CF131: (FO) @MAX(0,CE131-CG110)
CH131: (FO) +BK151-BU151
CI131: (FO) [W8] @MAX(0,CH131-CL110)
```

Table 9. Average CPUE of all sockeye salmon
and average proportions of Stikine
River Tahltan and Non-Tahltan stocks
in the catch from the District 108
fishery.

WEEK	CPUE	TAHLTAN	NON-TAHLTAN
25	13.29	0.9	0.1
26	52.89	0.7	0.3
27	39.80	0.6	0.3
28	33.59	0.4	0.5
29	33.54	0.2	0.6
30	20.70	0.2	0.6
31	10.68	0.06	0.8
32	5.33	0	0.7
33	2.00	0	0.7
34	0.72	0	0.6
35	0.82	0	0.4
TOTAL	213.36		

CPUE = Average of 1961-1978.
Stock proportions from 1985-1987 data.

Table 10. Header for the Lotus worksheet Allocation Model. Highlighted values in Lotus are shown as bold type in this table.

MMST.WK1	MANAGEMENT MODEL	STIKINE RIVER 1988	
WORKSHEET CREATED BY NORMA JEAN SANDS (907) 465-4250			
Last Update May 5, 1988			
MODEL FOR PREDICTING TOTAL ALLOWABLE CATCH OF STIKINE RIVER SOCKEYE SALMON IN US DISTRICT FISHERIES AND CANADIAN IN-RIVER FISHERIES			
PRESEASON FORECAST	123,500	0.5 TAHLTAN	Input values highlighted
ESCAPEMENT GOAL	60,000	0.5 TAHLTAN	-----
FOOD FISHERY	5,000	0.9 TAHLTAN	-----
RUN SIZE USED:			MENU use <Alt> + key
Week 25 & 26:	preseason forecast above	i	input data
Week 27:	mean (district+river Tahltan est.)	w	print input
Week 28 to end:	river est. + district catch	o	goto output
To change,	must change column D	p	print output
GOTO A21 FOR INPUT FIELD (PgDn)		r	return to menu
GOTO BJ81 FOR OUTPUT TABLES		s	save and quit

Table 11. Input fields to the Lotus worksheet Allocation Model.

INPUT: Catches and stock composition					
Todays date: 08-May					
STAT WEEK	DISTRICT 108		DISTRICT 106/30		
	CATCH p TAHLTAN	p M.STEM	CATCH p TAHLTAN	p M.STEM	
25	30	0.9	0.1	644	0
26	14	0.7	0.3	642	0
27	0	0.6	0.3	4295	0.01
28	0	0.4	0.5	0	0.01
29	0	0.2	0.6	7899	0.001
30	2009	0.2	0.6	8515	0
31	1676	0.06	0.8	14339	0
32	788	0	0.7	10045	0
33	451	0	0	5796	0
34	165	0	0	5588	0
35	33	0	0	2119	0
TOTAL	5166			59682	

INPUT: if no commercial catch use test fisheries effort is in boat-days						
Todays date: 08-May						
STAT WEEK	DISTRICT 106/41		LOWER RIVER			
	CATCH	EFFORT p TAHLTAN	p M.STEM	CATCH	EFFORT p TAHLTAN	
25	1946	138	0	0	0	25
26	3047	178	0.004	0	42	26
27	13093	206	0.132	0.067	715	38
28	478	4	0.09	0.04	3193	40
29	203	2	0.06	0.02	1742	30
30	12669	124	0	0.005	1693	20
31	19246	180	0.04	0.001	3111	38
32	14774	178	0	0	945	17
33	14066	170	0.009	0	511	15
34	4927	100	0	0.005	337	13
35	1037	100	0	0.019	122	13
TOTAL	85486	1242		12411	239	
				TOTAL	1500	
					4100	
					TOTAL	

Table 12. Output tables from the Lotus worksheet Allocation Model.

OUTPUT TABLES Table 1. Run Size and Total Allowable Catch and Projected Escapement For All Stikine Sockeye (I = incidental catches)									
WEEK	IN-RIVER RUN	TOTAL RUN	TAC	U.S.	CANADA	ESCAPE-MENT	USED	TOTAL	
R.EST.	D.EST.								
25		63577	123500	63500	33500	30000	60000		
26	44906	49903	44641	38056	0	I	4000	29250	
26	38615	42855	42855	48535	0	I	4000	33200	
29	61957	66890	76638	6850	8890	I	10000	522001	
30	64298	71491	75887	71491	11491	1491	10000	54342	
31	73359	83356	76447	83356	23256	8336	15020	60000	
32	81075	93519	80402	93519	32519	13519	20000	60000	
33	82865	96121	79802	96121	36121	16121	20000	60000	
34	83402	96718	79783	96718	36718	16718	20000	60000	
35	85417	98957	79719	98957	38957	18957	20000	60000	

Table 2. Cumulative Catches All Stikine Sockeye

WEEK	D106	D108	L.RIVER	U.RIVER	CANADA	FOOD	ALL
			U.S.	COMM.	COMM.	FISH	CANADA
25	0	30	30	0	0	0	0
26	12	44	56	42	100	142	
27	2661	44	2705	757	100	857	400
28	2723	44	2767	3950	400	400	1100
29	2747	44	2791	5592	800	6492	2000
30	2619	1651	410	725	1200	8505	2900
31	2651	3093	7473	12096	1400	11896	3000
32	3711	3644	7255	11441	1500	12941	3900
33	3638	3644	7482	11952	1500	13452	4000
34	3879	3644	7523	12289	1500	13789	4100
35	3899	3644	7543	12411	1500	13911	4100

Table 3. Fishing Regimes for U.S. on all Stikine Sockeye

WEEK	ALL DISTRICTS			SEASON —DISTRICT 108—			
	SEASON	WEEKLY	FISHING	SURPLUS	SEASON	WEEKLY	DISTRICT 108—
	TAC	TAC	EFFORT	106/108	TAC	TAC	EFFORT
25	33500	1340	486	I / D	21150	2587	216
26	33500	4184	445	I / D	21150	9110	246
27	0	0	0	I / 0	0	0	0
28	0	0	0	I / 0	0	0	0
29	0	0	0	I / 0	0	0	0
30	1491	0	0	I / 0	0	0	0
31	8236	2416	632	I / D	0	0	0
32	13619	4517	4805	I / D	4167	0	0
33	16121	8766	15938	I / D	6509	0	0
34	16718	0	0	I / D	7047	0	0
35	18957	0	0	I / D	9061	0	0

Table 4. Fishing Regimes for Canada on all Stikine Sockeye

WEEK	SEASONAL		SEASONAL		WEEKLY		WEEKLY	
	TOTAL	COMM.	TOTAL	COMM.	TAC	COMM.	TAC	EFFORT
25	30000	25000	0	0				
26	30000	25000	1000	50				
27	40000	0	0	0				
28	40000	0	0	0				
29	10000	5000	155	2				
30	10000	5000	0	0				
31	15020	10020	439	8				
32	20000	15000	1366	29				
33	20000	15000	1030	34				
34	20000	15000	663	47				
35	20000	15000	1211	199				

OUTPUT TABLES
Table 5. Run Size and Total Allowable Catch and Projected Escapement
For Tahltan Sockeye
(I = incidental catches)

WEEK	IN-RIVER RUN	TOTAL RUN	TAC	U.S.	CANADA	ESCAPE-MENT	USED	TOTAL	
R.EST.	D.EST.								
25	0	61750	31750	16750	15000	30000			
26	19423	21802	16254	19026	0	I	2000	12625	
27	15466	17225	27062	17225	0	I	2200	11467	
28	26430	29407	20543	29407	0	I	5000	23459	
29	28953	32210	31503	32210	I	5000	23989	30534	
30	32210	37704	30284	37704	I	7500	26433	31315	
31	33394	37704	32891	37704	204	7500	26431	12500	
32	33314	37615	32511	37615	115	7500	26363	12500	
33	32975	37238	32834	37238	I	7500	26015	12500	
34	32836	37084	32784	37084	7084	I	7500	25875	

OUTPUT TABLES
Table 9. Run Size and Total Allowable Catch and Projected Escapement
For Mainstem Sockeye
(I = incidental catches)

WEEK	IN-RIVER RUN	TOTAL RUN	TAC	U.S.	CANADA	ESCAPE-MENT	USED	TOTAL	
R.EST.	D.EST.								
25	0	61750	31750	16750	15000	30000			
26	25483	28191	28387	19026	0	I	2000	16225	
27	23150	25730	3026	25730	0	I	2000	22157	
28	35527	39403	46295	39403	8890	I	5000	30534	
29	35346	39281	44383	39281	1491	5000	30353		
30	40767	46644	46164	46644	16644	8336	7520	34459	
31	47680	55815	47511	55815	12315	12500	33567		
32	50427	59480	46949	59480	29480	16718	12500	33985	
33	52581	61873	46935	61873	31873	18957	12500	34125	

Table 6. Cumulative Catches Tahltan Sockeye

WEEK	D106	D108	L.RIVER	U.RIVER	CANADA	FOOD	ALL
			U.S.	COMM.	COMM.	FISH	CANADA
25	0	27	27	0	0	0	0
26	12	37	49	31	0	31	121
27	1783	37	1820	581	90	671	360
28	1826	37	1863	326	2591	980	4581
29	1847	37	1883	453	720	1800	7023
30	1877	429	2205	5383	1080	6463	2410
31	2161	539	3156	5175	1260	7235	3150
32	2161	539	3156	6060	1250	7410	10920
33	2743	539	3282	6070	1250	7420	3600
34	2743	539	3282	6073	1350	7423	3690
35	2743	539	3282	6073	1350	7423	3690

Table 7. Fishing Regimes for U.S. on Tahltan Stock

WEEK	SEASON	WEEKLY	TAC	EFFORT
25	16750	838	332	
26	16750	2288	300	
27	0	0	0	
28	0	0	0	
29	0	0	0	
30	0	0	0	
31	0	0	0	
32	204	0	0	
33	115	0	0	
34	0	0	0	
35	0	0	0	

Table 8. Fishing Regimes for Canada on Tahltan Stock

WEEK	SEASON	WEEKLY	TAC	COMM.	EFFORT
25	15000	10500	0	0	
26	15000	10500	735	42	
27	2000	0	0	0	
28	2000	0	0	0	
29	5000	500	0	0	
30	5000	500	0	0	
31	7500	3000	0	0	
32	7500	3000	0	0	
33	7500	3000	0	0	
34	7500	3000	0	0	
35	7500	3000	0	0	

Table 11. Fishing TAC'S on Mainstem Stocks

WEEK	—U.S.—		—CANADA	

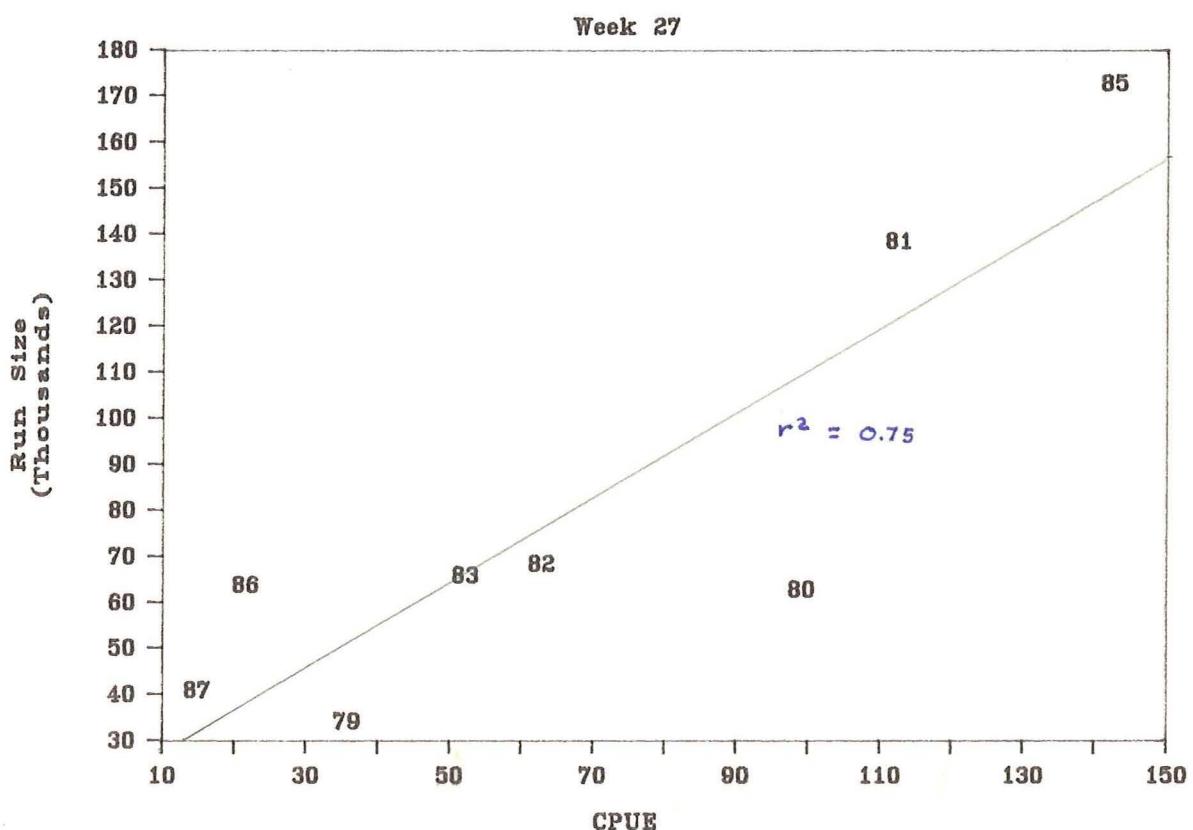
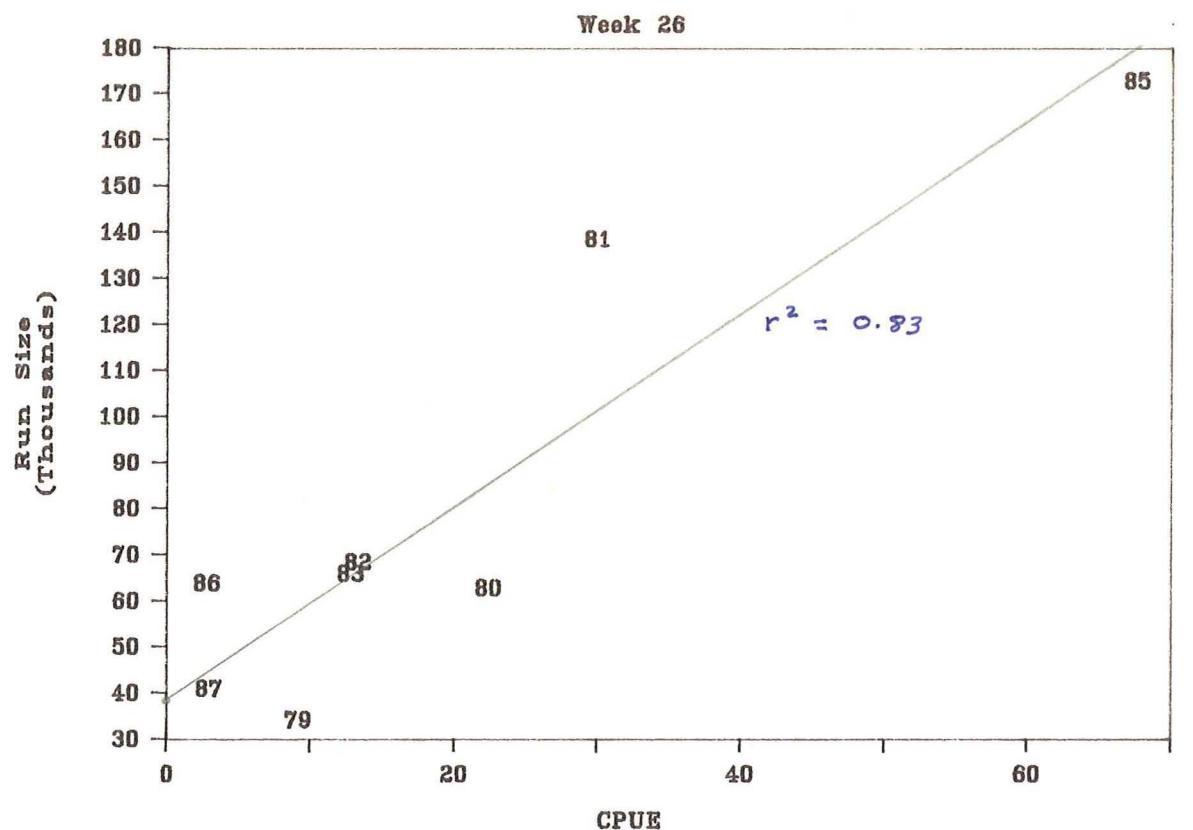


Figure 1. Inriver run size of Stikine sockeye salmon regressed against cumulative CPUE from the Canadian lower river commercial fishery for weeks 26 through 31.

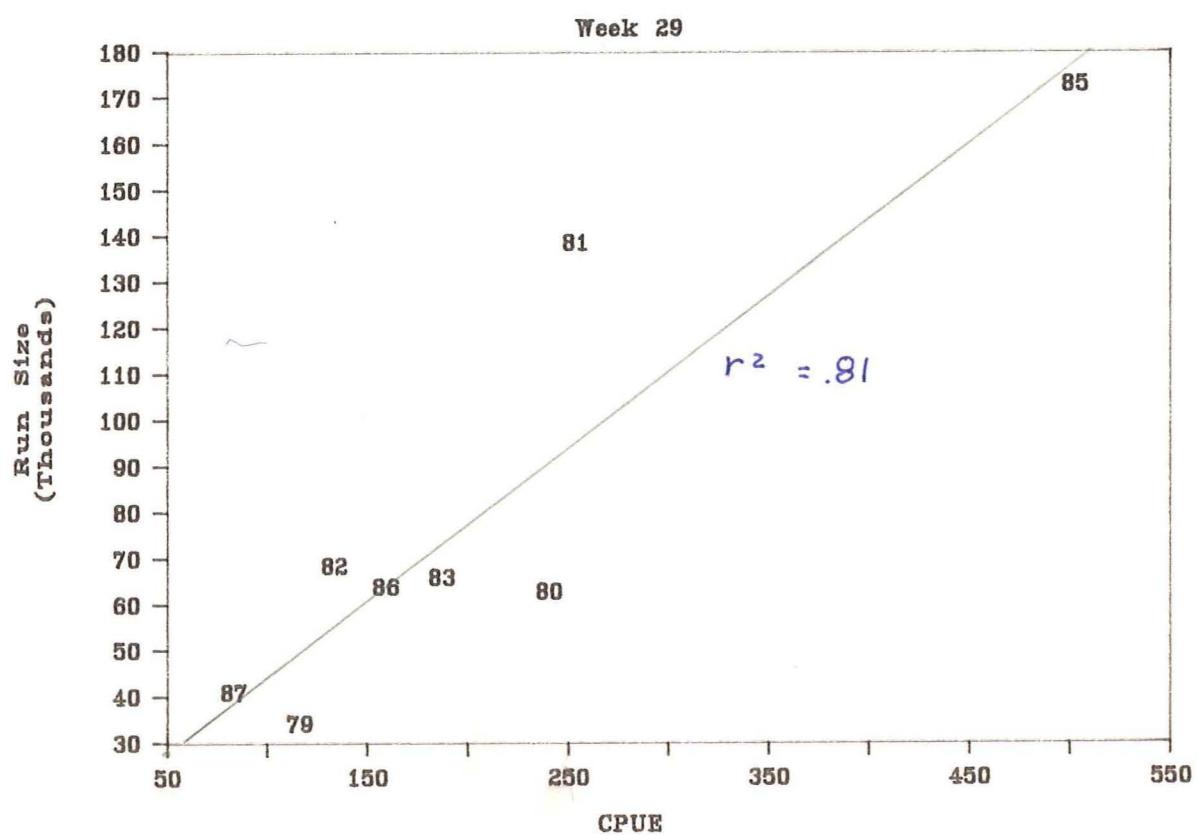
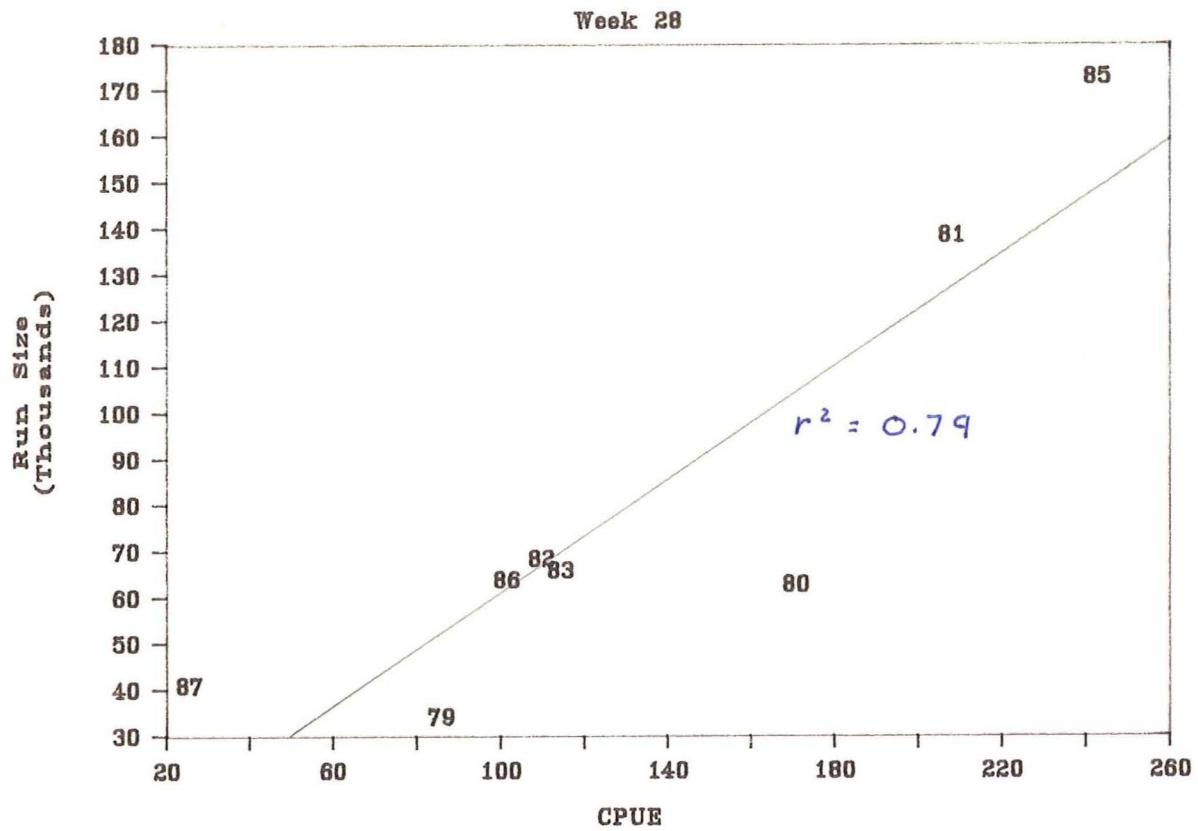


Figure 1. (page 2 of 3)

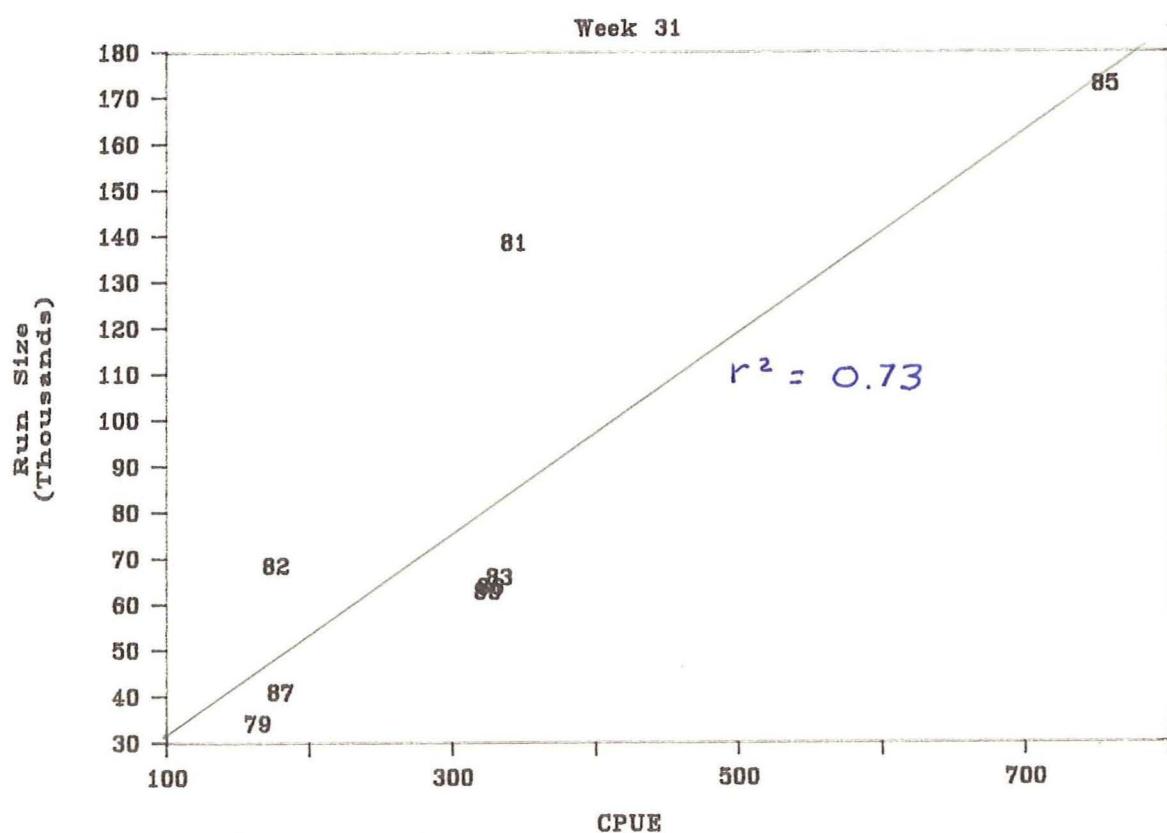
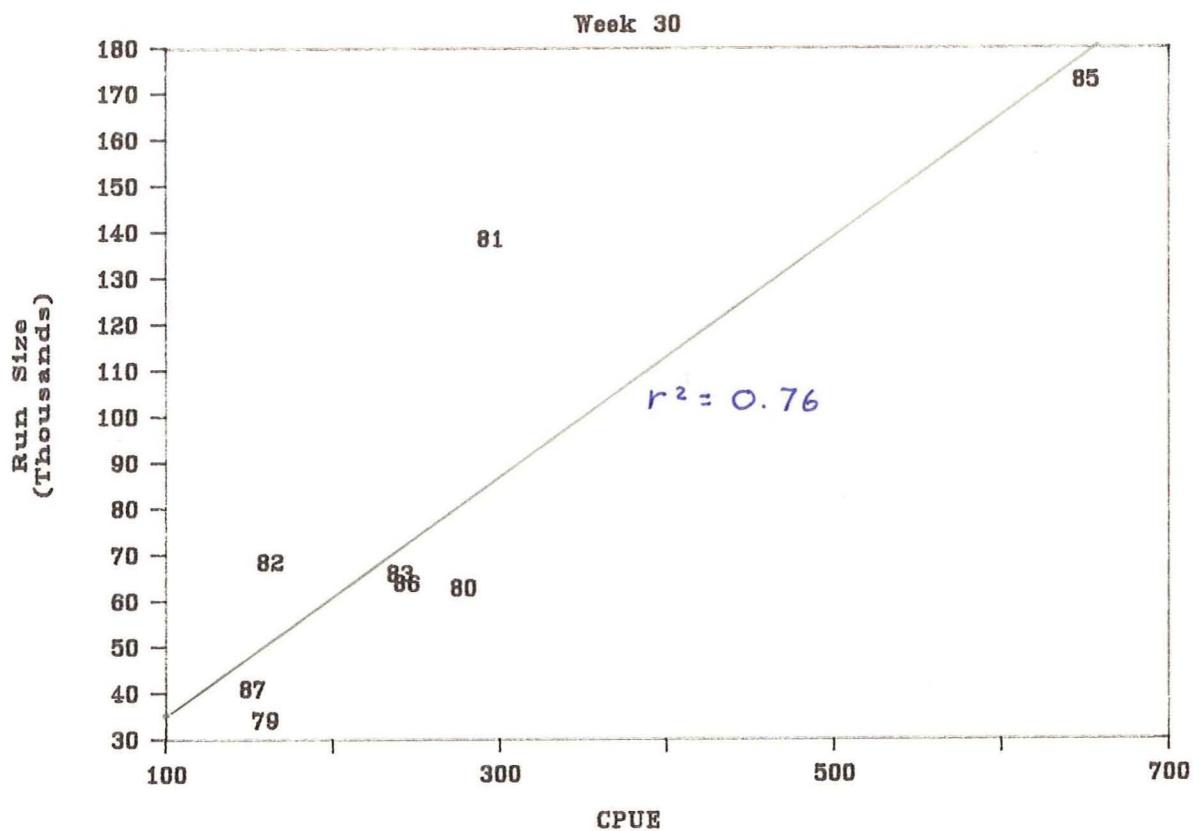


Figure 1. (page 3 of 3)

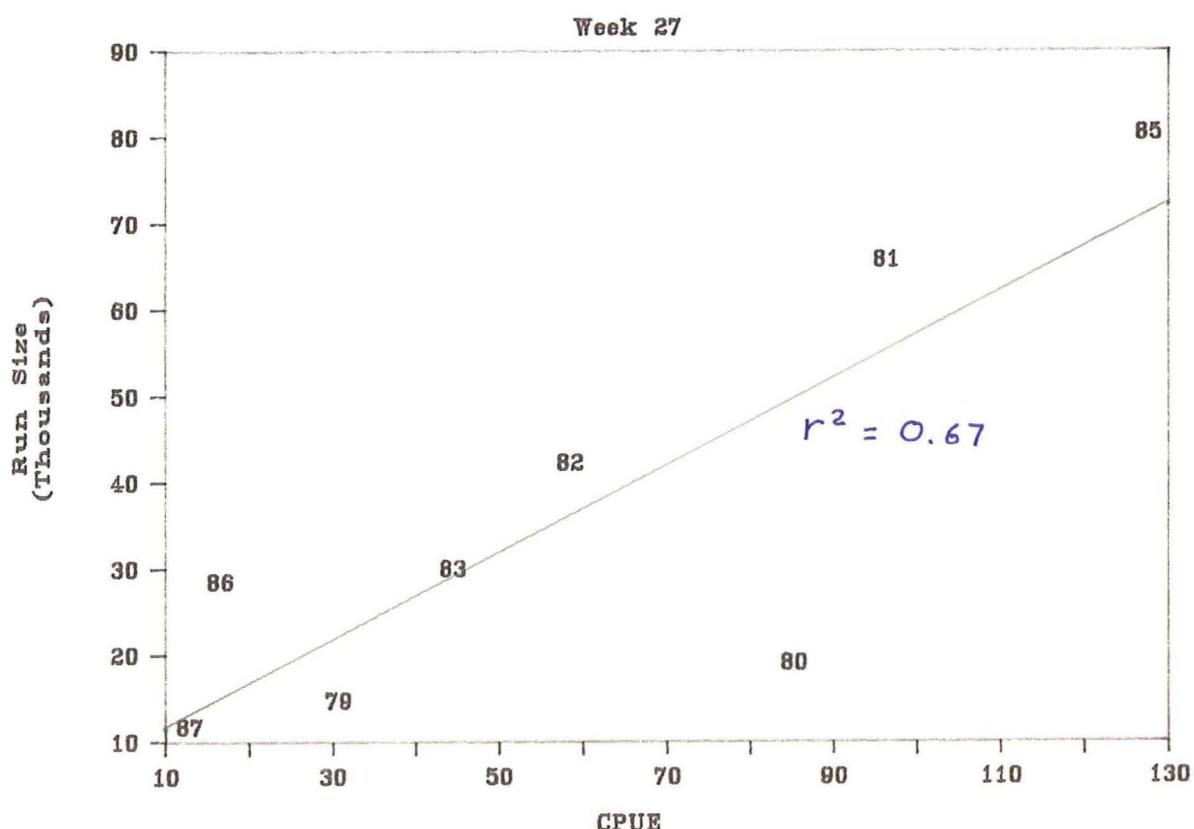
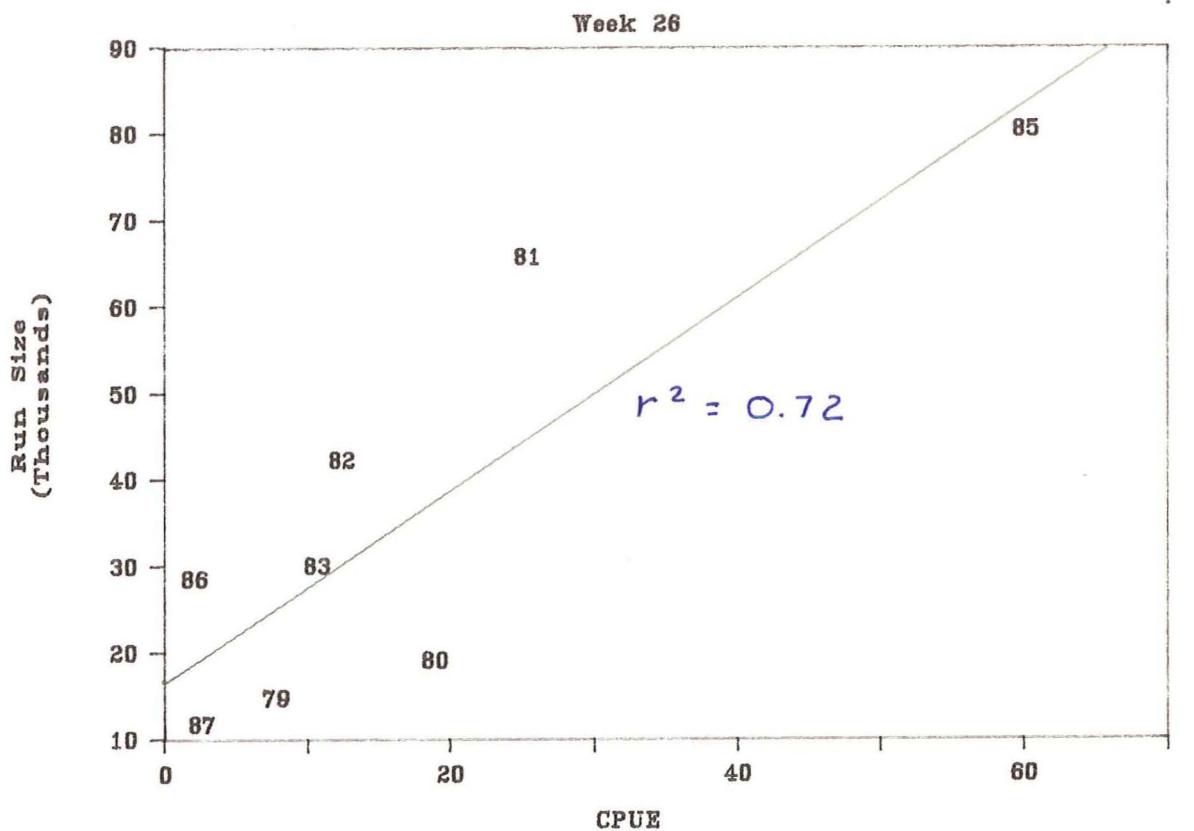


Figure 2. Inriver run size of Tahltan sockeye salmon regressed against cumulative CPUE from the Canadian lower river commercial fishery for weeks 26 through 31.

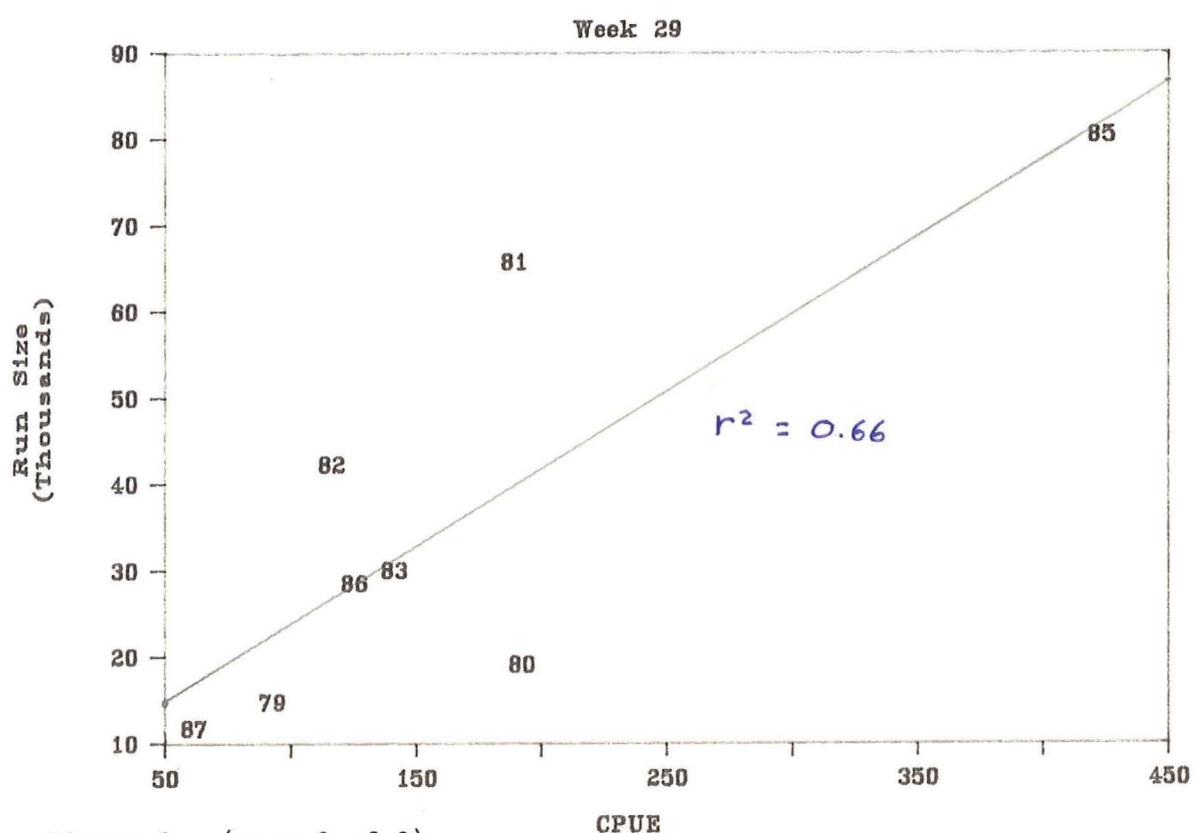
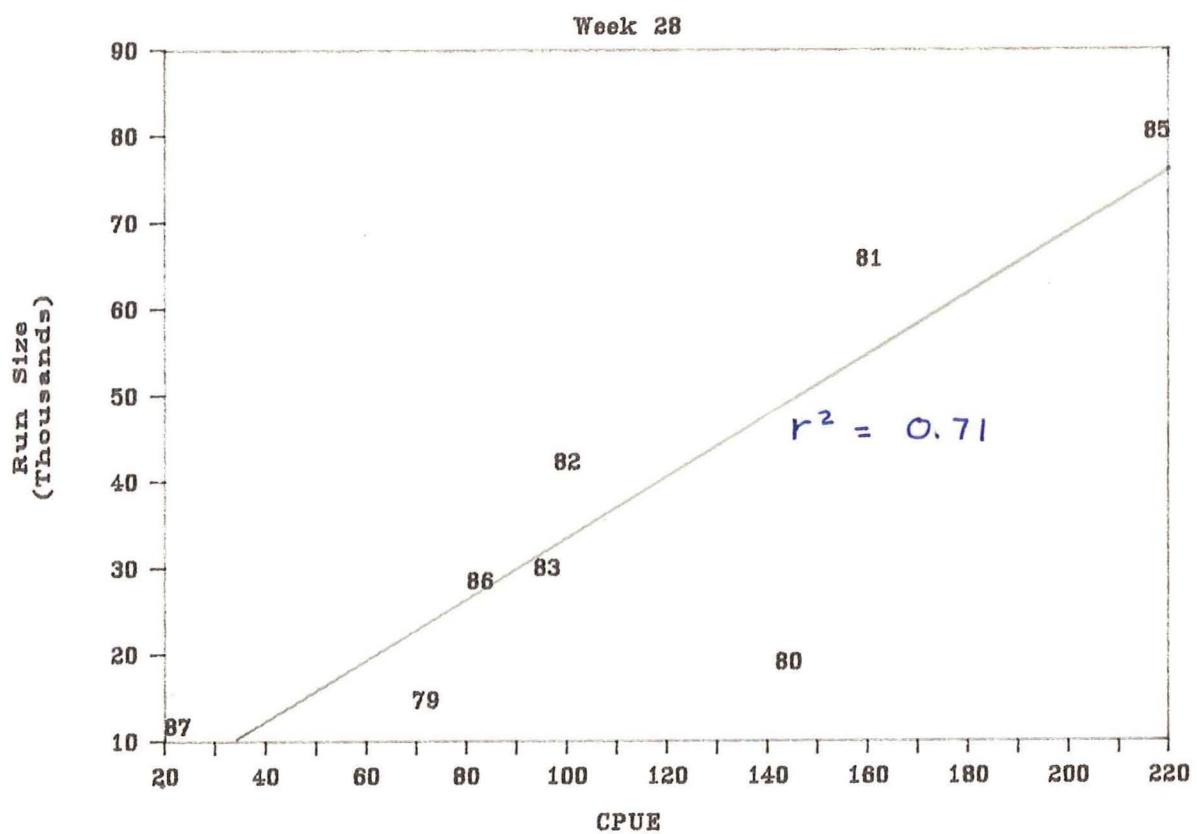


Figure 2. (page 2 of 2)

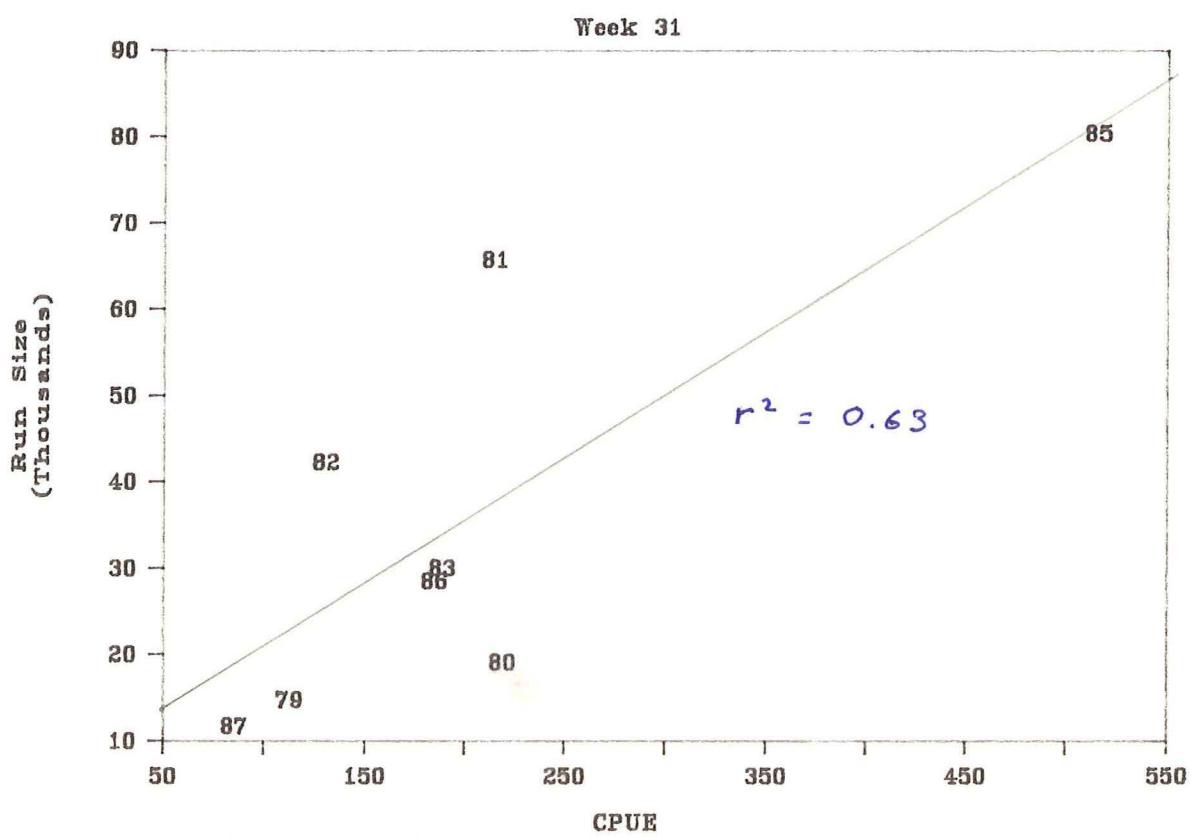
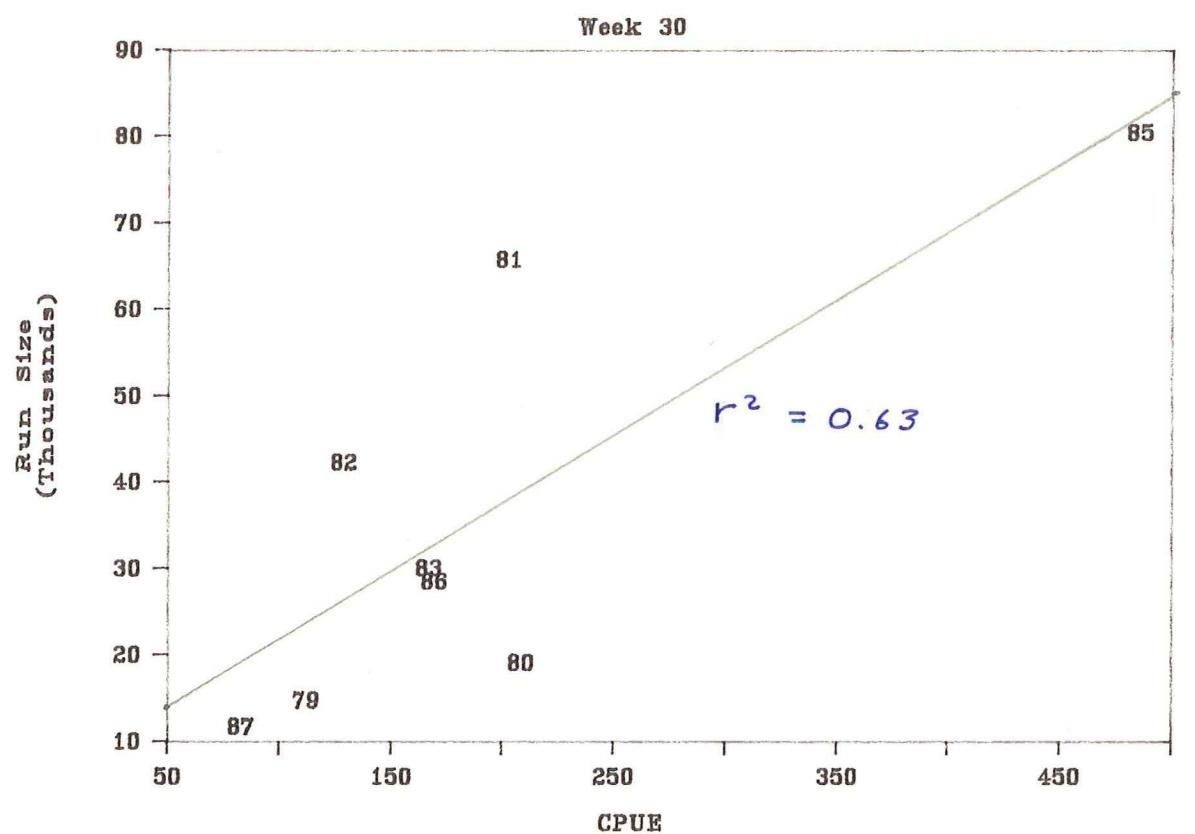


Figure 2. (page 3 of 3)

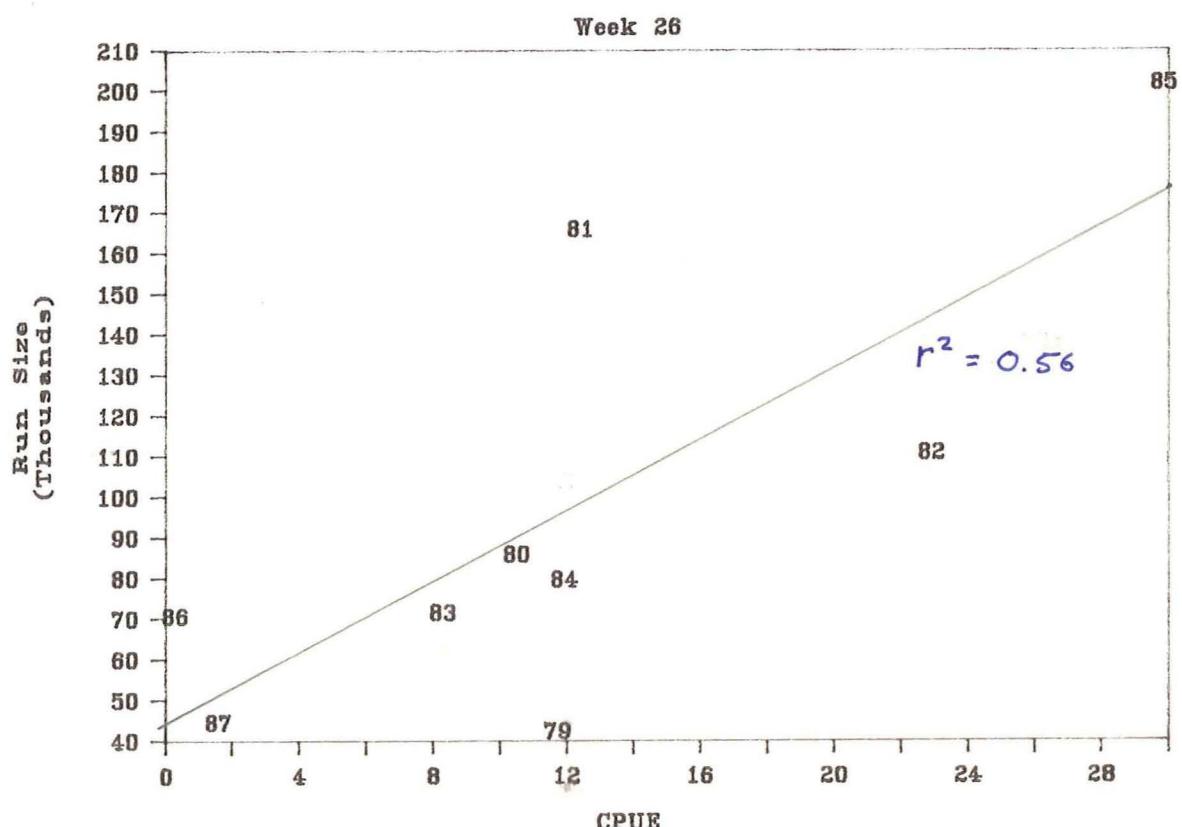
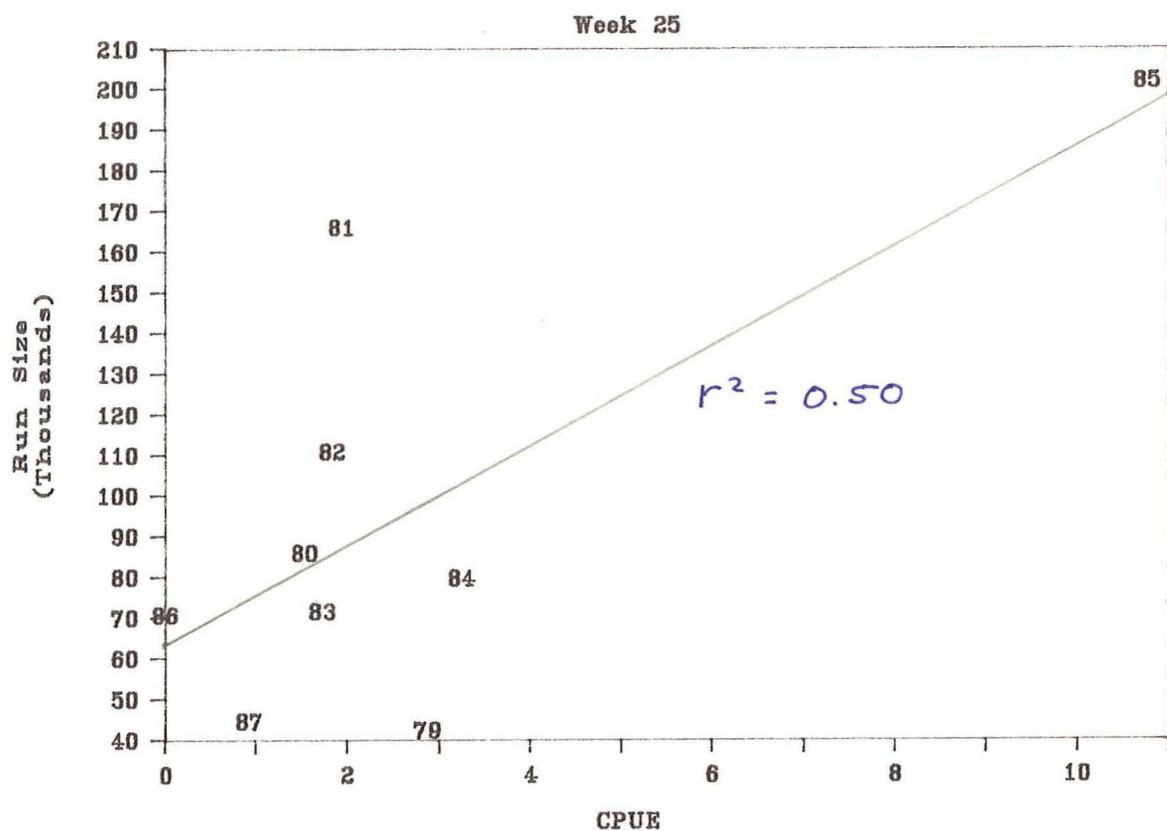


Figure 3. Total run size of Stikine sockeye salmon regressed against cumulative CPUE from the U.S. District 106-41/42 commercial fishery for weeks 25 through 30.

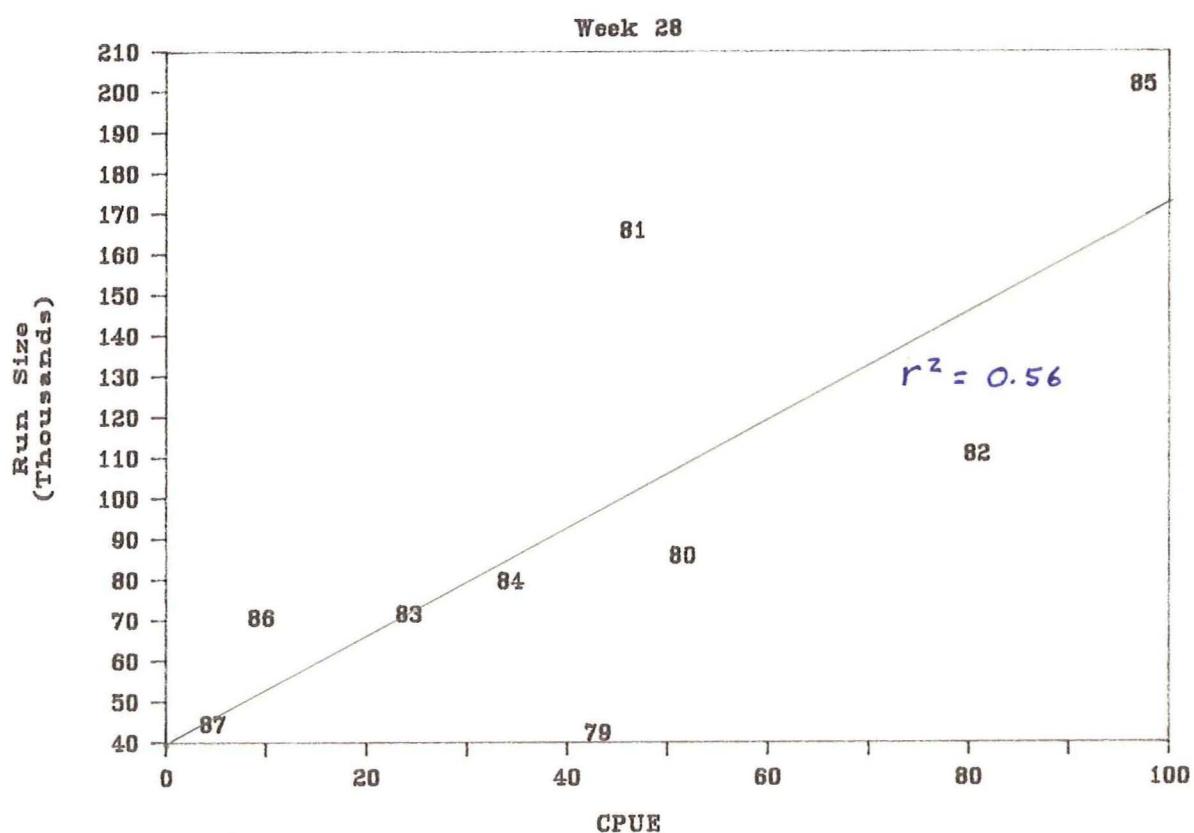
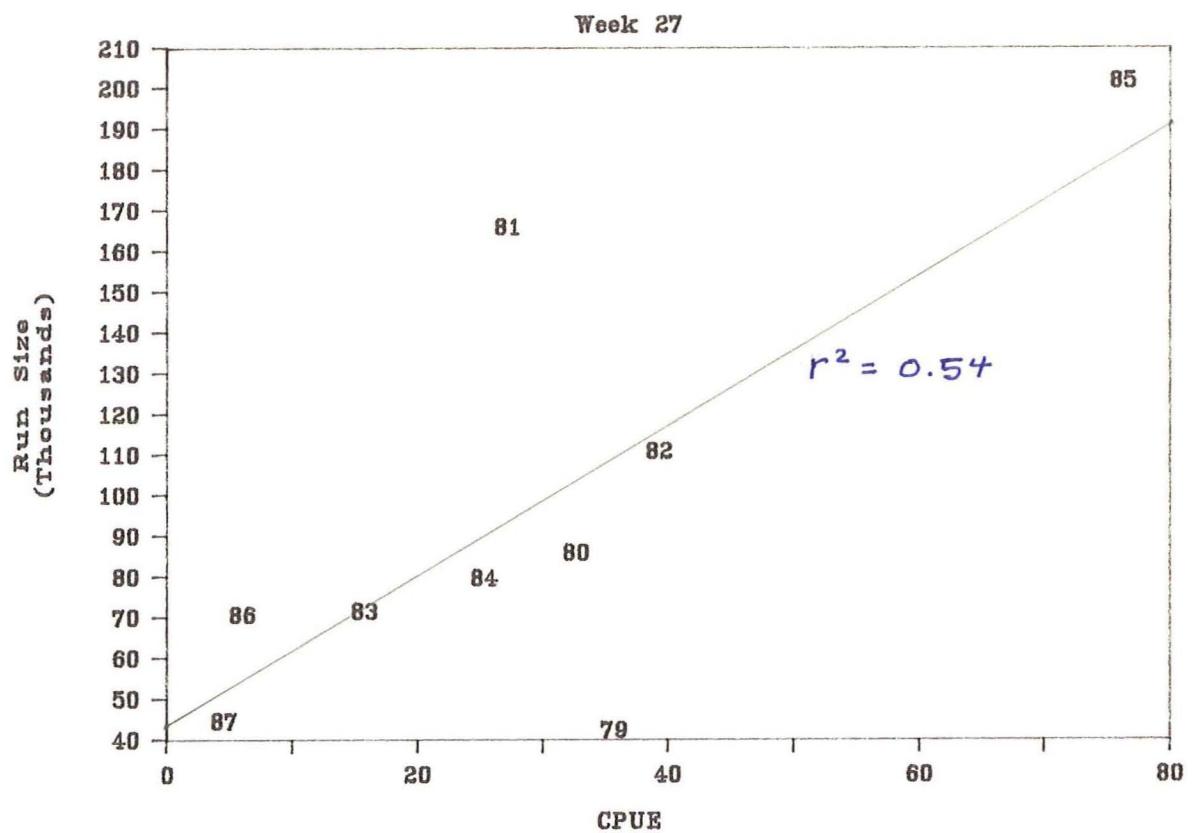


Figure 3. (page 2 of 3)

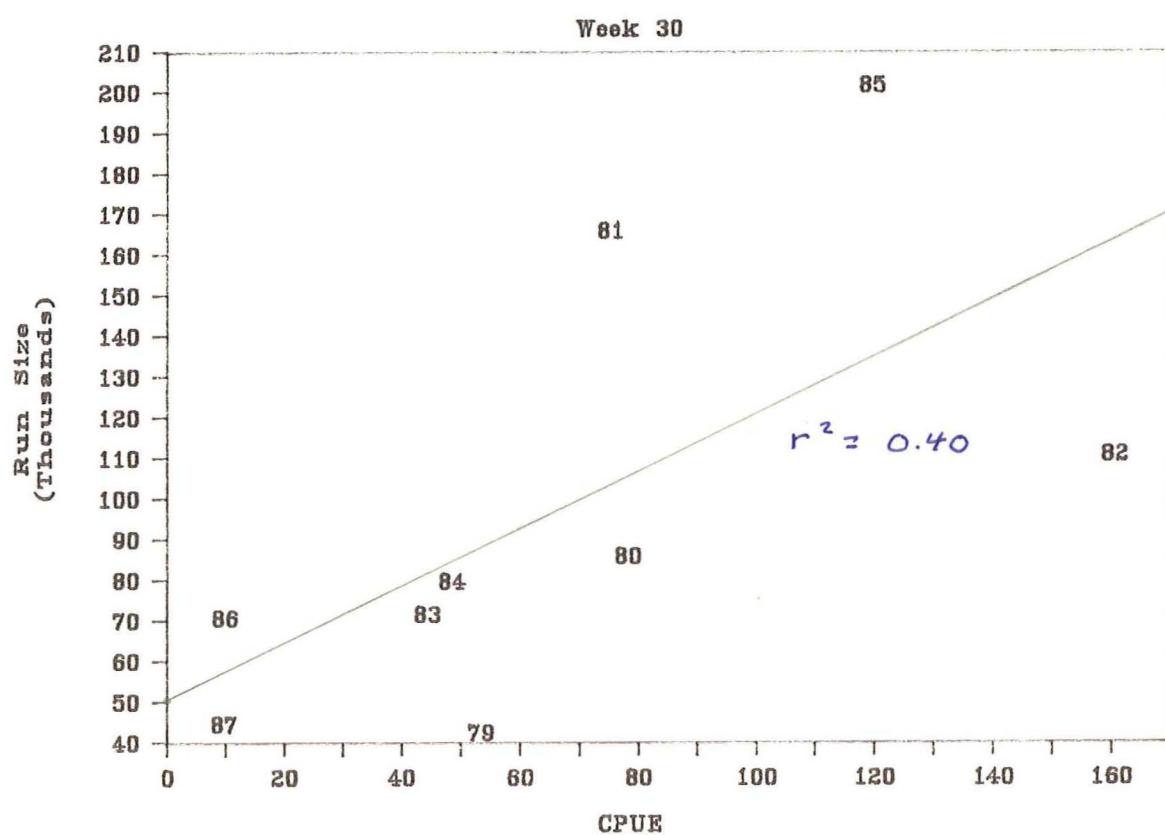
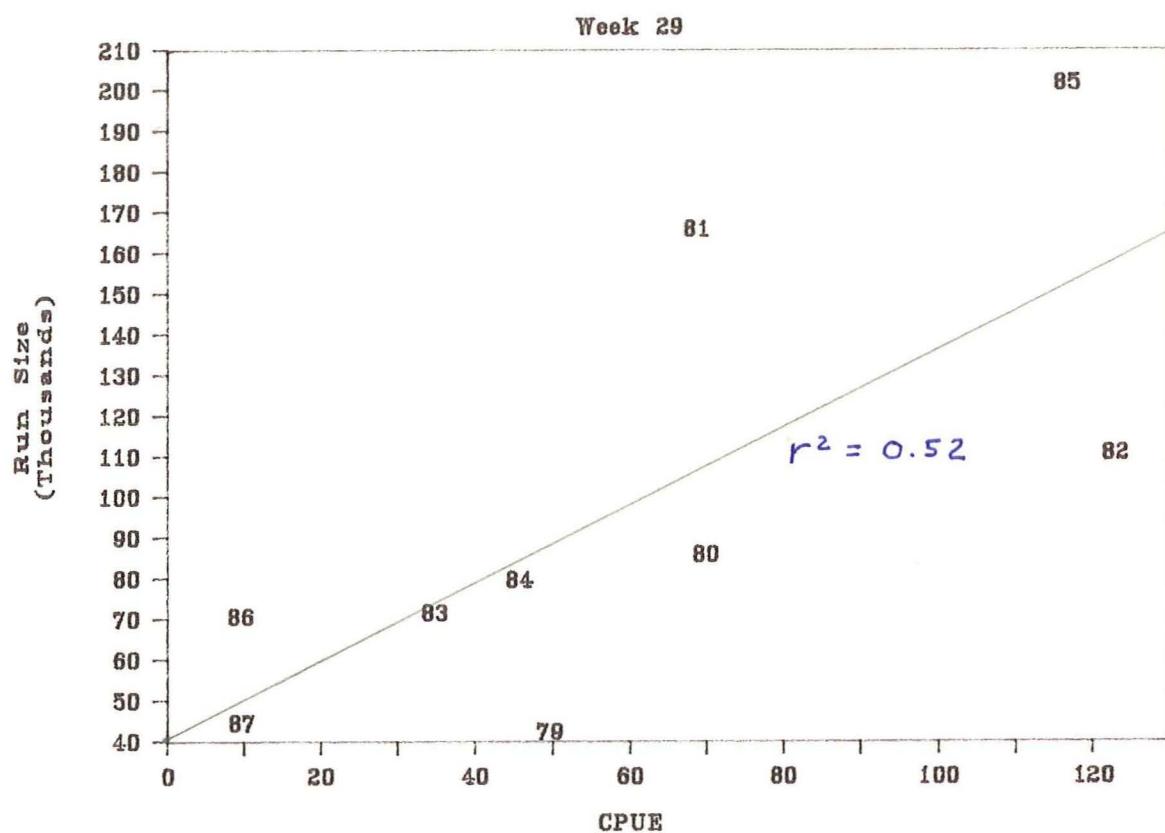


Figure 3. (page 3 of 3)

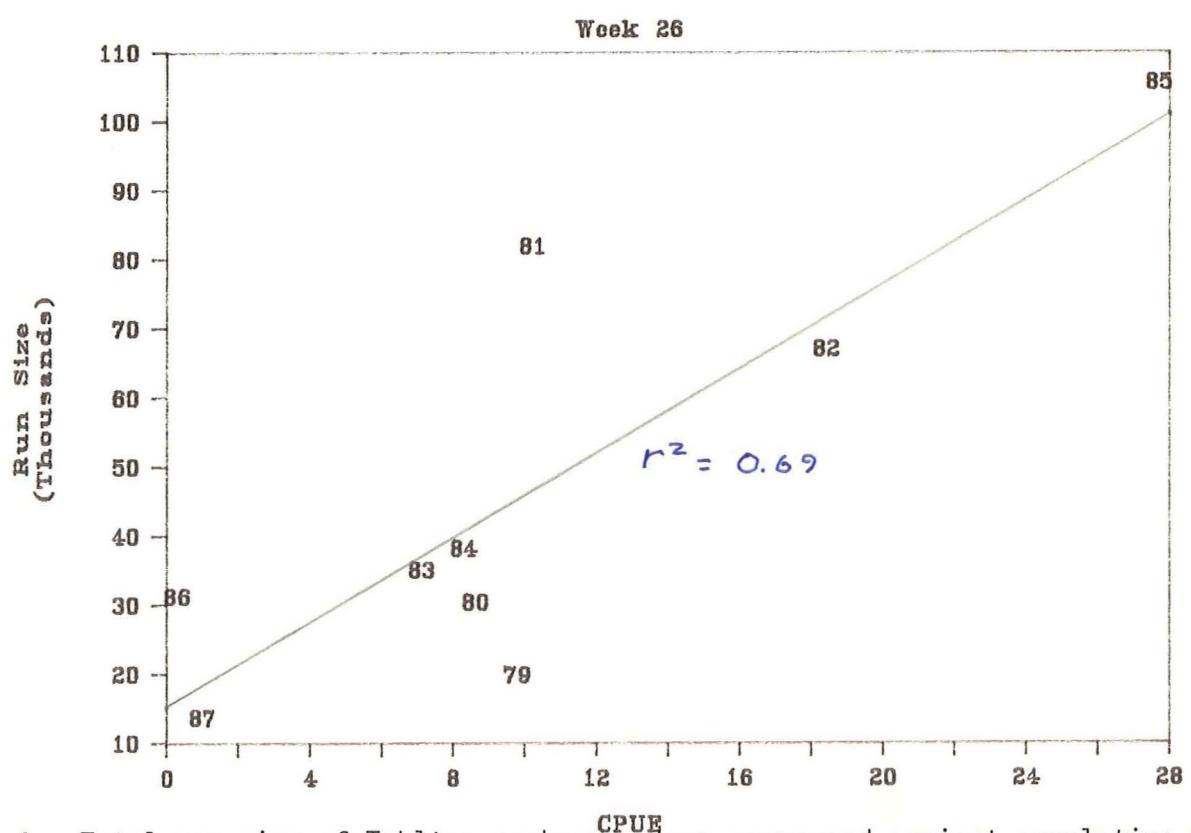
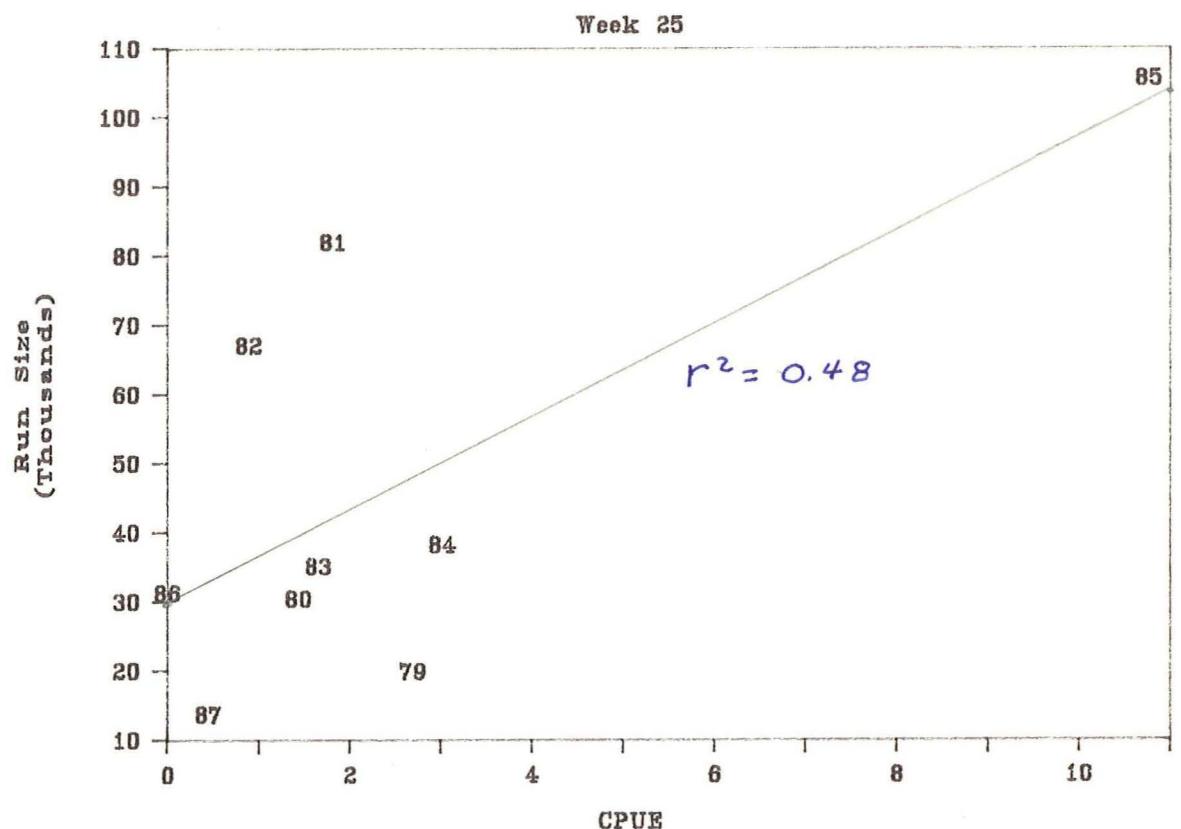


Figure 4. Total run size of Tahltan sockeye salmon regressed against cumulative CPUE from the U.S. District 106-41/42 commercial fishery for weeks 25 through 30.

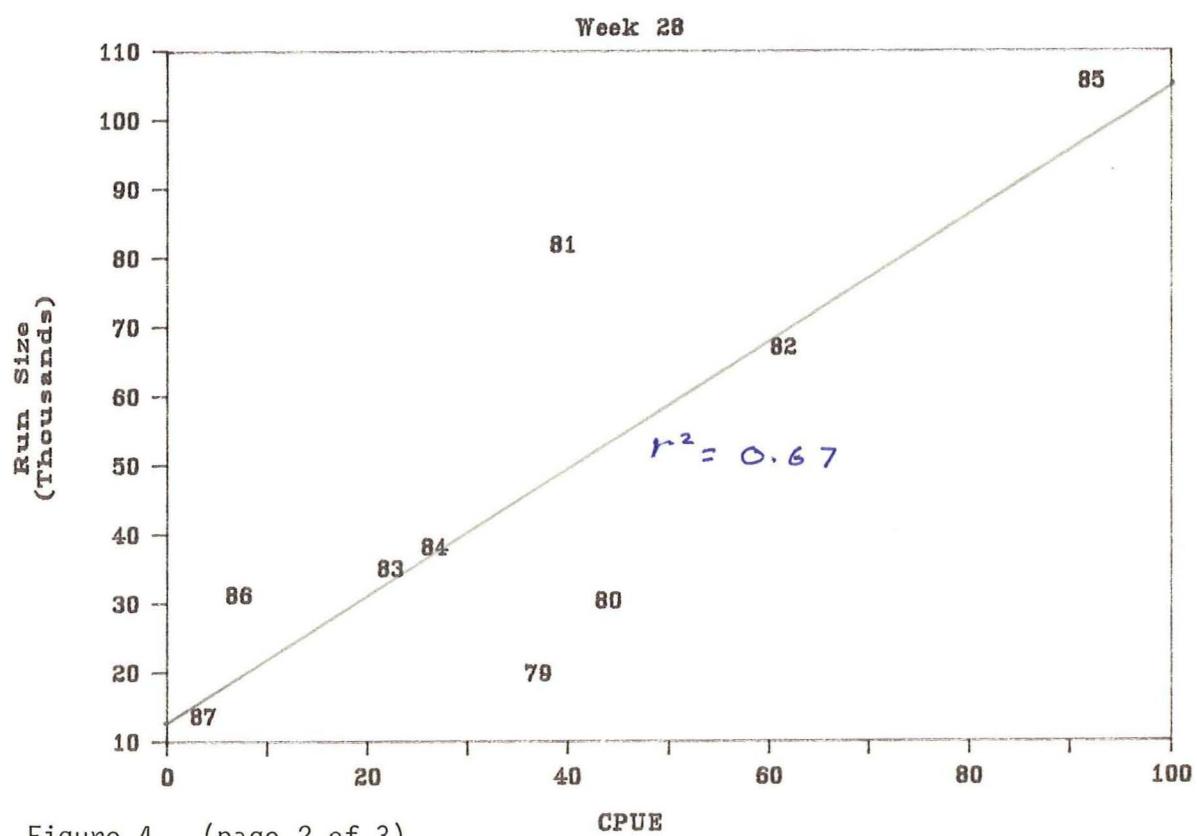
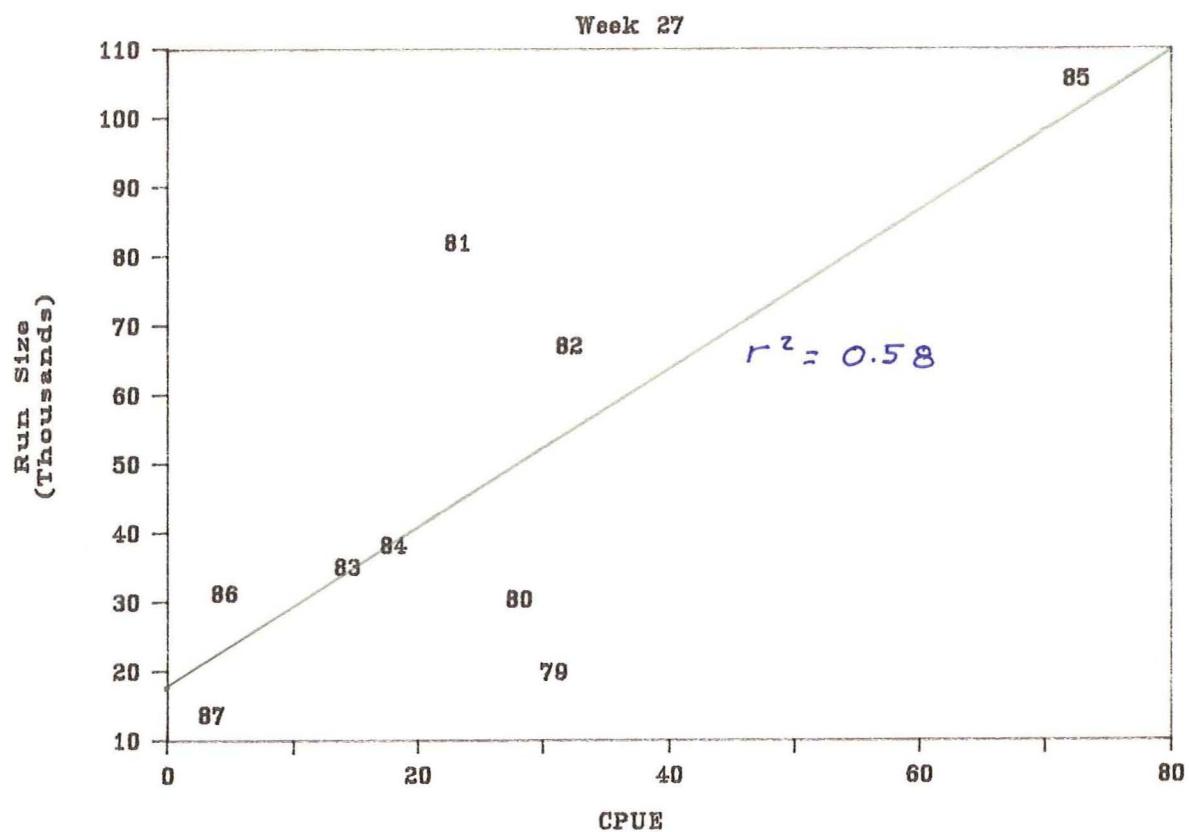


Figure 4. (page 2 of 3)

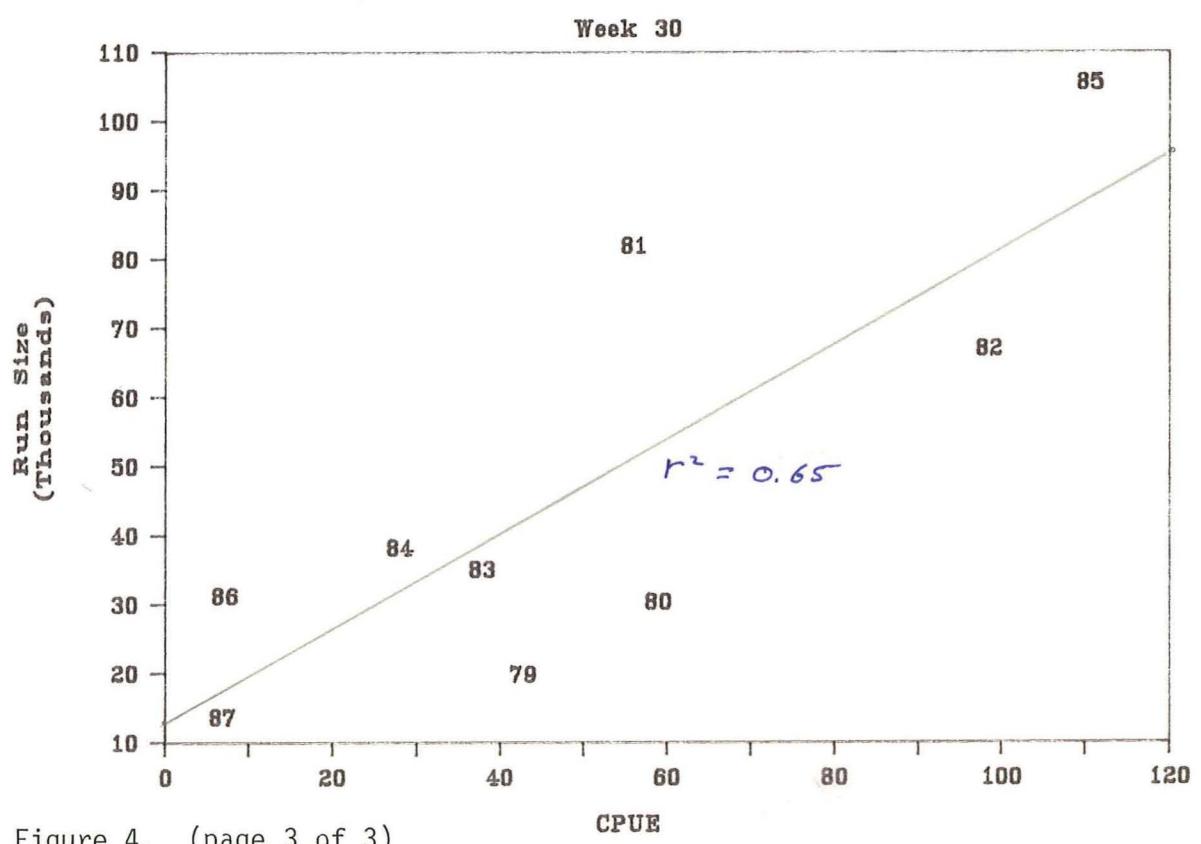
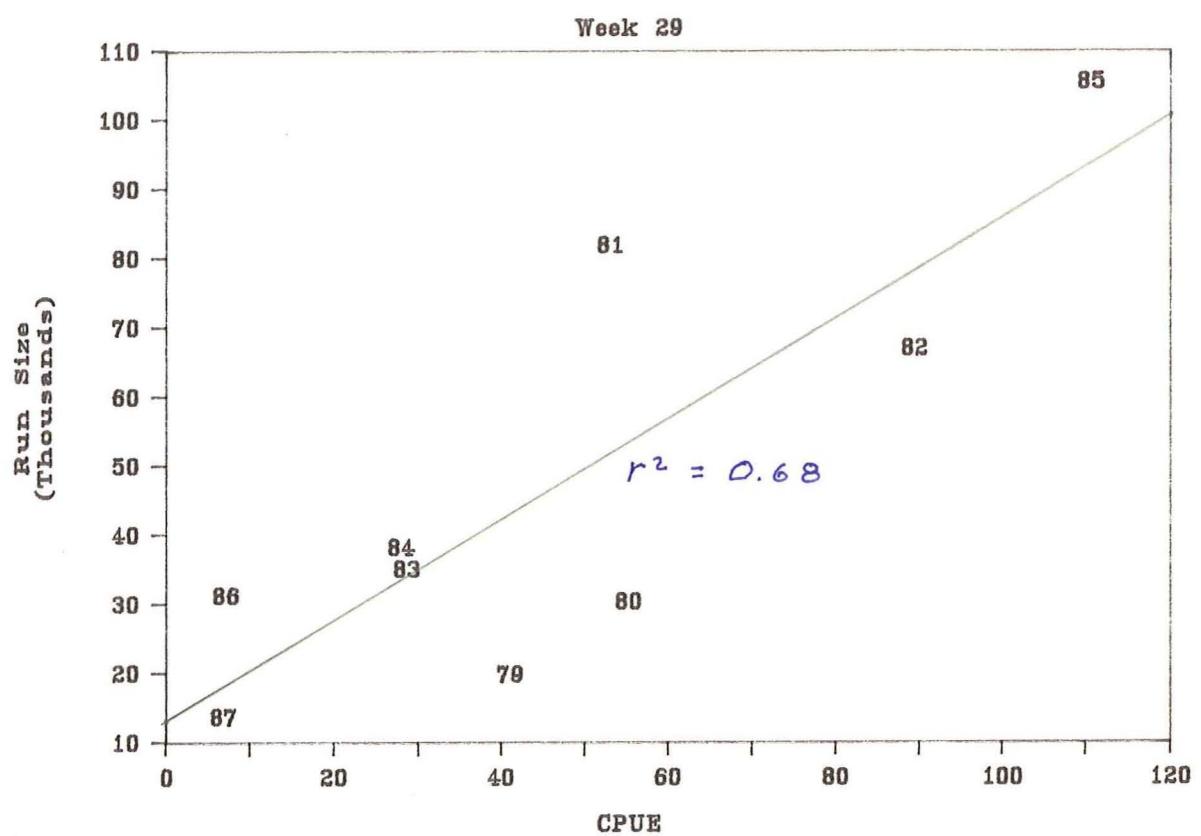


Figure 4. (page 3 of 3)