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## **Description of a Daily Simulation Model For the Area 4 (Skeena) Commercial Gillnet Fishery**

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**ABSTRACT**

Cox-Rogers, S. 1994. Description of a daily simulation model for the Area 4 (Skeena River) commercial gillnet fishery. Can. Manuscr. Rep. Fish. Aquat. Sci. 2256: iv + 46 p.

This report describes a daily simulation model for the Area 4 (Skeena River) commercial gillnet fishery. The model evaluates the effects of various gillnet fishing patterns on the catch and escapement of sockeye, steelhead (including sub-stocks), early-run coho, chinook, and pink salmon migrating through four sub-areas of Area 4. For any fishing pattern, the model predicts the daily sockeye harvest rate associated with the fishing effort, and applies this rate to the abundance of salmon to calculate catch. The model uses sockeye harvest rate and effort relationships obtained from run-reconstructions of Area 4 fishery data for the years 1985-1991. The daily abundance of each species entering Area 4 depends upon the run sizes and run-timings used in the model. A return of 2.3 million fish to Area 4 is used as the expected sockeye run size. Run sizes for other species can be specified, or represented as proportions, for harvest rate calculations. The daily proportions of sockeye entering the fishery are derived from average reconstructed run-timing curves for the base-period years 1985-1991. The run-timings for other species are summarized from a combination of test fishery and tagging data, and are represented in the model as normal distributions. The model is spread-sheet based, and evaluates any combination of fish abundance and gillnet fishing pattern, including the use of gillnet weedlines and catch and release for steelhead. Changes in harvest rate are measured about the pattern for the 1985-1991 period.

**RÉSUMÉ**

Dans ce rapport, on décrit un modèle de simulation quotidienne de la pêche commerciale au filet maillant dans le secteur 4 (Skeena River). Le modèle en question permet d'évaluer les effets de divers modes de pêche au filet maillant sur les captures et sur l'échappée; il s'utilise pour le saumon rouge, la truite arc-en-ciel anadrome (y compris les sous-stocks), le saumon coho à remonte hâtive, le saumon quinnat et le saumon rose en migration dans quatre sous-unités du secteur 4. Quel que soit le mode d'exploitation, le modèle permet de prévoir le taux de capture quotidien de saumon rouge correspondant à l'effort de pêche et, par l'application du taux obtenu aux effectifs, de calculer les prises. Le modèle fait intervenir des relations entre le taux de capture et l'effort de pêche, déterminées par reconstruction des remontes dans le secteur 4 à partir de données recueillies de 1985 à 1991. La valeur quotidienne des effectifs de chaque espèce pénétrant dans le secteur 4 dépend de la taille et de la chronologie de la remonte utilisées dans le modèle. Pour le saumon rouge, l'effectif escompte de remonte utilisé dans le modèle est un retour de 2.3 millions de poissons dans le secteur 4. Pour calculer le taux de capture des autres espèces,

on peut utiliser des valeurs d'effectif de remonte déterminées ou des proportions. Dans le cas du saumon rouge, la proportion quotidienne pénétrant dans la zone de pêche est déterminée d'après des courbes chronologiques des remontes moyennes reconstituées pour la période de base (1985-1991). Pour les autres espèces, la chronologie de la remonte est établie sous une forme condensée à partir d'un ensemble de données conjuguant les résultats de pêches exploratoires et d'études de marquage et représentée sous forme distributions normales dans le modèle. Le modèle est un tableau de ventilation et permet d'évaluer toutes les combinaisons possibles d'effectifs et de modes d'exploitation au filet maillant, y compris le filet maillant modifié de type "weedlines" ainsi que la capture avec remise à l'eau pour la truite arc-en-ciel anadrome. Les variations du taux de capture sont mesurées par rapport à la courbe de la période de base (1985-1991).

## INTRODUCTION

The Skeena River, in northern British Columbia, supports an important commercial fishery for sockeye and pink salmon each July and August. The fishery takes place in statistical Area 4, adjacent to the river mouth. Although management of the Area 4 fishery has evolved considerably since the late 1800's (see Sprout and Kadowaki 1987), the incidental catch of non-target species in Area 4, such as steelhead, coho and chinook salmon, remains a concern. Overlaps in run-timing among the various salmon stocks prevent harvesting of single stocks in Area 4, while diverse stock productivities preclude the application of a single harvest rate that would provide the maximum sustained yield for all stocks (Sprout and Kadowaki 1987). Recent management of the fishery has been characterized by attempts to reduce harvest rates on incidental species. Fishing opportunities are now restricted in early August to protect early-run coho. As well, in 1991, DFO committed to reducing Area 4 steelhead harvest rates by 50% within three years. Unfortunately, reliable catch and escapement data for Skeena River coho and steelhead do not exist, and so direct evaluation of Area 4 harvest rates, for these species, is difficult.

In the absence of reliable catch and escapement data for Skeena River steelhead, Ward et al. (1993) developed a computer model of the Area 4 fishery to estimate steelhead harvest rates indirectly. Their approach used weekly harvest rates for sockeye, adjusted for differences in run-timing, as a surrogate for steelhead and other co-migrating species. Ward et al's. (1993) model was a useful first step in understanding the dynamics of the Area 4 fishery; however, the weekly time step in the model was found to be insufficient for pre-season planning purposes. Daily resolution of the Area 4 fishery, on a sub-area basis, is required to assess harvest rate changes attributable to specific management actions.

This report describes a daily simulation model for the Area 4 commercial gillnet fishery. The model was jointly developed by the Department of Fisheries and Oceans and the British Columbia Ministry of Environment, Lands, and Parks, as a tool for evaluating Area 4 management options. The model is spread-sheet based, and evaluates the effects of various gillnet fishing patterns on the catch and escapement of sockeye, steelhead (including sub-stocks), early-run coho, chinook, and pink salmon migrating through four sub-areas of Area 4. The model allows managers to explore alternate fishing regimes before fishing actually takes place, and provides an objective framework for pre-season planning. As an example of model use, various simulations of the Area 4 fishery are presented.

## METHODS

### General Description of the Area 4 Model

The structure of the Area 4 model is similar to the "gauntlet" fishery models described by Gilhousen (1992) and Starr and Hilborn (1988). Fish are assumed to pass through a series of sequential fisheries before escaping to spawn. The catch of fish in each sequential fishery is regulated by varying the number of boats present, and by varying the days when fishing occurs.

The Area 4 model uses the following inputs to simulate the fishery:

- a) total incoming abundance of sockeye, coho, steelhead, chinook, and pink salmon.
- b) run-timing curves for sockeye, coho, steelhead, chinook, and pink salmon.
- c) daily fishing effort (# of boats).
- d) a schedule of expected changes in daily harvest rate attributable to gillnet "weedlines", and steelhead catch and release..

The model treats Area 4 as four sequential fisheries: Outside, Sound, Smith, and River/Gap/Slough (Figure 1). All fish are assumed to move through each sub-area prior to passing into the Skeena River. The runs entering the fishery are partitioned into daily migration blocks. Each migration block represents a proportion of the run-timing curve for each species. The migration blocks are moved sequentially through each sub-area using a daily time-step. Sockeye tagging studies show that sockeye take between two and five days to move through Area 4 (Takagi and Smith 1973), with four days being the best point estimate (Smith and Jordan 1973). Currently, the model is configured with a four day migration rate for all species, although the number of days each migration block spends in each sub-area can be modified if required.

The basic calculation in the model is the estimate of sub-area catch and escapement, where the catch depends upon the gillnet fishing pattern (ie. the dates fished and the effort present). For any fishing pattern, the model first predicts the daily sockeye harvest rate associated with the daily fishing effort in each sub-area, and then applies this rate to the daily proportion of fish present in each sub-area to calculate daily catch and escapement.

The relationships for predicting daily harvest rate from fishing effort were obtained from historical Area 4 sockeye run-reconstructions. The daily effort in each sub-area can be entered manually into the model, or predicted from regressions relating historical Area 4 effort to date. If specified, changes in harvest rate, attributable to using gillnet weedlines, and catch and release for steelhead, are incorporated into the daily harvest rate calculations.

The abundance of fish entering Area 4 depends upon the run sizes and run-timings used in the model. The run-timing curve for sockeye is derived from the historical run-reconstructions. The run-timing curves for other species are summarized from a combination of test fishery CPUE



and tagging data, and are represented in the model as normal distributions with specified peak dates and standard deviations.

A 25% exploitation rate is applied to the abundance of each species before the start of calculations. This rate represents estimates of Skeena River sockeye exploitation in S. E. Alaska, and Canadian Areas 1, 3 and 5.

The major assumptions of the model are:

- a) fish pass through each sub-area as a uniform band.
- b) migration is constant in speed and direction.
- c) fishing gear is spread uniformly over the migration path within each sub-area
- d) gear efficiency remains stable during the allowed fishing time while each unit removes fish that another unit could have caught (eg. gear competition occurs).
- e) an exponential limit adequately describes the relationship between daily harvest rate and fishing effort in each sub-area:

$$1) \ h = 1 - e^{-qE}$$

where C is catch, N is abundance, h is the harvest rate (C/N), q is an estimate of the catchability coefficient, E is effort, and e is the base of natural logarithms (Hilborn and Walters 1992).

- f) daily harvest rates calculated for sockeye apply to all co-migrating species.

## Data Sources

The model was configured using data obtained from the Operations Branch of the Department of Fisheries and Oceans in Prince Rupert. The primary sources of data were Area 4 sockeye catch and effort records by sub-area from 1985-1991, and Tyee test fishery catch per effort (CPUE) records, by species, from 1985-1991. The schedule of weedline impacts used in the model was summarized from studies conducted by Lewensky (1992). The years 1985-1991 were selected as the "base-period" for the model because a) these years represent recent management of the Area 4 fishery, and b) the data were complete for run-reconstruction by sub-area.

The Area 4 sockeye catch data used to configure the model represented fishery officer hail estimates collected inseason. To calibrate the inseason hails against actual sales slip catch records, the inseason hails were first converted to proportions of the seasonal total for each year, and then multiplied by the annual sales slip figure. Sockeye escapement past the Tyee test fishery was generated using Tyee test fishery CPUE expanded to daily escapement. Daily (i) sockeye escapement ( $E_i$ ) was estimated by dividing daily sockeye CPUE in the test fishery by annual estimates of test fishery catchability (q). Annual sockeye catchability in the test fishery was obtained from post-season calibrations using actual escapement estimates from the Babine River

counting fence (Cox-Rogers and Jantz 1993).

$$2) E_i = CPUE_i / q$$

The Area 4 effort data used to configure the model represented gillnet (95%) and purse seine vessels (5%) counted during fishery officer surveys and overflights. Purse seine effort, where present in the data base, was converted to gillnet equivalents using a 1985-1991 sockeye conversion ratio of approximately 4:1 (eg. seine CPUE : gillnet CPUE).

### **Model Configuration**

The model was configured in three steps: A) run-reconstruction of historical sockeye returns to Area 4, B) defining species run-timing, and C) simulating the fishery.

#### **A) Sockeye Run Reconstruction**

The sockeye run-reconstructions used to configure the model followed the methodology of Starr and Hilborn (1988). The reconstructions established daily sockeye abundance and harvest rates in each sub-area of Area 4 for the 1985-1991 base-period, and established run-timing curves for sockeye entering the fishery. The basic relationships used in the reconstructions were:

$$(3) \quad \begin{aligned} N_{ij} &= C_{ij} + E_{ij} \\ h_{ij} &= C_{ij} / N_{ij} \end{aligned}$$

where  $N_i$  was daily abundance in sub-area  $j$ ,  $C_i$  was daily catch,  $E_i$  was daily escapement, and  $h_i$  was the daily harvest rate.

The reconstructions also configured data relating Area 4 fishing effort to date. Linear regressions relating fishing effort and date were calculated for a) average 1985-1991 total Area 4 effort against date and b) average 1985-1991 sub-area proportions of Area 4 effort against date. Average weekly effort was evaluated at the mid-point of each Julian week to account for differences in fishery start dates attributable to calendar variation among years.

#### **B) Species Run-timing**

The run-timing curves used to configure the model were derived from a variety of sources. For sockeye, the 50% cumulative proportion (catch + escapement) dates were calculated from the run-reconstructions, and aligned with the average 1985-1991 50% cumulative proportion date. The daily proportions were then averaged across all years and smoothed to remove daily variability.

For early-run coho, chinook, and pink salmon, run-timing was estimated using 1985-1991

test fishery CPUE. The 50% cumulative CPUE dates were calculated for each year, and aligned to the average 1985-1991 50% cumulative CPUE dates. The daily CPUE's were then averaged across all years, and expressed as daily proportions. The daily proportions were smoothed to remove variability caused by low or zero CPUE values in some years. Normal distributions were applied to the smoothed daily proportions, using the mean 50% peak dates for each species and a common standard deviation, for all species, of 12.5 days. Finally, the normal distributions were moved back four days to approximate run-timing into the fishery.

Steelhead run-timing was estimated from a review of available information (Ward et al. 1993), and from a run-reconstruction of 1985-1991 test fishery CPUE "entering" the fishery by:

$$4) N_{ij} = E_{ij} / (1-h_{ij})$$

where  $N_{ij}$  was reconstructed daily CPUE in sub-area  $j$ ,  $E_i$  was daily escapement (CPUE), and  $h_i$  was reconstructed daily sockeye harvest rate. The 50% cumulative proportion dates were calculated from the run-reconstructions, and aligned with the average 1985-1991 50% cumulative proportion date. The daily proportions were then averaged across all years and smoothed to remove daily variability. A normal distribution was applied to the smoothed daily proportions, using the mean 50% peak date, and a standard deviation of 12.5 days. Normal distributions were also used to represent steelhead sub-stock timing in the model. The peak dates and standard deviations (11.0 days) for steelhead sub-stocks were obtained from Ward et al. (1993).

### C) Fishery Simulation

The objective of the fishery simulations was to 1) establish the average 1985-1991 base-period fishing pattern and harvest rates for all species, and 2) modify the base-period fishing pattern to show the effects of alternate management options. The fishery simulations were configured using the following inputs:

- a) incoming Area 4 abundance by species
- b) incoming Area 4 run-timing by species
- c) daily Area 4 fishing pattern by date (ie. area and effort) and pattern of weed-line use
- d) schedule of weedline and steelhead catch and release impacts

For the simulations, inputs a, b, and d were held constant while input c was varied. Changes in harvest rate were measured relative to the pattern for the 1985-1991 base-period. For simulation purposes, a run size of 2.3 million was used as the "expected" run entering Area 4. Run sizes for steelhead, coho, chinook, and pink salmon were set at one, due to uncertainty in the expected run sizes for these species.

The calculations used in the fishery simulations were simply a rearrangement of equation (3), and followed the forward-construction methodology described by Starr and Hilborn (1988):

$$C_{ij} = h_{ij}N_{ij}$$

5)  $E_{ij} = N_{ij} - C_{ij}$

where  $C_i$  was daily catch in sub-area  $j$ ,  $h_i$  was the daily harvest rate from equation (1),  $N_i$  was daily abundance, and  $E_i$  was daily escapement.

The performance of the base-period model was also tested under stochastic conditions, using Monte Carlo simulation (Crystal Ball 1991, Decisioneering Inc.). Two calculations in the model can be expected to be sensitive to stochastic variation: a) the sub-area daily harvest rates calculated from equation (1), and b), the daily proportions of each species entering the fishery, as determined from their run-timing curves. Although the prediction of effort by sub-area is also subject to variability, the objective of the Monte Carlo simulation was to find the most likely base-period harvest rates when effort was held constant.

The Monte Carlo simulation was configured by specifying probability distributions for (a) and (b) above, and running the model for 20,000 trials to find the probability distributions of the Area 4 harvest rates for all species. For the sub-area daily harvest rates, triangular probability distributions were defined about the point estimates for the base-period simulation, using, as maximum and minimum values, the harvest rates calculated when the 95% confidence limits for  $q$  were placed into equation (1). For the run-timings, triangular probability distributions were specified about the peak day of entry in Area 4 for each species, with one week (seven days) on either side of the peak used to specify the minimum and maximum values. To be consistent with other species, a normal run-timing curve was defined for sockeye, using a peak day of entry into Area 4 of July 21, and a standard deviation of 12.5 days. The standard deviation of the run-timing curves for each species was not altered for the Monte Carlo simulation, to examine the impacts of early versus late peak timing, rather than protracted versus compressed run duration.

#### **Adjustments to daily harvest rates: Gillnet weedlines and steelhead catch and release**

When specified as model options, gillnet weedline and steelhead catch and release impacts were directly applied to the daily harvest rates calculated from equation 1. Weedlines are gillnets suspended below the water surface, so that fish near the surface can swim over the net without being caught. For surface oriented species, such as steelhead (Ruggerone et al. 1990), using weedlines in Area 4 is expected to reduce steelhead harvest rates considerably (Lewensky 1992). Catch and release of live steelhead from gillnets is another method of reducing steelhead harvest rates. Catch and release of live steelhead was first proposed by the North Coast Advisory Board in 1992. Steelhead surviving captures are placed in holding tanks, revived, and later released into areas where recapture is reduced. For the fishery simulations, weedline and catch and release impacts were modelled as expected percentage reductions in daily harvest rate.

## RESULTS

### A) Sockeye Run Reconstruction

The results of the sockeye run-reconstructions for 1985-1991 are presented in Appendix 1. The reconstructed sockeye harvest rates are highest in the River/Gap/Slough, and lowest in the Sound and Outside. Average effort in Area 4 peaks in the third to fourth weeks of July (Figure 2), corresponding to the general timing of the fishery on sockeye. Relative effort also increases noticeably in the River/Gap/Slough as the season progresses, and decreases in the other sub-areas (Figure 3). This probably reflects of the fleet's tendency to "follow" the sockeye and pink runs into the river as the season progresses, and the departure of much of the fleet after early August, leaving mostly river-gillnets in the fishery.

Figure 4 shows the relationship between daily sockeye harvest rate and daily effort in each sub-area for 1985-1991. Although the fitted curves indicate a progressive increase in daily harvest rate with effort, there is considerable variability in the raw data when more than one or two hundred boats are fishing. Figure 5 summarizes the modelled daily harvest rate versus effort relationship among the sub-areas. For any level of fishing effort, daily harvest rates are highest in the River/Gap/Slough, and lowest in the Sound and Outside. This suggests differential catchability among areas, with sockeye becoming more vulnerable to capture as they approach the river mouth. Increasing sockeye vulnerability toward the river mouth may be related to the funnelling effect of the Skeena River estuary, where fish are concentrated by shallower water and restricted topography.

### B) Species Run-timing

The average 1985-1991 run-timings for each species are shown in Figure 6. For sockeye and steelhead, the 50% peak dates of entry into the fishery were estimated to be thirteen days apart (July 21 and August 3 respectively, Table 1), the same as reported by Ward et al. (1993). For early-run coho, and pink salmon, the 50% peak dates of entry were August 6 and 7 respectively. The 50% peak date of entry for chinook was July 1.

Figure 7 compares the annual reconstructed run-timings generated for steelhead and sockeye, expressed as cumulative proportions. Unlike sockeye, the steelhead reconstructions show considerable annual variation. Some of this variation appears due to the nature of test fishery CPUE data for steelhead. Many daily CPUE values for steelhead are consecutively low or zero. This creates "holes" in the reconstructions calculated using equation 4. As well, some variation may be due to annual variability in stock-specific steelhead abundance. Because of these sources of variability, a normal curve (Figure 8) is considered a better approximation of run-timing for steelhead. The same concerns apply to the timing curves generated for early-run coho, chinook, and, to a lesser extent, pink salmon. Actual catch and escapement data is needed to further refine the run-timings for steelhead, coho, chinook and pink salmon used in the model.

### C) Fishery Simulation

#### - 1985-1991 Base-Period Harvest Rates: point estimates

The result of the 1985-1991 base-period simulation is presented in Table 2. The base-period simulation used a 1985-1991 fishing pattern calculated as follows:

Julian Week	Week Ending	Average Days Fished	1985-1991 Actual Mean Effort (1st day)	1985-1991 Model Effort (1st day)
26	June 25 - July 01	0	0	0
27	July 02 - July 08	1	413	438
28	July 09 - July 15	2	466	546
29	July 16 - July 22	2	679	653
30	July 23 - July 29	4	709	761
31	July 30 - Aug 05	3	608	623
32	Aug 06 - Aug 12	3	494	485
33	Aug 13 - Aug 19	3	341	347
34	Aug 20 - Aug 26	3	220	210
35	Aug 27 - Sept 02	1	88	72
		-----		
		22		

From table 2, the point estimate Area 4 harvest rates, for the base-period, were 40.6% for sockeye, 36.3% for steelhead, 34.8% for coho, 33.7% for pinks, and 20.4% for chinook. The base-period harvest rates on steelhead sub-stocks were 42.3% for early-run (eg. Morice), 36.5% for middle-run (eg. Babine), and 30.5% for late-run (eg. Kispiox). The simulated sockeye harvest rate of 40.6% compares with the actual average 1985-1991 sockeye harvest of 41.2%, and the actual unweighted average sockeye harvest rate of 39.2% (Table 3).

#### - 1985-1991 Base-Period Harvest Rates: Monte Carlo estimates

The results of the Monte Carlo simulation are shown in Figures 9, 10, and 11. After 20,000 trials, the most probable (modal) Area 4 harvest rates, for the base-period, were calculated to be 42.3% for sockeye, 35.5% for steelhead, 34.9% for coho, 33.3% for pinks, and 20.2% for chinook. The modal base-period harvest rates on steelhead sub-stocks were 42.6% for early-run (eg. Morice), 37.8% for middle-run (eg. Babine), and 30.4% for late-run (eg. Kispiox).



These results are similar to the point estimates generated from a single model run. However, unlike the point estimate simulation, the Monte Carlo simulation describes the certainty about the modal estimates. For example, the 90% certainty ranges for the base-period were harvest rates were: sockeye (38.7% - 42.4%), steelhead (30.2% - 39.0%), coho (29.0% - 39.3%), pinks (27.8% - 38.5%), chinook (14.5% - 26.7%), early-run steelhead (39.4% - 42.7%), middle-run steelhead (30.8% - 40.7%), and late-run steelhead (23.9% - 36.2%). Based on these results, the sensitivity of the model is considered to be well within the ranges required for management purposes.

Interestingly, for both sockeye and early run steelhead, the harvest rate probability distributions are positively skewed, with relatively "tight" 90% certainty ranges. For other species, the harvest rate probability distributions are more symmetric, and have wider 90% certainty ranges. This is likely due to the interaction between the fishing pattern, the daily harvest rates produced by the fishing pattern, and the run-timing for each species. Daily harvest rates, which are maintained at their highest levels when effort peaks later in July, appear to offset the effects of variable peak run-timing for both sockeye and early steelhead, thus resulting in Area 4 harvest rates exhibiting tighter certainty ranges. For other species, the interaction between daily harvest rates and run-timing is more variable, thus resulting in Area 4 harvest rates exhibiting wider certainty ranges.

### **-1994 Pre-Season Fishery Simulations**

The results of several point estimate simulations, for the 1994 fishing season, are shown in Table 4. The simulation runs are presented as examples of what different fishery objectives might produce, and are not intended as recommendations for specific management options.

The simulations were configured by altering the fishing pattern (specific dates fished) to achieve the stated objectives. The simulations summarize a range of potential management options from status quo (#2) to consideration of early-timed steelhead impacts (#9). The schedule of 1.2m weedline impacts (60-mesh standard nets) used in the simulations is presented in Table 5. Comments regarding these simulation runs are as follows:

#### **1) Base Case**

The actual Area 4 sockeye harvest rate over the base-period was approximately 40% (eg. 39.2% to 41.2%, depending on the weighting method used). The steelhead harvest rate is estimated to be 36%. A 50% reduction would result in a steelhead harvest rate of 18%.

#### **2) Recent Management -plus steelhead catch and release**

This model run shows the expected benefits from the steelhead catch and release program, and the coho conservation plan of recent years (two days per week in early August). The steelhead and sockeye harvest rates are both reduced by 4%.

### 3) Recent Management

- plus steelhead catch and release, plus weedlines in all areas

This model run is similar to #2, with the addition of 1.2 m weedlines in all areas. The additional impact of weedlines reduces the steelhead harvest rate to 20%, close to the 18% target. Sockeye harvest rate is reduced to 31%, equivalent to a catch reduction of 212,000 sockeye.

### 4) 50% steelhead harvest rate reduction

- plus steelhead catch and release, plus weedlines in all areas
- fishing pattern moved earlier to increase sockeye catch
- fishing time increased to account for reduced sockeye catch with weedlines

This version is similar to #3 with the fishing pattern altered to reduce the steelhead harvest rate to the 18% target, while improving the sockeye harvest rate to within 2% of the base case.

### 5) 50% steelhead harvest rate reduction

- plus steelhead catch and release, plus weedlines in outside areas only
- fishing pattern moved earlier to increase sockeye catch
- fishing time increased to account for reduced sockeye catch with weedlines

This version is similar to #3 and #4 except weedlines are only used in outside fisheries. The steelhead 50% reduction is achieved, while the sockeye harvest rate is improved to slightly above the base case.

### 6) 50% steelhead harvest rate reduction

- plus steelhead catch and release, plus weedlines in all areas
- fishing pattern moved earlier to increase sockeye catch
- differential impact on river fishers
- fishing time increased to account for reduced sockeye catch with weedlines

This version is similar to #3 and #4 except river fisheries are reduced while maintaining outside fisheries. The steelhead reduction is within the target range, while the sockeye harvest rate is similar to the base case.

### 7) 50% steelhead harvest rate reduction

- plus steelhead catch and release, plus weedlines in all areas
- fishing pattern adjusted to maximize sockeye catch
- August fisheries 'eliminated'.
- fishing time increased to account for reduced sockeye catch with weedlines

This run 'maximizes' sockeye catch by switching effort from the August fishery to the July sockeye period. The sockeye harvest is increased by 5% over the base-period, however this

incremental catch is at the expense of the August fishery and reduces the benefits to early steelhead runs.

**8) 50% steelhead harvest rate reduction  
-plus steelhead catch and release, no weedlines**

Here, the model run shows the fishing pattern required to achieve the 50% steelhead harvest rate reduction if weedlines are not part of the package. As expected, the required reduction in fishing time is significant, especially in August. Maximum harvest rate reduction for coho is shown by this fishing pattern.

**9) 50% early steelhead harvest rate reduction  
-plus steelhead catch and release, plus weedlines in all areas  
-fishing time increased to account for reduced sockeye catch with weedlines**

This version reduced the harvest rate on early steelhead to 50%. Achieving this objective requires a major reduction in sockeye harvest since the timing of the early steelhead stocks more closely overlaps with sockeye.

From table 4, several general aspects of the simulation runs are apparent. First, the modeled Area 4 harvest rates depend on when fishing occurs in relation to the run-timing curves for each species. For sockeye, maximum harvest rates occur when fishing effort is high during mid to late July. For steelhead, minimum harvest rates occur when effort is low from late July through mid-August, and/or when weedlines are used. For coho and pinks, minimum harvest rates occur when effort is low from early to mid-August.

Second, sub-stock Area 4 harvest rates on steelhead are only reduced when fishing effort is low in relation to their run-timing. For "early" timed steelhead stocks (late July), harvest rates are only reduced when late July effort is reduced, or when weedlines are specified during periods of high sockeye directed effort. The simulations clearly identify a fundamental dilemma for the Area 4 fishery: harvest rates for steelhead can be changed for all stocks in aggregate, but not equally for all sub-stocks at once. This idea applies to all species.

**Comments on Weedline Impacts and Catch and Release for Steelhead**

In waters outside the River/Gap/Slough, 1.2m weedlines are expected to reduce harvest rates on all species, but with a much greater reduction for steelhead because of their surface orientation. In the River/Gap/Slough, weedlines are expected to reduce harvest rates on all species except coho (Table 5). It should be stressed, however, that the data in Table 5 were generated under test fishing conditions. The actual impacts of fishing weedlines in Area 4 are not known, and need to be evaluated. Currently, uncertainty exists regarding the impacts of using weedlines under full fleet conditions. To reflect this uncertainty, the weedline impacts used in the model were arbitrarily reduced by approximately 30%. Further assessment of the theoretical and

actual impacts of fishing weedlines in Area 4 is required.

The reduction in Area 4 harvest rates attributable to catch and release depends upon the number of boats participating (compliance), the mortality rate upon landing, and the probability of recapture after release. Preliminary assessment suggests that compliance rates are currently low, while the mortality rate upon landing is high (70%). As such, the current benefits of catch and release are probably quite low. In the model, catch and release benefits are modeled as a 5% reduction in the daily harvest rate. Major improvements in compliance and landing mortality would be required for catch and release to further reduce steelhead harvest rates in Area 4.

## CONCLUSIONS

This report describes a daily simulation model for the Area 4 commercial gillnet fishery. The model evaluates the effects of various gillnet fishing patterns on the catch and escapement of sockeye, steelhead (including sub-stocks), early-run coho, chinook, and pink salmon migrating through four sub-areas of Area 4. The model is a useful tool for evaluating alternate management options for the Area 4 fishery. The model also provides managers with an objective and consistent framework for pre-season planning. Caution, however, should be used in relying on the harvest rate calculations for designing fisheries without some form of in-season evaluation program in place. The model generates "average" expected impacts for the Area 4 fishery, and in-season run-timing, run sizes, effort patterns, and migration rates can differ from the pre-season predictions generated by the model. As such, the model simulations should only be used to guide the in-season management process.

For sockeye, the model does well in predicting the average impacts of fishing in Area 4. Reconstructed sockeye timing into Area 4 varies little from year to year, and using effort to predict daily sockeye harvest rate results in average sub-area catches and escapements that agree relatively well with actual data. For other species, the model predictions are currently the best available, and will eventually need to be calibrated against actual catch and escapement data to assess their accuracy.

## RECOMMENDATIONS

- 1) The model can be used for Area 4 management purposes subject to a continuation of work directed at refining run-timing, catchability, and sensitivity of the model to stochastic variation and violation in assumptions.
- 2) Stock specific data for all species are needed to further refine the run-timings used in the model. Specifically, Area 4 catch and escapement monitoring programs for these species should be developed, as well as stock identification techniques for stock-specific evaluation of run-timing.
- 3) Studies should be implemented to examine the theoretical and empirical impacts of fishing gillnets with weedlines in Area 4. Specifically, the use of weedlines in a full fleet situation should be evaluated.

## ACKNOWLEDGMENTS

The assistance of Dr. Art Tautz (B.C. Ministry of Environment, Lands, and Parks), and Dave Peacock (Department of Fisheries and Oceans) in developing the Area 4 model is greatly appreciated. The comments of PSARC (Pacific Stock Assessment Review Committee) reviewers Paul Ryall (Department of Fisheries and Oceans) and Dr. Russ Frith (LGL Environmental Consultants) were especially valuable and helped to improve the paper considerably. Thanks to Dr. Marc Labelle (B.C. Ministry of Environment, Lands, and Parks) for assisting with the Monte Carlo simulations. This paper has been formally reviewed and approved by PSARC and the Pacific Region of the Department of Fisheries and Oceans.

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SPECIES	AREA 4 (1) 50% PEAK DATE	NORMAL CURVE STANDARD DEVIATION
CHINOOK	JULY 1	12.5
SOCKEYE	JULY 21	N/A
STEELHEAD	AUGUST 3	12.5
-early run	JULY 27	11.0
-middle run	AUGUST 5	11.0
-late run	AUGUST 9	11.0
COHO (early)	AUGUST 6	12.5
PINK (even)	AUGUST 7	12.5
PINK (odd)	AUGUST 1	12.5

(1) ENTERING FISHERY

Table 1. Average 1985-1991 peak 50% dates for salmon entering Area 4, as calculated for use in the model.

TABLE 1	allSx	Coho	Chin	Pink	Chum	MorS	KisS	BulS	ZymS	SusS	BabS	OthS	AllS
Incoming Run	3200000	1.000	1.000	1.000	0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Oth. Fis. Cat.	800000	0.250	0.250	0.250	0	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
Area 4 Run (ac)	2400000	0.750	0.750	0.750	0	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750
Area 4 Run (mo)	2397978	0.750	0.745	0.749	0	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750
Oth. Fis. Cat.													
catch	800000	0.250	0.250	0.250	0	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
esc	2397978	0.750	0.745	0.749	0	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750
h.r	0.25	0.250	0.251	0.250	0.00	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
OUTSIDE													
catch	203027	0.053	0.028	0.051	0	0.066	0.045	0.055	0.066	0.066	0.055	0.053	0.055
esc	2194951	0.697	0.716	0.699	0	0.684	0.705	0.695	0.684	0.684	0.695	0.697	0.695
h.r	0.08	0.070	0.038	0.068	0.00	0.088	0.060	0.074	0.088	0.088	0.074	0.071	0.074
SOUND													
catch	154343	0.038	0.025	0.036	0	0.049	0.032	0.040	0.049	0.049	0.040	0.038	0.040
esc	2040608	0.659	0.691	0.662	0	0.635	0.673	0.655	0.635	0.635	0.655	0.658	0.655
h.r	0.07	0.054	0.035	0.052	0.00	0.072	0.045	0.057	0.072	0.072	0.057	0.055	0.058
SMITH													
catch	206532	0.045	0.040	0.043	0	0.062	0.037	0.048	0.062	0.062	0.048	0.045	0.049
esc	1834076	0.614	0.651	0.620	0	0.573	0.636	0.607	0.573	0.573	0.607	0.613	0.606
h.r	0.10	0.068	0.058	0.064	0.00	0.098	0.054	0.073	0.098	0.098	0.073	0.069	0.074
R/G/S													
catch	410102	0.126	0.059	0.123	0	0.140	0.115	0.131	0.140	0.140	0.131	0.128	0.128
esc	1423974	0.489	0.593	0.497	0	0.433	0.521	0.476	0.433	0.433	0.476	0.484	0.478
h.r	0.22	0.205	0.090	0.198	0.00	0.244	0.181	0.216	0.244	0.244	0.216	0.210	0.211
All Area 4													
catch	974004	0.261	0.152	0.252	0	0.317	0.229	0.274	0.317	0.317	0.274	0.266	0.272
esc	1423974	0.489	0.593	0.497	0	0.433	0.521	0.476	0.433	0.433	0.476	0.484	0.478
h.r	0.406	0.348	0.204	0.337	0.000	0.423	0.305	0.365	0.423	0.423	0.365	0.354	0.363
Area 4 H.R.	0.304	0.261	0.152	0.252	0.000	0.317	0.229	0.274	0.317	0.317	0.274	0.266	0.272
AREA 4 Exploit.													
TOTAL EXPLOIT.	0.555	0.511	0.403	0.503	0.000	0.567	0.479	0.524	0.567	0.567	0.524	0.516	0.522

Table 2. Predicted average Area 4 harvest rates for sockeye, early-run coho, chinook, pink, and steelhead salmon for the base-period years 1985-1991.

	ACTUAL 1991	ACTUAL 1990	ACTUAL 1989	ACTUAL 1988	ACTUAL 1987	ACTUAL 1986	ACTUAL 1985	ACTUAL 85-91 AVG	MODEL 85-91 AVG
Incoming Run	3088471	2577331	2509299	4044396	2619753	1726081	5850501	3202262	3200000
Oth. Fis. Cat.	772118	644333	627325	1011099	654938	431520	1462625	800565	800000
Area 4 Run (ac)	2316353	1932998	1881974	3033297	1964815	1294561	4387876	2401696	2397978
Oth. Fis. Cat.									
catch	772118	644333	627325	1011099	654938	431520	1462625	800565	800000
esc	2316353	1932998	1881974	3033297	1964815	1294561	4387876	2401696	2397978
h.r	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.250	0.250
OUTSIDE									
catch	208887	150102	114352	192835	93038	64863	530149	193461	203027
esc	2107466	1782896	1767622	2840462	1871777	1229698	3857727	2208235	2194951
h.r	0.090	0.078	0.061	0.064	0.047	0.050	0.121	0.081	0.085
SOUND									
catch	133976	99380	89517	213921	96886	94727	493054	174494	154343
esc	1973490	1683516	1678105	2626541	1774891	1134971	3364673	2033741	2040608
h.r	0.064	0.056	0.051	0.075	0.052	0.077	0.128	0.079	0.070
SMITH									
catch	267147	259757	144248	399473	126284	113784	374501	240742	206532
esc	1706343	1423759	1533857	2227068	1648607	1021187	2990172	1792999	1834076
h.r	0.135	0.154	0.086	0.152	0.071	0.100	0.111	0.118	0.101
R/G/S									
catch	352539	318771	274398	706867	200466	177076	635996	380873	410102
esc	1353804	1104988	1259459	1520201	1448141	844111	2354176	1412126	1423974
h.r	0.207	0.224	0.179	0.317	0.122	0.173	0.213	0.212	0.224
All Area 4									
catch	962549	828010	622515	1513096	516674	450450	2033700	989571	974004
esc	1353804	1104988	1259459	1520201	1448141	844111	2354176	1412126	1423974
TOTAL	2316353	1932998	1881974	3033297	1964815	1294561	4387876	2401696	2397978
Area 4 H.R.	0.416	0.428	0.331	0.499	0.263	0.348	0.463	0.412	0.406
Area 4 H.R. (1)	-	-	-	-	-	-	-	0.393	-
AREA 4 Exploit.	0.312	0.321	0.248	0.374	0.197	0.261	0.348	0.309	0.304
TOTAL EXPLOIT.	0.562	0.571	0.498	0.624	0.447	0.511	0.598	0.559	0.554

Area 4 H.R. (1) = unweighted

Table 3. Comparison of actual average 1985-1991 sockeye catch, escapement, and harvest rate in Area 4 with the results obtained for the base-period simulation.

RUN	DESCRIPTION	SUB-AREAS	WEEKLY		PATTERN	EARLY		SOCK. H.RATE	PINK H.RATE	EARLY COHO H.RATE		SOCKEYE CATCH	SOCKEYE ESCAPE	FISHING WEEKS	FISHING DAYS
			FISHING JULY	FISHING AUGUST		STLHD H.RATE	STLHD H.RATE								
1	BASE 1986-91	Outside (1) River	0 1 2 2 4 0 1 2 2 4	3 3 3 3 1 3 3 3 3 1		38.3%	42.4%	40.0%	33.7%	34.8%	34.8%	927,704	1,370,358	9	22
2	Recent management Coho + C&R	Outside (1) River	0 1 2 2 4 0, 1 2 2 4	3 2 2 3 1 3 2 2 3 1		31.7%	39.0%	38.7%	30.0%	31.1%	31.1%	843,766	1,454,296	9	20
3	Recent management Coho + C&R + weed(fall)	Outside (1) River	0 1 2 2 4 0 1 2 2 4	3 2 2 3 1 3 2 2 3 1		20.3%	25.0%	31.4%	25.6%	30.4%	30.4%	722,383	1,575,679	9	20
4	50% steelhead H.R Red. C&R + weed(fall) consider fishing pattern consider sockeye catch	Outside (1) River	1 2 5 4 2 1 2 5 4 2	2 2 1 1 0 2 2 1 1 0		17.2%	25.0%	38.7%	20.5%	24.7%	24.7%	888,769	1,409,293	9	20
5	50% steelhead H.R Red. C&R + weed(fall only) consider fishing pattern consider sockeye catch	Outside (1) River	1 2 5 4 3 1 2 5 4 3	1 1 1 1 0 1 1 1 1 0		18.7%	29.0%	42.0%	19.5%	21.3%	21.3%	965,567	1,332,496	9	19
6	50% steelhead H.R Red. C&R + weed(fall) reduce river fishing pattern consider sockeye catch	Outside (1) River	1 2 5 5 3 1 2 5 4 2	2 2 2 1 0 1 1 1 0 0		17.4%	28.0%	41.3%	21.7%	25.4%	25.4%	949,388	1,348,674	9	23
7	50% steelhead H.R Red. C&R + weed(fall) maximize sockeye catch	Outside (1) River	1 3 6 5 4 1 3 6 5 4	3 0 0 0 0 3 0 0 0 0		18.8%	31.0%	48.2%	20.5%	24.7%	24.7%	1,081,882	1,236,180	9	22
8	50% steelhead H.R Red. C&R maximize sockeye catch No weedlines	Outside (1) River	1 2 4 3 2 1 2 4 3 2	2 0 0 0 0 2 0 0 0 0		18.8%	31.0%	37.3%	15.6%	16.9%	16.9%	858,060	1,440,002	9	14
9	50% early athd. H.R Red. C&R + weed(fall) consider fishing pattern consider sockeye catch	Outside (1) River	1 2 3 2 2 1 2 3 2 2	2 2 2 1 0 2 2 2 1 0		14.7%	19.0%	28.2%	18.3%	22.1%	22.1%	648,722	1,649,340	9	17

1) eq. Outside, Sound, and Smith

Table 4. The results of various simulation runs showing the effects of alternative fishing patterns on Area 4 harvest rates for steelhead, sockeye, pink, and coho. Changes in harvest rate are compared to pattern for the 1985-1991 base period. The weekly fishing pattern represents the number of days fished within each statistical week. The weedline impacts used in the simulations represent data for 1.2m 60-mesh standard nets.

AREA	YEAR TESTED	TYPE OF WEEDLINE	NET TYPE	TESTED LOCATION	CHANGE STLHD.(1)	CHANGE SOCK.(1)	CHANGE PINK(1)	CHANGE COHO(1)	CHANGE CHINOOK(1)
4	1991	1.20 METER	60 MESH-STD	MARINE	-76%	-29%	-30%	-23%	N/A
4	1991	0.80 METER	60 MESH-STD	MARINE	-45%	-22%	-15%	-11%	N/A
4	1991	0.40 METER	60 MESH-STD	MARINE	-40%	-16%	-12%	-21%	N/A
4	1991	1.20 METER	60 MESH-STD	RIVER	-39%	-28%	-24%	6%	N/A
4	1992	1.20 METER	60 MESH-STD	MARINE	-65%	-13%	-24%	-17%	N/A
4	91-92 AVG	1.20 METER	60 MESH-STD	MARINE	-70%	-21%	-27%	-20%	N/A
4	1992	NONE	60 MESH-MONO	MARINE	-48%	0%	63%	7%	N/A
4	1992	1.20 METER	60 MESH-MONO	MARINE	-69%	17%	92%	-4%	N/A
4	1992	NONE	90 MESH-MONO	MARINE	-35%	50%	122%	68%	N/A
4	1992	1.20 METER	90 MESH-MONO	MARINE	-73%	25%	54%	31%	N/A

(1) CHANGES IN CATCH RELATIVE TO 60-MESH STD NET

Table 5. The expected change in catch for weedlines fished in Area 4. The data represent the percent change in catch, by species, compared to standard 60-mesh nets. (Source. Lewensky 1992).



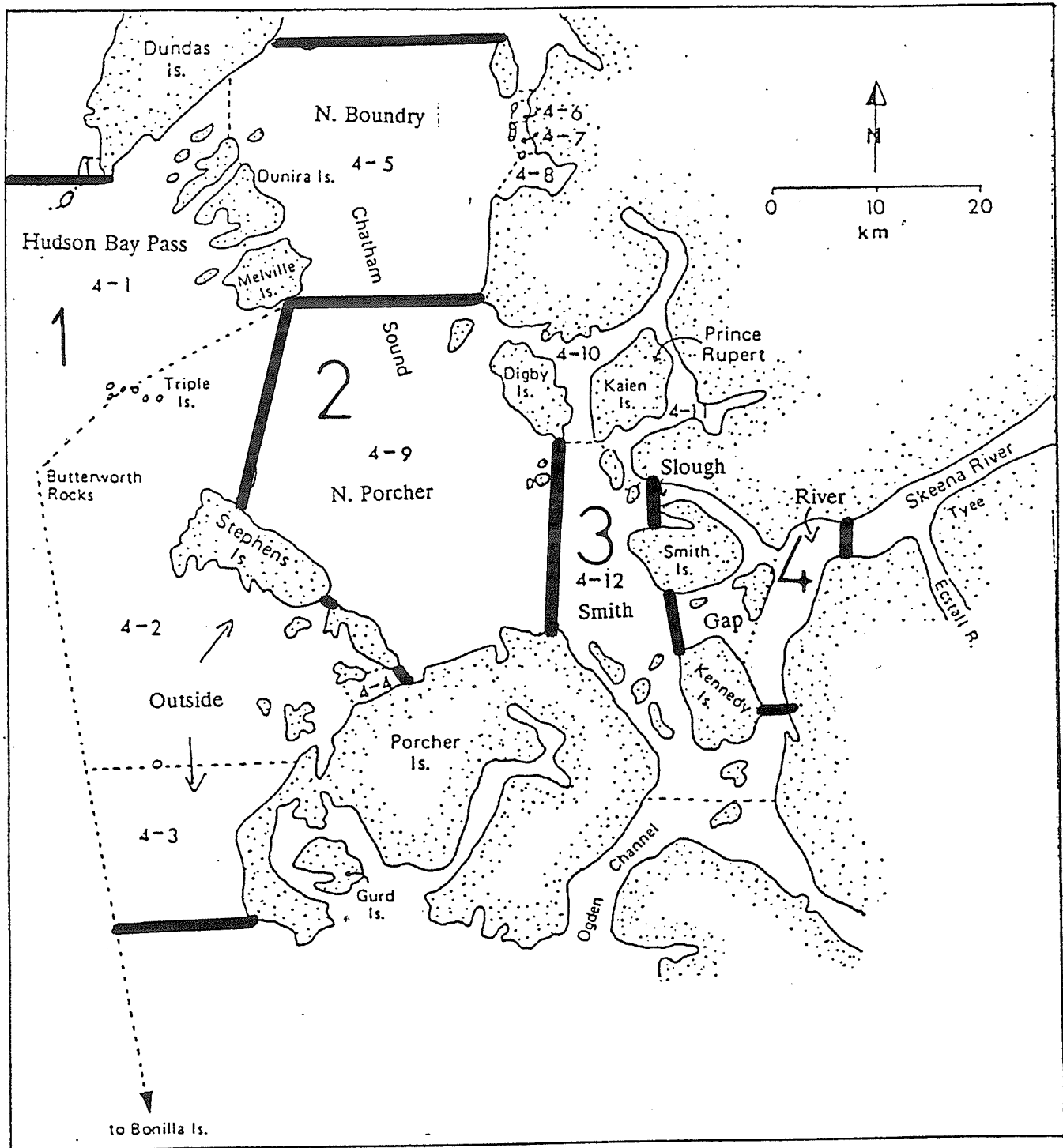


Figure 1. Map of statistical Area 4 at the mouth of the Skeena River, showing the four sub-areas used in the model : (1) Outside(4-1, 4-2, 4-3, 4-4, 4-5), (2) Sound ( 4-9), (3) Smith (4-12), and (4) River/Gap/Slough (4-13, 4-14, 4-15).

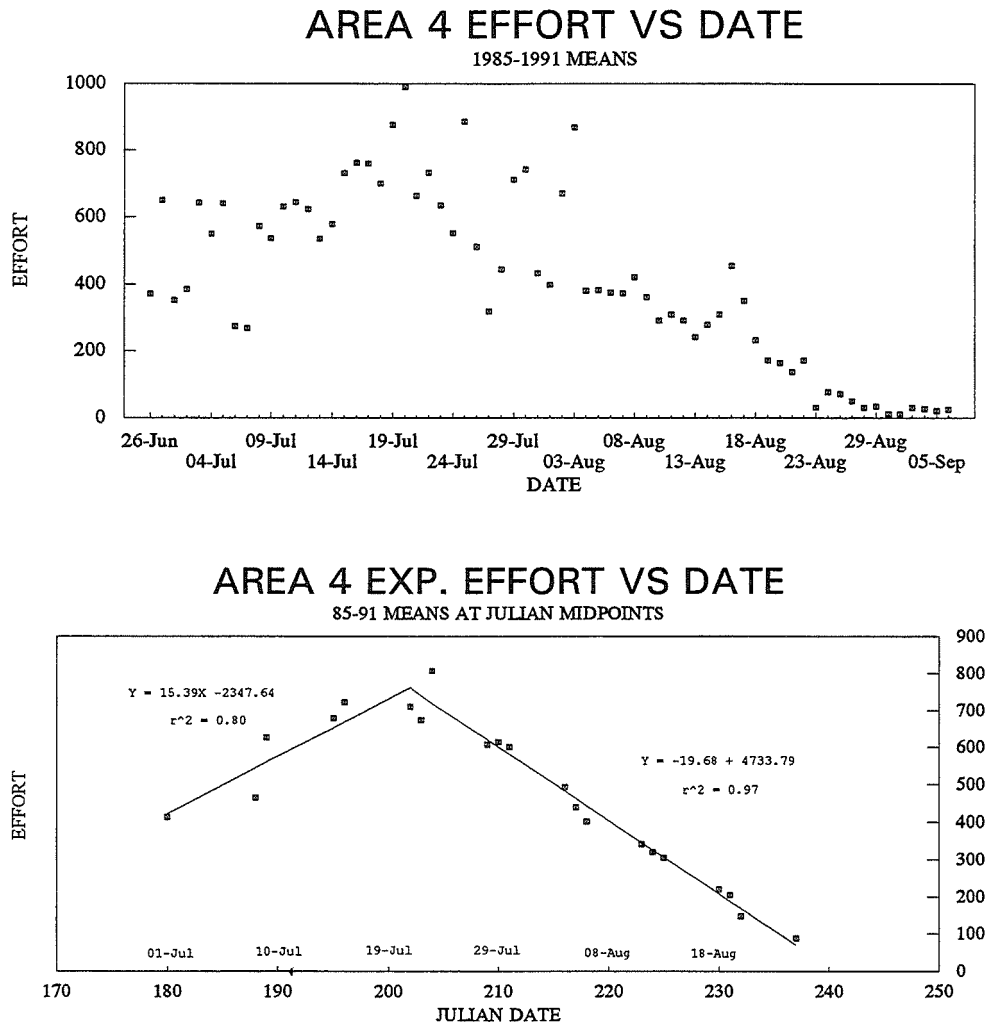


Figure 2. Average 1985-1991 total Area 4 by date. The first graph shows the actual mean effort calculated by date from 1985-1991. The second graph shows the means aligned to the mid-point of each Julian calendar week to account for differences in fishery start dates attributable to calendar variation among years.

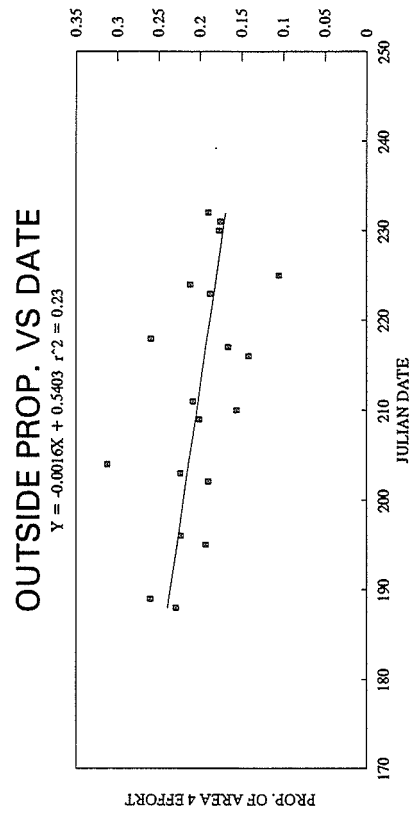
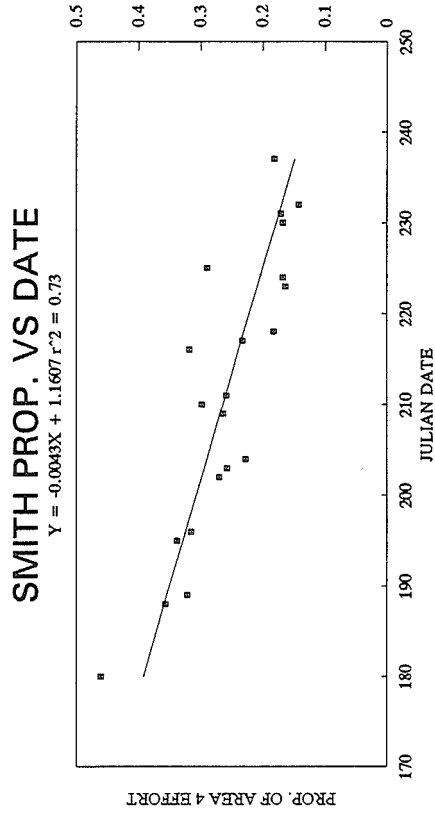
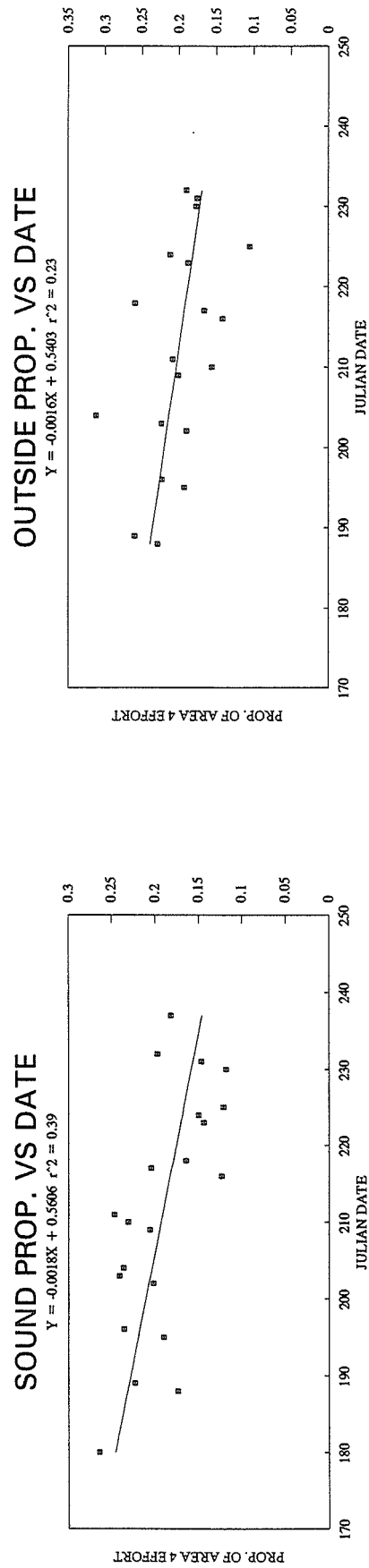
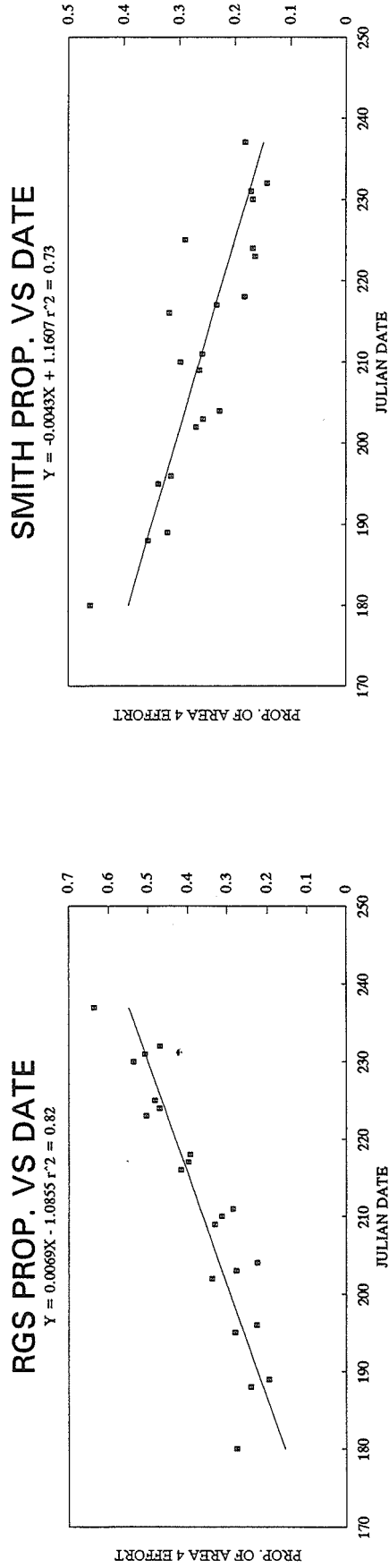


Figure 3. Average 1985-1991 sub-area proportions of total Area 4 effort by date.

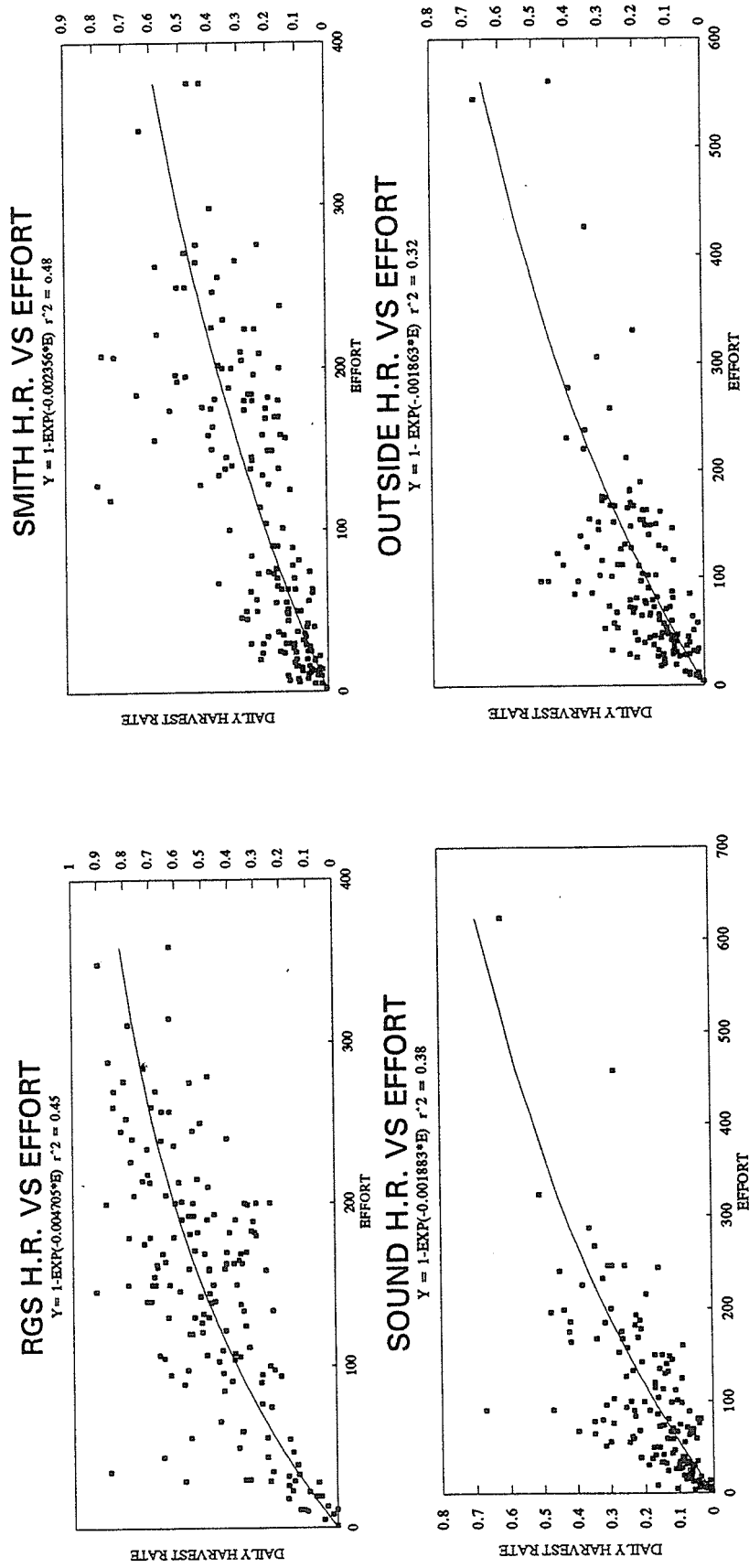


Figure 4. The relation between daily sockeye harvest rate and daily effort in each sub-area of Area 4 from 1985-1991.

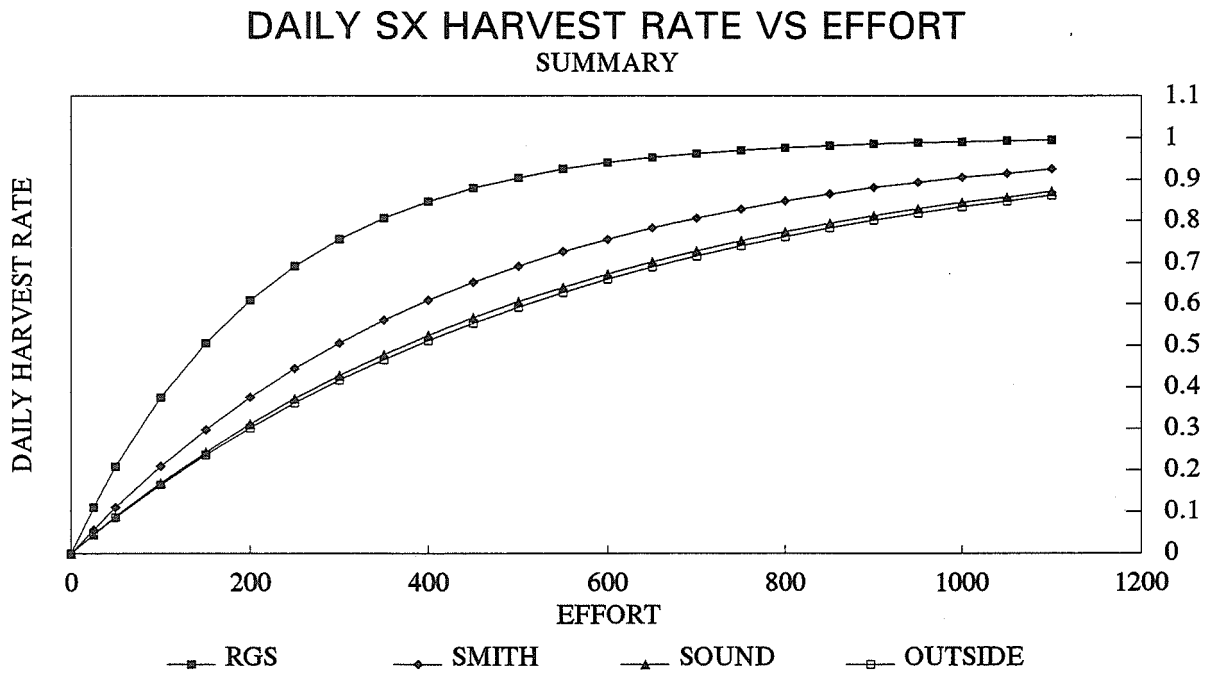


Figure 5. Summary of figure 4, showing the relationship between daily sockeye harvest rate and daily effort in each sub-area of Area 4 from 1985-1991.

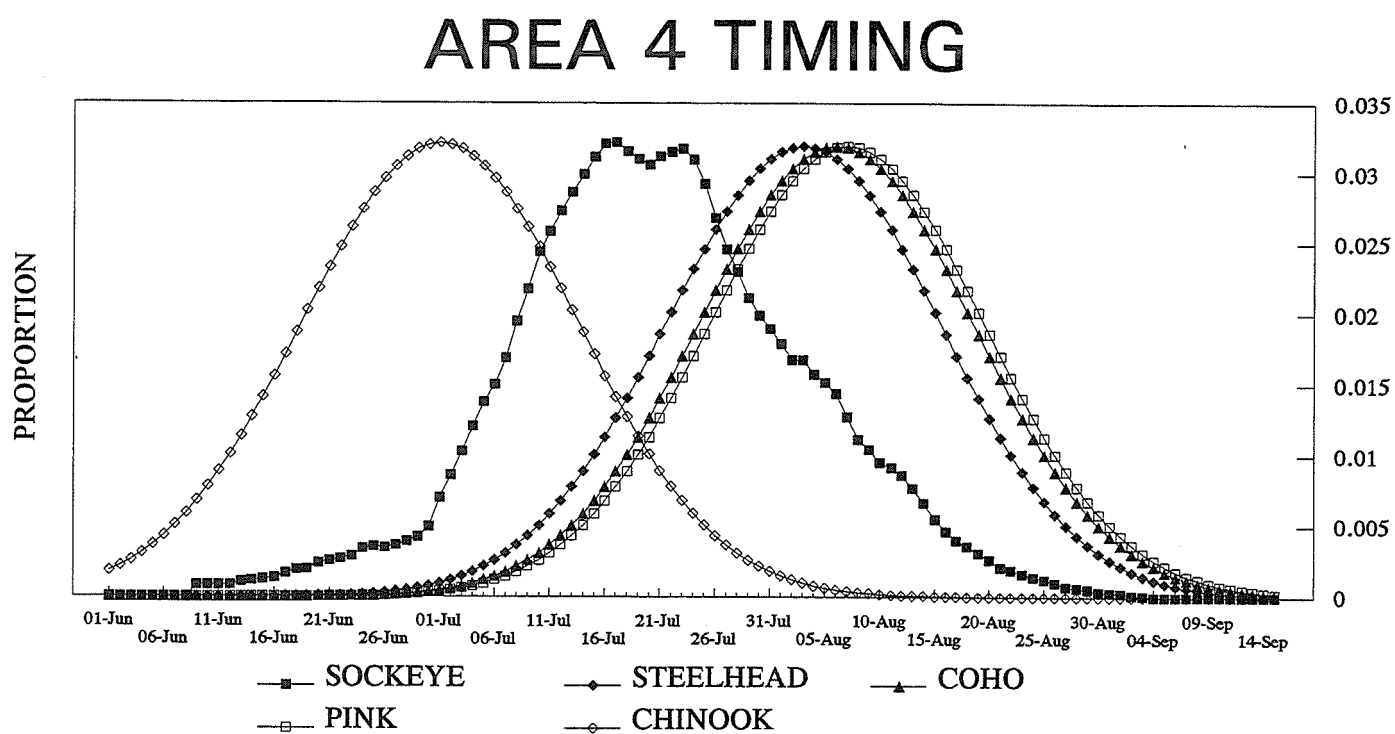
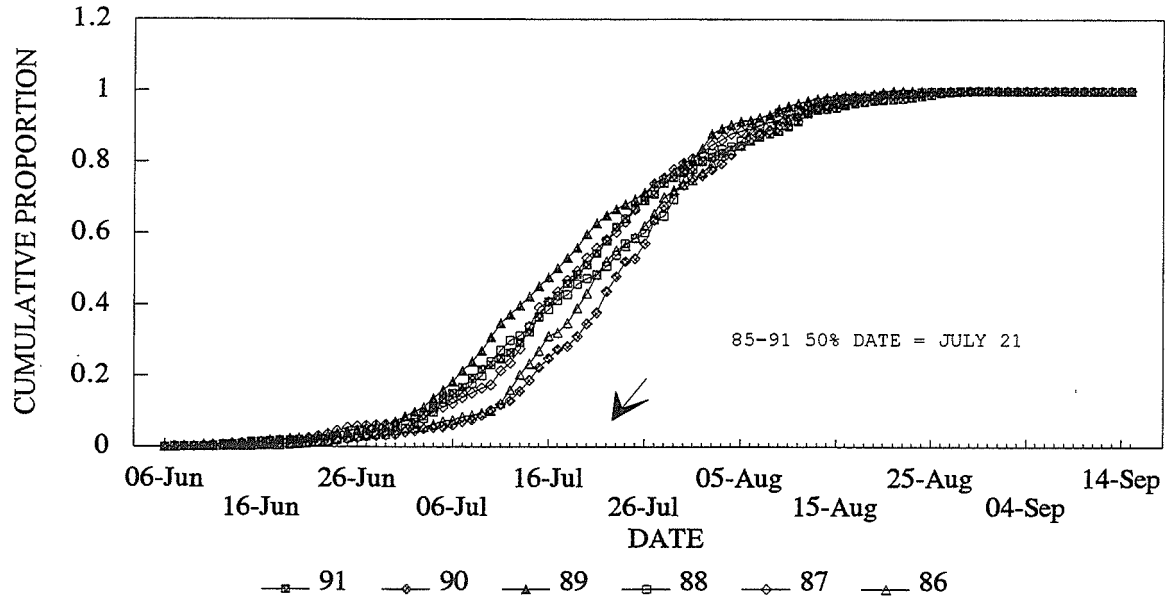


Figure 6. Average 1985-1991 run timing for chinook, sockeye, steelhead, coho, and pink salmon entering Area 4.

## AREA 4 SOCKEYE TIMING

CUMULATIVE PROPORTIONS



## AREA 4 STEELHEAD TIMING

CUMULATIVE PROPORTION CPUE

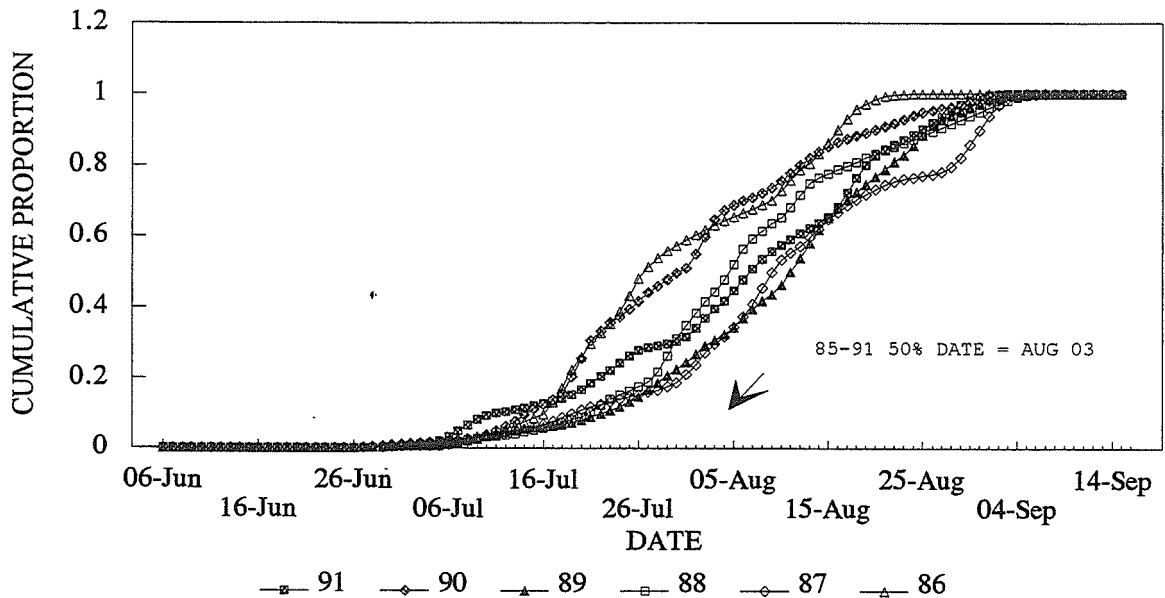


Figure 7. 1986-1991 sockeye and steelhead run timing into Area 4, expressed as cumulative daily proportions.

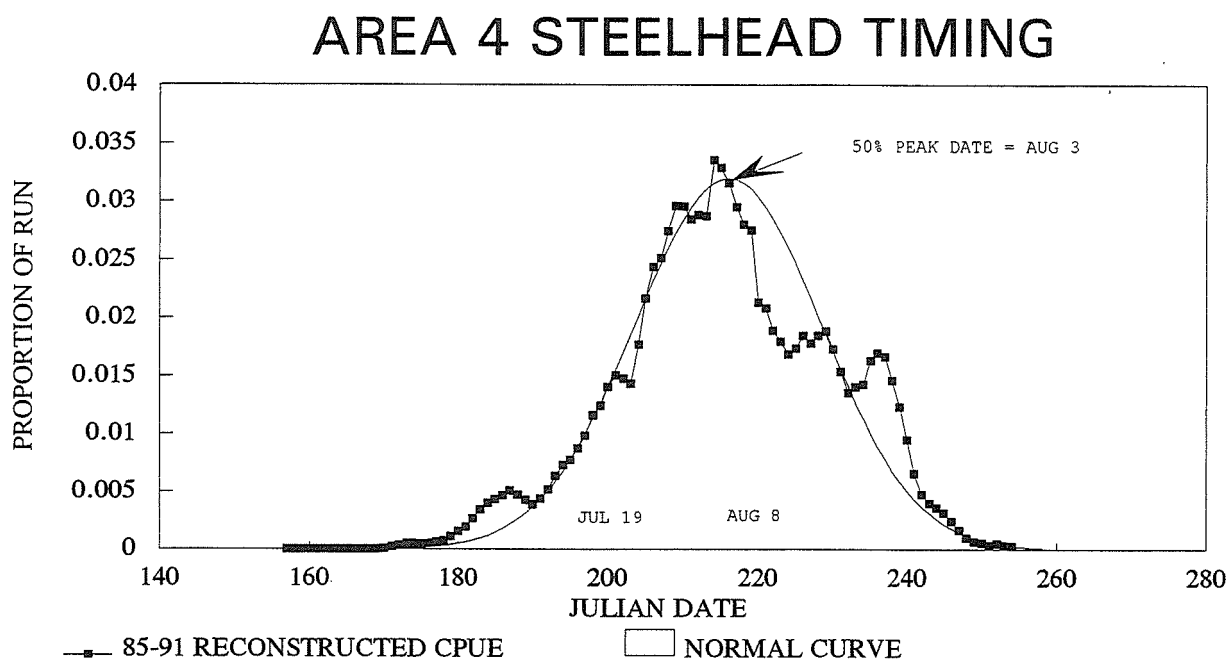


Figure 8. Average 1985-1991 steelhead run timing into Area 4, showing the smoothed proportion CPUE curve, and the normal curve used in the model to represent steelhead run timing.



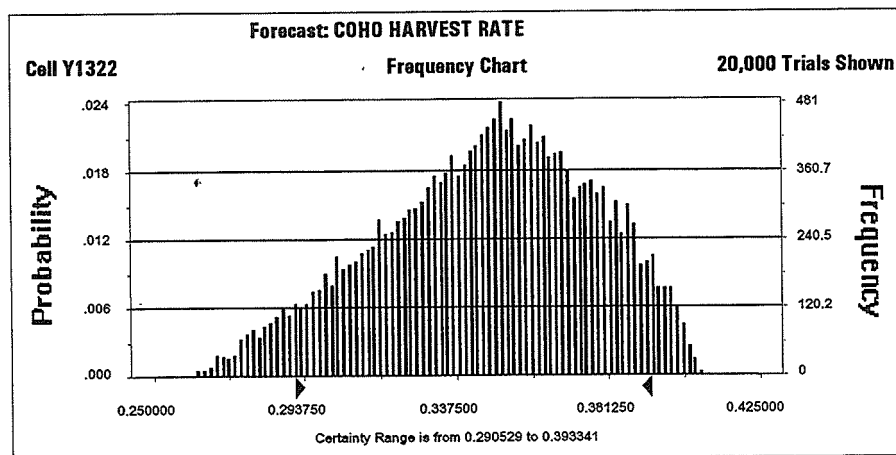
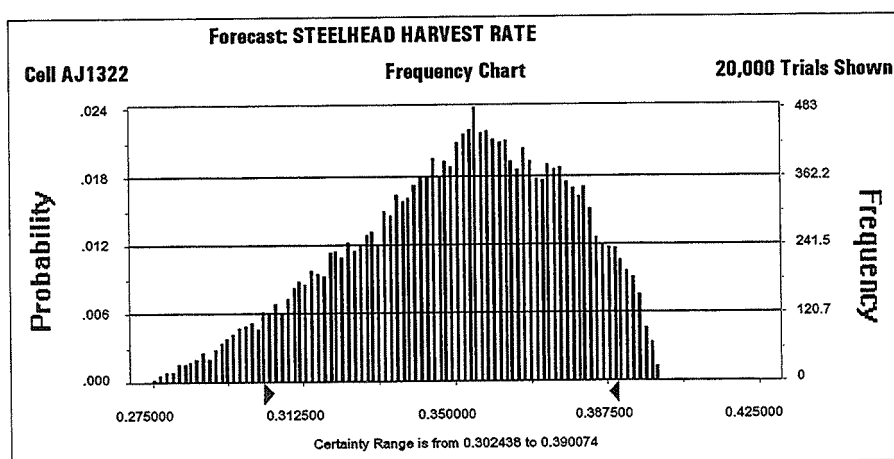
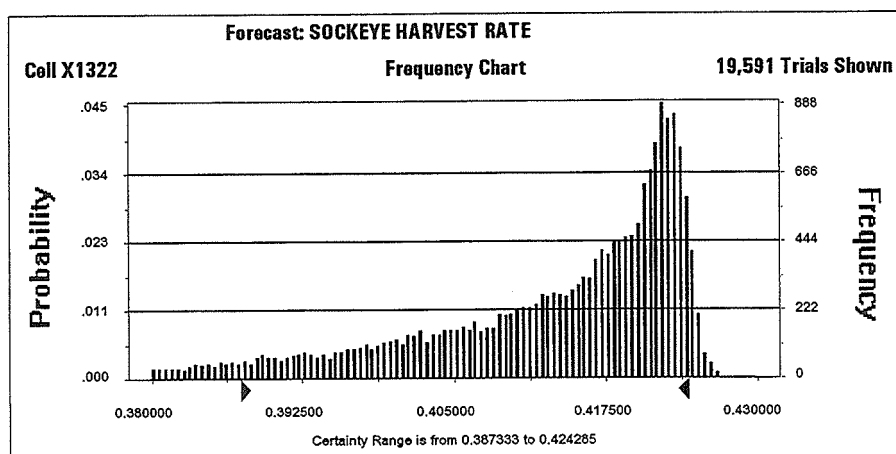


Figure 9. Probability distributions for 1985-1991 base-period Area 4 harvest rates for sockeye, steelhead, and coho, as obtained from Monte Carlo simulation.

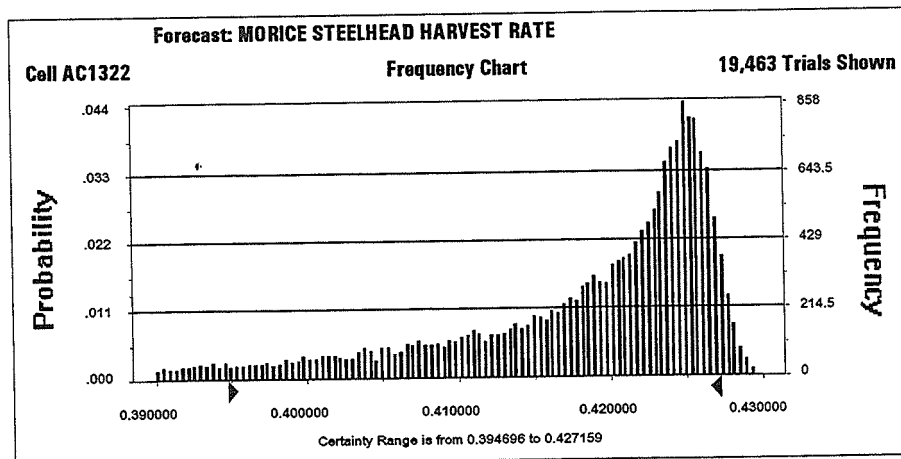
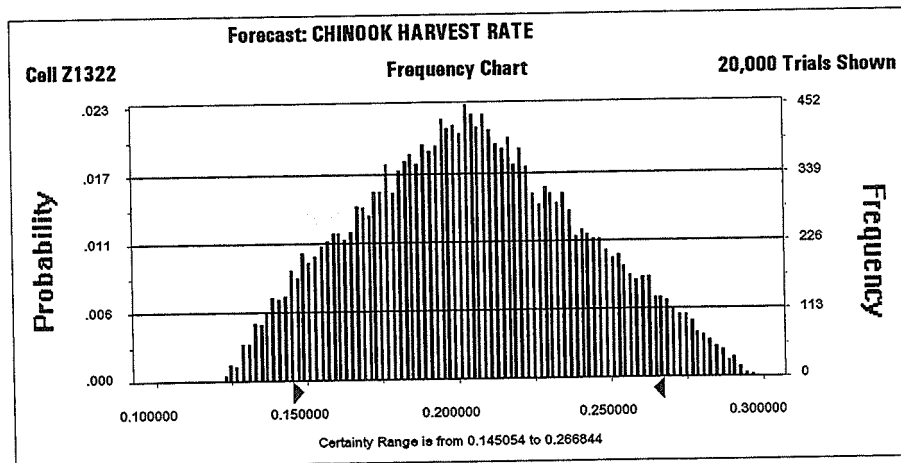
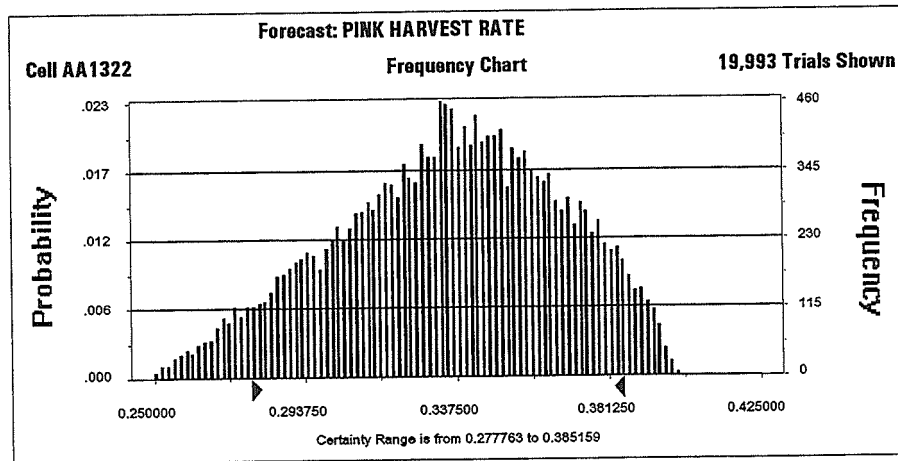


Figure 10. Probability distributions for 1985-1991 base-period Area 4 harvest rates for pinks, chinook, and early-run steelhead (Morice) as obtained from Monte Carlo simulation.

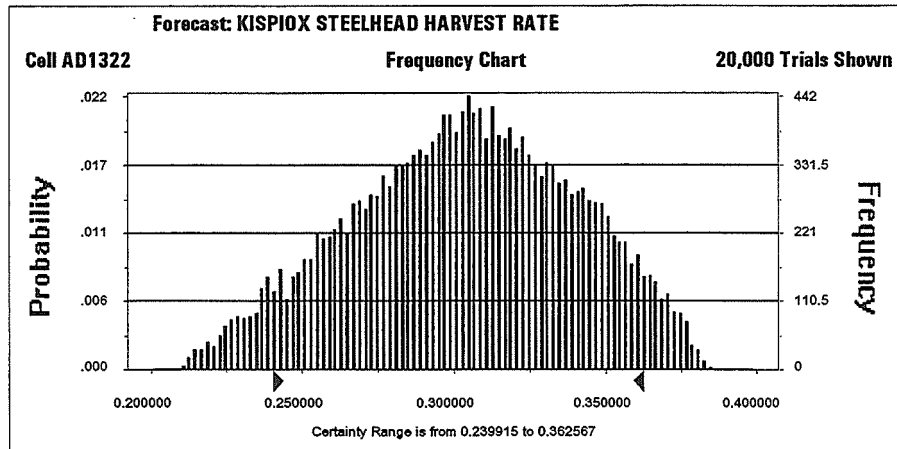
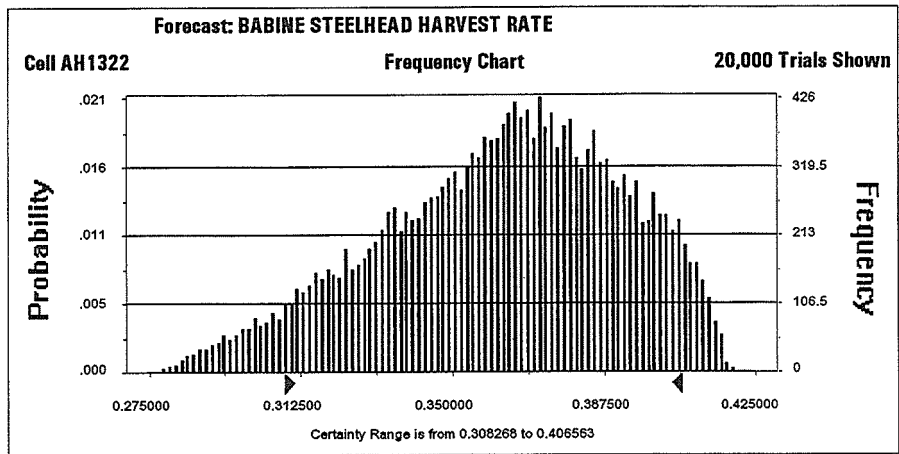


Figure 11. Probability distributions for 1985-1991 base-period Area 4 harvest rates for middle-run (Babine) and late-run (Kisplox) steelhead as obtained from Monte Carlo simulation.

APPENDIX 1. 1985-1991 Area 4 sockeye run-reconstruction through four sub-areas of Area 4 (see Figure 1).

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	JN6	JN7	JN8	JN9	JN10	JN11	JN12	JN13	JN14	JN15	JN16	JN17	JN18	JN19	JN20	JN21	JN22	JN23	JN24	JN25	JN26	JN27	JN28	JN29	JN30	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J12	J13	J14	J15	J16	J17	J18	J19	J20	J21	J22	J23	J24	J25	J26	J27	J28	J29	J30	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

21-Aug A21	11966	100	4900	4516	18188	0.25	20	1000	972	15067	0.07	35	1217	1122	13013	0.09	35	1763	1625	18322	0.09	8185
22-Aug A22	15671	85	5610	5171	12145	0.43	11	375	346	11892	0.03	35	1297	1196	16697	0.07	35	1435	1353	14985	0.09	8035
23-Aug A23	6974			0	11546	0.00			0	15502	0.00			0	13662	0.00			0	16627	0.00	
24-Aug A24	11546			0	15502	0.00			0	15662	0.00			0	16627	0.00			0	10358	0.00	
25-Aug A25	15502			0	13662	0.00			0	16627	0.00			0	10358	0.00			0	6760	0.00	
26-Aug A26	13662			0	16627	0.00			0	10358	0.00			0	6760	0.00			0	12180	0.00	
27-Aug A27	16627			0	10358	0.00			0	6760	0.00			0	12180	0.00			0	0	0.00	
28-Aug A28	10358			0	6760	0.00			0	12180	0.00			0	0	0.00			0	0	0.00	
29-Aug A29	6760			0	12180	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
30-Aug A30	12180			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
31-Aug A31	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
01-Sep S1	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
02-Sep S2	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
03-Sep S3	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
04-Sep S4	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
05-Sep S5	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
06-Sep S6	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
07-Sep S7	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
08-Sep S8	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
09-Sep S9	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
10-Sep S10	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
11-Sep S11	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
12-Sep S12	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
13-Sep S13	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
14-Sep S14	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
15-Sep S15	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
TOTAL	2154177	3866	682966	655996	2990176	0.213	2994	405115	374501	3364673	0.111	3994	533196	495054	3857727	0.128	4173	573213	530149	4387776	0.121	2035699
AREA 4 I.R.						0.145					0.085					0.112					0.121	0.463

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ACTUAL ESC	EFFORT BROS	HAIL CATCH	SALES CATCH	BROS RUN	DAILY H.R.	EFFORT SMITH	HAIL CATCH	SALES CATCH	SMITH RUN	DAILY H.R.	EFFORT SOUND	HAIL CATCH	SALES CATCH	SOUND RUN	DAILY EFFORT H.R. OUTSIDE	HAIL CATCH	SALES CATCH	OUTSIDE RUN	DAILY SALES H.R. CATCH	YEARLY TOTAL
0	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0.00	0
0	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0.00	0
0	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0.00	0
0	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0.00	0
207	0	0	0	207	0.00	0	0	0	207	0.00	0	0	0	207	0.00	0	0	0	0.00	0
97	0	0	0	97	0.00	0	0	0	97	0.00	0	0	0	97	0.00	0	0	0	0.00	0
708	0	0	0	708	0.00	0	0	0	708	0.00	0	0	0	708	0.00	0	0	0	0.00	0
13	0	0	0	13	0.00	0	0	0	13	0.00	0	0	0	13	0.00	0	0	0	0.00	0
708	0	0	0	708	0.00	0	0	0	480	0.00	0	0	0	480	0.00	0	0	0	0.00	0
13	0	0	0	13	0.00	0	0	0	48	0.00	0	0	0	48	0.00	0	0	0	0.00	0
480	0	0	0	480	0.00	0	0	0	48	0.00	0	0	0	48	0.00	0	0	0	0.00	0
14	0	0	0	14	0.00	0	0	0	457	0.00	0	0	0	457	0.00	0	0	0	0.00	0
480	0	0	0	480	0.00	0	0	0	457	0.00	0	0	0	457	0.00	0	0	0	0.00	0
15	0	0	0	15	0.00	0	0	0	251	0.00	0	0	0	251	0.00	0	0	0	0.00	0
457	0	0	0	457	0.00	0	0	0	450	0.00	0	0	0	450	0.00	0	0	0	0.00	0
457	0	0	0	457	0.00	0	0	0	450	0.00	0	0	0	450	0.00	0	0	0	0.00	0
251	0	0	0	251	0.00	0	0	0	708	0.00	0	0	0	708	0.00	0	0	0	0.00	0
450	0	0	0	450	0.00	0	0	0	812	0.00	0	0	0	812	0.00	0	0	0	0.00	0
708	0	0	0	708	0.00	0	0	0	915	0.00	0	0	0	915	0.00	0	0	0	0.00	0
812	0	0	0	812	0.00	0	0	0	862	0.00	0	0	0	862	0.00	0	0	0	0.00	0
915	0	0	0	915	0.00	0	0	0	862	0.00	0	0	0	862	0.00	0	0	0	0.00	0
207	0	0	0	207	0.00	0	0	0	1250	0.00	0	0	0	1250	0.00	0	0	0	0.00	0
152	0	0	0	152	0.00	0	0	0	1250	0.00	0	0	0	1250	0.00	0	0	0	0.00	0
2678	0	0	0	2678	0.00	0	0	0	3290	0.00	0	0	0	3290	0.00	0	0	0	0.00	0
15	0	0	0	15	0.00	0	0	0	5578	0.00	0	0	0	5578	0.00	0	0	0	0.00	0
2678	0	0	0	2678	0.00	0	0	0	3888	0.00	0	0	0	3888	0.00	0	0	0	0.00	0
25	0	0	0	25	0.00	0	0	0	5556	0.00	0	0	0	5556	0.00	0	0	0	0.00	0
5578	0	0	0	5578	0.00	0	0	0	5504	0.00	0	0	0	5504	0.00	0	0	0	0.00	0
3888	0	0	0	3888	0.00	0	0	0	8337	0.00	0	0	0	8337	0.00	0	0	0	0.00	0
5556	0	0	0	5556	0.00	0	0	0	9569	0.00	0	0	0	9569	0.00	0	0	0	0.00	0
3180	0	0	0	3180	0.00	0	0	0	8337	0.00	0	0	0	8337	0.00	0	0	0	0.00	0
5504	0	0	0	5504	0.00	0	0	0	9569	0.00	0	0	0	9569	0.00	0	0	0	0.00	0
8337	0	0	0	8337	0.00	0	0	0	4427	0.00	0	0	0	4427	0.00	0	0	0	0.00	0
9569	0	0	0	9569	0.00	0	0	0	3268	0.00	0	0	0	3268	0.00	0	0	0	0.00	0
01-Jul-71	0	0	0	0	0.00	0	0	0	4574	0.00	0	0	0	4574	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	3150	0.00	0	0	0	3150	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	8185	0.00	0	0	0	8185	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	11976	0.00	0	0	0	11976	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	5965	0.00	0	0	0	5965	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	4700	0.00	0	0	0	4700	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	5762	0.00	0	0	0	5762	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	6522	0.00	0	0	0	6522	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	8182	0.00	0	0	0	8182	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	7238	0.00	0	0	0	7238	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	49145	0.00	0	0	0	49145	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	28152	0.00	0	0	0	28152	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	49145	0.00	0	0	0	49145	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	55339	0.00	0	0	0	55339	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	46713	0.00	0	0	0	46713	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	34048	0.00	0	0	0	34048	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	54204	0.00	0	0	0	54204	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	11871	0.00	0	0	0	11871	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	54204	0.00	0	0	0	54204	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	34884	0.00	0	0	0	34884	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	54196	0.00	0	0	0	54196	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	54111	0.00	0	0	0	54111	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	60531	0.00	0	0	0	60531	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	54196	0.00	0	0	0	54196	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	7885	0.00	0	0	0	7885	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	31665	0.00	0	0	0	31665	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	15183	0.00	0	0	0	15183	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	32270	0.00	0	0	0	32270	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	42341	0.00	0	0	0	42341	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	42341	0.00	0	0	0	42341	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	13295	0.00	0	0	0	13295	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	19544	0.00	0	0	0	19544	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	27334	0.00	0	0	0	27334	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	12844	0.00	0	0	0	12844	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	19799	0.00	0	0	0	19799	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	823	0.00	0	0	0	823	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	16087	0.00	0	0	0	16087	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	937	0.00	0	0	0	937	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	516	0.00	0	0	0	516	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	1062	0.00	0	0	0	1062	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	9938	0.00	0	0	0	9938	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	11096	0.00	0	0	0	11096	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	5988	0.00	0	0	0	5988	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	829	0.00	0	0	0	829	0.00	0	0	0	0.00	0
05-Jul-71	0	0	0	0	0.00	0	0	0	538	0.00	0</									

21-Aug S21	1206	90	1080	1836	6484	0.28	30	900	890	4026	0.22	69	1732	1606	7449	0.22	54	1078	1000	3921	0.25	5332
22-Aug S22	4648				3156	0.00			0	5845	0.00			0	2922	0.00			0	0	0.00	
23-Aug S23	3156			0	5845	0.00			0	2922	0.00			0	0	0.00			0	0	0.00	
24-Aug S24	5845			0	2922	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
25-Aug S25	2922			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
26-Aug S26	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
27-Aug S27	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
28-Aug S28	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
29-Aug S29	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
30-Aug S30	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
31-Aug S31	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
01-Sep S32	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
02-Sep S33	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
03-Sep S34	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
04-Sep S35	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
05-Sep S36	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
06-Sep S37	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
07-Sep S38	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
08-Sep S39	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
09-Sep S40	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
10-Sep S41	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
11-Sep S42	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
12-Sep S43	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
13-Sep S44	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
14-Sep S45	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
15-Sep S46	0			0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
TOTAL	84412	2207	191005	177076	1021199	0.173	1214	122734	113784	1134971	0.100	1786	102066	94727	1229698	0.077	1032	69972	64863	1294561	0.050	459345
AREA 4 H.R.						0.137					0.082					0.073					0.050	0.548



1987 AREA 4 RECONSTRUCTION 24-Oct

DATE

	ACTUAL ESC	EFFORT E/G/S	HAIL CATCH	SALES CATCH	E/G/S RUN	DAILY H.R.	EFFORT SMITH	HAIL CATCH	SALES CATCH	SMITH RUN	DAILY H.R.	EFFORT SOUND	HAIL CATCH	SALES CATCH	SOUND RUN	DAILY EFFORT H.R. OUTSIDE	HAIL CATCH	SALES CATCH	OUTSIDE RUN	DAILY SALES H.R. CATCH	YEARLY TOTAL
06-Jun JN6	0	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0.00	0.00
07-Jun JN7	0	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0.00	0.00
08-Jun JN8	0	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0.00	0.00
09-Jun JN9	0	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0.00	0.00
10-Jun JN10	389	1367	0	0	1367	0.00	0	0	0	1367	0.00	0	0	0	1367	0.00	0	0	0	0.00	0.00
11-Jun JN11	933	3357	0	0	3357	0.00	0	0	0	3357	0.00	0	0	0	3357	0.00	0	0	0	0.00	0.00
12-Jun JN12	2337	2337	0	0	2337	0.00	0	0	0	2337	0.00	0	0	0	2337	0.00	0	0	0	0.00	0.00
13-Jun JN13	2337	2337	0	0	2337	0.00	0	0	0	2337	0.00	0	0	0	2337	0.00	0	0	0	0.00	0.00
14-Jun JN14	2337	2337	0	0	2337	0.00	0	0	0	2337	0.00	0	0	0	2337	0.00	0	0	0	0.00	0.00
15-Jun JN15	2337	2337	0	0	2337	0.00	0	0	0	2337	0.00	0	0	0	2337	0.00	0	0	0	0.00	0.00
16-Jun JN16	2337	2337	0	0	2337	0.00	0	0	0	2337	0.00	0	0	0	2337	0.00	0	0	0	0.00	0.00
17-Jun JN17	5141	5141	0	0	5141	0.00	0	0	0	5141	0.00	0	0	0	5141	0.00	0	0	0	0.00	0.00
18-Jun JN18	3862	3862	0	0	3862	0.00	0	0	0	3862	0.00	0	0	0	3862	0.00	0	0	0	0.00	0.00
19-Jun JN19	4163	4163	0	0	4163	0.00	0	0	0	4163	0.00	0	0	0	4163	0.00	0	0	0	0.00	0.00
20-Jun JN20	2959	2959	0	0	2959	0.00	0	0	0	2959	0.00	0	0	0	2959	0.00	0	0	0	0.00	0.00
21-Jun JN21	4100	4100	0	0	4100	0.00	0	0	0	4100	0.00	0	0	0	4100	0.00	0	0	0	0.00	0.00
22-Jun JN22	3035	3035	0	0	3035	0.00	0	0	0	3035	0.00	0	0	0	3035	0.00	0	0	0	0.00	0.00
23-Jun JN23	4627	4627	0	0	4627	0.00	0	0	0	4627	0.00	0	0	0	4627	0.00	0	0	0	0.00	0.00
24-Jun JN24	1877	1877	0	0	1877	0.00	0	0	0	1877	0.00	0	0	0	1877	0.00	0	0	0	0.00	0.00
25-Jun JN25	7061	7061	0	0	7061	0.00	0	0	0	7061	0.00	0	0	0	7061	0.00	0	0	0	0.00	0.00
26-Jun JN26	10909	10909	0	0	10909	0.00	0	0	0	10909	0.00	0	0	0	10909	0.00	0	0	0	0.00	0.00
27-Jun JN27	1442	1442	0	0	1442	0.00	0	0	0	1442	0.00	0	0	0	1442	0.00	0	0	0	0.00	0.00
28-Jun JN28	16527	16527	0	0	16527	0.00	0	0	0	16527	0.00	0	0	0	16527	0.00	0	0	0	0.00	0.00
29-Jun JN29	18195	18195	0	0	18195	0.00	0	0	0	18195	0.00	0	0	0	18195	0.00	0	0	0	0.00	0.00
30-Jun JN30	7148	7148	0	0	7148	0.00	0	0	0	7148	0.00	0	0	0	7148	0.00	0	0	0	0.00	0.00
01-Jul J1	2320	2320	0	0	2320	0.00	0	0	0	2320	0.00	0	0	0	2320	0.00	0	0	0	0.00	0.00
02-Jul J2	3135	3135	0	0	3135	0.00	0	0	0	3135	0.00	0	0	0	3135	0.00	0	0	0	0.00	0.00
03-Jul J3	4351	4351	0	0	4351	0.00	0	0	0	4351	0.00	0	0	0	4351	0.00	0	0	0	0.00	0.00
04-Jul J4	8976	8976	0	0	8976	0.00	0	0	0	8976	0.00	0	0	0	8976	0.00	0	0	0	0.00	0.00
05-Jul J5	13290	13290	0	0	13290	0.00	0	0	0	13290	0.00	0	0	0	13290	0.00	0	0	0	0.00	0.00
06-Jul J6	17154	17154	0	0	17154	0.00	0	0	0	17154	0.00	0	0	0	17154	0.00	0	0	0	0.00	0.00
07-Jul J7	17154	17154	0	0	17154	0.00	0	0	0	17154	0.00	0	0	0	17154	0.00	0	0	0	0.00	0.00
08-Jul J8	16923	16923	0	0	16923	0.00	0	0	0	16923	0.00	0	0	0	16923	0.00	0	0	0	0.00	0.00
09-Jul J9	15800	15800	0	0	15800	0.00	0	0	0	15800	0.00	0	0	0	15800	0.00	0	0	0	0.00	0.00
10-Jul J10	32527	32527	0	0	32527	0.00	0	0	0	32527	0.00	0	0	0	32527	0.00	0	0	0	0.00	0.00
11-Jul J11	25643	25643	0	0	25643	0.00	0	0	0	25643	0.00	0	0	0	25643	0.00	0	0	0	0.00	0.00
12-Jul J12	27449	27449	0	0	27449	0.00	0	0	0	27449	0.00	0	0	0	27449	0.00	0	0	0	0.00	0.00
13-Jul J13	14696	14696	0	0	14696	0.00	0	0	0	14696	0.00	0	0	0	14696	0.00	0	0	0	0.00	0.00
14-Jul J14	3142	3142	0	0	3142	0.00	0	0	0	3142	0.00	0	0	0	3142	0.00	0	0	0	0.00	0.00
15-Jul J15	30157	30157	0	0	30157	0.00	0	0	0	30157	0.00	0	0	0	30157	0.00	0	0	0	0.00	0.00
16-Jul J16	64190	64190	0	0	64190	0.00	0	0	0	64190	0.00	0	0	0	64190	0.00	0	0	0	0.00	0.00
17-Jul J17	122975	122975	0	0	122975	0.00	0	0	0	122975	0.00	0	0	0	122975	0.00	0	0	0	0.00	0.00
18-Jul J18	122975	122975	0	0	122975	0.00	0	0	0	122975	0.00	0	0	0	122975	0.00	0	0	0	0.00	0.00
19-Jul J19	103501	103501	0	0	103501	0.00	0	0	0	103501	0.00	0	0	0	103501	0.00	0	0	0	0.00	0.00
20-Jul J20	31625	31625	0	0	31625	0.00	0	0	0	31625	0.00	0	0	0	31625	0.00	0	0	0	0.00	0.00
21-Jul J21	29561	29561	0	0	29561	0.00	0	0	0	29561	0.00	0	0	0	29561	0.00	0	0	0	0.00	0.00
22-Jul J22	24088	24088	0	0	24088	0.00	0	0	0	24088	0.00	0	0	0	24088	0.00	0	0	0	0.00	0.00
23-Jul J23	23698	23698	0	0	23698	0.00	0	0	0	23698	0.00	0	0	0	23698	0.00	0	0	0	0.00	0.00
24-Jul J24	17856	17856	0	0	17856	0.00	0	0	0	17856	0.00	0	0	0	17856	0.00	0	0	0	0.00	0.00
25-Jul J25	41129	41129	0	0	41129	0.00	0	0	0	41129	0.00	0	0	0	41129	0.00	0	0	0	0.00	0.00
26-Jul J26	44641	44641	0	0	44641	0.00	0	0	0	44641	0.00	0	0	0	44641	0.00	0	0	0	0.00	0.00
27-Jul J27	44641	44641	0	0	44641	0.00	0	0	0	44641	0.00	0	0	0	44641	0.00	0	0	0	0.00	0.00
28-Jul J28	42097	42097	0	0	42097	0.00	0	0	0	42097	0.00	0	0	0	42097	0.00	0	0	0	0.00	0.00
29-Jul J29	52992	52992	0	0	52992	0.00	0	0	0	52992	0.00	0	0	0	52992	0.00	0	0	0	0.00	0.00
30-Jul J30	62108	62108	0	0	62108	0.00	0	0	0	62108	0.00	0	0	0	62108	0.00	0	0	0	0.00	0.00
31-Jul J31	62108	62108	0	0	62108	0.00	0	0	0	62108	0.00	0	0	0	62108	0.00	0	0	0	0.00	0.00
01-Aug A1	32038	32038	0	0	32038	0.00	0	0	0	32038	0.00	0	0	0	32038	0.00	0	0	0	0.00	0.00
02-Aug A2	46221	46221	0	0	46221	0.00	0	0	0	46221	0.00	0	0	0	46221	0.00	0	0	0	0.00	0.00
03-Aug A3	10082	10082	0	0	10082	0.00	0	0	0	10082	0.00	0	0	0	10082	0.00	0	0	0	0.00	0.00
04-Aug A4	1213	1213	0	0	1213	0.00	0	0	0	1213	0.00	0	0	0	1213	0.00	0	0	0	0.00	0.00
05-Aug A5	8306	8306	0	0	8306	0.00	0	0	0	8306	0.00	0	0	0	8306	0.00	0	0	0	0.00	0.00
06-Aug A6	14408	14408	0	0	14408	0.00	0	0	0	14408	0.00	0	0	0	14408	0.00	0	0	0	0.00	0.00
07-Aug A7	19210	19210	0	0	19210	0.00	0	0	0	19210	0.00	0	0	0	19210	0.00	0	0	0	0.00	0.00
08-Aug A8	23111	23111	0	0	23111	0.00	0	0	0	23111	0.00	0	0	0	23111	0.00	0	0	0	0.00	0.00
09-Aug A9	10684	10684	0	0	10684	0.00	0	0	0	10684	0.00	0	0	0	10684	0.00	0	0	0	0.00	0.00
10-Aug A10	4564	4564	0	0	4564	0.00	0	0	0	4564	0.00	0	0	0	4564	0.00	0	0	0	0.00	0.00
11-Aug A11	5618	5618	0	0	5618	0.00	0	0	0	5618	0.00	0	0	0	5618	0.00	0	0	0	0.00	0.00
12-Aug A12	3323	3323	0	0	3323	0.00	0	0	0	3323	0.00	0	0	0	3323	0.00	0	0	0	0.00	0.00
13-Aug A13	2119	2119	0	0	2119	0.00	0	0	0	2119	0.00	0	0	0	2119	0.00	0	0	0	0.00	0.00



198 AREA 4 RECONSTRUCTION  
24-Oct

DATE

1998 AREA 4 RECONSTRUCTION																					
24-Oct																					
DATE	ACTUAL ESC	EFFORT B/G/S	HAUL CATCH	SALES CATCH	B/G/S RUN	DAILY H.R.	EFFORT SMITH	HAUL CATCH	SALES CATCH	SMITH RUN	DAILY H.R.	EFFORT SOUND	HAUL CATCH	SALES CATCH	SOUND RUN	DAILY EFFORT H.R. OUTSIDE	HAUL CATCH	SALES CATCH	OUTSIDE RUN	YEARLY TOTAL DAILY SALES H.R. CATCH	
06-Jun JN6				0	0	0.00			0	851	0.00			0	558	0.00		0	265	0.00	
07-Jun JN7				0	0	0.00			0	558	0.00			0	265	0.00		0	247	0.00	
08-Jun JN8	851			0	0	0.00			0	265	0.00			0	247	0.00		0	265	0.00	
09-Jun JN9	558			0	0	0.00			0	265	0.00			0	1674	0.00		0	1674	0.00	
10-Jun JN10	247			0	0	0.00			0	247	0.00			0	1674	0.00		0	1390	0.00	
11-Jun JN11	265			0	0	0.00			0	1674	0.00			0	2131	0.00		0	2131	0.00	
12-Jun JN12	1290			0	0	0.00			0	2131	0.00			0	2131	0.00		0	2899	0.00	
13-Jun JN13	2131			0	0	0.00			0	2899	0.00			0	1290	0.00		0	1290	0.00	
14-Jun JN14	2899			0	0	0.00			0	1290	0.00			0	1253	0.00		0	1253	0.00	
15-Jun JN15	1290			0	0	0.00			0	1253	0.00			0	1957	0.00		0	1957	0.00	
16-Jun JN16	2131			0	0	0.00			0	1957	0.00			0	3045	0.00		0	3045	0.00	
17-Jun JN17	2899			0	0	0.00			0	3045	0.00			0	3951	0.00		0	3951	0.00	
18-Jun JN18	1290			0	0	0.00			0	3951	0.00			0	3951	0.00		0	3951	0.00	
19-Jun JN19	1253			0	0	0.00			0	3951	0.00			0	3951	0.00		0	3951	0.00	
20-Jun JN20	1957			0	0	0.00			0	3951	0.00			0	3951	0.00		0	3951	0.00	
21-Jun JN21	3045			0	0	0.00			0	3951	0.00			0	3951	0.00		0	3951	0.00	
22-Jun JN22	3951			0	0	0.00			0	3951	0.00			0	6255	0.00		0	6255	0.00	
23-Jun JN23	3951			0	0	0.00			0	6255	0.00			0	5012	0.00		0	5012	0.00	
24-Jun JN24	6255			0	0	0.00			0	5012	0.00			0	3100	0.00		0	3100	0.00	
25-Jun JN25	5012			0	0	0.00			0	3100	0.00			0	7632	0.00		0	7632	0.00	
26-Jun JN26	3100			0	0	0.00			0	7632	0.00			0	17390	0.00		0	17390	0.00	
27-Jun JN27	17390			0	0	0.00			0	17390	0.00			0	13380	0.00		0	13380	0.00	
28-Jun JN28	7632			0	0	0.00			0	13380	0.00			0	13380	0.00		0	13380	0.00	
29-Jun JN29	3411			0	0	0.00			0	9337	0.00			0	16544	0.00		0	16544	0.00	
30-Jun JN30	7234			0	0	0.00			0	8350	0.00			0	13471	0.00		0	13471	0.00	
01-Jul J1	8350			0	0	0.00			0	16544	0.00			0	24640	0.00		0	24640	0.00	
02-Jul J2	16544			0	0	0.00			0	13471	0.00			0	4253	0.00		0	4253	0.00	
03-Jul J3	13590			0	0	0.00			0	4253	0.00			0	1196	0.00		0	1196	0.00	
04-Jul J4	13471			0	0	0.00			0	24640	0.00			0	3100	0.00		0	3100	0.00	
05-Jul J5	7911			0	0	0.00			0	4253	0.00			0	4253	0.00		0	4253	0.00	
06-Jul J6	1196			0	0	0.00			0	38458	0.00			0	83847	0.00		0	83847	0.00	
07-Jul J7	3100			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
08-Jul J8	38458			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
09-Jul J9	83847			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
10-Jul J10	33497			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
11-Jul J11	13078			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
12-Jul J12	23705			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
13-Jul J13	8185			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
14-Jul J14	59665			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
15-Jul J15	38823			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
16-Jul J16	96055			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
17-Jul J17	7082			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
18-Jul J18	14699			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
19-Jul J19	23520			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
20-Jul J20	24240			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
21-Jul J21	22290			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
22-Jul J22	12493			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
23-Jul J23	48899			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
24-Jul J24	226			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
25-Jul J25	226			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
26-Jul J26	226			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
27-Jul J27	226			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
28-Jul J28	68135			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
29-Jul J29	43395			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
30-Jul J30	47099			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
31-Jul J31	113422			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
01-Aug A1	127400			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
02-Aug A2	31771			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
03-Aug A3	22123			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
04-Aug A4	22123			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
05-Aug A5	22123			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
06-Aug A6	18666			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
07-Aug A7	23566			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
08-Aug A8	20815			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
09-Aug A9	10782			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
10-Aug A10	31506			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
11-Aug A11	30710			0	0	0.00			0	83847	0.00			0	83847	0.00		0	83847	0.00	
12-Aug A12	57068																				

21-Aug A21	4389	200	4800	0	2189	0.00	3.4	952	0	7442	0.00	31	837	0	11676	0.00	-40	216	0	4124	0.00	6388
22-Aug A22	2789			4506	7442	0.61			894	11676	0.08			786	4472	0.19			203	4673	0.04	
23-Aug A23	2936			0	10782	0.00			0	3338	0.00			0	2826	0.00			0	8279	0.00	
24-Aug A24	10782			0	3338	0.00			0	4472	0.00			0	3631	0.00			0	3631	0.00	
25-Aug A25	3338			0	4472	0.00			0	2826	0.00			0	3631	0.00			0	2863	0.00	
26-Aug A26	4472			0	2826	0.00			0	8679	0.00			0	2863	0.00			0	2844	0.00	
27-Aug A27	2826			0	8679	0.00			0	3631	0.00			0	2844	0.00			0	1582	0.00	
28-Aug A28	8679			0	3631	0.00			0	2844	0.00			0	1582	0.00			0	558	0.00	
29-Aug A29	3631			0	2844	0.00			0	1582	0.00			0	558	0.00			0	274	0.00	
30-Aug A30	2844			0	1582	0.00			0	558	0.00			0	274	0.00			0	750	0.00	
31-Aug A31	1582			0	558	0.00			0	274	0.00			0	750	0.00			0	0	0.00	
01-Sep A32	558			0	274	0.00			0	750	0.00			0	1225	0.00			0	0	0.00	
02-Sep A33	274			0	750	0.00			0	1225	0.00			0	1107	0.00			0	0	0.00	
03-Sep A34	750			0	1225	0.00			0	1107	0.00			0	1344	0.00			0	0	0.00	
04-Sep A35	1225			0	1107	0.00			0	1344	0.00			0	1610	0.00			0	0	0.00	
05-Sep A36	1107			0	1344	0.00			0	1610	0.00			0	1701	0.00			0	0	0.00	
06-Sep A37	1344			0	1610	0.00			0	1701	0.00			0	0	0			0	0	0.00	
07-Sep A38	1610			0	1701	0.00			0	0	0.00			0	0	0			0	0	0.00	
08-Sep A39	1701			0	0	0.00			0	0	0.00			0	0	0			0	0	0.00	
09-Sep A40				0	0	0.00			0	0	0.00			0	0	0			0	0	0.00	
10-Sep A41				0	0	0.00			0	0	0.00			0	0	0			0	0	0.00	
11-Sep A42				0	0	0.00			0	0	0.00			0	0	0			0	0	0.00	
12-Sep A43				0	0	0.00			0	0	0.00			0	0	0			0	0	0.00	
13-Sep A44				0	0	0.00			0	0	0.00			0	0	0			0	0	0.00	
14-Sep A45				0	0	0.00			0	0	0.00			0	0	0			0	0	0.00	
15-Sep A46				0	0	0.00			0	0	0.00			0	0	0			0	0	0.00	
TOTAL	1528597	5084	785469	704867	2235464	0.316	3763	445297	399473	2634937	0.152	3543	266578	215921	2848088	0.075	3016	236963	192835	3033297	0.064	1515096
AREA 4 H.R.						0.232					0.131					0.070					0.063	0.497

1989 AREA 4 RECONSTRUCTION										YEARLY TOTAL			
24-Oct										DAILY SALES			
DATE	ACTUAL	EFFORT	HAIR	SALES	R/G/S	DAILY	EFFORT	HAIR	SALES	DAILY	EFFORT	HAIR	SALES
	ESC	R/G/S	CATCH	CATCH	RUN	H.R.	SMITH	CATCH	CATCH	H.R.	OUTSIDE	CATCH	H.R. CATCH
06-Jun JN6	0	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00
07-Jun JN7	0	0	0	0	915	0.00	915	0	0	0.00	610	0	0.00
08-Jun JN8	0	0	0	0	610	0.00	610	0	0	0.00	1476	0	0.00
09-Jun JN9	915	0	0	0	1476	0.00	1476	0	0	0.00	1791	0	0.00
10-Jun JN10	610	0	0	0	1791	0.00	1791	0	0	0.00	1112	0	0.00
11-Jun JN11	1476	0	0	0	1112	0.00	1112	0	0	0.00	6802	0	0.00
12-Jun JN12	1791	0	0	0	6802	0.00	6802	0	0	0.00	2097	0	0.00
13-Jun JN13	1112	0	0	0	2097	0.00	2097	0	0	0.00	2345	0	0.00
14-Jun JN14	6802	0	0	0	1112	0.00	1112	0	0	0.00	2145	0	0.00
15-Jun JN15	2097	0	0	0	6802	0.00	6802	0	0	0.00	1181	0	0.00
16-Jun JN16	1112	0	0	0	2097	0.00	2097	0	0	0.00	4626	0	0.00
17-Jun JN17	6802	0	0	0	1112	0.00	1112	0	0	0.00	4892	0	0.00
18-Jun JN18	2097	0	0	0	6802	0.00	6802	0	0	0.00	4597	0	0.00
19-Jun JN19	1112	0	0	0	2097	0.00	2097	0	0	0.00	3022	0	0.00
20-Jun JN20	6802	0	0	0	1112	0.00	1112	0	0	0.00	4026	0	0.00
21-Jun JN21	2097	0	0	0	6802	0.00	6802	0	0	0.00	5679	0	0.00
22-Jun JN22	1112	0	0	0	2097	0.00	2097	0	0	0.00	1831	0	0.00
23-Jun JN23	6802	0	0	0	1112	0.00	1112	0	0	0.00	3868	0	0.00
24-Jun JN24	2097	0	0	0	6802	0.00	6802	0	0	0.00	1502	0	0.00
25-Jun JN25	1112	0	0	0	2097	0.00	2097	0	0	0.00	13262	0	0.00
26-Jun JN26	6802	0	0	0	1112	0.00	1112	0	0	0.00	6450	0	0.00
27-Jun JN27	2097	0	0	0	6802	0.00	6802	0	0	0.00	10905	0	0.15
28-Jun JN28	1112	0	0	0	2097	0.00	2097	0	0	0.00	10286	0	0.00
29-Jun JN29	6802	0	0	0	1112	0.00	1112	0	0	0.00	8672	0	0.00
30-Jun JN30	2097	0	0	0	6802	0.00	6802	0	0	0.00	8652	0	0.00
01-Jul J1	10286	0	0	0	8672	0.00	8672	0	0	0.00	27233	0	0.00
02-Jul J2	8672	0	0	0	10286	0.00	10286	0	0	0.00	21200	0	0.00
03-Jul J3	8652	0	0	0	8652	0.00	8652	0	0	0.00	22825	0	0.15
04-Jul J4	7924	0	0	0	11536	0.00	11536	0	0	0.00	43182	0	0.00
05-Jul J5	21566	0	0	0	19448	0.00	19448	0	0	0.00	46942	0	0.00
06-Jul J6	11536	0	0	0	19448	0.00	19448	0	0	0.00	56756	0	0.00
07-Jul J7	19448	0	0	0	11536	0.00	11536	0	0	0.00	46442	0	0.00
08-Jul J8	49235	0	0	0	49235	0.00	49235	0	0	0.00	59290	0	0.00
09-Jul J9	49235	0	0	0	42168	0.00	42168	0	0	0.00	69994	0	0.30
10-Jul J10	42168	0	0	0	46942	0.00	46942	0	0	0.00	74618	0	0.23
11-Jul J11	46942	0	0	0	56756	0.00	56756	0	0	0.00	46300	0	0.21
12-Jul J12	11664	210	12266	11856	26695	0.79	26695	104	5952	0.16	12120	0	0.00
13-Jul J13	11856	200	11054	11857	38774	0.30	38774	74	4443	0.15	23350	0	0.00
14-Jul J14	27206	0	0	0	35416	0.00	35416	72	4246	0.08	21327	0	0.00
15-Jul J15	35416	0	0	0	35360	0.00	35360	0	0	0.00	46737	0	0.00
16-Jul J16	35360	0	0	0	35416	0.00	35416	0	0	0.00	54658	0	0.00
17-Jul J17	35360	0	0	0	35416	0.00	35416	0	0	0.00	70420	0	0.00
18-Jul J18	35360	0	0	0	35416	0.00	35416	0	0	0.00	40051	0	0.00
19-Jul J19	35360	0	0	0	35416	0.00	35416	0	0	0.00	33862	0	0.22
20-Jul J20	35360	0	0	0	35416	0.00	35416	0	0	0.00	20173	0	0.00
21-Jul J21	35360	0	0	0	35416	0.00	35416	0	0	0.00	23372	0	0.00
22-Jul J22	35360	0	0	0	35416	0.00	35416	0	0	0.00	34993	0	0.00
23-Jul J23	35360	0	0	0	35416	0.00	35416	0	0	0.00	48554	0	0.00
24-Jul J24	35360	0	0	0	35416	0.00	35416	0	0	0.00	31914	0	0.12
25-Jul J25	35360	0	0	0	35416	0.00	35416	0	0	0.00	31375	0	0.00
26-Jul J26	35360	0	0	0	35416	0.00	35416	0	0	0.00	41590	0	0.00
27-Jul J27	35360	0	0	0	35416	0.00	35416	0	0	0.00	23664	0	0.04
28-Jul J28	35360	0	0	0	35416	0.00	35416	0	0	0.00	37655	0	0.02
29-Jul J29	35360	0	0	0	35416	0.00	35416	0	0	0.00	75944	0	0.00
30-Jul J30	35360	0	0	0	35416	0.00	35416	0	0	0.00	19131	0	0.14
31-Jul J31	35360	0	0	0	35416	0.00	35416	0	0	0.00	16515	0	0.14
01-Aug A1	35360	0	0	0	35416	0.00	35416	0	0	0.00	8380	0	0.00
02-Aug A2	35360	0	0	0	35416	0.00	35416	0	0	0.00	11387	0	0.00
03-Aug A3	35360	0	0	0	35416	0.00	35416	0	0	0.00	15741	0	0.08
04-Aug A4	35360	0	0	0	35416	0.00	35416	0	0	0.00	22715	0	0.08
05-Aug A5	35360	0	0	0	35416	0.00	35416	0	0	0.00	20673	0	0.08
06-Aug A6	35360	0	0	0	35416	0.00	35416	0	0	0.00	11878	0	0.00
07-Aug A7	35360	0	0	0	35416	0.00	35416	0	0	0.00	12404	0	0.00
08-Aug A8	35360	0	0	0	35416	0.00	35416	0	0	0.00	71558	0	0.00
09-Aug A9	35360	0	0	0	35416	0.00	35416	0	0	0.00	56700	0	0.04
10-Aug A10	35360	0	0	0	35416	0.00	35416	0	0	0.00	5113	0	0.00
11-Aug A11	35360	0	0	0	35416	0.00	35416	0	0	0.00	2611	0	0.00
12-Aug A12	35360	0	0	0	35416	0.00	35416	0	0	0.00	3390	0	0.00
13-Aug A13	35360	0	0	0	35416	0.00	35416	0	0	0.00	280	0	0.00
14-Aug A14	35360	0	0	0	35416	0.00	35416	0	0	0.00			
15-Aug A15	35360	0	0	0	35416	0.00	35416	0	0	0.00			
16-Aug A16	35360	0	0	0	35416	0.00	35416	0	0	0.00			
17-Aug A17	35360	0	0	0	35416	0.00	35416	0	0	0.00			
18-Aug A18	35360	0	0	0	35416	0.00	35416	0	0	0.00			
19-Aug A19	35360	0	0	0	35416	0.00	35416	0	0	0.00			
20-Aug A20	35360	0	0	0	35416	0.00	35416	0	0	0.00			



DATE	06-Jan J26	07-Jan J27	08-Jan J28	09-Jan J29	10-Jan J30	11-Jan J31	12-Jan J01	13-Jan J02	14-Jan J03	15-Jan J04	16-Jan J05	17-Jan J06	18-Jan J07	19-Jan J08	20-Jan J09	21-Jan J10	22-Jan J11	23-Jan J12	24-Jan J13	25-Jan J14	26-Jan J15	27-Jan J16	28-Jan J17	29-Jan J18	30-Jan J19	01-Feb J20	02-Feb J21	03-Feb J22	04-Feb J23	05-Feb J24	06-Feb J25	07-Feb J26	08-Feb J27	09-Feb J28	10-Feb J29	11-Feb J30	12-Feb J31	13-Feb J01	14-Feb J02	15-Feb J03	16-Feb J04	17-Feb J05	18-Feb J06	19-Feb J07	20-Feb J08	21-Feb J09	22-Feb J10	23-Feb J11	24-Feb J12	25-Feb J13	26-Feb J14	27-Feb J15	28-Feb J16	29-Feb J17	01-Mar J18	02-Mar J19	03-Mar J20	04-Mar J21	05-Mar J22	06-Mar J23	07-Mar J24	08-Mar J25	09-Mar J26	10-Mar J27	11-Mar J28	12-Mar J29	13-Mar J30	14-Mar J31	15-Mar J01	16-Mar J02	17-Mar J03	18-Mar J04	19-Mar J05	20-Mar J06	21-Mar J07	22-Mar J08	23-Mar J09	24-Mar J10	25-Mar J11	26-Mar J12	27-Mar J13	28-Mar J14	29-Mar J15	30-Mar J16	01-Apr J17	02-Apr J18	03-Apr J19	04-Apr J20	05-Apr J21	06-Apr 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J31	01-Jan J01	02-Jan J02	03-Jan J03	04-Jan J04	05-Jan J05	06-Jan J06	07-Jan J07	08-Jan J08	09-Jan J09	10-Jan J10	11-Jan J11	12-Jan J12	13-Jan J13	14-Jan J14	15-Jan J15	16-Jan J16	17-Jan J17	18-Jan J18	19-Jan J19	20-Jan J20	21-Jan J21	22-Jan J22	23-Jan J23	24-Jan J24	25-Jan J25	26-Jan J26	27-Jan J27	28-Jan J28	29-Jan J29	30-Jan J30	31-Jan J31	01-Feb J01	02-Feb J02	03-Feb J03
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21-Aug A21	3149	32	1218	1284	7038	0.18	14	142	150	7548	0.02	7	112	118	6978	0.02	10	175	184	7516	0.02	1736
22-Aug A22	5754	29	1722	1815	7219	0.25	10	227	239	6860	0.03					7332	0.00		0	7409	0.00	2054
23-Aug A23	5404			0	6211	0.00			0	7132	0.00				7409	0.00			0	828	0.00	
24-Aug A24	5404			0	7132	0.00			0	7409	0.00				828	0.00			0	9023	0.00	
25-Aug A25	7132			0	7409	0.00			0	828	0.00				9023	0.00			0	982	0.00	
26-Aug A26	7409			0	828	0.00			0	982	0.00				1000	0.00			0	1000	0.00	
27-Aug A27	828	50	947	998	3023	0.35	13	203	214	6588	0.03				6588	0.00			0	1330	0.00	1212
28-Aug A28	2025	15	219	231	6575	0.04	5	60	63	2752	0.02				2752	0.00			0	4441	0.00	294
29-Aug A29	6144	10	258	304	2689	0.11	6	153	180	1830	0.10	2	19	22	4441	0.01			0	982	0.00	506
30-Aug A30	2185	5	78	82	1650	0.05	2	22	23	4419	0.01	4	53	56	982	0.06			0	1245	0.00	161
31-Aug A31	1568	1	4	4	4395	0.00	5	38	40	976	0.04	5	24	25	1245	0.02			0	1000	0.00	70
01-Sep S1	4391			0	886	0.00			0	1217	0.00				1000	0.00			0		0.00	
02-Sep S2	886			0	1217	0.00			0	1000	0.00				1804	0.00			0		0.00	
03-Sep S3	1217	11	118	124	1000	0.12	8	118	124	1804	0.07	11	87	92	2657	0.03			0		0.00	340
04-Sep S4	876	11	102	108	1680	0.00	8	248	261	2366	0.10	9	111	117	703	0.17			0		0.00	486
05-Sep S5	1722	8	34	36	2504	0.02	7	73	77	586	0.15	6	22	23	553	0.64			0		0.00	136
06-Sep S6	2282			71	259	0.14	10	69	73	380	0.14	5	52	53	512	0.11			0		0.00	198
07-Sep S7	438			0	438	0.00			0	438	0.00				0	0.00			0		0.00	
08-Sep S8	438			0	438	0.00			0	0	0.00				0	0.00			0		0.00	
09-Sep S9				0	0	0.00			0	0	0.00				0	0.00			0		0.00	
10-Sep S10				0	0	0.00			0	0	0.00				0	0.00			0		0.00	
11-Sep S11				0	0	0.00			0	0	0.00				0	0.00			0		0.00	
12-Sep S12				0	0	0.00			0	0	0.00				0	0.00			0		0.00	
13-Sep S13				0	0	0.00			0	0	0.00				0	0.00			0		0.00	
14-Sep S14				0	0	0.00			0	0	0.00				0	0.00			0		0.00	
15-Sep S15				0	0	0.00			0	0	0.00				0	0.00			0		0.00	
TOTAL	111217	3113	265740	318771	1429986	0.223	2928	207807	239757	1689746	0.154	1295	82656	99380	1789126	0.056	1321	127090	150102	1932998	0.078	828011
AREA 4 H.R.						0.164					0.134					0.051					0.077	0.427



1991 AREA 4 RECONSTRUCTION  
24-Oct

DATE	ACTUAL ESC	EFFORT R/G/S	HAUL CATCH	SALES CATCH	R/G/S RUN	DAILY H.R.	EFFORT SMITH	HAUL CATCH	SALES CATCH	SMITH RUN	DAILY H.R.	EFFORT SOUND	HAUL CATCH	SALES CATCH	SOUND RUN	DAILY H.R.	EFFORT OUTSIDE	HAUL CATCH	SALES CATCH	OUTSIDE RUN	DAILY H.R.	YEARLY TOTAL DAILY SALES H.R. CATCH
06-Jan JN6	0	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	667	0.00	0.00
07-Jan JN7	0	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	1323	0.00	0.00
08-Jan JN8	0	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	656	0.00	0.00
09-Jan JN9	0	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	962	0.00	0.00
10-Jan JN10	667	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	1846	0.00	0.00
11-Jan JN11	1323	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	2963	0.00	0.00
12-Jan JN12	656	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	6563	0.00	0.00
13-Jan JN13	962	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	2055	0.00	0.00
14-Jan JN14	1946	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	4723	0.00	0.00
15-Jan JN15	2063	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	8790	0.00	0.00
16-Jan JN16	6505	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	3591	0.00	0.00
17-Jan JN17	2055	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	3422	0.00	0.00
18-Jan JN18	4723	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	1724	0.00	0.00
19-Jan JN19	8790	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	1508	0.00	0.00
20-Jan JN20	3617	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	2711	0.00	0.00
21-Jan JN21	3591	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	5520	0.00	0.00
22-Jan JN22	3422	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	3662	0.00	0.00
23-Jan JN23	1724	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	4056	0.00	0.00
24-Jan JN24	1508	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	20721	0.00	0.00
25-Jan JN25	3098	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	47306	0.00	0.00
26-Jan JN26	2111	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	3619	0.00	0.00
27-Jan JN27	3520	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	4056	0.00	0.00
28-Jan JN28	3662	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	7106	0.00	0.00
29-Jan JN29	3619	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	3064	0.00	0.00
30-Jan JN30	4056	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	26721	0.00	0.00
01-Jul J1	3090	56	1898	1686	0	0.00	207	21066	19340	0	0.00	30	840	746	0	0.00	58	995	884	47306	0.00	21865
02-Jul J2	7106	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	3619	0.00	0.00
03-Jul J3	7106	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	4056	0.00	0.00
04-Jul J4	7106	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	7106	0.00	0.00
05-Jul J5	7106	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	3064	0.00	0.00
06-Jul J6	46322	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	20721	0.00	0.00
07-Jul J7	36789	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	47306	0.00	0.00
08-Jul J8	53057	139	29715	26397	0	0.00	256	16420	14586	0	0.00	94	11892	10484	0	0.00	61	8511	7561	57712	0.13	59028
09-Jul J9	20671	98	6459	5738	24794	0.23	188	11523	10336	30531	0.34	113	8306	7178	50151	0.15	127	15765	14004	57438	0.24	37356
10-Jul J10	10056	95	6367	5656	20595	0.28	182	9380	8510	42773	0.20	120	8342	7410	44433	0.17	123	15925	14147	52187	0.43	53723
11-Jul J11	14639	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	44537	0.00	0.00
12-Jul J12	34023	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	67343	0.00	0.00
13-Jul J13	35879	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	68297	0.00	0.00
14-Jul J14	35879	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	68297	0.00	0.00
15-Jul J15	35879	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	68297	0.00	0.00
16-Jul J16	28709	169	20817	18492	41599	0.50	266	21063	19713	60011	0.31	150	13542	12030	81359	0.15	162	15805	12263	97218	0.13	61498
17-Jul J17	18848	183	14726	13082	41599	0.32	276	18757	16218	69319	0.23	160	8290	7164	84954	0.09	155	14349	12747	38013	0.34	49411
18-Jul J18	28217	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	78703	0.00	0.00
19-Jul J19	53111	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	27073	0.00	0.00
20-Jul J20	77590	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	62799	0.00	0.00
21-Jul J21	25566	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	62799	0.00	0.00
22-Jul J22	34055	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	62799	0.00	0.00
23-Jul J23	34055	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	62799	0.00	0.00
24-Jul J24	34055	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	62799	0.00	0.00
25-Jul J25	40999	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	62799	0.00	0.00
26-Jul J26	40999	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	62799	0.00	0.00
27-Jul J27	71642	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	48940	0.00	0.00
28-Jul J28	45852	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	44144	0.00	0.00
29-Jul J29	23801	145	20261	17999	37722	0.48	200	15950	14169	39336	0.36	98	5789	5143	56134	0.09	112	10676	9484	39466	0.24	46794
30-Jul J30	10723	130	15289	13582	25367	0.54	180	16168	14463	50991	0.28	96	10386	9404	29982	0.31	112	12662	11315	39820	0.10	15652
31-Jul J31	11783	165	15068	13383	36628	0.37	145	5997	5327	20378	0.26	65	6393	5678	15946	0.15	83	11051	9817	45969	0.08	34069
01-Aug A1	23243	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	30300	0.00	0.00
02-Aug A2	12551	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	19482	0.00	0.00
03-Aug A3	12551	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	19482	0.00	0.00
04-Aug A4	15940	161	34264	30438	45809	0.67	48	4615	4100	50290	0.14	35	2143	1904	24903	0.08	60	2462	2187	22804	0.10	38628
05-Aug A5	14661	150	22764	20715	26100	0.79	35	2992	2772	23599	0.12	25	1595	1451	20501	0.07	49	2697	2454	23255	0.11	27341
06-Aug A6	5477	125	7774	6906	20277	0.34	35	3274	2908	19165	0.15	28	2242	1992	20501	0.10	42	4330	3846	39820	0.10	15652
07-Aug A7	13371	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	20664	0.00	0.00
08-Aug A8	16257	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	19482	0.00	0.00
09-Aug A9	18509	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	19482	0.00	0.00
10-Aug A10	26357	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	19482	0.00	0.00
11-Aug A11	16355	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	0	0.00	0	0	0	19482	0.00	0.00
12-Aug A12	19482	0	0	0	0	0.00	0	0	0	0	0.00											

21-Aug A31	5401	50	3852	3422	2227	0.37	25	909	807	4894	0.16	15	395	351	4374	0.08	28	259	230	4122	0.06	4870
22-Aug A32	4185			0	4187	0.00			0	4023	0.00			0	3892	0.00			0	3569	0.00	
23-Aug A33	4185			0	4187	0.00			0	3892	0.00			0	3569	0.00			0	9567	0.00	
24-Aug A34	4023			0	3892	0.00			0	3569	0.00			0	9567	0.00			0	7019	0.00	
25-Aug A35	3892			0	3569	0.00			0	9567	0.00			0	7019	0.00			0	7182	0.00	
26-Aug A36	1599	28	763	678	9567	0.07	25	545	484	7018	0.06	14	84	75	7182	0.01	4	26	25	12383	0.00	1260
27-Aug A37	8889	19	440	591	6535	0.06	16	506	450	12496	0.00	7	74	66	12562	0.00		13	12	1117	0.00	918
28-Aug A38	6144			0	6658	0.00			0	12496	0.00			0	1117	0.00			0	4646	0.00	
29-Aug A39	6658			0	7117	0.00			0	7117	0.00			0	4646	0.00			0	2315	0.00	
30-Aug A30	12496			0	2052	0.00			0	2115	0.00			0	4646	0.00			0	1599	0.00	
31-Aug A31	7117			0	2052	0.00			0	2115	0.00			0	1599	0.00			0	0	0.00	
01-Sep S1	2052			0	2052	0.00			0	2115	0.00			0	1599	0.00			0	0	0.00	
02-Sep S2	2052			0	2052	0.00			0	2115	0.00			0	1599	0.00			0	0	0.00	
03-Sep S3	2115			0	2115	0.00			0	2115	0.00			0	1599	0.00			0	0	0.00	
04-Sep S4	1599			0	1599	0.00			0	1599	0.00			0	1599	0.00			0	0	0.00	
05-Sep S5				0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
06-Sep S6				0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
07-Sep S7				0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
08-Sep S8				0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
09-Sep S9				0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
10-Sep S10				0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
11-Sep S11				0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
12-Sep S12				0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
13-Sep S13				0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
14-Sep S14				0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
15-Sep S15				0	0	0.00			0	0	0.00			0	0	0.00			0	0	0.00	
TOTAL	1153804	3407	397444	352559	1706343	0.207	4026	301774	267147	1971490	0.155	1898	155271	133976	2107466	0.064	2224	236339	208887	2316553	0.090	962549
AREA 4 I.R.						0.152					0.115					0.038					0.090	0.416