CAN MODIFIED GILLNETS CATCH SALMON WITHOUT CATCHING STEELHEAD?

by

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CAN MODIFIED GILLNETS CATCH SALMON

WITHOUT CATCHING STEELHEAD?

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ABSTRACT

In the Bella Coola region of B.C, an experiment was conducted to study whether gillnets lowered 48 inches below the corkline would catch fewer steelhead *(Oncorhynchus gairdneri)* without decreasing the commercial catch of other salmon *(Oncorhynchus)*. This project reports the work done on the experimental design and data analysis of the above study. A randomized block design was chosen as most appropriate for the experiment. Power estimates were used to determine the recommended number of blocks. ANOVA techniques were used to analyze the results from the experiment. Emphasis was put on the investigation of the main treatment effect and its interactions with various environmental factors.

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My thanks to Dr. Rick Routledge for spending a lot of time and patience helping me in the preparation of this work. He was a source of much needed encouragement.

I would also like to thank Vic Lewynski from Western Renewable Resources who provided the problem which became the basis of this project and continued to offer practical insight whenever it was needed.

Finally, to the fish who got caught, providing us with nourishment and data, and to the ocean for her magic.

DEDICATION

To Mom and Dad

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Introduction : Of Fish and Fishermen

The number of species of fish in the ocean will probably never be known to humanity, but one thing is certain; there are two kinds of fishermen/women, labelled henceforth as fishers. The first kind employs the use of boats and nets to catch fish that eventually find their way to our dinner tables. We will call this group the commercial fishers. The other group angle for fish with rod and reel, labelled henceforth, sport fishers.

Unfortunately, in the Bella Coola region, on the coast of northern B.C the two types of fishers have conflicting interests. The commercial fishers make their livelihood on the ocean, by the mouths of the rivers. On the other hand, the sport fishers catch their prey on the rivers, and therefore would like to see as many fish as possible go up the rivers on their way back to their spawning beds. There has been a concern by the sporting community that there are not enough fish in the rivers because too many are caught by the commercial fishers' nets.

Although the number of fish caught for sport is minute compared to the harvest of commercial fishing, the provincial government has a reason to encourage the activity. Sport fishing generates considerable revenue through related business such as guiding and cabin and boat rentals, as well as through hotels and restaurants.

Conflict would be unavoidable if it weren't for the fact that the two fisheries are interested in different types of fish. The sport fishers' chief delight is steelhead *(Oncorhynchus gairdneri)*, while the bread and butter of the commercial fishery is chum salmon *(Oncorhynchus keta)*, and to a lesser degree the other salmon species: chinook *(Oncorhynchus tshawytscha)*, pink *(Oncorhynchus gorbuscha)*, sockeye *(Oncorhynchus nerka)*, and coho *(Oncorhynchus kisutch)*.

Unfortunately the nets used by the commercial fishers do not discriminate between these different species. They catch everything that gets its gills caught in the mesh. However, there has been some evidence that shows steelhead to have a tendency of swimming close to the surface, while the other salmon make their movement deeper under water.

The natural response to this evidence is to design nets with windows at the top. This is achieved simply by hanging the mesh 48 inches (decided somewhat arbitrarily) below the corkline. The Department of Fisheries and Oceans was interested in contracting out an experiment to investigate whether such a net will really catch fewer steelhead without significantly reducing the catch of other salmon, especially chum.

Western Renewable Resources came to Simon Fraser University's Statistical Consulting Service, looking for new ideas that the Consulting Service might have regarding its bid for the proposed experiment. It stated that its main concern was to design an experiment that would have decent power (to detect a substantial treatment effect) but at feasible cost.

My first contribution described in this project was to use power calculations to enhance the proposal. As mentioned above, the most important criterion for the experimental design was to ensure that the experiment would have adequate power but relatively low cost. As it turned out, Western Renewable Resources was awarded the contract to run a substantially reduced experiment, and it invited me to analyze the results. I analyzed the data mainly using analysis of variance methodology after applying the logarithmic transformation. The analysis was complicated by the necessity to include a variety of environmental covariates.

Chapter 1 : Experimental Design

The main purpose of the experiment is to test whether a net hung one meter below the surface will catch fewer steelhead without decreasing the catch of salmon. An intuitively appealing as well as logistically feasible design is the randomized block. Each block would contain a pair of nets: standard and treatment (the treatment being the lowering of the net 48 inches below the surface). Each pair would be set and picked at, as much as possible, at the same time. (A net is picked when it is removed from the water, and the fish caught in it are collected) are And each day the nets would be assigned to the participating fishers, either at random or on a systematic rotation basis.

By blocking we hoped to rule out all conceivable confounding effects, except maybe for location. Unfortunately gill nets tend to move with the current. Therefore the location could not be held constant within blocks. As mentioned in the introduction, optimizing the power of the test was one of the experimenter's main concerns. We hoped that blocking would be useful in decreasing the error variance, and hence increasing the power of the test to detect substantial treatment effects.

The obvious way to increase power without increasing the level of the test (set at 0.05) is by increasing the sample size. Since our sampling unit is a net pick, then increasing the sample size means increasing one or more of the following : the number of pairs of nets, the number of times each pair was picked in a day, or the number of days the experiment was allowed to run.

The Power of the Experiment

A simple model:

For bidding purposes it was important to have an estimate of the power of our proposed tests. For example the government might have given the experimenter an additional pair of nets if he could show that this would improve the power of the test significantly. However, the problem with trying to estimate the power of a test before the experiment was conducted was that we had to come up with a plausible model in the absence of appropriate data.

In the past, Western Renewable Resources had collected data on the catch of the species of interest. The observations included, the size of the catch, the sites of the net, the time and date during which the net was set, and the mesh size. I would henceforth refer to these data as historical data The structure of the historical data was clearly different from what we would expect to get from the experiment, namely there were no treatment nets here.

The following tables summarize these data, recorded from 1432 netpicks:

Table 1.1:

A brief statistical summary of the historical data, where SH, CM, CK, PK, SX, and CO denote the number of steelhead, chum, chinook, pink, sockeye, and coho caught in a single net pick.

	SH	CM	CK	PK	SX	CO
$\bar{X}$	1.470	124.34	0.499	89.448	4.879	6.523
SD	2.217	151.315	1.291	226.054	12.819	10.333
n	1311	382	1376	1397	1393	1210

We can see, as expected, that chum was by far the most important species to the commercial fishery. It was interesting to note that chum was also the species for which there were the most incidents of missing data. This suggested that the fishers who collected the data might have been insecure about giving out information on the size of their harvest. This observation was in line with Western Renewable Resources' hunch that the data for the other species were also inaccurate, specifically, that the steelhead catch might have been under recorded. Unfortunately we had no more reliable data.

These data, and the ones we anticipated from the experiment arose from frequency counts and therefore were clearly not normal. To get a feel of the structure of the data I tried regressing the rate of catch (measured in fish per hour for each net pick) against the covariates mentioned above, with normal error terms. Using backward elimination I arrived at the following selections of predictor variables for the two most prominent species of interest - steelhead and chum.

Table 1.2:
Selected covariates for steelhead and chum from the historical data.

	DAWN	SITE	WEEK	MESH	MONTH
Steelhead	*	*	*		
Chum		*		*	*

where * in row i and column j denotes that factor j is significant for the species at row i, and

DAWN is a variable that indicates whether the net was set during dawn.

SITE indicates one of the 3 sites where the net was set.

WEEK indicates one of the 12 weeks during which the data were collected.

MESH indicates one of the five groups (grouped to the closest inch) of the mesh size of the net.

MONTH indicates one of the four months during which the data were collected.

Note that the time factor WEEK was used for steelhead, while MONTH was used for chum. This was done because, for chum, i1f the data was classified by WEEK there would not be enough observations in some cells.

The residual plots for the above models can be found in Figures 1.1 and 1.2. The plots suggest that the variability of the rate of catch increases with the rate of the catch. They also indicate that the data might have come from a distribution with a large positive skewness. This suggests that a log transformation of the data might allow us to apply a simple analysis of variance technique using normal error terms.

Note that the catch rate has a lower bound of 0. This lower bound apprears in plots (1.1) and (1.2) as the straight lines at the bottom of the graphs that go through the origin. A raw residual can never be less than 0 minus the estimate. This leads to an approximately linear lower bound on the standardized residuals.

Figure 1.1

The residual plot for Steelhead before log transformation

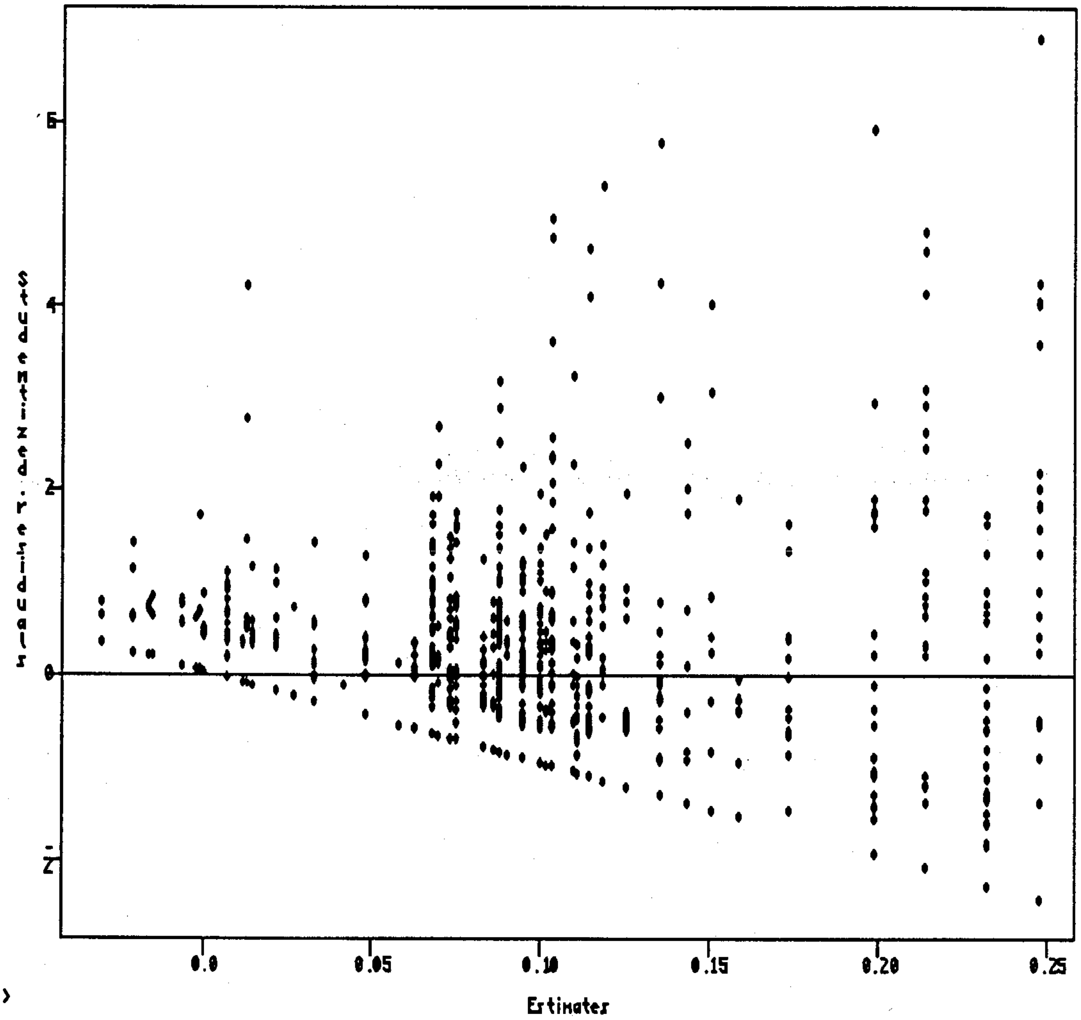


Figure 1.2

The residual plot for Chum before log transformation

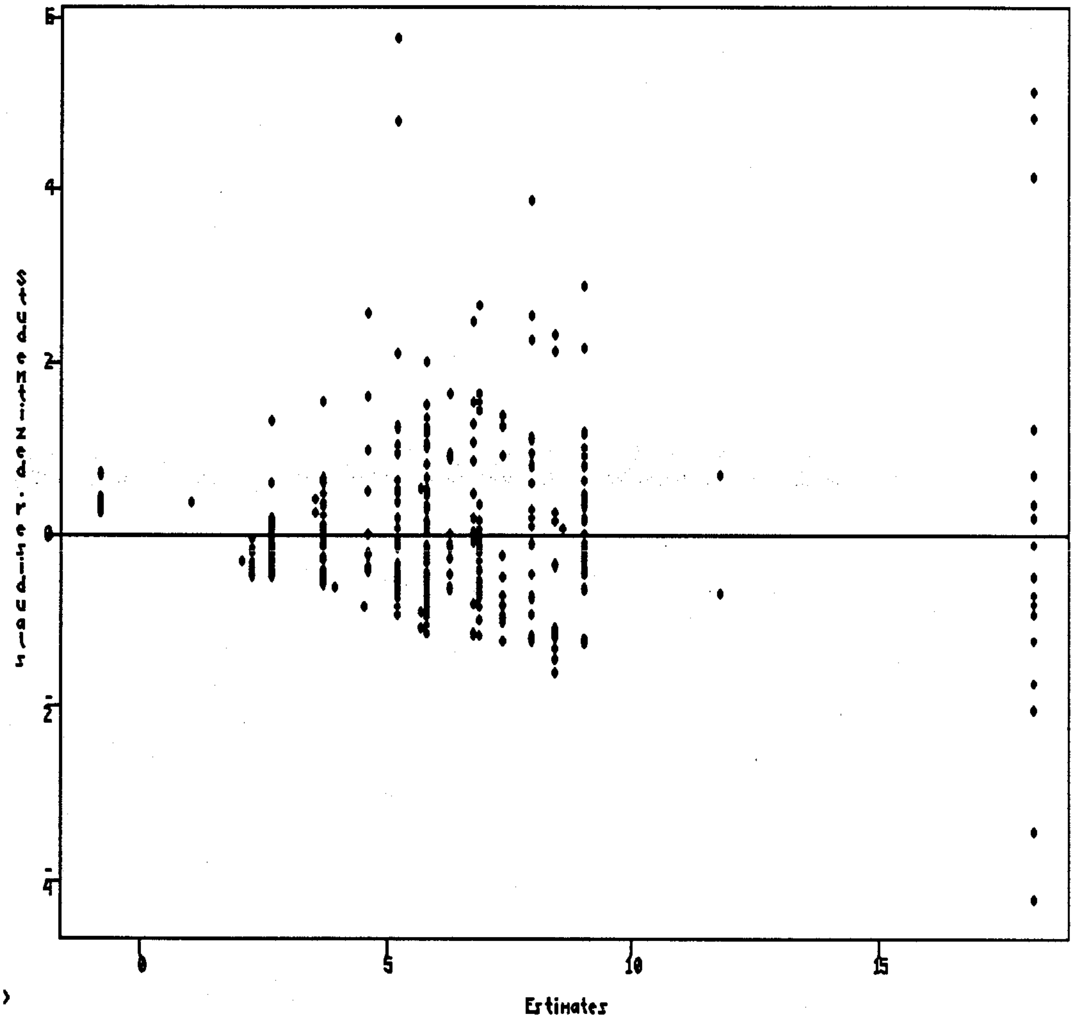


Figure 1.3

Residual plot for Steelhead, after log transformation

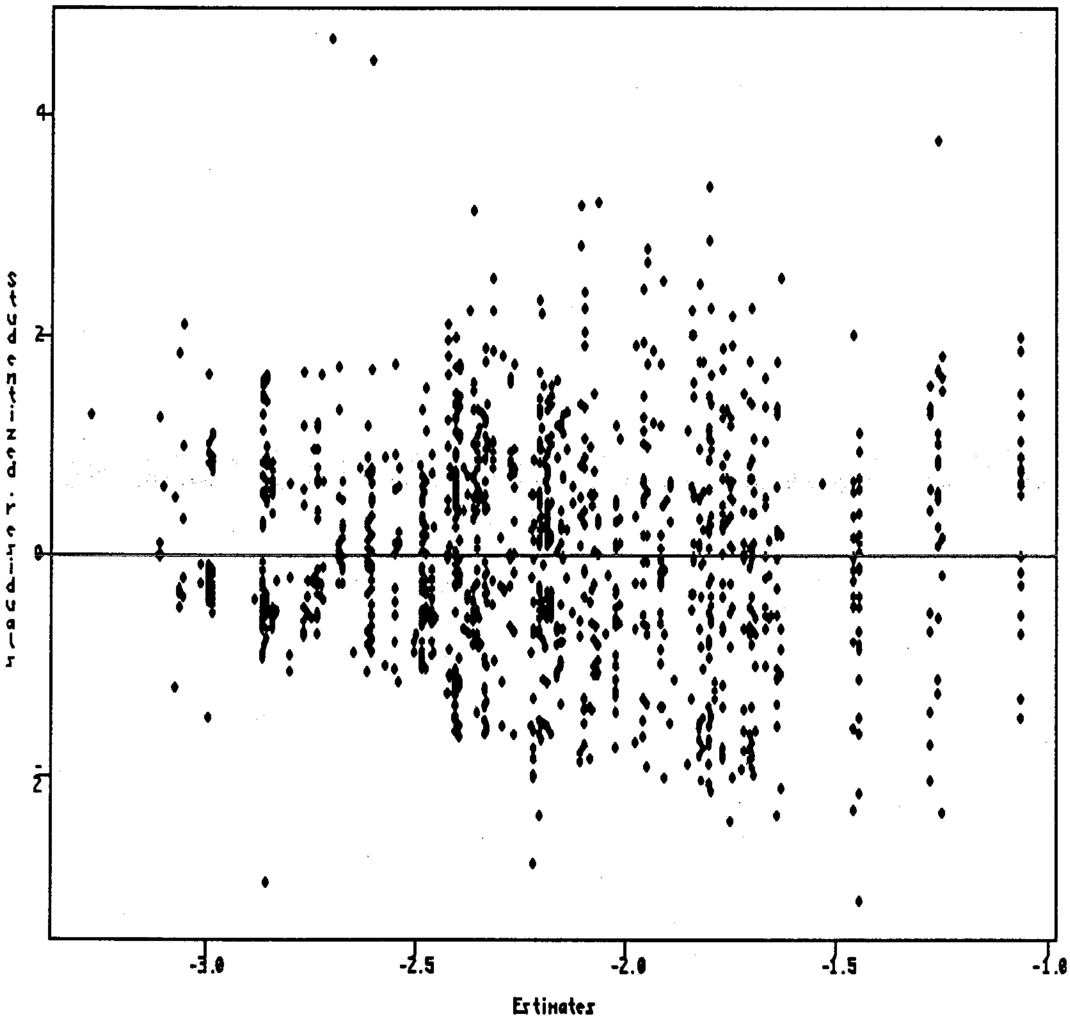
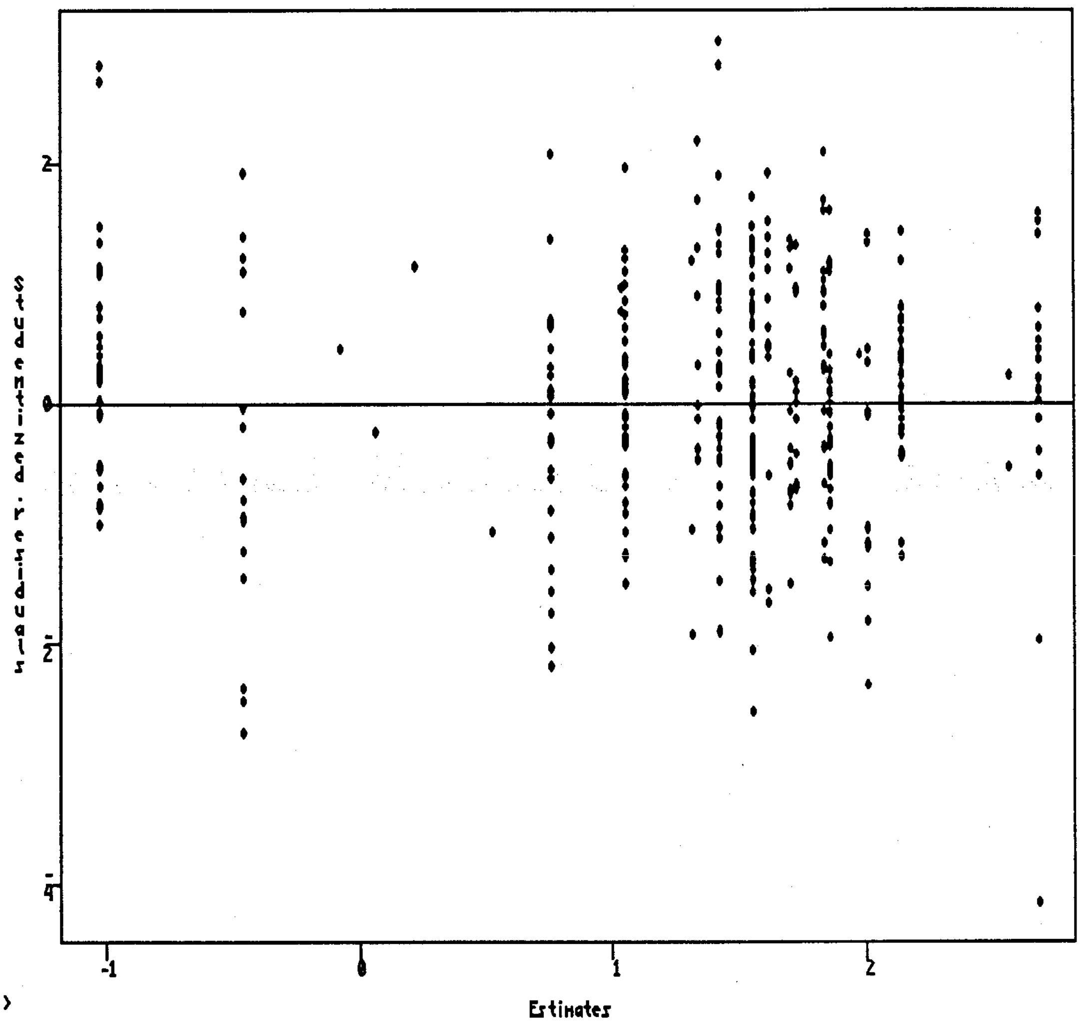


Figure 1.4

Residual plot for Chum after log transformation



After the logarithmic transformation we get the following data summary.

Table 1.3:
A brief statistical summary of the transformed historical data, where LSH = $\log\left(\frac{SH + 1}{\text{elapsed time}}\right)$ that is, the log of the adjusted catch per hour in each net pick for steelhead. Similarly, LCM, LCK, LPK, LSX, LCO are the log of the adjusted catch rate for chum, chinook, pink, sockeye, and coho.

	LSH	LCM	LCK	LPK	LSX	LCO
$\overline{X}$	-2.216	1.319	-2.591	0.203.	-2.010	-1.301
SD	0.752	1.117	0.712	1.717	1.203	0.957
n	1306	380	1348	1353	1349	1186

To check the effectiveness of the transformation, I fitted the following models (obtained through backward elimination) for steelhead and chum:

LSH = Constant + DAWN effect + SITE effect + WEEK effect
+ MESH effect
LCM = Constant + SITE effect + MONTH effect + MESH effect

The residual plots of the above models can be found in Figures 1.3 and 1.4. Compared to the residual plots in of the untransformed data in Figures 1.1 and 1.2, these plots seem to have constant variance and substantially reduced skewness. Therefore it seemed not unreasonable to assume that the log transformation has done a good job of stabilizing the variance, and reducing skewness.

The log transformation would also give a physically meaningful interpretation of any observed treatment effect. The ratio of the catch rate between treatment and control nets could be easily estimated by $e^{(\hat{\alpha}_1 - \hat{\alpha}_2)}$, where $\hat{\alpha}_1$ and $\hat{\alpha}_2$ are the estimated treatment effects in the model fitted to the transformed data.

In light of the above findings, I proceeded by performing the same preliminary analysis to the transformed historical data. The main purpose of the analysis was to estimate the error variance of the model I hoped to fit to the data from the experiment (which at this point were not yet available). The estimated error variances were then used to calculate the estimated power of the experiment.

To the historical data I fitted the full model,

$$Y'_{ijklm} = \mu' + \alpha'_i + \beta'_j + \gamma'_k + \delta'_l + \varepsilon'_{jklm} \qquad (1.1)$$

where Y_{ijklm} = log of the adjusted catch per hour for each net pick,

μ' = overall mean,

α'_i : i = 1, 2

are the dawn effects,

β'_j : j = 1, 2, 3

are the site effects,

γ'_k : k = 1,...,12

are the week effects,

δ'_l : l = 1,...,5

are the mesh size (to the closest inch) effects,

ε^*_{ijkm} are the iid normal errors term with mean 0 and variance ω^2,

The following table shows the covariates for each species that were chosen through backward elimination (at α = .05)

Table 1.4:

Selected covariates for the historical data after logarithmic transformation.

	DAWN	SITE	WEEK	MESH	MONTH
LSH	*	*	*	*	
LCM		*		*	*
LCK	*	*	*		
LPK	*	*	*	*	
LSX	*	*	*	*	
LCO	*	*			*

Assuming that the treatment and control groups would have the same error variance, I could use MSE's from the above models as estimates for the error variances of the models that I hoped to fit to the future data.

Table 1.5:
MSE's from fitting linear models to the historical data.

	LSH	LCM	LCK	LPK	LSX	LCO
MSE	0.357	0.264	0.924	0.465	0.724	0.455

After obtaining the above estimates, I considered a simple model to be fitted to the data obtained from the experiment to be :

$$Y_{ij} = \mu + \alpha_i + \beta_j + \varepsilon_{ij} \qquad (1.2)$$

where Y is the natural log of the adjusted catch per hour for each net pick for each species,

μ is the overall mean,

α_i is the treatment effect, $i = 1, 2$

β_j is the block effect, $j = 1,...,n$

ε_{ij} is the error term,

with ε_{ij} assumed to be iid $N(0,\sigma^2)$,

and the MSE's in table 1.5 were used as the estimates for σ^2.

At this stage, I excluded factors such as mesh size, the site of the net, and a few other factors from this model partly because they were of secondary interest, but more importantly, because there was no way of knowing the extent to which the treatments might interact with the other factors. I had also treated the random blocks as if they were fixed, because there was no way of estimating the variance of the block effect, nor the reduction of error variance due to blocking.

At this point I would like to caution the reader of the inherent uncertainty of building a model to be fitted to a set of data that are not yet available. Of a particular concern is the estimation of the error variance (σ^2 in model 1.2).

The error variance σ^2 of the model (1.2) that I hoped to fit to the anticipated data from the experiment, was estimated by fitting a linear model to the historical data (data that were obtained prior to the experiment). The two sets of data have fundamentally different structures. The historical data arose from an observational study, whereas the anticipated data would come from a controlled experiment. The most important aspect of this difference is that there were no treatment nets in the historical data.

Another difficulty arose from the fact that fish catches tend to vary from year to year. Some years have stronger runs than others. Therefore, the above estimates of σ^2 were at best educated guesses that were bound to be rough.

The power of the anticipated test:

The client was particularly concerned in the ability to detect a reduction in the catch of 50% or more. Thus in the alternative hypothesis we would have $\mu_t = 0.5\ \mu_c$, where μ_t and μ_c were the mean catch of the treatment, and control nets respectively. After the log transformation the above equation is equivalent to

$$\log(\mu_t) = \log(0.5\ \mu_c) = \log(\mu_c) - \log(2).$$

Therefore we set up the anticipated treatment effect to be approximately equal to 0.5log(2), with $\alpha_1 - \alpha_2 = \log(2)$.

Note however, that in general, for any random variable X, $E[\log(X)] \neq \log[E(X)]$. Therefore, the above approximation of the treatment effect (α_1 and α_2) under the alternative hypothesis may lead to the errors in the calculated power. This is particularly true for a discrete random variable with a small expected value, such as the catch rate for Steelhead. The following simple example illustrates this point:

Let T = the catch rate of the treatment net with the following distribution:

$$T = \begin{cases} 0 \ / \ t \ \text{with probability } (1-p) \\ 1 \ / \ t \ \text{with probaility } p \end{cases}$$

where t is the elapsed time.

And let C = the catch rate of the control net, with the following distribution:

$$C = \begin{cases} 0 \ / \ t \ \text{with probability } (1-2p) \\ 1 \ / \ t \ \text{with probability } 2p \end{cases}$$

let T′ be the log of the adjusted catch rate of the treatment net with the distribution:

$$T' = \begin{cases} \log(1 \ / \ t) \ \text{with probability } (1-p) \\ \log(2 \ / \ t) \ \text{with probability } p \end{cases}$$

and let C′ be the log of the adjusted catch rate of the control net with a distribution analogous to T′.

Now we have E(C) = 2E(T). However, E(C′) - E(T′) = p*log(2), which is less than log(2) as approximated above. This overestimation of the treatment effect lead to an overestimation of the anticipated power.

To improve the estimation of the anticipated power would require the knowledge of the distribution of the catch rate of the treatment and control nets. Because the distributions in question were unknown, I chose to estimate the treatment effect under the alternative hypothesis of a 50% reduction in the catch rate as 0.5log(2).

To calculate the power of the test of the hypotheses

$$H_o : \alpha_1 = \alpha_2 = 0 \quad \text{vs,} \quad H_a : -\alpha_1 = \alpha_2 = 0.5\log(2) = 0.3466 \quad (1.3)$$

in model (1.2) we used the fact that under H_a the test statistic, $F^* = MSTr/MSE$ has a noncentral F distribution, defined as follows (Kendall, and Stuart, (1973), pp. 268-269):

If $X_1, \ldots, X_d$ are independent $N(\mu_i, 1)$ for $i=1,\ldots,d$ then $Y = \sum_{i=1}^{d} X_i^2$ has a non-central χ^2 distribution with d degrees of freedom and noncentrality parameter $\lambda = \sum_{i=1}^{d} \mu_i^2$. Furthermore if Z is a central χ^2_h, then we say that $\frac{Y / d}{Z / h}$ has a non-central F distribution with d and h degrees of freedom and noncentrality parameter λ.

The power of the test, as a function of the sample size, can then be calculated using the the non-central F distribution. The computer package, P.C - SIZE (Dallal, D.E. , 1985) produces a table of n (the number of observations for each treatment group, assuming a balanced design) and their corresponding power, but we need to specify

α = the level of the test

d_1 = the numerator degrees of freedom

λ = the noncentrality parameter, specified as a multiple of n, and

d_2 = the denominator degrees of freedom, specified as a linear function of n.

In model (1.2) we have :

$\alpha = 0.05$

d_1 = (the number of treatment levels - 1) = 1

d_2 = (sample size - number of parameters)

$= 2n - (1+ 1 + (n-1))$

$= n - 1$

The non-centrality parameter for the above test statistic F^* under the alternative hypothesis can be obtained by

$$\lambda = d1\ (E(MSTr) - \sigma^2)/\sigma^2$$

where MSTr is the mean of treatment sum of squares, and σ^2 is the variance of the error terms.

(Graybill (1961): Theorem 11.16, p. 244)

Using the well known result

$$E(MSTr) = n\sum_{i=1}^{a-1}\alpha_i^2 + \sigma^2$$

where α_i is the treatment effect for the i^{th} treatment level, and a is the number of treatment levels.

After substituting MSE for σ^2, we get $\hat{\lambda} = \left(n\sum_{i=1}^{2}\alpha_i^2\right) / MSE$

where n = the number of observation for each group, and

$\alpha_1 = -\alpha_2 = 0.3466$.

Therefore, we have

$$\hat{\lambda} = \frac{n(.2403)}{MSE}$$

The estimated noncentrality parameters $\hat{\lambda}$ for the six species are given as follows :

Table 1.6:

The estimated noncentrality parameters for the test statistic F^* under the alternative hypothesis that there is a 50% reduction in the catch, based on the historical data.

	Steelhead	Chum	Chinook	Pink	Sockeye	Cohoe
λ	n(.6730)	n(.5281)	n(.9101)	n(.2600)	n(.5167)	n(.3319)

After running the program, PC-Size, we get the following power table:

Table 1.7:
The power to detect a 50% reduction, at α level = 0.05 in the catch rate of the six species, calculated based on the historical data

n	Steelhead	Chum	Chinook	Pink	Sockeye	Coho
8	0.516	0.427	0.641	0.240	0.419	0.292
16	0.866	0.775	0.945	0.480	0.766	0.578
24	0.970	0.926	0.993	0.668	0.920	0.771
32	0.994	0.978	1	0.798	0.976	0.884
40	0.999	0.994	1	0.882	0.993	0.944
48	1	0.999	1	0.933	0.998	0.974
56	1	1	1	0.963	1	0.989
64	1	1	1	0.980	1	0.995

where n = (# of pairs of nets) x (# of times the nets are picked each day) x (# of days the experiment is run).
Note the total sample size is N = 2n.

Because of the logistic constraints such as funds, fishing regulations, and the commercial fishers' (un)willingness to participate in the experiment, we could not increase the sample size indefinitely.

Given these restrictions, our client felt that the optimal design to propose would be the following : 2 pairs of nets, one pair with a 4.625" mesh and the other with a 6" mesh (these mesh sizes were chosen because they seemed to catch the most steelhead, and chum). The four nets were to be picked twice a day, two days a week for four weeks. The corresponding power of our test can be obtained from the above table with n = 32.

Chapter 2 : Data Analysis

Western Renewable Resources was awarded the contract to carry out the experiment, but not with the experimental design as proposed in Chapter 1. Unfortunately, due to restrictions in funding, the experiment could not be carried out as planned. The two major modifications to the planned design were :

1 Instead of two, there was only one pair of nets available for the experiment.

2 Instead of twice a day, the nets were set and picked in a manner that the fishers normally fish.

The experiment was conducted during the first two weeks in July and the last two weeks in August with a total of 104 net picks.

In addition to the the size of the catch for each species in each net pick, the experimenter also recorded the following information:

1 The time when the nets were set and picked. Of a special interest was whether the net was soaking (in the water) around dawn, as the fishers had observed that the size of the catch tended to be different at dawn compared to the other times of the day.

2 The date when the nets were picked.

3 The site where the catch was made. The area fished by the Bella Coola fishers has been divided into five sites shown in Figure (2.1).

4 Weather: sunny, broken cloud, overcast, or rain.

5 Wind: calm, moderate, or strong.

6 Surface condition: calm, choppy, or heavy.

Notation

The dependent variables of interest were the sizes of the catches in each net pick for each of the six species of fish. However, because the nets had different soaking time, and the fish catches were frequency counts, as argued in Chapter 1, I used the log transform of the adjusted catch rate in each net pick as the dependent variable.

The dependent variable for steelhead was defined as:

$$LSH = \log\left(\frac{\text{the number of steelhead caught} + 1}{\text{elapsed time}}\right)$$

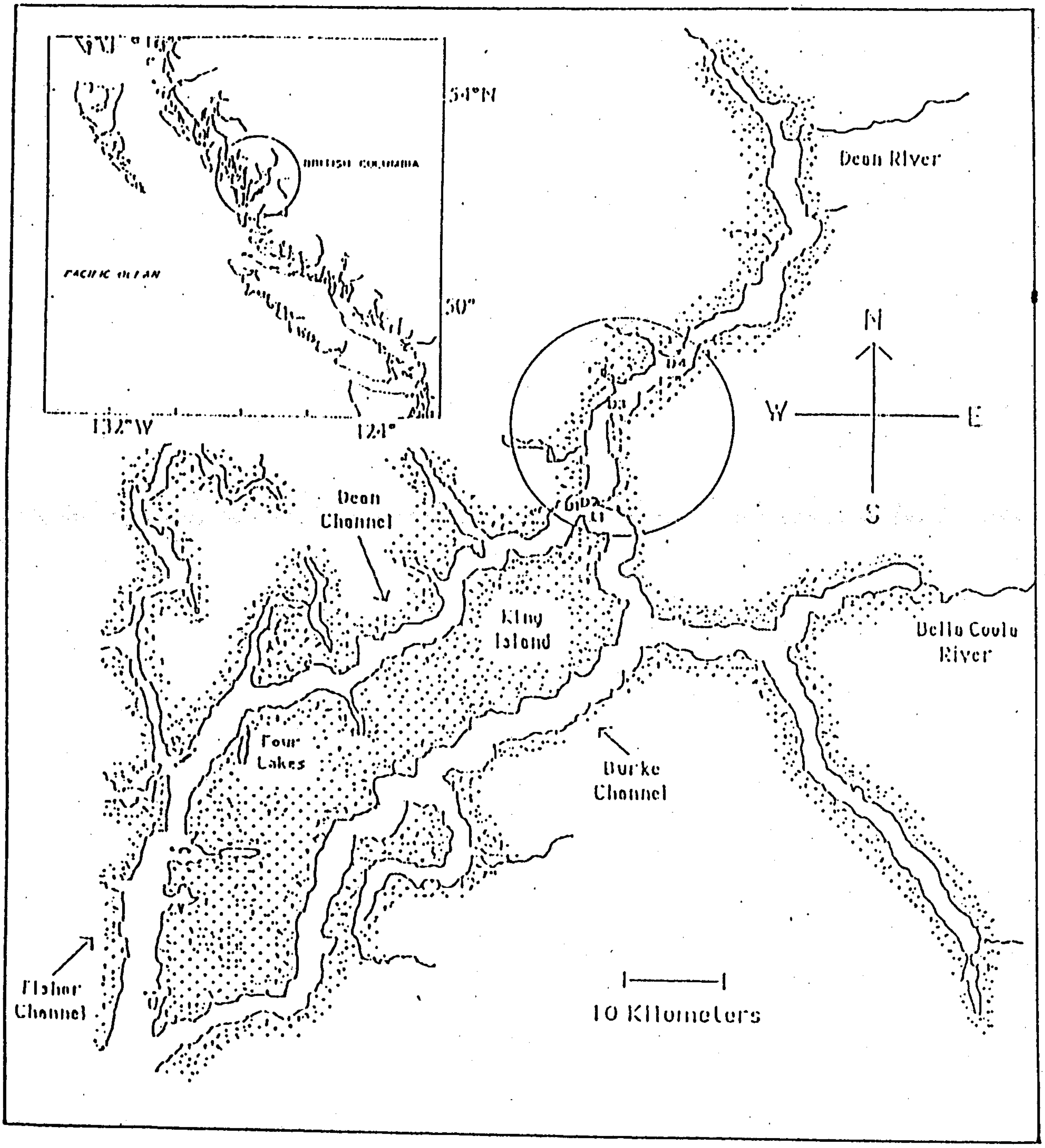
LCM, LCK, LPK, LSX, LCO were defined similarly for chum, chinook, pink, sockeye, and coho.

The TREATMENT effects were coded:

$$T_i \ ; \ i = \begin{cases} 1 \text{ for treatment nets} \\ 2 \text{ for control nets} \end{cases} \quad ; \text{ where } \sum T_i = 0$$

Figure 2.1

The location of the five experimental fishing sites, where
D1 = Dean channel along the shore,
D2 = Dean channel on the open water,
D3 = Showquiltz along the shore,
D4 = Whitecliff along the shore,
L1 = Labouclere along the shore.



The DAWN effects were coded:

$$D_j \;;j = \begin{cases} 1 \text{ for nets soaked during dawn} \\ 2 \text{ otherwise} \end{cases} \quad ; \text{ where } \sum D_j = 0$$

The WEEK effects were coded:

$$W_k \;;\; k = \begin{cases} 1 \text{ for the first week in July} \\ 2 \text{ for the second week in July} \\ 3 \text{ for the third week in August} \\ 4 \text{ for the fourth week in August} \end{cases} \quad ; \text{ where } \sum W_k = 0$$

The SITE effects were coded :

$$S_l \;;\; l = \begin{cases} 1 \text{ for site D1} \\ 2 \text{ for site D2} \\ 3 \text{ for site L1} \\ 4 \text{ for site D3 or D4} \end{cases} \quad ; \text{ where } \sum S_l = 0$$

See Figure (2.1) for the geographic locations of these sites.

The WEATHER condition effects were coded :

$$WX_m \;;\; m = \begin{cases} 1 \text{ if sunny} \\ 2 \text{ if cloudy} \\ 3 \text{ if overcast} \\ 4 \text{ if rainy} \end{cases} \quad ; \sum WX_m = 0$$

The SURFACE condition effects were coded :

$$SUR_n \;;\; n = \begin{cases} 1 \text{ for calm} \\ 2 \text{ for choppy or heavy waves} \end{cases} \quad ; \text{ where } \sum SUR_n = 0$$

And the BLOCK effects were coded as B_o , $o = 1,...,52$, again with the restriction that $\sum B_o = 0$

Note that the wind factor was not considered, since it was highly correlated with surface condition (the sample correlation of the two factors was virtually 1). Note also that some of the adjacent levels of two of the factors (SITE and SUR) have been grouped into a single level. This was done because there were not enough observations in some of the cells to form an invertible design matrix..

A Preliminary Look

As our main objective was to investigate the main treatment effect, I started the data analysis with a simple comparison of the means between the treatment and control groups for each of the six species. In this part of the analysis, all factors, except for TREATMENT and BLOCK were ignored.

The following table provides a brief comparison between treatment and control nets. In the table, let

$LSHt_o$ = the log of the adjusted catch rate of the treatment net from the o^{th} block for steelhead.

$LSHc_o$ = the log of the adjusted catch rate of the control net from the o^{th} block for steelhead.

$LSHd_o$ = their difference.

That is,

$LSHd_o = LSHt_o - LSHc_o$.

The same variables were defined for the other species with LCM, LCK, LPK, LSX, LCO as abbreviations for chum, chinook, pink, sockeye, and coho.

Table 2.1 :

A brief statistical summary of the data from the experiment. A comparison between control and treatment nets. Note: there were 104 observations (52 in the treatment group, and 52 in the control group)

	LSHc	LCMc	LCKc	LPKc	LSXc	LCOc
$\bar{X}$	-0.997	1.966	-1.232	-0.546	-0.739	-0.942
SD	0.614	0.578	0.527	0.857	0.673	0.592

	LSHt	LCMt	LCKt	LPKt	LSXt	LCOt
$\bar{X}$	-1.226	1.592	-1.271	-1.109	-0.990	-1.060
SD	0.586	0.786	0.558	0.649	0.733	0.590

	LSHd	LCMd	LCKd	LPKd	LSXd	LCOd
$\bar{X}$	-0.240	-0.375	-0.039	-0.563	-0.251	-0.119
SD	0.564	0.602	0.410	0.790	0.744	0.485

To test the hypothesis that there was no treatment effect for steelhead, I fitted the model,

$$LSH_{1o} = \mu_{LSH} + T_1 + B_o + \varepsilon_{1o} , \qquad (2.1)$$

where μ_{LSH} = the overall mean of LSH,

T_1, and B_o defined as above,

ε_{1o} = normally distributed error terms.

Therefore,

$$\begin{aligned} LSHt_o &= LSH_{1o} \\ &= \mu + T_1 + (B_o + \varepsilon_{1o}) \\ LSHc_o &= LSH_{2o} \\ &= \mu + T_2 + (B_o + \varepsilon_{2o}) \end{aligned}$$

$$\begin{aligned} LSHd_o &= LSHt_o - LSHc_o \\ &= 2T_1 + (\varepsilon_{1o} - \varepsilon_{2o}) \end{aligned}$$

Note that $(B_o + \varepsilon_{1o})$, $(B_o + \varepsilon_{2o})$, $(\varepsilon_{1o} - \varepsilon_{2o})$ were indistinguishable from random error terms, and were therefore treated as such.

Testing the hypothesis of no treatment effect $(T_1 = T_2 = 0)$ is equivalent to testing for the location of the mean of LSHd. Therefore we could focus our attention on the distribution LSHd. The histograms of LSHd and LCMd can be found in Figures (2.2) and (2.3). These histograms suggest that the distribution of LSHd and LCMd are not far from normal.

Figure 2.2

The histogram of LSHd

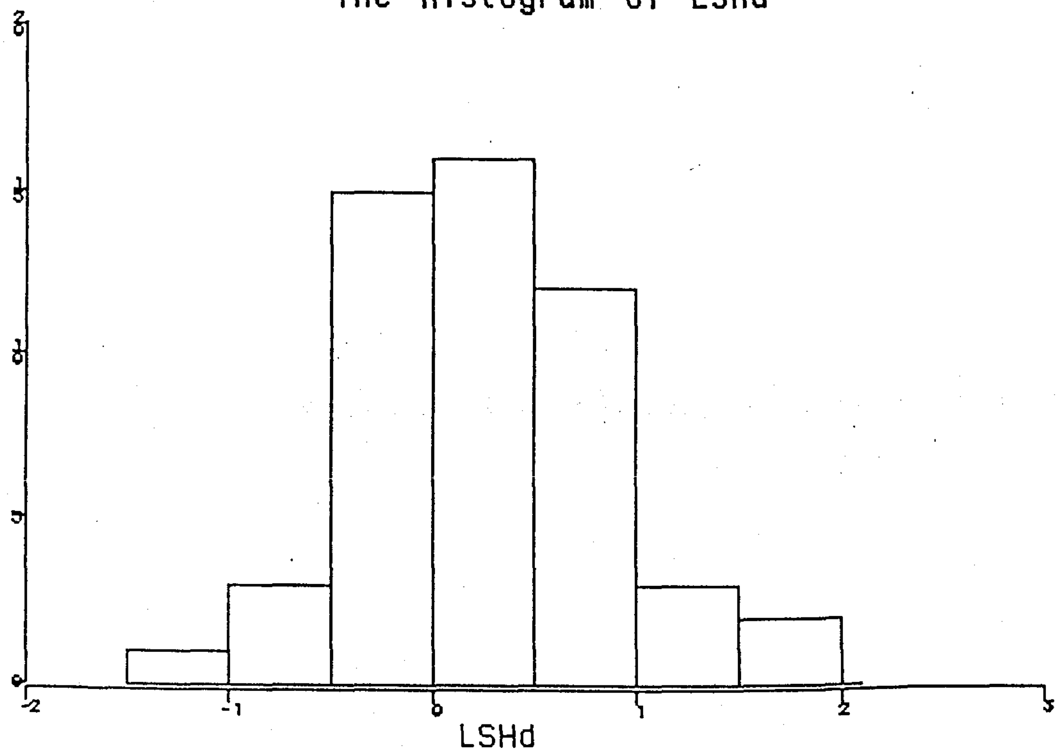
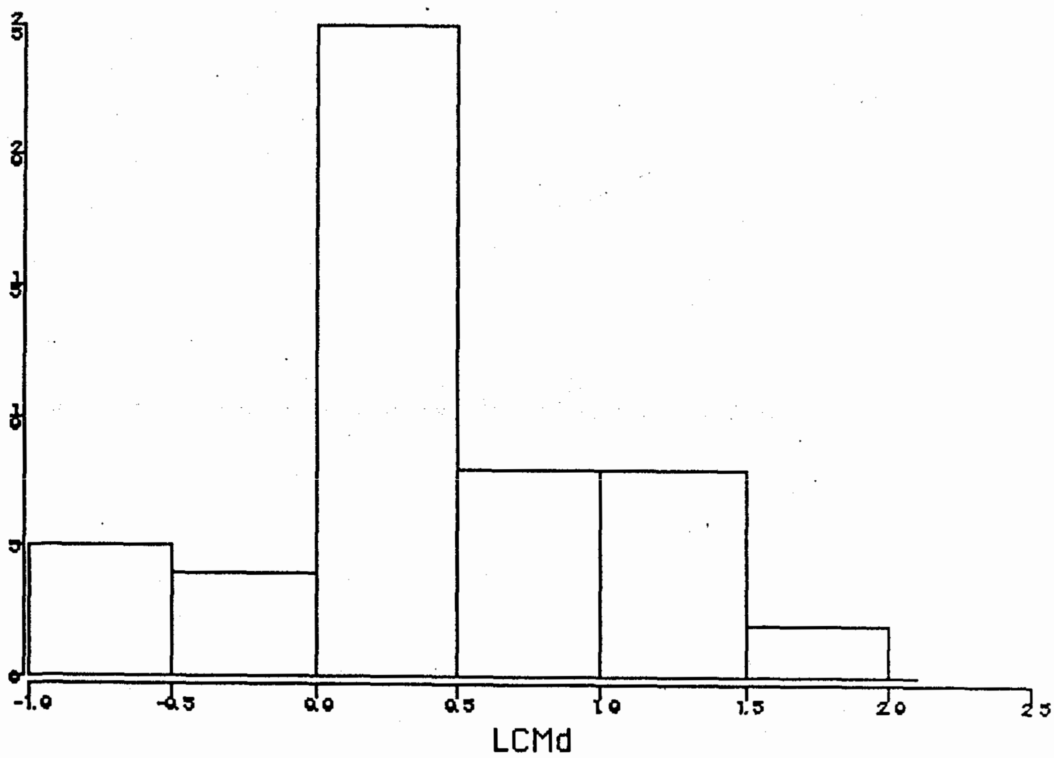


Figure 2.3

The histogram of LCMd



Therefore we can test the hypothesis :

$$H_o : \mu_{LSHd} = 0 \qquad \text{vs.} \qquad H_a : \mu_{LSHd} > 0$$

using the test statistic

$$Z = \frac{\overline{LSHd}}{SD_{LSHd} / \sqrt{52}}$$

If LSHd is normally distributed, then Z will have a t distribution with 51 degrees of freedom, which is very close to the normal distribution. However, even if the assumption of the normality of LSHd was not satisfied, the Central Limit Theorem suggest that the test statistic Z would still be approximately normal.

Furthermore, let

$$SH_{io} = \left(\frac{\text{the number of Steelhead caught} + 1}{\text{elapsed time}} \right)$$

$$= \exp (LSH_{io})$$

After applying model (2.1) we get

$$SH_{io} = \exp\ (\ \mu + T_i)\ \times \exp\ (B_o + \varepsilon_{io}\ ).$$

Now exp ($\mu + T_i$) can be viewed as the mean of the adjusted catch rate of treatment group i. Therefore,

$$\exp\ (T_1 - T_2) = \frac{\exp\ (\ \mu + T_1)}{\exp\ (\ \mu + T_2)}$$

can be seen as the ratio of the mean adjusted catch rate between the control and treatment nets.

From model (2.1) we can see that $\overline{LSHd}$ is the obvious estimator for ($T_1 - T_2$), therefore, the straightforward estimator for exp ($T_1 - T_2$), the ratio of the mean of the adjusted catch rate, is exp ($\overline{LSHd}$)

Identical hypothesis testing and estimation procedures were performed on the other species : CM, CK, PK, SX, CO.

The following table summarizes the results.

Table 2.2

The p-values of the above hypothesis tests and the estimated ratio of the mean of the adjusted catch rate between the treatment and control nets for each of the six species

	p-value	estimated ratio
SH	0.0011	0.787
CM	0.0000	0.687
CK	0.2451	0.962
PK	0.0000	0.569
SX	0.0075	0.778
CO	0.0384	0.888

Note that at α level = 0.05 the tests were significant for all of the species, except for chinook. Also note that the estimated ratios showed a greater reduction in the chum catch (31.3%) than that in the steelhead (21.3%). This might be an early indication that the treatment nets were releasing proportionately more chum than steelhead.

The above preliminary inference on treatment effects were meant only to be a preliminary analysis to get a general feeling of the data. A more thorough analysis was done by introducing statistical models that included several other factors that might affect the size of the catch.

The model :

Now that I have obtained the data from the experiment, I could expand the model (1.2) that was considered in Chapter 1 to include more significant factors. A fuller model that I considered was

$$Y_{ijklmno} = \mu + T_i + D_j + W_k + S_l + WX_m + SUR_n + B_{o(jklm)}$$
$$+ T.D_{(ij)} + T.W_{(ik)} + T.S_{(il)} + T.WX_{(im)}$$
$$+ T.SUR_{(in)} + \varepsilon_{ijklmno} \qquad (2.2)$$

Where ε is assumed to be iid N $(0,\sigma^2_\varepsilon)$

B_o is assumed to be iid N $(0,\sigma^2_\beta)$ for o = 1,...,52, and

the effects of each factor add up to 0 , and

the error terms ε and the random factor B are mutually independent.

The only interaction terms included in this fuller model were first order interactions involving TREATMENT, because they were the only interaction terms with applicable physical interpretation.

Note also that:

1 All the factors were fixed effects, except for BLOCK which was random.

2 The data contained different numbers of observations in each cell.

3 Because every block (pair of nets) was set at the same time, and therefore exposed to the same environmental conditions, BLOCKS are nested in every combination of the other factors, except for TREATMENT.

The model described in (2.2) is a mixed effects model with unbalanced data and a nested design. The ANOVA methodology with mixed effects and unbalanced data is quite complicated. It involved estimating the vector of variance components $\underline{\sigma}^2 = [\sigma_\beta^2 \ \sigma_\varepsilon^2]'$ by setting

$$E(q) = C\underline{\sigma}^2,$$

where q is a vector, with the same dimension as $\underline{\sigma}^2$, of any linearly independent quadratic forms of the observations, and C is a matrix, (Searle, 1987, pp. 495-496).

The difficulty lies in choosing q. For unbalanced data there does not seem to be an optimal set of quadratic forms that can be used as elements of q, whereas for balanced data the sum of squares of the analysis of variance do provide estimators with certain desirable minimum variance and unbiased properties.

(Searle, 1987, pp. 495-496)

I side stepped this complication by splitting the model into two parts:

$$AVG_{jklmno} = (Y_{1jklmno} + Y_{2jklmno}) /2$$

and

$$DIF_{jklmno} = (Y_{1jklmno} - Y_{2jklmno})$$

That is, AVG was the average of the 2 observations in each block, and DIF was the difference of the observations between control and treatment nets in each block (much like LSHd in model (2.1)).

From (2.2) we have :

$$AVG_{jklmno} = \mu + D_j + W_k + S_l + WX_m + SUR_n + B_{O(jklmn)} + (\varepsilon_{1jklmno} + \varepsilon_{2jklmno})/2$$

and

$$DIF_{jklmn} = (T_1 - T_2) + (T.D_{2j} - T.D_{1j}) + (T.W_{2k} - T.W_{1k}) + (T.S_{2l} - T.S_{1l}) + (T.WX_{2m} - T.WX_{1m}) + (T.SUR_{2n} - T.SUR_{1n}) + (\varepsilon_{2jklmno} - \varepsilon_{1jklmno})$$

Note, that after averaging within blocks, each block contained only one observation. Because the factor B was nested in every combination of the other factors, the block effect B was redundant, and could be treated as an error term. Consequently, the subscript o was dropped and replaced by the subscript p to denote replicates in each cell, and we write:

$$AVG_{jklmnp} = \mu + D_j + W_k + S_l + WX_m + SUR_n + \varepsilon'_{jklmnp} \quad , \qquad (2.3)$$

where $\varepsilon'_{jklmnp} = B_{o(jklmn)} + (\varepsilon_{1jklmno} + \varepsilon_{2jklmno}) / 2$

$$\sim N\ (\ 0\ , (\ \sigma^2_\beta + \sigma^2_\varepsilon\ /\ 2\ ))$$

DIF can also be simplified by noting that it is a dependent variable arising from the differences between control and treatment nets within each block. The term ($T.D_{1j} - T.D_{2j}$) can be viewed as the difference between control and treatment nets at the j^{th} DAWN level, that is: 2 x (TREATMENT.DAWN) interaction effect, and we can define it as $T.D_j = (T.D_{2j} - T.D_{1j})$. After applying an analogous argument to the other factors (T.W, T.S, T.WX, T.SUR), and using the fact that $T_1 = - T_2$ we can write:

$$DIF_{jklmnp} = 2T_1 + T.D_j + T.W_k + T.S_l + T.WX_m + T.SUR_n + \varepsilon''_{jklmnp} \qquad (2.4)$$

where $\varepsilon''_{jklmnp} = \varepsilon_{1jklmno} - \varepsilon_{1jklmno}$

$\sim N (0, 2\sigma^2_\varepsilon)$.

Both (2.3) and (2.4) are fixed effect models which can be analyzed using the standard ANOVA method. I have proceeded to use (2.3) to select significant main factors (DAWN, WEEK, SITE, WEATHER, and SURFACE) for each species of fish, and have then used (2.4) to test the significance of TREATMENT effect, and its interactions with the main effects that were selected.

The estimates of the parameters obtained by fitting the models (2.3) and (2.4) might not be equivalent to the estimates that would have been obtained using the mixed effects model (2.2). The following discussion shows that other more complex estimates may exist with better theoretical properties.

An overview of the parameter estimation in the mixed effects model with unbalanced data is found in Searle (1987, pp. 484 - 489).

The mixed effects model can be defined as follows:

$$y = X\,\beta + Z\,u + \underline{\varepsilon}$$

where y is a vector of the response variable, X is the design matrix corresponding to the vector of fixed effects β, u is the vector of random effects with corresponding design matrix Z, and e is the error vector defined as

$$e = y - E(y|u),$$

where

$$E(y|u) = X\,\beta + Z\,u,$$

$$E(y) = X\,\beta,$$

$$Var(u) = \sigma_u^2\, I \quad \text{and as usual,}$$

$$Var(\underline{\varepsilon}) = \sigma_\varepsilon^2\, I \quad \text{with the additional assumption :}$$

$$cov(u,\underline{\varepsilon}) = 0$$

The symbol V is used for the variance covariance matrix of y:

$$V = var(y)$$

$$= \sigma_u^2 Z\,Z' + \sigma_e^2 I$$

The best linear unbiased estimators (BLUE) of the fixed effects vector β is found to be

$$\hat{\beta} = (X'\,V^{-1}\,X)^{-}\,X'\,V^{-1}y$$

This estimator is different from the one I used to estimate the parameters in the fixed effects models (2.3) and (2.4), namely

$$\hat{\beta}' = (X'X)^{-1}X'y$$

Consequently, our estimates of the fixed effects may not be BLUE. However, there are advantages in choosing the simpler estimates $\hat{\beta}'$. Using the BLUE estimator $\hat{\beta}$ requires that one estimate V, which involves the estimation of the variance components σ_u^2 and σ_e^2. As discussed above, this estimation problem is full of difficulties, with no obvious optimal solution.
(Searle, 1987, p. 489)

The other advantage of using the simpler estimator $\hat{\beta}'$, and therefore the fixed effects models (2.3) and (2.4) is a practical one. I felt that it was important to keep the methodology of this consulting problem as simple as possible, so that the client could understand the applied techniques thoroughly as possible.

Choosing Covariates

I used the stepwise regression procedure (with α to enter = α to delete = 0.05), starting with an empty model to see which of the variables in model (2.3) should be included.

After some of these factors were chosen, again the stepwise regression procedure was applied to see which of the variables (TREATMENT, and all first order interactions between TREATMENT and all of the other factors that had been chosen above) in model (2.4) should be included.

While there is no theoretical restriction to include interaction terms between TREATMENT and factors that were not included in model (2.3), the physical interpretation of it may be confusing. Therefore I have restricted the interaction terms that were considered to be included in model (2.4) to only those between TREATMENT and factors that have been included in model (2.3).

In model (2.3)

$$AVG_{jklmn} = \mu + D_j + W_k + S_l + WX_m + SUR_n + \varepsilon'_{jklmn}$$

for each of the six species, I used stepwise regression procedure with partial F-test to choose between the factors (D, W, S, WX, SUR). After performing the tests (at α to enter = α to delete = 0.05) and estimating the effects of each of the significant factor, I arrived at the following models for each of the six species:

Steelhead :

$$LSHa_{jkmp} = \mu + D_j + W_k + WX_m + \varepsilon'_{jkmp}$$

where LSHa (steelhead average) is (2.3) for steelhead. The following least squares estimates were obtained:

$\overline{LSHa} = -1.117$

$\hat{\mu} = -1.350$

$\hat{D}_1 = -0.231$ $\hat{D}_2 = 0.231$

$\hat{W}_1 = 0.069$ $\hat{W}_2 = -0.026$ $\hat{W}_3 = -0.284$ $\hat{W}_4 = 0.241$

$\hat{WX}_1 = -0.088$ $\hat{WX}_2 = 0.321$ $\hat{WX}_3 = 0.187$ $\hat{WX}_4 = -0.420$

MSE = 0.171

Chum

$$LCMa_{lp} = \mu + S_l + \varepsilon_{lp}$$

where

$\overline{LCMa} = 1.779$

$\hat{\mu} = 1.7$

$\hat{S}_1 = 0.18$ $\hat{S}_2 = -0.409$ $\hat{S}_3 = -0.170$ $\hat{S}_4 = 0.399$

MSE = 0.316

Chinook

$$LCKa_{jkp} = \mu + D_j + W_k + \varepsilon'_{jkp}$$

where

$\overline{LCKa} = -1.252$

$\hat{\mu} = -1.347$

$\hat{D}_1 = -0.243$ $\hat{D}_2 = 0.243$

$\hat{W}_1 = -0.138$ $\hat{W}_2 = 0.007$ $\hat{W}_3 = -0.177$ $\hat{W}_4 = 0.308$

MSE = 0.185

Pink

$$LPKa_{jkp} = \mu + D_j + W_k + \varepsilon'_{jkp}$$

where

$\overline{LPKa} = -0.827$

$\hat{\mu} = -0.922$

$\hat{D}_1 = -0.277$ $\hat{D}_2 = 0.277$

$\hat{W}_1 = -0.408$ $\hat{W}_2 = 0.039$ $\hat{W}_3 = 0.021$ $\hat{W}_4 = 0.348$

MSE = 0.299

Sockeye

$$LSXa_{jlmp} = \mu + D_j + S_l + WX_m + \varepsilon'_{jlmp}$$

where

$\overline{LSXa} = -0.864$

$\hat{\mu} = -1.194$

$\hat{D}_1 = -0.290$ $\hat{D}_2 = 0.290$

$\hat{S}_1 = 0.213$ $\hat{S}_2 = -0.108$ $\hat{S}_3 = -0.400$ $\hat{S}_4 = 0.295$

$\hat{WX}_1 = -0.033$ $\hat{WX}_2 = 0.098$ $\hat{WX}_3 = 0.381$ $\hat{WX}_4 = -0.446$

MSE = 0.181

Coho

$$LCOa_p = \mu + \varepsilon'_p$$

where

$\overline{LCOa} = \hat{\mu} = -1.001$

SD= 0.539

Residual plots of the above models for steelhead and chum can be found in Figures (2.4) and (2.5).

Figure 2.4

The residual plot for LSHa

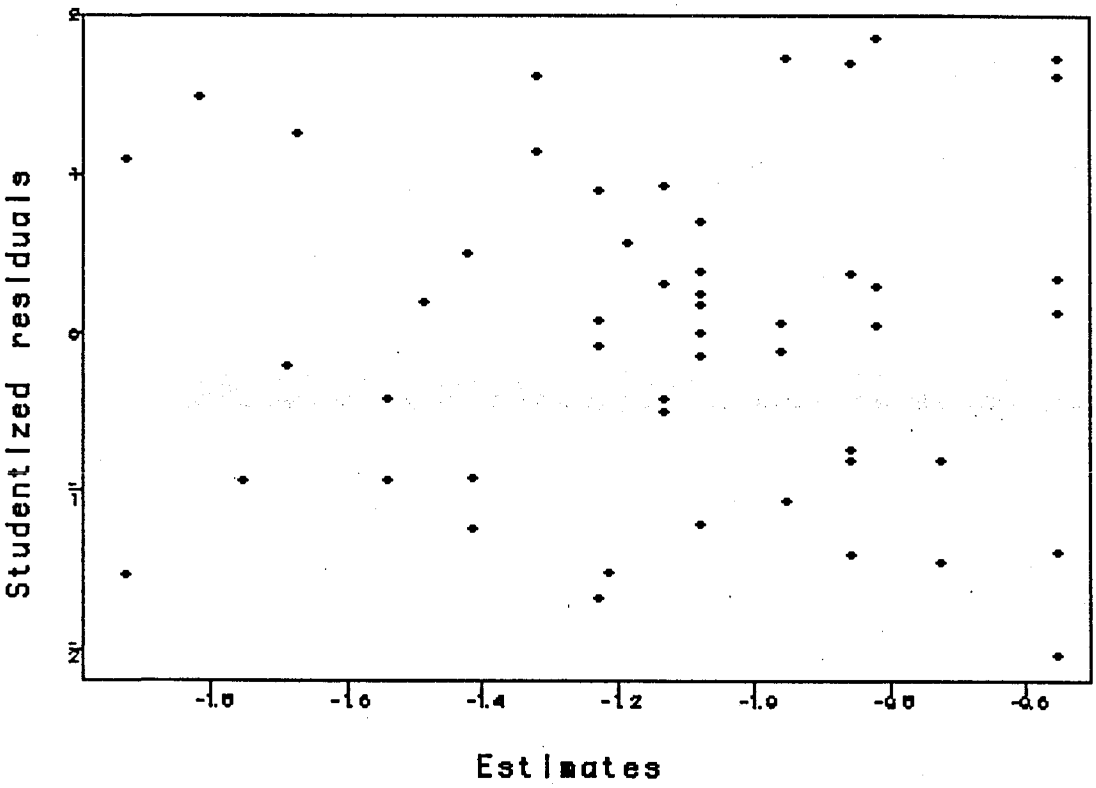
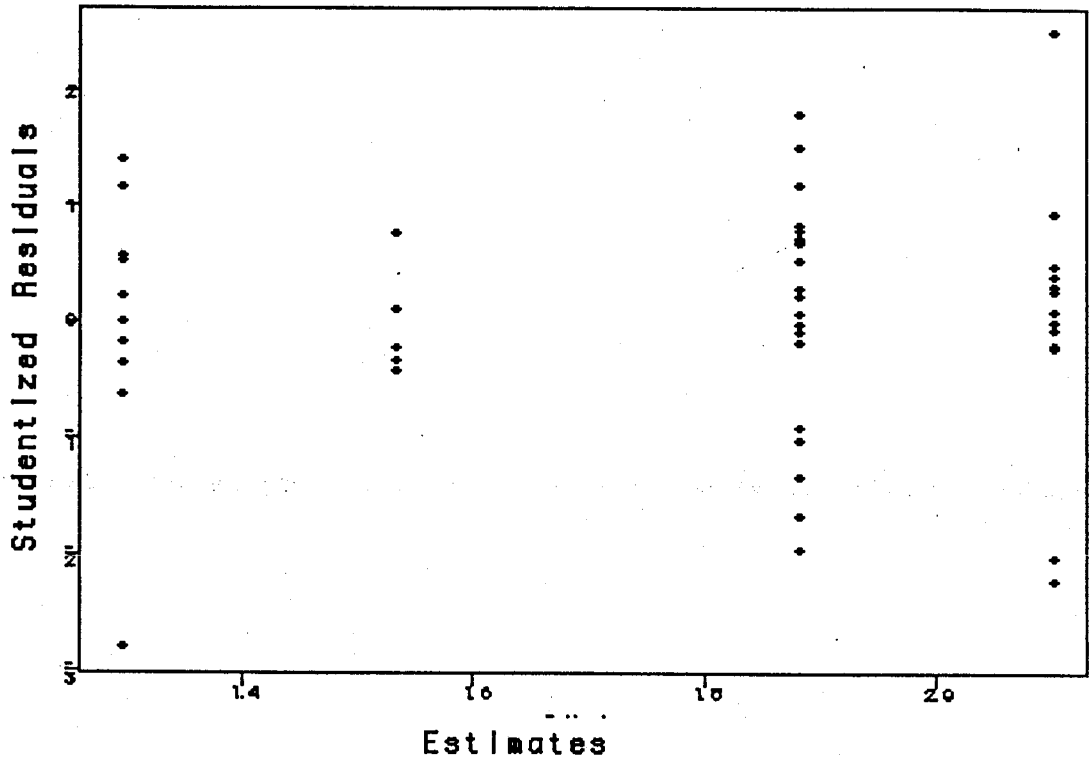


Figure 2.5

The residual plot for LCMa



Note that both the sample average $\overline{LSHa}$ and $\hat{\mu}$ could both be used as estimators of the overall mean μ. $\overline{LSHa}$ is the weighted sample average of all the cells means in the model, while $\hat{\mu}$ is the unweighted sample average of the cell means. $\hat{\mu}$ would be a better estimator if the cells were of equal importance. However, the cells were not of equal importance.

The fishers tended to fish more often in some sites than others, during some times of the day more than others, etc. This inequality of cell importance was reflected in the relative cell sizes of the data, because the experiment was run, as much as possible mimicking the actual fishing operation. Therefore the weighted sample average $\overline{LSHa}$ is a preferred estimator for the overall population mean μ. The same reasoning was applied to the other salmon species.

The mean of the log of the adjusted catch rate for each species μ reflects the relative importance of the six species of fish to the local fishing industry. However, because it is well known that chum is by far the most important species in the fishery, the estimation of μ is somewhat accessory. Of more importance is the estimation of the treatment effect (if it exists) for each species.

To test the significance of the factor TREATMENT and its first order interaction with the factors that had been chosen above, I used the model (2.4),

$$DIF_{jklmnp} = 2T_1 + T.D_j + T.W_k + T.S_l + T.WX_m + T.SUR_n + \varepsilon''_{jklmnp}$$

where $\varepsilon'' - N(0, 2\sigma^2_\varepsilon)$

Starting with an empty model, I used the stepwise regression procedure with α to enter = α to delete = 0.05. I arrived at the following models for each of the six species:

Steelhead

$$LSHd_p = 2T_1 + \varepsilon''_p$$

where

$\overline{LSHd} = 2\hat{T}_1 = -0.240$

SD = 0.564

Chum

$$LCMd_{lp} = 2T_1 + T.S_l + \varepsilon''_{lp}$$

where

$\overline{LCMd} = -0.375$

$2\hat{T}_1 = -0.450$

$\hat{T.S}_1 = 0.164$ $\hat{T.S}_2 = -0.346$ $\hat{T.S}_3 = -0.195$ $\hat{T.S}_4 = 0.377$

MSE = 0.308

Chinook

$$CKd_p = \varepsilon''_p$$

with

SD = 0.410

that is, the main treatment effect is not significant for chinook.

Pink

$$PKd_p = 2T_1 + \varepsilon''_p$$

where,

$\overline{PKd} = 2\hat{T}_1 = -0.563$

SD = 0.790

Sockeye

$$SXd_p = 2T_1 + \varepsilon''_p$$

where,

$\overline{SXd} = 2\hat{T}_1 = -0.251$

SD = 0.744

Coho

$$COd_p = 2T_1 + \varepsilon''_p$$

where,

$\overline{COd} = 2\hat{T}_1 = -0.119$

SD = 0.485

As before, the weighted sample average is the preferred estimator of the overall population mean. In this case the overall population mean is $2T_1$, twice the TREATMENT effect. Also note that chum was the only species in which a first order interaction involving TREATMENT (T.S) was significant.

For steelhead, pink, sockeye, and coho, the treatment effect did not interact with any other factors, and therefore could be estimated using table (2.2). The treatment effect was not significant for chinook, while for chum, since there was an interaction between treatment and the factor sites, different treatment effects were estimated for different sites as follows :

The MLE for $\left(\mu_{LCMd_i}\right)$ was obtained by the sample cell mean from each site, which in the model

$$LCMd_{ip} = 2T_i + T.S_i + \varepsilon''_{ip}$$

is expressed by $2\hat{T}_i + (\hat{T.S})_i$. Further, we can use exp { $2\hat{T}_i + (\hat{T.S})_i$} as the MLE for $\exp\left(\mu_{LCMd_i}\right)$, which is the ratio of the catch rate between treatment and control nets in site i for chum.

Further, the 95% Confidence Interval for $\left(\mu_{LCMd_i}\right)$ can be obtained by applying appropriate standard errors to the above point estimators, that is:

$$\{ 2\hat{T}_i + (\hat{T \cdot S})_i \} \pm \{ Z_{.025} \times \sqrt{MSE/52} \}$$

Finally, the 95% confidence intervals for $\exp\left(\mu_{LCMd_i}\right)$, which is the ratio of the mean catch rate between the treatment and control nets in site i can be found by exponentiating the upper and lower limits of of the confidence intervals for $\left(\mu_{LCMd_i}\right)$ found above.

The following table summarizes the results.

Table 2.3
95% confidence intervals, and point estimates for the ratio of the mean catch rate between treatment and control nets in each site for chum.

Site	Point estimate	Confidence interval
1	75%	(65% , 87%)
2	45%	(39% , 52%)
3	52%	(45% , 61%)
4	93%	(80% , 108%)

Similarly, for steelhead, in the absence of any interaction terms involving TREATMENT, the MLE for $\exp(\mu_{LSHd})$ and its corresponding 95% confidence interval can be found by exponentiating the upper and lower limits of the confidence interval for μ_{LSHd} :

$$\overline{LSHd} \pm \{ Z_{.025} \times SD(LSHd) / \sqrt{52} \}$$

The following table summarizes the estimates:

Table 2.4
The estimates of the ratio of mean catch rates between the treatment and control nets for steelhead.

Point estimate :	79%
95% confidence interval :	(67% , 92%)

CONCLUSIONS

Although there are other methods of analysis that can be applied to the experimental data, such as generalized linear modeling, the classical ANOVA approach on logarithmically transformed data seemed adequate in this context.

The analysis above leads to the following conclusions. The treatment net, which was designed in hope that it would decrease the catch of steelhead without significantly decreasing the catch of other salmon, particularly chum , seemed to decrease the catch of all the species, except for chinook, by a substantial proportion.

Based on the estimates obtained in Chapter 2, the treatment net decreased the catch of steelhead by 21% , pink by 43% , sockeye by 22% , and coho by 11% , while the catch rate for chinook did not seem to be affected. More interestingly, the reductions of chum catches were different in each site. Only in site 4 was the reduction of the chum catch (7%) less than the reduction of the steelhead catch.

Considering that the main species of interests were steelhead and chum, the above analysis leads to the recommendation that if treatment nets were to be used at all, that they should only be implemented in site 4. Note that site 4 is a grouping of two different sites (Showquiltz and Whitecliff shores).

However, the Department of Fisheries and Oceans has already decided to take a different course of action. The department has decided in enforcing the use of the treatment nets for the entire fishing fleet in the region. But this time, the nets will be lowered 30 inches instead of 48 below the corkline. A similar study of the effectiveness of these new modified nets may or may not be undertaken.

Appendix 1

The Raw Historical Data

The columns are as follows : SH, CM, CK, PK, SX, CO, MESH, WEEK, MONTH, ELAPSED TIME, DAWN, and SITE, as defined in Chapter 1.

0	1	2	1	10	0	4.500	1	1	11	2	1
0	3	1	1	14	0	.	1	1	4	2	1
0	14	1	11	47	2	4.500	1	1	7	2	1
.	5	2	4	9	0	4.500	1	1	14	2	1
.	4	4	11	19	1	4.250	1	1	14	2	1
.	.	.	.	5	.	.	1	1	14.66	2	1
0	9	10	8	16	5	.	1	1	8	2	1
0	9	1	0	0	0	.	1	1	7.50	2	1
1	4	0	1	8	0	4.250	1	1	6	2	1
3	5	9	14	61	4	4.250	1	1	24	1	1
1	6	6	5	11	2	4.250	1	1	9.50	2	1
2	6	4	9	32	0	4.250	1	1	17.16	2	1
3	8	0	10	23	0	4.500	1	1	16.08	2	1
0	0	5	0	11	0	.	1	1	8	2	1
0	3	0	3	13	0	.	1	1	9.83	2	1
0	1	0	4	24	2	4.500	1	1	4	2	1
2	13	3	14	44	10	4.500	1	1	23.66	1	1
2	3	5	9	30	2	4.375	1	1	19.41	1	1
0	11	2	15	74	9	4.250	1	1	16.833	2	1
0	1	1	9	12	6	.	1	1	7.167	2	1
2	7	5	8	42	2	4.500	1	1	17.500	2	1
3	6	3	7	19	4	4.625	1	1	17.833	2	1
0	1	0	1	7	0	.	1	1	6.167	2	1
3	5	6	25	37	2	4.250	1	1	14.333	2	1
2	2	9	6	6	1	4.250	1	1	15.167	2	1
2	6	0	10	35	2	4.625	1	1	20	1	1
.	1	3	6	13	2	.	1	1	14.917	2	1
3	8	10	24	52	11	4.500	1	1	19	1	1
1	2	4	7	16	4	.	1	1	5	2	1
.	1	0	2	17	0	.	1	1	19	1	1
7	9	5	4	11	0	4.250	1	1	11	2	1
1	12	0	23	59	8	.	1	1	24	1	1
1	12	13	2	6	2	6	1	1	14.667	2	1
1	8	2	1	2	3	.	1	1	4.250	2	1
0	0	0	3	10	1	4.250	1	1	4.500	2	1
4	10	3	5	14	4	4.250	1	1	15.667	2	1
1	1	3	3	9	1	.	1	1	8.333	2	1
0	2	0	1	25	1	.	1	1	.	.	1
2	3	4	6	23	1	4.875	1	1	16.500	2	1
0	0	2	1	7	0	.	1	1	7.500	2	1
3	5	4	7	40	0	4.250	1	1	18.500	1	1

0	1	2	1	15	1	.	1	1	5.500	2	1
6	5	1	7	57	2	4.500	1	1	18	1	1
1	1	1	1	18	0	.	1	1	6	2	.
10	11	5	15	47	3	.	1	1	8	2	1
0	55	2	97	35	2	4.500	2	2	18	1	1
0	19	5	122	31	1	4.625	2	2	14.500	2	1
1	14	2	.	21	1	4.500	2	2	18	1	1
7	39	.	120	.	.	4.250	2	2	18	1	1
6	36	3	86	47	3	4.500	2	2	19	1	1
2	54	3	.	45	5	4.750	2	2	20	1	1
4	41	6	84	30	7	4.500	2	2	19	1	1
2	29	.	89	.	.	4.625	2	2	17.500	2	1
2	35	3	87	53	2	4.500	2	2	17	2	1
0	7	4	142	32	2	4.500	2	2	16	2	1
7	27	1	304	60	5	4.500	2	2	20.500	1	1
0	21	3	90	47	1	4.500	2	2	13	2	1
1	44	5	394	112	2	4.500	2	2	18	1	1
1	49	2	187	44	11	4.500	2	2	21	1	1
2	21	1	313	88	4	4.250	2	2	16	2	1
2	30	0	82	12	3	5.125	2	2	15.500	2	1
2	8	2	33	20	1	4.250	2	2	13.500	2	1
0	18	1	247	63	4	4.250	2	2	19	1	1
.	104	5	193	126	11	4.125	2	2	21	1	1
0	51	1	24	3	4	6	2	2	20	1	1
5	19	6	119	28	3	4.500	2	2	14.500	2	1
2	14	5	146	45	8	4.500	2	2	20	1	1
0	32	4	291	77	7	.	2	2	18	1	1
0	50	.	25	.	0	4.500	2	2	20.500	1	1
3	10	5	208	43	2	4.500	2	2	20	1	1
1	36	4	342	36	1	4.250	2	2	17	2	1
0	183	5	115	64	13	4.875	2	2	23	1	1
10	69	2	158	80	3	4.500	2	2	15.500	2	3
7	51	4	102	62	6	4.625	2	2	16.500	2	3
9	45	2	147	49	1	5	2	2	14	2	3
4	42	3	140	43	2	.	2	2	13	2	3
12	50	1	141	49	4	4.625	2	2	13	2	3
3	53	3	68	19	0	5	2	2	16	2	3
4	33	5	71	47	5	4.750	2	2	15	2	3
6	42	4	170	62	7	4.375	2	2	13.500	2	3
2	74	3	431	43	3	4.250	2	2	46	1	3
3	43	4	148	17	8	4.500	2	2	23	1	3
0	23	0	36	17	0	4.500	2	2	7	2	3
3	23	0	148	37	3	4.750	2	2	23	1	3
3	27	0	67	41	0	4.500	2	2	8	2	3
8	.	.	.	.	.	4.500	2	2	20.500	1	3
3	.	0	0	19	0	4.500	2	2	7	2	3
2	30	2	152	27	3	4.625	2	2	25.500	1	3
4	.	.	189	33	.	4.500	2	2	23.500	1	3
1	19	0	53	10	0	4.500	2	2	6.500	2	3
6	.	.	126	.	.	4.500	2	2	24.500	1	3
0	.	0	21	8	0	4.500	2	2	4.500	2	3

5	123	2	144	15	8	4.500	2	2	25.500	1	3
3	20	0	33	3	0	4.500	2	2	0.500	2	3
10	56	0	161	39	1	4.500	2	2	25	1	3
3	44	0	60	.	1	4.500	2	2	7	2	3
7	45	1	143	69	1	4.625	2	2	24.500	1	3
6	.	1	.	19	1	4.625	2	2	6.500	2	3
11	123	11	683	104	5	4.250	2	2	34.500	1	3
2	36	0	160	10	5	4.250	2	2	21	1	3
5	.	.	126	25	.	4.500	2	2	23.500	1	3
5	.	0	353	39	2	4.750	2	2	28	1	3
2	32	5	83	32	4	4.125	2	2	21.500	1	3
3	7	0	38	15	0	4.250	2	2	6.500	2	3
3	48	3	273	1	2	5	2	2	31	1	3
1	28	0	19	0	0	5	2	2	3	2	3
4	47	1	.	15	3	4.500	2	2	20.500	2	3
2	93	1	164	18	0	5.125	2	2	26	1	3
0	23	0	48	0	0	4.625	2	2	4.500	2	3
2	.	.	119	13	.	5.125	2	2	29.500	1	3
1	.	0	47	12	0	5.125	2	2	2.500	2	3
1	.	1	123	21	.	4.125	2	2	22.500	1	3
1	.	0	19	0	0	4.125	2	2	3.500	2	3
2	107	0	174	49	.	4.625	2	2	31	1	3
0	19	0	21	0	0	4.625	2	2	3.500	2	3
7	50	0	142	54	0	4.500	2	2	23	1	3
3	20	0	37	2	0	4.500	2	2	7	2	3
1	81	1	25	1	2	6	2	2	23	1	3
0	.	0	.	0	0	6	2	2	5	2	3
3	35	2	153	33	4	4.500	2	2	26	1	3
2	16	0	29	13	0	4.500	2	2	6.500	2	3
4	62	0	74	13	1	5	2	2	23.500	1	3
4	49	2	209	57	2	4.500	2	2	20.500	1	3
5	21	1	64	12	0	4.500	2	2	7.500	2	3
4	.	.	.	40	.	4.750	2	2	27	1	3
3	20	0	36	23	0	4.750	2	2	5	2	3
2	30	2	97	14	0	4.500	2	2	19	2	3
3	.	1	51	10	0	4.500	2	2	7.500	2	3
9	.	0	102	28	0	4.375	2	2	30.500	1	3
0	.	0	26	3	1	4.385	2	2	3	2	3
0	.	.	59	17	.	4.500	2	2	7	1	3
9	.	.	232	.	.	4.500	2	2	25	1	3
2	36	0	78	21	0	4.500	2	2	6	2	3
5	53	0	241	3	0	.	2	2	30	1	3
1	81	6	569	19	17	3.500	3	2	5.500	2	2
.	108	0	70	17	.	.	3	2	14	2	1
1	17	4	107	88	3	4.250	3	2	12.500	2	1
1	39	2	154	47	1	4.750	3	2	12.500	2	1
1	55	2	447	48	14	5.125	3	2	14.500	2	1
1	175	1	306	59	0	5.125	3	2	16	2	1
0	24	1	315	102	3	4.500	3	2	15	2	1
0	46	5	81	21	3	5.125	3	2	14	2	1
0	43	2	195	40	5	5.125	3	2	13.500	2	1

0	200	2	85	.	3	5.125	3	2	15.500	2	1
0	229	0	109	35	28	5.125	3	2	18.500	1	1
0	302	2	35	4	18	6	3	2	16.500	2	1
1	193	1	84	3	9	6	3	2	17.500	2	1
0	101	2	53	2	9	5.875	3	2	20	1	1
0	281	0	491	19	34	3.500	3	2	26	1	2
0	437	1	178	12	5	3.500	3	2	27.500	1	2
4	988	6	621	26	60	3.500	3	2	28.500	1	2
1	268	4	168	12	20	3.500	3	2	28	1	2
0	450	1	614	34	18	3.500	3	2	30	1	2
1	595	2	521	13	17	3.500	3	2	28.500	1	2
0	450	6	1299	23	51	3.500	3	2	24	1	2
.	.	.	24	11	.	.	3	2	.	.	3
.	.	.	56	19	.	.	3	2	.	.	3
.	.	.	34	12	.	.	3	2	.	.	3
.	.	.	10	5	.	.	3	2	.	.	3
.	.	.	23	9	.	.	3	2	.	.	3
.	.	.	121	39	.	.	3	2	.	.	3
.	.	.	14	6	.	.	3	2	.	.	3
.	.	.	14	5	.	.	3	2	.	.	3
.	.	.	85	35	.	.	3	2	.	.	3
.	.	.	40	7	.	.	3	2	.	.	3
.	.	.	134	18	.	.	3	2	.	.	3
.	.	.	33	6	.	.	3	2	.	.	3
.	.	.	49	11	.	.	3	2	.	.	3
.	.	.	13	13	.	.	3	2	.	.	3
.	.	.	5	0	.	.	3	2	.	.	3
.	.	.	37	8	.	.	3	2	.	.	3
10	249	2	0	.	.	6.500	3	2	18	1	3
2	196	1	18	1	.	.	3	2	19.500	1	3
2	187	0	19	15	.	.	3	2	17	2	3
14	261	4	20	6	.	6	3	2	20	.	3
3	32	0	66	14	.	4.750	3	2	13	2	3
3	128	0	98	29	.	.	3	2	17.500	2	3
3	188	0	128	29	.	5.125	3	2	21	1	3
4	260	2	13	4	.	6.125	3	2	19	1	3
9	277	1	27	10	.	.	3	2	16.500	2	3
7	133	2	96	41	.	.	3	2	15.500	2	3
8	126	3	112	35	.	5.125	3	2	18.500	1	3
1	104	2	28	15	.	.	3	2	15.500	2	3
3	103	2	15	8	.	.	3	2	16	2	3
10	179	5	131	.	.	4.875	3	2	18	1	3
2	32	7	222	69	20	4.125	3	2	24	1	1
1	182	3	155	23	14	6.250	3	2	25	1	1
3	142	0	148	22	10	6	3	2	24.500	1	1
0	77	1	85	11	0	4.125	3	2	24	1	1
0	257	1	68	17	16	6.125	3	2	25	1	1
0	268	2	.	28	7	6	3	2	21.500	1	1
0	219	2	26	5	6	6	3	2	24.500	1	1
2	22	0	147	40	.	.	3	2	22	2	1
0	396	1	14	1	7	6	3	2	23	1	1

2	173	0	43	10	10	6	3	2	21	2	1
1	65	4	102	14	10	6.500	3	2	23	1	1
0	220	12	40	.	12	6	3	2	24.500	1	1
2	95	1	22	4	1	6	3	2	24.500	1	1
0	136	0	6	3	3	5.875	3	2	22	1	1
0	.	.	.	.	.	3.500	3	2	48	1	2
3	.	.	.	.	.	3.500	3	2	48	1	2
5	.	.	.	.	.	3.500	3	2	48	1	2
1	.	.	.	.	.	3.500	3	2	48	1	2
3	.	.	.	.	.	3.500	3	2	48	1	2
3	.	.	.	.	.	3.500	3	2	32	1	2
6	.	.	.	.	.	3.500	3	2	48	1	2
4	.	.	.	.	.	3.500	3	2	48	1	2
0	20	0	222	6	5	3.500	3	2	20	1	2
3	.	.	.	.	.	3.500	3	2	48	1	2
1	70	4	267	7	17	3.500	3	2	17.500	1	2
0	392	1	281	7	31	3.500	3	2	30.500	1	2
1	217	1	22	7	0	6	3	2	26	1	3
0	193	0	38	5	2	6	3	2	24	1	3
4	317	0	31	3	1	6	3	2	26	1	3
3	520	2	45	1	0	6	3	2	25	1	3
3	311	0	0	5	12	.	3	2	24	1	3
1	280	0	5	1	0	.	3	2	23.500	1	3
3	207	0	33	9	2	6.125	3	2	27.500	1	3
4	402	0	31	3	3	5.785	3	2	22.500	1	3
1	428	0	12	4	0	6.750	3	2	24	1	3
3	486	0	53	12	2	5.875	3	2	28.500	1	3
0	271	1	30	7	1	6	3	2	25	1	3
2	275	0	50	3	1	6	3	2	24	1	3
0	31	0	17	4	1	.	3	2	19	2	3
2	183	2	11	9	3	5.125	3	2	27.500	1	3
7	330	2	266	12	2	3.500	4	2	6	1	2
1	73	1	88	5	1	6	4	2	15.500	2	1
0	19	0	363	37	0	4.750	4	2	17.500	2	1
1	179	0	92	10	5	6	4	2	16	2	1
1	204	5	101	2	5	6	4	2	16.500	2	1
1	105	1	61	2	4	6.500	4	2	14.500	2	1
1	154	2	73	2	3	6.250	4	2	12.500	2	1
1	64	4	331	7	2	6.625	4	2	13.500	2	1
3	121	1	72	4	4	6	4	2	14	2	1
0	114	0	52	5	5	6	4	2	15.500	2	1
0	147	0	90	0	7	6.250	4	2	12.500	2	1
6	553	0	1470	43	8	3.500	4	2	28.500	1	2
5	340	0	1083	49	16	3.500	4	2	24	1	2
4	894	0	1187	31	17	3.500	4	2	24	1	2
3	632	0	1562	37	27	3.500	4	2	27.500	1	2
3	866	2	1451	36	19	3.500	4	2	22.500	1	2
8	465	3	2301	30	36	3.500	4	2	26.500	1	2
0	.	0	17	0	2	.	4	2	12	2	3
1	.	0	18	2	4	6.250	4	2	14	2	3
3	.	2	20	4	3	5.750	4	2	13	2	3

4	.	0	15	8	1	.	4	2	14.500	2	3
0	172	0	15	0	2	7.250	4	2	18.500	1	3
14	.	0	58	10	9	5.875	4	2	18	1	3
5	295	0	14	2	4	7	4	2	21	1	3
0	39	0	164	2	1	5.125	4	2	18	1	3
3	132	2	72	3	6	6.250	4	2	19	1	3
5	138	0	55	4	7	6	4	2	15.500	2	3
4	.	1	10	4	0	6	4	2	2	2	3
1	153	2	69	0	3	6	4	2	19.500	1	3
2	137	0	49	1	3	6.125	4	2	19	1	3
7	.	0	16	0	5	.	4	2	13.500	2	3
4	.	0	38	0	0	6.250	4	2	18.500	1	3
	.	1	20	.	2	6.750	4	2	12.500	2	3
0	51	1	175	10	6	5	4	2	14	2	3
4	.	0	65	6	2	6	4	2	13.500	2	3
8	285	0	11	10	0	6.250	4	2	22.500	1	3
8	.	1	56	6	8	6.125	4	2	17	2	3
5	.	.	.	4	.	6.750	4	2	16	2	3
1	214	0	35	3	7	6.125	4	2	20.500	1	3
7	.	1	49	6	6	6.250	4	2	17.500	2	3
10	153	1	21	6	7	6.250	4	2	15	2	3
0	.	0	5	0	0	.	4	2	3.500	2	1
3	.	0	30	0	0	.	4	2	9.500	2	1
2	.	0	28	9	0	6	4	2	28	1	1
0	.	0	4	1	0	6.500	4	2	9.500	2	1
1	.	3	210	3	6	6.250	4	2	24	1	1
1	.	3	703	12	10	5	4	2	24.500	1	1
0	22	0	104	2	0	5.125	4	2	7.500	2	1
0	93	0	320	10	5	5.125	4	2	22.500	2	1
0	39	0	65	1	0	5.125	4	2	10.500	2	1
0	.	0	0	0	0	6	4	2	7	2	1
1	.	0	29	0	0	6.125	4	2	5	2	1
0	.	0	33	0	1	6	4	2	7.500	2	1
0	.	0	17	1	0	6	4	2	10	2	1
1	.	0	74	1	3	5.875	4	2	24	1	1
0	.	0	40	1	0	6.500	4	2	11.500	2	1
1	.	.	.	.	.	3.500	4	2	48	1	2
4	.	.	.	.	.	3.500	4	2	48	1	2
10	.	.	.	.	.	3.500	4	2	48	1	2
6	.	.	.	.	.	3.500	4	2	48	1	2
.	.	.	.	.	.	3.500	4	2	48	1	2
16	.	.	.	.	.	3.500	4	2	48	1	2
9	.	.	.	.	.	3.500	4	2	48	1	2
.	.	0	24	2	0	.	4	2	6	2	3
0	.	0	1	0	0	.	4	2	10	2	3
10	209	1	70	8	1	6.125	4	2	22	2	3
.	.	0	1	0	0	.	4	2	4	2	3
1	.	0	6	1	0	.	4	2	3.500	2	3
.	.	0	2	0	0	6	4	2	6	2	3
.	.	0	56	3	8	7.250	4	2	31	1	3
2	.	0	17	2	0	6.750	4	2	30.500	1	3

1	.	0	0	1	0	.	4	2	11	2	3
7	123	0	54	1	7	6.250	4	2	18	2	3
8	208	1	74	6	1	6	4	2	21.500	1	3
1	.	.	.	.	0	.	4	2	10	2	3
2	229	0	62	0	3	6	4	2	22	1	3
.	.	0	9	2	0	.	4	2	7	2	3
.	.	0	3	11	1	5.875	4	2	4.500	2	3
1	.	1	11	3	0	.	4	2	12	1	3
12	187	0	48	2	1	6	4	2	17.500	2	3
.	.	0	11	0	0	.	4	2	9.500	2	3
0	80	0	57	9	2	6.250	4	2	21	1	3
.	.	0	22	0	0	.	4	2	8	2	3
5	.	0	.	.	.	.	4	2	10	2	3
.	.	0	15	0	1	.	4	2	10.500	2	3
1	.	0	13	3	3	6.500	4	2	26	1	3
14	140	0	77	10	0	.	4	2	22.500	2	3
.	.	0	7	1	0	.	4	2	6	2	3
11	168	0	97	12	1	6.125	4	2	22.500	1	3
9	154	0	69	9	2	6.250	4	2	24.500	1	3
0	.	1	29	2	0	.	4	2	8.500	2	3
3	132	0	52	5	4	6.125	4	2	21.500	1	3
2	139	0	16	1	0	6.500	4	2	22.500	2	3
5	165	0	56	3	2	6.500	4	2	20.500	2	3
.	.	2	62	1	.	.	5	2	16	2	1
.	.	0	127	1	.	.	5	2	17	2	1
.	.	2	82	0	.	.	5	2	18	1	1
.	.	1	100	0	.	.	5	2	19	1	1
.	.	1	80	0	.	.	5	2	20	1	1
.	.	1	102	2	.	.	5	2	20	1	1
.	.	1	136	1	.	.	5	2	13	2	1
.	.	0	196	3	.	.	5	2	13.500	2	1
0	.	2	40	0	1	.	5	2	12	2	3
0	.	0	14	0	4	.	5	2	13	2	3
0	.	1	13	2	0	.	5	2	12.500	2	3
0	.	2	37	5	6	.	5	2	12	2	3
.	.	1	30	2	.	.	5	2	20.500	1	3
.	.	0	16	2	.	.	5	2	21	1	3
1	.	0	17	0	0	6.500	5	2	15	2	3
3	.	0	27	1	2	6	5	2	16	2	3
2	.	0	87	7	7	5.875	5	2	15	2	3
1	.	0	23	1	3	6.125	5	2	18	1	3
1	.	0	20	1	3	6.500	5	2	17.500	2	3
1	.	0	9	2	2	6.125	5	2	14	2	3
1	.	0	26	4	3	6.125	5	2	14	2	3
2	.	0	26	0	1	6.500	5	2	15	2	3
0	.	0	23	6	6	6.250	5	2	17	2	3
5	.	3	76	3	2	6	5	2	13.500	2	3
0	.	1	51	5	5	6.125	5	2	16.500	2	3
0	.	0	15	0	1	6	5	2	12	2	3
0	.	0	59	0	5	6	5	2	16.500	2	3
2	.	0	44	1	3	6.250	5	2	15.500	2	3

3	.	0	19	1	0	6.250	5	2	11.500	2	3
1	.	0	4	0	1	6.250	5	2	10.500	2	3
0	.	0	6	0	0	7	5	2	8.500	2	3
0	.	0	61	1	4	6.125	5	2	17.500	2	3
2	.	0	40	3	0	6	5	2	14.500	2	3
0	.	2	37	5	6	6.250	5	2	13.500	2	3
.	.	0	27	0	2	.	5	2	.	.	1
.	.	0	27	1	4	.	5	2	.	.	1
.	.	0	13	0	1	.	5	2	26.500	1	1
.	.	3	27	1	3	.	5	2	.	.	1
.	.	0	.	1	0	.	5	2	21	1	1
.	.	0	71	0	3	.	5	2	23	1	1
.	.	1	30	2	1	.	5	2	.	.	1
.	.	1	65	0	5	6.500	5	2	40.500	1	1
0	.	2	2	.	0	6	5	2	6.500	2	1
.	.	0	79	0	5	.	5	2	24	1	1
.	.	0	2	1	0	.	5	2	.	.	1
.	.	0	211	0	9	.	5	2	.	.	1
.	.	1	211	0	7	.	5	2	.	.	1
.	.	0	114	0	5	.	5	2	.	.	1
.	.	1	76	1	3	.	5	2	.	.	1
.	.	0	3	0	0	.	5	2	.	.	1
.	.	0	30	0	0	.	5	2	7.500	2	1
.	.	0	3	0	0	.	5	2	.	.	1
.	.	0	21	1	0	.	5	2	.	.	1
.	.	0	2	0	0	.	5	2	.	.	1
.	.	0	5	1	0	.	5	2	.	.	1
.	.	0	84	7	1	.	5	2	.	.	1
.	.	0	8	3	0	.	5	2	.	.	1
4	.	1	2	0	0	6.500	5	2	10	2	3
.	.	0	84	7	3	.	5	2	.	.	3
0	.	0	4	1	0	6.500	5	2	9	2	3
.	.	0	4	1	0	.	5	2	.	.	3
2	.	0	51	12	1	6.125	5	2	26.500	1	3
0	.	0	0	0	0	6.500	5	2	7	2	3
.	.	0	17	2	0	.	5	2	.	.	3
0	.	0	1	0	0	6.500	5	2	9	2	3
0	.	0	0	0	0	6	5	2	6	2	3
0	.	0	4	1	0	6	5	2	9	2	3
.	.	1	4	1	.	.	5	2	.	.	3
2	.	0	28	11	1	6.250	5	2	17.500	1	3
1	.	0	24	2	0	6.125	5	2	26	1	3
6	.	0	25	7	4	6	5	2	29	1	3
0	.	0	10	0	0	6	5	2	5	2	3
0	.	1	.	.	0	6	5	2	4	2	3
1	.	0	11	.	1	6	5	2	7.500	2	3
2	.	0	37	28	0	5.875	5	2	29.500	1	3
1	.	0	19	2	1	6.125	5	2	28	1	3
4	.	0	3	1	.	7	5	2	31	1	3
4	.	1	1	1	0	6.750	5	2	23	1	3
0	.	0	15	1	0	6	5	2	6	2	3

1	.	0	10	0	1	6	5	2	5.500	2	3
3	.	1	11	0	1	6.125	5	2	18.500	2	3
3	.	2	40	7	4	5.875	5	2	20	1	3
0	.	0	9	1	0	5.875	5	2	4	2	3
4	.	0	96	3	.	5.875	5	2	20.500	1	3
1	.	0	50	9	2	5.875	5	2	5.500	2	3
3	.	0	16	5	3	5.750	5	2	30.500	1	3
0	.	0	1	0	0	5.750	5	2	3.500	2	3
4	.	0	27	6	1	6.250	5	2	29	1	3
0	76	0	37	2	0	5.875	6	3	10.500	1	1
0	99	0	393	5	3	5	6	3	11	2	1
0	121	0	27	1	0	6.500	6	3	11.500	2	1
1	211	0	92	2	0	6	6	3	15	1	1
0	180	0	125	1	1	6	6	3	15	1	1
0	143	0	24	1	1	7	6	3	16.500	1	1
0	152	0	76	0	0	6	6	3	15.500	1	1
0	120	0	51	0	1	6.500	6	3	10	2	1
1	48	0	24	2	0	5.875	6	3	13.500	1	1
0	79	0	252	0	1	5.875	6	3	12	1	1
0	95	0	140	0	1	5.875	6	3	13	1	1
0	87	0	55	0	1	5.875	6	3	12.500	1	1
2	.	0	854	1	12	.	6	3	17	1	2
1	.	.	1163	1	17	.	6	3	11.500	1	2
5	.	0	904	3	.	3.500	6	3	17	1	2
0	.	0	27	0	0	6.250	6	3	11	1	3
1	.	0	24	0	0	.	6	3	4	2	3
0	.	0	14	0	2	.	6	3	8	2	3
0	.	0	11	1	1	6.125	6	3	13	1	3
.	.	0	39	3	0	.	6	3	12	1	3
.	.	0	67	6	2	.	6	3	11.500	2	3
.	.	0	26	1	0	.	6	3	7.500	2	3
.	.	0	24	0	0	.	6	3	11	2	3
.	.	0	6	0	0	.	6	3	9.500	2	3
.	.	0	14	2	0	.	6	3	8.500	2	3
.	.	0	4	1	0	.	6	3	2.500	2	3
0	.	0	10	0	0	6.125	6	3	6	2	3
.	.	0	30	1	0	.	6	3	9.500	2	3
.	.	0	24	0	0	.	6	3	12	1	3
0	.	0	21	2	0	6	6	3	12	1	3
.	.	0	14	4	1	.	6	3	8.500	2	3
1	.	0	39	1	1	6.250	6	3	10.500	1	3
3	.	0	55	4	0	6.125	6	3	14	1	3
1	.	0	48	0	0	6.250	6	3	17	1	3
.	.	0	21	1	0	.	6	3	10	2	3
3	.	0	83	0	1	5.875	6	3	15	1	3
3	.	0	21	1	0	6	6	3	9.500	1	3
0	.	0	15	0	1	5.750	6	3	14.500	1	3
0	117	0	73	1	4	5.875	6	3	24	1	1
0	75	0	47	0	1	6	6	3	11	1	1
2	.	0	45	2	.	6	6	3	17	2	1
0	122	0	763	2	10	5	6	3	16	2	1

2	292	0	367	1	3	6.500	6	3	27.500	1	1
0	155	0	661	0	4	5.125	6	3	26.500	1	1
0	201	0	311	0	15	6	6	3	18.500	1	1
0	281	0	626	1	3	6	6	3	25	1	1
0	177	0	238	0	10	6.500	6	3	17.500	2	1
0	467	0	467	1	11	5.875	6	3	16.500	2	1
0	75	0	160	0	5	6	6	3	10	2	1
1	128	0	254	2	1	5.875	6	3	12.500	2	1
2	.	0	875	10	.	.	6	3	35.500	1	2
1	.	1	1672	19	.	3.500	6	3	12.500	1	2
9	.	.	4282	16	.	.	6	3	35	1	2
0	.	0	1545	8	.	.	6	3	13.500	1	2
2	.	0	32	0	2	6.250	6	3	17	1	3
.	.	0	13	0	3	6.750	6	3	20.500	1	3
0	81	0	325	1	6	6	6	3	16	2	3
1	.	0	155	9	5	5.875	6	3	19.500	1	3
4	.	0	74	3	2	6.250	6	3	21	1	3
2	.	0	145	6	0	6	6	3	18.500	2	3
4	.	0	25	1	2	6.500	6	3	18	2	3
3	.	0	68	2	3	6.500	6	3	21	1	3
0	.	0	24	1	5	6.500	6	3	15.500	2	3
1	.	0	28	3	4	6.250	6	3	10.500	2	3
0	.	0	53	0	4	6.125	6	3	16	2	3
2	.	0	26	0	2	.	6	3	20.500	1	3
4	.	0	208	7	0	6	6	3	22	1	3
0	72	0	116	0	2	6	6	3	17	2	3
1	.	0	46	3	1	6.125	6	3	28.500	1	3
.	.	0	79	1	0	6	6	3	16	2	3
4	.	1	111	1	1	6.250	6	3	26.500	1	3
5	.	0	169	0	3	6.125	6	3	26	1	3
2	.	0	47	2	0	5.750	6	3	17	1	3
7	.	1	171	1	.	6	6	3	28	1	3
1	.	1	74	0	5	5.875	6	3	20	1	1
0	.	0	34	3	4	7	6	3	43.500	1	1
0	130	0	197	1	0	6.500	6	3	16.500	2	1
0	113	1	287	0	4	6	6	3	13.500	2	1
0	47	0	52	0	0	6	6	3	14.500	2	1
0	53	0	238	1	2	6	6	3	12	2	1
0	144	0	422	0	5	6	6	3	25	1	1
0	64	0	62	2	2	6.500	6	3	21	2	1
0	234	0	364	0	9	5.875	6	3	17	2	1
0	113	0	130	0	9	5.125	6	3	12	2	1
0	144	0	186	2	4	6	6	3	24	1	1
0	81	0	202	0	4	6	6	3	18	2	1
0	81	0	157	2	4	5.875	6	3	24.500	1	1
0	64	0	162	0	1	6	6	3	14	2	1
0	120	0	166	0	7	6	6	3	23.500	1	1
4	.	0	1330	5	.	3.500	6	3	12	1	2
1	.	2	570	4	.	3.500	6	3	12	1	2
1	.	2	930	4	.	3.500	6	3	13	1	2
1	.	0	44	2	1	5.750	6	3	25	1	3

3	.	0	106	5	1	6	6	3	28.500	1	3
2	.	0	39	0	6	6	6	3	23	1	3
3	.	0	23	1	0	6.125	6	3	26.500	1	3
1	106	0	211	1	10	6	6	3	.	.	3
2	.	0	18	3	2	7.125	6	3	23	1	3
2	.	0	12	0	2	6.750	6	3	39	1	3
0	.	0	60	5	0	5.375	6	3	18	1	3
0	.	0	26	0	0	5.875	6	3	4.500	2	3
.	.	0	10	0	0	.	6	3	22	1	3
0	.	0	88	1	1	6.250	6	3	37	1	3
.	.	0	92	4	3	6.125	6	3	44.500	1	3
2	.	0	59	2	2	6	6	3	20.500	1	3
2	.	0	52	1	0	6	6	3	26.500	1	3
4	.	0	50	2	6	6.250	6	3	44.500	1	3
2	.	0	16	0	2	5.875	6	3	15	2	1
1	.	0	13	0	1	6.500	6	3	43	1	1
.	.	0	22	0	1	.	6	3	24	1	1
0	.	0	84	0	3	5.875	6	3	14	2	1
3	.	0	28	0	0	6.125	6	3	31	1	1
0	.	0	28	0	4	6.125	6	3	31	1	1
1	.	0	85	0	1	6	6	3	17	1	1
4	.	0	13	6	0	6.125	6	3	35	1	1
3	.	0	66	1	2	6.125	6	3	29	1	1
.	.	0	194	0	.	.	6	3	29	1	1
0	.	0	19	0	8	6.750	6	3	30.500	1	1
0	.	2	80	0	4	6	6	3	21	1	1
1	.	0	21	3	0	5.375	6	3	27	1	1
.	.	0	36	0	0	.	6	3	29.500	1	1
1	.	0	17	0	3	.	6	3	.	.	1
0	.	0	72	1	4	6	6	3	19.500	1	1
0	.	0	54	6	5	5.875	6	3	27.500	1	1
2	.	0	96	3	0	5.750	6	3	21	1	1
0	85	1	97	0	8	6	6	3	16.500	2	1
0	157	0	202	0	7	6.500	6	3	22	2	1
0	102	0	293	0	4	6	6	3	21.500	2	1
0	91	1	220	0	13	6	6	3	24	1	1
1	93	1	434	0	9	6	6	3	16	2	1
1	58	0	114	2	7	6.500	6	3	25.500	1	1
0	99	0	138	0	8	6.500	6	3	17	2	1
0	65	0	225	1	5	5.875	6	3	15	2	1
0	54	1	192	1	6	6	6	3	11	2	1
1	63	0	374	0	2	5.125	6	3	22	1	1
0	88	0	261	0	9	6	6	3	25	1	1
0	50	0	101	0	4	6	6	3	8	2	1
0	109	0	213	1	1	5.875	6	3	22.500	2	1
0	50	0	373	0	6	6	6	3	14.500	2	1
0	57	0	155	0	3	5.875	6	3	16.500	2	1
0	.	2	283	0	3	6	6	3	21	1	1
0	84	1	193	0	4	5.875	6	3	16	2	1
.	.	0	135	1	3	6	6	3	29.500	1	3
3	0	0	102	3	2	5.125	6	3	11.500	2	3

2	.	1	55	12	3	6	6	3	26.500	1	3
.	.	0	37	0	4	6.125	6	3	23	1	3
4	.	0	57	1	8	6.500	6	3	43.500	1	3
.	.	1	36	1	4	6.125	6	3	21.500	1	3
0	.	0	77	0	10	6	6	3	24	1	3
4	.	0	84	1	5	6	6	3	28.500	1	3
0	71	0	27	0	2	6	6	3	20.500	2	1
2	579	0	231	1	8	5.875	6	3	23.500	1	1
0	66	1	24	0	1	6.125	6	3	21.500	1	1
1	275	0	49	1	4	6.500	6	3	47	1	1
0	.	0	64	0	2	.	6	3	21	2	1
1	185	1	120	0	4	5.125	6	3	22	1	1
0	78	0	0	0	13	6	6	3	22.500	1	1
0	75	0	97	0	2	6	6	3	21	1	1
0	75	0	87	0	.	6.125	6	3	20.500	1	1
0	88	0	34	0	2	.	6	3	20	2	1
0	51	0	25	0	0	6.750	6	3	8.500	2	1
0	57	0	97	4	2	5.750	6	3	28	1	1
0	.	0	9	0	1	.	6	3	23	1	1
0	106	0	66	0	1	5.875	6	3	22.500	1	1
0	50	0	92	1	2	6.500	6	3	26	1	1
0	62	0	121	1	6	6.500	6	3	23.500	1	1
0	55	0	332	0	6	6	6	3	16.500	2	1
0	1019	0	409	5	13	5.875	6	3	100.500	1	1
0	79	0	83	0	3	6	6	3	23	1	1
0	51	0	168	0	4	5.125	6	3	22.500	1	1
0	121	0	371	1	0	6	6	3	24	1	1
0	33	0	77	0	4	6.500	6	3	20.500	1	1
0	31	0	82	0	4	6	6	3	26.500	1	1
0	37	0	148	0	4	5.875	6	3	24.500	1	1
2	.	0	121	2	5	.	6	3	48	1	3
.	.	1	27	1	1	.	6	3	23.500	1	3
3	.	0	10	1	0	.	6	3	7	2	3
0	.	0	14	0	3	6	6	3	22.500	1	3
.	.	0	5	0	2	.	6	3	11.500	2	3
0	.	1	94	0	1	5.875	6	3	22.500	1	3
0	.	0	7	0	1	.	6	3	14	2	3
4	.	0	15	1	2	6.125	6	3	21	1	3
.	.	0	9	1	3	.	6	3	13.500	2	3
2	.	0	17	0	2	6	6	3	14	2	3
.	.	0	67	4	1	5.375	6	3	23.500	1	3
1	.	0	28	3	3	.	6	3	21.500	1	3
0	.	0	6	0	0	5.875	6	3	15	2	3
0	.	0	29	1	0	5.875	6	3	6.500	2	3
0	.	0	24	0	0	5.125	6	3	5.500	2	3
1	.	0	39	0	6	6	6	3	22.500	1	3
1	.	0	4	0	1	6	6	3	3	2	3
2	.	0	38	0	1	6.125	6	3	20	1	3
2	.	0	13	0	1	.	6	3	25	1	3
0	.	0	38	0	0	6	6	3	18.500	2	3
.	.	0	3	0	1	.	6	3	18	2	3

.	.	0	34	0	3	6.125	6	3	24.500	1	3
3	.	1	230	0	4	.	6	3	18	2	3
5	.	0	.	7	7	6.125	6	3	24	1	3
.	.	0	9	0	1	.	6	3	18.500	2	3
0	.	0	33	0	0	.	6	3	23.500	1	3
0	27	0	22	0	5	5.875	6	3	23.500	1	1
1	36	4	66	1	0	6	6	3	18.500	2	1
1	121	0	40	1	0	6.500	6	3	20.500	2	1
0	47	0	24	0	6	6.125	6	3	19.500	2	1
0	73	1	157	3	4	5.750	6	3	22	1	1
0	47	1	160	0	4	6	6	3	15	2	1
1	41	1	110	0	3	6.500	6	3	23.500	1	1
0	55	0	82	0	10	6	6	3	24	1	1
0	44	1	778	0	0	6	6	3	24	1	1
0	35	0	513	0	1	6	6	3	20.500	2	1
0	21	0	89	0	4	6.500	6	3	9	2	1
0	67	0	78	1	3	6.500	6	3	24	1	1
0	68	0	78	1	4	6	6	3	9	2	1
0	68	0	190	0	9	6	6	3	24.500	1	1
0	94	1	165	1	0	6	6	3	22.500	2	1
0	16	0	320	0	1	6.500	6	3	19.500	2	1
0	16	0	61	0	4	5.875	6	3	14.500	2	1
1	47	0	49	0	6	5.875	6	3	16.500	2	1
0	31	1	41	0	3	5.875	6	3	16.500	2	1
0	42	0	102	2	5	6	6	3	22.500	1	1
0	68	0	190	0	7	5.875	6	3	23	1	1
0	31	0	50	0	4	6	6	3	13	2	1
0	32	0	520	0	5	5.125	6	3	10.500	2	1
2	.	0	105	0	4	6.250	6	3	26.500	1	3
1	.	0	24	1	0	.	6	3	17.500	2	3
2	.	2	28	0	3	6	6	3	21	1	3
1	.	0	32	0	2	6	6	3	25	1	3
4	99	0	6	0	3	6.125	6	3	25.500	1	3
0	.	0	49	4	2	5.375	6	3	17.500	2	3
1	.	1	22	0	9	6.250	6	3	9.500	2	3
1	.	0	27	1	1	6.125	6	3	19	2	3
1	.	0	15	1	1	6.250	6	3	27.500	1	3
1	.	0	6	3	3	5.875	6	3	24.500	1	3
1	.	0	20	3	2	6	6	3	24	1	3
1	.	0	11	0	0	6	6	3	4.500	2	3
1	.	0	4	0	0	5.750	6	3	4.500	2	3
0	.	0	356	0	.	5	7	3	16	2	1
0	.	0	49	0	.	6.125	7	3	14.500	2	1
0	.	0	468	3	.	5	7	3	16.500	2	1
0	.	0	392	0	.	5.125	7	3	15	2	1
0	.	0	401	0	.	5	7	3	13.500	2	1
0	.	0	164	0	.	5.125	7	3	12.500	2	1
0	.	0	591	1	.	5	7	3	16	2	1
0	.	0	43	0	.	6.125	7	3	14	2	1
0	.	0	77	0	.	6	7	3	13	2	1
0	.	0	372	0	.	5	7	3	13.500	2	1

1	.	0	866	0	.	4.875	7	3	14.500	2	1
0	.	.	378	1	.	5.125	7	3	16	2	1
0	.	0	58	1	.	6.250	7	3	13	2	1
0	.	0	477	0	.	5.125	7	3	16.500	2	1
0	.	1	55	0	.	6	7	3	13.500	2	1
0	.	0	365	0	.	5.125	7	3	16	2	1
2	.	.	277	0	.	5.125	7	3	15.500	2	1
0	.	0	3	0	0	5.750	7	3	1	2	1
1	.	0	47	0	6	.	7	3	25	1	3
4	.	0	31	2	.	.	7	3	12	2	3
1	.	0	38	0	.	6	7	3	15	2	3
0	.	0	40	2	10	6.125	7	3	17.500	2	3
0	.	0	9	1	.	5.875	7	3	16	2	3
0	.	0	6	0	1	6.500	7	3	19	1	3
3	.	0	47	4	.	6.125	7	3	16	2	3
5	.	0	39	0	.	6	7	3	14	2	3
1	.	0	.	.	.	5.875	7	3	26	1	3
2	.	0	26	3	.	6.250	7	3	12	2	3
0	.	0	11	0	0	6	7	3	18.500	1	3
0	.	0	33	0	2	6	7	3	18.500	1	3
.	.	0	24	.	.	.	7	3	19	1	3
2	.	0	65	0	.	6	7	3	14.500	2	3
8	.	0	73	7	.	5.875	7	3	13.500	2	3
0	.	0	44	0	0	5.875	7	3	11	2	3
1	.	0	15	1	9	.	7	3	20	1	3
4	.	0	153	5	.	5.875	7	3	13	2	3
0	.	0	109	0	0	5.125	7	3	27.500	1	1
0	.	0	777	2	.	5	7	3	24.500	1	1
0	.	0	638	1	.	4.875	7	3	28.500	1	1
0	.	0	578	1	.	5.125	7	3	23.500	1	1
0	.	0	439	1	0	5.125	7	3	24	1	1
0	.	0	726	1	.	5.125	7	3	23.500	1	1
0	.	0	694	2	0	4.625	7	3	19	2	1
0	.	.	584	0	.	5.125	7	3	24	1	1
0	.	0	619	2	.	5	7	3	22	1	1
.	.	0	52	1	.	6.375	7	3	26.500	1	3
0	.	0	10	0	1	6	7	3	7.500	2	3
1	.	0	36	0	0	6	7	3	22	1	3
1	.	0	50	1	3	6	7	3	23.500	1	3
2	.	0	25	0	.	6.125	7	3	25	1	3
6	.	4	337	3	.	5.375	7	3	40	1	3
1	.	0	32	0	.	6.125	7	3	26	1	3
6	.	0	75	0	3	6	7	3	24.500	1	3
2	.	0	43	2	.	5.875	7	3	24.500	1	3
1	.	0	32	0	.	6.125	7	3	11	2	3
1	.	0	.	0	.	6.125	7	3	10	2	3
4	.	0	35	2	.	6	7	3	26	1	3
6	.	0	100	0	14	6.250	7	3	39.500	1	3
0	.	0	40	0	7	6.500	7	3	23.500	1	3
0	.	0	6	0	2	6.250	7	3	24	1	3
2	.	0	92	0	.	6	7	3	23	1	3

4	.	0	114	2	.	5.875	7	3	13	2	3
2	.	0	46	0	.	.	7	3	18	2	3
1	.	0	15	0	.	6.125	7	3	7.500	2	3
0	.	0	19	1	1	6	7	3	12	2	1
0	.	0	22	1	1	6	7	3	15	2	1
1	.	0	91	2	0	5.875	7	3	20.500	2	1
.	.	0	370	1	.	5	7	3	25.500	1	1

0	.	0	380	0	1	5.125	7	3	21.5	2	1
0	.	0	876	1	.	5	7	3	26	1	1
1	.	0	112	0	.	6.125	7	3	23.5	1	1
0	.	0	638	3	.	5.125	7	3	25.5	1	1
1	.	0	176	0	.	6	7	3	22.5	1	1
0	.	0	690	3	2	5.125	7	3	23.5	1	1
1	.	0	564	0	0	5.125	7	3	26	1	1
0	.	0	969	2	2	4.625	7	3	31	1	1
0	.	0	168	0	6	6	7	3	23	1	1
0	.	0	633	3	.	5	7	3	26.5	1	1
1	.	0	44	0	3	5.75	7	3	15	2	3
4	.	0	36	3	2	6	7	3	25.5	1	3
2	.	0	54	0	1	6	7	3	25	1	3
0	.	0	9	0	2	6.125	7	3	19	2	3
0	.	0	95	0	2	5.375	7	3	26.5	1	3
3	.	0	47	0	1	6	7	3	25.5	1	3
0	.	0	6	1	3	5.875	7	3	27	1	3
1	.	0	3	2	0	5.875	7	3	8	2	3
2	.	0	6	2	1	5.875	7	3	24.5	1	3
4	.	0	37	0	.	6.125	7	3	15.5	2	3
1	.	0	44	0	0	.	7	3	21	1	3
0	.	0	17	0	4	6.25	7	3	27.5	1	3
3	.	0	31	0	3	6.5	7	3	24	1	3
2	.	0	10	1	1	6	7	3	23	1	3
0	.	0	8	1	0	6	7	3	6.5	2	3
0	.	0	60	0	1	6	7	3	25.5	1	3
1	.	0	93	0	1	5.875	7	3	25.5	1	3
0	.	0	21	2	6	.	7	3	25	1	3
0	.	0	36	0	4	6.125	7	3	22	1	3
0	.	0	1	0	0	6	7	3	7	2	1
0	.	0	45	0	3	6	7	3	21.5	1	1
0	.	0	416	2	4	5	7	3	24	1	1
0	.	1	281	0	.	5.25	7	3	24.5	1	1
0	.	0	565	0	.	5.125	7	3	24.5	1	1
0	.	0	125	0	0	5.125	7	3	23	2	1
0	.	0	524	1	6	5	7	3	21.5	2	1
1	.	0	110	0	.	5.125	7	3	21	2	1
0	.	0	335	1	.	5.125	7	3	24.5	1	1
0	.	0	187	0	.	5.25	7	3	12.5	2	1
.	.	0	614	1	.	5.125	7	3	22.5	1	1
0	.	0	43	0	3	.	7	3	9	2	1
.	.	0	107	0	.	6.25	7	3	26	1	1
0	.	0	75	0	.	6	7	3	25	1	1
0	.	0	480	1	2	5.125	7	3	23.5	2	1
0	.	0	64	0	.	5.875	7	3	.	.	1
0	.	0	37	0	7	6	7	3	23	1	1
3	.	0	30	0	0	6.375	7	3	21	1	3
1	.	0	8	0	5	6	7	3	23.5	1	3
2	.	0	6	0	1	6.125	7	3	16	2	3
3	.	0	4	1	1	5.875	7	3	23.5	1	3
2	.	0	19	1	1	6.125	7	3	10.5	2	3

5	.	1	81	2	3	6	7	3	22.5	1	3
2	.	0	11	1	0	5.875	7	3	14	1	3
1	.	0	25	2	3	6.125	7	3	25	1	3
1	.	0	3	0	0	6	7	3	21	2	3
0	.	0	4	1	4	6	7	3	21.5	1	3
2	.	0	19	0	0	6.5	7	3	24.5	1	3
0	.	0	33	2	0	5.875	7	3	22	2	3
2	.	0	23	0	7	5.75	7	3	19.5	2	3
0	.	0	9	1	2	5.75	7	3	11.5	1	3
0	.	0	30	1	4	6.375	7	3	22	1	1
0	.	0	10	0	.	6.125	7	3	9	2	1
0	.	0	7	0	1	5.75	7	3	9.5	2	1
0	.	0	249	1	.	5.25	7	3	23.5	1	1
0	.	0	369	1	.	5	7	3	9	2	1
0	.	0	654	2	.	5.125	7	3	22	2	1
0	.	0	463	1	8	5.25	7	3	21.5	2	1
0	.	0	481	2	5	4.875	7	3	19	1	1
0	.	.	488	0	.	5.125	7	3	19	2	1
0	.	0	841	0	.	4.75	7	3	22	2	1
0	.	0	20	0	4	6.25	7	3	21	2	1
1	.	0	670	4	.	4.625	7	3	23	1	1
0	.	0	578	0	7	4.75	7	3	21.5	2	1
1	.	0	520	0	.	5	7	3	21	1	1
0	.	0	216	0	.	5.125	7	3	25	1	1
0	.	.	349	0	.	5	7	3	22.5	1	1
1	.	0	52	1	6	6	7	3	17	2	3
0	.	1	3	4	2	6.125	7	3	27.5	1	3
1	.	0	92	8	5	5.375	7	3	21	2	3
3	.	1	63	0	10	6	7	3	25	1	3
0	.	0	9	1	8	5.875	7	3	26	1	3
2	.	0	11	0	0	5.875	7	3	15.5	2	3
1	.	0	15	0	3	5.875	7	3	27	1	3
2	.	1	45	1	5	.	7	3	25.5	1	3
2	.	0	22	0	2	6.5	7	3	21.5	1	3
0	.	0	28	1	0	6	7	3	24	1	3
1	.	0	37	1	9	6.125	7	3	21	2	3
3	.	0	178	2	2	5.875	7	3	24	1	3
0	.	0	13	0	4	6	7	3	26	1	1
0	.	0	13	0	10	6.375	7	3	15.5	2	3
1	.	0	2	0	1	6.125	7	3	23.5	1	3
0	.	0	2	0	0	6.125	7	3	6.5	2	3
1	.	0	82	3	3	5.375	7	3	25.5	1	3
1	.	0	31	0	.	6	7	3	21	2	3
0	.	0	9	0	6	5.875	7	3	23	1	3
0	.	0	1	0	1	5.875	7	3	19	1	3
1	.	0	29	1	.	.	7	3	22	2	3
4	.	0	12	7	.	5.875	7	3	7	2	3
0	.	0	5	0	3	6	7	3	10	2	3
0	.	0	16	0	.	.	7	3	20	2	3
2	.	0	32	0	.	6.125	7	3	23.5	1	3
0	.	0	18	0	5	6	7	3	26	1	1

1	.	0	118	0	6	5.125	7	3	24	1	1
1	.	0	334	2	9	5.125	7	3	24.75	1	1
0	.	0	24	0	16	6.125	7	3	49	1	1
1	.	1	40	0	25	5.875	7	3	22.5	2	1
0	.	0	129	1	19	5.875	7	3	14.5	2	1
0	.	0	55	0	11	6.25	7	3	26	1	1
0	.	0	117	0	7	5.125	7	3	22	1	1
1	.	0	567	2	10	4.75	7	3	22	2	1
0	.	0	79	2	6	5	7	3	18	2	1
1	.	0	213	1	11	5.25	7	3	17.5	2	1
0	.	0	27	0	6	6	7	3	25.5	1	1
0	.	0	12	0	2	6	7	3	23	1	1
2	.	0	23	0	14	6.5	7	3	23.5	1	1
0	.	0	18	0	2	6.25	7	3	26.5	1	1
0	.	0	52	0	.	5.25	7	3	18	2	1
0	.	0	18	0	8	6	7	3	22.5	1	1
0	.	0	14	1	4	.	7	3	22	1	1
0	.	0	30	3	7	6.5	7	3	22.5	2	1
0	.	0	0	2	0	6.75	7	3	5	2	3
0	.	0	50	1	5	6	7	3	23	1	1
1	.	0	34	0	14	6.25	7	3	25	1	1
0	.	0	12	2	2	6	7	3	24.5	1	1
0	.	1	31	1	2	.	7	3	24.25	1	1
1	.	0	21	5	4	6.5	7	3	24	1	1
1	.	0	1	0	3	6	7	3	3.5	2	3
0	.	0	42	0	15	6	7	3	23.5	1	1
1	.	0	124	0	25	5.25	7	3	25.25	1	1
0	.	0	9	0	7	6	7	3	17.25	2	1
0	.	0	306	3	9	5.125	7	3	24	1	1
0	.	1	132	2	9	5.125	7	3	26.5	1	1
1	.	0	315	2	10	5	7	3	26	1	1
0	.	0	3	0	6	5.125	7	3	24	1	1
0	.	0	192	0	3	5	7	3	.	.	1
0	.	0	19	1	2	6.125	7	3	23.75	1	1
0	.	0	374	1	8	5	7	3	24.25	1	1
0	.	0	311	0	9	5.25	7	3	20.25	2	1
1	.	0	405	1	16	5	7	3	18.75	2	1
0	.	0	15	1	29	6.125	7	3	8.25	2	1
0	.	1	18	0	23	6.5	7	3	24.5	1	1
1	.	1	158	1	25	5	7	3	21.5	1	1
0	.	2	31	0	7	6	7	3	11.75	2	1
0	.	0	80	1	2	5.875	8	3	13	2	1
0	.	0	117	0	0	6	8	3	14.333	2	1
1	.	0	91	0	2	6	8	3	13.667	2	1
0	.	2	20	1	5	6	8	3	14.25	2	1
0	.	1	52	0	3	5.875	8	3	15	2	1
0	.	0	50	0	4	6.125	8	3	14	2	1
0	.	0	41	0	1	6	8	3	14.75	2	1
0	.	0	64	0	4	5.875	8	3	12.75	2	1
0	.	0	87	0	1	5.875	8	3	15.5	2	1
0	.	0	60	0	1	5.875	8	3	13.5	2	1

0	.	0	180	1	2	5	8	3	17.167	2	1
0	.	0	55	0	4	5.875	8	3	16	2	1
1	.	0	334	0	.	4.625	8	3	15.333	2	1
0	.	0	47	1	5	5.875	8	3	13.5	2	1
0	.	0	713	0	3	5	8	3	18	1	1
0	.	2	33	0	0	.	8	3	1	2	1
.	.	0	38	0	5	5.875	8	3	25.667	1	1
0	.	1	68	0	2	6	8	3	27.083	1	1
0	.	0	55	0	0	6	8	3	28.75	1	1
1	.	0	27	0	1	5.875	8	3	20.167	2	1
0	.	0	57	0	3	6.125	8	3	26.333	1	1
0	.	1	75	0	1	5.875	8	3	24.333	1	1
0	.	0	266	0	1	5.875	8	3	27	1	1
1	.	0	41	7	26	6	8	3	38	1	2
0	.	0	10	0	1	5.875	8	3	22.5	1	3
0	.	0	8	0	1	6	8	3	21	1	3
1	.	2	9	0	0	5.875	8	3	20.833	1	3
0	.	0	9	0	1	6	8	3	22.917	1	3
1	.	0	4	0	1	6.5	8	3	24	1	3
1	.	0	10	0	0	6.25	8	3	26.75	1	3
4	.	0	61	1	6	5.875	8	3	20.25	1	3
0	.	1	9	0	1	5.875	8	3	29.5	1	3
2	.	0	20	1	1	6	8	3	46.25	1	3
.	.	0	5	0	0	6.25	8	3	21.5	1	3
0	.	0	14	0	4	6	8	3	21.5	1	3
2	.	0	19	1	0	6	8	3	21.667	1	3
3	.	0	10	1	0	6	8	3	23.833	1	3
1	.	0	11	1	4	6	8	3	22.25	1	3
1	.	0	21	0	1	6	8	3	26.583	1	3
0	.	0	6	0	2	6.125	8	3	24.167	1	3
0	.	0	11	0	2	6.25	8	3	22	1	3
0	.	0	4	0	0	5.875	8	3	22.583	1	3
0	.	0	4	0	0	5.875	8	3	22	1	3
1	.	0	12	1	1	6	8	3	24	1	3
1	.	1	2	0	0	6.5	8	3	22.75	2	3
0	.	0	57	4	0	5.375	8	3	22.5	1	3
1	.	0	1	0	2	6.25	8	3	25	1	3
2	.	0	10	1	4	6	8	3	22.75	1	3
0	.	0	4	0	1	6	8	3	24	1	3
0	.	0	5	0	0	6	8	3	23	1	3
5	.	0	19	1	1	6.125	8	3	21.25	1	3
2	.	0	9	0	4	5.875	8	3	26.75	1	3
0	.	0	10	0	2	5.875	8	3	23	1	3
2	.	0	16	0	0	6	8	3	26.5	1	3
.	.	1	150	1	.	.	8	3	113.5	1	3
2	.	0	6	1	5	6.5	8	3	24.5	1	3
0	.	0	8	0	0	6	8	3	21.5	2	3
0	.	0	46	1	5	5.875	8	3	28	1	3
1	.	0	6	0	2	6.25	8	3	22.25	1	3
2	.	0	12	1	6	6	8	3	21.75	2	3
0	.	0	14	0	4	6	8	3	22.75	1	3

2	.	0	8	1	1	6	8	3	24.75	1	3
0	.	0	0	0	0	6.25	8	3	5.5	2	1
0	.	0	37	1	25	6.5	8	3	15.25	2	1
3	.	0	48	1	16	5.375	8	3	25.25	1	1
1	.	1	36	2	6	5.875	8	3	24.5	1	1
2	.	0	11	0	3	6	8	3	22.25	1	1
4	.	0	18	1	13	5.875	8	3	25.5	1	3
.	.	0	32	2	.	.	8	3	.	.	3
.	.	0	11	0	.	6	8	3	24.5	1	3
0	.	0	3	1	0	6.5	8	3	27.5	1	3
.	.	0	28	1	.	6	8	3	25	1	3
1	.	0	5	4	7	5.875	8	3	23	1	3
0	.	0	42	2	1	6.125	8	3	23.5	1	3
2	.	0	21	1	9	.	8	3	27.5	1	3
.	.	0	13	2	.	.	8	3	26.25	1	3
.	.	0	3	0	3	6.5	8	3	26	1	3
.	.	0	0	2	8	.	8	3	10	2	3
0	.	0	6	0	7	6	8	3	16	2	3
0	.	1	6	0	5	6	8	3	25	1	3
.	.	0	0	0	11	.	8	3	25	1	3
5	.	0	21	0	12	6.125	8	3	25	1	3
.	.	0	5	0	.	.	8	3	24	1	3
1	.	0	23	1	9	6	8	3	15	2	3
.	.	0	3	0	.	.	8	3	.	.	3
2	.	0	24	1	4	6	8	3	25.5	1	3
2	.	0	27	0	6	6	8	3	23.5	1	3
0	.	0	60	3	10	6	8	3	22.5	1	3
0	.	0	8	0	5	6	8	3	22.75	1	3
2	.	0	22	2	8	.	8	3	72	1	3
0	.	0	17	1	4	6.125	8	3	26.5	1	3
2	.	0	88	2	4	.	8	3	26	1	3
1	.	0	43	1	9	6	8	3	26.5	1	3
2	.	0	21	0	3	5.875	8	3	21.5	2	3
0	.	0	13	1	5	.	8	3	24	1	3
1	.	0	18	0	8	.	8	3	17.5	2	3
3	.	0	5	1	6	6	8	3	26.75	1	3
1	.	0	7	0	3	5.875	8	3	22.25	2	3
1	.	0	19	1	6	5.125	8	3	20	2	3
4	.	0	58	0	13	6.125	8	3	19.5	2	3
6	.	0	45	0	14	.	8	3	23.5	1	3
3	.	0	71	2	7	5.875	8	3	24	1	3
1	.	1	5	0	5	6.25	8	3	24	1	3
2	.	0	27	1	8	6	8	3	28	1	3
1	.	0	7	0	2	6	8	3	19	2	3
2	.	0	6	1	5	6	8	3	24.25	1	3
5	.	0	5	0	5	6	8	3	24.75	1	3
1	.	1	25	1	10	6	8	3	11.5	2	3
0	.	0	14	0	2	6	8	3	22	1	3
1	.	0	35	0	6	.	8	3	23	1	3
0	.	0	3	0	3	6.75	8	3	25.25	1	3
2	.	0	36	0	16	6.125	8	3	22.5	2	3

0	.	3	20	0	3	5.875	8	3	19.5	1	3
4	.	0	55	1	8	.	8	3	22	1	3
1	.	1	11	1	.	6	8	3	13	2	3
1	.	0	3	0	5	5.75	8	3	12.75	2	3
.	.	0	6	4	9	.	8	3	.	.	3
3	.	0	5	.	.	6	8	3	26	1	3
4	.	1	9	1	27	6	8	3	25.5	1	3
4	.	0	5	1	6	.	8	3	28	1	3
2	.	0	1	0	4	6.125	8	3	23	1	3
2	.	0	21	1	.	5.375	8	3	19	2	3
5	.	0	8	1	6	.	8	3	22	1	3
2	.	0	2	2	9	6	8	3	25.5	1	3
4	.	0	2	0	10	5.875	8	3	24	1	3
3	.	0	0	0	5	6	8	3	21.5	1	3
1	.	0	8	0	1	6	8	3	23.75	1	3
1	.	0	6	2	7	5.875	8	3	24.75	1	3
0	.	0	22	0	6	6.125	8	3	24	1	3
5	.	0	18	0	10	.	8	3	24	1	3
1	.	0	23	0	.	5.875	8	3	23	1	3
1	.	0	4	0	13	5.875	8	3	8.25	2	3
1	.	1	7	2	.	6	8	3	19	2	3
2	.	0	2	0	4	6	8	3	25.75	1	3
0	.	0	1	0	2	6	8	3	23.333	1	3
1	.	1	2	0	2	6	8	3	23	1	3
0	.	0	12	0	14	6	8	3	29	1	3
1	.	0	6	0	.	6	8	3	20.5	2	3
4	.	0	3	0	9	6	8	3	27.583	1	3
0	.	0	3	1	5	6.75	8	3	18	2	3
0	.	0	10	0	.	6.125	8	3	23	1	3
3	.	0	10	1	7	5.875	8	3	23.5	1	3
0	.	0	3	0	2	7	8	3	25.25	1	3
1	.	0	64	1	14	5.875	8	3	22	2	1
0	.	0	61	1	.	5.125	8	3	13.5	2	1
0	.	0	14	0	8	5.875	8	3	12.5	2	1
0	.	0	11	0	13	6.125	8	3	11	2	1
0	.	1	21	0	4	6.25	8	3	17.5	2	1
1	.	0	9	0	7	7	8	3	26.5	1	1
0	.	0	7	2	14	6	8	3	25.5	1	3
3	.	0	6	2	19	5.75	8	3	23.5	1	3
1	.	0	13	0	.	6	8	3	22	2	3
0	.	0	26	2	25	6	8	3	24	1	3
1	.	0	13	0	12	6.125	8	3	23	1	3
5	.	0	68	4	12	5.375	8	3	25	1	3
1	.	0	17	1	5	6	8	3	24	1	3
1	.	0	10	0	7	5.875	8	3	26	1	3
3	.	0	10	2	13	6	8	3	23.5	1	3
4	.	0	19	0	6	6.125	8	3	24	1	3
2	.	0	28	0	38	6	8	3	26	1	3
1	.	0	3	2	3	5.875	8	3	25.5	1	3
4	.	1	4	0	15	6.25	8	3	25	1	3
1	.	0	5	0	6	6	8	3	21.75	2	3

2	.	0	11	1	17	6	8	3	23.5	1	3
1	.	0	14	0	5	.	8	3	23.5	1	3
0	.	0	14	0	7	6	8	3	23	1	3
0	.	0	16	0	18	6	8	3	15	2	3
0	.	0	1	0	17	6.75	8	3	9.25	2	3
0	.	0	7	1	5	6.125	8	3	14	2	3
0	.	0	8	0	12	6.125	8	3	16.5	2	3
0	.	0	2	1	8	6	8	3	13.25	2	3
0	.	0	10	0	16	6	9	3	16.5	2	1
0	.	0	3	1	9	6	9	3	15.25	2	1
0	.	0	5	0	11	6	9	3	17.333	2	1
0	.	0	2	0	9	5.875	9	3	16.75	2	1
0	.	0	28	0	11	6.125	9	3	17	2	1
0	.	0	24	1	11	6	9	3	15	2	1
0	.	1	10	0	19	6	9	3	16	2	1
0	.	0	3	2	7	6	9	3	15.25	2	1
0	.	1	5	0	16	6	9	3	13	2	1
0	.	0	7	0	14	6.5	9	3	13.75	2	1
0	.	2	20	1	18	6	9	3	13.5	2	1
0	.	0	6	0	18	6.125	9	3	14.25	2	1
0	.	0	13	1	17	6	9	3	14	1	1
2	.	2	13	3	.	.	9	3	16	2	2
0	.	0	23	1	14	.	9	3	15.5	2	2
2	.	3	11	1	25	6	9	3	17	2	2
0	.	0	30	0	11	6.125	9	3	16.5	2	2
0	54	0	0	0	2	6.25	9	3	14	2	3
3	86	0	0	0	6	6.125	9	3	17.5	2	3
1	133	0	1	0	6	.	9	3	15.75	2	3
0	40	0	2	0	3	6.125	9	3	15.5	2	3
0	71	0	0	0	3	5.875	9	3	14.5	2	3
3	154	0	6	1	6	.	9	3	10.25	1	3
1	58	0	7	0	5	5.875	9	3	17.25	2	3
0	98	0	5	0	15	6.25	9	3	18	1	3
0	89	0	0	2	4	5.5	9	3	14.75	2	3
0	110	0	1	0	6	6	9	3	17	2	3
1	37	0	2	0	2	.	9	3	13.25	2	3
0	58	0	2	0	2	6.75	9	3	16.5	2	3
1	71	0	1	0	2	6.125	9	3	14.5	2	3
0	82	0	0	0	0	6.125	9	3	16.75	2	3
1	.	0	4	0	17	5.875	9	3	17.75	2	3
1	.	0	3	0	3	5.875	9	3	15.5	2	3
0	.	0	21	0	20	6	9	3	25.75	1	1
1	.	0	26	0	16	6	9	3	25.25	1	1
0	187	0	25	0	23	6	9	3	20.5	2	1
0	.	0	11	0	25	6	9	3	25.75	1	1
0	.	2	7	0	15	6	9	3	25.25	1	1
0	.	1	16	0	10	6	9	3	26	1	1
0	.	0	15	0	25	6	9	3	24.5	1	1
0	.	0	21	2	29	6.5	9	3	23.25	1	1
1	.	0	11	1	22	6	9	3	24.75	1	1
1	.	0	43	0	15	6	9	3	24.5	1	1

0	.	0	11	0	43	6.125	9	3	24.75	1	1
0	.	0	63	0	5	4.75	9	3	24.25	1	1
0	147	0	48	0	2	.	9	3	29	1	1
0	.	1	23	0	18	6	9	3	23.25	1	1
0	.	0	26	1	19	6	9	3	25	1	1
0	.	0	14	0	4	.	9	3	8.75	2	1
0	.	1	29	0	32	5.875	9	3	23.25	1	1
1	.	1	18	0	12	5.875	9	3	16.5	1	2
7	.	1	22	0	23	5.125	9	3	28.5	1	2
3	.	1	44	0	.	6	9	3	41	1	2
6	.	1	20	1	.	6.25	9	3	40	1	2
3	.	1	32	4	.	6	9	3	40	1	2
1	.	1	12	2	.	6	9	3	29	1	2
6	.	0	39	5	63	6	9	3	42	1	2
1	.	1	27	1	26	6	9	3	23.5	1	2
6	.	3	65	6	73	6	9	3	46	1	2
10	.	1	19	0	50	6.125	9	3	44	1	2
4	.	1	16	1	6	5.875	9	3	32	1	2
7	.	0	60	2	39	5.875	9	3	45	1	2
4	.	1	26	2	19	6	9	3	31	1	2
3	.	0	46	4	18	5.75	9	3	25	1	2
1	.	2	61	1	21	5.875	9	3	29.5	1	2
2	.	1	21	1	16	6.125	9	3	29.5	1	2
10	.	2	28	2	25	6	9	3	42.5	1	2
0	.	1	33	0	22	5.875	9	3	25.5	1	2
3	.	0	15	4	13	5.875	9	3	27.5	1	2
3	.	2	47	6	51	5.875	9	3	39	1	2
1	.	0	6	0	13	6.25	9	3	9.5	2	2
3	.	2	250	8	51	5.375	9	3	43.5	1	2
0	.	2	25	0	17	5.125	9	3	13	2	2
3	.	1	795	4	132	.	9	3	14	1	2
1	.	3	2222	13	191	1.75	9	3	50	1	2
0	152	0	6	0	7	6.125	9	3	20.75	2	3
4	173	0	4	0	7	.	9	3	26.5	1	3
4	309	0	16	2	9	5.875	9	3	24	1	3
1	453	0	23	2	10	6	9	3	25.5	1	3
4	156	0	4	0	5	6	9	3	26.5	1	3
4	196	0	15	2	5	6	9	3	24.25	1	3
5	196	0	19	0	20	5.875	9	3	20	2	3
2	267	0	12	1	8	.	9	3	24.25	1	3
2	305	0	15	1	17	6	9	3	23.25	1	3
2	269	1	13	1	7	6	9	3	21.25	1	3
3	321	0	34	2	6	6	9	3	23.75	1	3
5	234	0	13	3	7	5.875	9	3	23.25	1	3
3	94	0	7	1	1	6.125	9	3	21.25	2	3
4	240	0	21	3	19	6	9	3	38.5	1	3
0	.	0	3	0	2	6	9	3	11.75	1	1
.	.	0	5	0	6	6	9	3	10.25	2	1
.	.	0	5	0	7	.	9	3	35.75	1	1
2	44	0	2	0	2	6.25	9	3	25.5	1	3
3	114	1	2	1	19	6.125	9	3	27.5	1	3

2	94	0	5	0	7	6	9	3	26	1	3
4	105	0	6	0	22	.	9	3	23.5	1	3
2	.	0	9	0	22	.	9	3	23.5	1	3
1	.	0	7	1	16	5.875	9	3	24.75	1	3
1	.	0	11	0	9	6	9	3	22	1	3
5	108	0	5	0	15	6.125	9	3	25	1	3
2	.	1	9	1	9	.	9	3	22.75	1	3
0	88	0	2	0	3	5.875	9	3	21.5	2	3
1	42	0	2	2	7	.	9	3	15.75	2	3
1	.	0	14	1	19	6	9	3	20	2	3
1	70	0	13	2	7	.	9	3	20.75	2	3
0	88	0	4	0	3	.	9	3	24.5	1	3
2	.	0	12	2	18	6.125	9	3	25	1	3
0	.	0	10	1	19	.	9	3	20.75	2	3
3	76	0	3	1	11	6.25	9	3	21.25	2	3
1	131	0	3	2	10	5.875	9	3	24.25	1	3
1	.	0	14	1	16	5.5	9	3	23.5	1	3
1	.	0	8	1	25	6	9	3	22.5	1	3
0	.	0	4	0	1	6	9	3	18.75	2	3
5	140	0	10	0	8	6	9	3	24	1	3
2	.	0	9	0	19	6	9	3	24.25	1	3
0	.	0	14	0	7	.	9	3	23	1	3
1	67	0	3	0	10	.	9	3	23.5	1	3
6	147	0	8	2	11	5.875	9	3	25.5	1	3
1	.	0	0	0	8	6.125	9	3	19.5	2	3
1	.	0	2	0	12	6.125	9	3	1.75	2	3
3	96	2	36	2	6	5.875	9	3	27.5	1	3
1	.	1	15	1	12	6	9	3	22.25	1	1
1	.	0	6	0	8	6	9	3	21.5	1	1
2	.	0	0	0	15	6.125	9	3	21	2	1
1	.	1	3	0	9	6	9	3	24	1	1
0	.	0	1	1	4	6	9	3	7.75	2	1
0	.	0	5	1	9	6.5	9	3	24	1	1
0	.	0	1	0	7	6	9	3	23.5	1	1
0	.	0	2	0	9	6.125	9	3	19	2	1
1	.	1	15	0	7	6	9	3	23.75	1	1
0	.	0	0	0	5	6	9	3	25.25	1	1
0	.	0	22	1	3	5.125	9	3	20	1	1
0	.	0	11	0	27	5.875	9	3	23.75	1	1
2	.	0	9	0	7	6.125	9	3	13.75	2	2
1	.	0	3	0	15	6.25	9	3	24	1	3
0	.	0	0	0	1	6.25	9	3	6	2	3
3	.	0	2	1	12	6.125	9	3	23	1	3
3	.	0	3	0	5	6	9	3	22	2	3
2	.	0	4	0	16	6	9	3	22	1	3
1	.	0	8	0	17	6.125	9	3	23	1	3
1	.	0	9	2	.	5.875	9	3	24	1	3
1	.	0	1	0	.	5.875	9	3	5.5	2	3
1	.	0	15	0	2	6	9	3	24	1	3
5	.	0	3	0	7	6.125	9	3	24	1	3
2	.	0	15	3	6	5.375	9	3	24.5	1	3

0	.	0	2	1	4	5.375	9	3	8	2	3
.	.	0	6	1	16	5.875	9	3	22	1	3
1	.	0	1	0	3	6	9	3	6.5	2	3
1	.	0	2	0	5	6	9	3	24.5	1	3
0	.	0	1	0	3	5.875	9	3	23.5	1	3
1	.	0	0	0	1	5.875	9	3	10.5	2	3
2	.	0	6	1	12	5.875	9	3	33	1	3
6	.	0	3	0	.	5.875	9	3	11.5	2	3
2	.	0	0	0	10	.	9	3	24	1	3
7	.	0	27	5	41	5.75	9	3	89	1	3
3	.	0	4	0	.	6	9	3	23.5	1	3
1	.	0	13	6	7	5.125	9	3	25.25	1	3
3	.	0	2	2	.	6.125	9	3	21	1	3
0	.	1	3	1	7	6.125	9	3	22.5	1	3
5	.	0	8	0	12	5.875	9	3	24	1	3
0	.	0	1	0	3	5.875	9	3	7	2	3
2	.	0	2	1	.	6.25	9	3	23.5	1	3
2	.	0	1	0	3	6.25	9	3	9.5	2	3
1	.	0	5	1	3	5.875	9	3	23.5	1	3
1	.	0	0	0	0	5.875	9	3	10	2	3
1	.	0	3	1	0	6	9	3	7.5	2	3
3	.	0	11	0	8	6	9	3	25.5	1	3
4	.	0	18	4	18	5.5	9	3	25	1	3
1	.	0	0	0	3	5.5	9	3	7	2	3
2	.	0	4	1	5	6	9	3	10	2	3
2	.	0	9	1	.	6	9	3	24	1	3
2	.	0	1	0	1	6	9	3	23.5	1	3
1	.	0	0	0	2	6	9	3	11	2	3
0	.	0	1	0	0	6	9	3	8.5	2	3
2	.	0	12	0	13	6	9	3	22.5	1	3
1	.	0	10	1	21	6	9	3	21.5	2	3
.	.	0	2	0	17	.	9	3	23.5	1	3
2	.	0	0	0	.	6.75	9	3	8	2	3
2	.	0	1	3	9	5.125	9	3	25	1	3
3	.	0	2	2	19	6.125	9	3	28.75	1	3
2	.	0	2	0	8	6.125	9	3	3.5	2	3
3	.	0	3	0	16	6	9	3	23.5	1	3
1	.	0	17	0	9	5.875	9	3	23	1	3
2	.	0	5	2	3	5.875	9	3	7	2	3
0	.	1	2	0	6	5.875	10	4	16.75	2	1
0	.	1	4	0	6	6.125	10	4	17	2	1
0	.	0	2	0	0	5.875	10	4	15.5	2	2
0	.	0	1	0	11	6.25	10	4	18	1	2
0	.	0	4	0	.	6.125	10	4	13.5	2	2
1	.	0	4	1	.	6	10	4	17.5	2	2
1	.	1	14	1	4	5.125	10	4	15.5	2	2
0	.	1	5	0	9	6.125	10	4	17	2	2
1	.	0	16	0	6	5.875	10	4	16.5	2	2
1	.	0	10	1	12	5.875	10	4	18	1	2
0	.	1	3	0	4	6	10	4	13	2	2
1	.	0	13	0	7	6	10	4	18.5	1	2

0	.	1	10	1	4	6	10	4	18	1	2
2	.	1	4	0	4	6	10	4	16	2	2
0	.	0	3	0	8	6	10	4	14.5	2	2
0	.	0	6	0	4	5.75	10	4	16	2	2
3	.	0	21	0	22	5.875	10	4	17.5	2	2
0	.	0	1	0	5	6	10	4	16.5	2	2
1	.	0	2	0	3	5.875	10	4	14	2	2
1	.	0	1	0	7	5.875	10	4	15	2	2
0	.	0	5	0	8	5.875	10	4	14	2	2
0	.	0	6	0	0	5.125	10	4	13	2	3
0	.	0	0	0	2	6	10	4	14.75	2	3
1	.	0	5	0	1	5.875	10	4	13.75	2	3
0	.	0	5	0	4	6	10	4	12.75	2	3
0	.	0	5	0	0	5.375	10	4	15	2	3
3	.	0	1	0	1	6	10	4	13.75	2	3
0	.	0	1	0	3	5.875	10	4	1.25	2	3
1	.	0	8	0	0	5.125	10	4	13.25	2	3
1	.	0	4	0	12	5.875	10	4	16	2	3
0	.	0	2	0	1	5.875	10	4	14.25	2	3
0	.	0	2	0	5	6.125	10	4	15.5	2	3
0	.	0	6	0	4	5.875	10	4	15.25	2	3
0	.	0	7	0	15	6	10	4	23	1	1
0	.	0	9	0	16	5.875	10	4	10.5	2	1
0	.	0	0	0	26	6.125	10	4	10.5	2	1
0	.	0	1	0	20	6	10	4	8	2	1
0	.	0	3	1	32	6	10	4	21.75	1	1
0	.	0	6	0	5	6	10	4	19.25	2	1
0	.	0	0	0	2	6	10	4	17	2	1
0	.	0	4	0	7	6.5	10	4	19.25	2	1
0	.	0	4	2	10	6	10	4	21.25	2	1
0	.	0	1	0	17	6.125	10	4	22	2	1
0	.	0	0	1	9	6.125	10	4	22.75	1	1
0	.	0	7	0	2	6	10	4	13	2	1
1	.	0	11	2	12	6	10	4	21.5	2	1
1	.	0	21	1	18	5.125	10	4	32	1	1
0	.	0	2	0	14	.	10	4	22.25	2	1
1	.	0	1	0	17	6	10	4	22	1	1
0	.	0	0	0	8	6	10	4	12.5	2	1
0	.	0	3	0	25	6	10	4	23.25	1	1
0	.	0	1	0	9	5.875	10	4	19.75	2	1
2	.	2	24	2	35	6	10	4	47	1	2
1	.	0	7	1	17	6.25	10	4	24.5	1	2
0	.	0	41	0	6	5.125	10	4	19.5	2	2
1	.	0	20	1	5	6	10	4	26	1	2
2	.	1	12	0	19	6.125	10	4	23	1	2
0	.	1	23	0	18	5.875	10	4	25.5	1	2
0	.	0	12	2	16	5.875	10	4	4.5	2	2
1	.	0	15	0	2	6	10	4	33.5	1	2
4	.	0	20	2	.	6	10	4	23.5	1	2
0	.	0	10	0	10	6	10	4	4.5	2	2
1	.	2	24	1	.	6	10	4	41.5	1	2

0	.	0	14	0	5	6	10	4	3.5	2	2
0	.	0	1	0	8	6	10	4	3.5	2	2
1	.	0	25	4	.	5.75	10	4	24.5	1	2
1	.	1	1	1	.	6	10	4	24.5	1	2
1	.	1	8	0	.	5.875	10	4	24	1	2
2	.	0	8	1	.	5.875	10	4	24.5	1	2
1	.	1	6	0	9	5.875	10	4	23	1	2
0	.	0	14	0	0	6.125	10	4	24	1	2
0	.	0	1	0	0	5.25	10	4	11.5	2	2
2	.	0	2	2	20	6.5	10	4	31	1	3
0	.	0	0	0	.	5.75	11	4	6	1	1
1	.	0	2	1	10	6	11	4	19.75	1	1
0	.	0	0	0	6	5.875	11	4	18.5	1	1
0	.	0	0	1	.	5.875	11	4	19.5	1	1
0	.	0	0	0	18	6.125	11	4	22	1	1
1	.	0	0	1	10	6	11	4	18	1	1
0	.	0	1	1	5	6	11	4	5	2	1
0	.	0	0	0	3	6	11	4	6.5	2	1
0	.	2	0	0	24	.	11	4	16.75	2	1
1	.	0	0	0	4	.	11	4	6	2	1
.	.	0	1	1	3	.	11	4	8.5	2	1
0	.	0	0	0	22	6	11	4	16.5	2	1
0	.	0	0	0	8	6	11	4	6.75	2	1
0	.	0	1	0	28	6	11	4	18.5	1	1
0	.	0	0	0	2	6	11	4	6	2	1
0	.	0	0	1	26	6.125	11	4	17.5	2	1
0	.	1	0	0	22	6.125	11	4	18	1	1
0	.	0	0	0	3	6.125	11	4	6	2	1
0	.	0	0	0	47	6	11	4	17	2	1
0	.	0	0	1	3	6	11	4	5.75	2	1
0	.	0	0	0	8	6	11	4	14.5	2	1
0	.	0	0	1	10	6	11	4	12.5	2	1
0	.	0	0	0	6	6	11	4	6.75	2	1
1	.	0	1	0	27	6.5	11	4	16	2	1
0	.	0	0	0	11	6.5	11	4	7.5	2	1
0	.	0	0	0	38	5.875	11	4	17.25	2	1
.	.	0	0	0	4	5.875	11	4	5.25	2	1
1	.	0	0	0	29	6	11	4	15.75	2	1
0	.	0	0	0	10	6	11	4	7.5	2	1
0	.	0	1	0	7	6	11	4	11.75	2	1
0	.	0	2	0	1	6	11	4	7.75	2	1
1	.	0	0	0	33	6	11	4	16	2	1
0	.	0	0	0	4	6	11	4	5.75	2	1
0	.	0	2	0	37	6.125	11	4	17.5	2	1
0	.	0	0	0	6	6.125	11	4	6.25	2	1
0	.	0	0	0	20	6	11	4	17	2	1
0	.	0	0	0	1	6	11	4	5.75	2	1
1	.	1	0	0	16	5.875	11	4	15.5	2	1
0	.	0	0	0	40	5.875	11	4	18.25	1	1
0	.	0	0	0	7	5.875	11	4	5	2	1
4	.	0	0	1	.	6	11	4	17	2	3

0	.	0	0	0	2	6	11	4	7	2	3
1	.	0	1	0	10	5.875	11	4	23.5	1	3
1	.	0	0	1	8	6.5	11	4	7.5	2	3
0	.	1	1	0	22	6.125	11	4	16.5	2	3
0	.	0	0	0	8	6	11	4	15	2	3
0	.	0	0	0	0	6	11	4	9	2	3
0	.	0	1	0	6	6	11	4	17	2	3
0	.	0	0	0	4	6	11	4	5.5	2	3
1	.	0	0	0	8	6	11	4	23.5	1	3
2	.	0	0	2	9	6	11	4	19	1	3
1	.	0	0	0	1	6	11	4	5	2	3
1	.	0	1	1	8	5.375	11	4	15.5	2	3
0	.	0	0	0	6	5.375	11	4	8.5	2	3
0	.	0	1	0	5	6	11	4	18.5	1	3
0	.	0	0	0	.	6	11	4	5.5	2	3
2	.	0	0	0	12	6.125	11	4	18	1	3
1	.	0	0	0	2	6.125	11	4	3	2	3
2	.	0	0	0	.	6.25	11	4	16.5	2	3
0	.	0	0	0	3	6.25	11	4	7.5	2	3
0	.	0	0	1	17	5.875	11	4	14	2	3
0	.	0	0	2	3	5.875	11	4	10	2	3
0	.	0	0	1	.	6	11	4	12.5	2	3
1	.	0	1	0	0	6	11	4	11.5	2	3
1	.	0	1	0	13	6	11	4	19.5	1	3
0	.	0	0	1	0	6	11	4	4.5	2	3
0	.	1	1	0	11	6	11	4	16	2	3
0	.	0	0	0	10	6.25	12	4	14	2	1
0	.	2	0	0	8	5.875	12	4	17	2	1
1	.	2	0	0	11	6.125	12	4	14.5	2	1
0	.	0	0	0	6	6	12	4	13.75	2	1
1	.	0	0	0	6	6	12	4	17	2	1
3	.	0	0	1	5	6	12	4	7	2	1
0	.	1	0	0	4	6.125	12	4	13	2	1
1	.	0	0	0	25	6	12	4	18	1	1
0	.	0	0	0	3	6	12	4	14.5	2	1
0	.	0	0	0	6	6	12	4	17.5	2	1
0	.	2	0	0	5	5.875	12	4	17.5	2	1
1	.	0	0	0	.	5.875	12	4	15.5	2	1
0	.	0	0	0	2	5.875	12	4	5.5	2	1
0	.	1	0	0	7	6	12	4	16.5	2	1
0	.	1	0	0	12	6	12	4	18	1	1
0	.	1	0	0	.	5.875	12	4	18.5	1	1
0	.	0	0	1	9	5.875	12	4	5.5	2	1
2	.	0	0	0	6	6.5	12	4	13	2	1
1	.	0	0	0	15	6	12	4	14.25	2	1
0	.	0	0	0	10	6	12	4	18	1	1
1	.	2	0	0	.	6	12	4	16	2	1
1	.	0	0	0	1	6	12	4	3.5	2	1
0	.	3	0	0	6	6.25	12	4	15.5	2	1
0	.	0	0	0	11	.	12	4	16.5	2	1
0	.	0	0	0	2	6	12	4	4.5	2	1

0	.	0	0	0	11	5.875	12	4	24	1	1
0	.	0	0	0	1	6	12	4	9	2	1
1	.	0	0	0	5	6	12	4	16	2	1
0	.	1	0	0	.	5.875	12	4	17	2	1
0	.	0	0	0	10	6	12	4	14	2	1
0	.	0	0	0	.	5.875	12	4	8	2	1
0	.	2	0	0	12	6.125	12	4	14.5	2	1
0	.	0	0	0	9	5.875	12	4	17.5	2	1
0	.	0	0	0	2	5.875	12	4	6.5	2	1
0	.	0	0	0	.	6	12	4	15	2	1
0	.	0	0	0	8	5.125	12	4	15	2	1
0	.	0	0	0	9	6	12	4	18.5	1	1
0	.	0	0	1	3	6	12	4	5	2	1
0	.	0	0	0	14	6	12	4	15.5	2	3
0	.	0	0	0	15	6.25	12	4	24	1	3
1	.	0	0	0	0	6	12	4	4	2	3
0	.	0	0	0	12	6.5	12	4	14.5	2	3
1	.	0	0	1	14	6.125	12	4	17.25	2	3
0	.	0	0	0	6	6	12	4	7.5	2	3
3	.	0	0	0	10	6.125	12	4	18.5	1	3
0	.	0	0	0	0	6.125	12	4	2.5	2	3
3	.	.	0	0	.	5	12	4	16	2	3
3	.	0	0	0	7	5.875	12	4	20.75	1	3
0	.	0	0	0	16	6	12	4	18.5	1	3
0	.	1	0	0	9	6.125	12	4	15.75	2	3
0	.	0	0	0	3	6	12	4	6	2	3
3	.	2	0	0	13	5.875	12	4	23.75	1	3
1	.	0	0	0	11	6.125	12	4	21	1	3
2	.	1	0	0	10	6	12	4	16.25	2	3
1	.	0	0	0	10	6	12	4	16.5	2	3
1	.	0	0	0	0	6	12	4	7.5	2	3
2	.	0	0	1	.	6.125	12	4	18	1	3
0	.	0	0	0	9	6	12	4	16.5	2	3
1	.	0	0	0	3	6	12	4	7	2	3
0	.	0	0	0	9	5.25	12	4	17.75	2	3
0	.	0	0	0	.	5.25	12	4	3	2	3
1	.	0	1	0	.	5.875	12	4	16.75	2	3
0	.	0	0	0	1	5.875	12	4	5.25	2	3
2	.	1	0	0	7	5.875	12	4	24	1	3
0	.	0	0	0	0	5.125	12	4	4.5	2	3
1	.	0	0	1	3	5.25	12	4	19	1	3
11	46	7	11	73	2	4.75	1	1	24	1	1
3	28	6	2	62	0	5	1	1	24	1	1
6	398	0	29	3	2	6.5	4	2	32.5	1	3
0	237	0	30	2	3	6.5	4	2	10	2	1
18	4	8	115	15	6	6.130	4	2	47	1	3
8	628	0	63	3	7	6.130	5	2	47.25	1	.
14	757	0	240	6	12	6.130	6	3	108	1	3
0	32	0	18	0	3	6.130	6	3	13	2	1
6	179	0	117	2	8	6.130	7	3	57	.	3
11	785	1	72	3	61	6.130	8	3	118	1	3

0	19	0	2	1	8	6.130	10	4	20	1	3
1	31	1	3	1	12	6.130	10	4	15.5	2	1

Appendix 2

The Raw Experimental Data

The columns are arranged as follows: SH, CM, CK, PK, SX, CO, W, ELAPSED TIME, T, D, S, WX, SUR, B, as defined in Chapter 2.

0	24	0	2	0	2	1	5.75	1	2	2	1	1	1
1	48	4	0	0	3	1	4.67	2	2	2	1	1	1
0	19	3	0	0	0	1	3.00	1	1	4	3	1	2
0	17	0	0	0	1	1	2.00	2	1	4	3	1	2
0	4	0	0	0	0	1	2.83	1	1	1	3	1	3
1	8	0	0	0	0	1	3.00	2	1	1	3	1	3
1	10	1	0	0	0	1	4.17	1	2	1	3	2	4
1	14	4	1	0	0	1	4.00	2	2	1	3	2	4
0	43	0	1	0	0	1	3.00	1	2	1	3	2	5
0	51	3	0	0	0	1	3.50	2	2	1	3	2	5
1	9	1	0	0	0	1	3.33	1	2	2	3	2	6
3	15	4	1	1	1	1	3.73	2	2	2	3	2	6
0	11	0	0	0	4	1	7.83	1	1	2	4	1	7
2	49	1	0	0	2	1	8.58	2	1	2	4	1	7
0	8	0	0	0	0	1	3.83	1	2	4	3	2	8
0	11	2	0	0	0	1	4.33	2	2	4	3	2	8
0	17	4	0	0	0	1	3.00	1	2	1	3	2	9
0	20	3	0	0	1	1	3.33	2	2	1	3	2	9
0	43	0	1	0	1	1	11.10	1	1	2	4	1	10
0	74	0	2	3	2	1	12.30	2	1	2	4	1	10
1	46	2	0	0	0	1	6.00	1	2	1	2	2	11
1	63	5	1	0	0	1	5.33	2	2	1	2	2	11
0	18	1	0	0	0	1	4.75	1	2	1	2	2	12
1	62	4	0	0	0	1	5.50	2	2	1	2	2	12
2	35	0	0	1	2	1	8.17	1	1	2	2	1	13
2	102	3	1	0	7	1	7.83	2	1	2	2	1	13
1	25	0	0	1	0	1	3.00	1	2	1	1	1	14
0	20	1	0	0	0	1	3.17	2	2	1	1	1	14
0	22	3	0	0	0	1	4.92	1	2	2	1	1	15
2	22	0	0	0	0	1	4.67	2	2	2	1	1	15
0	32	1	1	0	0	1	3.92	1	2	1	1	2	16
0	32	4	5	0	1	1	3.67	2	2	1	1	2	16
0	58	3	1	0	2	2	7.00	1	2	4	1	1	17
0	70	2	6	1	1	2	6.00	2	2	4	1	1	17
0	12	1	0	0	0	2	6.33	1	1	4	1	1	18
0	20	3	0	0	0	2	5.50	2	1	4	1	1	18
1	32	0	0	0	0	2	4.67	1	2	4	1	2	19
1	51	1	1	0	0	2	5.08	2	2	4	1	2	19
0	19	1	1	0	0	2	3.75	1	2	4	1	2	20
0	32	0	1	0	0	2	3.33	2	2	4	1	2	20
0	27	0	0	0	2	2	5.08	1	2	3	1	1	21
1	36	1	4	1	0	2	4.33	2	2	3	1	1	21
0	26	0	0	0	0	2	6.50	1	1	3	3	2	22

0	37	1	0	0	0	2	6.67	2	1	3	3	2	22
0	4	0	0	0	0	2	1.42	1	2	1	2	2	23
1	7	0	0	0	0	2	1.83	2	2	1	3	2	23
0	7	1	0	0	0	2	4.17	1	2	3	3	2	24
0	25	0	1	0	0	2	3.67	2	2	3	3	2	24
1	21	0	0	1	1	2	1.42	1	2	1	3	2	25
0	17	2	4	0	0	2	2.67	2	2	1	3	2	25
0	13	1	0	0	0	2	8.50	1	1	2	3	2	26
1	32	0	3	0	2	2	8.07	2	1	2	3	2	26
0	22	0	0	0	1	2	1.92	1	2	4	2	1	27
0	10	0	1	0	1	2	2.17	2	2	4	2	1	27
0	26	0	0	0	0	2	1.92	1	2	4	2	1	28
0	13	0	2	0	0	2	2.17	2	2	4	2	1	28
0	25	1	1	0	0	2	2.50	1	2	1	2	2	29
0	56	1	6	0	0	2	2.00	2	2	1	2	2	29
1	18	0	0	1	3	3	8.17	1	1	2	2	1	30
0	52	2	6	1	6	3	7.42	2	1	2	2	1	30
0	7	1	0	0	0	3	4.00	1	2	1	1	1	31
0	14	0	0	0	0	3	4.25	2	2	1	1	1	31
0	46	0	1	0	0	3	2.75	1	2	1	2	3	32
0	28	0	6	0	0	3	3.17	2	2	1	2	3	32
0	27	0	3	0	0	3	2.83	1	2	1	2	2	33
0	22	0	4	1	0	3	2.25	2	2	1	2	2	33
0	27	0	2	0	1	3	3.00	1	2	1	2	2	34
1	31	0	2	0	1	3	3.33	2	2	1	2	2	34
0	11	0	0	0	4	3	6.83	1	1	2	2	1	35
0	39	2	6	0	3	3	6.50	2	1	2	2	1	35
0	4	2	0	0	0	3	2.67	1	2	1	2	1	36
0	7	1	0	0	0	3	2.83	2	2	1	2	1	36
0	32	0	0	1	0	3	5.75	1	2	1	4	2	37
1	48	4	1	0	0	3	5.25	2	2	1	4	2	37
0	24	1	0	0	0	3	4.17	1	2	1	2	2	38
1	31	5	5	0	0	3	4.67	2	2	1	2	2	38
0	3	1	0	0	0	3	5.75	1	2	2	3	1	39
0	6	1	5	0	3	3	6.00	2	2	2	3	1	39
0	24	0	0	0	0	3	6.17	1	1	3	3	1	40
2	22	1	7	0	0	3	5.67	2	1	3	3	1	40
0	19	1	3	0	0	3	6.50	1	2	3	2	1	41
1	32	0	0	0	0	3	6.92	2	2	3	2	1	41
0	15	0	0	0	0	3	4.00	1	2	3	2	2	42
1	20	0	0	0	1	3	3.58	2	2	3	2	2	42
0	34	0	3	3	6	4	8.33	1	1	1	1	1	43
4	59	1	6	2	6	4	7.25	2	1	1	1	1	43
0	16	2	0	0	0	4	1.50	1	2	4	2	2	44
0	17	0	0	0	0	4	1.83	2	2	4	2	2	44
0	5	0	0	0	0	4	1.08	1	2	4	2	2	45
0	12	0	0	0	0	4	0.83	2	2	4	2	2	45
1	46	0	0	0	0	4	4.00	1	2	4	2	2	46
0	68	0	1	0	0	4	4.42	2	2	4	2	2	46
0	61	1	1	0	1	4	2.00	1	2	4	2	2	47
5	69	2	7	1	1	4	2.48	2	2	4	2	2	47

0	67	0	1	0	1	4	8.50	1	1	4	4	2	48
0	60	1	2	0	3	4	7.50	2	1	4	4	2	48
0	21	1	0	0	0	4	2.00	1	2	4	2	1	49
1	10	0	0	0	0	4	2.33	2	2	4	2	1	49
0	40	0	0	0	0	4	4.00	1	2	1	2	1	50
0	30	0	2	0	0	4	3.50	2	2	1	2	1	50
0	3	0	0	0	0	4	2.67	1	2	1	1	1	51
0	25	0	5	0	0	4	2.83	2	2	1	1	1	51
0	4	0	1	0	1	4	2.33	1	2	3	1	1	52
0	30	0	3	1	3	4	2.83	2	2	3	1	1	52

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