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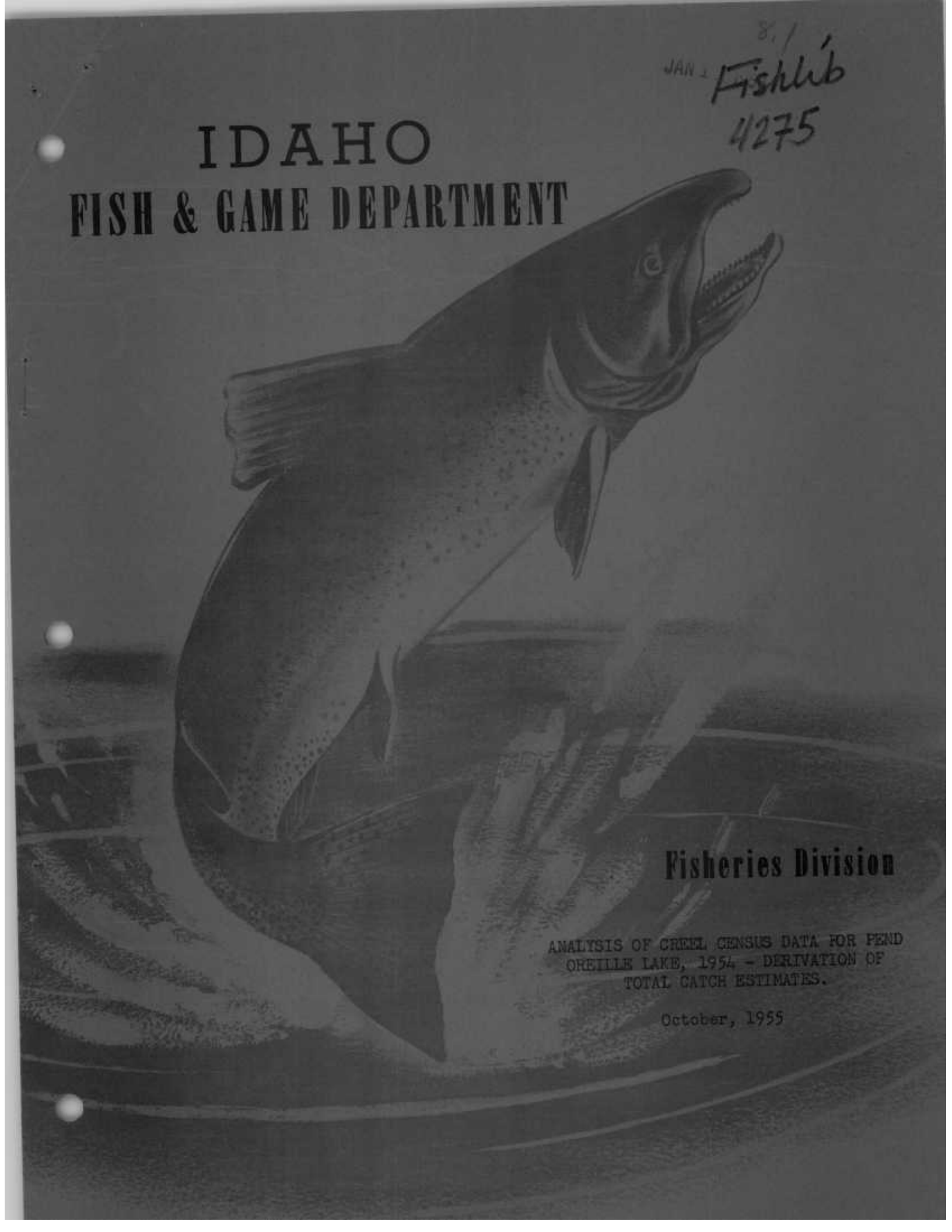

Fisheries Division

ANALYSIS OF CREEL CENSUS DATA FOR PEND OREILLE LAKE, 1954 - DERIVATION OF TOTAL CATCH ESTIMATES.

October, 1955

STATE OF IDAHO

DEPARTMENT OF FISH AND GAME

FEDERAL AID TO FISHERIES

Project F 3-R Research Report

Title: Analysis of Creel Census Data for Pend Oreille Lake 1954 - Derivation of Total Catch Estimates.

Author: Daniel R. Embody, Consulting Statistician

Date: October 25, 1955

Introduction

In the earlier reports of the Pend Oreille Lake census, references 1, 2, and 3, preliminary estimates of the total catch are published. As a result of recent research a series of final catch estimates have been developed and are given in reference 4. The final estimates are labeled as final in the sense that the final method of calculation was used.

A comparison of preliminary and final estimates shows differences of sizable magnitudes. For the years 1951 and 1952, minor adjustments to compensate for omissions in the census are partly responsible. The major cause of the differences among estimates lies in the method of making the estimates.

For the catch estimates to be strictly comparable from year to year and simultaneously to utilize the information contained within the data efficiently, a number of requirements must be fulfilled. The final method evolved by the writer appears to meet the various requirements. It is not the purpose of this report to give a lengthy development of the method, but rather to give a complete set of the calculations made to obtain the catch estimate for 1954.

Method of Analysis

In the example, a detailed development of the calculations for the Garfield section will be explained (Tables 1-5). For the other 3 sections, tables summarizing the complete calculations will be given.

Table 1 lists the total catches of salmonids (adjusted for missed fishermen) classified by months and days.

Table 2 lists the catches of Table 1 with the number 700 added.

Table 3 lists the catches + 700, (C+700) divided by 100 and converted to a base 10 logarithm. Row and column totals and means are also calculated.

At the bottom of this page calculations for the analysis of variance are shown.

For a complete description of the analysis of variance reference 5 is cited. The analysis given in reference 5 is very similar to the one made on Table 3.

It might be in order at this point to explain the transformation to log $(\frac{C+700}{100})$. As was pointed out in reference 5, for creel census data to be analyzed by analysis of variance techniques, a number of requirements must be fulfilled. In a later report it will be shown that an important requirement, namely the stabilization of errors, is not accomplished by converting daily catch totals to logarithms; but the transformation log $(\frac{C+700}{100})$ approximately stabilizes the errors (variances) over the range of the census data.

Table 4 gives estimated values of the catch transformed to $(\text{Log } \frac{C+700}{100})$. Values in this table are obtained from column means and row deviations of Table 3. The first few values under Sunday are calculated as follows:

FEB. From table 3, column mean = 1.079
" " " row deviation = -.243
Est. $(\text{Log } \frac{C+700}{100})$ = .836

MAR. From table 3 column mean = 1.079
" " " row deviation = -.116
Est. $(\text{Log } \frac{C+700}{100})$ = .963

The value for Saturday in May is calculated as follows:

From table 3, column mean = 1.128
" " ", row deviation= .474
Est. $(\text{Log } \frac{C+700}{100})$ = 1.602

The value for the second weekday in October is calculated as follows:

From table 3, column mean = 1.122
" " ", row deviation = -.196
Est. $(\text{Log } \frac{C+700}{100})$ .926

The remaining items in table 4 are obtained in the same manner.

Table 5 shows the conversion of the estimated values of $\text{Log } (\frac{C+700}{100})$ from logarithms to arithmetic means. Reference 5 gives the method by which

the conversion is made together with references to sources.

From reference 5, page 21:

$$\text{Log}_{10} M = \bar{x} + 1.15129\, s^2$$

Where

M. = mean in a original arithmetic scale

$\bar{x}$ = mean of variables in logarithms to the base 10

s^2 = square of the standard deviation in logarithms.

The value of s^2 used in this study is a pooled within-year value as illustrated in table 9. Calculations for table 5, February, Sunday are as follows:

Est. $(\text{Log } \frac{C+700}{100})$	= .836
Add (1.1513)(.028329)	= .033
Log Arithmetic mean	= .869
Take antilogarithms multiply by 100	= 740
Subtract -	= 700
Estimated Sunday catch	= 40 fish
Multiply by 4 Sundays	= 160 fish, estimated catch

for Sundays, February, 1954.

The remainder of table 5 is estimated as illustrated. Tables 6-9 present a complete set of calculations for the total catch for 1954.

The following listing gives final catch estimates as derived for 1954.

Bayview	636,848
Garfield	254,506[r]
Sandpoint	107,454
Hope	142,148[r]
Total	1,140,956

r revised to eliminate small numerical errors in calculations.

Total catch should be reported as 1,140,000.

D.R.E.

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References

1. Jeppson, Paul, and. Tim Vaughan. Fisheries Investigations of Lake Pend Oreille, Idaho. D.J. Report F 3-R-1. December 12, 1952.
2. Jeppson, Paul. Fisheries Investigations of Lake Pend Oreille, Idaho. D. U. Report F. 3-R-2, October, 1953.
3. Whitt, Charles. Lake Pend Oreille Creel Census, 1954. D. J. Report F 3-R-4. February, 1955
4. Embody, Daniel R., Statistical Adjustments of Creel Census Data for Pend Oreille Lake to Compensate for Changes in Census Methods. D. J. Report F 3-R. June 15, 1955.
5. Embody, Daniel R. Analysis of Variance Calculations as Applied to Creel Census Data. Research Report Little Salmon River Project, June 2, *1954.*

Table 1. Total Recorded Catches of Salmonids for the Garfield Section, 1954 Adjusted for Missed Fishermen

	Sun.	Sat.	Wkdy 1	Wkdy 2	Wkdy 3
Feb.	0	0	0	0	0
Mar.	620	3	0	899	0
Apr.	112	3103	943	2385	5825
May	6100	3700	2682	4931	433
Jun.	205	356	2322	1271	971
Jul.	710	505	403	250	281
Aug.	360	542	276	110	14
Sept.	937	1123	198	423	832
Oct.	35	393	15	8	14
Nov.	46	31	12	1	11

Table 2. Catches (Table 1) with 700 added.

	Sun.	Sat.	Wkdy 1	Wkdy 2	Wkdy3
Feb.	700	700	700	700	700
Mar.	1320	703	700	1599	700
Apr.	812	3803	1643	3085	6525
May	6800	4400	3382	5631	1133
Jun.	905	1056	3022	1971	1671
Jul.	1410	1205	1103	950	981
Aug.	1060	1242	976	818	714
Sep.	1637	1823	898	1123	1532
Oct.	735	1093	715	708	714
Nov.	746	731	712	701	711

Table 3. Catches, Table 2, Divided by 100 and Converted to Base 10 Logarithms. (Log $\frac{(C+700)}{100}$)

	Sun.	Sat.	Wkdy	Wkdy	Wkdy		Mean	Dev.
Feb.	.845	.845	.845	.845	.845	4.225	.845	-.243
Mar.	1.121	.846	.845	1.204	.845	4.861	.972	-.116
Apr.	.910	1.580	1.216	1.489	1.815	7.010	1.402	.313
May	1.833	1.644	1.529	1.751	1.054	7.811	1.562	.474
Jun.	.957	1.024	1.480	1.295	1.223	5.979	1.196	.108
Jul.	1.149	1.081	1.043	.978	.992	5.243	1.049	-.040
Aug.	1.025	1.094	.989	.908	.954	4.870	.974	-.114
Sep.	1.214	1.261	.953	1.050	1.185	5.663	1.133	.044
Oct.	.866	1.039	.854	.850	.854	4.463	.893	-.196
Nov.	.873	.864	.852	.846	.852	4.287	.857	-.231
Total	10.793	11.278	10.606	11.216	10.519	54.412		
Mean	1.079	1.128	1.061	1.122	1.252	1.088		

Analysis of Variance

Source of Variance	D.F.	SS	SS- CF	MS	
Total	49	63.101742	3.888428		
Days	4	59.261739	.048425	.012106	.012106
Months	9	61.790492	2.577178	.286353	.286353
D X M	36		1.262825	.035078	.035078

CF = 59.213314

Table 4. ESTIMATED CATCHES in Transformed Values (Log $\frac{C+700}{100}$)

	Sun.	Sat.	Wkdy 1	Wkdy 2	Wkdy 3	Mean of 3 Wkdys
Feb.	.836	.884	.817	.878	.809	.835
Mar.	.963	1.012	.945	1.006	.936	.962
Apr.	1.393	1.442	1.374	1.435	1.366	1.392
May	1.553	1.602	1.535	1.596	1.526	1.552
Jun.	1.187	1.235	1.168	1.229	1.159	1.185
Jul.	1.040	1.088	1.021	1.081	1.012	1.038
Aug.	.965	1.014	.946	1.007	.938	.964
Sep.	1.124	1.172	1.105	1.166	1.096	1.122
Oct.	.884	.932	.864	.926	.856	.882
Nov.	.848	.897	.830	.891	.821	.847

Table 5. Calculation of Catch for Sundays (Garfield Section).

	Est. Mean Log $\left(\frac{C+700}{100}\right)$	Log $\left(\frac{C+700}{100}\right)$ +.0326	C+700	Estimated Catch, C.	Number Days	Cumulative Catch
Feb.	.836	.869	740	40	4	160
Mar.	.963	.996	991	291	4	1324
Apr.	1.393	1.426	2667	1967	4	9192
May	1.553	1.586	3855	3155	5	24967
Jun.	1.187	1.220	1660	960	4	28807
Jul.	1.040	1.073	1183	483	4	30739
Aug.	.965	.998	995	295	5	32214
Sep.	1.124	1.157	1435	735	4	35154
Oct.	.884	.917	826	126	5	35784
Nov.	.848	.881	760	60	4	36024
					43	

Table 6. Derivation of Final Catch Estimates, GARFIELD BAY, 1954

	Sun.	Sat.	Wkdy 1	Wkdy 2	Wkdy 3	Σ	$\bar{x}$
Feb. *	0	0	0	0	0		
	700	700	700	700	700		-.243240
	.845	.845	.845	.845	.845	4.225	.845000
	.836	.884	.817	.878	.809		
Mar.	620	3	0	899	0		
	1320	703	700	1599	700		-.116040
	1.121	.846	.845	1.204	.845	4.861	.972200
	.963	1.012	.945	1.006	.936		
Apr.	112	3103	943	2385	5825		
	812	3803	1643	3085	6525		.313760
	.910	1.580	1.216	1.489	1.815	7.010	1.402000
	1.393	1.442	1.374	1.435	1.366		
May	6100	3700	2682	4931	433		
	6800	4400	3382	5631	1133		
	1.833	1.644	1.529	1.751	1.054	7.811	1.562200
	1.553	1.602	1.535	1.596	1.526		
June	205	356	2322	1271	971		
	905	1056	3022	1971	1671		.107560
	.957	1.024	1.480	1.295	1.223	5.979	1.195800
	1.187	1.235	1.168	1.229	1.159		
July	710	505	403	250	281		
	1410	1205	1103	950	981		-.039640
	1.149	1.081	1.043	..978	.992	5.243	1.048600
	1.040	1.088	1.021	1.081	1.012		
Aug.	360	542	276	110	14		
	1060	1242	976	810	714		-.114240
	1.025	1.094	.989	.908	.854	4.870	.974000
	.965	1.014	.946	1.007	.938		
Sept.	937	1123	198	423	832		
	1637	1823	898	1123	1532		+.044360
	1.214	1.261	.953	1.050	1.185	5.663	1.132600
	1.124	1.172	1.105	1.166	1.096		
Oct.	35	393	15	8	14		
	735	1093	715	708	714		-.195640
	.866	1.039	.854	.850	.854	4.463	.892600
	.884	.932	.864	.926	.856		
Nov.	46	31	12	1	11		
	746	731	712	701	711		-.230840
	.873	.864	.852	.846	.852	4.287	.857400
	.848	.897	.830	.891	.821		
Σ	10.793	11.278	10.606	11.216	10.519	54.412	
$\bar{x}$	1.079300	1.127800	1.060600	1.121600	1.051900	1.088240	

Total	49	63.101742	3.888428	
Days	4	59.261739	.048425	.012106
Months	9	61.790492	2.577178	.286353
D X M	36		1.262825	.035078
C. F.		59.213314		

* The four rows of data for each month represent (1) C, Catch, (2) C+700, (3) Log $\left(\frac{C+700}{100}\right)$ (4) Est. Log. $\left(\frac{C+700}{100}\right)$, in that order.

Table 6. Derivation of Final Catch Estimates, Garfield Bay, 1954 (cont.)

GARFIELD 1954	$\bar{y}$	$\bar{y}$+.0326	C+700	C	Number Days	Cumulative Catch
Sunday						
Feb.	.836	.869	740	40	4	160
Mar.	.963	.996	991	291	4	1324
Apr.	1.393	1.426	2667	1967	4	9192
May	1.553	1.586	3855	3155	5	24967
Jun.	1.187	1.220	1660	960	4	28807
Jul.	1.040	1.073	1183	483	4	30789
Aug.	.965	.998	995	295	5	32214
Sep.	1.124	1.157	1435	735	4	35154
Oct.	.884	.917	826	126	5	35784
Nov.	.848	.881	760	60	4	36024
					43	
Saturday						
Feb.	.884	.917	826	126	4	504
Mar.	1.012	1.045	1109	409	4	2140
Apr.	1.442	1.475	2985	2285	4	11280
May	1.602	1.635	4315	3615	5	29355
Jun.	1.235	1.268	1854	1154	4	33971
Jul.	1.088	1.121	1321	621	5	37076
Aug.	1.014	1.047	1114	414	4	38732
Sep.	1.172	1.205	1603	903	4	42344
Oct.	.932	..965	923	223	5	43459
Nov.	.897	.930	851	151	4	44063
					43	
Weekday						
Feb.	.835	.868	738	38	20	760
Mar.	.962	.995	989	289	23	7407
Apr.	1.392	1.425	2661	1961	22	50549
May	1.552	1.585	3846	3146	21	116615
Jun.	1.185	1.218	1652	952	22	137559
Jul.	1.038	1.071	1178	478	22	148075
Aug.	.964	.997	993	293	22	154521
Sep.	1.122	1.155	1429	729	22	170559
Oct.	.882	.915	822	122	21	173121
Nov.	.847	.880	759	59	22	174419
					217	254506

NOTE ON REPORT OF JUNE 15, 1955 ENTITLED "Statistical Adjustments of Creel Census Data for Pend Oreille Lake to Compensate for Changes in Census Methods"

In Table 1 of this report the sines of angles are off by one day, i.e., the sine listed for 140, namely .755 is in fact the sine for 139, and etc. The statistical analyses were made using the values listed in the tables and, as such, are correct.

Table 7. Derivation of Final Catch Estimates, SANDPOINT, 1954

	Sun.	Sat.	Wkdy 1	Wkdy 2	Wkdy 3	E	$\bar{x}$	Pooled Weekday $\bar{x}$
eb. *	0	0	0	0	0			
	700	700	700	700	700		-.129310	
	.845	.845	.845	.845	.845	4.225	.845000	
	.904	.922	.826	.782	.791			.800
March	0	0	0	0	0			
	700	700	700	700	700		-.129320	
	.845	.845	.845	.845	.845	4.225	.845000	
	.904	.922	.826	.782	.791			.800
April	15	796	0	155	337			
	715	1496	700	855	1037		-.009920	
	.854	1.175	.845	.932	1.016	4.822	.964400	
	1.023	1.042	.945	.901	.910			.919
May	4992	1767	2010	62	42			
	5692	2467	2710	762	742		+.292080	
	1.755	1.392	1.433	.882	.870	6.332	1.266400	
	1.325	1.344	1.248	1.203	1.212			
June	629	2036	10	1168	251			
	1329	2736	710	1868	951		+.157880	
	1.124	1.437	.851	1.271	.978	5.661	1.132200	
	1.191	1.209	1.113	1.069	1.078			1.087
July	1058	733	288	4	650			
	1758	1433	988	704	1350		+.100480	
	1.245	1.156	.995	.848	1.130	5.374	1.074800	
	1.134	1.152	1.056	1.012	1.020			1.029
Aug.	121	498	640	149	32			
	821	1198	1340	849	732		+.008080	
	.914	1.078	1.127	.929	.864	4.912	.982400	
	1.041	1.086	.964	.919	.928			.937
Sept.	373	88	82	44	208			
	1073	788	782	744	908		-.044120	
	1.031	.897	.893	.872	.958	4.651	.930200	
	.989	1.007	.911	.867	.876			.885
Oct.	24	1	52	0	2			
	724	701	752	700	702		-.119720	
	.860	.846	.876	.845	.846	4.273	.854600	
	.913	.932	.836	.792	.800			.809
Nov.	22	0	0	0	5			
	722	700	700	700	705		-.126120	
	.858	.845	.845	.845	.848	4.241	.848200	
	.907	.925	.829	.785	.794			.803
E	10.331	10.516	9.555	9.114	9.200	48.716		
$\bar{x}$	1.033100	1.051600	.955500	.911400	.920000		.974320	

Analysis of Variance

Source of Variance	D.F.	SS	SS-CF	M.S.
Total	49	49.438048	1.973075	
Days	4	47.631884	.166911	
Months	9	48.395622	.930649	
D X M	36		.875515	.024320

-- 47.464973

The four rows of data for each month represent (1) C, Catch, (2) C+700, (3) Log $\left(\frac{C+700}{100}\right)$ (4) Est. Log. $\left(\frac{C+700}{100}\right)$, in that order.

Table 7. (cont.)

SANDPOINT, 1954

	$\bar{y}$	$\bar{y}$+.0326	C+700	C	Number of Days	Cumulative Catch
Feb.	.904	.937	865	165	4	660
Mar.	.904	.937	865	165	4	1320
Apr.	1.023	1.056	1138	438	4	3072
May.	1.325	1.358	2280	1580	5	10972
Jun.	1.191	1.224	1675	975	4	14872
Jul	1.134	1.167	1469	769	4	17948
Aug.	1.041	1.074	1186	486	5	20378
Sept.	.989	1.022	1052	352	4	21786
Oct.	.913	.946	883	183	5	22701
Nov.	.907	.940	871	171	4	23385
					43	
Feb.	.922	.955	902	202	4	808
Mar.	.922	.955	902	202	4	1616
Apr.	1.042	1.075	1189	489	4	3572
May	1.344	1.377	2382	1682	5	11982
Jun.	1.209	1.242	1746	1046	4	16166
Jul.	1.152	1.185	1531	831	5	20321
Aug.	1.086	1.119	1315	615	4	22781
Sept.	1.007	1.040	1096	396	4	24365
Oct.	.932	.965	923	223	5	25480
Nov.	.925	.958	908	208	4	26312
					43	
Feb.	.800	.833	681	-19	20	
Mar.	.800	.833	681	-19	23	
Apr.	.919	.952	895	195	22	3473
May	1.221	1.254	1795	1095	21	26468
Jun.	1.087	1.120	1318	618	22	40064
Jul.	1.029	1.062	1153	453	22	50030
Aug.	.937	.970	933	233	22	55156
Sept.	.885	.918	828	128	22	57972
Oct.	.809	.842	695	-5	21	
Nov.	.803	.836	686	-5	22	57757
					217	107454

Table 8. Derivation of Final Catch Estimates, HOPE 1954.

	Sun.	Sat.	Wkdy 1	Wkdy 2	Wkdy 3	Σ	x̄	Pooled Weekday x̄
Feb.*	0	0	0	0	0			
	700	700	700	700	700			
	.845	.845	.845	.845	.845	4.225	.845000	
	.833	.806	.835	.895	.857			.862
Mar.	0	0	0	0	0			
	700	700	700	700	700			
	.845	.845	.845	.845	.845	4.225	.845000	.862
	.833	.806	.835	.895	.857			
April	375	0	0	1652	950			
	1075	700	700	2352	1650			
	1031	.845	.845	1.371	1.217	5.309	1.061800	
	.909	.882	.910	.971	.930			.937
May	808	508	4283	5422	4419			
	1508	1208	4983	6122	5119			
	1.178	1.082	1.697	1.787	1.709	7.453	1.490600	
	1.479	1.451	1.480	1.540	1.502			1.507
June	443	661	151	8	199			
	1143	1361	851	708	899			
	1.058	1.134	.930	.850	.954	4.926	.985200	
	.974	.946	.975	1.035	.997			1.002
July	595	309	186	186	13			
	1295	1009	886	886	713			
	1.112	1.004	.947	.947	.853	4.863	.972600	
	.961	.933	.962	1.022	.984			.989
Aug.	279	305	151	721	168			
	979	1005	851	1521	868			
	.991	1.002	.930	1.182	.938	5.043	1.008600	
	.963	.935	.964	1.024	.986			.991
Sept.	395	465	252	65	227			
	1095	1165	952	765	927			
	1.039	1.066	.979	.884	.967	4.935	.987000	
	.975	.948	.977	1.037	.999			1.004
Oct.	15	7	179	14	14			
	715	707	879	714	714			
	.854	.849	.944	.854	.854	4.355	.871000	
	.859	.832	.861	.921	.883			.888
Nov.	0	5	3	0	8			
	700	705	703	700	708			
	.845	.848	.847	.845	.850	4.235	.847000	
	.835	.808	.837	.897	.859			.864
Σ	9.798	9.520	9.809	10.410	10.032	49.569		
x̄	.979800	.952000	.980900	1.041000	1.003200		.991380	

Analysis of Variance

Source	DF	SS	SS-CF	M.S.
Total	49	51.618645	2.476930	
Days	4	49.185681	.043966	.010992
Months	9	50.807101	1.665386	.185043
D X M	36		.767578	.021322

CF = 49.141715

* The four rows of data for each month represent (1) C,Catch, (2) C+700, (3) Log $\left(\frac{C+700}{100}\right)$ (4) Est. Log. $\left(\frac{C+700}{100}\right)$, in that order.

Table 8. (cont.) HOPE, 1954

	$\bar{y}$	$\bar{y}$+0326	C+700	C	Number Days	Catch
Feb.	.833	.866	734	34	4	136
Mar.	.833	.866	734	34	4	272
Apr.	.909	.942	875	175	4	972
May	1.479	1.512	3251	2551	5	13727
Jun.	..974	1.007	1016	316	4	14991
Jul.	.961	.994	986	286	4	16135
Aug.	.963	.996	991	291	5	17590
Sept.	.975	1.008	1019	319	4	18866
Oct.	.859	.892	780	80	5	19266
Nov.	.835	.868	738	38	4	19418
Feb.	.806	.839	690	-10	4	-40
Mar.	.806	.839	690	-10	4	-80
Apr.	.822	.915	822	122	4	408
May	1.451	1.484	3048	2348	5	12148
Jun.	.946	.979	953	253	4	13160
Jul.	.933	.966	925	225	5	14285
Aug.	.935	.968	929	229	4	15201
Sept.	.948	.981	957	257	4	16229
Oct.	.832	.865	733	33	5	16394
Nov.	.808	.841	693	-7	4	16366
Feb.	.862	.895	785	85	20	1700
Mar.	.862	.895	785	85	23	3655
Apr.	.937	.970	933	233	22	8781
May	1.507	1.540	3467	2767	21	66888
Jun.	1.002	1.035	1084	384	22	75336
Jul.	.989	1.022	1052	352	22	83080
Aug.	.991	1.024	1057	357	22	90934
Sept.	1.004	1.037	1089	389	22	99492
Oct.	.888	.921	834	234	21	104406
Nov.	.864	.897	789	89	22	106364
						142148

Table 9. Derivation of Final Catch Estimates, Bayview 1954

	Sun.	Sat.	Wkdy 1	Wkdy 2	Wkdy 3	E	$\bar{x}$
Feb. *	1	1213	0	436	180		
	701	1913	700	1136	880		-.361040
	.846	1.282	.845	1.055	.944	4.972	.994400
	1.089	1.131	.932	.939	.880		
March	1745	3127	2030	3853	2956		
	2445	3827	2730	4553	3656		+.170160
	1.388	1.583	1.436	1.658	1.563	7.628	1.525600
	1.620	1.662	1.464	1.471	1.411		
April	1254	2156	1577	6190	282		
	1954	2856	2277	6890	982		.031360
	1.291	1.456	1.357	1.838	.992	6.934	1.386800
	1.481	1.523	1.325	1.332	1.273		
May	4067	1700	3083	3240	5361		
	4767	2400	3783	3940	6061		.247360
	1.678	1.380	1.578	1.596	1.782	8.014	1.602800
	1.697	1.739	1.541	1.548	1.489		
June	3132	8926	7000	2436	3382		
	3832	9626	7700	3136	4082		.356360
	1.585	1.983	1.886	1.496	1.611	8.559	1.711800
	1.806	1.848	1.650	1.657	1.598		
July	17534	12663	2158	742	390		
	18234	13363	2858	1442	1090		.252360
	2.261	2.126	1.458	1.159	1.037	8.039	1.607800
	1.702	1.744	1.546	1.553	1.494		
Aug.	1358	1327	716	264	834		
	2058	2027	1416	964	1534		-.167240
	1.313	1.307	1.151	.984	1.186	5.941	1.188200
	1.283	1.325	1.126	1.133	1.074		
Sept.	3333	2920	1008	765	1251		
	4033	3620	1708	1465	1951		+.015160
	1.606	1.559	1.232	1.166	1.290	6.853	1.370600
	1.465	1.507	1.309	1.316	1.256		
Oct.	4144	1724	624	589	727		
	4844	2424	1324	1289	1427		-.064440
	1.685	1.384	1.122	1.110	1.154	6.455	1.291000
	1.386	1.427	1.229	1.236	1.177		
Nov.	6	23	46	174	15		
	706	723	746	874	715		-.480040
	.849	.859	.873	.942	.854	4.377	.875400
	.970	1.012	.813	.820	.761		
E	14.500	14.919	12.936	13.004	12.413	67.772	1.355440
$\bar{x}$	1.450000	1.491900	1.293600	1.300400	1.241300		

		$S\bar{x}^2$	Sx^2	M.S.
Total	49	97.784204	5.923325	
Days	4	92.335324	.474445	.118611
Months	9	95.235593	3.374714	.374968
D X M	36		1.074166	.029837

CF = 91.860879

* The four rows of data for each month represent (1) C,catch, (2) C+700, (3) Log $\left(\frac{C+700}{100}\right)$ (4) Est. Log. $\left(\frac{C+700}{100}\right)$, in that order.

Table 9. (cont) BAYVIEW, 1954

	$\bar{y}$	$\bar{y}$+.0326	C+700	C	NUMBER DAYS	
Sundays						
Feb.	1.089	1.122	1324	624	4	2496
Mar.	1.620	1.653	4498	3798	4	17688
Apr.	1.481	1.514	3266	2566	4	27952
May	1.697	1.733	5370	4670	5	51302
Jun.	1.806	1.839	6902	6202	4	76110
Jul.	1.702	1.735	5433	4733	4	95042
Aug.	1.283	1.316	2070	1370	5	101892
Sep.	1.465	1.498	3148	2448	4	111684
Oct.	1.386	1.419	2624	1924	5	121304
Nov.	.970	1.003	1007	307	4	122532
					43	
Saturdays						
Feb.	1.131	1.164	1459	759	4	3036
Mar.	1.662	1.695	4955	4255	4	20056
Apr.	1.523	1.556	3597	2895	4	31636
May	1.739	1.772	5916	5216	5	57716
Jun.	1.848	1.881	7603	6903	4	85328
Jul.	1.744	1.777	5984	5284	5	111748
Aug.	1.325	1.358	2280	1580	4	118068
Sep.	1.507	1.540	3467	2767	4	129136
Oct.	1.427	1.460	2884	2184	5	140056
Nov.	1.012	1.045	1109	409	4	141692
					43	
Weekdays						
Feb.	.917	.950	891	191	20	3820
Mar.	1.449	1.482	3034	2334	23	57502
Apr.	1.310	1.343	2203	1503	22	90568
May	1.526	1.559	3622	2922	21	151930
Jun.	1.635	1.668	4656	3956	22	238962
Jul.	1.531	1.564	3664	2964	22	304170
Aug.	1.111	1.144	1393	693	22	319416
Sep.	1.294	1.327	2123	1423	22	350722
Oct.	1.214	1.247	1766	1066	21	373108
Nov.	.798	.831	678	-22	22	372624
					217	636848

Table 9. Bayview 1954 (Cont.)

Pooled 1954 Variance (s^2)

Bayview	1.074166	36	
Garfield	1.262825	36	
Sandpoint	.875515	36	
Hope	.767578	36	
	3.980084	144	.027639

Pooled 4 year within-year Variance

1951	3.188044	106	
1952	1.642768	100	
1953	5.184075	144	
1954	3.980084	144	
	13.994971	494	.028329 $= s^2$

$1.15129\ s^2 = .032614$