



ORIGINS OF SOCKEYE SALMON (Oncorhynchus nerka) IN THE
LYNN CANAL DRIFT GILLNET FISHERY OF 1982 BASED ON SCALE
PATTERN ANALYSIS

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ADF&G TECHNICAL DATA REPORTS

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Data presented in these reports is intended to be final, however, some revisions may occasionally be necessary. Minor revisions will be made via errata sheets. Major revisions will be made in the form of revised reports.

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ABSTRACT

Linear discriminant function analysis of scale patterns of age 1.3 sockeye salmon (*Oncorhynchus nerka*) and age composition data obtained from the escapements and commercial catches in Lynn Canal (District 15), Southeastern Alaska provided the basis for apportioning the catch into its component runs of Chilkat and Chilkoot Lakes. The total return of sockeye salmon to Lynn Canal in 1982 was 456,722 of which 273,528 were harvested and 183,194 escaped to spawn. The return of sockeye salmon of Chilkat Lake origin was 204,383 of which 124,162 (60.8%) were harvested and 80,221 escaped to spawn. The return of sockeye salmon of Chilkoot Lake origin was 252,339 of which 149,366 (59.2%) were harvested and 102,973 escaped to spawn.

INTRODUCTION

The District 15 drift gillnet fishery operates in those waters of Lynn Canal, Southeastern Alaska north of Little Island (Figure 1). While all five species of Pacific salmon (*Oncorhynchus* sp.) are harvested, the fleet targets on sockeye salmon (*O. nerka*) from June through late August. During the period 1970 to 1981 the fishery harvested between 18,388 and 193,701 sockeye salmon each year. The average annual harvest for this same period was 111,184. Sockeye salmon harvested in Lynn Canal originate from the Chilkoot Lake and Chilkat Lake systems. The geography of Lynn Canal coupled with similar migratory timing of these two runs results in a mixed stock fishery.

Estimation of the numbers of fish harvested by run is essential to sound management. Catch apportionment of the run coupled with escapement counts provide estimates of total return by brood year. Total return estimates can subsequently be used to model spawner-recruit relationships, to estimate optimum escapement requirements, and to forecast run size.

The purpose of this report is to provide estimates of the catch, escapement, and total return by age class for the sockeye salmon returning to the Chilkat and Chilkoot Lake systems in 1982. Previous studies demonstrated the feasibility of identifying Chilkat and Chilkoot sockeye salmon using scale patterns of the freshwater zone (Bergander 1974; Marshall et al. 1982). We used a combination of linear discriminant analysis of scale patterns and age composition data to estimate the contribution of each run to the catch.

METHODS

Numbers of Fish

Catch statistics reported in this paper were obtained from preliminary data on the harvest of sockeye salmon in District 15 as of February 1983. Estimates of the escapement to each river were obtained by visually counting the number of fish through weirs. The Chilkat River weir operated from 25 June through 8 October. The Chilkoot River weir operated from 3 June through 16 September.

Age Composition

Examination of scale samples provide age information of fish in the catch and escapement. Samples were collected on the left side of the fish approximately two rows above the lateral line and on the diagonal row downward from the posterior insertion of the dorsal fin. Scales were mounted on gum cards and impressions were made in cellulose acetate (Clutter and Whitesel 1956). Ages were recorded in European¹ notation.

¹ European formula: Numerals preceding the decimal refer to the number of freshwater annuli, numerals following the decimal are the number of marine annuli. Total age is the sum of these two numbers plus 1.

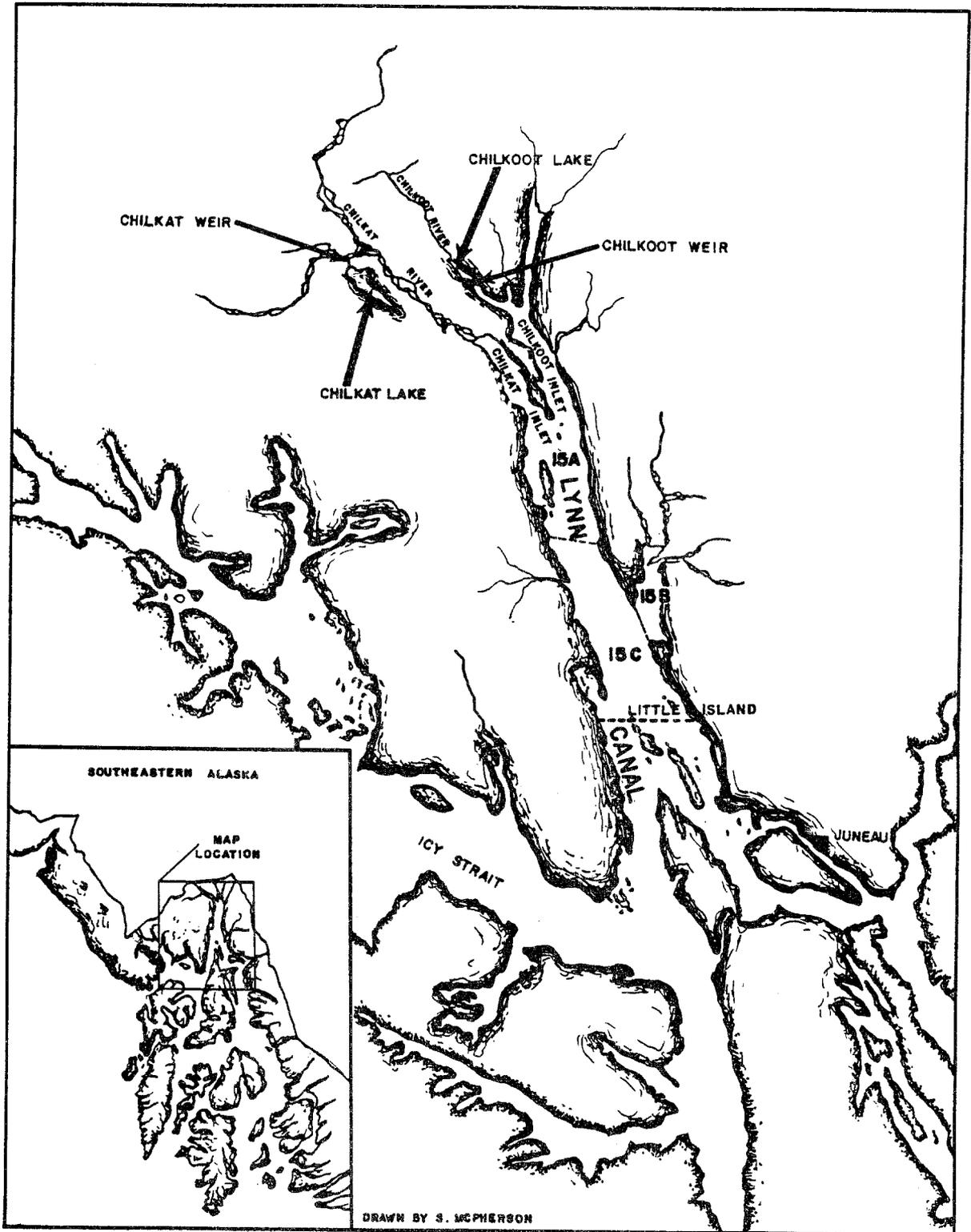


Figure 1. Map of Lynn Canal with inset of Southeastern Alaska.

Scale samples were collected from the commercial catch for each fishing period from 13 June through 14 September and age composition was estimated for each of those periods. Catches made after this date were small and did not justify the cost of sampling. We assigned the same age composition to catches made after 14 September as was computed for the period 12 September - 14 September.

Scale samples were collected from fish captured at the Chilkat and Chilkoot River weirs by dipnetting and by use of fyke traps positioned on the upstream side of the weirs. A beach seine was also used to capture adults at the Chilkat weir site. Age composition data collected on a daily basis was pooled with two objectives in mind. First, a minimum sample of approximately 550 was desired and second we hoped to split the available samples into at least three time periods. Sufficient samples were available from both escapements to accomplish these objectives.

Stock Identification

Estimates of the contribution of the Chilkat and Chilkoot River runs to the commercial catch were made using linear discriminant function analysis of scale patterns and age composition data. Because of the dominance of age 1.3 fish in the Chilkoot River stock, we limited our scale pattern analysis estimates to this age class.

Scale Measurements:

Scale impressions were magnified to 100 power and projected onto a digitizing tablet using equipment similar to that described by Ryan and Christie (1976). Data was recorded onto computer diskettes from the digitizer tablet under the control of a FORTRAN program executing on a microcomputer. Measurements were taken along an axis approximately 20 degrees off the primary scale axis; this axis is approximately perpendicular to the sculptured field. We measured the distance between each circulus in each of three scale pattern zones. The zones were: (1) scale focus to the outside edge of the freshwater annulus; (2) outside edge of the freshwater annulus to the last circulus of plus growth; and (3) the last circulus of the plus growth zone to the outer edge of the first ocean annulus (Figure 2). A set of 11 variables was then computed for each of these three zones (Table 1).

Analytical Procedures:

Linear discriminant function analysis (Fisher 1936; Dixon and Brown 1979) of scale pattern data was used to identify the origin of sockeye salmon harvested in the fishery. We constructed the discriminant function with scale pattern data collected from fish in the escapements to each of the respective river's in previous years because of our need to determine the origins of fish harvested on an in-season basis and because of the long delay between the fishery and the availability of escapement samples from Chilkat River fish. We evaluated this procedure with samples collected from the current year when the samples became available. Because there was no significant difference we did not reclassify the fishery samples with a year specific model.

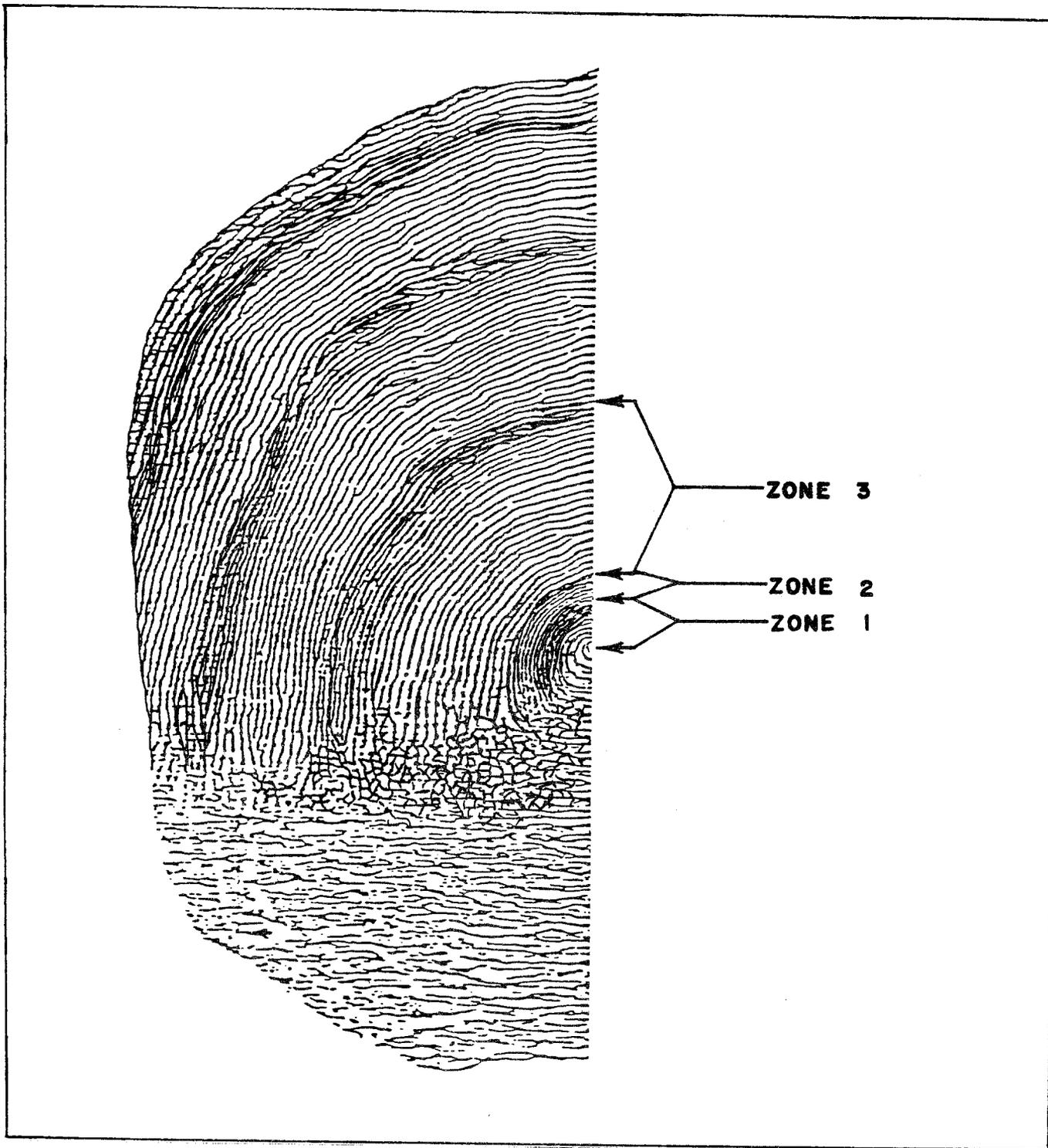


Figure 2. Photograph of a sockeye salmon scale showing the three zones measured.

Table 1. Variables computed from scale patterns for inclusion in the linear discriminant function analysis.

Variable Name	Description
NC(i) ¹	Number of circuli in zone (i).
ID(i)	Measured size of zone (i).
TWO(i)	Distance from the beginning of zone i to the second circulus of zone (i).
FOUR(i)	Distance from the beginning of zone i to the fourth circulus of zone (i).
SIX(i)	Distance from the beginning of zone i to the sixth circulus of zone (i).
EIGHT(i)	Distance from the beginning of zone i to the eighth circulus of zone (i).
MIN(i)	Distance between the two closest circuli in zone (i).
MAX(i)	The maximum distance between two contiguous circuli in zone (i).
LMIN(i)	The distance from the beginning of the zone (i) to the first circulus of variable MIN(i) in zone (i).
LMAX(i)	The distance from the beginning of zone (i) to the first circulus of variable MAX(i) in zone (i).
NCH(i)	The number of circuli in the first half of zone (i).

¹ Where i = 1, 2, 3.

Selection of a subset of the 33 characters for inclusion in the discriminant model was made by offering all variables to the stepwise procedure described by Dixon and Brown (1979) with an F level for inclusion set at 4.0. We then compared the accuracy of the models generated at each step in the analysis and when inclusion of additional variables failed to produce increased accuracy we ignored their use in subsequent analysis.

Estimates of the proportion of age 1.3 fish originating from the Chilkat and Chilkoot Rivers was made by classifying scale pattern data obtained from a sample of the commercial catch during each fishing period. Point estimates were corrected for misclassification error rates using the procedure of Cook and Lord (1978). The variance and 90% confidence intervals for these estimates was computed using the procedures of Pella and Robertson (1979).

Estimates of the proportion of other age classes in the fishery originating from the two rivers was made using the age 1.3 estimates and the ratio of age 1.3 fish in the escapements to the other age classes using the formula:

$$\hat{S}_{ij} = \frac{(\hat{C}_{i1.3}) (\hat{E}_{ij}/\hat{E}_{i1.3})}{\sum_{i=1}^2 (\hat{C}_{i1.3}) (\hat{E}_{ij}/\hat{E}_{i1.3})}$$

Where: \hat{S}_{ij} = Estimated proportion of stock i in the harvest of age j.

$\hat{C}_{i1.3}$ = Estimated proportion of stock i in the harvest of age 1.3 fish.

\hat{E}_{ij} = Estimated proportion of age j fish in stock i's escapement.

$\hat{E}_{i1.3}$ = Estimated proportion of age 1.3 fish in stock i's escapement.

RESULTS

Numbers of Fish

The total harvest of sockeye salmon in the Lynn Canal (District 15) area was 273,528 (Table 2). The harvest occurred over a 19-week period beginning 13 June and lasting through 18 October. The harvest peaked during the period 25 July to 13 August. Management strategies to selectively harvest or protect stocks of sockeye, pink (*O. gorbuscha*), chum (*O. keta*), or coho (*O. kisutch*) salmon produced considerable weekly variation in the time, areas, and gear permitted. These regulatory measures are summarized as footnotes to Table 2.

Table 2. Harvest of sockeye salmon in Lynn Canal (District 15) by period, 1982.

Section	Statistical week	Period	Hours (H)	Boats (B)	Catch
15-A ¹	25	6/13 - 14	24	57	2,730
15-A ¹	26	6/20 - 23	72	58	6,181
15-A ²	27	6/27 - 30	72	62	8,023
15-A ²	28	7/ 4 - 7	60 ³	44	8,399
15-A ⁴	29	7/11 - 13	48	50	8,386
15-A ⁴	30	7/18 - 20	48	64	12,622
15-A ⁵	31	7/25 - 28	72	98	47,954
15-A ⁶	32	8/ 1 - 3	48	183	55,736
15-A ⁷	33	8/ 8 - 13	108 ⁷	160	52,184
15-AB & C ⁸	34	8/16 - 20	96	160	30,667
15-A & C ⁹	35	8/22 - 27	120 ⁹	140	24,512
15-A & C ¹⁰	36	8/29 - 31	48	120	11,429
15-A & C ¹¹	37	9/ 5 - 7	48	125	2,374
15-A & C ¹²	38	9/12 - 14	48	125	1,443
15-A & C ¹²	39	9/19 - 21	48	155	688
15-A & C ¹¹	40	9/26 - 28	48	135	124
15-A & C ¹⁰	41	10/4 - 6	48	152	54
15-A & C ¹³	42	10/10 - 12	48	101	13
15-A & C ¹⁰	43	10/17 - 18	24	79	9

¹ Section 15-A open in the waters of Chilkoot Inlet north of the latitude of the Katzehin Flats buoy and in the waters of Lynn Canal south of the latitude of the southernmost tip of Talsani Island and east of a line from the southernmost tip of Talsani Island to Eldred Rock light and north of the latitude of Eldred Rock light.

² Chilkoot Inlet open north at 59°10'00" N. latitude.

³ Fishing period restricted to daylight hours (4 a.m. through 11:59 p.m.)

⁴ Section 15-A open only in the waters of Chilkoot Inlet north of 59°10'00" N. latitude and in the waters of Lynn Canal south of the latitude of the southernmost tip of Talsani Island.

⁵ Chilkoot Inlet northeast of a line from a point on the eastern shore of Lynn Canal at the latitude of the Katzehin Flats buoy to Indian Rock light to Taiya Point was closed. Lutak Inlet fishing boundary extended to Chilkoot River mouth for the final 12 hours.

Table 2. Harvest of sockeye salmon in Lynn Canal (District 15) by period, 1982 (continued).

- ⁶ Section 15-A fishing boundaries identical to previous period except northern Lutak Inlet boundary returned to standard boundary of 59° 18' 48" N. latitude, 135°31'36" W. longitude.
- ⁷ Section 15-A open 48 hours, except Chilkoot Inlet and Lutak Inlet north of 59°10'00" N. latitude open through 8/13 at 11:59 a.m. and limited to daylight hours (4 a.m. through 11:59 p.m.). Chilkat Inlet and Lynn Canal waters west and north of a line from the southernmost tip of Seduction Point to the southernmost tip of Talsani Island to the western shore of Lynn Canal at the latitude of the southernmost tip of Talsani Island was closed (Total = 108 hours).
- ⁸ Sections 15-B and 15-C open for 48 hours. Section 15-A open for 96 hours in the waters of Lynn Canal south of the latitude of the southernmost tip of Talsani Island and in the waters of Chilkoot Inlet and Lutak Inlet north of 59°10'00" N. latitude.
- ⁹ Chilkat Inlet north of the latitude of Glacier Point was closed. Section 15-C open for 48 hours. Section 15-A open for 72 hours, but extended for an additional 48 hours in the portion of Section 15-A north of 59°10'00" N. latitude. (Total = 120 hours).
- ¹⁰ Chilkat Inlet north of the latitude of the northernmost tip of Kochu Island was closed.
- ¹¹ Chilkat Inlet north of a line from the Glacier Point marker to the westernmost tip of Twin Coves was closed.
- ¹² Section 15-C open only south of the latitude of Bridget Point. Chilkat Inlet north of a line from the Glacier Point marker to the westernmost tip of Twin Coves was closed.
- ¹³ Sections 15-A and 15-C open for 48 hours.

The estimated escapement of sockeye salmon to Chilkat Lake was 80,221 fish (Table 3). The weir was installed on 3 June and the first fish counted on 25 June, counting continued through 7 October. Counts were generally low and sporadic during the months of June, July, and August. Approximately 75% of the run occurred during September. Very low counts from 7 to 11 September probably resulted from flooding silt laden water from Tsirku River backing up into the Chilkat River slough.

The estimated escapement into Chilkoot Lake was 102,973 fish (Table 4). Counts were fairly low from 3 June to 14 June. An early surge lasting from 15 June to 29 June resulted in 23,156 fish, or 22.5% of the escapement. Counts of only several hundred per day prevailed until mid July. From mid June through mid August daily counts were in the 1000-4000 range. Two modes were evident in the escapement counts, the first being strongly defined at 18 June and the second weakly defined mode occurring the last week of July.

The mean aerial dates of the Chilkoot River and Chilkat River escapements were 198.8 (18 July) and 255.5 (13 September), respectively (Figure 3). The variance of the escapement counts shows that the Chilkoot River escapement was more protracted than the escapement into the Chilkat River (504.8 vs 417.9).

Age Composition

This section summarizes the sockeye salmon age composition for those fish commercially caught and those in the escapements. Significant differences are evident in the escapement age composition data which by itself provides insight into the stock composition of the catch.

Escapement:

The Chilkoot River data was divided into three time periods and differences are evident between these periods (Table 5). Age 1.3 fish dominated the escapement. The percent of age 1.3 fish in the samples decreased in each of these time periods from 92.5% early to 68.5% late in the run. The percent of age 1.2 fish increased in samples collected during the season from 5.5% to 29.7%. Fish of other age classes were rare. Samples collected during the period 11 June through 18 July indicate the presence of slightly more males (54.5%). During the period from 19 July through 30 July females were slightly more abundant (55.0%). During the last sampling period from 31 July through 8 September each sex was approximately equally represented in samples.

The age composition of the Chilkat River sockeye salmon escapement was diverse (Table 6). Age 2.2 fish increased from 32.6% to 54.2% of the samples during the season. Age 2.3 fish increased from 27.8% to 39.1% of the sample between the first and second periods and no significant change was evident between the second and third periods. The percent of age 1.3 fish decreased dramatically between the first (32.6%) and second (1.7%) sample periods and did not change between the second and third periods. Age 1.2 fish accounted for a small percent of samples collected, and in all three periods ranged from 0.8% to 5.0%. Sex composition of the samples indicates that both sexes were represented approximately equally in each period.

Table 3. Daily and cumulative escapement of sockeye salmon past the Chilkat River weir, 1982.

DATE	NUMBERS		PROPORTION	
	DAILY	CUMULATIVE	DAILY	CUMULATIVE
June 3	0	0	0.00000	0.00000
4	0	0	0.00000	0.00000
5	0	0	0.00000	0.00000
6	0	0	0.00000	0.00000
7	0	0	0.00000	0.00000
8	0	0	0.00000	0.00000
9	0	0	0.00000	0.00000
10	0	0	0.00000	0.00000
11	0	0	0.00000	0.00000
12	0	0	0.00000	0.00000
13	0	0	0.00000	0.00000
14	0	0	0.00000	0.00000
15	0	0	0.00000	0.00000
16	0	0	0.00000	0.00000
17	0	0	0.00000	0.00000
18	0	0	0.00000	0.00000
19	0	0	0.00000	0.00000
20	0	0	0.00000	0.00000
21	0	0	0.00000	0.00000
22	0	0	0.00000	0.00000
23	0	0	0.00000	0.00000
24	0	0	0.00000	0.00000
25	88	88	0.00010	0.00010
26	23	31	0.00029	0.00039
27	0	31	0.00000	0.00039
28	65	96	0.00081	0.00120
29	41	137	0.00051	0.00171
30	79	216	0.00098	0.00269
July 1	1	217	0.00001	0.00271
2	8	225	0.00010	0.00280
3	33	563	0.00421	0.00702
4	22	585	0.00002	0.00704
5	18	603	0.00022	0.00727
6	90	693	0.00112	0.00839
7	44	1,113	0.00548	0.01387
8	8	1,121	0.00010	0.01397
9	35	1,156	0.00044	0.01441
10	12	1,168	0.00015	0.01456
11	24	1,192	0.00310	0.01766
12	11	1,203	0.00138	0.01905
13	30	1,233	0.00037	0.01942
14	39	1,272	0.00049	0.01991
15	1	1,273	0.00001	0.01992
16	0	1,273	0.00000	0.01992
17	31	1,304	0.00039	0.02031
18	22	1,326	0.00278	0.02309
19	1,174	2,500	0.01463	0.03772
20	525	3,025	0.00654	0.04427
21	179	3,204	0.00223	0.04650
22	33	3,237	0.00418	0.05067
23	50	3,287	0.00062	0.05130
24	29	3,316	0.00036	0.05166
25	0	3,316	0.00000	0.05166
26	0	3,316	0.00000	0.05166
27	1,240	4,556	0.01546	0.06712
28	0	4,556	0.00000	0.06712
29	0	4,556	0.00000	0.06712
30	0	4,556	0.00000	0.06712
31	0	4,556	0.00000	0.06712
August 1	2	4,558	0.00002	0.06714
2	341	4,899	0.00425	0.07139
3	477	5,376	0.00595	0.07734
4	729	6,105	0.00909	0.08643
5	467	6,572	0.00582	0.09225
6	32	6,604	0.00040	0.09265
7	1,448	8,052	0.01805	0.11070
8	6	8,058	0.00007	0.11077
9	0	8,058	0.00000	0.11077
10	30	8,088	0.00037	0.11114

-Continued-

Table 3. Daily and cumulative escapement of sockeye salmon past the Chilkat River weir, 1982 (continued).

DATE	NUMBERS		PROPORTION	
	DAILY	CUMULATIVE	DAILY	CUMULATIVE
11	7	9,426	0.00009	0.11750
12	34	9,460	0.00042	0.11792
13	17	9,477	0.00021	0.11814
14	415	9,892	0.00517	0.12333
15	90	9,982	0.00112	0.12443
16	2,085	12,067	0.02599	0.15042
17	696	12,763	0.00868	0.15910
18	1	12,764	0.00001	0.15911
19	6	12,770	0.00007	0.15919
20	82	12,852	0.00102	0.16021
21	1,113	13,965	0.01387	0.17408
22	206	14,171	0.00257	0.17746
23	621	14,792	0.00774	0.18433
24	1,006	15,798	0.01254	0.19933
25	116	15,914	0.00020	0.19953
26	145	16,059	0.00181	0.19974
27	3,135	19,194	0.03908	0.24024
28	222	19,416	0.00027	0.24051
29	541	19,957	0.00067	0.24118
30	259	20,216	0.00036	0.24154
31	254	20,470	0.00317	0.24471
September 1	167	20,637	0.00208	0.24679
2	863	21,500	0.01076	0.25755
3	115	21,615	0.00015	0.25770
4	196	21,811	0.00244	0.25914
5	506	22,317	0.00631	0.26545
6	1,020	23,337	0.01271	0.27816
7	0	23,337	0.00000	0.27816
8	20	23,357	0.00002	0.27818
9	0	23,357	0.00000	0.27818
10	1	23,358	0.00001	0.27819
11	0	23,358	0.00000	0.27819
12	4,000	27,358	0.04986	0.32805
13	12,300	39,658	0.15333	0.48138
14	1,680	41,338	0.02100	0.50238
15	1,500	42,838	0.00187	0.50425
16	178	43,016	0.00222	0.50647
17	0	43,016	0.00000	0.50647
18	2,065	45,081	0.02574	0.53221
19	6,529	51,610	0.08139	0.61360
20	1,479	53,089	0.01844	0.63204
21	1,132	54,221	0.00165	0.63369
22	169	54,390	0.00021	0.63390
23	9,104	55,494	0.11349	0.74739
24	4,832	60,326	0.06023	0.80762
25	2,271	62,597	0.04077	0.84839
26	444	63,041	0.00593	0.85432
27	1,599	64,640	0.01993	0.87425
28	240	64,880	0.00299	0.87724
29	1,539	66,419	0.01918	0.89642
October 1	0	66,419	0.00000	0.89642
2	0	66,419	0.00000	0.89642
3	3	66,422	0.00004	0.89646
4	26	66,448	0.00032	0.89678
5	0	66,448	0.00000	0.89678
6	2	66,450	0.00002	0.89680
7	43	66,493	0.00009	0.89689
		80,221	0.00054	1.00000

Table 4. Daily and cumulative escapement of sockeye salmon past the Chilkoot River weir, 1982.

DATE	NUMBERS		PROPORTION	
	DAILY	CUMULATIVE	DAILY	CUMULATIVE
June 3	0	0	0.00000	0.00000
4	0	0	0.00000	0.00000
5	0	0	0.00000	0.00000
6	13	13	0.00013	0.00013
7	46	59	0.00045	0.00057
8	10	69	0.00010	0.00067
9	33	102	0.00032	0.00099
10	60	162	0.00058	0.00157
11	71	233	0.00069	0.00226
12	19	252	0.00018	0.00245
13	377	629	0.00366	0.00611
14	55	684	0.00053	0.00664
15	1,008	1,692	0.00979	0.01643
16	1,100	2,792	0.01068	0.02711
17	1,592	4,384	0.01546	0.04257
18	2,256	6,640	0.05104	0.09362
19	2,832	9,472	0.02750	0.12112
20	943	10,415	0.00916	0.13028
21	1,693	12,108	0.01644	0.14672
22	647	12,755	0.00628	0.15300
23	1,102	13,857	0.01070	0.16370
24	1,273	15,130	0.01236	0.17607
25	2,247	17,377	0.02182	0.19789
26	2,535	19,912	0.01491	0.21279
27	1,872	21,784	0.00847	0.22126
28	473	22,257	0.00459	0.22586
29	583	22,840	0.00566	0.23152
30	149	23,089	0.00145	0.23296
July 1	92	24,181	0.00089	0.23386
2	219	24,400	0.00213	0.23598
3	235	24,635	0.00228	0.23827
4	203	24,838	0.00197	0.24024
5	335	25,173	0.00325	0.24349
6	484	25,657	0.00470	0.24819
7	224	25,881	0.00218	0.25037
8	313	26,194	0.00304	0.25341
9	152	26,346	0.00148	0.25488
10	270	26,616	0.00262	0.25750
11	200	26,816	0.00194	0.25945
12	253	27,069	0.00246	0.26190
13	462	27,531	0.00449	0.26639
14	728	28,259	0.00707	0.27346
15	1,102	29,361	0.01070	0.28416
16	847	30,208	0.00823	0.29239
17	1,503	31,711	0.01460	0.30698
18	1,452	33,163	0.01410	0.32108
19	3,509	36,672	0.03408	0.35516
20	2,419	39,091	0.02349	0.37865
21	1,112	40,203	0.01080	0.38945
22	1,848	42,051	0.01795	0.40740
23	3,949	46,000	0.03835	0.44575
24	3,285	49,285	0.03190	0.47765
25	3,956	53,241	0.02871	0.50636
26	3,522	56,763	0.03420	0.54056
27	4,414	61,177	0.04287	0.58342
28	4,074	65,251	0.03956	0.62299
29	3,377	68,628	0.03280	0.65578
30	1,040	69,668	0.01010	0.66588
31	1,423	71,091	0.01382	0.67970
August 1	1,853	72,944	0.01800	0.69770
2	3,312	76,256	0.03216	0.72986
3	2,229	78,485	0.02165	0.75151
4	1,068	79,553	0.01037	0.76188
5	1,553	81,106	0.01508	0.77696
6	1,460	82,566	0.01418	0.79114
7	1,883	84,449	0.01829	0.80943
8	1,236	85,685	0.01200	0.82143
9	2,680	88,365	0.02603	0.84746
10	1,412	89,777	0.01371	0.86117

-Continued-

Table 4. Daily and cumulative escapement of sockeye salmon past the Chilkoot River weir, 1982 (continued).

DATE	NUMBERS		PROPORTION	
	DAILY	CUMULATIVE	DAILY	CUMULATIVE
11	945	89,622	0.00918	0.87034
12	802	90,424	0.00779	0.87813
13	800	91,224	0.00777	0.88590
14	412	91,636	0.00400	0.88990
15	830	92,466	0.00806	0.89796
16	422	92,888	0.00410	0.90206
17	921	93,809	0.00894	0.91101
18	1,483	95,292	0.01440	0.92541
19	908	96,200	0.00882	0.93423
20	216	96,416	0.00210	0.93632
21	158	96,574	0.00153	0.93786
22	168	96,742	0.00163	0.93949
23	719	97,461	0.00698	0.94647
24	736	98,197	0.00715	0.95362
25	299	98,496	0.00290	0.95652
26	371	98,867	0.00360	0.96013
27	260	99,127	0.00252	0.96265
28	102	99,229	0.00099	0.96364
29	112	99,341	0.00109	0.96473
30	0	99,341	0.00000	0.96473
31	141	99,482	0.00137	0.96610
1	216	99,698	0.00210	0.96820
2	145	99,843	0.00141	0.96960
3	648	100,491	0.00629	0.97590
4	256	100,747	0.00249	0.97838
5	373	101,120	0.00362	0.98200
6	313	101,433	0.00304	0.98504
7	125	101,558	0.00121	0.98626
8	205	101,763	0.00199	0.98825
9	123	101,886	0.00111	0.98944
10	118	102,004	0.00114	0.99059
11	147	102,151	0.00143	0.99202
12	204	102,355	0.00198	0.99400
13	234	102,589	0.00227	0.99627
14	84	102,673	0.00082	0.99709
15	0	102,673	0.00000	0.99709
16	300	102,973	0.00291	1.00000
17	0	102,973	0.00000	1.00000
18	0	102,973	0.00000	1.00000
19	0	102,973	0.00000	1.00000
20	0	102,973	0.00000	1.00000
21	0	102,973	0.00000	1.00000
22	0	102,973	0.00000	1.00000
23	0	102,973	0.00000	1.00000
24	0	102,973	0.00000	1.00000
25	0	102,973	0.00000	1.00000
26	0	102,973	0.00000	1.00000
27	0	102,973	0.00000	1.00000
28	0	102,973	0.00000	1.00000
29	0	102,973	0.00000	1.00000
30	0	102,973	0.00000	1.00000
1	0	102,973	0.00000	1.00000
2	0	102,973	0.00000	1.00000
3	0	102,973	0.00000	1.00000
4	0	102,973	0.00000	1.00000
5	0	102,973	0.00000	1.00000
6	0	102,973	0.00000	1.00000
7	0	102,973	0.00000	1.00000

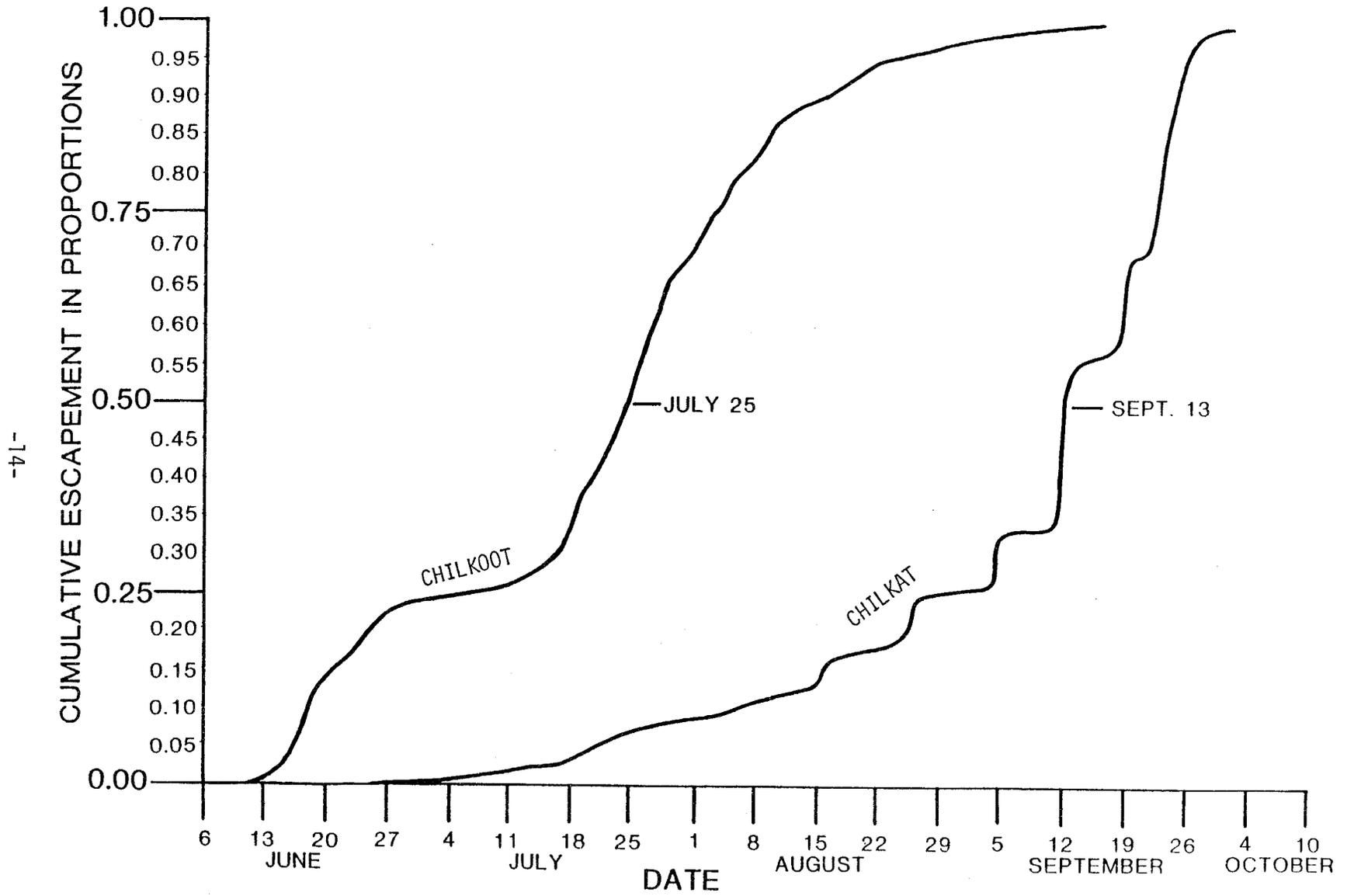


Figure 3. Cumulative daily escapement of sockeye salmon through the Chilkoot and Chilkat River weirs, 1982.

Table 5. Age and sex composition of sockeye salmon sampled at Chilkoote River weir, by date, 1982.

DATE	AGE CLASS															TOTAL		
	1.2			2.2			1.3			2.3			OTHER			MALES	FEMALES	TOTAL
	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL
06/14							5	1	1							0	1	1
06/15							15	11	26							16	13	29
06/16							15	18	33	1						16	18	34
06/17							21	21	42							21	21	42
06/18		1	1				21	21	42							21	21	42
06/19							21	21	42							21	21	42
06/20							21	21	42							21	21	42
06/21							16	20	36							16	20	36
06/22							17	17	34							17	17	34
06/23	1		1				17	17	34							17	17	34
06/24							17	17	34							17	17	34
06/25							15	15	30							15	15	30
06/26							14	14	28							14	14	28
06/27							14	14	28							14	14	28
06/28							20	20	40	1						21	21	42
06/29	3		3				20	10	30		1					21	11	32
06/30							2	10	12							2	10	12
07/02							2	2	4							2	2	4
07/05							2	2	4							2	2	4
07/06	1		1				2	2	4							3	3	6
07/08							2	2	4							2	2	4
07/09	1	2	3				2	2	4							4	4	8
07/10							2	2	4							2	2	4
07/11							2	2	4							2	2	4
07/12							2	2	4							2	2	4
07/13		1	1				2	2	4							3	3	6
07/14	1	1	2				2	2	4							3	3	6
07/15							2	2	4							2	2	4
07/16							2	2	4							2	2	4
07/17							2	2	4							2	2	4
07/18	4		4				2	2	4							6	4	10
06/11-07/18	16	15	31	0.0	0.0	0.0	279	239	518	5	1	6	5	0	5	305	255	560
NUMBERS																		
PERCENT	51.6	48.4	5.5	0.0	0.0	0.0	53.9	46.1	92.5	83.3	16.7	1.1	100.0	0.0	0.5	54.3	45.5	100.0
07/19	1	2	3	1		1	23	20	43							25	22	47
07/20	3		3				10	10	20							14	14	28
07/21							21	21	42	1						22	22	44
07/22	4	11	15				18	18	36							22	23	45
07/23	3	3	6		1	1	15	19	34					1		20	23	43
07/24	4	4	8				15	23	38							20	27	47
07/25							14	16	30							17	20	37
07/26	7	14	21	1	1	2	16	16	32	1	1	2				19	17	36
07/27							16	16	32							16	16	32
07/28	7	18	25		1	1	30	31	61					1		31	30	61
07/29	7	7	14				10	8	18							18	16	34
07/30	6	7	13				10	8	18							18	16	34
07/19-07/30	43	74	117	33.3	66.7	1.1	196	225	421	4	2	6	5	1	6	250	306	556
NUMBERS																		
PERCENT	36.3	63.2	21.0	33.3	66.7	1.1	46.6	53.4	75.7	66.7	33.3	1.1	83.3	16.7	1.1	45.0	55.0	100.0
07/31		4	4				5	4	9							5	4	9
08/01	5		5				14	14	28							14	14	28
08/02	20	18	38				15	15	30							17	17	34
08/03	10	10	20	1		1	15	15	30							20	20	40
08/04	1	1	2				11	11	22							12	12	24
08/05							11	11	22							11	11	22
08/06	7	7	14				14	14	28							15	15	30
08/07							14	14	28							15	15	30
08/08							12	12	24							13	13	26
08/09	1	1	2				8	8	16							9	9	18
08/10	4	4	8				8	8	16							9	9	18
08/11							8	8	16							9	9	18
08/12							8	8	16							9	9	18
08/13							8	8	16							9	9	18
08/14							8	8	16							9	9	18
08/15							8	8	16							9	9	18
08/16							8	8	16							9	9	18
08/17							8	8	16							9	9	18
08/18							8	8	16							9	9	18
08/19	2		2				8	8	16							9	9	18
08/20							8	8	16							9	9	18
08/21	1		1				5	5	10							6	6	12
08/22	1		1				13	13	26							14	14	28
08/23							6	6	12							6	6	12
08/24							4	4	8							4	4	8
08/25							4	4	8							4	4	8
08/26							4	4	8							4	4	8
09/01	2		2				4	4	8							4	4	8
09/04	1		1				4	4	8							4	4	8
09/07							4	4	8							4	4	8
09/08							3	3	6							3	3	6
07/31-09/08	79	88	167	0.0	2	2	201	184	385	0	3	3	5	0	5	285	277	562
NUMBERS																		
PERCENT	47.3	52.7	29.7	0.0	100.0	0.4	52.2	47.8	68.5	0.0	100.0	0.5	100.0	0.0	0.5	50.7	49.3	100.0

Table 6. Age and sex composition of sockeye salmon sampled at Chilkat River by date, 1982.

DATE	AGE CLASS																	
	1.2			2.2			1.3			2.3			OTHER			TOTAL		
	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL	MALES	FEMALES	TOTAL
06/28							3		3						3	0	3	
06/30							2		2						2	0	2	
07/01		1	1				2		2				1		1	1	1	
07/02		1	1				4		4						4	1	5	
07/07		1	1	1	1		4	5	9						4	5	9	
07/08				1	1		7	5	12						7	5	12	
07/10		1	1				7	8	15						7	8	15	
07/11				1	1		2	3	5						2	3	5	
07/13															0	0	0	
07/15				1	1										1	1	2	
07/19				1	1		1	2	3						1	2	3	
07/22	3	2	5	1	4	5	1	4	5	1	4	5			17	25	42	
07/23				1	1	2	3	4	7						5	6	11	
08/01										1	1	2			1	1	2	
08/03		1	1												0	0	0	
08/04															0	0	0	
08/06				1	1	2	2	1	3	1	1	2			1	1	2	
08/09	1	1	2	5	1	6	6	3	9	3	3	6			15	8	23	
08/11				1	1	2	1	1	2	1	1	2			3	2	5	
08/12	2		2	4	4	8	9	9	18	6	6	12			18	18	36	
08/13		1	1	4	3	7	3	3	6	4	4	8			8	7	15	
08/14				1	1	2	1	1	2	1	1	2			2	2	4	
08/15	6	4	10	6	10	16	12	11	23	12	13	25			36	38	74	
08/16	1		1			1	3	1	4	3	1	4			5	5	10	
08/17															0	0	0	
08/18				1	1	2	1	1	2						1	1	2	
08/19		1	1	1	1	2	2	1	3	1	1	2			1	1	2	
08/22				1	2	3	2	2	4	1	1	2			1	2	3	
08/23				1	1	2	1	1	2						1	1	2	
08/26		1	1	3	4	7	3	3	6	2	3	5			1	1	2	
08/28				1	9	10	1	1	2	10	8	18			14	23	37	
08/29		1	1	1	9	10	1	1	2	17	8	25			23	23	46	
08/30				1	1	2	1	1	2	2	2	4			4	4	8	
08/31															0	0	0	
09/01					1	1									1	1	2	
09/02				1	1	2	1	1	2						1	1	2	
09/03				2	3	5	11	1	12	2	2	4			14	5	19	
09/04				33	59	92		6	17	36	20	56			7	87	172	
06/28-09/04	13	16	29	76	114	190	108	82	190	96	66	162	10	1	11	303	279	582
NUMBERS	44.8	55.2	5.0	40.0	60.0	32.6	56.8	43.2	32.6	59.3	40.7	27.8	90.9	9.1	1.9	52.1	47.9	100.0
PERCENT																		
09/08										1	1	2			1	1	2	
09/10										1	1	2			1	0	1	
09/12		1	1	25	31	56	1	1	2	20	16	36	8	2	10	54	51	105
09/14				20	38	58	1	1	2	46	20	66	4	4	8	71	59	130
09/15		1	1	27	26	53	3	1	4	30	20	50	11	1	12	71	29	100
09/16	2		2	34	26	60	1	1	2	32	15	47			15	73	73	148
09/08-09/16	2	2	4	106	162	268	5	4	9	130	72	202	30	3	33	273	243	516
NUMBERS	50.0	50.0	0.8	39.6	60.4	51.9	55.6	44.4	1.7	64.4	35.6	39.1	90.9	9.1	6.4	52.9	47.1	100.0
PERCENT																		
09/17				6	7	13				8	4	12			5	19	11	30
09/18	1		1	11	36	47	1	2	3	13	15	28			5	53	57	99
09/21		1	1	23	38	61	1	1	2	15	21	36			4	43	60	103
09/26				26	30	56				20	15	35			5	52	44	96
09/27	2	2	4	17	27	44	1	1	2	15	15	30			7	38	47	85
09/28				4	4	8				6	7	13			1	21	12	33
09/29				15	22	37		1	1	19	9	28			2	36	32	68
10/02					1	1					1	1			1	0	1	2
10/03				2	4	6				11	3	14			1	14	7	21
09/17-10/03	3	3	6	111	169	280	5	4	9	107	87	194	23	5	28	249	268	517
NUMBERS	50.0	50.0	1.2	39.6	60.4	54.2	55.6	44.4	1.7	55.2	44.8	37.5	82.1	17.9	5.4	48.2	51.8	100.0
PERCENT																		

Estimates of the total number of sockeye salmon of each age class in the escapements to the Chilkoot and Chilkat Rivers was made by applying period age composition data to the number of fish passing the weir during those time periods and summing the estimates across the time periods. The escapement of sockeye salmon to the Chilkat River (Table 7) was dominated by age 2.2 (47.9%) and age 2.3 (35.5%) fish. Age classes 1.3 and 1.2 accounted for 9.7% and 2.0% of the total, respectively. Similar data for the Chilkoot River fish (Table 7) indicate that approximately 81,037 fish (78.7%) were age 1.3 and that 19,525 (19.0%) were age 1.2. Only 2.4% of the escapement was composed of other age classes.

Catch:

The harvest was composed mostly of age 1.3 fish (56.6%) followed by age 2.3 fish (25.9%), age 2.2 (11.4%), age 1.2 (4.9%), and 1.2% other age classes (Table 8). Early in the run, age 1.3 fish predominated in the catch and accounted for 74.0% to 94.4% of the harvest (Figure 4). The percent of age 1.3 fish fell to 56.9% in the catch of 1-3 August and continued to drop, reaching 9.6% of the catch of 29-31 August and remained low through the remainder of the season. The percent of age 2.3 fish in the catch showed a trend opposite of that exhibited by age 1.3 fish. Initially, age 2.3 fish accounted for 1.9% of the catch. The relative abundance of this age class steadily increased after 28 July to 57.9% during the period 29-31 August and remained high thereafter. Age 2.2 fish exhibited a pattern similar to that age 2.3 with initial low counts (0.8% to 4.3%), a rise to a high of 30.9% in the period 29-31 August, and remaining at similar levels. Age 1.2 fish were very scarce in all catches, their contribution ranged from 0.8 to 7.1%. Females were slightly more abundant than males in the catch (52.5% vs 47.5%) and this trend was evident within each principal age class except age 1.2 where males (72.1%) were more prevalent than females (27.9%).

Stock Identification

In this section we summarize the data pertinent to estimating stock composition of the commercial catch. Estimates of classification accuracy and confidence intervals for the age class specific estimates are of special concern because they establish the power of the analysis.

Summary Statistics for Scale Measurements:

The mean values and standard deviations of the scale variables computed for Chilkat and Chilkoot Lake sockeye salmon taken in previous years and used in the analysis are summarized in Table 9. The most obvious difference in these measurements is that Chilkat Lake fish show considerably more growth in their first freshwater year than do Chilkoot Lake fish (i.e., ID1 and NC1).

Variable Selection:

Frequency plots of the scale measurement variables showed that 8 of the 33 variables were not normally distributed and we excluded them from subsequent analysis. The eight variables were SIX1, EIGHT1, LMAX1, FOUR2, SIX2, EIGHT2, LMIN2, and LMIN3.

Table 7. Age composition of sockeye salmon in the escapement to Chilkat and Chilkoot Lakes, by period, 1982.

System	Period	Sample Size	Age Class					Other	Total
			1.2	2.2	1.3	2.3			
CHILKAT	06/25-09/04	582	Number 1,031 Percent 5.0	6,755 32.6	6,755 32.6	5,759 27.8	391 1.9	20,691 100.0	
	09/05-09/16	516	Number 189 Percent 0.8	12,675 51.9	426 1.7	9,554 39.1	1,561 6.4	24,404 100.0	
	09/17-10/07	517	Number 408 Percent 1.2	19,024 54.2	611 1.7	13,181 37.5	1,902 5.4	35,126 100.0	
	Total	1,615	Number 1,628 Percent 2.0	38,453 47.9	7,792 9.7	28,494 35.5	3,854 ¹ 4.8	80,221 100.0	
CHILKOOT	06/03-07/18	560	Number 1,830 Percent 5.5	0 0.0	30,583 92.5	354 1.1	295 0.9	33,063 100.0	
	07/19-07/30	556	Number 7,471 Percent 21.0	383 1.1	26,884 75.7	383 1.1	383 1.1	35,505 100.0	
	07/31-09/16	562	Number 10,224 Percent 29.7	122 0.4	23,569 68.5	184 0.5	306 0.9	34,405 100.0	
	Total	1,678	Number 19,525 Percent 19.0	506 0.5	81,037 78.7	921 0.9	984 ² 1.0	102,973 100.0	

¹ The estimated abundance by age class in the "other" category for Chilkat Lake run is: age 0.3, 0.8%; age 1.1, 8.3%; age 2.1, 59.0%; age 3.2, 29.9%; age 3.3, 2.0%.

² The estimated abundance by age class in the "other" category for Chilkoot Lake run is: age 0.3, 12.0%; age 1.4, 88.0%.

Table 8. Age and sex composition of sockeye salmon sampled from the commercial catch in Lynn Canal (District 15), by period, 1982.

	1.2			2.2			1.3			2.3			OTHER			TOTAL		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
06/13-06/14 N=(320)																		
NUMBERS	25		25	25	25	1,161	1,417	2,577	17	35	52	35	17	52	1,237	1,493	2,730	
PERCENT	100.0		0.9	100.0	0.9	45.0	55.0	94.4	33.3	66.7	1.9	66.7	33.3	1.9	45.3	54.7	100.0	
06/20-06/23 N=(321)																		
NUMBERS	59	40	99	98	20	117	2,443	2,885	5,328	231	288	519	39	78	117	2,870	3,311	6,181
PERCENT	60.0	40.0	1.6	83.3	16.7	1.9	45.8	54.2	86.2	44.4	55.6	8.4	33.3	66.7	1.9	46.4	53.6	100.0
06/27-06/30 N=(333)																		
NUMBERS	361	24	385	120	144	265	3,229	3,663	6,892	217	193	409	48	24	72	3,975	4,048	8,023
PERCENT	93.8	6.3	4.8	45.5	54.5	3.3	46.9	53.1	85.9	52.9	47.1	5.1	66.7	33.3	0.9	49.5	50.5	100.0
07/04-07/07 N=(328)																		
NUMBERS	359	103	462	76	101	176	3,023	4,175	7,198	231	282	512		50	50	3,688	4,711	8,399
PERCENT	77.8	22.2	5.5	42.9	57.1	2.1	42.0	58.0	85.7	45.0	55.0	6.1		100.0	0.6	43.9	56.1	100.0
07/11-07/13 N=(334)																		
NUMBERS	453	101	553	201		201	3,489	3,790	7,279	75	176	252	50	50	101	4,269	4,117	8,386
PERCENT	81.8	18.2	6.6	100.0		2.4	47.9	52.1	86.8	30.0	70.0	3.0	50.0	50.0	1.2	50.9	49.1	100.0
07/18-07/20 N=(369)																		
NUMBERS	648	34	682	34	67	101	5,033	5,923	10,956	307	375	682	67	135	202	6,088	6,534	12,622
PERCENT	95.0	5.0	5.4	33.3	66.7	0.8	45.9	54.1	86.8	45.0	55.0	5.4	33.3	66.7	1.6	48.2	51.8	100.0
07/25-07/28 N=(350)																		
NUMBERS	2,315	1,090	3,405	1,512	550	2,062	14,934	20,552	35,486	3,299	2,887	6,186	272	543	815	22,333	25,621	47,954
PERCENT	68.0	32.0	7.1	73.3	26.7	4.3	42.1	57.9	74.0	53.3	46.7	12.9	33.3	66.7	1.7	46.6	53.4	100.0
08/01-08/03 N=(434)																		
NUMBERS	2,328	905	3,233	2,436	2,692	5,128	12,583	19,131	31,714	7,823	6,669	14,491	650	520	1,170	25,819	29,917	55,736
PERCENT	72.0	28.0	5.8	47.5	52.5	9.2	39.7	60.3	56.9	54.0	46.0	26.0	55.6	44.4	2.1	46.3	53.7	100.0
08/08-08/13 N=(471)																		
NUMBERS	1,566	783	2,348	2,985	5,417	8,402	11,203	11,758	22,961	7,857	10,512	18,369	104		104	23,714	28,470	52,184
PERCENT	66.7	33.3	4.5	35.5	64.5	16.1	48.8	51.2	44.0	42.8	57.2	35.2	100.0		0.2	45.4	54.6	100.0
08/16-08/20 N=(441)																		
NUMBERS	1,051	421	1,472	2,225	2,712	4,937	6,675	8,413	15,088	4,380	4,728	9,108	61		61	14,393	16,274	30,667
PERCENT	71.4	28.6	4.8	45.1	54.9	16.1	44.2	55.8	49.2	48.1	51.9	29.7	100.0		0.2	46.9	53.1	100.0
08/22-08/27 N=(527)																		
NUMBERS	471	141	613	2,279	2,697	4,976	4,142	3,677	7,819	5,301	5,533	10,834	225	45	270	12,418	12,094	24,512
PERCENT	76.9	23.1	2.5	45.8	54.2	20.3	53.0	47.0	31.9	48.9	51.1	44.2	83.3	16.7	1.1	50.7	49.3	100.0
08/29-08/31 N=(353)																		
NUMBERS	30	61	91	1,912	1,620	3,532	387	710	1,097	3,536	3,082	6,617	30	61	91	5,896	5,533	11,429
PERCENT	33.3	66.7	0.8	54.1	45.9	30.9	35.3	64.7	9.6	53.4	46.6	57.9	33.3	66.7	0.8	51.6	48.4	100.0

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-Continued-

Table 8. Age and sex composition of sockeye salmon sampled from the commercial catch in Lynn Canal (District 15), by period, 1982 (continued).

	1.2			2.2			1.3			2.3			OTHER			TOTAL		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
09/05-09/07 N= (285)																		
NUMBERS	50	50	100	325	309	634	108	333	442	815	358	1,173	9	17	26	1,307	1,067	2,374
PERCENT	50.0	50.0	4.2	51.3	48.7	26.7	24.5	75.5	18.6	69.5	30.5	49.4	33.3	66.7	1.1	55.1	44.9	100.0
09/12-09/14 N= (471)																		
NUMBERS	12		12	275	107	382	37	34	71	625	337	962	16		16	965	478	1,443
PERCENT	100.0		0.8	72.0	28.0	26.5	52.2	47.8	4.9	65.0	35.0	66.7	100.0		1.1	66.9	33.1	100.0
09/19-09/21																		
NUMBERS	6		6	131	51	182	18	16	34	298	161	459	8		8	460	228	688
PERCENT	100.0		0.8	72.0	28.0	26.5	52.2	47.8	4.9	65.0	35.0	66.7	100.0		1.1	66.9	33.1	100.0
09/26-09/28																		
NUMBERS	1		1	24	9	33	3	3	6	54	29	83	1		1	83	41	124
PERCENT	100.0		0.8	72.0	28.0	26.5	52.2	47.8	4.9	65.0	35.0	66.7	100.0		1.1	66.9	33.1	100.0
10/04-10/06																		
NUMBERS	0		0	10	4	14	1	1	3	23	13	36	1		1	36	18	54
PERCENT	100.0		0.8	72.0	28.0	26.5	52.2	47.8	4.9	65.0	35.0	66.7	100.0		1.1	66.9	33.1	100.0
10/10-10/12																		
NUMBERS	0		0	2	1	3	0	0	1	6	3	9	0		0	9	4	13
PERCENT	100.0		0.8	72.0	28.0	26.5	52.2	47.8	4.9	65.0	35.0	66.7	100.0		1.1	66.9	33.1	100.0
10/17-10/17																		
NUMBERS	0		0	2	1	2	0	0	0	4	2	6	0		0	6	3	9
PERCENT	100.0		0.8	72.0	28.0	26.5	52.2	47.8	4.9	65.0	35.0	66.7	100.0		1.1	66.9	33.1	100.0
TOTAL																		
NUMBERS	9,735	3,751	13,486	14,647	16,526	31,173	68,469	86,481	154,951	35,098	35,661	70,759	1,617	1,542	3,159	129,566	143,962	273,528
PERCENT	72.2	27.8	4.9	47.0	53.0	11.4	44.2	55.8	56.6	49.6	50.4	25.9	51.2	48.8	1.2	47.4	52.6	100.0

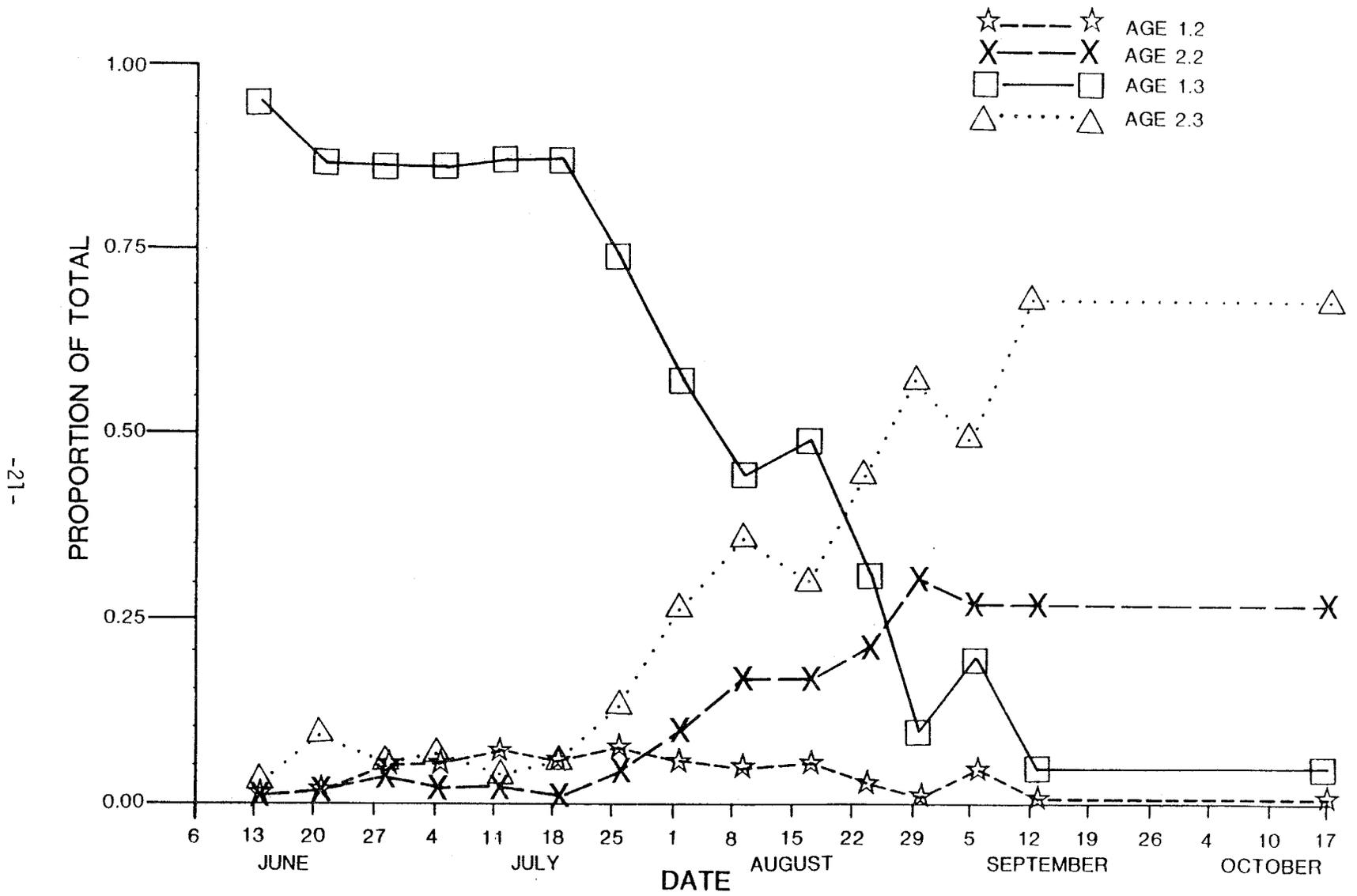


Figure 4. The percent of period catch samples composed of the principal age classes, Lynn Canal, 1982.

Table 9. Mean values and standard deviations of scale pattern variables.

Variable	Chilkoot		Chilkat	
	Mean	Standard Deviation	Mean	Standard Deviation
TWO1	27.46	5.14	43.06	7.33
FOUR1	40.25	8.27	67.91	8.51
MAX1	19.90	4.52	29.54	5.83
MIN1	5.14	1.10	5.79	1.28
LMIN1	3.75	1.57	10.68	2.66
NC1	5.96	1.60	13.10	2.21
ID1	54.56	13.44	149.02	24.00
NCH1	1.52	0.94	4.12	1.11
TWO2	19.06	3.19	19.24	8.38
MAX2	12.61	2.01	13.33	2.92
MIN2	7.81	1.49	8.98	2.05
LMAX2	3.28	1.88	2.45	1.55
NC2	5.20	1.78	3.75	2.58
ID2	53.07	20.42	42.15	36.02
NCH2	2.25	1.00	1.42	1.25
TWO3	26.59	4.26	28.31	5.19
FOUR3	55.60	7.30	58.48	8.42
SIX3	86.61	9.29	89.58	11.53
EIGHT3	118.27	11.36	121.71	14.62
MAX3	21.50	2.66	21.52	2.86
MIN3	8.71	1.54	8.13	1.56
LMAX3	10.93	5.14	8.97	5.01
NC3	26.69	3.54	26.22	3.55
ID3	385.36	49.24	380.02	48.56
NCH3	12.08	1.66	11.84	2.99

The variables selected by the stepwise procedure and their order of selection was ID1, FOUR1, LMIN1, TWO3, and MIN1. Comparison of the accuracy of models which included only the first variable selected, the first two selected, and so forth (Table 10) showed that no increase in accuracy was obtained after the first variable (ID1) was entered into the model and we, therefore, limited the model to use this variable exclusively. Limiting the variables used to ID1 resulted in reduced time required to digitize each scale and significantly decreased the time required to provide stock composition estimates during the fishing season.

The jackknifed classification accuracy of 99.1% for a model with a single variable is extremely high and contributed significantly to the narrow confidence intervals of subsequent age class specific stock composition estimates.

Age Class Specific Stock Composition Estimates:

The age class specific stock composition estimates based on scale pattern analysis of age 1.3 sockeye salmon sampled from the commercial catch (Table 11) indicates that among age 1.3 fish the Chilkoot Lake fish were more abundant than Chilkat Lake fish throughout the entire run. One must, however, consider the contribution of other age classes to obtain a complete picture of the abundance trends, these data are summarized in the following section.

Catch apportionment:

The harvest of 273,528 sockeye salmon was comprised of 149,366 Chilkoot Lake fish and 124,162 Chilkat Lake fish (Table 12). The weekly catches for each run are shown in Figure 5. Fish of both runs were caught in each fishing period during the 16 week season. Chilkoot River run fish predominated the catches during the period 13 June through 20 August, after this date, catches were composed mostly of Chilkat River fish. The catches of Chilkat River fish were slight during the first 6 fishing periods. Beginning with the fishing period of 25 July, catches of Chilkat River fish increased sharply and remained high for 6 weeks. Catches of Chilkat River fish fell off sharply during September. Catches of Chilkoot River fish increased during each successive weekly period reaching a peak during the last week of July. Catches of Chilkoot River fish remained high but exhibited a decreasing trend during the next four fishing periods. During the last five weekly fishing periods, the incidence of Chilkoot River fish was slight.

Run Summary:

The total return of sockeye salmon to Chilkoot Lake origin was 252,339 of which 149,366 were caught and 102,973 to spawn (Table 13). The exploitation rate for this run was 0.59. Age composition data shows that the exploitation rate was relatively constant between age classes except for age 1.2 fish which experienced a significantly lower exploitation rate of 0.36.

The total return of sockeye salmon of Chilkat Lake origin was 204,383 of which 124,162 were harvested and 80,221 escaped to spawn (Table 13). The exploitation rate for this run was 0.61. Exploitation rates between two-ocean and three-ocean fish varied considerably, the rates by age class were: age 1.2, 0.49; age 2.2, 0.42; age 1.3, 0.74; and age 2.3, 0.68.

Table 10. Jackknifed classification accuracy of sequential linear discriminant functions.

Step	Variable Entered	Overall Classification Accuracy	Percent Chilkoot Correctly Classified	Percent Chilkat Correctly Classified
1	ID1	99.1	100.0	98.2
2	FOUR1	99.1	100.0	98.2
3	LMIN1	99.1	100.0	98.2
4	TWO3	99.1	100.0	98.2
5	MIN1	99.1	100.0	98.2

Table 11. Age class specific stock composition estimates and 90% confidence coefficients calculated from scale pattern analysis of age 1.3 sockeye salmon in the Lynn Canal (District 15) commercial fishery, by period, 1982.

Stat Week	Chilkoot	Chilkat
25	0.770 ± 0.071	0.230 ± 0.071
26	0.698 ± 0.077	0.302 ± 0.077
27	0.575 ± 0.083	0.425 ± 0.083
28	0.678 ± 0.079	0.322 ± 0.079
29	0.708 ± 0.077	0.292 ± 0.077
30	0.923 ± 0.046	0.077 ± 0.046
31	0.903 ± 0.051	0.097 ± 0.051
32	0.831 ± 0.063	0.169 ± 0.063
33	0.862 ± 0.059	0.138 ± 0.059
34	0.995 ± 0.018	0.005 ± 0.018
35	0.975 ± 0.029	0.025 ± 0.029
36	0.695 ± 0.135	0.305 ± 0.135
37	0.885 ± 0.076	0.115 ± 0.076
38	0.586 ± 0.177	0.414 ± 0.177

Table 12. Stock composition estimates of sockeye salmon catches in Lynn Canal (District 15) by age class and period, 1982, expanded from age 1.3 scale pattern analysis.

Period	System	1.2		2.2		1.3		2.3		Other		Total	
		%	Number										
6/13-6/14	Chilkoot	79.4	20	0.0	0	77.0	1,983	1.0	1	7.5	4	73.6	2,008
	Chilkat	20.6	5	100.0	25	23.0	593	99.0	51	92.5	48	26.4	722
	Total	100.0	25	100.0	25	100.0	2,576	100.0	52	100.0	52	100.0	2,730
6/20-6/23	Chilkoot	72.7	72	0.0	0	69.8	3,720	0.7	4	5.3	6	61.5	3,802
	Chilkat	27.3	27	100.0	117	30.2	1,609	99.3	515	94.7	111	38.5	2,379
	Total	100.0	99	100.0	117	100.0	5,239	100.0	519	100.0	117	100.0	6,181
6/27-6/30	Chilkoot	60.9	235	0.0	0	57.5	3,963	0.4	2	3.2	2	52.4	4,202
	Chilkat	39.1	150	100.0	265	42.5	2,929	99.6	407	96.8	70	47.6	3,821
	Total	100.0	385	100.0	265	100.0	6,892	100.0	409	100.0	72	100.0	8,023
7/04-7/07	Chilkoot	70.8	327	0.0	0	67.8	4,881	0.6	3	4.9	2	62.1	5,213
	Chilkat	29.2	135	100.0	176	32.2	2,318	99.4	509	95.1	48	37.9	3,186
	Total	100.0	462	100.0	176	100.0	7,199	100.0	512	100.0	50	100.0	8,399
7/11-7/13	Chilkoot	73.7	407	0.3	1	70.8	5,153	0.7	2	5.6	6	66.4	5,569
	Chilkat	26.3	146	99.7	200	29.2	2,126	99.3	250	94.4	95	33.6	2,817
	Total	100.0	553	100.0	201	100.0	7,279	100.0	252	100.0	101	100.0	8,386
7/18-7/20	Chilkoot	93.2	636	1.4	1	92.3	10,111	3.5	24	22.5	45	85.7	10,817
	Chilkat	6.8	46	98.6	100	7.7	844	96.5	658	77.5	157	14.3	1,805
	Total	100.0	682	100.0	101	100.0	10,955	100.0	682	100.0	202	100.0	12,622
7/25-7/28	Chilkoot	91.5	3,115	1.1	23	90.3	32,044	2.7	168	18.4	150	74.0	35,500
	Chilkat	8.5	290	98.9	2,039	9.7	3,442	97.3	6,018	81.6	665	26.0	12,454
	Total	100.0	3,405	100.0	2,062	100.0	35,486	100.0	6,186	100.0	815	100.0	47,954
8/01-8/03	Chilkoot	85.0	2,748	0.6	30	83.1	26,353	1.4	211	10.6	125	52.9	29,467
	Chilkat	15.0	485	99.4	5,098	16.9	5,360	98.6	14,280	89.4	1,045	47.1	26,268
	Total	100.0	3,233	100.0	5,128	100.0	31,714	100.0	14,491	100.0	1,170	100.0	55,735

-Continued-

Table 12. Stock composition estimates of sockeye salmon catches in Lynn Canal (District 15) by age class and period, 1982, expanded from age 1.3 scale pattern analysis (continued).

Period	System	1.2		2.2		1.3		2.3		Other		Total	
		%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
8/08-8/13	Chilkoot	87.8	2,062	0.8	63	86.2	19,792	1.8	339	13.2	14	42.7	22,270
	Chilkat	12.2	286	99.2	8,339	13.8	3,169	98.2	18,030	86.8	90	57.3	29,914
	Total	100.0	2,348	100.0	8,402	100.0	22,961	100.0	18,369	100.0	104	100.0	52,184
8/16-8/20	Chilkoot	99.6	1,466	10.8	533	99.5	15,014	24.6	2,242	82.8	51	63.0	19,306
	Chilkat	0.4	6	89.2	4,404	0.5	75	75.4	6,866	17.2	10	37.0	11,361
	Total	100.0	1,472	100.0	4,937	100.0	15,089	100.0	9,108	100.0	61	100.0	30,367
8/22-8/27	Chilkoot	97.9	600	4.5	225	97.5	7,624	10.5	1,137	48.6	131	39.6	9,717
	Chilkat	2.2	13	95.5	4,751	2.5	195	89.5	9,697	51.4	139	60.4	14,795
	Total	100.0	613	100.0	4,976	100.0	7,819	100.0	10,834	100.0	270	100.0	24,512
8/29-8/31	Chilkoot	72.4	66	0.3	10	69.5	763	0.7	45	5.2	5	7.8	889
	Chilkat	27.6	25	99.7	3,522	30.5	335	99.3	6,572	94.8	86	92.2	10,540
	Total	100.0	91	100.0	3,532	100.0	1,098	100.0	6,617	100.0	91	100.0	11,429
9/05-9/07	Chilkoot	89.9	90	0.9	6	88.5	391	2.3	27	15.7	4	21.8	518
	Chilkat	10.1	10	99.1	628	11.5	51	97.7	1,145	84.3	22	78.2	1,856
	Total	100.0	100	100.0	634	100.0	442	100.0	1,172	100.0	26	100.0	2,374
9/12-9/14	Chilkoot	62.0	7	0.2	1	58.6	42	0.4	4	3.3	1	3.8	55
	Chilkat	38.0	5	99.8	381	41.4	29	99.6	958	96.7	15	96.2	1,388
	Total	100.0	12	100.0	382	100.0	71	100.0	962	100.0	16	100.0	1,443
9/19-9/21	Chilkoot	62.0	4	0.2	0	58.6	20	0.4	2	0.0	0	4.6	26
	Chilkat	38.0	2	99.8	182	41.4	14	99.6	457	100.0	8	95.4	663
	Total	100.0	6	100.0	182	100.0	34	100.0	459	100.0	8	100.0	689
9/26-10/17	Chilkoot	0.0	0	0.0	0	70.0	7	0.0	0	0.0	0	3.5	7
	Chilkat	100.0	1	100.0	53	30.0	3	100.0	134	100.0	2	96.5	193
	Total	100.0	1	100.0	53	100.0	10	100.0	134	100.0	2	100.0	200
Total	Chilkoot	87.9	11,155	2.9	893	85.1	131,861	6.0	4,211	17.3	546	54.6	149,366
	Chilkat	12.1	1,632	97.1	30,280	14.9	23,092	94.0	66,547	82.7	2,611	45.4	124,162
	Total	100.0	13,486	100.0	31,173	100.0	154,951	100.0	70,759	100.0	3,159	100.0	273,528

¹ The estimated abundance by age class in the "other" category for Chilkat Lake run is: age 3.2, 37.4%; age 0.3, 28.1%; age 3.3, 32.9%; age 0.4, 1.6%.

² The estimated abundance by age class in the "other" category for Chilkoot Lake run is: age 3.3, 33.9%; age 0.4, 0.3%; age 1.4, 65.8%.

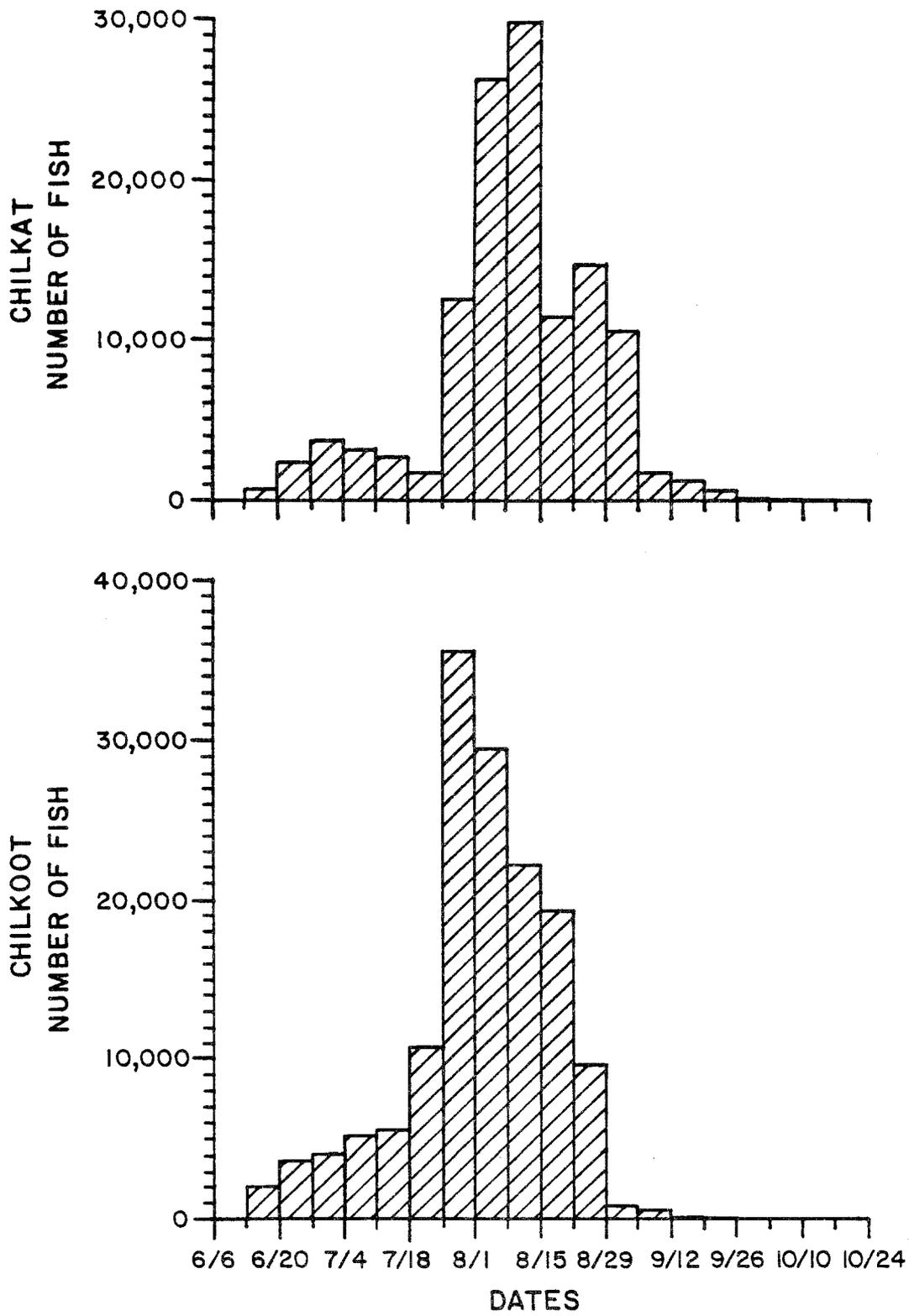


Figure 5. The catch of Chilkoot and Chilkat Lake sockeye salmon in the Lynn Canal drift gillnet fishery, by period, 1982.

Table 13. Catch, escapement, and total return of sockeye salmon to Lynn Canal (District 15) by age class and system, 1982.

System			1.2	2.2	1.3	2.3	Other	Total
Chilkoot	Catch	Numbers	11,855	893	131,861	4,211	546	149,366
		Percent	7.9	0.6	88.3	2.8	0.4	100.0
	Escapement	Numbers	19,525	506	81,037	921	984	102,973
		Percent	19.0	0.5	78.7	0.9	1.0	100.0
	Total Run	Numbers	31,380	1,399	212,898	5,132	1,530 ¹	252,339
		Percent	12.4	0.6	84.4	2.0	0.6	100.0
Chilkat	Catch	Numbers	1,632	30,280	23,092	66,547	2,611	124,162
		Percent	1.3	24.4	18.6	53.6	2.1	100.0
	Escapement	Numbers	1,628	38,453	7,792	28,494	3,854	80,221
		Percent	2.0	47.9	9.7	35.5	4.8	100.0
	Total Run	Numbers	3,260	68,733	30,884	95,041	6,465 ²	204,383
		Percent	1.6	33.6	15.1	46.5	3.2	100.0

¹ The estimated abundance by age class in the "other" category for Chilkat Lake run is: age 1.1, 5.0%; age 2.1, 35.1%; age 3.2, 32.8%; age 0.3, 11.9%; age 3.3, 14.5%; age 0.4, 0.7%.

² The estimated abundance by age class in the "other" category for Chilkoot Lake run is: age 0.3, 17.3%; age 0.4, 0.1%; age 1.4, 82.6%.

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