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DATE March 5, 1981

SUBJECT RE: 1980 Morice River Coded Wire Tagging (CWT) Program
OBJET

INTRODUCTION

As a precursor to a proposed hatchery facility, bio-baseline and manageability studies were initiated in the spring of 1979 and continued in the spring of 1980. The purpose of the downstream portion of the 1980 study was four-fold: 1) to capture, rear and CWT 75,000 chinook fry; 2) to obtain downstream timing of all juvenile salmonids; 3) to determine population estimates of chinook fry, and 4) to obtain biological samples of juvenile salmonids throughout their downstream migration.

METHODS & MATERIALS

Capture of Chinook Fry & Juvenile Salmonids

Two trapping locations were utilized on the Morice River, Site 1 was 6 km below Morice Lake, and Site 2 was located approximately 3 km below Morice Lake (see figure 1). At Site 1, four 2' x 3' floating incline plane traps were attached to a cable stretched across the river; one was installed on April 6; two on April 7, and one on April 14. A fyke net weir trap was placed adjacent to the east river bank approximately 100 meters upstream from the 2' x 3' traps from April 11-19. Two 2.5 x 1 meter fence panels and sandbags were placed upstream of this trap to divert the fry into the fyke net. Sandbags, placed upstream of the 2' x 3' traps diverted the fry into the traps, created a gentle back eddy for the rearing pens at the same time. All of these traps were removed on April 19 because of rising water levels. A 2' x 3' incline plane trap was installed on the cable adjacent to the east bank of the river at Site 1 and was operated from April 19-May 16.

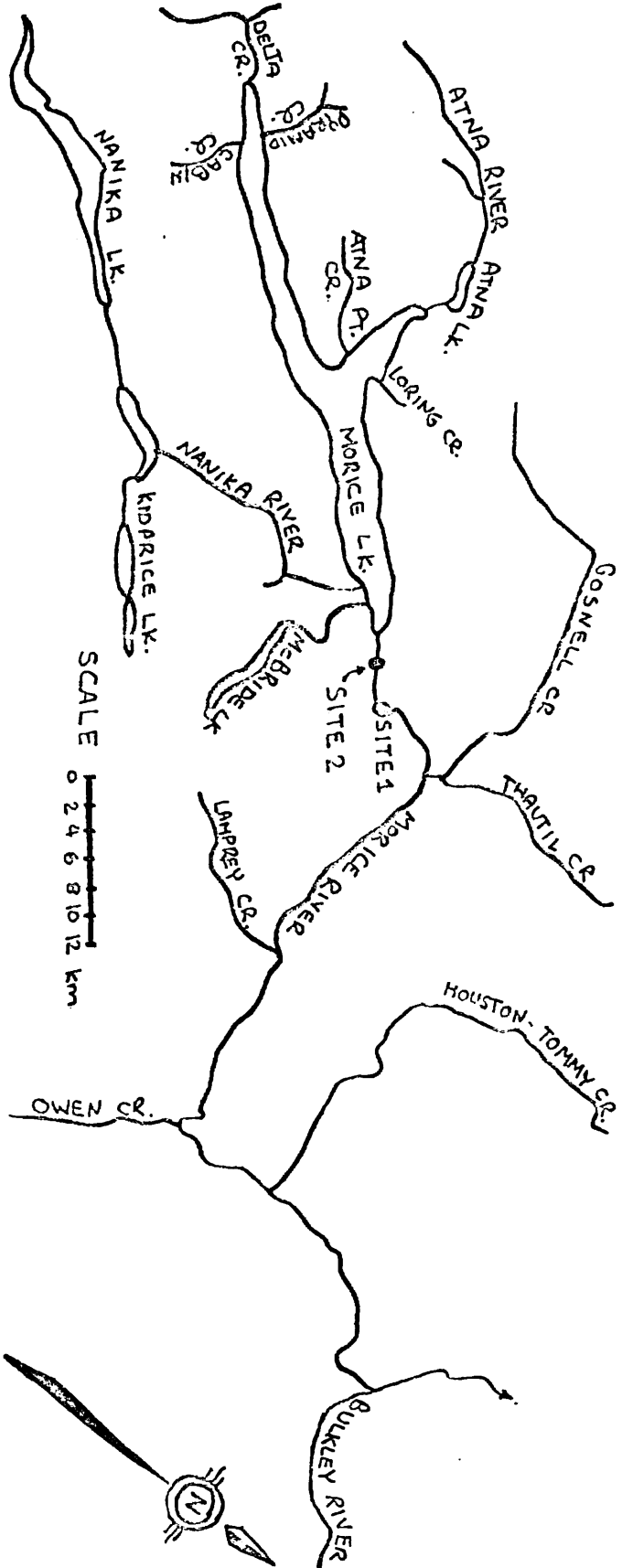
A 4' x 4' floating incline plane trap was attached to a cable stretched across the river at trap Site 2 and operated from May 14-July 10. This trap could not be installed earlier because of insufficient water levels.

Enumeration & Timing of Juvenile Salmonids

All downstream migrating salmonids were identified and enumerated. The first 83,000 chinook fry captured were reared and eventually nose tagged. Coho, chinook and sockeye smolts were counted and released, except for biological samples which were taken periodically. All other species were noted and released downstream of the trapping site.

Dye tests were conducted at trap Site 1 on April 8, 11, 14, 19, 24, May 1 and 13 and at trap Site 2 on May 15, 17, 26 and June 8, to determine the efficiency of the trapping gear.

FIGURE 1 : MORICE LAKE WATERSHED



Biological Samples

Specimens of chinook, coho and sockeye smolts were collected, preserved in a 10% formalin solution for 24 hours on May 18, 25, 31, June 8 and 11 and were sampled for length, weight and scale smears for age analysis. On the following dates; April 11, 18, 25, May 2, 9, 19, 25, 30 and June 9, fifty chinook fry were killed in a 10% MS222 (methanesulfonate) solution and sampled for length, weight and degree of yolk absorption.

Rearing of Chinook Fry

After removal from the traps, chinook fry were immediately transported to holding pens. These pens were set up at the river margin, adjacent to trap Site 1 from April 7-May 11 because of ice on the lake. After the ice had cleared from the lake, the fry and pens were transported by riverboat to the lake. The pens were attached to a raft located on the west side of the lake 3.5 km from its outlet.

They were held there until July 17 and fed a diet of Oregon Moist Fish Pellets (OMP), seven times a day. The feeding schedule was recalculated once a week using the OMP schedule because of changes in fish size and water temperatures. Pen liners were cleaned periodically using a gas-powered fire hose to prevent suffocation and disease from algae growth caused by accumulated food and metabolic wastes on the pen bottoms.

Tagging

Tagging procedures were similar to those used on other such studies. The tagged chinook fry were held for 24 hours at the tagging site in pens to determine immediate tagging mortality and tag retention from a random sample of 200 fish per day.

Crew & Accommodation

The number of crew members varied throughout the program. Five people were involved in the initial set up of camp and trap installation. Once the traps were in place two people conducted the program until tagging operations began, when a third person was added to the crew.

Two camper trailers provided the accommodation for the crew. There were never less than two vehicles in camp; a 4-wheel drive pick-up and a two wheel drive pick-up. The 4-wheel drive was equipped with a radio telephone.

RESULTS

Enumeration of Chinook Fry

Trapping began on April 7 and continued until July 10. Of the 127,422 fry captured 116,999 fry survived the trapping process. Trapping mortality was about 8.2%. Table I shows the number of each salmonid species caught daily.

Timing of the Downstream Migration of Salmonids

Chinook Fry - The chinook fry downstream migration appears to have two distinct peaks, April 19-May 1 and May 14-May 23 (see figure 2) judging by the estimated daily chinook run.

Coho and Sockeye Smolts - There appeared to be no peak in the downstream migration of coho smolts, as the numbers remained very low throughout the entire

TABLE I : Enumeration of all Salmonid Species Caught

Date	Chinook Live	Fry Caught Dead	Total	Sockeye Smolts Total	Coho Smolts Total	Coho Fry Total	Trout Total
Apr 7	1074	26	1100				
8	2044	63	2007				
9	1917	40	1957				
10	2238	53	2291				
11	4166	121	4287				
12	4203	151	4354				
13	6316	177	6495				
14	9683	111	9794				
15	7568	123	7691				
16	12444	200	12639				
17	12013	137	12150				
18	14058	212	14270				
19	10379	145	10524				
20	2563	44	2607				
21	1358	112	1470				
22	1964	54	2018				
23	1218	12	1230				
24	893	40	933				
25	818	10	828				
26	1027	14	1041				
27	815	8	823				
28	1078	18	1096				
29	25	1047	1072				
30	1009	19	1028				
May 1	565	20	585				
2	147	2	149				
3	50		50				
4	46		46				
5	58	1	59				
6	60	70	130				
7	20	1	21				
8	26	1	27				
9	30	2	32				
10	12		12				
11	15		15				
12	30	2	32				
13	68		68				
14	45		45				
15	900	200	1100	65	2		
16	1100	600	1700	226	2		1
17	505	650	1155	288	1		
18	1969	190	2159	287	2		
19	1706	45	1751	345	2		
20	1401	20	1421	365	2		
21	636	43	679	161	4		
22	1088	16	1104	177	2		
23	1080	58	1138	102	2		1
24	607	21	628	72			
25	276	300	576	30	2		
26	327	12	339	30	1		

TABLE I cont'd

Date	Chinook Live	Fry Dead	Caught Total	Sockeye Smolts Total	Coho Smolts Total	Coho Fry Total	Trout Total
May 27	496	300	796	11			
28	506	37	543	12	1		
29	67	400	467	100	1		1
30	588	380	968	180	1		
31	630	255	885	148	6		
Jun 1	44	826	870	75	3		1
2	16	710	726	99	14		
3	85	430	515	37	2		
4	574	109	683	36	1		
5	12	600	612	9	4		
6							
7	180	235	415	20	6		
8	159	31	190	11	4		
9		571	571	7	1		
10	36	94	130	7	2		
11							
12							
13		89	89	2	11		1
14							
15	1	83	84	1	2		
16							
17	23	6	29	2	10		1
18							
19		23	23	8	14		
20							
21	14		14	6			1
22							
23							
24							
25	15	1	16	2	2	7	1
26							
27							
28	3	33	36	1	20		2
29							
30		5	5	1	9	30	3
Jul 1							
2					1	157	
3							
4		2	2			33	
5							
6	2	7	9		3		
7							
8	6	3	9		3		
9							
10	7	2	9		3	2	
TOTALS	116999	10423	127422	2923	146	229	13

ESTIMATED DAILY POPULATION

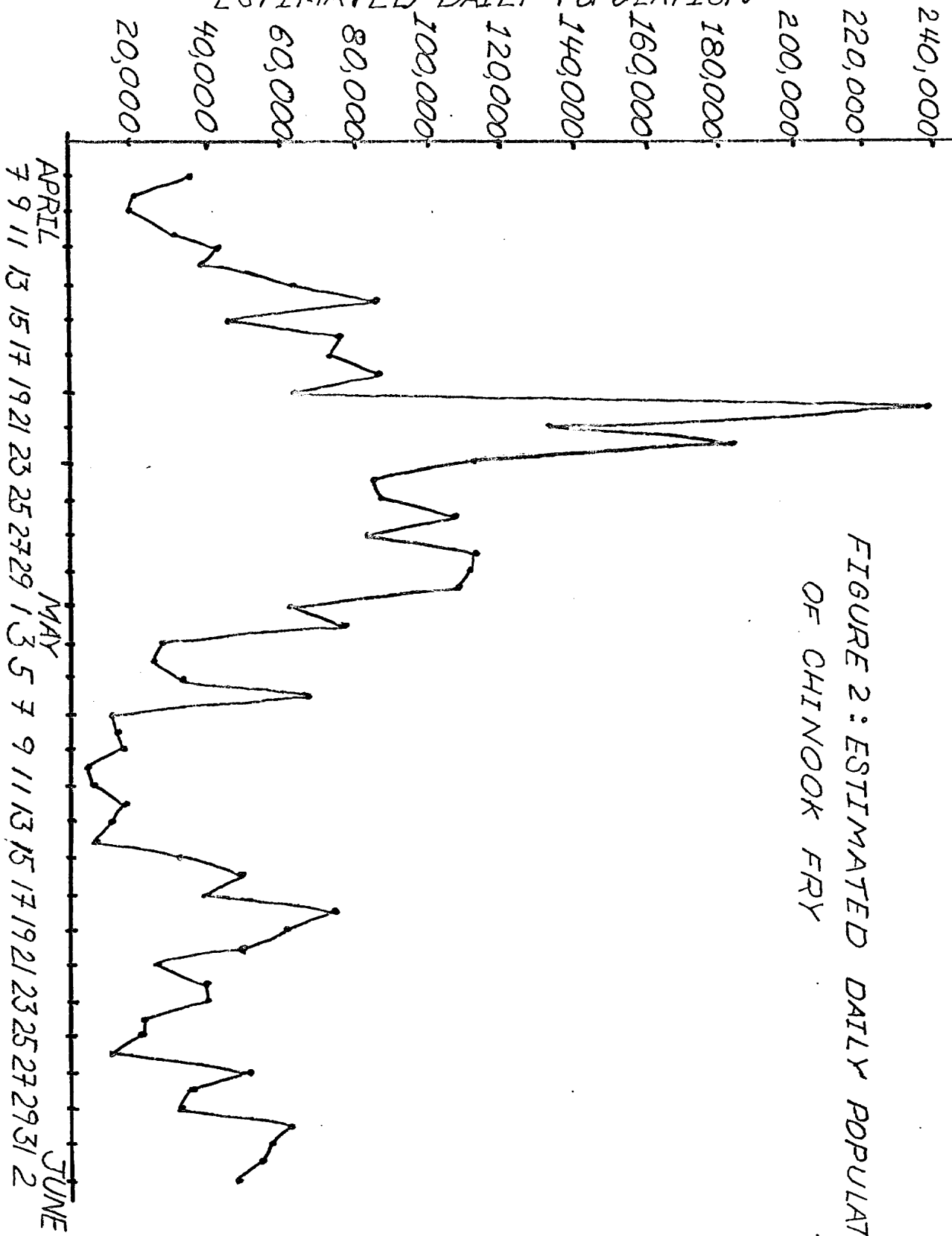


FIGURE 2: ESTIMATED DAILY POPULATION OF CHINOOK FRY

trapping period (see figure 3). Sockeye smolt migration exhibited two distinct peaks occurring May 15-May 21 and May 27-June 2 (see figure 4). During 1979 the sockeye smolt migration did not exhibit a pronounced peak, however, most of the run occurred between May 15-May 29.

Trapping Efficiency & Population Estimates

Dye tests with about 525 fry were done at Site 1 and 2. Table II shows the trapping efficiency and the estimated run of chinook fry. Higher water levels, different trapping sites, trap types and number of traps explains much of the variations in the tests.

Biological Sampling

Table III is a compilation of the average weights of wild fry caught on the Morice River as well as fry held for rearing. All fry were initially at the number 4 and subsequently at the number 5 stage for yolk absorption during the downstream migration.

The average length of coho smolts was 104.3mm and average weight was 14.04 g. For age 1+ sockeye smolts the average length was 87.3 mm and average weight was 6.67 g while age 2+ sockeye were 117.8 mm in length and weighed 16.78 g on the average (see Table IV).

Rearing Chinook Fry for Tagging

A total of 82,381 chinook fry were kept for rearing and tagging. The fish were held from April 7-July 5 when tagging began. 11,665 dead fry were removed from the pens between April 7-July 9. This indicates a mortality rate of 14.16%.

The growth curve (see figure 5) of the rearing chinook fry shows the relationship to temperature. Once the lake reached 7 C the fry started to increase in size and the warmer it got the greater the increase. Also, comparing this growth to the feeding schedule (see Table V), it appears that the growth rate increased when the fry were able to eat a larger size of mash. At the start of tagging the larger fish were approximately 322 to the pound, or 1.416 g/fish.

Tagging

A total of 69,253 fry were tagged. Tagging mortality was 0.17% (118) after a 24 hour period and tag retention averaged 99.2% (see Table VI). Therefore 68,687 chinook fry can be assumed to be tagged and released.

Total Captured for Rearing & CWT		82,381
Holding Pen Mortalities	11,565	
Fish too Small to Tag	589	
Tagging Mortalities	118	
Tag Loss (24 hour)	428	
Unaccounted For	904	
	<u>13,704</u>	<u>13,704</u>
Total Released Tagged		<u><u>68,687</u></u>

DISCUSSION

Trapping began on April 7, 1980, at which time chinook fry were migrating downstream. Because of ice on Morice Lake fry were held in pens at trapping

NUMBER OF SMOLTS

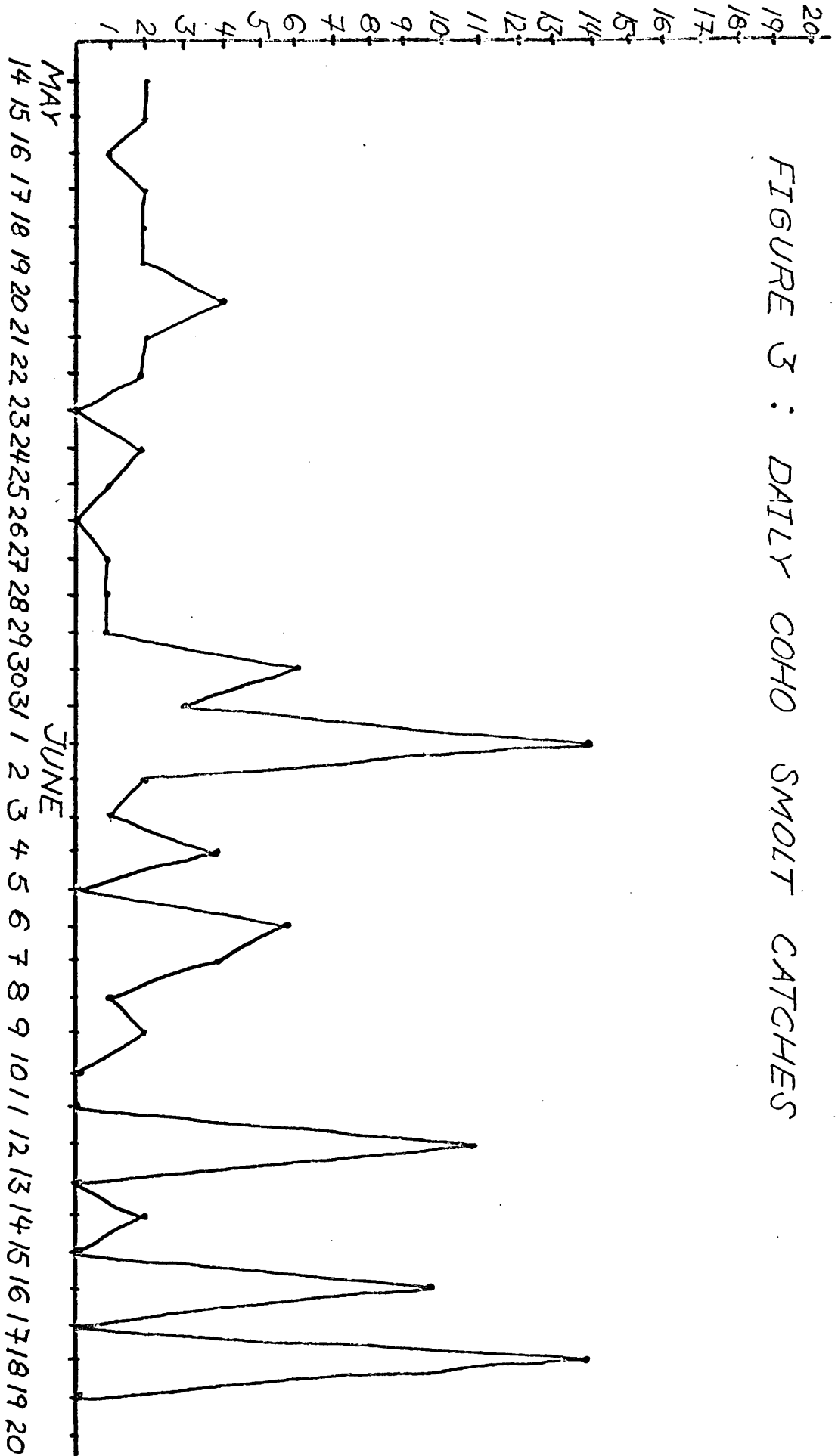


FIGURE 3 : DAILY COHO SMOLT CATCHES

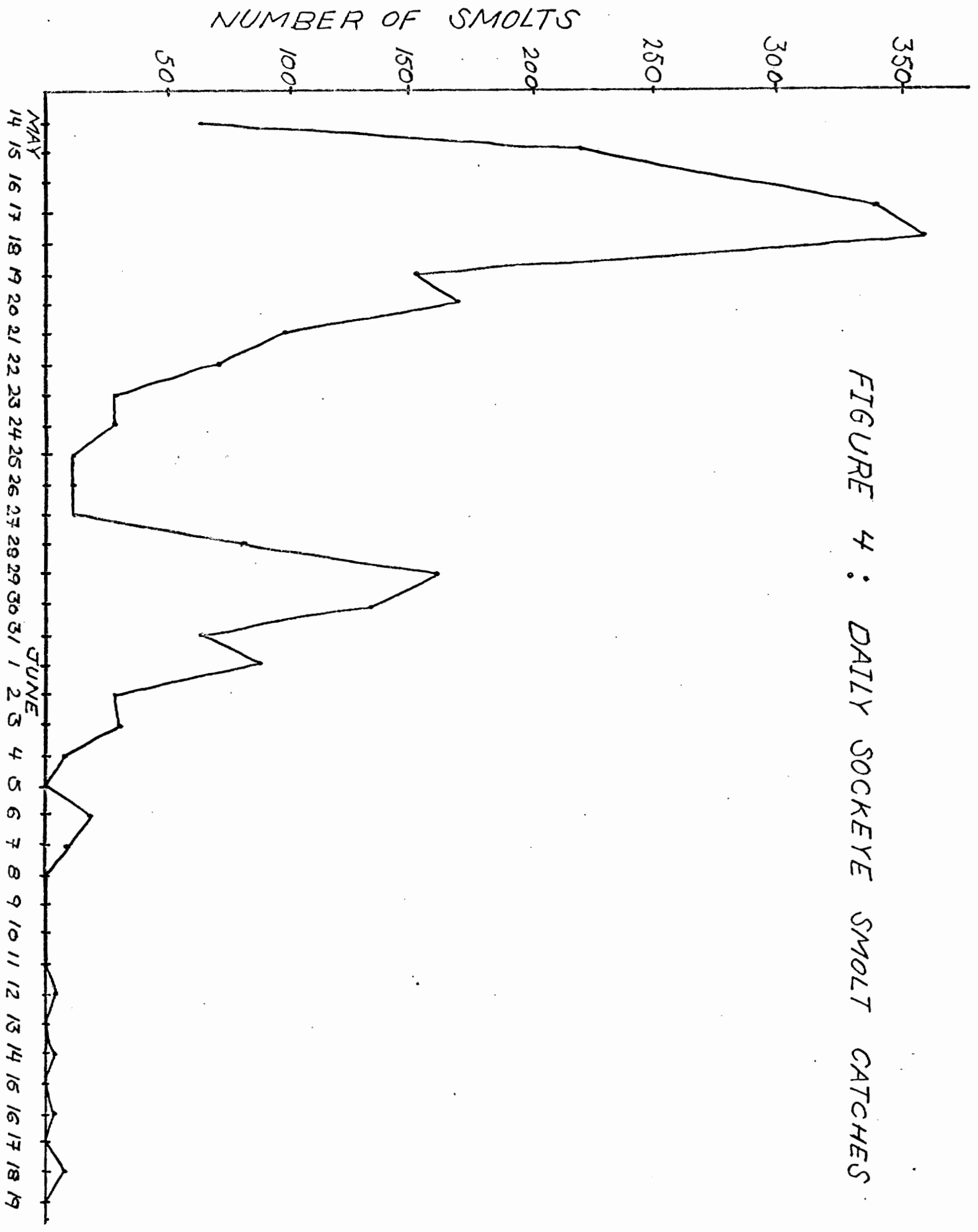


FIGURE 4 : DAILY SOCKEYE SMOLT CATCHES

TABLE II : Results from the Dye Tests & Population Estimate of Chinook Fry.

Date	Percent Trapped (from dye test)	Number Caught	Accumulated Total	Estimate of Daily Population	Accumulated Population
Apr 7	3.2	1100	1100	34375	34375
8	10.3	2007	3107	19485	53860
9	10.3	1957	5064	19000	72860
10	10.3	2291	7355	22243	95103
11	10.3	4287	11642	41621	136724
12	11.6	4354	15996	37534	174258
13	11.6	6495	22491	55991	230249
14	11.6	9794	32285	84431	314680
15	16.6	7691	39976	46331	361011
16	16.6	12639	52615	76138	437149
17	16.6	12150	64765	73193	510342
18	16.6	14270	79035	85964	596306
19	16.6	10524	89559	63398	659704
20	1.1	2607	92166	237000	896704
21	1.1	1470	93636	133636	1030340
22	1.1	2018	95654	183454	1213794
23	1.1	1230	96884	111818	1325612
24	1.1	933	97817	84818	1410430
25	0.96	828	98645	86250	1496680
26	0.96	1041	99686	108437	1605117
27	0.96	823	100509	85729	1690846
28	0.96	1096	101605	114167	1805013
29	0.96	1072	102677	111667	1916680
30	0.96	1028	103705	107083	2023763
May 1	0.96	585	104290	60937	2084700
2	0.19	149	104439	78421	2163121
3	0.19	50	104489	26316	2189437
4	0.19	46	104535	24211	2213648
5	0.19	59	104594	31053	2244701
6	0.19	130	104724	68421	2313122
7	0.19	21	104745	11053	2324175
8	0.19	27	104772	14211	2338386
9	0.19	32	104804	16842	2355228
10	0.19	12	104816	6316	2361544
11	0.19	15	104831	7895	2369439
12	0.19	32	104863	16842	2386281
13	0.57	68	104931	11930	2398211
14	0.57	45	104976	7895	2406106
15	3.4	1100	106076	32070	2438176
16	3.4	1700	107776	49563	2487739
17	2.9	1155	108931	40385	2528124
18	2.9	2159	111090	75490	2603614
19	2.9	1751	112841	61224	2664838
20	2.9	1421	114262	49685	2714523
21	2.9	679	114941	23741	2738264
22	2.9	1104	116045	38601	2776865
23	2.9	1138	117183	39790	2816655
24	2.9	628	117811	21958	2838613
25	2.9	576	118387	20140	2858753
26	2.9	339	118726	11853	2870606

TABLE II cont'd

Date	Percent Trapped (from dye test)	Number Caught	Accumulated Total	Estimate of Daily Population	Accumulated Population
May 27	1.5	796	119522	51688	2922294
28	1.5	543	120065	35260	2957554
29	1.5	467	120532	30325	2987879
30	1.5	968	121500	62857	3050736
31	1.5	885	122385	57468	3108204
Jun 1	1.5	870	123255	56494	3164698
2	1.5	726	123981	47143	3211841
to end		3441	127422	223442	3435283

TABLE III : Weight of River Chinook Fry and Rearing Fry

Date	River Fry		Pen 1-4 Fry		Pen 5-8 Fry		Pen 9-13 Fry		Pen 1-13 Fry	
	gram/fry	fry/lb	gram/fry	fry/lb	gram/fry	fry/lb	gram/fry	fry/lb	gram/fry	fry/lb
Apr 11	.53	857								
18	.62	732	.488	930					.488	930
25	.49	926	.492	921	.559	811	.642	706	.564	805
May 2	.51	890	.640	708	.523	867	.562	807	.575	790
9	.57	796	.598	759	.571	795	.600	757	.590	769
12			.598	759	.571	795	.600	757	.590	769
18			.619	733	.533	853	.535	848	.562	808
19	.61	744								
24			.586	744	.598	759	.577	786	.587	773
25	.48	946								
30	.52	873	.602	754	.593	766	.594	764	.596	762
Jun 8	.57	796	.568	799	.680	667	.692	656	.647	702
11			.679	669	.807	563	.708	641	.731	621
14			.837	543	.813	559	.806	565	.819	554
18			.917	496	.965	471	.972	463	.951	477
21			.985	463	1.000	454	1.105	411	1.030	441
26			1.233	369	1.230	370	1.296	351	1.253	362
29			1.433	317	1.462	312	1.397	325	1.431	317
Jul 3			1.348	337	1.461	312	1.439	316	1.416	321
9			1.905	238	1.950	232	2.075	219	1.977	230

TABLE IV : Average Lengths & Weights of Coho & Sockeye Smolts

Species	Age	Average Weight	Average Length
Coho		14.04 g.	104.3 mm
Sockeye	1+	6.67 g.	87.3 mm
Sockeye	2+	16.78 g.	117.8 mm

TABLE V : Feeding Schedule Changes for Rearing Chinook Fry

Date	Size of Fish Food	Number of Feedings/Day
Apr 11	1/32"	3
17	1/32"	5
26	1/32"	7
Jun 15	3/64"	7
Jul 6	1/16"	4

WEIGHT OF FRY (GRAM / FRY)

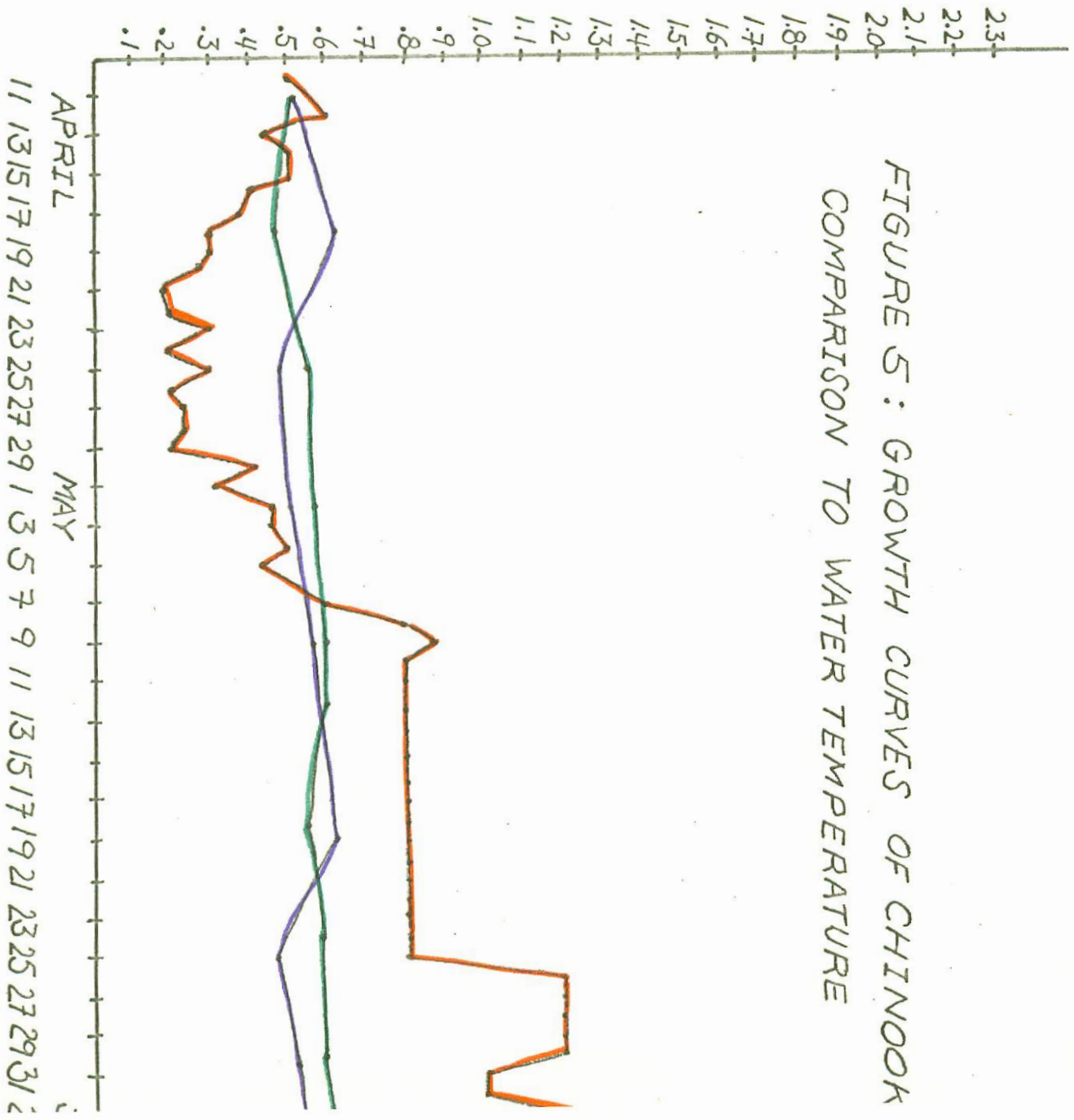


FIGURE 5 : GROWTH CURVES OF CHINOOK
COMPARISON TO WATER TEMPERATURE

TABLE VI : Number Chinook Fry Tagged and Number Released With Tags

Date	Number Tagged	Number Died	Number Released	Percent Tag Retention	Number Released With Tags
Ju1 5	3271	15	3256	97.5	3175
6	3923	3	3920	95.0	3724
7	1675	0	1675	96.5	1616
8	6249	3	6246	99.5	6215
9	4165	6	4159	100.0	4159
10	5244	5	5239	100.0	5239
11	5178	5	5173	100.0	5173
12	9299	51	9248	100.0	9248
13	6017	9	6008	99.5	5978
14	5210	2	5208	99.5	5182
15	7010	1	7009	100.0	7009
16	5073	0	5073	99.5	5048
17	6939	18	6921	100.0	6921
TOTALS	69253	118	69135	99.2	68687

Site 1. The pens were moved to Morice Lake during the period May 9-11 by river-boat, about 1 week after the ice had left Morice Lake.

Due to high water levels, it was necessary to use two trapping sites and a variety of trap types and numbers, thus the data is not consistent and caution must be used in interpreting the results for migration timing purposes.

During the rearing period mortality was 14.16% (11,665), but 83.6% (9756) of this mortality was an overnight kill in two pens. When these pens were pulled out of the water the next morning there didn't seem to be much algae or accumulated wastes in the pens, but there may have been an algae bloom in the vicinity. An onsite autopsy showed there was water in the swim bladders of the deceased fry. These combined effects may have caused the kill.

SUMMARY

- 1) 127,422 chinook fry were captured with 116,999 fry surviving the trapping methods for a mortality of 8.2 %.
- 2) Chinook fry migration appeared to have two distinct peaks; a) April 19-May 1 and b) May 14-May 23.
- 3) Sockeye smolts exhibited two distinct migration peaks; a) May 15-May 21 and b) May 27-June 2. Coho smolts did not exhibit a migration pattern as numbers remained low throughout the program.
- 4) A total of 82,381 chinook fry were kept for rearing and CWT. There was a loss of 11,665 fry during rearing for a 14.16% mortality rate.
- 5) A total of 69,253 chinook fry were tagged, with a tag retention of 99.2% and tagging mortality of 0.17%. Thus 68,687 chinook fry can be assumed to be tagged and released.

This program is to be conducted again in the spring of 1981 to complete the original three year commitment.



Darlene Sussbauer

cc Don Anderson
Bob Leamont