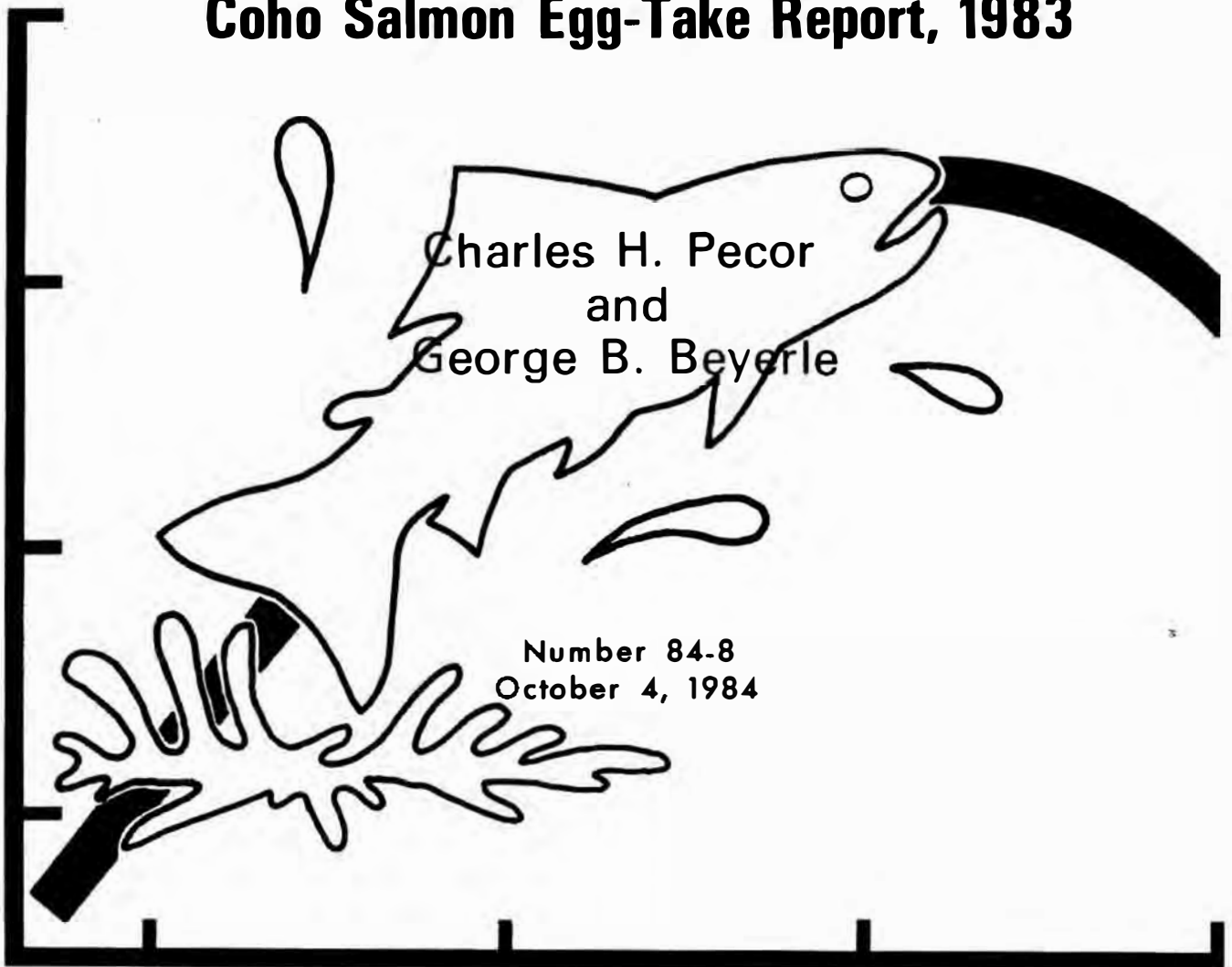


84-8

FISHERIES DIVISION

TECHNICAL REPORT

Platte River Harvest Weir and Coho Salmon Egg-Take Report, 1983



Charles H. Pecor
and
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Michigan Department of
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Introduction

Since 1966, the Platte River in Benzie County, has been the primary source of brood fish for Michigan's coho salmon stocking program. Eggs are collected each fall at the Platte River State Fish Hatchery, located 4 miles east of Honor (Fig. 1). The young coho are raised to the smolt stage (about 5 inches long) in 1.5 years and stocked at selected sites throughout Michigan.

Prior to 1979, annual plants of 400,000 to 600,000 coho smolts in the Platte River produced sufficient adults for egg-take operations plus a spectacular Lake Michigan sport fishery from Frankfort to Platte Bay in August and September. Since 1979, the annual plant has approximated 1,000,000 smolts. Annual returns from the larger plants have ranged from 123,000 to 168,000 adults, or 12.7% to 16.4%.

The Platte River has two salmon blocking weirs. The lower weir is located 1.5 miles upstream from the river mouth (Fig. 1). Since 1980 it has been the primary site for harvesting surplus salmon. Steelhead runs are monitored there also. The upper weir, located at the Platte River Hatchery, has facilities for holding adults and collecting eggs.

Current in-state and out-of-state commitments require the collection of 16,000,000 coho eggs annually. Depending on the size of the returning coho, the egg-take requires about 6,500 - 7,500 adult females (age 1.1). To assure that enough females are available for egg-take, the Fisheries Division has directed that 30,000 first-run salmon at the lower weir be passed upstream (allowed to swim through the open weir). An additional 3,000 salmon are passed each week to maintain a sport fishery in the river. However, the above numbers may be modified by the biologist-in-charge as conditions dictate.

Other salmon blocked by the lower weir (including surplus coho adults, a moderate run of chinook and, in recent years, a few pink salmon) are collected and harvested. Coho jacks (age 1.0) are small enough to swim upstream through the weir grates. Trout that are collected during harvest operations are counted and released upstream. This includes a moderate run of steelhead plus small runs of brown trout and lake trout. All salmon collected at the upper weir are harvested, including the coho used for egg-take.

Lower Weir Operation, 1983

The 1983 salmon run in the lower Platte River was typical. The salmon produced an excellent open-water fishery in the Frankfort-Platte Bay areas for over 3 weeks. The fish ran the river when expected and also in numbers expected. Unfortunately, the fish that were passed upstream at the lower weir swam up to the hatchery in just a few days. Consequently, anglers frequently complained that there were "no" fish in the river or connecting lakes.

The lower harvest weir was in place and ready for operation on September 6. The weir was manned 24 hours per day from September 9 to October 24. Very few salmon appeared at the weir until September 14. However, by September 17, the major run was in the river. Harvesting began September 16 and ended October 24. Thirty-two semi-truck loads of salmon were shipped out.

From September 10 to October 20, a total of 37,239 salmonids (salmon plus trout) were allowed to swim upstream through the open weir (Table 1). The species composition of these fish is assumed to be the same as that of fish actually handled during each week of harvesting. Additional trout were sorted out and passed around the weir.

Coho salmon

A total of 120,758 adult coho weighing 827,717 pounds were harvested (Table 2). About two-thirds of the harvest occurred during the week beginning September 18. Mean weight of the harvested fish was 6.8 pounds. An estimated 35,600 additional adult coho were passed upstream (Table 1).

At approximately weekly intervals biological samples of 100 or more randomly selected coho were sexed, measured, and weighed. Analyses of these data showed that the size of adult male coho increased significantly from 26.6 inches and 6.7 pounds in mid-September, to 27.3 inches and 7.3 pounds in late September, to 27.9 inches and 7.5 pounds in early October (Table 3). Size of adult female coho also increased, from 26.0 inches and 6.4 pounds in mid-September to 26.7 inches and 7.2 pounds in October. The weighted mean lengths and weights were: males, 26.9 inches and 6.88 pounds; females, 26.4 inches and 6.86 pounds. For both sexes combined, mean length was 26.6 inches and mean weight was 6.9 pounds.

In summary, a total of 156,358 adult coho salmon reached the Platte River lower weir in 1983, 67,377 (43.1%) males and 88,981 (59.9%) females (Table 3). The total adult run was 15.6% of the 1982 plant of 1,000,010 age 1.0 smolts (Table 4).

Chinook salmon

As usual, most of the chinook run came after the peak of the coho run and was not nearly so concentrated. The main part of the run occurred from September 27 through October 12. A total of 4,839 chinook (jacks and adults combined) weighing 71,250 pounds were harvested (Table 5). Mean weight was 14.7 pounds. Because no scale samples were taken, the chinook could not be enumerated by age groups. It was estimated that 1,275 chinook were passed upstream at the lower weir (Table 1).

The total of 6,114 chinook reaching the lower weir in 1983 was the largest run since full-scale operation of the weir began in 1980 (Table 6). All chinook were either strays from other plants, escapees from the Platte River Hatchery, or the result of natural reproduction. Chinook have not been stocked in the Platte River since 1972.

Pink salmon

The first pink salmon (two fish) were harvested at the lower weir in 1981. In 1983, over 35 pink salmon were harvested and a few others were observed above and below the lower weir.

Steelhead

The 1983 steelhead run peaked during the weeks beginning September 24 and October 3, after the major run of coho was over. This pattern has been consistent since 1980, although the dates have varied from year to year. The run was the largest since full-scale operations began in 1980. A total of 1,545 fish were counted and passed upstream in 1983 (Table 7), compared with 1,276 in 1982, 682 in 1981, and 124 in 1980. In addition, an estimated 353 steelhead passed through the weir (Table 7), making a total run of 1,898 steelhead in 1983. They averaged 7.5 pounds and consisted of 53.5% males and 46.5% females.

No scale samples were taken from steelhead, so age and growth data could not be determined. However, the length frequency distribution by sex (Fig. 2) showed two groups of steelhead in the run, fish which had probably spent just 1 year in Lake Michigan (mode of 18 inches, almost exclusively males) and fish which had spent 2 or more years in the lake (mode of 26-27 inches, almost equal numbers of males and females).

Brown trout and lake trout

Brown trout and lake trout are only minor components of the salmonid run in the Platte River (Table 7). A total of 58 brown trout were passed upstream in 1983 as compared to 38 in 1982, 78 in 1981, and 7 in 1980. Lake trout first appeared in the 1982 run (38 passed). Only 7 were passed in 1983.

Upper Weir Operation, 1983

Coho salmon

Weir stop-logs were in place by September 1 and the fish holding-egg taking facility was fully operational by September 6. The first coho (2 adults and 15-20 jacks) reached the holding ponds by September 2. The main run began September 16 and all six holding ponds were full by September 27. Additional fish were held in the river below the weir.

The fish in the holding ponds were checked for egg condition (degree of ripeness) on October 5 and October 10. The percentage of ripe females was 12.5% on October 5 and 46.5% on October 10. A total of 16,062,700 eggs were collected and fertilized on 14 working days between October 13 and November 1. Of these eggs, 8,578,500 (53%) were for in-state rearing and 7,484,200 (47%) were for out-of-state commitments (i.e., Indiana, 0.5 million; Wisconsin, 1.2 million; Illinois, 2.0 million; Pennsylvania, 2.5 million, and Ohio, 1.2 million).

The 1983 egg-take was carried out as a routine operation with no problems encountered. The fish matured when expected and egg quality was good. A total of 6,961 female coho salmon were stripped to collect the 16 million eggs, for an average of 2,307 eggs per female (Table 8). A check of the fecundity of 25 individual fish at the end of the run showed an average of 3,204 eggs per female with a range of 2,489 to 4,289. The eye-up rate for coho eggs incubated at the Platte River Hatchery was a relatively high

77.1% with a daily (6 days) range from 73.1% to 87.7%. Coho eye-up rates in recent years were 63.0% in 1979, 82.2% in 1980, 71.4% in 1981, and 55.9% in 1982.

The egg-take and harvest operations at the upper weir accounted for 33,421 coho, including 6,553 (19.6%) jacks and 26,868 (80.4%) adults (Table 8). The number of adults harvested at the upper weir was 75.47% of the estimated total of adults passed at the lower weir. Assuming that the number of jack coho harvested at the upper weir (6,553) was also 75.47% of the total number of jacks that passed the lower weir, the total 1983 jack run was estimated to be 8,683 fish. This is 0.9% of the total coho smolt plant in 1983 and 5.3% of the total estimated run of 165,041 coho in the Platte River in 1983.

Mean length and weight of jacks, calculated from periodic biological samples, were 16.4 inches and 1.6 pounds, respectively (Table 9). The mean weight of jacks, calculated from the harvest data, was the same, 1.6 pounds (Table 10).

Two jacks out of 177 (1.1%) taken for biological samples had an adipose clip. The Great Lakes Fisheries Commission has no record of an adipose clip being approved for coho smolts planted in 1983 (Margaret Ross, personal communication).

Chinook salmon

Almost two-thirds of the chinooks at the upper weir were harvested during the first 10 days of November (Table 11). The total harvest of 296 fish was only 23.2% of the estimated number of chinook passed at the lower weir.

Summary

The 1983 run of coho salmon in the Platte River consisted of 156,358 adults (43.1% males and 56.9% females) and 8,683 jacks. This is a return rate of 16.5% on the smolts planted in 1982. Mean lengths and weights were 26.9 inches and 6.9 pounds for adult males, 26.4 inches and 6.8 pounds for adult females, and 16.4 inches and 1.6 pounds for jacks.

A grand total of 154,175 coho adults and jacks weighing 1,004,225 pounds were harvested. A total of 147,626 adult coho (94.4% of the total run) were harvested, 120,758 at the lower weir and 26,868 at the upper weir. The upper weir harvest included 6,961 stripped female coho weighing 37,868 pounds from which the 1983 complement of 16,062,700 eggs was taken. The total weight of 140,665 coho adults harvested in the round was 955,892 pounds, 827,717 pounds at the lower weir and 128,175 pounds at the upper weir. Jack coho (6,553 fish, or 7.5% of the total jack run, weighing 10,465 pounds) were harvested only at the upper weir.

The 1983 run of 6,114 chinook was the largest ever recorded at the Platte River lower weir. Ultimately, 5,135 of these chinook (84.0%) were harvested, 4,839 at the lower weir and 296 at the upper weir. Total weight of the harvested chinook was 74,496 pounds of which 71,250 pounds were taken at the lower weir and 3,246 pounds were taken at the upper weir.

Other salmonids reaching the lower weir in 1983 included 1,898 steelhead (the largest run ever recorded), 58 brown trout, 7 lake trout, and about 35 pink salmon.

Recommendations for 1984

To maintain uniformity throughout the statewide harvest weir system, all length and weight measurements in harvest weir reports should be in the English system.

Reporting of fish harvested and passed should be done on a daily and calendar week basis, as in the 1983 report.

Platte River Lower Weir

Daily record of fish processed

For each anadromous species, record the daily, weekly, and cumulative number and weight of fish harvested and number of fish passed.

Weekly biological sampling

For coho, each week measure, weigh, and sex every adult coho (about 135 fish) in one randomly selected box (tote).

For chinook, as soon as possible during the chinook run, scale sample 50 males and 50 females covering the size range from 28 inches to the largest available. Fish in good, bright condition facilitate scale taking and reading. In addition, each week of the run measure and weigh 100 (or two totes) randomly selected chinook (all sizes, including jacks).

For steelhead, each week of the run measure, weigh, and scale sample 50 randomly selected fish (mortalities can be used as part of the weekly samples).

No biological data need be collected from brown trout, lake trout, or pink salmon.

Platte River Upper Weir

Daily record of fish processed

For each species of salmon, record the daily, weekly, and cumulative number and weight of fish harvested. The harvest of coho jacks should be recorded separately. During the coho egg-take, record the daily number and weight of stripped females and number of eggs taken.

Weekly biological sampling

For coho jacks only, each week measure and weigh 50 randomly selected fish.

No other biological sampling need be done at the upper weir.

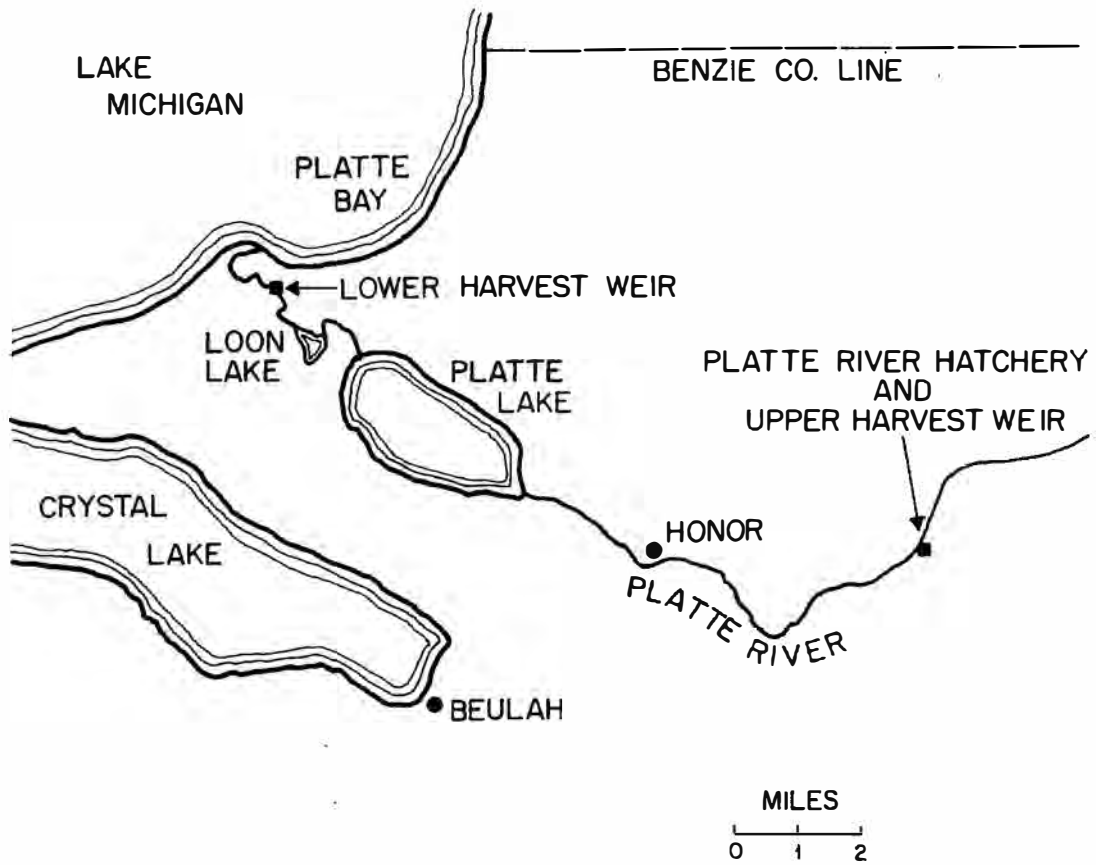


Figure 1. Location of the Platte River Hatchery and the upper and lower harvest weirs.

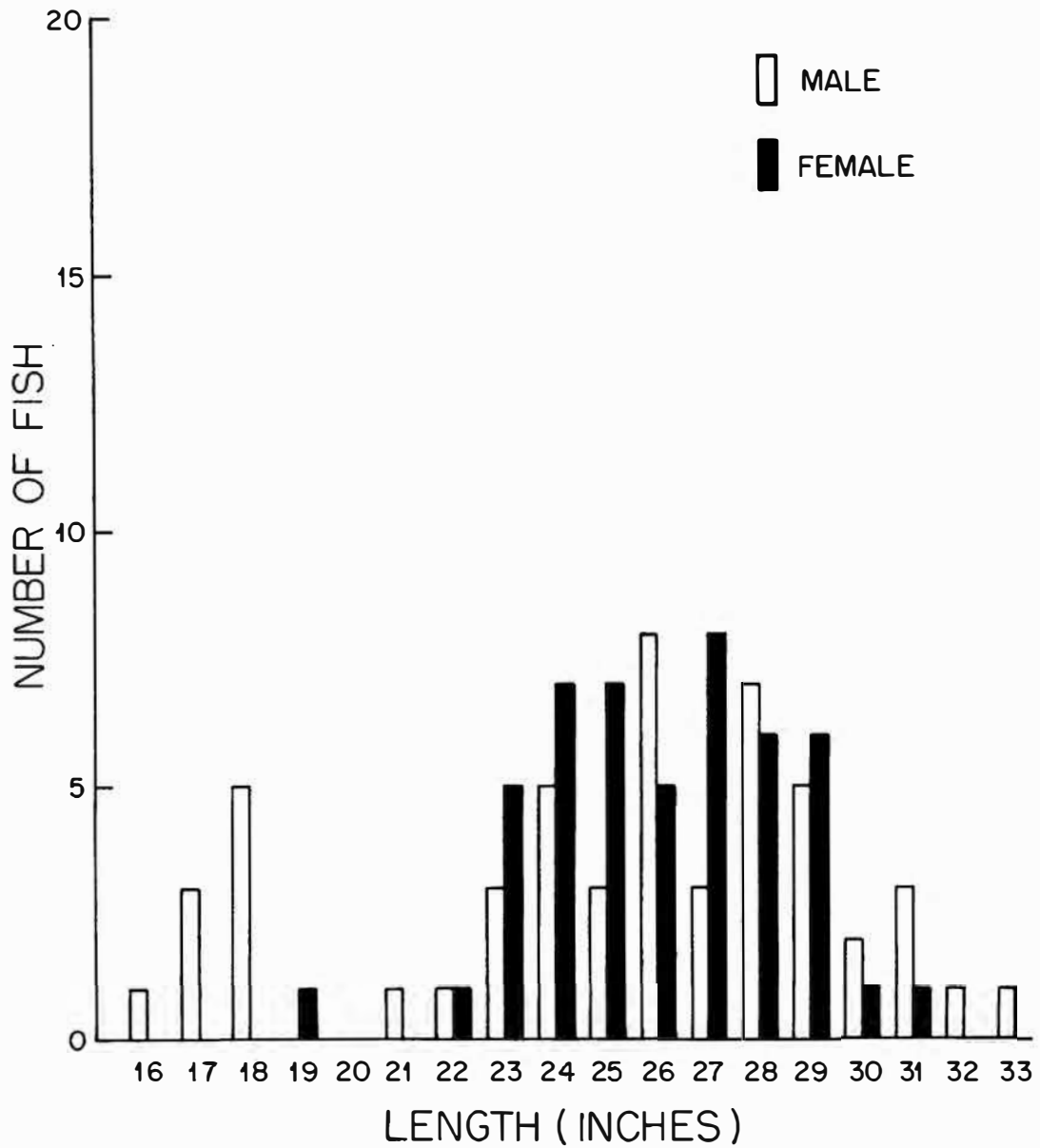


Figure 2. Length-frequency by sex of 100 steelhead from Platte River lower weir, October 4, 1983.

Table 1. Total salmonids, and estimated coho and chinook salmon, passed upstream at the Platte River lower weir, 1983.

Date	Sal- monids passed	Coho		Chinook	
		Percent ¹ in harvest	Estimated number passed	Percent ¹ in harvest	Estimated number passed
9/10	4				
Weekly total	4	100.00	4	0.0	0
9/11	5				
9/12	35				
9/13	267				
9/14	3,819				
9/15	880				
9/16	550				
9/17	15,000				
Weekly total	20,546	98.24	20,185	1.66	341
9/19	5,000				
9/21	1,000				
9/22	2,000				
9/23	2,000				
Weekly total	10,000	99.35	9,935	0.32	32
9/25	2,000				
9/27	500				
9/29	500				
10/1	1,200				
Weekly total	4,200	94.54	3,971	3.67	154
10/4	1,000				
10/8	1,000				
Weekly total	2,000	68.48	1,370	24.24	485
10/9	157				
Weekly total	157	27.16	43	59.42	93
10/17	135				
10/18	98				
10/19	57				
10/20	42				
Weekly total	332	37.85	92	50.95	170
Annual total	37,239	95.60	35,600	3.42	1,275

¹Percentage of the harvested or handled salmonids which were either coho or chinook.

Table 2. Summary of adult coho salmon harvested at Platte River lower weir, 1983.

Date	Coho harvested			Total weight (pounds)
	Live	Mortalities	Cumulative total	
9/16	5,130	0	5,130	33,345
9/17	4,995	0	10,125	32,467
Weekly totals	10,125	0		65,812
9/18	4,050	0	14,175	26,325
9/19	9,450	123	23,748	65,479
9/20	14,580	0	38,328	99,725
9/21	24,470	0	62,798	167,373
9/22	12,690	208	75,696	88,224
9/23	9,990	0	85,686	68,331
9/24	4,860	0	90,546	33,241
Weekly totals	80,090	331		548,698
9/25	9,450	0	99,996	64,639
9/26	4,455	0	104,451	30,472
9/27	2,632	70	107,153	19,319
9/29	4,455	0	111,608	31,852
10/1	2,970	335	114,913	23,629
Weekly totals	23,962	405		169,911
10/4	3,780	0	118,693	27,972
10/7	457	525	119,675	7,266
Weekly totals	4,237	525		35,238
10/12	210	370	120,255	4,242
10/14	270	0	120,525	1,997
Weekly totals	480	370		6,239
10/17	205	15	120,745	1,729
Weekly totals	205	15		1,729
10/24	13	0	120,758	90
Weekly totals	13	0		90
Annual total	119,112	1,646	120,758	827,717

Table 3. Estimated number of adult male and female coho salmon processed and their mean length (inches) and weight (pounds), based on weekly biological samples at the Platte River lower weir, 1983.

Week beginning	Number of coho			Mean	
	Harvested	Passed	Total	Length	Weight
<u>Age 1.1, male</u>					
9/11	3,756	7,490	11,246	26.6	6.69
9/18	34,501	4,262	38,763	26.8	6.72
9/25	11,452	1,866	13,318	27.3	7.33
10/2	2,624	755	3,379	27.9	7.51
10/9	468	24	492	27.9 ¹	7.51 ¹
10/16	121	51	172	27.9 ¹	7.51 ¹
10/23	7	0	7	27.9 ¹	7.51 ¹
Total	52,929	14,448	67,377		
Weighted means				26.9	6.88
<u>Age 1.1, female</u>					
9/11	6,369	12,699	19,068	26.0	6.41
9/18	45,920	5,673	51,593	26.5	6.93
9/25	12,915	2,105	15,020	26.5	7.00
10/2	2,138	615	2,753	26.7	7.22
10/9	382	19	401	26.7 ¹	7.22 ¹
10/16	99	41	140	26.7 ¹	7.22 ¹
10/23	6	0	6	26.7 ¹	7.22 ¹
Total	67,829	21,152	88,981		
Weighted means				26.4	6.84
Sexes combined	120,758	35,600	156,358	26.6	6.86

¹Assumed to be the same as samples taken week of October 2.

Table 4. Summary of adult coho salmon runs at the Platte River lower weir, 1980 through 1983.

Year	Adult coho (age 1.1)			Yearling plant in previous year	Percent return
	Estimated number passed ¹	Number harvested	Total run		
1980	76,480 ²	46,633	123,113	973,032	12.7
1981	38,874	129,175	168,049	1,028,038	16.3
1982	38,951	90,412	129,363	944,205	13.7
1983	35,600	120,758	156,358	1,000,010	15.6

¹95.60% of total salmon pass upstream.

²Fish not counted. Estimated from harvest at upper weir.

Table 5. Summary of adult chinook salmon (jacks and adults combined) harvested at Platte River lower weir, 1983.

Date	Chinook harvested			Total weight (pounds)
	Live	Mortalities	Cumulative total	
9/16	91	0	91	1,184
9/17	80	0	171	1,040
Weekly totals	171	0		
9/18	48	0	219	624
9/19	58	0	277	906
9/20	10	0	287	157
9/21	86	0	373	1,358
9/22	53	0	426	838
Weekly totals	255	0		
9/25	84	0	510	1,327
9/26	82	0	592	1,294
9/27	174	0	766	2,262
9/29	240	0	1,006	3,119
10/1	350	0	1,356	4,549
Weekly totals	930	0		
10/4	600	0	1,956	9,061
10/7	900	30	2,886	14,043
Weekly totals	1,500	30		
10/12	975	0	3,861	14,722
10/14	75	0	3,936	1,131
Weekly totals	1,050	0		
10/17	375	8	4,319	5,783
Weekly totals	375	8		
10/24	470	50	4,839	7,853
Weekly totals	470	50		
Annual total	4,751	88	4,839	71,253

Table 6. Summary of chinook salmon runs (jacks and adults combined) at the Platte River lower weir, 1980 through 1983.

Year	Estimated number passed ¹	Number harvested	Total run
1980	2,736 ²	1,699	4,435
1981	1,391	2,172	3,563
1982	1,393	1,606	2,999
1983	1,275	4,839	6,114

¹3.42% of total salmon passed.

²Fish not counted; estimated from harvest at upper weir.

Table 7. Number of trout passed upstream at the Platte River lower weir, 1983.

Date	Steelhead		Brown trout		Lake trout
	Handled	Swam up	Handled	Swam up	Handled
9/16	6		1		
9/17	3		0		
Weekly total	9	18	1	2	0
9/18	10		0		
9/19	9		0		
9/20	23		3		1
9/21	76		6		
9/22	64		5		
9/23	45		7		
9/24	16		2		
Weekly total	243	30	23	3	1
9/25	74		3		
9/26	82		3		
9/27	87		1		
9/29	57		3		
10/1	142		2		
Weekly total	442	73	12	2	0
10/4	286		3		
10/7	157		3		1
Weekly total	443	143	6	2	1
10/11	145		3		1
10/14	86		1		1
Weekly total	231	21	4	0	2
10/17	147		2		2
10/20	4		0		1
Weekly total	151	68	2	1	3
10/24	26		0		
Weekly total	26	0	0	0	0
Annual total	1,545	353	48	10	7

Table 8. Number of coho salmon harvested at the Platte River upper weir, 1983.

Date	Jacks	Adults			Mortalities
		Males	Females		
			Round	Stripped	
10/13	1,359	833	694	450	0
10/14	809	1,110	694	509	84
Weekly total	2,168	1,943	1,388	959	84
10/17	708	1,202	740	660	93
10/18	600	770	590	571	0
10/19	600	1,110	555	670	45
10/20	686	925	370	620	0
10/21	209	275	90	220	102
Weekly total	2,803	4,282	2,345	2,741	240
10/24	413	648	92	612	86
10/25	163	431	93	473	28
10/26	140	400	60	430	0
10/27	126	740	40	520	180
10/28	90	463	93	546	96
Weekly total	932	2,682	378	2,581	390
10/31	146	465	0	515	75
11/1	360	2,117	1,713	125	20
Weekly total	506	2,582	1,713	640	95
11/10	113	508	532	40	70
Weekly total	113	508	532	40	70
11/29	31	324	351	0	0
Weekly total	31	324	351	0	0
Annual total	6,553	12,321	6,707	6,961	879

Table 9. Mean lengths (inches) and weights (pounds) of jack coho salmon, from biological samples taken at the Platte River upper weir, 1983.

Week beginning	Total fish harvested	Mean	
		Length	Weight
10/9	2,168	15.7	1.61
10/16	2,803	16.9	1.61
10/23	932	16.9	1.61
10/30	506	15.8	1.44
11/6	113	15.8 ¹	1.44 ¹
11/27	31	15.8 ¹	1.44 ¹
Total	6,553		
Weighted mean		16.4	1.59

¹Assumed to be the same as samples taken week of October 30

Table 10. Pounds of coho salmon harvested at the Platte River upper weir, 1983.

Date	Adults				Mortalities
	Jacks	Males	Females		
			Round	Stripped	
10/13	2,186	5,439	4,365	2,489	0
10/14	1,303	7,249	4,365	2,815	538
Weekly total	3,490	12,688	8,730	5,304	538
10/17	1,140	7,853	4,654	3,651	595
10/18	966	4,936	3,840	3,089	0
10/19	966	7,114	3,613	3,624	293
10/20	1,105	5,928	2,410	3,353	0
10/21	335	1,764	586	1,190	659
Weekly total	4,512	27,595	15,103	14,907	1,547
10/24	666	4,153	604	3,333	556
10/25	262	2,762	604	2,560	181
10/26	225	2,564	390	2,326	0
10/27	203	4,742	260	2,813	1,153
10/28	146	2,967	604	2,954	622
Weekly total	1,502	17,188	2,462	13,986	2,512
10/31	236	2,976	0	2,780	481
11/1	518	13,655	11,049	675	130
Weekly total	754	16,631	11,049	3,455	611
11/10	163	3,276	3,430	216	452
Weekly total	163	3,276	3,430	216	452
11/29	44	2,090	2,273	0	0
Weekly total	44	2,090	2,273	0	0
Annual total	10,465	79,468	43,047	37,868	5,660
Mean weight	1.60	6.45	6.42	5.44	6.44

Table 11. Number and weight (pounds) of chinook salmon (adults and jacks combined) harvested at the Platte River upper weir, 1983.

Date	Males		Females		Mortalities	
	Number	Weight	Number	Weight	Number	Weight
10/13	1	7.9	1	11.9	0	
10/14	2	9.5	2	18.5	0	
Weekly total	3	17.4	3	30.4	0	0
10/17	2	9.0	1	14.3	0	
10/18	4	19.0	0		0	
10/20	3	18.1	0		0	
10/21	1	4.0	0		0	
Weekly total	10	50.1	1	14.3	0	0
10/24	10	72.1	2	30.0	0	
10/25	15	149.0	1	13.0	2	20.9
10/26	5	26.0	0		0	
10/27	8	52.0	0		0	
10/28	21	214.1	5	82.9	0	
Weekly total	59	513.2	8	125.9	2	20.9
10/31	11	76.1	3	45.0	0	
11/1	94	943.6	34	548.9	0	
Weekly total	105	1,019.7	37	593.9	0	0
11/10	34	339.5	25	405.6	0	
Weekly total	34	339.5	25	405.6	0	0
11/29	4	39.9	5	75.0	0	
Weekly total	4	39.9	5	75.0	0	0
Annual total	215	1,979.8	79	1,245.1	2	20.9