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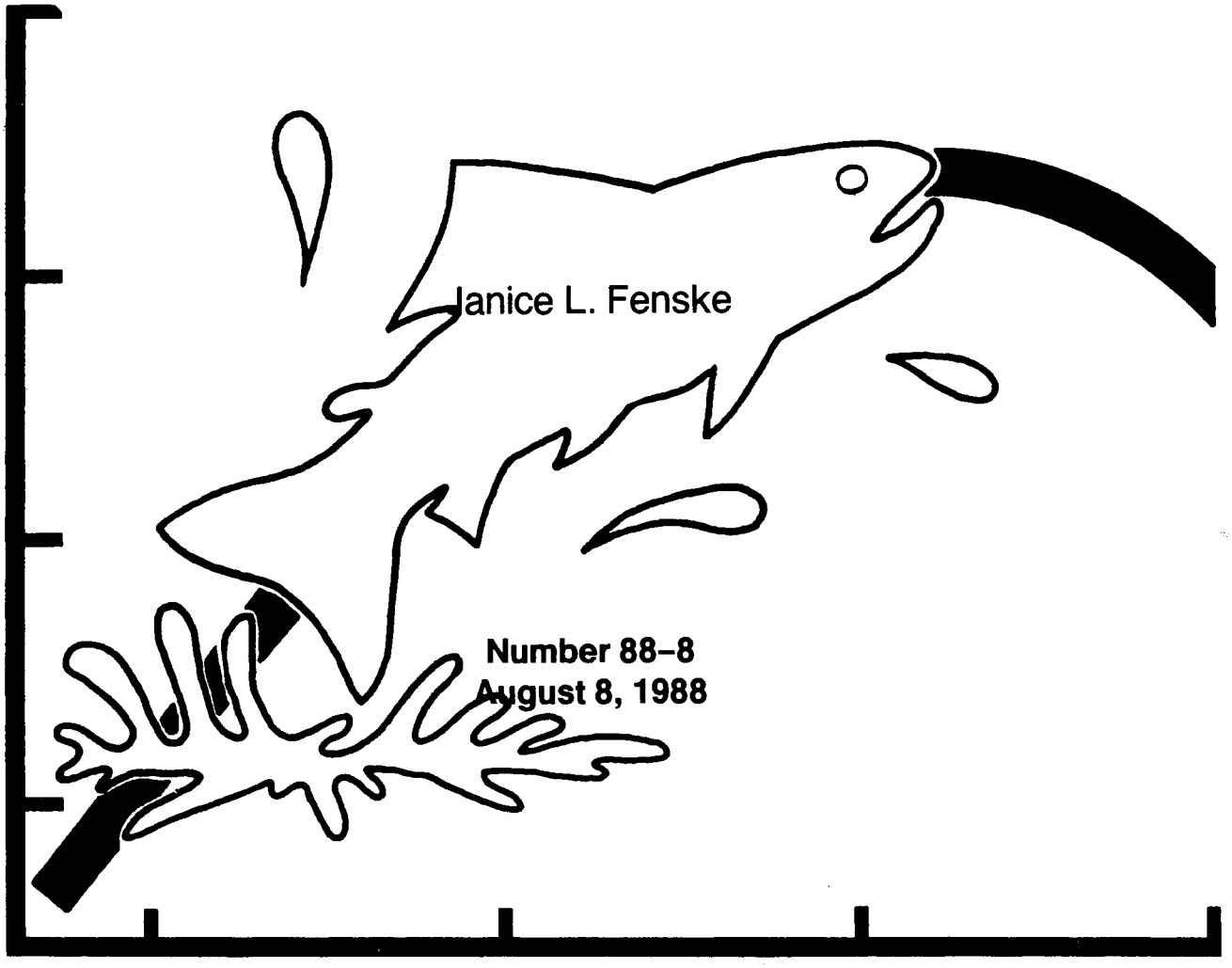
FISHERIES DIVISION

TECHNICAL REPORT

Medusa Creek Harvest Weir Report, 1987



Janice L. Fenske

Number 88-8
August 8, 1988

Michigan Department of
Natural Resources

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INTRODUCTION

Chinook salmon were stocked in the northern end of Lake Michigan (Antrim, Charlevoix, and Emmet counties) in the early phase of the salmon program, 1970 to 1976; however, no more chinook were added until 1983, when the Jordan River (Antrim County) was planted. It was subsequently decided that large numbers of Pacific salmon were undesirable in this river and the planting location was moved to Medusa Creek (Charlevoix County) beginning in 1984. An average of 337,526 spring fingerling chinook have been planted annually in Medusa Creek for the past 4 years (Table 1).

Medusa Creek is a small, man-made stream that is a tributary to northern Lake Michigan in Charlevoix County. It's flow is due to the operation of one to three pumps used to drain the limestone quarries of the Medusa Cement Company. This stream was chosen because (1) it was located in a good area for a salmon lake fishery and (2) because large numbers of returning surplus salmon could be controlled due to its small size and private ownership. All of the salmon that run Medusa Creek in the fall are harvested by and sold to a private contractor. An agreement exists between the private contractor and Medusa Cement Company for the use of the harvest site.

The location of the salmon blocking weir and harvest operation is approximately 150 feet upstream of the creek mouth. The harvest site was constructed in the fall of 1986 by a private contractor. A permanent harvest pond was dug adjacent to the creek, with an inlet at the upstream end to divert a portion of the creek flow through the pond and a fish ladder at the downstream end to allow passage of salmon into the pond (Figure 1). During fall harvest operations, a temporary wood rack weir is installed in the creek to prevent the salmon from migrating further upstream and to force them into the harvest pond.

Salmon harvest operations on Medusa Creek began in 1986. Few salmon returned in 1986, as would be expected since stocking at this location only began in 1984. An estimated 1,500 chinook salmon weighing 14,676 pounds were harvested during the period October 3 to November 7, 1986 (M. Shouder, unpublished data, Michigan Department of Natural Resources, Newberry).

HARVEST WEIR OPERATIONS, 1987

The harvest pond was filled and the blocking weir was installed during the second week of September. The harvest operation was completed on November 10, resulting in a total harvest season of 62 days. The salmon were harvested by Tempotech Industries personnel and all salmon were sold to this contractor. Fisheries Division personnel were on-site during harvest operations to monitor the harvest and collect biological data.

The first major run of chinook salmon occurred during the third week of September and the first harvest took place on September 21. The last date of harvest was November 10, for a total of 50 days of harvest operations. There were two peaks in the number of salmon harvested. The first and largest peak occurred during the week of September 28 and the second, somewhat small peak, occurred during the week of October 12 (Table 2). The total number of chinook salmon harvested was estimated at 11,230 with an estimated round weight of 131,132 pounds (Table 3).

Biological samples were taken during weeks 1, 2, 3, and 7 of the harvest operation. Each sample was randomly selected and consisted of 150 to 300 chinook. Data collected included length, weight, sex, number of lamprey scars, and fin clips. No scale samples were taken for age analysis because the reabsorption of scales on spawning chinook makes analysis from such scales inaccurate. Ages were assigned to the chinook sample based on a length-age key (Table 4). This table was derived from data collected during a sport fishery creel census at several sites on Lake Michigan from September through November 1987. (Insufficient creel census data were collected in 1987 from sites in Antrim, Charlevoix, and Emmet counties for use in assigning ages.) When assigning ages to fish in the biological samples from the weir there were some cases when inch groups represented by more than one age resulted in fractions of a fish. When this occurred, the fractions were assigned to an age group based on weight.

The chinook harvest was composed of fish from ages 0.1 to 0.5, with 13.0% age 0.1, 9.5% age 0.2, 37.3% age 0.3, 37.4% age 0.4, and 2.8% age 0.5 (Table 5). Based on the four biological samples, the run was composed of 24.6% females and 75.4% males (Table 5). Mean lengths and weights for the sexes combined were as follows: age 0.1, 22.7 inches and 4.2 pounds; age 0.2, 27.0 inches and 6.7 pounds; age 0.3, 33.5 inches and 11.7 pounds; age 0.4, 36.0 inches and 15.0 pounds; and age 0.5, 38.0 inches and 18.6 pounds (Table 6, Figure 2).

Chinook salmon have only been stocked in Medusa Creek since 1984, so no total return rate can be derived for any year class. Comparison of the percent of a year class returning to the Medusa Creek weir at each age to similar data for the Little Manistee River weir (Hay 1988) indicate that total year class return rates for chinook stocked in Medusa Creek may be low. The percent return for age-0.1 fish at the Little Manistee River weir has ranged from 0.4% to 1.9% (4 years). The percent of the 1986 plant returning to the Medusa Creek weir in 1987 was 0.5% (Table 7), which falls within the range reported at the Little Manistee weir. However, age-0.2 and age-0.3 fish returning to Medusa Creek in 1987 were only 0.4% and 0.8% of their year classes, respectively. These percentages are much below those reported at the Little Manistee weir, which ranged from 3.1% to 3.5% for age 0.2 and 1.7% to 3.2% for age 0.3 fish. These relatively low returns do not necessarily represent poor survival of the 1984 and 1985 plants in Medusa Creek. Many of the nearby rivers, including the Jordan and Boyne rivers, had larger runs of chinook salmon in 1987 than in previous years due, no doubt, to

straying from the Medusa plants. This was already recognized as a potential problem after the 1986 harvest season and, in 1987, the spring fingerlings planted in Medusa Creek were held in the harvest pond for about 2 weeks in an attempt to better imprint the fish to this stream.

No fish were stocked in Medusa Creek in 1983, but chinook were stocked in the Jordan River that year (Table 1) and it is believed that the age-0.4 fish harvested at the Medusa weir in 1987 represent straying from this plant. The percent of the 1983 plant in the Jordan River returning to the Medusa weir in 1987 as age-0.4 fish was 1.3%, which is very similar to the range of 1.1% to 1.2% reported for the Little Manistee weir. There was also a large run of chinook in the Jordan River in 1987 and, although these fish were not sampled, some of them would have been age 0.4 which suggests very good survival of the 1983 plant. There were also some age-0.5 chinook taken at the Medusa Creek weir in 1987. Since no chinook were stocked in any nearby streams in 1982, these fish were either assigned to the wrong age group, were produced naturally in nearby streams, or strayed from plants at more distant streams.

Lamprey scarring rates were very low for the chinook salmon. Only 0.5% of the fish sampled had fresh lamprey scars and 0.9% had healed lamprey scars. Two fin-clipped chinook were sampled. These fish were both age-0.2 females. One was 26.5 inches and 6.0 pounds with a right ventral (RV) clip, and the second was 29.0 inches and 7.0 pounds with a right pectoral (RP) clip. The origin of these fish could not be positively determined, but the RP clip did match chinook planted in 1985 at Chicago, Illinois. No species of fish other than chinook salmon entered Medusa Creek during harvest operations, however, one dead pink salmon was found on the beach at the mouth of the creek.

SUMMARY

Harvest operations took place at the Medusa Creek weir in 1987 from September 21 to November 10, a total of 50 days. An estimated 11,230 chinook salmon weighing 131,132 pounds were harvested during this period. The run consisted of 24.6% females and 75.4% males. The age composition of the run was 13.0% age 0.1 (0.5% of the 1986 plant), 9.5% age 0.2 (0.4% of the 1985 plant), 37.3% age 0.3 (0.8% of the 1984 plant), 37.4% age 0.4, and 2.8% age 0.5. Mean lengths and weights for the combined sexes were 22.7 inches and 4.2 pounds for age 0.1, 27.0 inches and 6.7 pounds for age 0.2, 33.5 inches and 11.7 pounds for age 0.3, 36.0 inches and 15.0 pounds for age 0.4, and 38.0 inches and 18.6 pounds for age 0.5.

RECOMMENDATIONS FOR 1988

It is recommended that the practice of holding the spring fingerlings in the harvest pond for a few weeks to better imprint the salmon be continued in order to attain better return rates. In addition, biological samples should be collected on a weekly basis during the entire harvest season. Finally, stream banks upstream of the harvest operation should be stabilized to retard the accumulation of sediment in the bottom of the harvest pond, the presence of which makes operation of the crowding gate difficult.

ACKNOWLEDGMENTS

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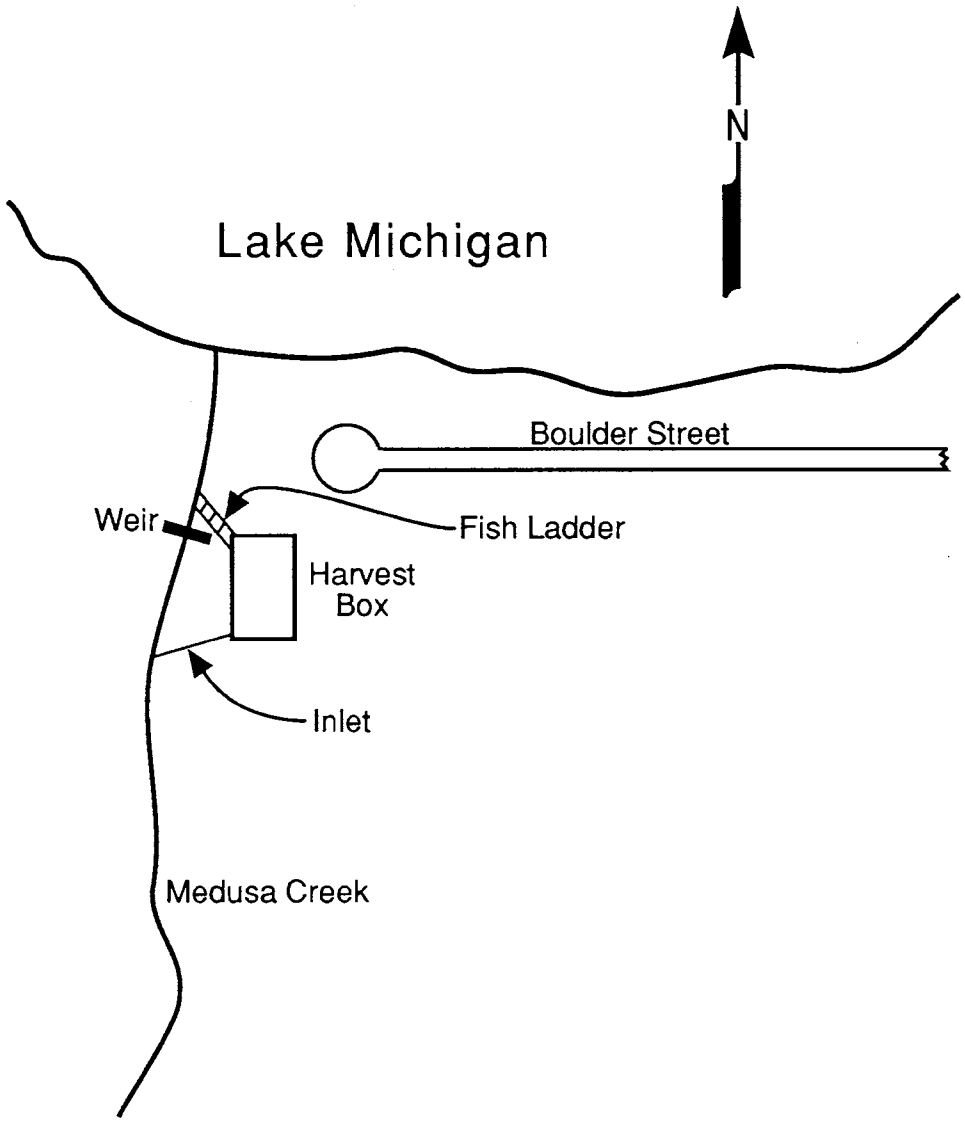

Figure 1. Location and schematic diagram of the Medusa Creek weir complex.

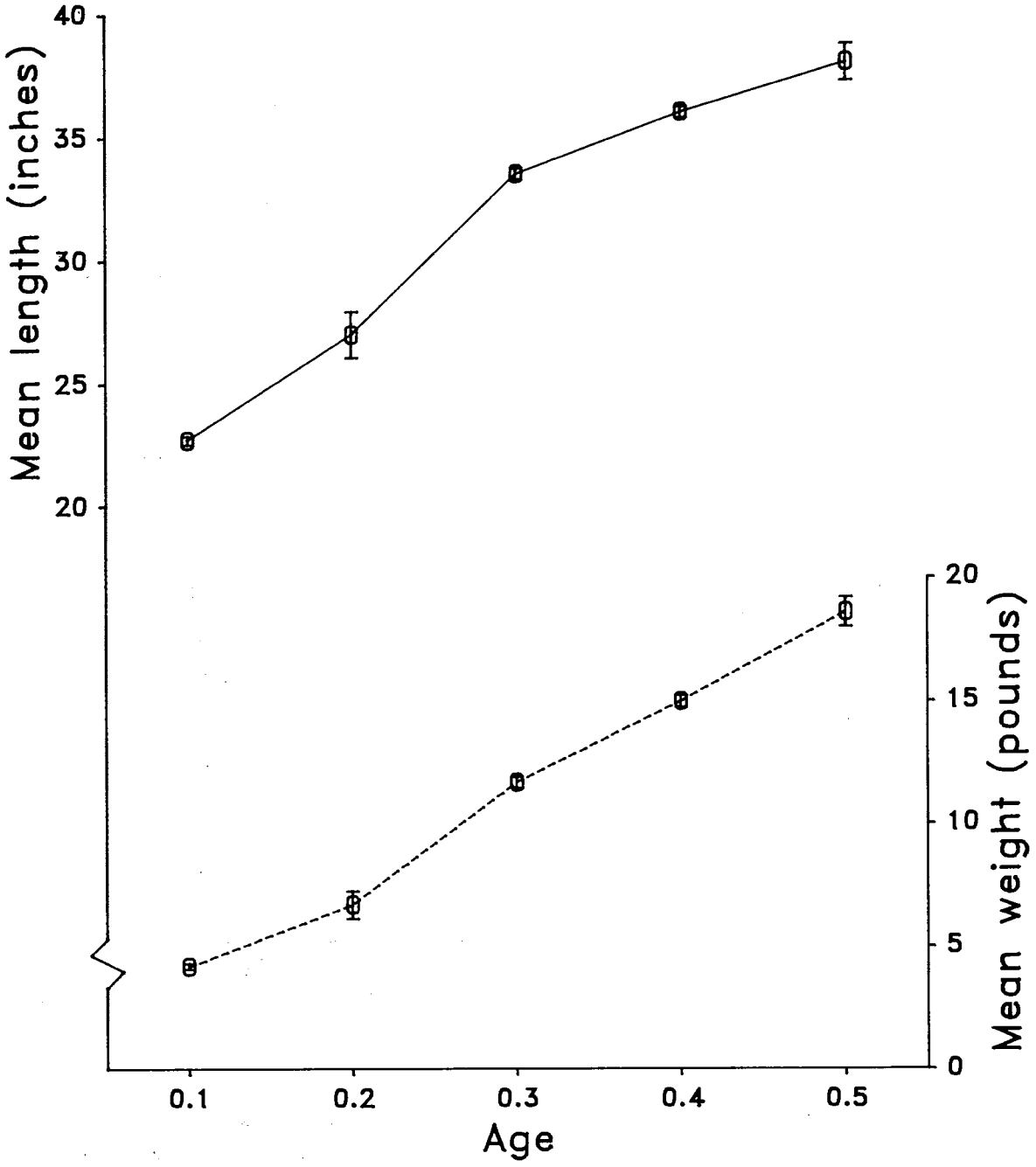

Figure 2. Mean total length (inches) and round weight (pounds), by age, of chinook salmon harvested at the Medusa Creek weir, fall 1987. Vertical bars represent two standard errors.

Table 1. Number of spring fingerling chinook salmon planted in Medusa Creek, Charlevoix County, 1984–87.

Planting year	Number planted
1984	500,108
1985	243,820
1986	299,975
1987	306,200
Total	1,350,103

Table 2. Number, by week, of chinook salmon harvested at the Medusa Creek weir, fall 1987.

Week	Week beginning	Number harvested
1	09/21	950
2	09/28	4,336
3	10/05	978
4	10/12	2,958
5	10/19	696
6	10/26	555
7	11/02	609
8	11/09	148
Total		11,230

Table 3. Number, by age, of chinook salmon harvested at the Medusa Creek weir, fall 1987. Weight (pounds) is in parentheses and was estimated using seasonal means.

	Age					
Year	0.1	0.2	0.3	0.4	0.5	Total
1987	1,460 (6,132)	1,067 (7,149)	4,189 (49,011)	4,200 (63,000)	314 (5,840)	11,230 (131,132)

Table 4. Length-age distribution (in percent by inch group) for chinook salmon scale sampled during the creel census at Pentwater, Ludington, Manistee, Frankfort, Leland, Grand Traverse Bay, Manistee Lake, Big Manistee River, Betsie River, and Platte River, September-November, 1987[1].

Length (inches)	Age				
	0.1	0.2	0.3	0.4	0.5
13	—	—	—	—	—
14	—	—	—	—	—
15	—	—	—	—	—
16	—	—	—	—	—
17	—	—	—	—	—
18	—	—	—	—	—
19	—	—	—	—	—
20	100	—	—	—	—
21	100	—	—	—	—
22	100	—	—	—	—
23	100	—	—	—	—
24	25	75	—	—	—
25	—	100	—	—	—
26	—	100	—	—	—
27	—	100	—	—	—
28	—	100	—	—	—
29	—	50	50	—	—
30	—	50	50	—	—
31	—	15	85	—	—
32	—	—	85	15	—
33	—	—	60	40	—
34	—	—	60	40	—
35	—	—	30	70	—
36	—	—	10	80	10
37	—	—	—	85	15
38	—	—	—	80	20
39	—	—	—	75	25
40+	—	—	—	—	100

[1]Table developed by District 6 personnel at the Harietta warehouse.

Table 5. Number and weight, by age and sex, of chinook salmon harvested at the Medusa Creek weir, fall 1987.

Week beginning	Male		Female		Total	
	Number	Pounds	Number	Pounds	Number	Pounds
Age 0.1						
09/21	162	638	—	—	162	638
09/28	643	2,670	—	—	643	2,670
10/05	73	342	—	—	73	342
11/02	12	50	—	—	12	50
Total	890	3,700	—	—	890	3,700
(Percent)	(13.0)	(4.6)	—	—	(13.0)	(4.6)
Age 0.2						
09/21	86	541	10	75	96	616
09/28	364	2,436	56	434	420	2,870
10/05	93	608	7	67	100	675
11/02	32	184	8	74	40	258
Total	575	3,769	81	650	656	4,419
(Percent)	(8.4)	(4.7)	(1.2)	(0.8)	(9.5)	(5.5)
Age 0.3						
09/21	162	1,817	130	1,620	292	3,437
09/28	1,147	12,981	643	7,982	1,790	20,963
10/05	226	2,486	100	1,197	326	3,683
11/02	77	845	81	986	158	1,831
Total	1,612	18,129	954	11,785	2,566	29,914
(Percent)	(23.5)	(22.6)	(13.9)	(14.7)	(37.3)	(37.3)
Age 0.4						
09/21	289	4,230	95	1,506	384	5,736
09/28	1,147	17,233	252	3,766	1,399	20,999
10/05	233	3,532	206	3,077	439	6,609
11/02	254	3,800	93	1,460	347	5,260
Total	1,923	28,795	646	9,809	2,569	38,604
(Percent)	(28.0)	(35.9)	(9.4)	(12.2)	(37.4)	(48.1)
Age 0.5						
09/21	16	315	—	—	16	315
09/28	84	1,540	—	—	84	1,540
10/05	40	743	—	—	40	743
11/02	44	818	8	152	52	970
Total	184	3,416	8	152	192	3,568
(Percent)	(2.7)	(4.3)	(0.1)	(0.2)	(2.8)	(4.4)

Table 6. Mean total length (inches) and weight (pounds), by age and sex, of chinook salmon harvested at the Medusa Creek weir, fall 1987. Two standard errors in parentheses.

Week beginning	Measurement	Age 0.1 Male	Age 0.1 Female	Age 0.2 Male	Age 0.2 Female	Age 0.3 Male	Age 0.3 Female
09/21	Length	22.5	—	26.2	28.5	33.4	33.6
		(0.259)	—	(0.933)	(2.082)	(0.492)	(0.428)
	Weight	3.9	—	6.3	7.5	11.2	12.5
		(0.167)	—	(0.545)	(2.082)	(0.363)	(0.375)
09/28	Length	22.8	—	26.8	30.8	33.5	33.9
		(0.257)	—	(1.448)	(1.500)	(0.407)	(0.456)
	Weight	4.2	—	6.7	7.8	11.3	12.4
		(0.183)	—	(0.951)	(2.500)	(0.325)	(0.615)
10/05	Length	22.5	—	26.1	30.0	32.8	32.4
		(0.579)	—	(1,143)	—	(0.619)	(0.639)
	Weight	4.7	—	6.5	9.5	11.0	12.0
		(0.310)	—	(0.722)	—	(0.373)	(0.693)
11/02	Length	23.3	—	25.9	30.5	32.8	33.1
		(1.453)	—	(1.130)	(1.000)	(0.515)	(0.497)
	Weight	4.2	—	5.8	9.3	11.0	12.2
		(0.333)	—	(0.535)	(0.500)	(0.346)	(0.460)
Weighted seasonal mean	Length	22.7	—	26.5	30.4	33.3	33.6
		(0.192)	—	(0.925)	(1.143)	(0.299)	(0.314)
	Weight	4.2	—	6.6	8.0	11.2	12.4
		(0.134)	—	(0.605)	(1.873)	(0.235)	(0.416)
Sexes combined	Length	22.7		27.0		33.5	
		(0.192)		(0.934)		(0.223)	
	Weight	4.2		6.7		11.7	
		(0.134)		(0.568)		(0.231)	

Table 6. Continued:

Week beginning	Measurement	Age			
		0.4		0.5	
		Male	Female	Male	Female
09/21	Length	36.1	35.3	39.1	—
		(0.347)	(0.412)	(0.970)	—
	Weight	14.6	15.9	19.7	—
		(0.366)	(0.427)	(1.166)	—
09/28	Length	36.6	35.3	38.3	—
		(0.397)	(0.816)	(1.667)	—
	Weight	15.0	14.9	18.3	—
		(0.496)	(0.841)	(1.202)	—
10/05	Length	35.8	34.3	37.7	—
		(0.492)	(0.414)	(0.760)	—
	Weight	15.2	14.9	18.6	—
		(0.557)	(0.465)	(1.276)	—
11/02	Length	35.7	34.8	37.5	36.5
		(0.414)	(0.489)	(0.625)	(1.000)
	Weight	15.0	15.7	18.6	19.0
		(0.484)	(0.670)	(0.711)	—
Weighted seasonal mean	Length	36.3	34.9	38.0	36.5
		(0.247)	(0.345)	(0.777)	(0.866)
	Weight	15.0	15.2	18.6	19.0
		(0.306)	(0.364)	(0.620)	—
Sexes combined	Length	36.0		38.0	
		(0.219)		(0.746)	
	Weight	15.0		18.6	
		(0.245)		(0.594)	

Table 7. Numbers, and in parentheses percent, by age, of chinook salmon in various year classes returning to Medusa Creek weir 1 to 5 years after stocking.

Year class	Number stocked	Age 0.1	0.2	0.3	0.4	0.5	Total
1983	315,495[1]	—	—	—	4,200	—	4,200
		—	—	—	(1.3)	—	(1.3)
1984	500,108	—	—	4,189	—	—	4,189
		—	—	(0.8)	—	—	(0.8)
1985	243,820	—	1,067	—	—	—	1,067
		—	(0.4)	—	—	—	(0.4)
1986	299,975	1,460	—	—	—	—	1,460
		(0.5)	—	—	—	—	(0.5)

[1]Stocked in the Jordan River.

LITERATURE CITED

Hay, R. L. 1988. Little Manistee River harvest weir and chinook salmon egg-take report, 1986. Michigan Department of Natural Resources, Fisheries Technical Report 88–3, Ann Arbor.

Report approved by W. C. Latta

Typed by G. M. Zurek