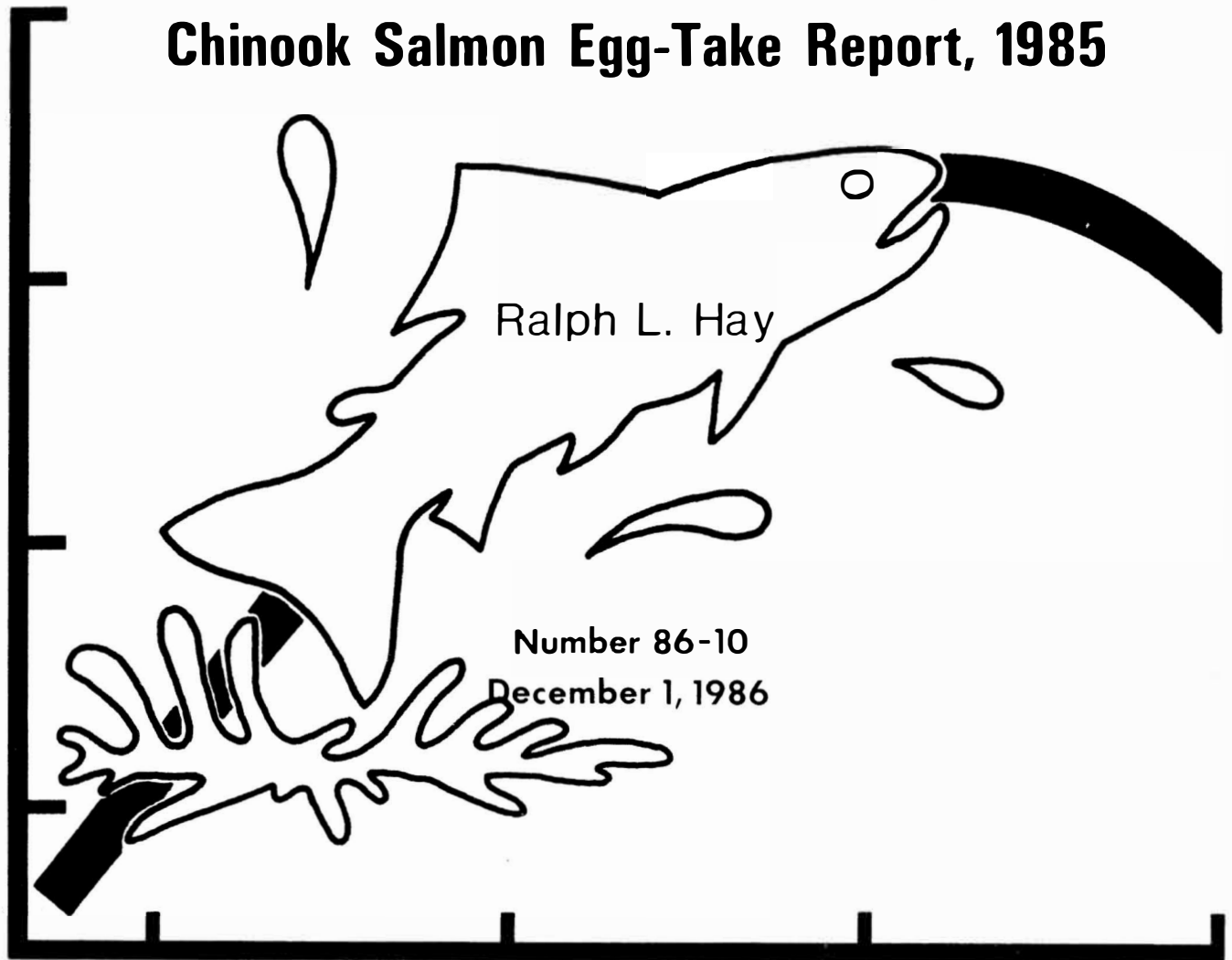


FISHERIES DIVISION

TECHNICAL REPORT

Little Manistee River Harvest Weir and Chinook Salmon Egg-Take Report, 1985



Michigan Department of
Natural Resources

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FISHERIES DIVISION**

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**LITTLE MANISTEE RIVER HARVEST WEIR
AND CHINOOK SALMON EGG-TAKE REPORT, 1985**

Ralph L. Hay

INTRODUCTION

As part of the Michigan Department of Natural Resources salmon management program for Lake Michigan, the Little Manistee River has been planted annually since 1967 with both coho and chinook salmon (Table 1). Construction of a blocking weir, fish ladder, holding ponds, and harvest facility on the river, about 5 miles upstream from Manistee Lake, Manistee County, began in 1967 and was completed in 1968 (Fig. 1). All chinook and coho salmon reaching the weir are harvested and sold to a commercial contractor. Normally, all other salmonids are passed upstream. The few salmon that enter the river when the weir is not in operation provide a limited stream fishery. The Little Manistee weir is Michigan's primary source for chinook eggs for in-state and out-of-state hatchery rearing and serves as a back-up (to the Platte River upper weir) for coho eggs. The facility is also used to monitor fall steelhead runs and each spring provides the majority of steelhead eggs for in-state hatchery rearing. Biological data have been collected on chinook and other anadromous salmonids since 1968.

From 1968 through 1978 chinook fingerlings were stocked in the Little Manistee River at an average rate of about 322,000 per year (Table 1). Beginning in 1979, the planting rate was increased by over 85% to an average of nearly 605,000 fingerlings. Substantial runs of returning adults have been produced but run size has not been closely related to stocking rate. The number of chinook actually harvested at the weir has varied between 11,136 (in 1977) and 39,359 (in 1983) (Table 2).

Chinook return to the weir at either age 0.1 (jacks), age 0.2, age 0.3, age 0.4, or age 0.5—but most commonly at age 0.2.¹ For the 1967, 1968, and 1981 year classes and plants, return rates were 0.4 to 1.9% at age 0.1, 3.4 to 3.5% at age 0.2, and 1.7 to 3.1% at age 0.3 (Table 3). For the 1981 year class there was a return rate of 1.2% at age 0.4. Comparable estimates cannot be made for the 1969–80 plants because the age composition of the run has not been monitored consistently; however, for jacks alone returns have averaged 0.7%.

The return rate of chinook salmon to the weir was high initially (1960's), declined (1970's), then increased (1980's). Return rates by chinook of all ages were approximately 8.5% for the 1967 plant, 7.2% for the 1968 plant, and 6.8% for the 1981 plant (Table 3). Returns from plants in the 1970's must have been lower because relatively low numbers came back to the weir in 1976–77 and 1980–82 (Table 2). Large runs, averaging 35,332 fish per year,

¹In aging anadromous fish, the number preceding the decimal denotes age at smolting (0 for most chinook, 1 for most coho) and the number following the decimal represents the number of annuli formed in the Great Lakes (mostly 1, 2, 3, 4, or 5 for chinook and 0 or 1 for coho). Note: a very recent study of scale samples from the Lake Michigan fishery indicates some chinook live to age 0.4 and 0.5. This finding suggests that some spawning chinook absorb one or two annuli from their scales while in the rivers and that the aging data given in preceding reports may be underestimates.

occurred from 1983 through 1985. These originated from average plants of about 591,000 smolts in 1978–84—an average return rate of about 6% per plant. The return rates represent only the weir harvest and do not include the angler harvest, which has increased since the 1960's. In 1985, the sport catch from all stocks of chinook salmon in Michigan waters of Lake Michigan was 511,000 fish (G. Rakoczy, personal communication).

Growth rate of chinook has fluctuated considerably (Table 4, Fig. 2). Average weight has varied from 3.0 to 9.5 pounds for age 0.1, from 9.5 to 20.9 pounds for age 0.2, and from 13.4 to 29.2 pounds for age 0.3. The fluctuations were especially large during the 1970's. Overall, age-0.1 chinook salmon decreased in size from 5.9 pounds (1960's) to an average of 4.3 pounds (early 1980's), a 27% reduction. A similar but less dramatic reduction in size can be seen for older fish. Average size declined further in 1985 but this is due, in part, to better aging techniques.

Annual plants of yearling coho salmon in the Little Manistee River have varied widely, from 91,000 in 1971 to 700,000 in 1969 (Table 1). Annual runs of coho to the weir have varied from 2,314 (in 1972) to 108,400 (in 1970) (Table 5). The return rate of jacks (age 1.0) has been relatively low, 0.1% to 0.7%, compared to adults (age 1.1), 3.0% to 15.0% (Table 3, Fig. 3). The total return rate is usually between 11 and 15%, however it declined to 8.5% for the 1983 plant and to only 3.1% for the 1984 plant. The return of the 1984 plant to the Platte River was low also (Pecor 1986). Possible reasons for the poor returns were discussed by Pecor. As with chinook, these return rates represent only the weir harvest and do not include the angler harvest, which has also fluctuated annually. In 1985, anglers harvested about 112,000 coho salmon from all stocks in Michigan waters of Lake Michigan (G. Rakoczy, personal communication).

The average size of coho jacks (age 1.0) has increased slightly since 1974 (Fig. 4, Table 6). However, the size of adult coho decreased from 8.7 pounds in 1968 to less than 5.0 pounds in 1979, then stabilized at about 6.4 pounds. Like the chinook, there has been a decrease in average size of adult coho from the 1960's to the early 1980's, but in the last several years the average has been fairly constant. It is assumed that the annual variations in size are primarily related to a combination of predator density and forage density in Lake Michigan.

The Little Manistee River is one of the top quality steelhead streams in Michigan. The fishery is supported almost entirely by natural reproduction. However, a plant of 100,188 fall fingerlings was made in 1974, and from 1981 through 1983 annual plants were made in conjunction with a research project on steelhead production (Table 1). In 1984 a small planting of three strains of summer steelhead yearlings was made to extend the steelhead fishery. The strains (Siletz, Rogue, and Umpqua River) were imported from the State of Oregon. The number of steelhead returning to the weir each fall has not been consistent, ranging from 320 in 1978 to 7,622 in 1971 (Table 7). Mean weight of steelhead (all age groups) has varied from 6.5

pounds in 1973 to 9.3 pounds in 1972 (Table 7). The estimated catch of steelhead from all Michigan waters of Lake Michigan was 47,000 in 1985 (G. Rakoczy, personal communication). Indications are that the open water catch will increase significantly in future years.

Small runs of anadromous brown trout occur in the Little Manistee River. The largest run, 238, was in 1975 (Table 8). Average size has ranged from 3.4 pounds (1974) to 6.8 pounds (1979). Runs have been increasing in recent years. In 1985, the estimated catch from Michigan waters of Lake Michigan was 49,000 brown trout (G. Rakoczy, personal communication).

Atlantic salmon yearlings were first planted in the Little Manistee River in 1977 (Table 1). Subsequent plants have been made in an attempt to establish this new species. Until 1984 only an occasional fish had been captured. Of the several strains and hybrids planted only the Sebago strain (from Maine) shows promise.

A few pink salmon have been harvested in the last few years. Numbers harvested are generally less than 25.

HARVEST WEIR OPERATIONS, 1985

On August 19, 1985, the weir grates were installed, blocking all anadromous fish. On August 30, the ponds were filled and the fish ladder was activated. Harvest began on the same day. The weir remained operational until November 8, at which time the grates were removed and the building was winterized. The weir was in operation for 83 days. All harvested chinook and coho salmon were sold on contract to Tempotech Industries, Hart, Michigan.

Chinook salmon

Harvest of chinook salmon began August 30 and ended November 8, a period of 71 days. Fish that were not ripe were harvested because, in other years, holding early-run chinook in maturation ponds resulted in high mortality. Two peak harvests occurred, the first during early September and the second near mid-October (Table 9, Fig. 5). A relatively small, but significant run of chinook entered the facility in late August and early September. A second, major run began in mid-September and peaked in mid-October. A total of 34,006 chinook were harvested in 1985, the third best harvest since 1968 (Table 2). The calculated total weight of all chinook, in the round, was 442,153 pounds.

For several weeks during the run, biological data were obtained from a randomly selected sample of 600 chinook to provide information on age composition and growth. To overcome the problem of aging river fish with reabsorbed scales, chinook salmon length frequencies were converted to age frequencies by means of a length-age frequency table (Table 10). Data for this table was obtained from scale samples and length measurements collected from Lake Michigan fish during a creel census at several sites from August to November 1985. In

applying the table to those length groups in which two or more age groups are represented, the lighter fish were assigned to the younger age group and the heavier fish to the older age group. The estimated total harvest consisted of 2,005 (5.9%) age-0.1 jacks weighing 9,085 pounds, 6,326 (18.6%) age-0.2 adults weighing 60,310 pounds, 19,437 (57.2%) age-0.3 adults weighing 261,045 pounds, 5,990 (17.6%) age-0.4 adults weighing 106,246 pounds, and 248 (0.7%) age-0.5 adults weighing 5,467 pounds (Table 9). The 1985 run of jacks represented 0.2% of the fingerlings stocked in 1984. The returning age-0.2 adults were 0.9% of the 1983 plant, age-0.3 adults were 3.2% of the 1982 plant, age-0.4 adults were 1.2% of the 1981 plant, and age-0.5 adults were less than 0.1% of the 1980 plant.

Females constituted about 47% of the total run — 25.2% of age 0.2, 55.7% of age 0.3, and 62.1% of age 0.4. No age-0.1 or age-0.5 females were collected (Table 9). Mean lengths and weights of males and females combined were: age 0.1, 22.7 inches and 4.5 pounds; age 0.2, 30.8 inches and 9.5 pounds; age 0.3, 34.4 inches and 13.4 pounds; age 0.4, 37.3 inches and 17.7 pounds; and age 0.5, 41.1 inches and 22.0 pounds (Table 11). Growth was nearly linear on a weight basis (Fig. 6). Females were slightly larger than males at each age.

The 1985 chinook egg-take operation began September 24 and ended November 1. During the 39-day period 20 million eggs were collected of which 12 million were for in-state rearing and 8 million were for out-of-state commitments (Table 12). A total of 4,708 female chinook (ages 0.2, 0.3 and 0.4) were stripped, excluding those which yielded low-quality eggs or were otherwise unsatisfactory. Assuming that about 7,000 females were handled to provide the 20 million eggs, a total run of 14,000 chinook (7,000/50% females) should provide sufficient eggs for current in-state and out-of-state requirements.

Egg-take operations began when the proportion of ripe females approached 40%. The "wet" method of egg fertilization was again used in 1985. Eggs were collected in a plastic pan and several milliliters of sperm were added. River water was quickly added, the mixture was stirred for several seconds and then allowed to stand for several minutes. The fertilized eggs were rinsed and allowed to water harden in milk cans (with flowing water) prior to transportation. Two additional methods of egg fertilization were tested on small lots, the "dry" and "dry-dry" methods. The "dry" method involved mixing eggs (from several females) with sperm in a 5-gallon plastic pail without water and letting the mixture stand for 30 minutes before water-hardening. The "dry-dry" method was similar to the "dry" method except that the egg-sperm mixture (without water) was transported to the hatchery and water-hardened in the incubator trays. The "dry" method produced slightly better eye-up than the other two methods (C. Pecor, personal communication). Overall, percent eye-up was normal for chinook salmon with a range of 72.3% (September 24) to 85.6% (October 4) (Table 12).

During egg-take operation, maximum river water temperature was 56°F (September 24) and minimum water temperature was 41°F (November 1) (Fig. 7). During the major part of the egg-take river water temperatures remained below 50°F.

Fecundity data were not collected in 1985.

No fin clips were found on 600 randomly examined chinook salmon.

Only 0.5% of the chinook sampled had a lamprey wound (Table 13). This was an increase over previous years, but still considerably below scarring rates in the 1960's and early 1970's.

Coho salmon

In 1985 the coho harvest coincided with the chinook harvest (August 30 through November 8, a total of 71 days). The peak harvest occurred during the week September 15-21, and since coho were not held for egg-take, the harvest dates roughly coincide with migration of coho into the river (Fig. 8). Like the chinook, the coho runs had decreased significantly by late October.

A total of 15,256 coho were harvested. The total weight calculated from biological samples was 96,798 pounds (Table 5). This was the smallest harvest and rate of return since 1974.

The age composition of the harvested coho was 79 (0.5%) age-1.0 jacks weighing 126 pounds and 15,177 (99.5%) age-1.1 adults weighing 96,672 pounds (Table 14). The returning age-1.0 jacks were 0.02% of the 1985 plant and the age-1.1 adults were 3.0% of the 1984 plant.

All age-1.0 and 42.5% of the age-1.1 coho were males. The total run consisted of 57.2% females. Mean lengths and weights were: age-1.0 males, 15.7 inches and 1.6 pounds; age-1.1 males, 26.2 inches and 6.4 pounds; age-1.1 females, 25.7 inches and 6.4 pounds; and age-1.1 sexes combined, 25.9 inches and 6.4 pounds (Table 15). Adult males and females were of equal weight.

Only 0.2% of the coho had lamprey wounds (Table 13). This rate was up slightly from recent years, but significantly less than the 1960's.

No coho eggs were taken at the Little Manistee weir in 1984.

A total of 595 adult coho were randomly checked for fin clips. Of these fish, 13 (2.2%) had adipose (Ad) fin clips. These fish were planted in 1984 by the Michigan Department of Natural Resources into Lake Superior at the Dead River (150,000Y), Sucker River (50,000Y), and Munising Bay (25,000Y).

Steelhead trout

Fall steelhead began entering the river in late August and the run peaked the first week of October (Fig. 9). Approximately 35% of the total run occurred during this 1 week period. As in most previous years, all steelhead were passed above the weir.

The 1985 run of 6,356 fish was a significant increase from last year (1,909) and was the best run since 1971 (Table 7). Sixty-five percent (65%) of the returning adults were age 2.1 or 2.2 (Table 16). These two age groups also represented 66% of the total estimated weight of 47,192 pounds. Mean lengths and weights for nine different age groups are given in Table 17 and Figure 10. Size of returning adults is more dependent upon years spent in Lake Michigan than on age at smolting.

A total of 322 steelhead were randomly checked for fin clips. Ten (3.1%) had fin clips. Observed fin clips were: adipose (Ad, 1 fish), dorsal-adipose (DAd, 7 fish), both ventrals (BV, 1 fish), and dorsal-adipose-left-ventral (DAdLV, 1 fish). The DAd fish (7) were planted in the Little Manistee River in 1983 and the BV fish (1) was planted in Lake Michigan by Wisconsin. Origins of the other 2 fish could not be decided because fin clips, age (from scales), and planting records did not coincide.

An intensive study of steelhead and their reproduction in the Little Manistee River is being concluded by Paul Seelbach, Institute for Fisheries Research, Ann Arbor, Michigan.

Brown trout

The anadromous brown trout run peaked in late September and lingered into November (Fig. 11). All but 15 brown trout were passed above the weir.

The 1985 run of 177 fish was the largest run since 1975 and the second largest since 1968 (Table 8). About 72% of the returning adults were age 1.1 or 1.2 (Table 18). These two age groups represented 74% of the total estimated weight of 1,085 pounds. Mean lengths and weights for the five represented age groups are given in Table 19 and Figure 12. Size of returning adults is more dependent upon years spent in Lake Michigan than on age at smolting.

A total of 133 brown trout were randomly checked for fin clips. Only 2 (1.5%) had left pectoral (LP) fin clips. These fish were planted in 1984 by the Michigan Department of Natural Resources into Lake Superior at Marquette Bay (30,000 FF).

Brown trout are not planted in the Little Manistee River. Therefore, it is assumed that these anadromous fish are from wild stock or from hatchery stock planted in Lake Michigan at Manistee.

Atlantic salmon

No Atlantic salmon were collected at the weir in 1985.

Pink salmon

A total of 11 pink salmon were harvested at the weir in 1985. The males (4) averaged 20.4 inches and 2.7 pounds. The females (7) were slightly smaller, averaging 18.2 inches and 2.0 pounds.

SUMMARY

In 1985 the Little Manistee harvest weir was in operation from August 19 through November 8 (83 days). Harvest of chinook and coho salmon and passage of other anadromous salmonids occurred from August 30 through November 8.

The entire salmon run of 34,006 chinook (442,153 pounds) and 15,256 coho (96,798 pounds) was harvested and sold to Tempotech Industries, Hart, Michigan.

The chinook run consisted of 2,005 age-0.1 jacks (0.2% of the 1984 fingerling plant), 6,326 age-0.2 adults (0.9% of the 1983 fingerling plant), 19,437 age-0.3 adults (3.2% of the 1982 fingerling plant), 5,990 age-0.4 adults (1.2% of the 1981 fingerling plant), and 248 age-0.5 adults (less than 0.1% of the 1980 fingerling plant). Mean sizes were: age 0.1, 22.7 inches (4.5 pounds); age 0.2, 30.8 inches (9.5 pounds); age 0.3, 34.4 inches (13.4 pounds); age 0.4, 37.3 inches (17.7 pounds); and age 0.5, 41.1 inches (22.0 pounds). During chinook egg-take operations (September 24 through November 1) 4,708 females (ages 0.2, 0.3, and 0.4) were stripped to obtain 20,382,592 eggs. The percent eye-up ranged from 72.3% (September 24) to 85.6% (October 4). River water temperature remained below 50°F throughout most of the egg-take.

The 1985 coho run was composed of 79 age-1.0 jacks (0.02% of the 1985 yearling plant) and 15,177 age-1.1 adults (3.0% of the 1984 yearling plant). Mean sizes were: age 1.0, 15.7 inches (1.6 pounds); and age 1.1, 25.9 inches (6.4 pounds).

The 1985 fall steelhead run of 6,356 fish, the best run since 1971, included nine different age groups. Nearly two-thirds of the fish were age 2.1 or 2.2.

The fall brown trout run of 177 fish was the largest since 1975. About 72% of the returning adults were age 1.1 or 1.2.

No Atlantic salmon returned to the weir in 1985.

Only 11 pink salmon were harvested. They averaged 19.0 inches and 2.3 pounds.

RECOMMENDATIONS FOR 1986

Use only data from biological samples to calculate weekly weights of chinook and coho salmon harvested. Do not scale sample river-run chinook salmon because their scales are severely eroded and are missing annuli; instead, collect scale samples from Lake Michigan chinook in the fall.

ACKNOWLEDGMENTS

Data collection, tabulation, and scale reading were done by Alfred Allen, Janice Sapak, Simeon Syrewicze, and Steve Lazar. Vernon Bennett and Linda Johnson provided assistance on computer use. Paul Seelbach and James Ryckman provided technical advice. Ludwig Frankenberger and James Schneider reviewed the report.

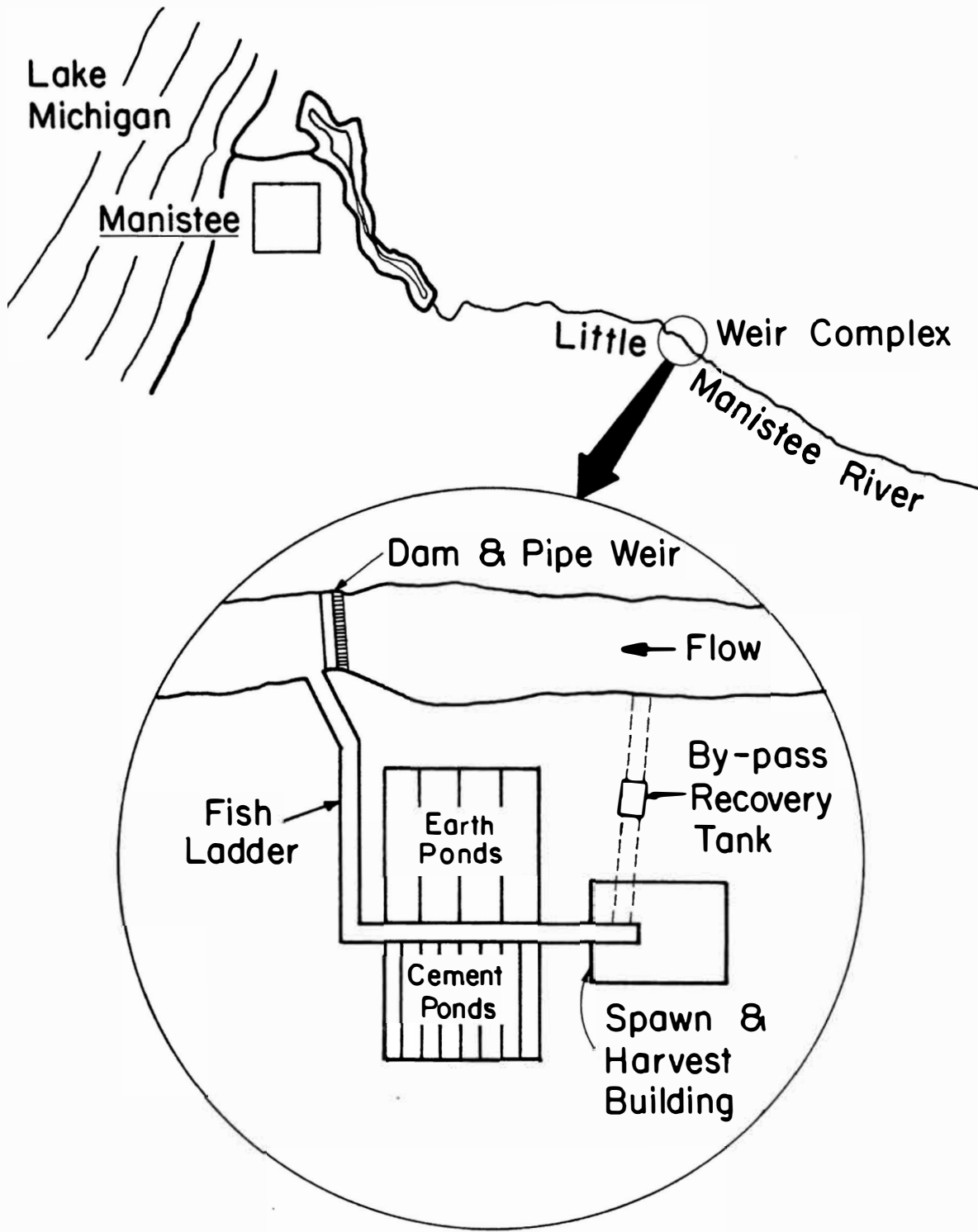


Figure 1. Location and schematic diagram of the Little Manistee River weir complex.

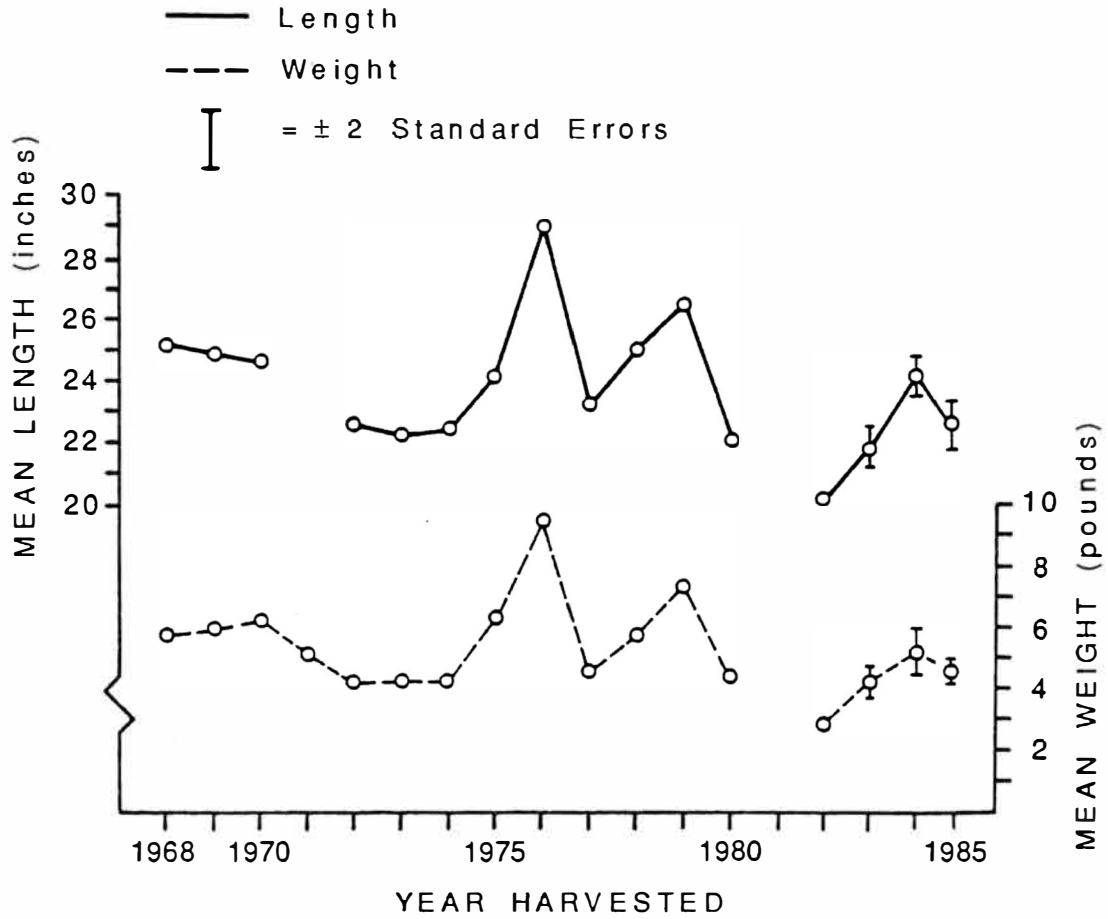


Figure 2. Mean total length (inches) and round weight (pounds) of age-0.1 (jack) chinook salmon harvested at the Little Manistœ River weir.

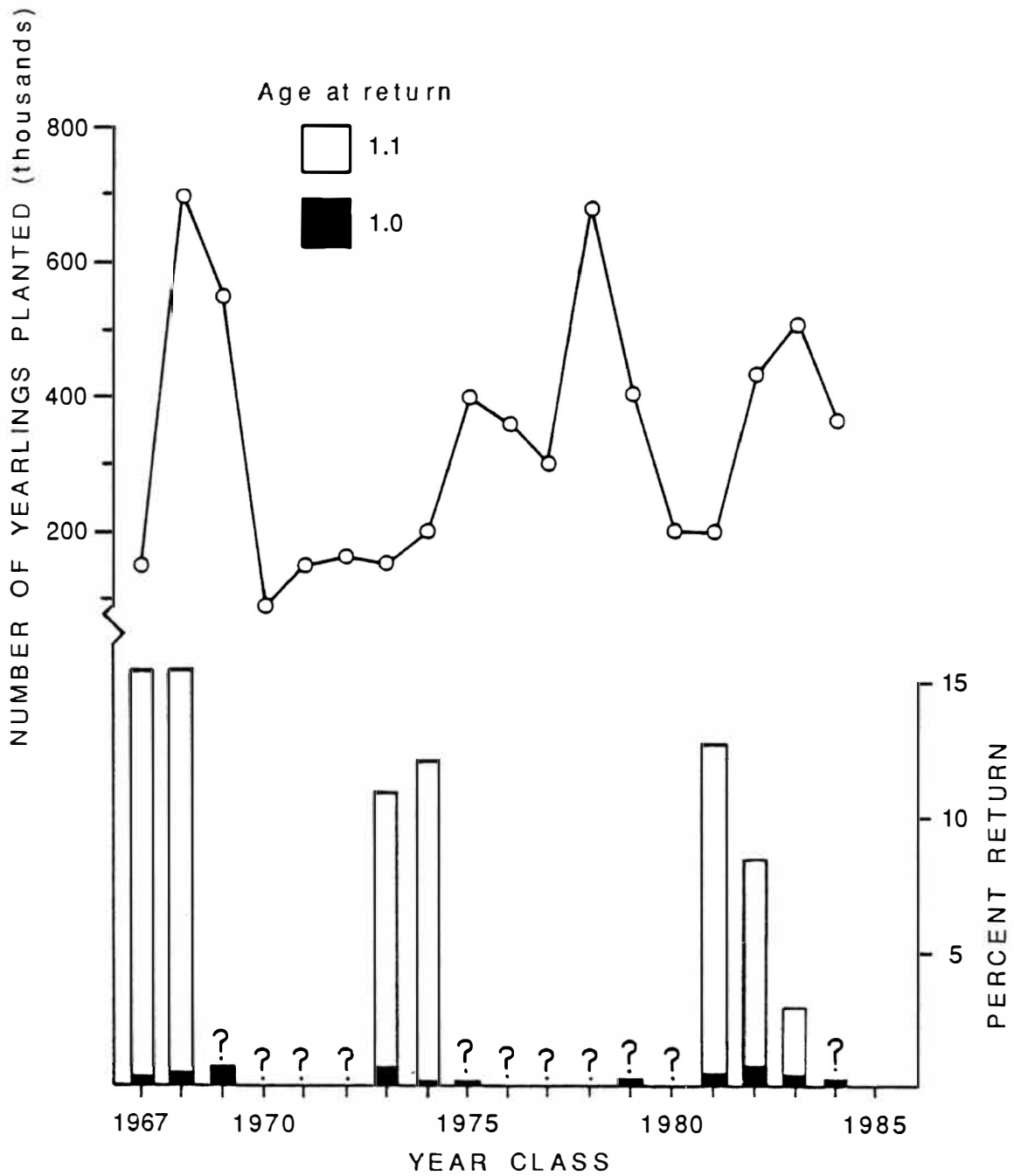


Figure 3. Percent return of coho salmon year classes, by age, to the Little Manistee River weir compared with the number of yearlings planted. Question marks (?) indicate incomplete return data.

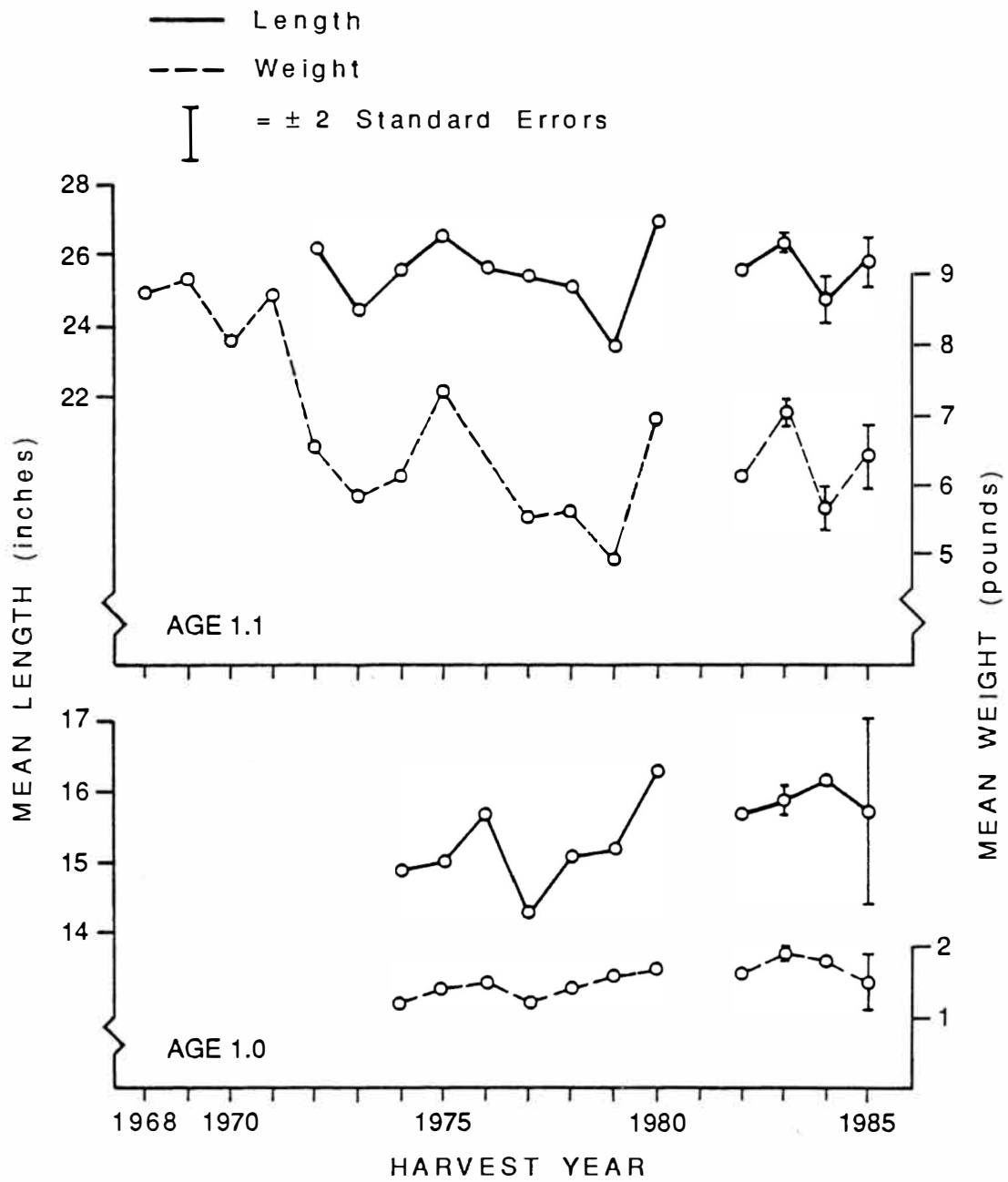


Figure 4. Mean total length (inches) and round weight (pounds) of age-1.0 and age-1.1 coho salmon harvested at the Little Manistee River weir. Only five age-1.0 coho were examined in 1985, hence the large standard error.

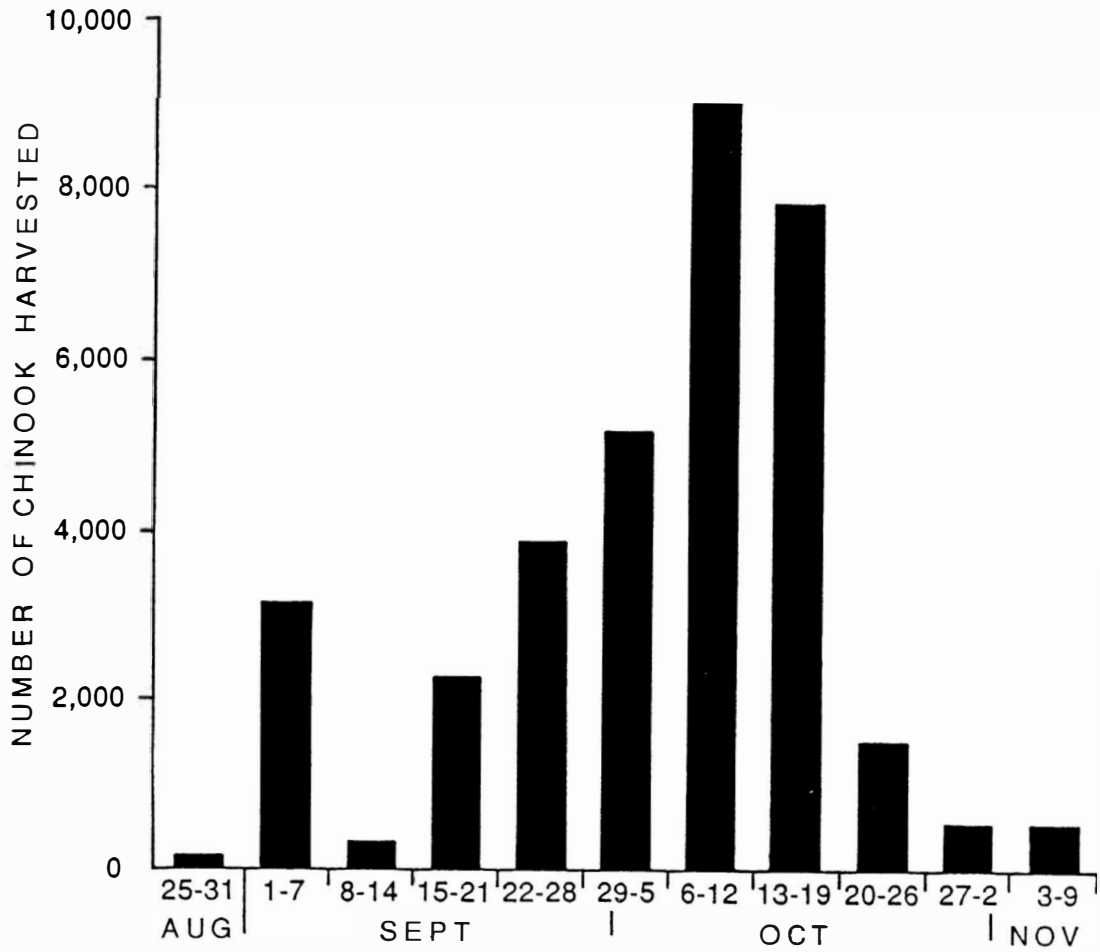


Figure 5. Periodicity of chinook salmon harvested at the Little Manistee River, fall 1985.

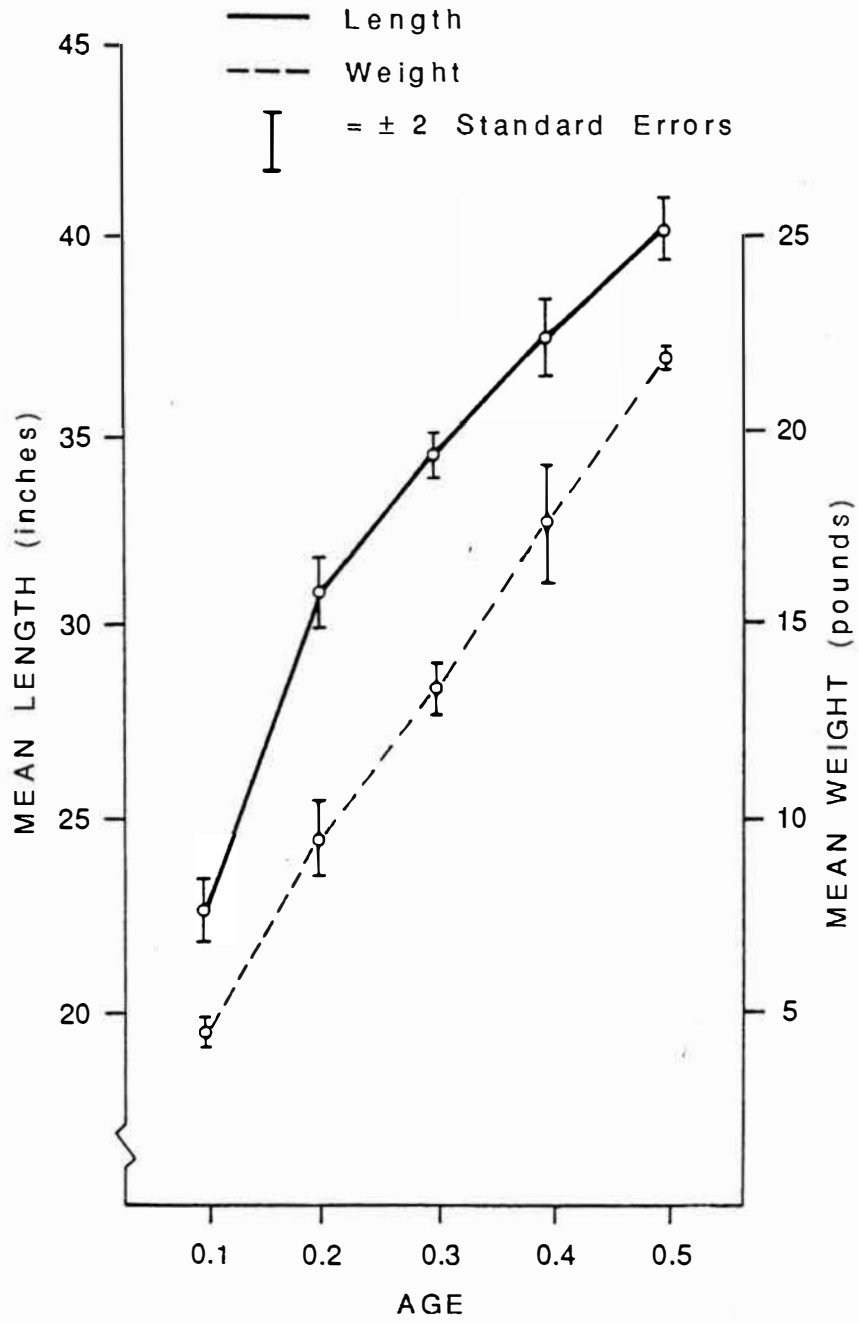


Figure 6. Mean total length (inches) and round weight (pounds) of chinook salmon, by age, at the Little Manistee River weir, fall 1985.

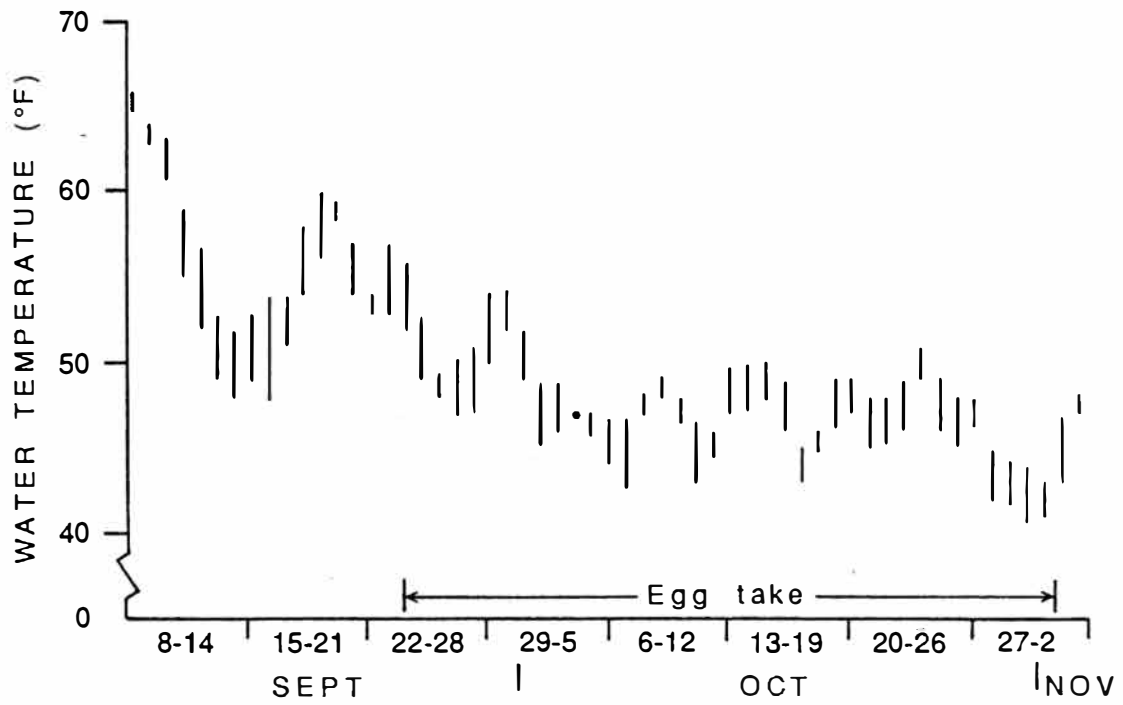


Figure 7. Daily minimum and maximum water temperatures for the Little Manistee River, fall 1985.

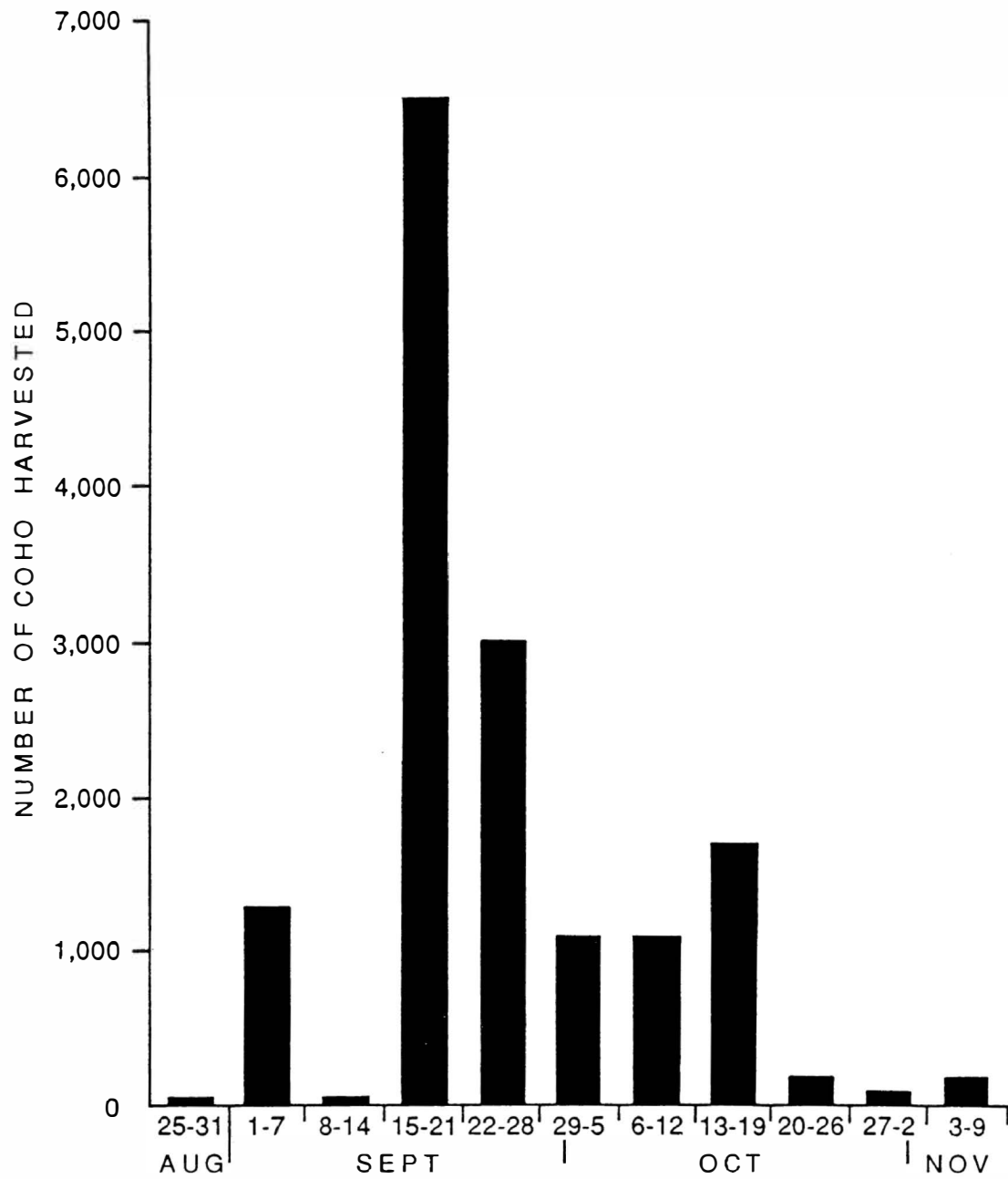


Figure 8. Periodicity of coho salmon harvested at the Little Manistee River weir, 1985.

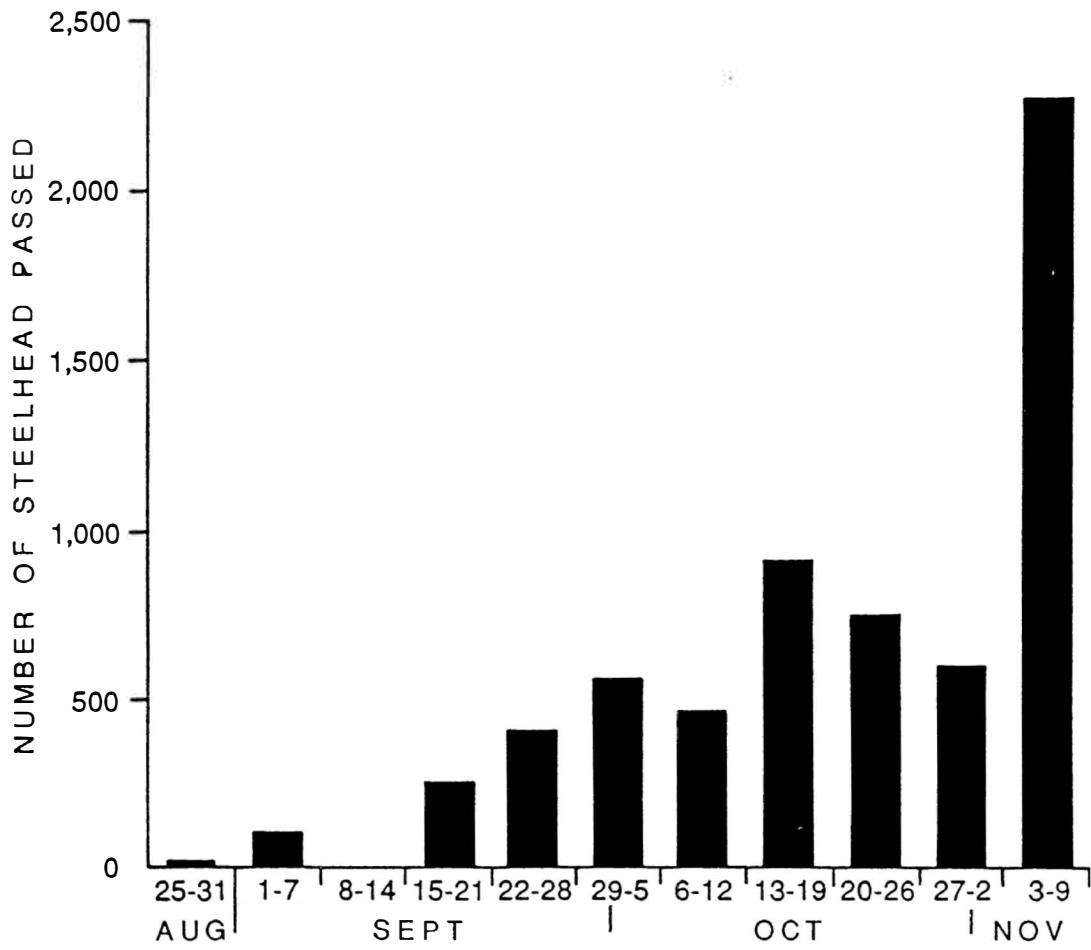


Figure 9. Periodicity of steelhead passed at the Little Manistee River weir, fall 1985.

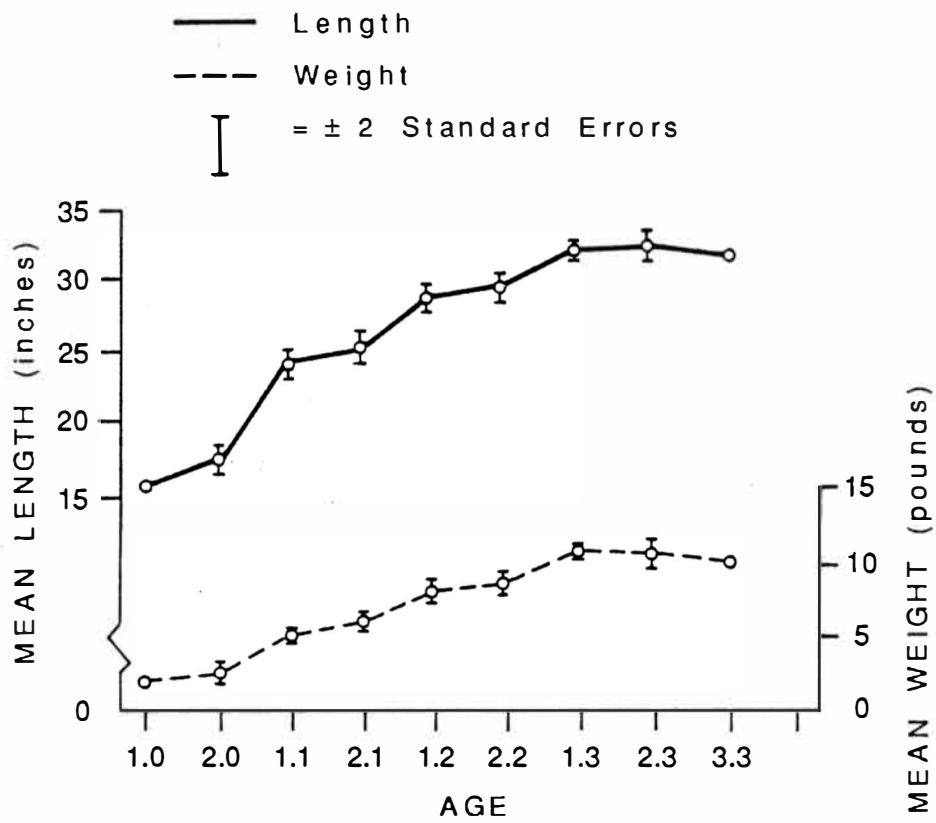


Figure 10. Mean total length (inches) and round weight (pounds) of steelhead, by age, at the Little Manistee River weir, fall 1985.

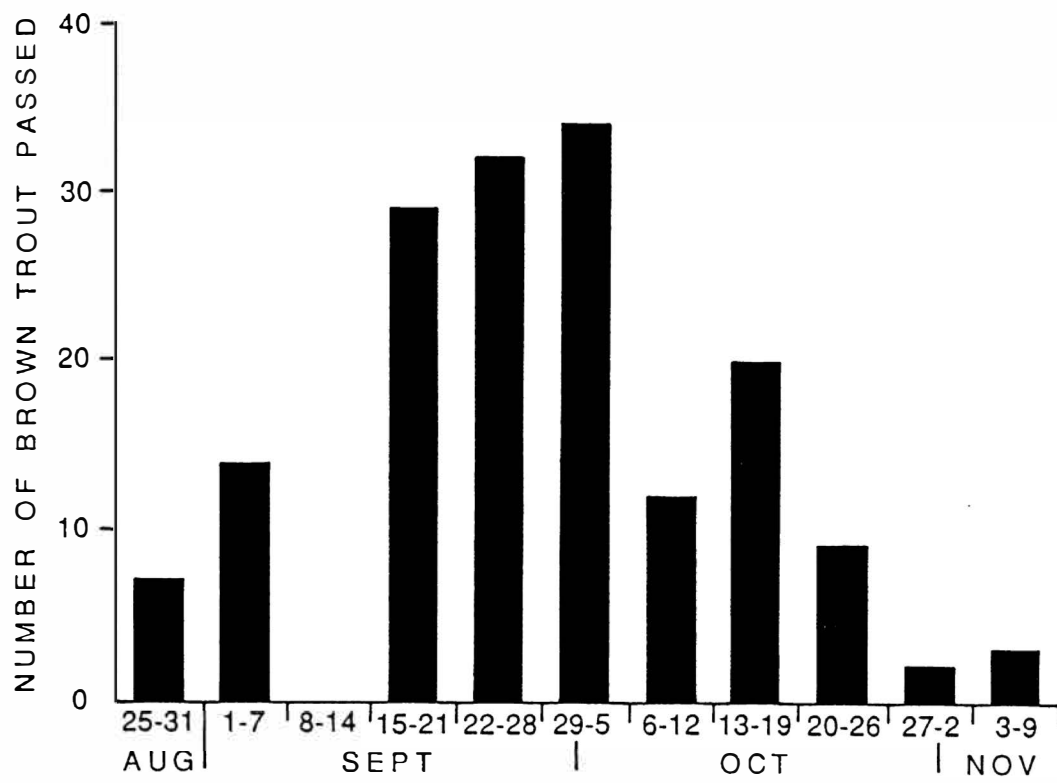


Figure 11. Periodicity of brown trout passed at the Little Manistee River weir, fall 1985.

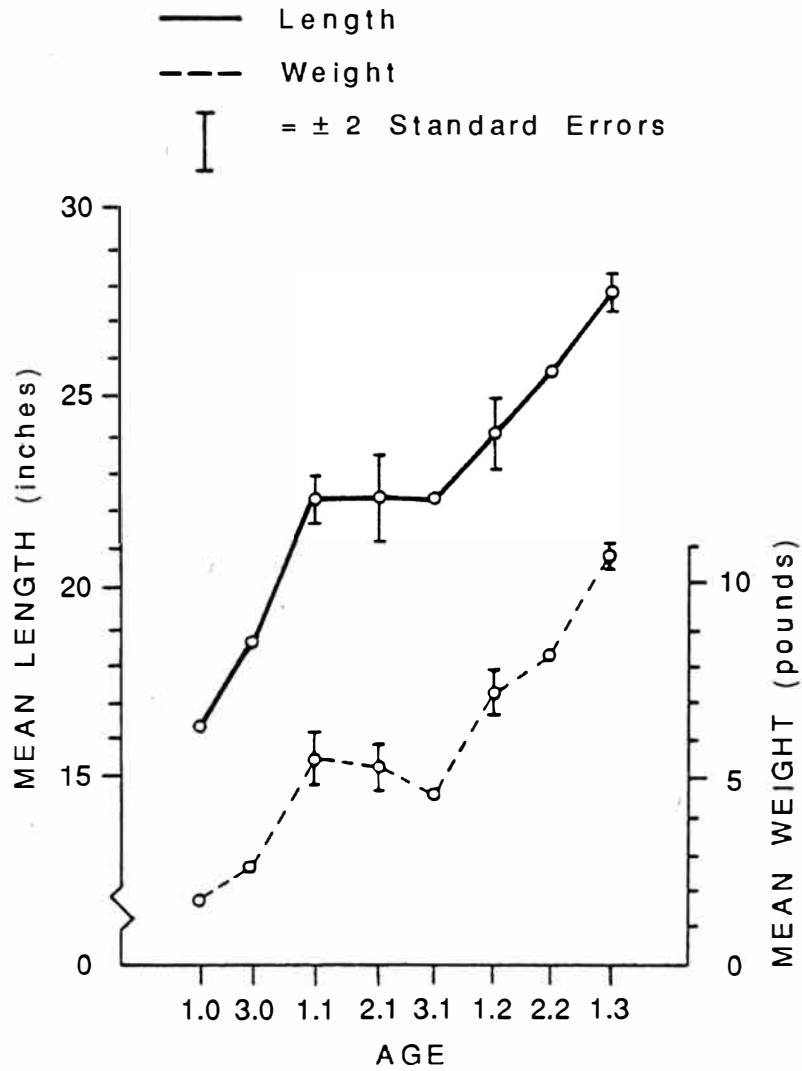


Figure 12. Mean total length (inches) and round weight (pounds) of brown trout, by age, at the Little Manistee River weir, fall 1985.

Table 1. Planting history of anadromous salmonids in the Little Manistee River since 1967. Age of fish at planting: spring fingerling (SF), fall fingerling (FF), and yearling (Y).

Planting year	Salmon			Trout
	Chinook (All SF)	Coho (All Y)	Atlantic (All Y)	Steelhead
1967	590,830	433,215	—	—
1968	321,912	148,365	—	—
1969	300,000	700,002	—	—
1970	308,900	550,012	—	—
1971	301,868	91,674	—	—
1972	300,908	150,067	—	—
1973	356,140	165,714	—	—
1974	402,330	150,067	—	100,188(FF)
1975	300,144	200,601	—	—
1976	301,300	400,282	—	—
1977	250,200	358,832	7,497	—
1978	400,028	302,980	15,000	—
1979	603,098	675,000	—	—
1980	550,272	400,158	—	—
1981	500,204	202,815	19,529	93,673(FF) 30,700(Y)
1982	600,294	200,000	25,030	100,000(FF) 30,000(Y)
1983	677,250	429,612	—	16,428(Y)
1984	805,773	500,066	—	5,079(Y) ¹ 5,000(Y) ² 4,817(Y) ³
1985	500,012	375,283	—	—
Total	8,407,663	6,434,745	67,056	293,861(FF) 92,024(Y)
Average	442,508	338,671	16,764	97,954(FF) 23,006(Y)

¹Siletz River strain of summer steelhead

²Rogue River strain of summer steelhead.

³Umpqua River strain of summer steelhead.

Table 2. Number of chinook salmon harvested, by age, at the Little Manistee River weir, 1968–85. Weight (pounds) is in parentheses.

Year	Age ¹					Adult ²	Mortalities ³	Total
	0.1	0.2	0.3	0.4	0.5			
1968	9,597	0	0	—	—	—	1,633	11,230
1969	5,175	18,693	0	—	—	—	2,420	26,288
1970	4,670	11,100	18,420	—	—	—	0	34,190
1971	2,885	11,913	6,415	—	—	—	—	21,213
1972	1,900	—	—	—	—	23,094	—	24,994
1973	1,153	—	—	—	—	15,323	—	16,476
1974	1,938	—	—	—	—	21,412	806	24,156
1975	762	—	—	—	—	27,106	1,360	29,228
1976	2,738	12,560	805	—	—	—	56	16,159
1977	—	—	—	—	—	—	—	11,136
1978	—	—	—	—	—	—	—	20,230
1979	—	—	—	—	—	—	—	22,925
1980	1,891	6,620	7,250	—	—	—	—	15,761 (234,366)
1981	—	—	—	—	—	—	—	11,811 (188,939)
1982	2,077	—	—	—	—	12,281	—	14,358 (165,412)
1983	8,865	17,637	12,857	—	—	—	—	39,359 (534,595)
1984	5,914	18,342	8,376	—	—	—	—	32,632 (436,057)
1985	2,005	6,326	19,437	5,990	248	—	—	34,006 (442,153)

¹See footnote on page 2 about aging.

²Ages 0.2 through 0.5 combined.

³Mortalities are included under age group headings in some years.

Table 3. Numbers, and in parentheses percent, of chinook and coho salmon in various year classes returning to the Little Manistee River weir 1 to 5 years after stocking. The estimates for chinook are less reliable due to aging problems.

Year class	Number stocked	Age ¹					Total
		0.1	0.2	0.3	0.4	0.5	
<u>Chinook</u>							
1967	590,830	11,230 (1.9)	20,588 (3.5)	18,420 (3.1)	—	—	50,238 (8.5)
1968	321,912	5,700 (1.8)	11,100 (3.4)	6,415 (2.0)	—	—	23,215 (7.2)
1981	500,204	2,077 (0.4)	17,637 (3.5)	8,376 (1.7)	5,990 (1.2)	—	34,080 (6.8)
<u>Coho</u>							
Year class	Number stocked	Age		Total			
		1.0	1.1				
1967	148,365	501 (0.3)	22,306 (15.0)	22,807 (15.4)			
1968	700,002	2,880 (0.4)	105,006 (15.0)	107,886 (15.4)			
1973	150,067	979 (0.7)	15,334 (10.2)	16,313 (10.9)			
1974	200,601	492 (0.3)	23,525 (11.7)	24,017 (12.0)			
1981	200,000	873 (0.4)	24,264 (12.1)	25,137 (12.5)			
1982	429,612	2,704 (0.6)	33,764 (7.9)	36,468 (8.5)			
1983	500,066	218 (0.1)	15,177 (3.0)	15,395 (3.1)			

¹See footnote on page 2 about aging.

Table 4. Mean total length (L, in inches) and weight (W, in pounds) of chinook salmon harvested at the Little Manistee weir, 1968-85. (For chinook in 1972-75 and 1982, lengths and weights shown under age 0.2 are for ages 0.2 and older combined.)

Year	Chinook, age ¹										
	0.1		0.2		0.3		0.4		0.5		
	L	W	L	W	L	W	L	W	L	W	
1968	25.2	5.8	—	—	—	—	—	—	—	—	—
1969	24.9	6.0	34.2	15.9	—	—	—	—	—	—	—
1970	24.7	6.3	34.7	16.6	39.8	23.0	—	—	—	—	—
1971	—	5.2	—	15.0	—	22.7	—	—	—	—	—
1972	22.6	4.3	35.6	17.7	—	—	—	—	—	—	—
1973	22.4	4.4	36.0	17.8	—	—	—	—	—	—	—
1974	22.5	4.4	34.9	16.7	—	—	—	—	—	—	—
1975	24.2	6.4	37.1	20.2	—	—	—	—	—	—	—
1976	29.0	9.5	37.5	20.9	41.7	29.2	—	—	—	—	—
1977	23.4	4.6	34.6	15.0	38.1	20.1	—	—	—	—	—
1978	25.0	5.8	30.3	10.1	35.0	15.5	—	—	—	—	—
1979	26.5	7.4	34.6	15.1	35.7	16.9	—	—	—	—	—
1980	22.2	4.5	34.3	15.4	36.4	19.3	—	—	—	—	—
1981	—	—	—	—	—	—	—	—	—	—	—
1982	20.2	3.0	35.3	14.5	—	—	—	—	—	—	—
1983	22.0	4.4	33.6	14.0	37.0	19.3	—	—	—	—	—
1984	24.3	5.2	34.3	13.4	38.3	18.9	—	—	—	—	—
1985	22.7	4.5	30.8	9.5	34.4	13.4	37.3	17.7	41.1	22.0	—

¹ Ages of chinook prior to 1977 were determined from length-frequency distributions; in 1977-80 and 1983-85, from scale samples and length-frequency distributions. See footnote on page 2 regarding uncertainties of aging age-0.2 and older chinook.

Table 5. Number of coho salmon harvested, by age, at the Little Manistee River weir, 1968–85. Weight (pounds) is in parentheses.

Year	Age		Mortalities ¹	Total
	1.0	1.1		
1968	490	58,422	1,336	60,248
1969	2,831	21,925	430	25,186
1970	3,300	102,100	3,000	108,400
1971	—	—	—	59,123
1972	—	—	—	2,314
1973	—	—	—	11,872
1974	939	4,928	262	6,129
1975	470	14,633	760	15,863
1976	978	23,480	47	24,505
1977	—	—	—	25,255
1978	—	—	—	23,696
1979	—	—	—	27,925
1980	900	49,104	—	50,004
	—	—	—	(353,043)
1981	—	—	—	(96,733)
1982	873	17,585	—	18,458
	—	—	—	(110,745)
1983	2,704	24,264	—	26,968
	—	—	—	(175,157)
1984	218	33,764	—	33,982
	—	—	—	(192,071)
1985	79	15,177	—	15,256
	—	—	—	(96,798)

¹Mortalities are included under age group headings in some years.

Table 6. Mean total length (L, in inches) and weight (W, in pounds) of coho salmon harvested at the Little Manistee River weir, 1968–85.

Year	Age ¹			
	1.0		1.1	
	L	W	L	W
1968	—	—	28.1	8.7
1969	—	—	—	8.9
1970	—	—	—	8.0
1971	—	—	—	8.7
1972	—	—	26.3	6.5
1973	—	—	24.5	5.8
1974	14.9	1.2	25.7	6.1
1975	15.0	1.4	26.6	7.3
1976	15.7	1.5	25.7	6.4
1977	14.3	1.2	25.5	5.5
1978	15.1	1.4	25.2	5.6
1979	15.2	1.6	23.5	4.9
1980	16.3	1.7	26.9	6.9
1981	—	—	—	—
1982	15.7	1.6	25.6	6.1
1983	15.9	1.9	26.4	7.0
1984	16.2	1.8	24.7	5.7
1985	15.7	1.6	25.9	6.4

¹Ages of coho in 1980 were determined from a length-frequency distribution.

Table 7. Number and mean length (L, in inches) and weight (W, in pounds) of steelhead (ages combined) reaching the Little Manistee River weir in fall 1968–85.

Year	Number				Mean	
	Passed	Transferred	Mortalities	Total	L	W
1968	1,297	0	25	1,322	25.1	7.3
1969	2,987	0	56	3,043	25.6	7.8
1970	7,322	0	89	7,411	—	8.7
1971	7,523	0	99	7,622	—	8.8
1972	3,515	0	46	3,561	27.4	9.3
1973	421	1,478 ¹	27	1,926	24.3	6.5
1974	2,270	1,200 ¹	18	3,838	26.4	7.3
1975	4,722	1,300 ¹	99	6,121	26.7	8.0
1976	503	45	30	578	26.8	7.6
1977	2,031	—	—	2,013	26.7	6.8
1978	320	—	—	320	—	—
1979	640	—	—	640	25.6	6.7
1980	1,111	—	—	1,111	25.6	7.0
1981	849	—	—	849	—	—
1982	347	—	—	347	25.2	6.9
1983	3,100	—	—	3,100	24.3	6.8
1984	1,830	—	79	1,909	26.0	7.1
1985	6,187	—	169	6,356	27.1	7.4

¹Transferred to Big Manistee and Pine rivers.

Table 8. Number and mean length (L, in inches) and weight (W, in pounds) of brown trout passed at the Little Manistee River weir, 1968-85.

Year	Number			Mean	
	Passed	Mortalities	Total	L	W
1968	28	—	28	—	—
1969	36	—	36	—	—
1970	123	—	123	—	5.6
1971	69	—	69	—	—
1972	5	—	5	—	—
1973	45	3	48	—	—
1974	159	2	161	19.4	3.4
1975	238	0	238	21.8	5.0
1976	104	2	106	22.9	5.8
1977	98	—	98	19.3	3.5
1978	51	—	51	—	—
1979	100	—	100	23.4	6.8
1980	28	—	28	18.6	3.4
1981	101	—	101	—	—
1982	62	—	62	21.4	4.9
1983	43	—	43	22.4	6.0
1984	134	7	141	22.4	5.3
1985	162	15	177	23.2	6.2

Table 9. Summary of harvest, mortalities, and total run of chinook salmon, by age and sex, at the Little Manistee River weir in 1985. Weight of stripped females was recalculated into round weight, therefore, the total weight of chinook does not correspond with weight shipped to Tempotech Industries.

Week beginning	Male		Female		Total	
	Number	Pounds	Number	Pounds	Number	Pounds
<u>Age 0.1</u>						
8/25	5	22	—	—	5	22
9/01	186	666	—	—	186	666
9/08	14	62	—	—	14	62
9/15	—	—	—	—	—	—
9/22	153	737	—	—	153	737
9/29	309	1,366	—	—	309	1,366
10/06	272	1,368	—	—	272	1,368
10/13	939	4,301	—	—	939	4,301
10/20	74	328	—	—	74	328
10/27	26	115	—	—	26	115
11/03	27	120	—	—	27	120
Total	2,005	9,085	—	—	2,005	9,085
(Percent)	(5.9)	(2.1)	—	—	(5.9)	(2.1)
<u>Age 0.2</u>						
8/25	15	137	5	52	20	189
9/01	496	4,385	155	1,491	651	5,876
9/08	38	346	14	147	52	493
9/15	230	2,192	167	1,855	397	4,047
9/22	613	5,339	230	2,144	843	7,483
9/29	720	6,804	206	2,270	926	9,074
10/06	1,090	10,911	454	5,430	1,544	16,341
10/13	1,174	9,991	235	2,232	1,409	12,223
10/20	208	1,895	74	776	282	2,671
10/27	73	665	26	273	99	938
11/03	76	692	27	283	103	975
Total	4,733	43,357	1,593	16,953	6,326	60,310
(Percent)	(13.9)	(9.8)	(4.7)	(3.8)	(18.6)	(13.6)
<u>Age 0.3</u>						
8/25	27	346	35	478	62	824
9/01	837	10,529	837	11,609	1,674	22,138
9/08	69	884	88	1,202	157	2,086
9/15	377	4,777	899	11,768	1,433	16,545
9/22	881	11,453	1,226	16,134	2,107	27,587
9/29	1,955	24,633	1,132	15,214	3,087	39,847
10/06	2,179	29,286	3,450	49,473	5,629	78,759
10/13	1,644	20,846	2,349	33,121	3,993	53,967

Table 9. Continued:

Week beginning	Male		Female		Total	
	Number	Pounds	Number	Pounds	Number	Pounds
Age 0.3						
10/20	372	4,765	476	6,502	848	11,267
10/27	130	1,665	166	2,268	296	3,933
11/03	135	1,729	173	2,363	308	4,092
Total (Percent)	8,606 (25.3)	110,913 (25.1)	10,831 (31.9)	150,132 (34.0)	19,437 (57.2)	261,045 (59.1)
Age 0.4						
8/25	8	136	12	215	20	351
9/01	279	4,751	310	5,242	589	9,993
9/08	19	322	30	536	49	858
9/15	146	2,467	272	4,820	418	7,287
9/22	498	8,277	192	3,214	690	11,491
9/29	206	3,646	515	9,079	721	12,725
10/06	545	9,892	1,089	20,909	1,634	30,801
10/13	392	6,162	1,018	18,538	1,410	24,700
10/20	104	1,763	164	2,932	268	4,695
10/27	37	627	57	1,019	94	1,646
11/03	38	644	59	1,055	97	1,699
Total (Percent)	2,272 (6.7)	38,687 (8.7)	3,718 (10.9)	67,559 (15.3)	5,990 (17.6)	106,246 (24.0)
Age 0.5						
8/25	1	22	—	—	1	22
9/01	—	—	—	—	—	—
9/08	3	66	—	—	3	66
9/15	—	—	—	—	—	—
9/22	38	874	—	—	38	874
9/29	103	2,184	—	—	103	2,184
10/06	—	—	—	—	—	—
10/13	78	1,771	—	—	78	1,771
10/20	15	330	—	—	15	330
10/24	5	110	—	—	5	110
11/03	5	110	—	—	5	110
Total (Percent)	248 (0.7)	5,467 (1.2)	—	—	248 (0.7)	5,467 (1.2)

Table 10. Length-age distribution (in percent of inch group) for chinook salmon scale sampled during creel census at Traverse City, Frankfort, Manistee, and Ludington (September-November 1985), and the Big Manistee River (August-September 1985).¹

Length (inches)	Age					
	0.0	0.1	0.2	0.3	0.4	0.5
14	100	—	—	—	—	—
15	—	—	—	—	—	—
16	—	—	—	—	—	—
17	—	—	—	—	—	—
18	—	100	—	—	—	—
19	—	100	—	—	—	—
20	—	100	—	—	—	—
21	—	100	—	—	—	—
22	—	100	—	—	—	—
23	—	100	—	—	—	—
24	—	60	40	—	—	—
25	—	33	67	—	—	—
26	—	—	100	—	—	—
27	—	—	100	—	—	—
28	—	—	100	—	—	—
29	—	—	100	—	—	—
30	—	—	89	11	—	—
31	—	—	46	54	—	—
32	—	—	40	60	—	—
33	—	—	10	90	—	—
34	—	—	4	82	14	—
35	—	—	—	81	19	—
36	—	—	—	63	37	—
37	—	—	—	40	60	—
38	—	—	—	17	83	—
39+	—	—	—	—	71	29

¹Table developed by District 6 personnel at the Harrietta warehouse.

Table 11. Mean total length (inches) and weight (pounds) of chinook salmon, by age and sex, harvested at the Little Manistee River weir in 1985. Standard error of mean ($S_{\bar{x}}$) in parentheses. No age-0.1 or age-0.5 females were sampled.

Week beginning	Measure-ment	Age				
		0.1	0.2		0.3	
		Male	Male	Female	Male	Female
9/01	Length	21.9 (0.422)	30.8 (0.349)	31.4 (0.727)	34.1 (0.430)	34.7 (0.268)
	Weight	3.6 (0.202)	8.8 (0.328)	9.6 (0.258)	12.6 (0.422)	13.9 (0.363)
9/15	Length	—	30.9 (0.591)	32.4 (0.243)	34.6 (0.401)	33.9 (0.225)
	Weight	—	9.5 (0.498)	11.1 (0.421)	12.7 (0.368)	13.1 (0.232)
9/22	Length	23.0 (0.482)	30.4 (0.610)	32.3 (0.408)	34.9 (0.436)	34.2 (0.293)
	Weight	4.8 0.284 (0.158)	8.7 (0.392)	9.3 (0.339)	13.0 (0.417)	13.2 (0.345)
9/29	Length	23.0 (0.485)	31.0 (0.578)	31.8 (0.798)	34.0 (0.277)	34.2 (0.305)
	Weight	4.4 (0.158)	9.4 (0.440)	11.0 (0.823)	12.6 (0.302)	13.4 (0.302)
10/06	Length	23.6 (0.521)	31.5 (0.501)	31.5 (0.490)	34.3 (0.323)	34.7 (0.261)
	Weight	5.0 (0.186)	10.0 (0.364)	12.0 (0.642)	13.4 (0.371)	14.3 (0.312)
10/13	Length	22.6 (0.344)	29.5 (0.623)	29.7 (1.401)	34.1 (0.461)	34.4 (0.246)
	Weight	4.6 (0.204)	8.5 (0.556)	9.5 (0.723)	12.7 (0.509)	14.1 (0.355)
Weighted seasonal mean	Length	22.7 (0.412)	30.6 (0.550)	31.5 (0.666)	34.2 (0.368)	34.4 (0.264)
	Weight	4.5 (0.203)	9.2 (0.436)	10.6 (0.566)	12.9 (0.393)	13.9 (0.322)
Sexes combined	Length		30.8 (0.579)		34.4 (0.310)	
	Weight		9.5 (0.468)		13.4 (0.354)	

Table 11. Continued:

Week beginning	Measure- ment	Age		
		0.4		0.5
		Male	Female	Male
9/01	Length	37.5 (0.613)	36.7 (0.478)	— —
	Weight	17.0 (0.761)	16.9 (0.623)	— —
9/15	Length	37.1 (0.601)	37.2 (0.508)	— —
	Weight	16.9 (0.546)	17.7 (0.746)	— —
9/22	Length	37.4 (0.406)	36.0 (0.745)	39.1 (0.0)
	Weight	16.6 (0.647)	16.7 (1.068)	23.0 (0.0)
9/29	Length	38.0 (0.232)	37.4 (0.467)	41.2 (0.800)
	Weight	17.7 (0.806)	17.6 (0.665)	21.2 (0.100)
10/06	Length	38.3 (0.802)	37.0 (0.562)	— —
	Weight	18.2 (1.073)	19.2 (1.052)	— —
10/13	Length	37.0 (0.329)	37.1 (0.432)	42.1 (0.0)
	Weight	15.7 (0.741)	18.2 (0.906)	22.7 (0.0)
Weighted seasonal mean	Length	37.6 (0.520)	37.0 (0.507)	41.1 (0.376)
	Weight	17.0 (0.801)	18.2 (0.887)	22.0 (0.047)
Sexes combined	Length	37.3 (0.512)		
	Weight	17.7 (0.854)		

Table 12. Summary of the chinook egg-take operation at the Little Manistee River weir, 1985. Eggs taken on September 24–25, 1985, were "eyed" at Platte River Hatchery then transferred to Thompson Hatchery for rearing.

Date	Number of females stripped	Number of eggs collected	Percent eye-up	Destination
9/24	210	775,328	72.3	Platte River
9/25	126	462,886	74.2	Platte River
9/27	216	888,444	—	Indiana
10/01	234	977,834	—	New York
10/02	243	1,041,480	—	New York
10/03	309	1,479,136	—	Illinois
10/03	6	28,668	—	MSU*
10/04	648	2,835,142	85.6	Platte River
10/07	647	2,858,284	84.1	Platte River
10/08	435	1,897,808	78.8	Platte River
10/09	341	1,550,648	76.0	Platte River
10/10	414	1,805,232	—	North Dakota and South Dakota
10/11	420	1,805,232	—	North Dakota and South Dakota
10/24	241	1,051,790	—	Wolf Lake
10/24	48	193,680	—	Wolf Lake (MSU)*
11/01	170	731,000	—	Wolf Lake
Total	4,708	20,382,592	—	
In-state	2,872	12,385,234	—	
Out-of-state	1,836	7,997,358	—	

*MSU = Michigan State University.

Table 13. Percent lamprey scarring of anadromous salmonids captured at the Little Manistee River harvest weir, 1968–85.

Year	Salmon		Trout	
	Chinook	Coho	Steelhead	Brown
1968	3.7	4.3	6.0	—
1969	4.7	2.5	0.9	—
1970	4.0	1.0	2.0	—
1971	2.8	1.5	0.0	—
1972	—	0.4	—	—
1973	0.7	0.0	0.0	—
1974	0.8	0.9	0.0	0.0
1975	1.0	0.4	0.3	0.0
1976	0.0	0.0	0.0	tr
1977	0.0	0.0	0.0	0.0
1978	—	—	—	—
1979	—	—	—	—
1980	0.3	0.2	0.0	0.0
1981	—	—	—	—
1982	0.0	0.0	0.0	0.0
1983	0.1	0.0	0.0	0.0
1984	0.1	0.1	0.0	0.0
1985	0.5	0.2	0.0	0.0

Table 14. Summary of coho salmon harvested, by age and sex, at the Little Manistee River weir, 1985.

Week beginning	Age 1.0		Age 1.1				Total	
	Male		Male		Female		Total	
	Num-ber	Weight	Num-ber	Weight	Num-ber	Weight	Num-ber	Weight
8/25	—	—	10	64	14	88	24	152
9/01	—	—	678	3,932	625	3,775	1,303	7,707
9/08	—	—	17	108	23	145	40	253
9/15	—	—	2,392	15,261	4,072	26,509	6,464	41,770
9/22	—	—	1,571	10,054	1,394	8,601	2,965	18,655
9/29	22	47	403	2,656	693	4,407	1,096	7,063
10/06	—	—	459	3,108	635	4,261	1,094	7,369
10/13	52	71	692	4,422	986	6,034	1,678	10,456
10/20	2	3	93	591	121	764	214	1,355
10/27	1	2	37	235	49	309	86	544
11/03	2	3	93	591	120	757	213	1,348
Total	79	126	6,445	41,022	8,732	55,650	15,177	96,672
(Percent)	(0.05)	(0.1)	(42.2)	(42.4)	(57.2)	(57.5)	(99.5)	(99.9)

Table 15. Mean length (inches) and weight (pounds) of coho salmon, by age and sex, harvested at the Little Manistee River weir, 1985. Standard error of the mean is in parentheses.

Week beginning	Measurement	Age		
		1.0	1.1	
		Male	Male	Female
9/01	Length	—	25.8 (0.293)	25.8 (0.211)
	Weight	—	5.8 (0.212)	6.0 (0.180)
9/15	Length	—	26.1 (0.330)	26.0 (0.207)
	Weight	—	6.4 (0.278)	6.5 (0.169)
9/22	Length	—	26.4 (0.242)	25.4 (0.236)
	Weight	—	6.4 (0.194)	6.2 (0.186)
9/29	Length	17.0 (0.500)	26.5 (0.333)	25.7 (0.187)
	Weight	2.2 (0.150)	6.6 (0.298)	6.4 (0.151)
10/06	Length	—	26.3 (0.199)	25.4 (0.179)
	Weight	—	6.8 (0.156)	6.7 (0.146)
10/13	Length	15.2 (0.821)	26.7 (0.364)	25.5 (0.206)
	Weight	1.4 (0.219)	6.4 (0.247)	6.1 (0.171)
Weighted seasonal mean by sex	Length	15.7 (0.726)	26.2 (0.298)	25.7 (0.214)
	Weight	1.6 (0.198)	6.4 (0.238)	6.4 (0.169)
Weighted seasonal mean, sexes combined	Length	15.7 (0.726)	25.9 (0.249)	
	Weight	1.6 (0.198)	6.4 (0.199)	

Table 16. Summary of number and weight (pounds, in parentheses) of steelhead, by age and sex, passed upstream at the Little Manistee River weir, fall 1985.

Week beginning	Age					
	1.0			2.0		
	Male	Female	Total	Male	Female	Total
8/25	—	—	—	1 (2)	1 (2)	2 (4)
9/01	—	—	—	4 (5)	—	4 (5)
9/08	—	—	—	—	—	—
9/15	—	—	—	5 (9)	5 (9)	10 (18)
9/22	—	—	—	15 (35)	7 (14)	22 (49)
9/29	—	—	—	11 (26)	45 (104)	56 (130)
10/06	10 (20)	—	10 (20)	9 (27)	10 (25)	19 (52)
10/13	—	—	—	58 (141)	58 (155)	116 (296)
10/20	—	—	—	16 (55)	15 (39)	31 (94)
10/27	2 (4)	—	2 (4)	17 (40)	19 (45)	36 (85)
11/03	7 (14)	—	7 (14)	68 (161)	74 (175)	142 (336)
Total	19 (38)	—	19 (38)	204 (501)	234 (568)	438 (1,069)
<u>Percent of run</u>						
Number	0.3	—	0.3	3.2	3.7	6.9
Weight	0.1	—	0.1	1.1	1.2	2.3

Table 16. Continued:

Week beginning	Age					
	1.1			2.1		
	Male	Female	Total	Male	Female	Total
8/25	— —	— —	— —	2 (12)	1 (6)	3 (18)
9/01	4 (18)	— —	4 (18)	7 (36)	7 (43)	14 (79)
9/08	— —	— —	— —	— —	— —	— —
9/15	16 (79)	16 (86)	32 (165)	16 (80)	10 (56)	26 (136)
9/22	— —	8 (42)	8 (42)	23 (109)	23 (114)	46 (223)
9/29	11 (68)	— —	11 (68)	101 (600)	56 (320)	157 (920)
10/06	9 (51)	— —	9 (51)	57 (338)	28 (153)	85 (491)
10/13	— —	19 (104)	19 (104)	76 (464)	211 (1,180)	287 (1,644)
10/20	16 (66)	16 (102)	32 (168)	127 (782)	80 (448)	207 (1,230)
10/27	12 (61)	10 (56)	22 (117)	60 (347)	53 (295)	113 (642)
11/03	47 (238)	41 (228)	88 (466)	239 (1,381)	212 (1,181)	451 (2,562)
Total	115 (581)	110 (618)	225 (1,199)	708 (4,149)	681 (3,796)	1,389 (7,945)
<u>Percent of run</u>						
Number	1.8	1.7	3.5	11.1	10.7	21.8
Weight	1.2	1.3	2.5	8.8	8.0	16.8

Table 16. Continued:

Week beginning	Age					
	1.2			2.2		
	Male	Female	Total	Male	Female	Total
8/25	1 (9)	1 (8)	2 (17)	3 (25)	4 (33)	7 (58)
9/01	7 (58)	11 (73)	18 (131)	30 (255)	26 (211)	56 (466)
9/08	— —	— —	— —	1 (8)	1 (8)	2 (16)
9/15	26 (205)	31 (231)	57 (436)	46 (367)	83 (657)	129 (1,024)
9/22	69 (551)	38 (321)	107 (872)	92 (799)	115 (946)	207 (1,745)
9/29	45 (394)	45 (383)	90 (777)	45 (394)	145 (1,225)	190 (1,619)
10/06	67 (574)	48 (391)	115 (965)	123 (1,052)	76 (660)	199 (1,712)
10/13	39 (378)	39 (345)	78 (723)	57 (494)	288 (2,549)	345 (3,043)
10/20	47 (410)	32 (195)	79 (605)	127 (1,015)	238 (1,925)	365 (2,940)
10/27	54 (453)	46 (361)	100 (814)	98 (825)	152 (1,265)	250 (2,090)
11/03	216 (1,812)	182 (1,427)	398 (3,239)	388 (3,267)	604 (5,025)	992 (8,292)
Total	571 (4,844)	473 (3,735)	1,044 (8,579)	1,010 (8,501)	1,732 (14,504)	2,742 (23,005)
Percent of run						
Number	9.0	7.4	16.4	15.9	27.2	43.1
Weight	10.3	7.9	18.2	18.0	30.7	48.7

Table 16. Continued:

Week beginning	Age								
	1.3			2.3			3.3		
	Male	Fe- male	Total	Male	Fe- male	Total	Male	Fe- male	Total
8/25	—	—	—	1	—	1	—	—	—
	—	—	—	(11)	—	(11)	—	—	—
9/01	7	—	7	7	4	11	—	—	—
	(71)	—	(71)	(77)	(41)	(118)	—	—	—
9/08	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—
9/15	—	10	10	—	—	—	—	—	—
	—	(115)	(115)	—	—	—	—	—	—
9/22	8	—	8	—	8	8	—	—	—
	(86)	—	(86)	—	(64)	(64)	—	—	—
9/29	11	—	11	22	22	44	—	—	—
	(129)	—	(129)	(233)	(238)	(471)	—	—	—
10/06	—	—	—	28	—	28	10	—	10
	—	—	—	(288)	—	(288)	(101)	—	(101)
10/13	—	—	—	58	19	77	—	—	—
	—	—	—	(659)	(190)	(849)	—	—	—
10/20	16	—	16	47	—	47	—	—	—
	(184)	—	(184)	(508)	—	(508)	—	—	—
10/27	8	3	11	22	9	31	2	—	2
	(87)	(35)	(122)	(238)	(90)	(328)	(20)	—	(20)
11/03	34	14	48	88	34	122	7	—	7
	(368)	(162)	(530)	(951)	(340)	(1,291)	(71)	—	(71)
Total	84	27	111	273	96	369	19	—	19
	(925)	(312)	(1,237)	(2,965)	(963)	(3,928)	(192)	—	(192)
Percent of run									
Number	1.3	0.4	1.7	4.3	1.5	5.8	0.3	—	0.3
Weight	2.0	0.7	2.7	6.3	2.0	8.3	0.4	—	0.4

Table 17. Summary of mean length (inches) and weight (pounds) of steelhead, by age and sex, passed upstream at the Little Manistee River weir, fall 1985. Standard error of the mean is in parentheses. No age-1.0 or age-3.3 females were sampled.

Week beginning	Measure- ment	Age				
		1.0	2.0		1.1	
		Male	Male	Female	Male	Female
9/01	Length	—	14.1 (0.0)	—	22.5 (0.0)	—
	Weight	—	1.1 (0.0)	—	4.5 (0.0)	—
9/15	Length	—	16.5 (0.0)	15.6 (0.0)	23.9 (1.185)	23.8 (0.285)
	Weight	—	1.8 (0.0)	1.7 (0.0)	5.0 (0.561)	5.4 (0.058)
9/22	Length	—	17.7 (1.300)	17.2 (0.0)	—	22.7 (0.0)
	Weight	—	2.4 (0.550)	2.0 (0.0)	—	5.2 (0.0)
9/29	Length	—	17.4 (0.0)	17.2 (0.702)	25.4 (0.0)	—
	Weight	—	2.4 (0.0)	2.3 (0.317)	6.2 (0.0)	—
10/06	Length	16.0 (0.0)	18.0 (0.0)	17.5 (0.0)	25.3 (0.0)	—
	Weight	2.0 (0.0)	3.0 (0.0)	2.5 (0.0)	5.7 (0.0)	—
10/13	Length	—	17.6 (0.451)	17.9 (0.726)	—	24.7 (0.0)
	Weight	—	2.4 (0.470)	2.7 (0.384)	—	5.5 (0.0)
10/20	Length	—	20.3 (0.0)	18.0 (0.0)	21.5 (0.0)	25.9 (0.0)
	Weight	—	3.4 (0.0)	2.6 (0.0)	4.1 (0.0)	6.4 (0.0)
Weighted seasonal mean	Length	16.0 (0.0)	17.8 (0.387)	17.5 (0.526)	23.6 (0.339)	24.5 (0.078)
	Weight	2.0 (0.0)	2.5 (0.301)	2.5 (0.261)	5.0 (0.160)	5.7 (0.016)
Sexes combined	Length		17.6 (0.463)		24.1 (0.205)	
	Weight		2.4 (0.279)		5.4 (0.086)	

Table 17. Continued:

Week beginning	Measure- ment	Age			
		2.1		1.2	
		Male	Female	Male	Female
9/01	Length	25.0 (0.650)	24.2 (0.515)	28.9 (0.800)	27.2 (0.601)
	Weight	5.2 (0.200)	6.2 (0.150)	8.3 (0.500)	6.7 (0.491)
9/15	Length	25.0 (1.386)	24.6 (0.950)	28.3 (0.218)	27.2 (0.389)
	Weight	5.0 (0.273)	5.6 (0.550)	7.9 (0.260)	7.4 (0.356)
9/22	Length	23.5 (0.233)	24.4 (0.473)	28.4 (0.484)	28.7 (0.097)
	Weight	4.7 (0.167)	5.0 (0.291)	8.0 (0.228)	8.4 (0.357)
9/29	Length	25.0 (0.602)	24.5 (0.668)	28.7 (0.782)	27.8 (0.429)
	Weight	5.9 (0.343)	5.7 (0.509)	8.8 (0.634)	8.5 (0.536)
10/06	Length	24.9 (0.558)	24.7 (1.040)	29.1 (0.565)	27.7 (0.593)
	Weight	5.9 (0.330)	5.5 (0.669)	8.6 (0.500)	8.1 (0.435)
10/13	Length	25.6 (0.444)	24.1 (0.450)	30.4 (0.050)	27.8 (0.450)
	Weight	6.1 (0.367)	5.6 (0.258)	9.7 (0.600)	8.8 (0.050)
10/20	Length	25.6 (0.410)	24.9 (0.497)	29.6 (0.513)	26.3 (0.600)
	Weight	6.2 (0.304)	5.6 (0.374)	8.7 (0.745)	6.1 (0.0)
Weight seasonal mean	Length	25.2 (0.517)	24.3 (0.546)	29.0 (0.479)	27.6 (0.438)
	Weight	5.9 (0.318)	5.6 (0.349)	8.6 (0.488)	7.9 (0.315)
Sexes combined	Length	24.8 (0.532)		28.4 (0.461)	
	Weight	5.7 (0.334)		8.3 (0.411)	

Table 17. Continued:

Week beginning	Measure- ment	Age			
		2.2		1.3	
		Male	Female	Male	Female
9/01	Length	29.0 (0.240)	28.4 (0.354)	31.3 (0.100)	— —
	Weight	8.5 (0.240)	8.1 (0.175)	10.2 (0.050)	— —
9/15	Length	28.9 (0.616)	28.0 (0.250)	—	31.4 (0.600)
	Weight	8.0 (0.306)	7.9 (0.185)	—	11.6 (0.750)
9/22	Length	29.1 (0.470)	28.4 (0.367)	30.6 (0.0)	— —
	Weight	8.7 (0.342)	8.2 (0.227)	10.7 (0.0)	— —
9/29	Length	29.5 (0.214)	28.9 (0.279)	31.1 (0.0)	— —
	Weight	8.8 (0.144)	8.4 (0.271)	11.7 (0.0)	— —
10/06	Length	28.8 (0.333)	28.9 (0.294)	—	— —
	Weight	8.6 (0.355)	8.7 (0.309)	—	— —
10/13	Length	29.0 (0.384)	28.6 (0.238)	—	— —
	Weight	8.7 (0.731)	8.8 (0.250)	—	— —
10/20	Length	29.3 (0.408)	28.7 (0.354)	33.0 (0.0)	— —
	Weight	8.0 (0.379)	8.1 (0.343)	11.5 (0.0)	— —
Weighted seasonal mean	Length	29.1 (0.391)	28.6 (0.296)	31.8 (0.017)	31.4 (0.600)
	Weight	8.4 (0.371)	8.4 (0.270)	11.2 (0.008)	11.6 (0.750)
Sexes combined	Length	28.8 (0.329)		31.7 (0.129)	
	Weight	8.4 (0.305)		11.2 (0.151)	

Table 17. Continued:

Week beginning	Measurement	Age		
		2.3		3.3
		Male	Female	Male
9/01	Length	32.0 (0.250)	31.3 (0.0)	—
	Weight	11.0 (0.800)	10.4 (0.0)	—
9/15	Length	—	—	—
	Weight	—	—	—
9/22	Length	—	28.4 (0.0)	—
	Weight	—	8.0 (0.0)	—
9/29	Length	32.0 (0.650)	32.4 (1.600)	—
	Weight	10.6 (0.700)	10.8 (1.300)	—
10/06	Length	31.0 (0.300)	—	31.0 (0.0)
	Weight	10.3 (0.722)	—	10.1 (0.0)
10/13	Length	31.3 (0.404)	31.3 (0.0)	—
	Weight	11.4 (0.518)	10.0 (0.0)	—
10/20	Length	32.1 (0.751)	—	—
	Weight	10.8 (0.700)	—	—
Weighted seasonal mean	Length	31.6 (0.513)	31.3 (0.664)	31.0 (0.0)
	Weight	10.9 (0.643)	10.1 (0.540)	10.1 (0.0)
Sexes combined	Length	31.5 (0.551)		
	Weight	10.7 (0.617)		

Table 18. Summary of number and weight (in parentheses) of brown trout, by age and sex, collected at the Little Manistee River weir, fall 1985.

Week beginning	Age								
	1.0			3.0			1.1		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
8/25	—	—	—	—	—	—	1	2	3
	—	—	—	—	—	—	(6)	(10)	(16)
9/01	—	—	—	—	—	—	2	2	4
	—	—	—	—	—	—	(12)	(13)	(25)
9/08	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—
9/15	—	—	—	—	—	—	5	9	14
	—	—	—	—	—	—	(31)	(44)	(75)
9/22	1	—	1	—	—	—	10	5	15
	(2)	—	(2)	—	—	—	(65)	(25)	(90)
9/29	—	—	—	1	—	1	8	6	14
	—	—	—	(3)	—	(3)	(39)	(31)	(70)
10/06	—	—	—	—	—	—	2	1	3
	—	—	—	—	—	—	(9)	(6)	(15)
10/13	—	—	—	—	2	2	3	9	12
	—	—	—	—	(5)	(5)	(19)	(54)	(73)
10/20	—	—	—	—	—	—	—	4	4
	—	—	—	—	—	—	—	(20)	(20)
10/27	—	—	—	—	—	—	—	1	1
	—	—	—	—	—	—	—	(5)	(5)
11/03	—	—	—	—	—	—	1	1	2
	—	—	—	—	—	—	(6)	(5)	(11)
Total	1	—	1	1	2	3	32	40	72
	(2)	—	(2)	(3)	(5)	(8)	(187)	(213)	(400)
Percent of run									
Number	0.6	—	0.6	0.6	1.1	1.7	18.1	22.6	40.7
Weight	0.2	—	0.2	0.3	0.5	0.7	17.2	19.6	36.8

Table 18. Continued:

Week beginning	Age								
	2.1			3.1			1.2		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
8/25	—	1	1	—	—	—	2	1	3
	—	(5)	(5)	—	—	—	(15)	(16)	(21)
9/01	7	5	12	—	—	—	5	—	5
	(40)	(24)	(64)	—	—	—	(41)	—	(41)
9/08	—	—	—	—	—	—	1	—	1
	—	—	—	—	—	—	(8)	—	(8)
9/15	2	7	9	—	—	—	5	1	6
	(10)	(35)	(45)	—	—	—	(35)	(10)	(45)
9/22	—	4	4	—	—	—	8	3	11
	—	(23)	(23)	—	—	—	(62)	(18)	(80)
9/29	1	1	2	—	—	—	12	4	16
	(7)	(6)	(13)	—	—	—	(85)	(23)	(108)
10/06	—	3	3	—	—	—	5	1	6
	—	(17)	(17)	—	—	—	(40)	(6)	(46)
10/13	—	—	—	2	—	2	2	3	5
	—	—	—	(9)	—	(9)	(14)	(18)	(32)
10/20	1	2	3	—	—	—	—	1	1
	(5)	(5)	(10)	—	—	—	—	(6)	(6)
10/27	—	—	—	—	—	—	1	—	1
	—	—	—	—	—	—	(7)	—	(7)
11/03	—	—	—	—	—	—	1	—	1
	—	—	—	—	—	—	(7)	—	(7)
Total	11	23	34	2	0	2	42	14	56
	(62)	(115)	(177)	(9)	(0)	(9)	(314)	(87)	(401)
<u>Percent of run</u>									
Number	6.2	13.0	19.2	1.2	0.0	1.2	23.7	7.9	31.6
Weight	5.7	10.6	16.3	0.8	0.0	0.8	28.9	8.0	37.0

Table 18. Continued:

Week beginning	Age					
	2.2			1.3		
	Male	Female	Total	Male	Female	Total
8/25	—	—	—	—	—	—
9/01	—	—	—	2 (23)	—	2 (23)
9/08	—	—	—	—	—	—
9/15	—	—	—	1 (11)	—	1 (11)
9/22	1 (10)	—	1 (10)	2 (21)	—	2 (21)
9/29	1 (7)	—	1 (7)	—	—	—
10/06	—	1 (8)	1 (8)	—	—	—
10/13	—	—	—	—	—	—
10/20	—	1 (8)	1 (8)	—	—	—
10/27	—	—	—	—	—	—
11/03	—	—	—	—	—	—
Total	2 (17)	2 (16)	4 (33)	5 (55)	0 (0)	5 (55)
<u>Percent of run</u>						
Number	1.1	1.1	2.2	2.8	0.0	2.8
Weight	1.6	1.5	3.1	5.1	0.0	5.1

Table 19. Summary of mean length (inches) and weight (pounds) of brown trout, by age and sex, collected at the Little Manistee River weir, fall 1985. No age-1.0, -3.1, or -1.3 females were collected. Standard error of the mean is in parentheses.

Week beginning	Measurement	Age				
		1.0	3.0		1.1	
		Male	Male	Female	Male	Female
9/01	Length	—	—	—	23.4	21.9
	Weight	—	—	—	(0.0)	(0.0)
9/15	Length	—	—	—	23.4	21.4
	Weight	—	—	—	(0.532)	(0.224)
9/22	Length	16.2	—	—	23.7	21.9
	Weight	(0.0)	—	—	(0.173)	(0.544)
9/29	Length	1.8	18.4	—	22.1	22.3
	Weight	(0.0)	(0.0)	—	(0.500)	(0.418)
10/06	Length	—	2.8	—	4.9	5.1
	Weight	—	(0.0)	—	(0.414)	(0.206)
10/13	Length	—	—	18.8	23.1	22.4
	Weight	—	—	(0.0)	(0.400)	(0.181)
10/20	Length	—	—	2.7	6.3	6.0
	Weight	—	—	(0.0)	(0.200)	(0.224)
Weighted seasonal mean	Length	16.2	18.4	18.8	23.1	22.0
	Weight	(0.0)	(0.0)	(0.0)	(0.340)	(0.282)
Sexes combined	Length	1.8	2.8	2.7	5.8	5.3
	Weight	(0.0)	(0.0)	(0.0)	(0.303)	(0.316)
Sexes combined	Length	—	18.7	—	22.5	—
	Weight	—	(0.0)	—	(0.308)	—
Sexes combined	Length	—	2.7	—	5.6	—
	Weight	—	(0.0)	—	(0.310)	—

Table 19. Continued:

Week beginning	Measurement	Age				
		2.1		3.1	1.2	
		Male	Female	Male	Male	Female
9/01	Length	23.6 (1.058)	22.0 (0.150)	—	26.0 (0.500)	—
	Weight	5.8 (0.664)	4.8 (0.300)	—	8.1 (0.600)	—
9/15	Length	22.8 (1.200)	22.1 (0.303)	—	24.5 (0.389)	26.8 (0.0)
	Weight	5.2 (0.150)	5.0 (0.240)	—	7.0 (0.152)	9.6 (0.0)
9/22	Length	—	22.8 (0.654)	—	24.7 (0.528)	22.2 (0.289)
	Weight	—	5.8 (0.533)	—	7.8 (0.439)	5.9 (0.549)
9/29	Length	25.3 (0.0)	22.6 (0.0)	—	24.3 (0.327)	23.0 (1.041)
	Weight	6.5 (0.0)	5.2 (0.0)	—	7.1 (0.290)	5.9 (0.926)
10/06	Length	—	22.6 (1.115)	—	25.9 (0.764)	23.4 (0.0)
	Weight	—	5.6 (0.569)	—	8.0 (0.886)	5.5 (0.0)
10/13	Length	—	—	22.0 (0.0)	24.1 (0.0)	23.0 (0.800)
	Weight	—	—	4.5 (0.0)	7.2 (0.0)	6.0 (0.950)
10/20	Length	23.1 (0.0)	17.5 (0.0)	—	—	23.3 (0.0)
	Weight	4.9 (0.0)	2.5 (0.0)	—	—	6.4 (0.0)
Weighted seasonal mean	Length	23.6 (0.891)	21.9 (0.401)	22.0 (0.0)	24.9 (0.444)	23.2 (0.572)
	Weight	5.6 (0.235)	5.0 (0.319)	4.5 (0.0)	7.5 (0.410)	6.2 (0.631)
Sexes combined	Length	22.4 (0.565)		24.4 (0.477)		
	Weight	5.2 (0.291)		7.2 (0.468)		

Table 19. Continued:

Week beginning	Measure- ment	Age		
		2.2		1.3
		Male	Female	Male
9/01	Length	—	—	28.7 (0.0)
	Weight	—	—	11.6 (0.0)
9/15	Length	—	—	29.5 (0.0)
	Weight	—	—	10.9 (0.0)
9/22	Length	27.5 (0.0)	—	27.2 (0.600)
	Weight	9.8 (0.0)	—	10.2 (0.250)
9/29	Length	24.3 (0.0)	—	—
	Weight	7.2 (0.0)	—	—
10/06	Length	—	25.8 (0.0)	—
	Weight	—	7.5 (0.0)	—
10/13	Length	—	—	—
	Weight	—	—	—
10/20	Length	—	25.5 (0.0)	—
	Weight	—	8.2 (0.0)	—
Weighted seasonal mean	Length	25.9 (0.0)	25.6 (0.0)	28.3 (0.240)
	Weight	8.5 (0.0)	7.8 (0.0)	10.9 (0.100)
Sexes combined	Length	25.8 (0.0)		—
	Weight	8.2 (0.0)		—

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Pecor, C. H. 1986. Platte River harvest weir and coho salmon egg-take report, 1985. Michigan Department of Natural Resources, Fisheries Technical Report 86-3, Ann Arbor, Michigan, USA.

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