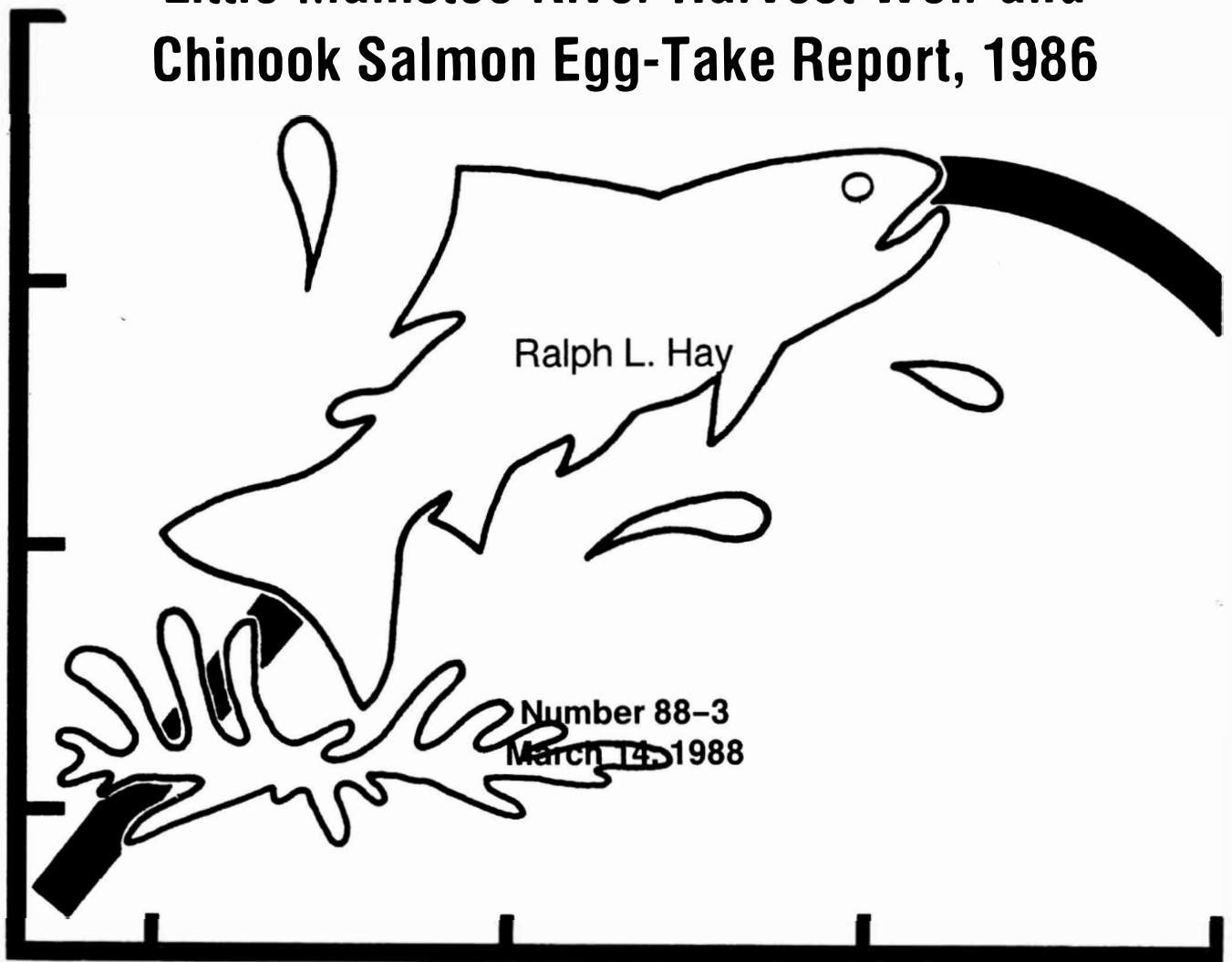


# FISHERIES DIVISION

## TECHNICAL REPORT

### Little Manistee River Harvest Weir and Chinook Salmon Egg-Take Report, 1986



Michigan Department of  
Natural Resources

**MICHIGAN DEPARTMENT OF NATURAL RESOURCES  
FISHERIES DIVISION**

**Fisheries Technical Report No. 88-3  
March 14, 1988**

**LITTLE MANISTEE RIVER HARVEST WEIR  
AND CHINOOK SALMON EGG-TAKE REPORT, 1986**

**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 80% to an average of nearly 588,000 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.<sup>1</sup> For the 1967, 1968, 1981, and 1982 year classes and plants, return rates were 0.4 to 1.9% at age 0.1, 3.1 to 3.5% at age 0.2, and 1.7 to 3.2% at age 0.3 (Table 3). For the 1981, and 1982 year classes, return rates were 1.2 and 1.1% at 0.4, respectively. 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, 6.8% for the 1981 plant, and 8.9% for the 1982 plant (Table 3). Returns from plants in the 1970's must have been lower because relatively low

---

<sup>1</sup>In 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.

numbers came back to the weir in 1976–77 and 1980–82 (Table 2). Large runs, averaging 32,032 fish per year, occurred from 1983 through 1986. These originated from average plants of about 580,000 smolts in 1978–85—an average return rate of about 5.5% 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 1986, the estimated sport harvest from all stocks of chinook salmon in Michigan waters of Lake Michigan which were surveyed was 514,000 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 7.6 to 20.9 pounds for age 0.2, and from 12.7 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 1986 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 averaged only 3.8% for the 1984–85 plants. The return of the 1985 plant to the Platte River was low also (Pecor 1987). Possible reasons for the poor returns were discussed by Pecor (1987). As with chinook, these return rates represent only the weir harvest and do not include the angler harvest, which has also fluctuated annually. In 1986, anglers harvested an estimated 135,000 coho salmon from all stocks in Michigan waters of Lake Michigan which were surveyed (G. Rakoczy, personal communication).

The average weight of coho jacks (age 1.0) increased slightly from 1974–83, then gradually decreased (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 6.3 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 sport harvest of steelhead from all Michigan waters of Lake Michigan which were surveyed was 35,000 in 1986 (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). Annual runs in excess of 100 fish have occurred since 1984. In 1986, the estimated sport harvest from Michigan waters of Lake Michigan which were surveyed was 74,000 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, 1986

On August 22, 1986, the weir grates were installed to block anadromous fish. On September 4, the ponds were filled and the fish ladder was activated. Harvest began on September 8. The weir remained operational until November 12, 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.

From September 9–11, 1986, heavy precipitation (5–7 inches) created severe flooding in the Little Manistee River. Water flowed over and around the weir for several days, allowing an unknown number of fish to negotiate the weir structure.

#### *Chinook salmon*

Harvest of chinook salmon began September 8 and ended November 7, a period of 61 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 late September and the second near mid-October (Table 9). 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 22,131 chinook were harvested

in 1986 (Table 2). The calculated total weight of all chinook, in the round, was 298,188 pounds.

For several weeks during the run, biological data were obtained from a randomly selected sample of 700 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 1986. 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 397 (1.8%) age-0.1 jacks weighing 1,684 pounds, 1,025 (4.6%) age-0.2 adults weighing 7,896 pounds, 13,850 (62.6%) age-0.3 adults weighing 173,230 pounds, 6,849 (30.9%) age-0.4 adults weighing 115,123 pounds, and 10 (<0.1%) age-0.5 adults weighing 255 pounds (Table 9). The 1986 run of jacks represented 0.1% of the fingerlings stocked in 1985. The returning age-0.2 adults were 0.1% of the 1984 plant, age-0.3 adults were 2.0% of the 1983 plant, age-0.4 adults were 1.1% of the 1982 plant, and age-0.5 adults were less than 0.1% of the 1981 plant.

Females constituted about 50% of the total run — 5.3% of age 0.1, 19.3% of age 0.2, 56.7% of age 0.3, and 44.9% of age 0.4. No age-0.5 females were collected (Table 9). Mean lengths and weights of males and females combined were: age 0.1, 21.0 inches and 4.2 pounds; age 0.2, 28.3 inches and 7.6 pounds; age 0.3, 33.6 inches and 12.7 pounds; age 0.4, 36.9 inches and 17.1 pounds; and age 0.5 (males only), 42.0 inches and 25.5 pounds (Table 11). Growth was nearly linear on a weight basis (Fig. 5). In general, females were slightly larger than males at each age.

The 1986 chinook egg-take operation began September 23 and ended October 24. During the 32-day period 17 million eggs were collected of which 13 million were for in-state rearing and 4 million were for out-of-state commitments (Table 12). A total of 3,572 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 6,000 females were handled to provide the 17 million eggs, a total run of 12,000 chinook (6,000/50% 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 1986. 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. Excluding the egg-take on September 26, the percent eye-up was normal for

chinook salmon with a range of 67.3% (September 29) to 73.0% (September 23 and 24) (Table 12). No explanation can be given for the very poor eye-up for eggs taken on September 26.

During the egg-take operation, maximum river water temperature was 61 °F (September 28) and minimum water temperature was 42 °F (October 18) (Fig. 6). Slightly over 50% of the eggs were collected when the river water temperature exceeded 50 °F.

Fecundity data were not collected in 1986.

No fin clips were found on 700 randomly examined chinook salmon.

Only 1.4% of the chinook sampled had a lamprey wound (Table 13). This was the highest since 1971, but still considerably below scarring rates in the 1960's and early 1970's.

### *Coho salmon*

In 1986 the coho harvest coincided with the chinook harvest (September 8 through November 7, a total of 61 days). Peak harvests occurred during the first and third weeks of September and since coho were not held for egg-take, the harvest dates roughly coincide with migration of coho into the river (Table 14). Like the chinook, the coho runs had decreased significantly by late October.

A total of 16,724 coho were harvested. The total weight calculated from biological samples was 92,165 pounds (Table 5). This was the second smallest harvest and rate of return since 1975.

The age composition of the harvested coho was 125 (0.7%) age-1.0 jacks weighing 177 pounds and 16,599 (99.3%) age-1.1 adults weighing 91,988 pounds (Table 14). The returning age-1.0 jacks were 0.04% of the 1986 plant and the age-1.1 adults were 4.4% of the 1985 plant.

All age-1.0 and 44.4% of the age-1.1 coho were males. The total run consisted of 55.2% females. Mean lengths and weights were: age-1.0 males, 16.3 inches and 1.4 pounds; age-1.1 males, 25.7 inches and 5.7 pounds; age-1.1 females, 25.0 inches and 5.5 pounds; and age-1.1 sexes combined, 25.3 inches and 5.5 pounds (Table 15). Adult males were slightly larger than females.

Only 0.1% of the coho had lamprey wounds (Table 13). This rate was significantly less than the 1960's.

No coho eggs were taken at the Little Manistee weir in 1986.

A total of 700 adult coho were randomly checked for fin clips. Of these fish, 2 (0.3%) had left ventral (LV) fin clips. These fish could have been planted in 1985 by the Michigan Department of Natural Resources into Lake Superior at Dead River (135,000Y), Black River (70,000Y), Portage Canal (52,000Y), or Munising Bay (45,000Y), or into Lake Michigan at the Platte River (60,000Y).

Skin color was examined on 700 coho salmon sampled at approximately weekly intervals (Table 16). Most early run coho had silver skin, however, as the season progressed, fish lost

their silver sheen and by late October most coho were dark colored. Females retained their silver color longer than males.

#### *Steelhead trout*

Fall steelhead began entering the river in late August and the run peaked during mid-October (Table 17). Approximately 50% of the total run occurred during this 2-week period. As in most previous years, all steelhead were passed above the weir.

The 1986 run of 4,720 fish was less than last year (6,356), but was the second best run since 1975 (Table 7). Forty-three percent (43%) of the returning adults were age 1.2 or 2.2 (Table 17). These two age groups also represented 49% of the total estimated weight of 34,342 pounds. Mean lengths and weights for 11 different age groups are given in Table 18 and Figure 7. Size of returning adults is more dependent upon years spent in Lake Michigan than on age at smolting.

A total of 588 steelhead were randomly checked for fin clips. Fifty-one (8.7%) had fin clips as follows:

| Fin clip                                     | Number of fish |
|--|----------------|
| Adipose (Ad)                                 | 1              |
| Dorsal-adipose (DAd)                         | 2              |
| Adipose-left ventral (AdLV)                  | 13             |
| Adipose-both ventrals (AdBV)                 | 17             |
| Adipose-right ventral (AdRV)                 | 2              |
| Adipose-left pectoral (AdLP)                 | 1              |
| Adipose-left pectoral-right ventral (AdLPRV) | 2              |
| Adipose-left pectoral-both ventrals (AdLPBV) | 3              |
| Left pectoral (LP)                           | 1              |
| Right pectoral (RP)                          | 2              |
| Right pectoral-left ventral (RPLV)           | 1              |
| Left pectoral-right ventral (LPRV)           | 1              |
| Both pectorals-right ventral (BPRV)          | 2              |
| Left ventral(LV)                             | 1              |
| Both ventrals (BV)                           | 1              |
| Adipose-right pectoral (AdRP)                | 1              |

The DAd fish (2) were planted in the Little Manistee River in 1983. The AdRV fish (2) and AdLP fish (1) were planted in Lake Michigan by Wisconsin in 1984. The AdLV fish (13 Umpqua strain of summer steelhead), AdBV fish (17 Siletz strain of summer steelhead), LPRV fish (1 Rogue strain of summer steelhead), and AdRP fish (1 Skamania strain of summer steelhead) were all planted in Lake Michigan by Michigan in 1984. Origins of the 14 remaining 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 has been 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 (Table 19). All but 10 brown trout were passed above the weir.

The 1986 run of 99 fish was down from the previous 2 years (Table 8). About 86% of the returning adults were age 1.1 or 1.2 (Table 19). These two age groups represented 85% of the total estimated weight of 554 pounds. Mean lengths and weights for the six represented age groups are given in Table 20 and Figure 8. Size of returning adults is more dependent upon years spent in Lake Michigan than on age at smolting.

A total of 93 brown trout were randomly checked for fin clips. Only 5 (5.4%) had fin clips. Observed fin clips were included: left pectoral (LP, 1 fish); right pectoral (RP, 1 fish); left pectoral-right pectoral (LPRP, 2 fish); and left maxillary (LM, 1 fish). Origins of these fish could not be determined because fin clips, age 1 from scales, and planting records did not coincide.

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 1986.

#### *Pink salmon*

No pink salmon were collected at the weir in 1986.

### SUMMARY

In 1986 the Little Manistee harvest weir was in operation from August 22 through November 12 (83 days). Harvest of chinook and coho salmon and passage of other anadromous salmonids occurred from September 8 through November 12.

The entire salmon run of 22,131 chinook (298,188 pounds) and 16,724 coho (92,165 pounds) was harvested and sold to Tempotech Industries, Hart, Michigan.

The chinook run consisted of 397 age-0.1 jacks (0.1% of the 1985 fingerling plant), 1,025 age-0.2 adults (0.1% of the 1984 fingerling plant), 13,850 age-0.3 adults (2.0% of the 1983 fingerling plant), 6,849 age-0.4 adults (1.1% of the 1982 fingerling plant), and 10 age-0.5 adults (less than 0.1% of the 1981 fingerling plant). Mean sizes were: age 0.1, 21.0 inches (4.2 pounds); age 0.2, 28.3 inches (7.6 pounds); age 0.3, 33.6 inches (12.7 pounds); age 0.4, 36.9 inches (17.1 pounds); and age 0.5, 42.0 inches (25.5 pounds). During chinook egg-take operations (September 23 through October 24) 3,572 females (ages 0.2, 0.3, and 0.4) were

stripped to obtain 16,613,648 eggs. The percent eye-up ranged from 18.5% (September 26) to 73.0% (September 23 and 24). During the first 9 days of egg-take, the river water temperature exceeded 50 °F.

The 1985 coho run was composed of 125 age-1.0 jacks (0.04% of the 1986 yearling plant) and 16,599 age-1.1 adults (4.4% of the 1985 yearling plant). Mean sizes were: age 1.0, 16.3 inches (1.4 pounds); and age 1.1, 25.3 inches (5.5 pounds).

The 1986 fall steelhead run of 4,720 fish included 11 different age groups. Forty-three percent (43%) of the fish were age 1.2 or 2.2 (three summers in Lake Michigan). Nearly two-thirds of the fin-clipped steelhead were summer strains (Umpqua, Siletz, Rogue, and Skamania) planted in Lake Michigan by Michigan in 1984.

The fall brown trout run of 99 fish was less than the previous 2 years. About 86% of the returning adults were age 1.1 or 1.2.

No Atlantic salmon or pink salmon returned to the weir in 1986.

#### **RECOMMENDATIONS FOR 1987**

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. Utilize the "dry" method for chinook egg-take. This method involves 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.

#### **ACKNOWLEDGMENTS**

Data collection, tabulation, and scale reading were done by Alfred Allen, Janice Sapak, Simeon Syrewicze, and Steve Lazar. Kelley Smith developed a computer program for data analyses and provided technical advice.

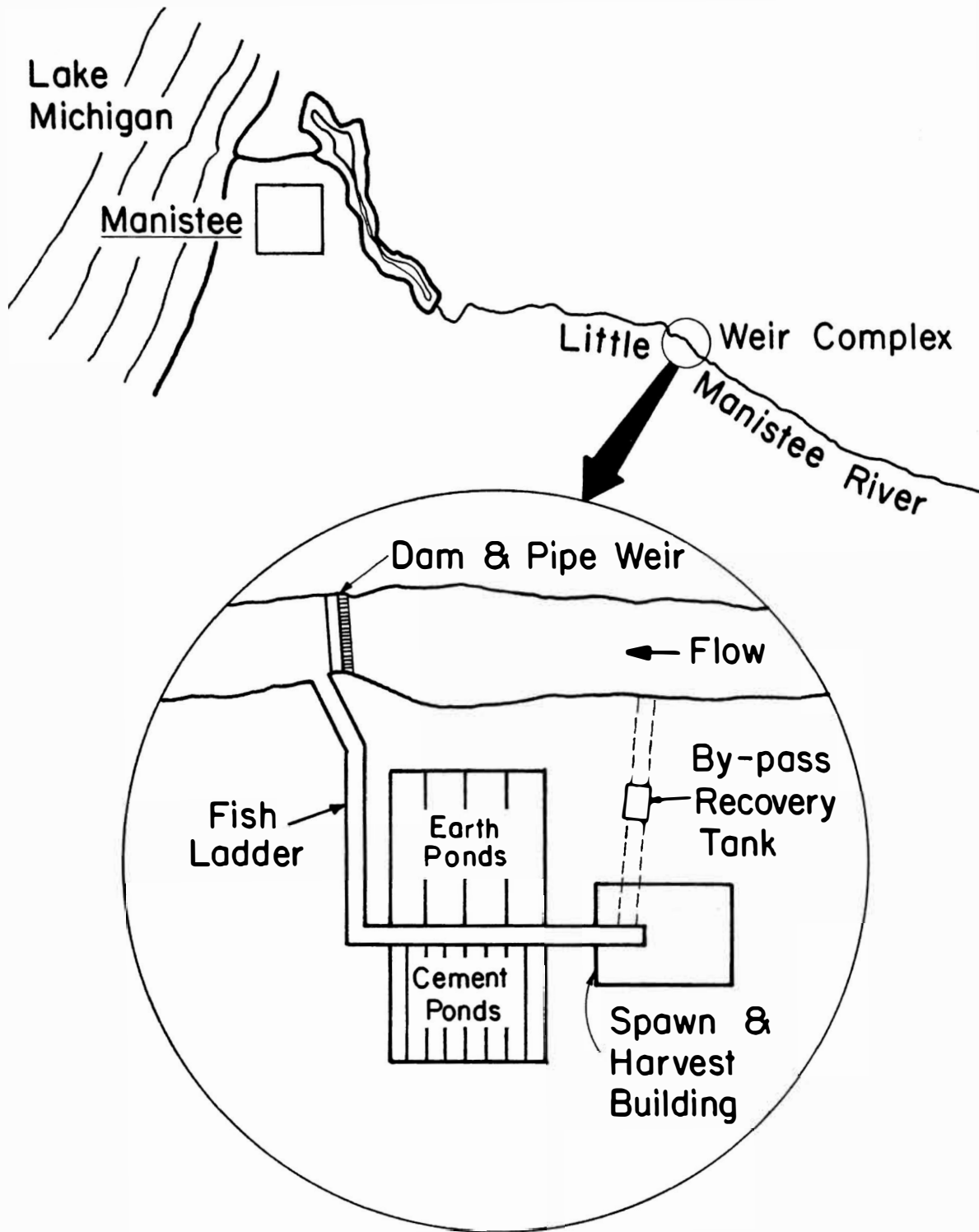


Figure 1. Location and schematic diagram of the Little Manistee River weir complex.

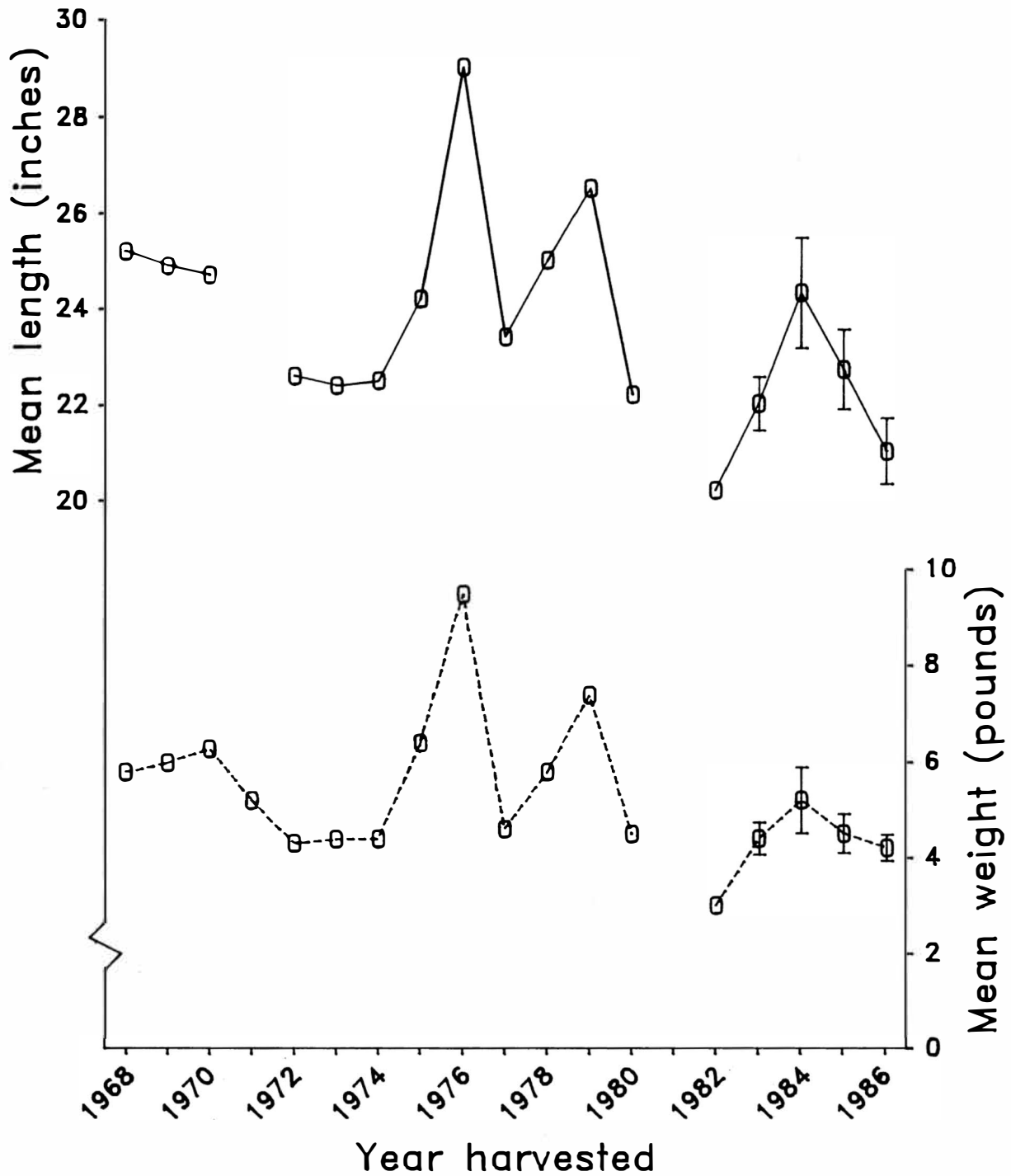


Figure 2. Mean total length (inches) and round weight (pounds) of age-0.1 (jack) chinook salmon harvested at the Little Manistee River weir. Vertical bars indicate two standard errors.

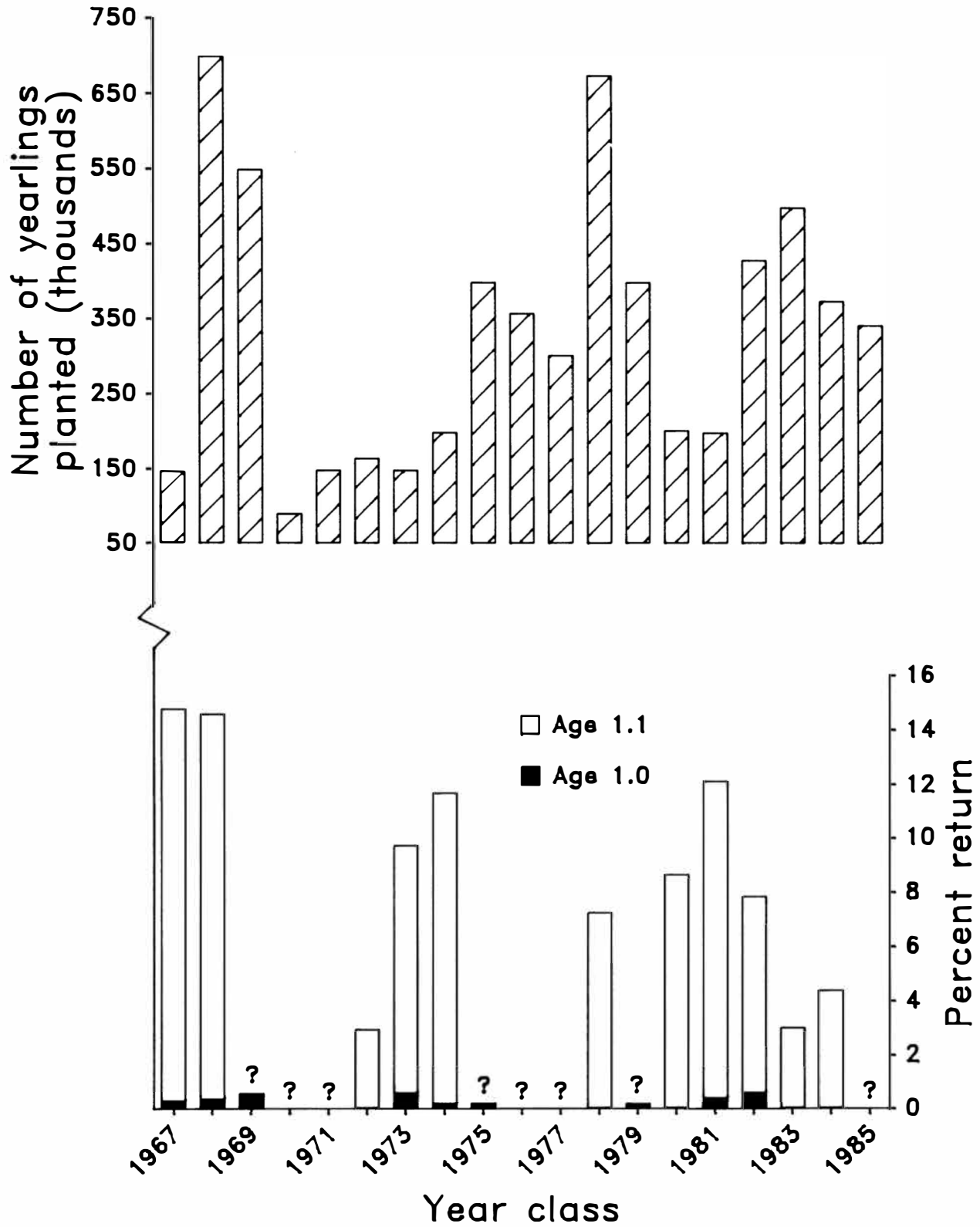


Figure 3. Percent return, by age, of coho salmon year classes to the Little Manistee River weir compared with the number of yearlings planted. Question marks (?) indicate incomplete return data.

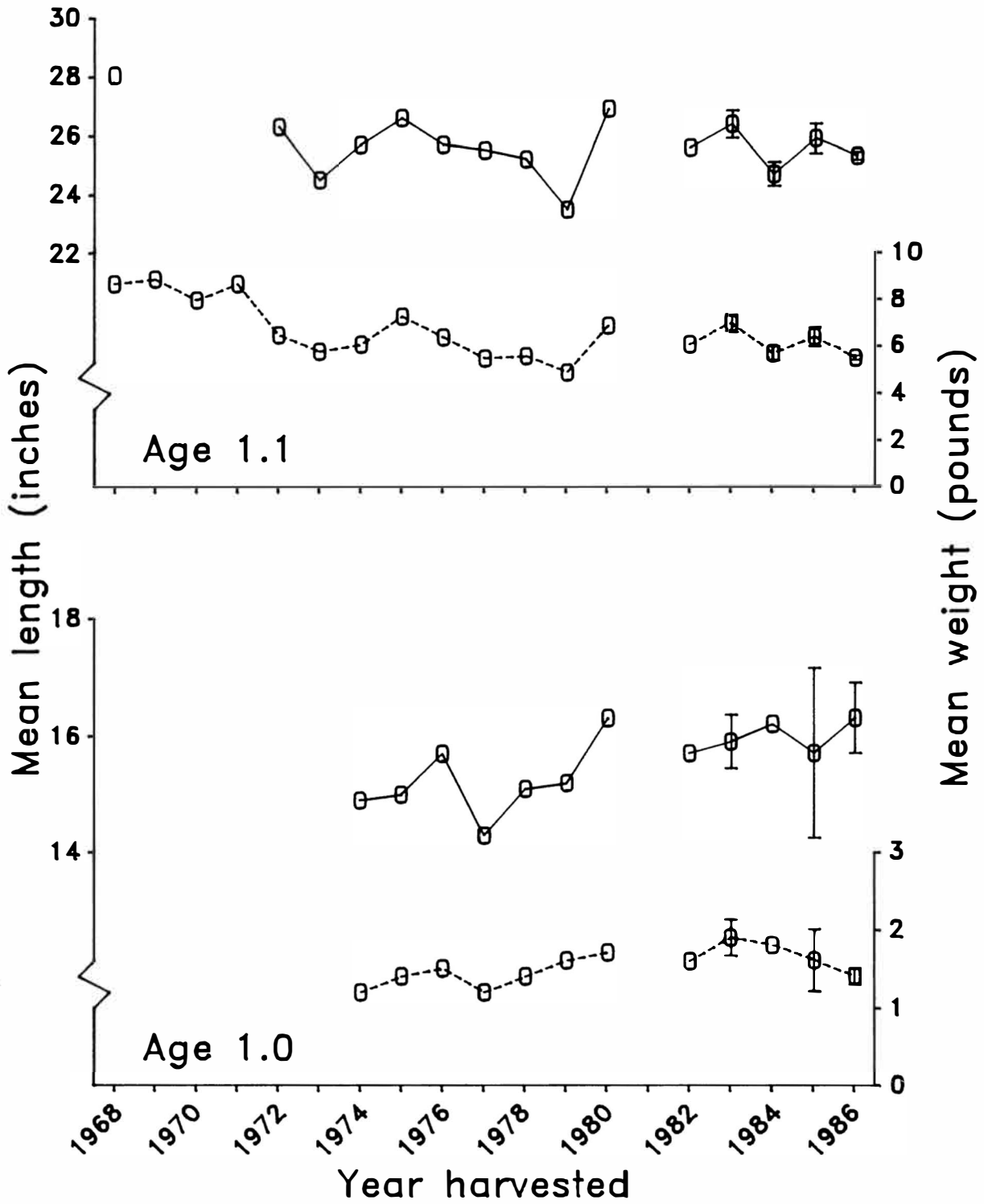


Figure 4. Mean total length (inches) and round weight (pounds) of age-1.0 and age-1.1 coho salmon harvested at the Little Manistee River weir. Vertical bars indicate two standard errors.

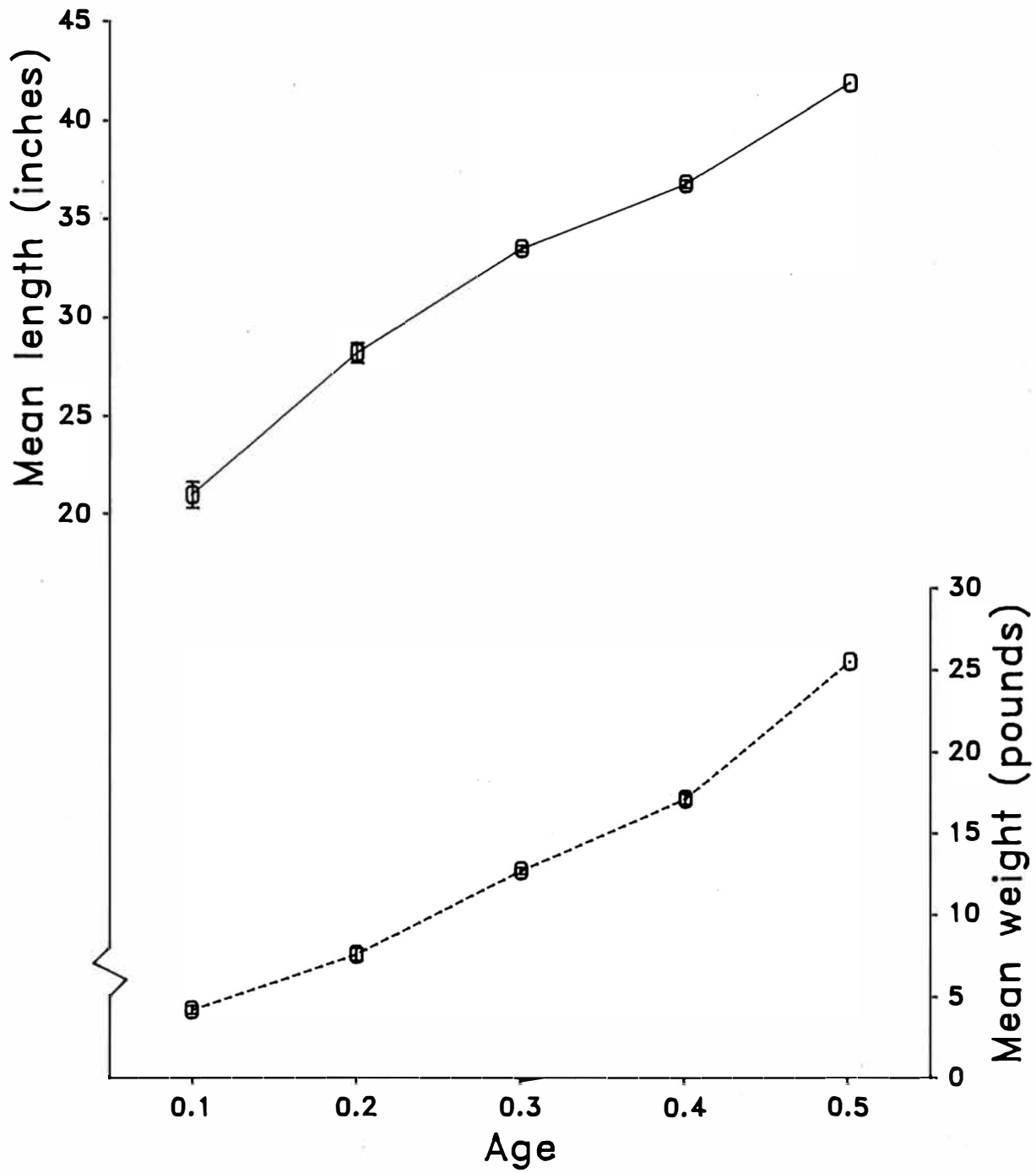


Figure 5. Mean total length (inches) and round weight (pounds), by age, of chinook salmon harvested at the Little Manistee River weir, fall 1986. Vertical bars indicate two standard errors.

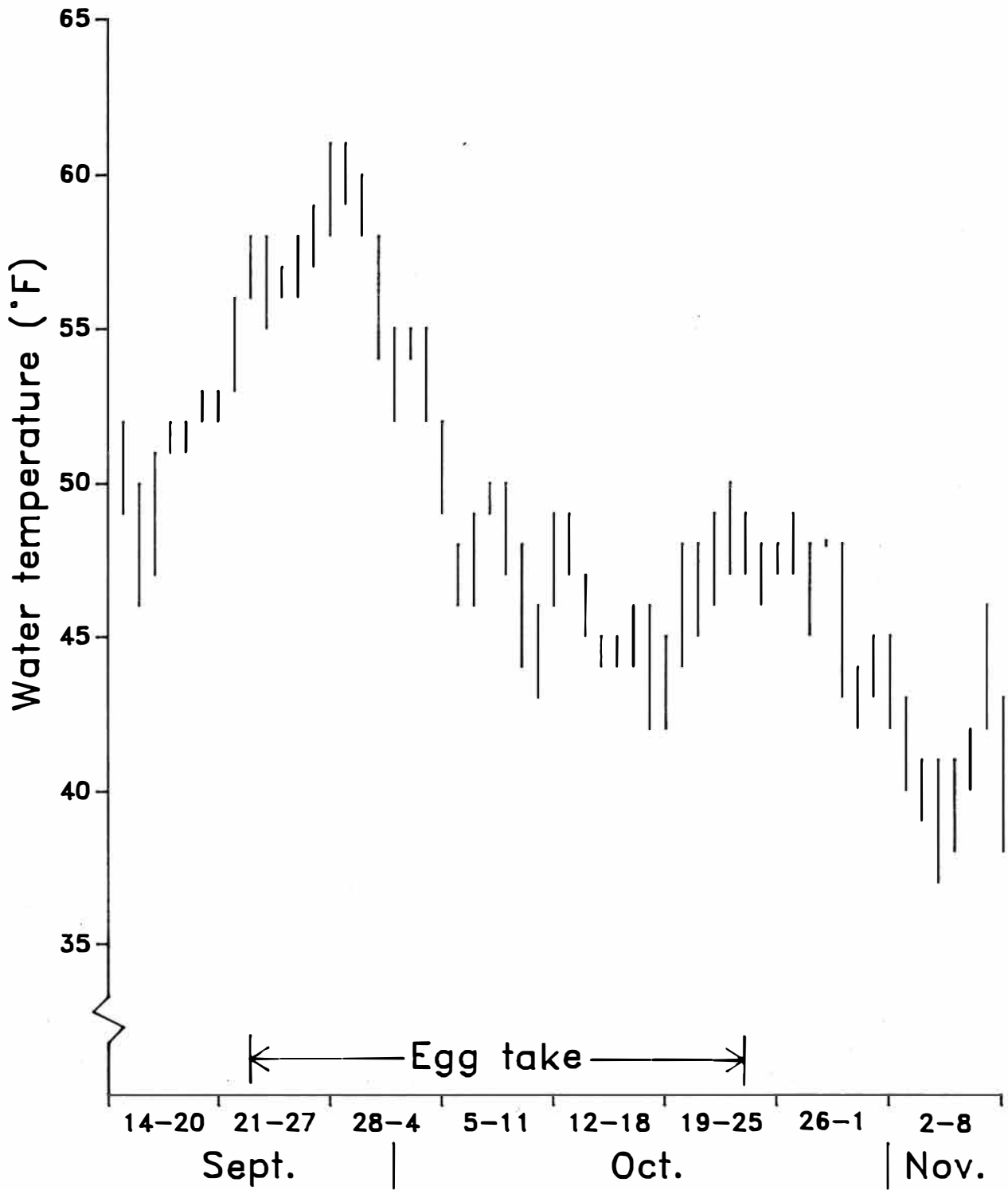


Figure 6. Daily minimum and maximum water temperatures for the Little Manistee River, fall 1986.



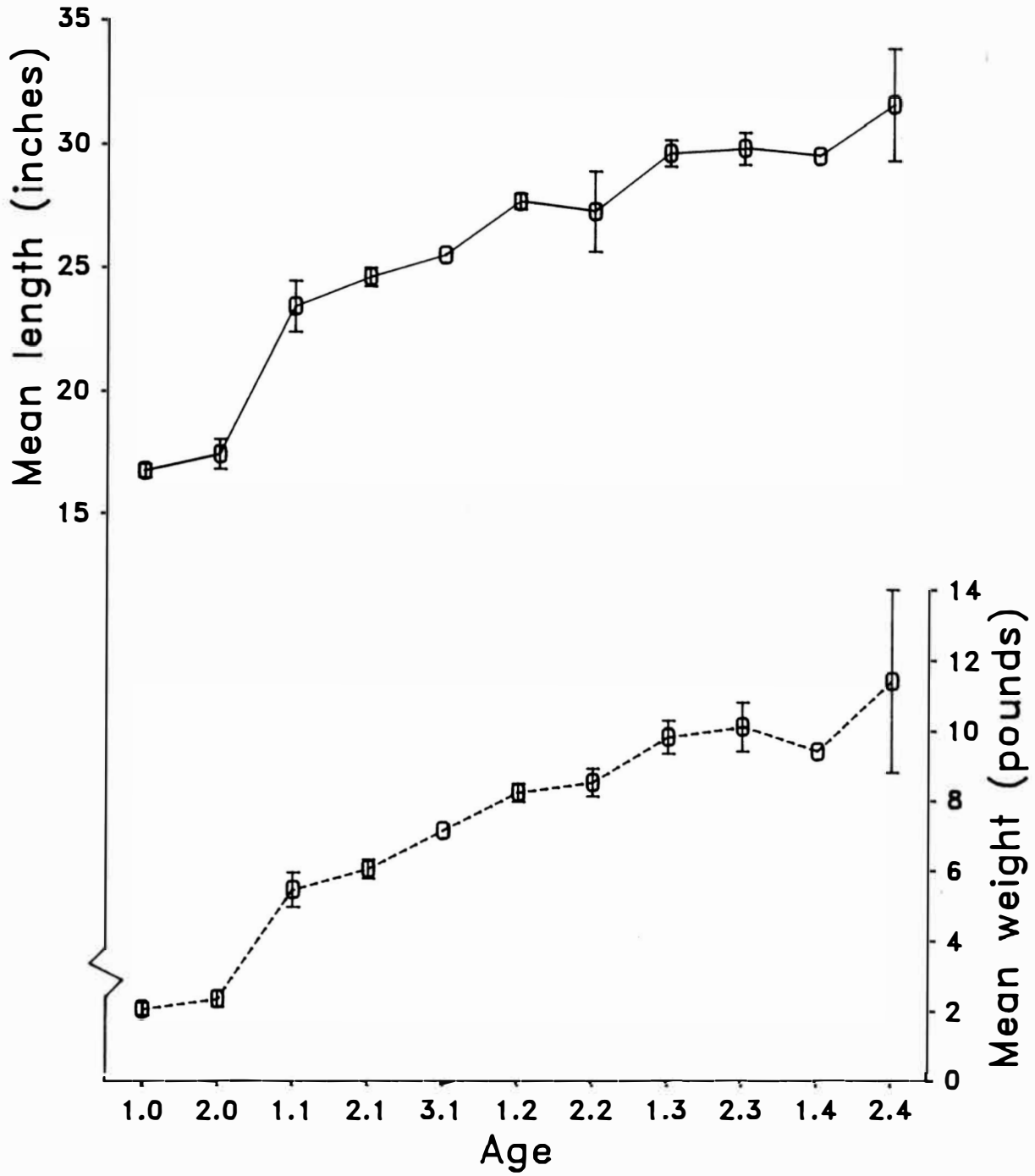


Figure 7. Mean total length (inches) and round weight (pounds), by age, of steelhead passed upstream at the Little Manistee River weir, fall 1986. Vertical bars indicate two standard errors.

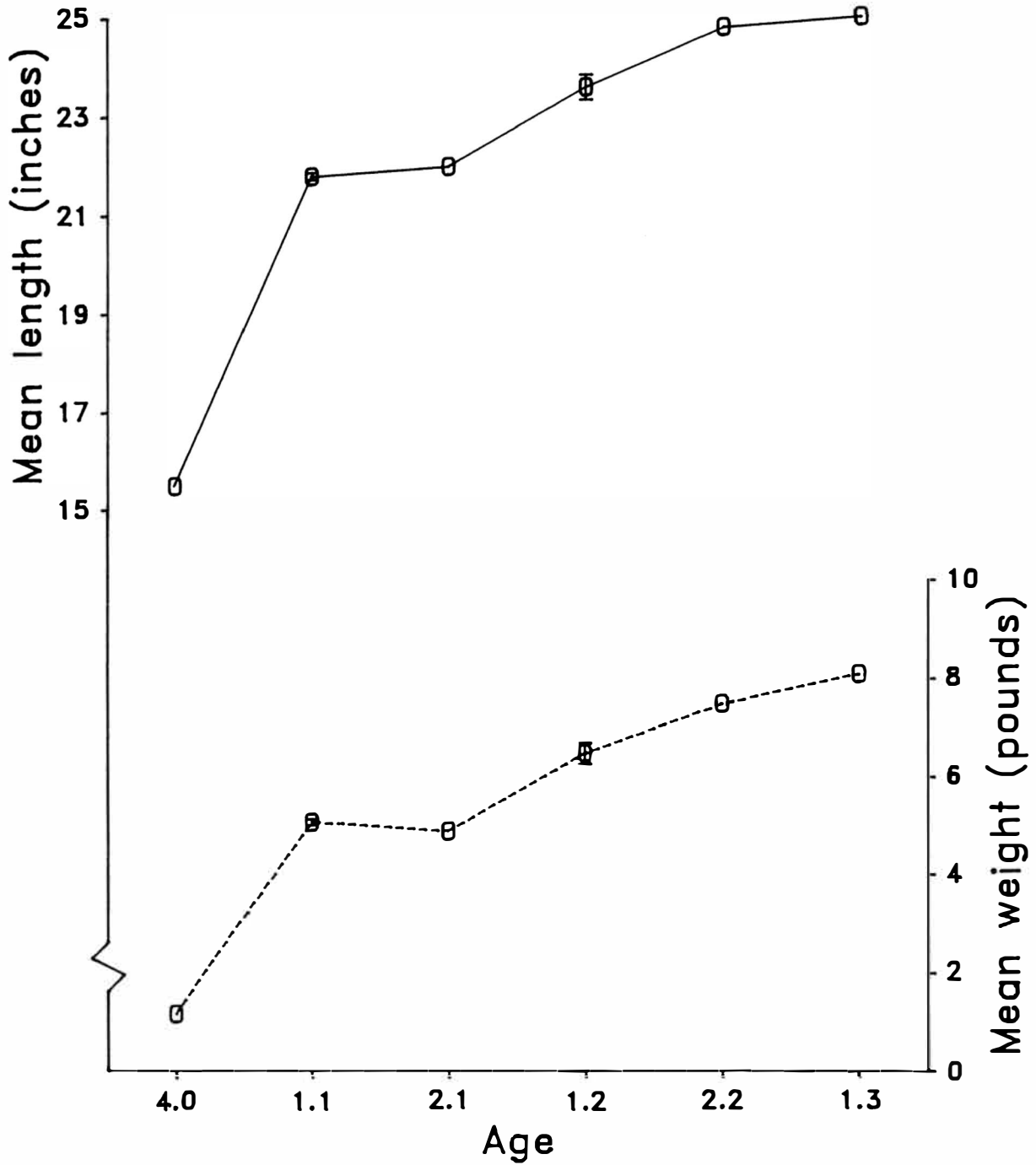


Figure 8. Mean total length (inches) and round weight (pounds), by age, of brown trout passed upstream at the Little Manistee River weir, fall 1986. Vertical bars indicate two standard errors.

Table 1. Planting history of anadromous salmonids in the Little Manistee River since 1967. Age of fish at planting are 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)<br>30,700(Y)   |
| 1982          | 600,294                        | 200,000      | 25,030           | 100,000(FF)<br>30,000(Y)  |
| 1983          | 677,250                        | 429,612      | —                | 16,428(Y)   |
| 1984          | 805,773                        | 500,066      | —                | 5,079(Y) <sup>1</sup><br>5,000(Y) <sup>2</sup><br>4,817(Y) <sup>3</sup> |
| 1985          | 500,012                        | 375,283      | —                | —   |
| 1986          | 450,273<br>19,721 <sup>4</sup> | 343,121      | —                | —   |
| Total         | 8,841,457                      | 6,777,866    | 67,056           | 293,861(FF)<br>92,024(Y)  |
| Average       | 442,073                        | 338,893      | 16,764           | 97,954(FF)<br>23,006(Y)   |

<sup>1</sup>Siletz River strain of summer steelhead.

<sup>2</sup>Rogue River strain of summer steelhead.

<sup>3</sup>Umpqua River strain of summer steelhead.

<sup>4</sup>Triploid chinook salmon.

Table 2. Number, by age, of chinook salmon harvested at the Little Manistee River weir, fall 1968–86. Weight (pounds) is in parentheses.

| Year | Age <sup>1</sup> |        |        |       |     | Adult <sup>2</sup> | Mortalities <sup>3</sup> | 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<br>(234,366) |
| 1981 | —                | —      | —      | —     | —   | —                  | —                        | 11,811<br>(188,939) |
| 1982 | 2,077            | —      | —      | —     | —   | 12,281             | —                        | 14,358<br>(165,412) |
| 1983 | 8,865            | 17,637 | 12,857 | —     | —   | —                  | —                        | 39,359<br>(534,595) |
| 1984 | 5,914            | 18,342 | 8,376  | —     | —   | —                  | —                        | 32,632<br>(436,057) |
| 1985 | 2,005            | 6,326  | 19,437 | 5,990 | 248 | —                  | —                        | 34,006<br>(442,153) |
| 1986 | 397              | 1,025  | 13,850 | 6,849 | 10  | —                  | —                        | 22,131<br>(298,188) |

<sup>1</sup>See footnote in Introduction about aging.

<sup>2</sup>Ages 0.2 through 0.5 combined.

<sup>3</sup>Mortalities are included under age group headings in some years.

Table 3. Numbers, and in parentheses percent, by age, of chinook and coho salmon in various year classes returning to the Little Manistee River weir 1 to 5 years after stocking.

| Year class                        | Number stocked | Age             |                 |                 |                |              | Total           |
|-----------------------------------|----------------|-----------------|-----------------|-----------------|----------------|--------------|-----------------|
|                                   |                | 0.1             | 0.2             | 0.3             | 0.4            | 0.5          |                 |
| <b><u>Chinook</u><sup>1</sup></b> |                |                 |                 |                 |                |              |                 |
| 1967                              | 590,830        | 11,230<br>(1.9) | 20,588<br>(3.5) | 18,420<br>(3.1) | —              | —            | 50,238<br>(8.5) |
| 1968                              | 321,912        | 5,700<br>(1.8)  | 11,100<br>(3.4) | 6,415<br>(2.0)  | —              | —            | 23,215<br>(7.2) |
| 1981                              | 500,204        | 2,077<br>(0.4)  | 17,637<br>(3.5) | 8,376<br>(1.7)  | 5,990<br>(1.2) | 10<br>(<0.0) | 34,090<br>(6.8) |
| 1982                              | 600,294        | 8,865<br>(1.5)  | 18,342<br>(3.1) | 19,437<br>(3.2) | 6,849<br>(1.1) | —            | 53,493<br>(8.9) |

| Year class         | Number stocked | Age            |                   | Total             |
|--------------------|----------------|----------------|-------------------|-------------------|
|                    |                | 1.0            | 1.1               |                   |
| <b><u>Coho</u></b> |                |                |                   |                   |
| 1967               | 148,365        | 501<br>(0.3)   | 22,306<br>(15.0)  | 22,807<br>(15.4)  |
| 1968               | 700,002        | 2,880<br>(0.4) | 105,006<br>(15.0) | 107,886<br>(15.4) |
| 1973               | 150,067        | 979<br>(0.7)   | 15,334<br>(10.2)  | 16,313<br>(10.9)  |
| 1974               | 200,601        | 492<br>(0.2)   | 23,525<br>(11.7)  | 24,017<br>(12.0)  |
| 1981               | 200,000        | 873<br>(0.4)   | 24,264<br>(12.1)  | 25,137<br>(12.6)  |
| 1982               | 429,612        | 2,704<br>(0.6) | 33,764<br>(7.9)   | 36,468<br>(8.5)   |
| 1983               | 500,066        | 218<br>(<0.0)  | 15,177<br>(3.0)   | 15,395<br>(3.1)   |
| 1984               | 375,283        | 79<br>(<0.0)   | 16,599<br>(4.4)   | 16,678<br>(4.4)   |

<sup>1</sup>See footnote in Introduction about aging.

Table 4. Mean total length (L, in inches) and weight (W, in pounds), by age, of chinook salmon harvested at the Little Manistee weir, fall 1968–86. For chinook in 1972–75 and 1982, lengths and weights shown under age 0.2 are for ages 0.2 and older combined.

| Year | Age  |     |      |      |      |      |      |      |      |      |
|------|------|-----|------|------|------|------|------|------|------|------|
|      | 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 |
| 1986 | 21.0 | 4.2 | 28.3 | 7.6  | 33.6 | 12.7 | 36.9 | 17.1 | 42.0 | 25.5 |

<sup>1</sup> Ages of chinook prior to 1977 were determined from length-frequency distributions; in 1977–80 and 1983–86, from scale samples and length-frequency distributions. See footnote in Introduction regarding uncertainties of aging age-0.2 and older chinook.

Table 5. Number, by age, of coho salmon harvested at the Little Manistee River weir, fall 1968-86. Weight (pounds) is in parentheses.

| Year | Age   |         | Mortalities <sup>1</sup> | 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)  |
| 1986 | 125   | 16,599  | —                        | 16,724    |
|      | —     | —       | —                        | (92,165)  |

<sup>1</sup>Mortalities are included under age group headings in some years.

Table 6. Mean total length (L, in inches) and weight (W, in pounds), by age, of coho salmon harvested at the Little Manistee River weir, fall 1968-86.

| Year              | Age  |     |      |     |
|-------------------|------|-----|------|-----|
|                   | 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 <sup>1</sup> | 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 |
| 1986              | 16.3 | 1.4 | 25.3 | 5.5 |

<sup>1</sup>Ages of coho in 1980 were determined from a length-frequency distribution.



Table 7. Number and mean total length (L, in inches) and weight (W, in pounds) of steelhead (ages combined) collected at the Little Manistee River weir, fall 1968–86.

| 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 <sup>1</sup> | 27          | 1,926 | 24.3 | 6.5 |
| 1974 | 2,270  | 1,200 <sup>1</sup> | 18          | 3,488 | 26.4 | 7.3 |
| 1975 | 4,722  | 1,300 <sup>1</sup> | 99          | 6,121 | 26.7 | 8.0 |
| 1976 | 503    | 45                 | 30          | 578   | 26.8 | 7.6 |
| 1977 | 2,031  | —                  | —           | 2,031 | 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 |
| 1986 | 4,646  | 16 <sup>2</sup>    | 58          | 4,720 | 26.0 | 7.3 |

<sup>1</sup>Transferred to Big Manistee and Pine rivers.

<sup>2</sup>Summer strain steelhead transferred to Wolf Lake Hatchery.

Table 8. Number and mean total length (L, in inches) and weight (W, in pounds) of brown trout (ages combined) collected at the Little Manistee River weir, fall 1968-86.

| Year | Number |             |       | Mean   |        |
|------|--------|-------------|-------|--------|--------|
|      | Passed | Mortalities | Total | Length | Weight |
| 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    |
| 1986 | 89     | 10          | 99    | 22.4   | 5.6    |

Table 9. Summary of the number and weight, by age and sex, of chinook salmon harvested at Little Manistee River weir, fall 1986. Weight of stripped females was recalculated into round weight and, therefore, the total weight of chinook does not correspond with the weight shipped to Tempotech Industries.

| Week beginning | Male   |        | Female |         | Total  |         |
|----------------|--------|--------|--------|---------|--------|---------|
|                | Number | Pounds | Number | Pounds  | Number | Pounds  |
| <b>Age 0.1</b> |        |        |        |         |        |         |
| 9/07           | 185    | 872    | —      | —       | 185    | 872     |
| 9/14           | 31     | 123    | —      | —       | 31     | 123     |
| 9/21           | 104    | 380    | —      | —       | 104    | 380     |
| 9/28           | 35     | 130    | —      | —       | 35     | 130     |
| 10/05          | —      | —      | —      | —       | —      | —       |
| 10/12          | —      | —      | —      | —       | —      | —       |
| 10/19          | 21     | 95     | 21     | 84      | 42     | 179     |
| 10/26          | —      | —      | —      | —       | —      | —       |
| 11/02          | —      | —      | —      | —       | —      | —       |
| Total          | 376    | 1,600  | 21     | 84      | 397    | 1,684   |
| (Percent)      | (1.7)  | (0.5)  | (0.1)  | (<0.0)  | (1.8)  | (0.6)   |
| <b>Age 0.2</b> |        |        |        |         |        |         |
| 9/07           | 82     | 668    | 41     | 344     | 123    | 1,012   |
| 9/14           | 31     | 230    | 10     | 95      | 41     | 325     |
| 9/21           | 130    | 1,011  | 26     | 156     | 156    | 1,167   |
| 9/28           | 177    | 1,161  | —      | —       | 177    | 1,161   |
| 10/05          | 78     | 611    | 26     | 226     | 104    | 837     |
| 10/12          | 220    | 1,716  | 74     | 644     | 294    | 2,360   |
| 10/19          | 83     | 691    | 21     | 195     | 104    | 886     |
| 10/26          | 17     | 97     | —      | —       | 17     | 97      |
| 11/02          | 9      | 51     | —      | —       | 9      | 51      |
| Total          | 827    | 6,236  | 198    | 1,660   | 1,025  | 7,896   |
| (Percent)      | (3.7)  | (2.1)  | (0.9)  | (0.6)   | (4.6)  | (2.6)   |
| <b>Age 0.3</b> |        |        |        |         |        |         |
| 9/07           | 411    | 5,121  | 884    | 11,467  | 1,295  | 16,588  |
| 9/14           | 261    | 3,304  | 396    | 5,233   | 657    | 8,537   |
| 9/21           | 518    | 5,905  | 1,218  | 15,748  | 1,736  | 21,653  |
| 9/28           | 994    | 12,602 | 1,278  | 17,253  | 2,272  | 29,855  |
| 10/05          | 752    | 8,855  | 778    | 9,769   | 1,530  | 18,624  |
| 10/12          | 2,129  | 25,122 | 2,203  | 27,758  | 4,332  | 52,880  |
| 10/19          | 647    | 7,501  | 751    | 9,986   | 1,398  | 17,487  |
| 10/26          | 185    | 2,139  | 218    | 2,723   | 403    | 4,862   |
| 11/02          | 104    | 1,206  | 123    | 1,538   | 227    | 2,744   |
| Total          | 6,001  | 71,755 | 7,849  | 101,475 | 13,850 | 173,230 |
| (Percent)      | (27.1) | (24.1) | (35.5) | (34.0)  | (62.6) | (58.1)  |

Table 9. Continued:

| Week<br>beginning | Male   |        | Female |        | Total  |         |
|-------------------|--------|--------|--------|--------|--------|---------|
|                   | Number | Pounds | Number | Pounds | Number | Pounds  |
| <b>Age 0.4</b>    |        |        |        |        |        |         |
| 9/07              | 226    | 4,015  | 226    | 3,754  | 452    | 7,769   |
| 9/14              | 156    | 2,711  | 146    | 2,239  | 302    | 4,950   |
| 9/21              | 155    | 2,818  | 440    | 8,003  | 595    | 10,821  |
| 9/28              | 745    | 12,949 | 319    | 5,707  | 1,064  | 18,656  |
| 10/05             | 570    | 9,146  | 389    | 6,597  | 959    | 15,743  |
| 10/12             | 1,615  | 25,840 | 1,101  | 18,717 | 2,716  | 44,557  |
| 10/19             | 146    | 2,380  | 396    | 6,747  | 542    | 9,127   |
| 10/26             | 101    | 1,626  | 39     | 611    | 140    | 2,237   |
| 11/02             | 57     | 918    | 22     | 345    | 79     | 1,263   |
| Total             | 3,771  | 62,403 | 3,078  | 52,720 | 6,849  | 115,123 |
| (Percent)         | (17.0) | (20.9) | (13.9) | (17.7) | (30.9) | (38.6)  |
| <b>Age 0.5</b>    |        |        |        |        |        |         |
| 9/07              | —      | —      | —      | —      | —      | —       |
| 9/14              | 10     | 255    | —      | —      | 10     | 255     |
| 9/21              | —      | —      | —      | —      | —      | —       |
| 9/28              | —      | —      | —      | —      | —      | —       |
| 10/05             | —      | —      | —      | —      | —      | —       |
| 10/12             | —      | —      | —      | —      | —      | —       |
| 10/19             | —      | —      | —      | —      | —      | —       |
| 10/26             | —      | —      | —      | —      | —      | —       |
| 11/02             | —      | —      | —      | —      | —      | —       |
| Total             | 10     | 255    | —      | —      | 10     | 255     |
| (Percent)         | (<0.0) | (0.1)  | —      | —      | (<0.0) | (0.1)   |

Table 10. Length-age distribution (in percent of inch group) for chinook salmon scale sampled during creel census at Pentwater, Ludington, Manistee, Frankfort, Leland, Grand Traverse Bay, Manistee Lake, Big Manistee River, Betsie River, and Platte River, September-November 1986.<sup>1</sup>

| Length<br>(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  |

<sup>1</sup>Table developed by District 6 personnel at the Harrietta warehouse.

Table 11. Mean total length (inches) and weight (pounds), by age and sex, of chinook salmon harvested at the Little Manistee River weir, fall 1986. Two standard errors in parentheses.

| Week beginning | Measurement | Age             |           |                 |                 |                 |                 |
|----------------|-------------|-----------------|-----------|-----------------|-----------------|-----------------|-----------------|
|                |             | 0.1             |           | 0.2             |                 | 0.3             |                 |
|                |             | Male            | Female    | Male            | Female          | Male            | Female          |
| 9/07           | Length      | 21.1<br>(0.773) | —         | 29.4<br>(0.465) | 28.9<br>(0.600) | 33.5<br>(0.882) | 33.5<br>(0.396) |
|                | Weight      | 4.7<br>(0.493)  | —         | 8.1<br>(0.777)  | 8.4<br>(2.200)  | 12.5<br>(0.800) | 13.0<br>(0.526) |
| 9/14           | Length      | 21.6<br>(0.467) | —         | 27.2<br>(3.180) | 31.9<br>—       | 33.7<br>(1.005) | 33.5<br>(0.503) |
|                | Weight      | 4.0<br>(0.968)  | —         | 7.4<br>(2.439)  | 9.5<br>—        | 12.7<br>(0.932) | 13.2<br>(0.603) |
| 9/21           | Length      | 20.5<br>(1.005) | —         | 28.9<br>(0.841) | 28.7<br>—       | 32.9<br>(0.904) | 33.5<br>(0.426) |
|                | Weight      | 3.7<br>(0.252)  | —         | 7.8<br>(1.011)  | 6.0<br>—        | 11.4<br>(0.908) | 12.9<br>(0.685) |
| 9/28           | Length      | 21.0<br>—       | —         | 26.3<br>(1.743) | —               | 34.2<br>(0.664) | 33.7<br>(0.289) |
|                | Weight      | 3.7<br>—        | —         | 6.6<br>(1.007)  | —               | 12.7<br>(0.718) | 13.5<br>(0.518) |
| 10/05          | Length      | —               | —         | 28.3<br>(0.333) | 30.0<br>—       | 34.1<br>(0.831) | 33.7<br>(0.463) |
|                | Weight      | —               | —         | 7.8<br>(0.851)  | 8.7<br>—        | 11.8<br>(0.723) | 12.6<br>(0.660) |
| 10/19          | Length      | 23.7<br>—       | 19.4<br>— | 29.1<br>(0.287) | 30.4<br>—       | 33.2<br>(0.816) | 33.3<br>(0.621) |
|                | Weight      | 4.5<br>—        | 4.0<br>—  | 8.3<br>(0.263)  | 9.3<br>—        | 11.6<br>(0.692) | 13.3<br>(0.606) |

Table 11. Continued:

| Week beginning         | Measurement | Age     |        |         |         |         |         |
|------------------------|-------------|---------|--------|---------|---------|---------|---------|
|                        |             | 0.1     |        | 0.2     |         | 0.3     |         |
|                        |             | Male    | Female | Male    | Female  | Male    | Female  |
| 10/26                  | Length      | —       | —      | 26.5    | —       | 34.0    | 33.4    |
|                        |             | —       | —      | (1.964) | —       | (0.673) | (0.375) |
|                        | Weight      | —       | —      | 5.7     | —       | 11.6    | 12.5    |
|                        |             | —       | —      | (1.361) | —       | (0.573) | (0.491) |
| Weighted seasonal mean | Length      | 21.1    | 19.4   | 28.0    | 29.6    | 33.7    | 33.6    |
|                        |             | (0.543) | —      | (0.570) | (0.585) | (0.322) | (0.170) |
|                        | Weight      | 4.3     | 4.0    | 7.5     | 8.2     | 12.1    | 13.1    |
|                        |             | (0.303) | —      | (0.415) | (2.146) | (0.308) | (0.244) |
| Sexes combined         | Length      | 21.0    |        | 28.3    |         | 33.6    |         |
|                        |             | (0.683) |        | (0.507) |         | (0.165) |         |
|                        | Weight      | 4.2     |        | 7.6     |         | 12.7    |         |
|                        |             | (0.273) |        | (0.386) |         | (0.197) |         |

Table 11. Continued:

| Week beginning | Measure-ment | Age             |                 |      |        |
|----------------|--------------|-----------------|-----------------|------|--------|
|                |              | 0.4             |                 | 0.5  |        |
|                |              | Male            | Female          | Male | Female |
| 9/07           | Length       | 37.3<br>(0.882) | 35.9<br>(0.562) | —    | —      |
|                | Weight       | 17.8<br>(1.390) | 16.6<br>(1.266) | —    | —      |
| 9/14           | Length       | 37.4<br>(0.670) | 35.6<br>(0.408) | 42.0 | —      |
|                | Weight       | 17.4<br>(1.103) | 15.3<br>(0.697) | 25.5 | —      |
| 9/21           | Length       | 38.1<br>(0.876) | 36.7<br>(0.612) | —    | —      |
|                | Weight       | 18.2<br>(2.967) | 18.2<br>(1.129) | —    | —      |
| 9/28           | Length       | 37.5<br>(0.590) | 36.5<br>(0.607) | —    | —      |
|                | Weight       | 17.4<br>(0.767) | 17.9<br>(1.275) | —    | —      |
| 10/05          | Length       | 37.5<br>(0.501) | 36.7<br>(0.692) | —    | —      |
|                | Weight       | 16.0<br>(0.851) | 17.0<br>(1.203) | —    | —      |
| 10/19          | Length       | 37.7<br>(1.003) | 36.1<br>(0.405) | —    | —      |
|                | Weight       | 16.3<br>(0.807) | 17.0<br>(0.769) | —    | —      |



Table 11. Continued:

| Week beginning         | Measurement | Age             |                 |           |        |
|------------------------|-------------|-----------------|-----------------|-----------|--------|
|                        |             | 0.4             |                 | 0.5       |        |
|                        |             | Male            | Female          | Male      | Female |
| 10/26                  | Length      | 37.1<br>(0.647) | 35.8<br>(0.438) | —         | —      |
|                        | Weight      | 16.1<br>(1.105) | 15.7<br>(0.733) | —         | —      |
| Weighted seasonal mean | Length      | 37.5<br>(0.284) | 36.3<br>(0.239) | 42.0<br>— | —<br>— |
|                        | Weight      | 17.0<br>(0.450) | 17.2<br>(0.453) | 25.5<br>— | —<br>— |
| Sexes combined         | Length      | 36.9<br>(0.203) |                 | 42.0<br>— |        |
|                        | Weight      | 17.1<br>(0.318) |                 | 25.5<br>— |        |

Table 12. Summary of the chinook egg-take operation at the Little Manistee River weir, fall 1986.. Eggs taken on September 23-24, 1986, were "eyed" at Wolf Lake Hatchery then transferred to Platte River Hatchery for rearing.

| Date         | Number of females stripped | Number of eggs collected | Percent eye-up | Destination      |
|--------------|----------------------------|--------------------------|----------------|------------------|
| 9/19         | 6                          | 24,739                   | —              | MSU*             |
| 9/23         | 242                        | 997,800                  | 73.0           | Wolf Lake        |
| 9/24         | 240                        | 1,222,920                | 73.0           | Wolf Lake        |
| 9/26         | 290                        | 1,471,000                | 18.5           | Thompson         |
| 9/27         | 284                        | 1,200,000                | 72.9           | Platte River     |
| 9/29         | 252                        | 1,104,232                | 67.3           | Platte River     |
| 9/30         | 244                        | 1,070,972                | 69.4           | Platte River     |
| 9/30         | 6                          | 26,335                   | —              | MSU*             |
| 10/01        | 288                        | 1,383,616                | 70.0           | Platte River     |
| 10/02        | 282                        | 1,233,946                | 71.4           | Platte River     |
| 10/06        | 198                        | 907,428                  | —              | Indiana          |
| 10/07        | 234                        | 1,094,254                | —              | Illinois         |
| 10/09        | 20                         | 90,000                   | —              | MSU*             |
| 10/09        | 138                        | 621,000                  | —              | Wolf Lake (MSU)* |
| 10/13        | 278                        | 1,263,880                | —              | South Dakota     |
| 10/14        | 18                         | 90,000                   | —              | MSU*             |
| 10/14        | 132                        | 665,200                  | —              | South Dakota     |
| 10/15        | 204                        | 1,147,998                | —              | Wolf Lake        |
| 10/16        | 210                        | 968,328                  | —              | Wolf Lake (MSU)* |
| 10/24        | 6                          | 30,000                   | —              | MSU*             |
| Total        | 3,572                      | 16,613,648               | —              |                  |
| In-state     | 2,730                      | 12,682,886               | —              |                  |
| Out-of-state | 842                        | 3,930,762                | —              |                  |

\*MSU = Michigan State University.

Table 13. Percent lamprey scarring of anadromous salmonids captured at the Little Manistee River weir, fall 1968–86.

| 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       | <0.1  |
| 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   |
| 1986 | 1.4     | 0.1  | 0.2       | 0.0   |

Table 14. Summary of the number and weight, by age and sex, of coho salmon harvested at the Little Manistee River weir, fall 1986.

| Week<br>beginning | Male   |        | Female |        | Total  |        |
|-------------------|--------|--------|--------|--------|--------|--------|
|                   | Number | Pounds | Number | Pounds | Number | Pounds |
| <b>Age 1.0</b>    |        |        |        |        |        |        |
| 9/07              | 81     | 117    | —      | —      | 81     | 117    |
| 9/14              | 14     | 15     | —      | —      | 14     | 15     |
| 9/21              | —      | —      | —      | —      | —      | —      |
| 9/28              | 26     | 39     | —      | —      | 26     | 39     |
| 10/05             | 4      | 6      | —      | —      | 4      | 6      |
| 10/12             | —      | —      | —      | —      | —      | —      |
| 10/19             | —      | —      | —      | —      | —      | —      |
| 10/26             | —      | —      | —      | —      | —      | —      |
| 11/02             | —      | —      | —      | —      | —      | —      |
| Total             | 125    | 177    | —      | —      | 125    | 177    |
| (Percent)         | (0.7)  | (0.02) | —      | —      | (0.7)  | (0.2)  |
| <b>Age 1.1</b>    |        |        |        |        |        |        |
| 9/07              | 2,425  | 13,152 | 1,536  | 8,133  | 3,961  | 21,285 |
| 9/14              | 793    | 4,777  | 584    | 3,186  | 1,377  | 7,963  |
| 9/21              | 1,471  | 8,578  | 2,733  | 15,141 | 4,204  | 23,719 |
| 9/28              | 1,052  | 5,704  | 1,551  | 8,270  | 2,603  | 13,974 |
| 10/05             | 178    | 961    | 262    | 1,389  | 440    | 2,350  |
| 10/12             | 585    | 3,289  | 687    | 3,595  | 1,272  | 6,884  |
| 10/19             | 552    | 3,358  | 1,230  | 7,082  | 1,782  | 10,440 |
| 10/26             | 200    | 1,167  | 406    | 2,223  | 606    | 3,390  |
| 11/02             | 117    | 679    | 237    | 1,304  | 354    | 1,983  |
| Total             | 7,373  | 41,665 | 9,226  | 50,323 | 16,599 | 91,988 |
| (Percent)         | (44.1) | (45.2) | (55.2) | (54.6) | (99.3) | (99.8) |

Table 15. Mean total length (inches) and weight (pounds), by age and sex, of coho salmon harvested at the Little Manistee River weir, fall 1986. Two standard errors in parentheses.

| Week beginning            | Measure-<br>ment | Age             |        |                 |                 |
|---------------------------|------------------|-----------------|--------|-----------------|-----------------|
|                           |                  | 1.0             |        | 1.1             |                 |
|                           |                  | Male            | Female | Male            | Female          |
| 9/07                      | Length           | 15.9<br>(0.600) | —      | 25.4<br>(0.438) | 25.0<br>(0.578) |
|                           | Weight           | 1.5<br>(0.100)  | —      | 5.4<br>(0.327)  | 5.3<br>(0.372)  |
| 9/14                      | Length           | 14.4<br>—       | —      | 26.1<br>(0.462) | 25.1<br>(0.497) |
|                           | Weight           | 1.1<br>—        | —      | 6.0<br>(0.368)  | 5.5<br>(0.357)  |
| 9/21                      | Length           | —               | —      | 25.7<br>(0.455) | 24.8<br>(0.331) |
|                           | Weight           | —               | —      | 5.8<br>(0.352)  | 5.5<br>(0.228)  |
| 9/28                      | Length           | 18.5<br>—       | —      | 25.8<br>(0.426) | 25.0<br>(0.371) |
|                           | Weight           | 1.5<br>—        | —      | 5.4<br>(0.285)  | 5.3<br>(0.252)  |
| 10/12                     | Length           | —               | —      | 26.0<br>(0.481) | 24.9<br>(0.453) |
|                           | Weight           | —               | —      | 5.6<br>(0.376)  | 5.2<br>(0.314)  |
| 10/19                     | Length           | —               | —      | 26.2<br>(0.539) | 25.0<br>(0.365) |
|                           | Weight           | —               | —      | 6.1<br>(0.390)  | 5.8<br>(0.244)  |
| 10/26                     | Length           | —               | —      | 26.3<br>(0.662) | 25.4<br>(0.319) |
|                           | Weight           | —               | —      | 5.8<br>(0.436)  | 5.5<br>(0.252)  |
| Weighted<br>seasonal mean | Length           | 16.3<br>(0.593) | —      | 25.7<br>(0.201) | 25.0<br>(0.172) |
|                           | Weight           | 1.4<br>(0.099)  | —      | 5.7<br>(0.151)  | 5.5<br>(0.116)  |
| Sexes<br>combined         | Length           | 16.3<br>(0.593) |        | 25.3<br>(0.134) |                 |
|                           | Weight           | 1.4<br>(0.099)  |        | 5.5<br>(0.093)  |                 |

Table 16. Relationship between skin color and sex for coho salmon harvested at the Little Manistee River weir, fall 1986.

| Week<br>beginning | Percent |        |      |        |
|-------------------|---------|--------|------|--------|
|                   | Silver  |        | Dark |        |
|                   | Male    | Female | Male | Female |
| 9/07              | 37      | 35     | 25   | 3      |
| 9/14              | 53      | 40     | 5    | 2      |
| 9/21              | 5       | 52     | 30   | 13     |
| 9/28              | 1       | 32     | 40   | 27     |
| 10/12             | 2       | 3      | 44   | 51     |
| 10/19             | 1       | 9      | 30   | 60     |
| 10/26             | 3       | 6      | 30   | 61     |

Table 17. Summary of the number and weight, by age and sex, of steelhead passed upstream at the Little Manistee River weir, fall 1986.

| Week beginning | Male   |        | Female |        | Total  |        |
|----------------|--------|--------|--------|--------|--------|--------|
|                | Number | Pounds | Number | Pounds | Number | Pounds |
| <b>Age 1.0</b> |        |        |        |        |        |        |
| 9/07           | 1      | 1      | —      | —      | 1      | 1      |
| 9/14           | —      | —      | —      | —      | —      | —      |
| 9/21           | 7      | 14     | 36     | 67     | 43     | 81     |
| 9/28           | 8      | 14     | 67     | 122    | 75     | 136    |
| 10/05          | 3      | 6      | 26     | 59     | 29     | 65     |
| 10/12          | 48     | 115    | 95     | 181    | 143    | 296    |
| 10/19          | —      | —      | 106    | 233    | 106    | 233    |
| 10/26          | 12     | 12     | 12     | 26     | 24     | 38     |
| 11/02          | —      | —      | —      | —      | —      | —      |
| Total          | 79     | 162    | 342    | 688    | 421    | 850    |
| (Percent)      | (1.7)  | (0.5)  | (7.3)  | (2.0)  | (8.9)  | (2.5)  |
| <b>Age 2.0</b> |        |        |        |        |        |        |
| 9/07           | 2      | 3      | —      | —      | 2      | 3      |
| 9/14           | —      | —      | 1      | 2      | 1      | 2      |
| 9/21           | 7      | 23     | 13     | 27     | 20     | 50     |
| 9/28           | 4      | 8      | 29     | 58     | 33     | 66     |
| 10/05          | 10     | 24     | 23     | 53     | 33     | 77     |
| 10/12          | 48     | 108    | 71     | 166    | 119    | 274    |
| 10/19          | —      | —      | 26     | 60     | 26     | 60     |
| 10/26          | —      | —      | —      | —      | —      | —      |
| 11/02          | 9      | 23     | —      | —      | 9      | 23     |
| Total          | 80     | 189    | 163    | 366    | 243    | 555    |
| (Percent)      | (1.7)  | (0.6)  | (3.5)  | (1.1)  | (5.2)  | (1.6)  |
| <b>Age 1.1</b> |        |        |        |        |        |        |
| 9/07           | 2      | 10     | 3      | 12     | 5      | 22     |
| 9/14           | 1      | 3      | 1      | 7      | 2      | 10     |
| 9/21           | 16     | 87     | 10     | 40     | 26     | 127    |
| 9/28           | 21     | 102    | 33     | 174    | 54     | 276    |
| 10/05          | 7      | 45     | 20     | 110    | 27     | 155    |
| 10/12          | 24     | 127    | 48     | 290    | 72     | 417    |
| 10/19          | 53     | 228    | 53     | 323    | 106    | 551    |
| 10/26          | —      | —      | 36     | 235    | 36     | 235    |
| 11/02          | 9      | 45     | 9      | 45     | 18     | 90     |
| Total          | 133    | 647    | 213    | 1,236  | 346    | 1,883  |
| (Percent)      | (2.8)  | (1.9)  | (4.5)  | (3.6)  | (7.3)  | (5.5)  |

Table 17. Continued:

| Week<br>beginning  | Male         |                 | Female        |                 | Total           |                  |
|--------------------|--------------|-----------------|---------------|-----------------|-----------------|------------------|
|                    | Number       | Pounds          | Number        | Pounds          | Number          | Pounds           |
| <b>Age 2.1</b>     |              |                 |               |                 |                 |                  |
| 9/07               | 3            | 15              | —             | —               | 3               | 15               |
| 9/14               | —            | —               | —             | —               | —               | —                |
| 9/21               | 3            | 14              | 13            | 82              | 16              | 96               |
| 9/28               | 8            | 41              | 63            | 352             | 71              | 393              |
| 10/05              | 13           | 68              | 29            | 185             | 42              | 253              |
| 10/12              | 119          | 697             | 71            | 419             | 190             | 1,116            |
| 10/19              | 79           | 461             | 79            | 474             | 158             | 935              |
| 10/26              | 24           | 145             | 83            | 587             | 107             | 732              |
| 11/02              | 9            | 62              | 36            | 182             | 45              | 244              |
| Total<br>(Percent) | 258<br>(5.5) | 1,503<br>(4.4)  | 374<br>(7.9)  | 2,281<br>(6.6)  | 632<br>(13.4)   | 3,784<br>(11.0)  |
| <b>Age 3.1</b>     |              |                 |               |                 |                 |                  |
| 9/07               | —            | —               | —             | —               | —               | —                |
| 9/14               | —            | —               | —             | —               | —               | —                |
| 9/21               | 3            | 21              | —             | —               | 3               | 21               |
| 9/28               | —            | —               | —             | —               | —               | —                |
| 10/05              | —            | —               | —             | —               | —               | —                |
| 10/12              | —            | —               | —             | —               | —               | —                |
| 10/19              | —            | —               | —             | —               | —               | —                |
| 10/26              | —            | —               | —             | —               | —               | —                |
| 11/02              | —            | —               | —             | —               | —               | —                |
| Total<br>(Percent) | 3<br>(0.1)   | 21<br>(0.1)     | —             | —               | 3<br>(0.1)      | 21<br>(0.1)      |
| <b>Age 1.2</b>     |              |                 |               |                 |                 |                  |
| 9/07               | 27           | 201             | 7             | 54              | 34              | 255              |
| 9/14               | 8            | 60              | 10            | 76              | 18              | 136              |
| 9/21               | 39           | 303             | 94            | 723             | 133             | 1,026            |
| 9/28               | 38           | 338             | 63            | 500             | 101             | 838              |
| 10/05              | 36           | 313             | 49            | 398             | 85              | 711              |
| 10/12              | 48           | 331             | 309           | 2,524           | 357             | 2,855            |
| 10/19              | 185          | 1,599           | 158           | 1,309           | 343             | 2,908            |
| 10/26              | 71           | 607             | 95            | 809             | 166             | 1,416            |
| 11/02              | —            | —               | 45            | 335             | 45              | 335              |
| Total<br>(Percent) | 452<br>(9.6) | 3,752<br>(10.9) | 830<br>(17.6) | 6,728<br>(19.6) | 1,282<br>(27.2) | 10,480<br>(30.5) |



Table 17. Continued:

| Week<br>beginning     | Male         |                | Female       |                | Total         |                 |
|-----------------------|--------------|----------------|--------------|----------------|---------------|-----------------|
|                       | Number       | Pounds         | Number       | Pounds         | Number        | Pounds          |
| <b><u>Age 2.2</u></b> |              |                |              |                |               |                 |
| 9/07                  | 12           | 98             | 2            | 15             | 14            | 113             |
| 9/14                  | 1            | 8              | 2            | 13             | 3             | 21              |
| 9/21                  | 39           | 343            | 20           | 170            | 59            | 513             |
| 9/28                  | 25           | 213            | 17           | 141            | 42            | 354             |
| 10/05                 | 16           | 151            | 46           | 364            | 62            | 515             |
| 10/12                 | 24           | 149            | 48           | 403            | 72            | 552             |
| 10/19                 | 132          | 1,338          | 106          | 877            | 238           | 2,215           |
| 10/26                 | 107          | 873            | 36           | 294            | 143           | 1,167           |
| 11/02                 | 27           | 211            | 90           | 689            | 117           | 900             |
| Total<br>(Percent)    | 383<br>(8.1) | 3,384<br>(9.9) | 367<br>(7.8) | 2,966<br>(8.6) | 750<br>(15.9) | 6,350<br>(18.5) |
| <b><u>Age 1.3</u></b> |              |                |              |                |               |                 |
| 9/07                  | —            | —              | 1            | 8              | 1             | 8               |
| 9/14                  | 1            | 10             | 2            | 19             | 3             | 29              |
| 9/21                  | 13           | 126            | —            | —              | 13            | 126             |
| 9/28                  | 17           | 171            | 8            | 73             | 25            | 244             |
| 10/05                 | 10           | 102            | 10           | 80             | 20            | 182             |
| 10/12                 | 119          | 1,211          | 48           | 398            | 167           | 1,609           |
| 10/19                 | 106          | 1,092          | 79           | 774            | 185           | 1,866           |
| 10/26                 | 24           | 190            | 47           | 481            | 71            | 671             |
| 11/02                 | 45           | 442            | 18           | 198            | 63            | 640             |
| Total<br>(Percent)    | 335<br>(7.1) | 3,344<br>(9.7) | 213<br>(4.5) | 2,031<br>(5.9) | 548<br>(11.6) | 5,375<br>(15.7) |
| <b><u>Age 2.3</u></b> |              |                |              |                |               |                 |
| 9/07                  | 2            | 21             | —            | —              | 2             | 21              |
| 9/14                  | —            | —              | —            | —              | —             | —               |
| 9/21                  | 7            | 72             | 13           | 121            | 20            | 193             |
| 9/28                  | 17           | 169            | —            | —              | 17            | 169             |
| 10/05                 | 7            | 72             | 16           | 144            | 23            | 216             |
| 10/12                 | 71           | 705            | —            | —              | 71            | 705             |
| 10/19                 | 132          | 1,296          | 26           | 343            | 158           | 1,639           |
| 10/26                 | 24           | 268            | 12           | 134            | 36            | 402             |
| 11/02                 | 45           | 454            | 63           | 601            | 108           | 1,055           |
| Total<br>(Percent)    | 305<br>(6.5) | 3,057<br>(8.9) | 130<br>(2.8) | 1,343<br>(3.9) | 435<br>(9.2)  | 4,400<br>(12.8) |

Table 17. Continued:

| Week<br>beginning | Male   |        | Female |        | Total  |        |
|-------------------|--------|--------|--------|--------|--------|--------|
|                   | Number | Pounds | Number | Pounds | Number | Pounds |
| <b>Age 1.4</b>    |        |        |        |        |        |        |
| 9/07              | —      | —      | —      | —      | —      | —      |
| 9/14              | —      | —      | —      | —      | —      | —      |
| 9/21              | —      | —      | —      | —      | —      | —      |
| 9/28              | —      | —      | —      | —      | —      | —      |
| 10/05             | —      | —      | —      | —      | —      | —      |
| 10/12             | —      | —      | —      | —      | —      | —      |
| 10/19             | —      | —      | —      | —      | —      | —      |
| 10/26             | 12     | 109    | —      | —      | 12     | 109    |
| 11/02             | —      | —      | 9      | 88     | 9      | 88     |
| Total             | 12     | 109    | 9      | 88     | 21     | 197    |
| (Percent)         | (0.3)  | (0.3)  | (0.2)  | (0.3)  | (0.4)  | (0.6)  |
| <b>Age 2.4</b>    |        |        |        |        |        |        |
| 9/07              | —      | —      | —      | —      | —      | —      |
| 9/14              | —      | —      | —      | —      | —      | —      |
| 9/21              | —      | —      | —      | —      | —      | —      |
| 9/28              | —      | —      | —      | —      | —      | —      |
| 10/05             | 3      | 29     | —      | —      | 3      | 29     |
| 10/12             | —      | —      | —      | —      | —      | —      |
| 10/19             | —      | —      | —      | —      | —      | —      |
| 10/26             | —      | —      | —      | —      | —      | —      |
| 11/02             | 36     | 418    | —      | —      | 36     | 418    |
| Total             | 39     | 447    | —      | —      | 39     | 447    |
| (Percent)         | (0.8)  | (1.3)  | —      | —      | (0.8)  | (1.3)  |

Table 18. Mean total length (inches) and weight (pounds), by age and sex, of steelhead passed upstream at the Little Manistee River weir, fall 1986. Two standard errors in parentheses.

| Week beginning | Measurement | Age             |                 |                 |                 |                 |                 |                 |                 |
|----------------|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                |             | 1.0             |                 | 2.0             |                 | 1.1             |                 | 2.1             |                 |
|                |             | Male            | Female          | Male            | Female          | Male            | Female          | Male            | Female          |
| 9/07           | Length      | 13.6<br>—       | —<br>—          | 17.3<br>(1.800) | —<br>—          | 23.7<br>(3.200) | 22.4<br>(0.945) | 23.5<br>(0.811) | —<br>—          |
|                | Weight      | 1.0<br>—        | —<br>—          | 1.7<br>(0.600)  | —<br>—          | 5.2<br>(2.500)  | 3.8<br>(0.751)  | 5.0<br>(0.240)  | —<br>—          |
| 9/14           | Length      | —<br>—          | —<br>—          | —<br>—          | 16.0<br>—       | 20.1<br>—       | 24.5<br>—       | —<br>—          | —<br>—          |
|                | Weight      | —<br>—          | —<br>—          | —<br>—          | 1.7<br>—        | 3.4<br>—        | 6.8<br>—        | —<br>—          | —<br>—          |
| 9/21           | Length      | 16.4<br>(1.700) | 16.1<br>(0.670) | 18.2<br>(1.000) | 17.4<br>(0.635) | 23.5<br>(0.994) | 20.9<br>(5.834) | 22.0<br>—       | 25.0<br>(1.694) |
|                | Weight      | 2.1<br>(0.700)  | 1.9<br>(0.249)  | 3.3<br>(0.100)  | 2.1<br>(0.208)  | 5.4<br>(0.508)  | 4.0<br>(2.533)  | 4.5<br>—        | 6.3<br>(0.822)  |
| 9/28           | Length      | 16.0<br>(0.800) | 16.0<br>(0.591) | 16.7<br>—       | 16.7<br>(1.226) | 22.8<br>(1.905) | 22.9<br>(1.282) | 22.8<br>(2.600) | 23.2<br>(1.148) |
|                | Weight      | 1.7<br>(0.200)  | 1.8<br>(0.215)  | 2.1<br>—        | 2.0<br>(0.220)  | 4.9<br>(1.025)  | 5.3<br>(0.786)  | 5.2<br>(1.700)  | 5.6<br>(0.713)  |
| 10/05          | Length      | 17.1<br>—       | 17.4<br>(0.879) | 18.7<br>(0.346) | 17.4<br>(0.863) | 25.4<br>(1.200) | 23.9<br>(0.282) | 23.2<br>(1.887) | 25.1<br>(0.640) |
|                | Weight      | 1.9<br>—        | 2.3<br>(0.374)  | 2.4<br>(0.406)  | 2.3<br>(0.391)  | 6.4<br>(0.800)  | 5.5<br>(0.504)  | 5.3<br>(1.066)  | 6.4<br>(0.390)  |
| 10/12          | Length      | 17.9<br>(0.500) | 17.4<br>(0.660) | 18.4<br>(0.400) | 18.1<br>(1.849) | 23.5<br>—       | 24.6<br>(0.700) | 24.9<br>(1.040) | 25.3<br>(0.416) |
|                | Weight      | 2.4<br>(0.200)  | 1.9<br>(0.424)  | 2.3<br>(0.100)  | 2.3<br>(0.706)  | 5.3<br>—        | 6.1<br>(0.500)  | 5.9<br>(0.848)  | 5.9<br>(0.305)  |

Table 18. Continued:

| Week beginning         | Measure-ment | Age             |                 |                 |                 |                 |                 |                 |                 |
|------------------------|--------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                        |              | 1.0             |                 | 2.0             |                 | 1.1             |                 | 2.1             |                 |
|                        |              | Male            | Female          | Male            | Female          | Male            | Female          | Male            | Female          |
| 10/19                  | Length       | —               | 16.7<br>(0.690) | —               | 15.1<br>—       | 21.5<br>(7.000) | 24.3<br>(0.500) | 24.0<br>(2.099) | 24.4<br>(0.867) |
|                        | Weight       | —               | 2.2<br>(0.503)  | —               | 2.3<br>—        | 4.3<br>(2.600)  | 6.1<br>(0.600)  | 5.8<br>(1.444)  | 6.0<br>(0.643)  |
| 10/26                  | Length       | 15.3<br>—       | 17.7<br>—       | —               | —               | —               | 25.7<br>(1.249) | 25.0<br>(0.600) | 26.3<br>(0.662) |
|                        | Weight       | 1.0<br>—        | 2.2<br>—        | —               | —               | —               | 6.5<br>(0.940)  | 6.1<br>(0.500)  | 7.1<br>(0.525)  |
| 11/02                  | Length       | —               | —               | 18.0<br>—       | —               | 23.1<br>—       | 22.4<br>—       | 25.7<br>—       | 24.0<br>(2.073) |
|                        | Weight       | —               | —               | 2.6<br>—        | —               | 5.0<br>—        | 5.0<br>—        | 6.9<br>—        | 5.1<br>(1.509)  |
| Weighted seasonal mean | Length       | 17.1<br>(0.415) | 16.8<br>(0.316) | 18.3<br>(0.297) | 17.2<br>(0.980) | 22.6<br>(3.696) | 24.1<br>(0.423) | 24.5<br>(0.834) | 24.8<br>(0.355) |
|                        | Weight       | 2.0<br>(0.164)  | 2.0<br>(0.205)  | 2.4<br>(0.087)  | 2.2<br>(0.367)  | 4.9<br>(1.381)  | 5.8<br>(0.296)  | 5.8<br>(0.612)  | 6.1<br>(0.254)  |
| Sexes combined         | Length       | 16.8<br>(0.287) |                 | 17.5<br>(0.609) |                 | 23.5<br>(1.028) |                 | 24.7<br>(0.373) |                 |
|                        | Weight       | 2.0<br>(0.186)  |                 | 2.3<br>(0.228)  |                 | 5.4<br>(0.489)  |                 | 6.0<br>(0.272)  |                 |

Table 18. Continued:

| Week beginning | Measurement | Age  |        |         |         |         |          |         |         |
|----------------|-------------|------|--------|---------|---------|---------|----------|---------|---------|
|                |             | 3.1  |        | 1.2     |         | 2.2     |          | 1.3     |         |
|                |             | Male | Female | Male    | Female  | Male    | Female   | Male    | Female  |
| 9/07           | Length      | —    | —      | 27.8    | 28.2    | 28.4    | 27.6     | —       | 29.0    |
|                | Weight      | —    | —      | (0.485) | (0.820) | (0.750) | (0.700)  | —       | —       |
| 9/14           | Length      | —    | —      | 27.9    | 27.3    | 29.3    | 27.2     | 30.4    | 29.7    |
|                | Weight      | —    | —      | (1.219) | (0.578) | —       | (1.400)  | —       | (0.199) |
| 9/21           | Length      | 25.6 | —      | 27.2    | 27.3    | 28.7    | 28.3     | 29.8    | —       |
|                | Weight      | 7.1  | —      | (0.816) | (0.262) | (1.029) | (0.369)  | (1.087) | —       |
| 9/28           | Length      | —    | —      | 28.4    | 27.6    | 28.2    | 27.4     | 30.6    | 29.5    |
|                | Weight      | —    | —      | (0.681) | (0.202) | (0.790) | (0.698)  | (1.069) | (0.700) |
| 10/05          | Length      | —    | —      | 28.5    | 27.6    | 29.1    | 27.8     | 30.5    | 28.3    |
|                | Weight      | —    | —      | (0.787) | (0.619) | (1.765) | (0.692)  | (2.467) | (0.577) |
| 10/12          | Length      | —    | —      | 26.0    | 27.9    | 27.3    | 15.8     | 30.2    | 28.1    |
|                | Weight      | —    | —      | (0.800) | (0.554) | —       | (25,900) | (1.459) | (1.800) |

Table 18. Continued:

| Week beginning         | Measurement | Age   |        |         |         |         |         |         |         |
|------------------------|-------------|-------|--------|---------|---------|---------|---------|---------|---------|
|                        |             | 3.1   |        | 1.2     |         | 2.2     |         | 1.3     |         |
|                        |             | Male  | Female | Male    | Female  | Male    | Female  | Male    | Female  |
| 10/19                  | Length      | —     | —      | 28.0    | 27.2    | 29.7    | 27.5    | 30.3    | 29.4    |
|                        |             | —     | —      | (1.135) | (1.229) | (1.623) | (1.266) | (1.313) | (1.387) |
|                        | Weight      | —     | —      | 8.6     | 8.3     | 10.1    | 8.3     | 10.3    | 9.8     |
|                        |             | —     | —      | (1.026) | (1.203) | (1.136) | (1.164) | (0.648) | (0.702) |
| 10/26                  | Length      | —     | —      | 28.9    | 28.3    | 28.3    | 28.1    | 28.0    | 30.1    |
|                        |             | —     | —      | (0.418) | (0.582) | (1.465) | (2.117) | (1.400) | (0.250) |
|                        | Weight      | —     | —      | 8.6     | 8.5     | 8.2     | 8.2     | 7.9     | 10.2    |
|                        |             | —     | —      | (0.338) | (0.620) | (1.164) | (1.683) | —       | (0.695) |
| 11/02                  | Length      | —     | —      | —       | 27.4    | 27.3    | 27.1    | 30.4    | 29.6    |
|                        |             | —     | —      | —       | (1.645) | (1.405) | (0.642) | (1.167) | (1.300) |
|                        | Weight      | —     | —      | —       | 7.4     | 7.8     | 7.7     | 9.8     | 11.0    |
|                        |             | —     | —      | —       | (1.052) | (1.419) | (0.741) | (1.051) | (1.000) |
| Weighted seasonal mean | Length      | 25.6  | —      | 27.9    | 27.7    | 28.7    | 26.0    | 30.1    | 29.2    |
|                        |             | —     | —      | (0.493) | (0.367) | (0.739) | (3.346) | (0.681) | (0.657) |
|                        | Weight      | 7.1   | —      | 8.3     | 8.1     | 8.8     | 8.1     | 10.0    | 9.5     |
|                        |             | —     | —      | (0.434) | (0.317) | (0.552) | (0.410) | (0.632) | (0.313) |
| Sexes combined         | Length      | 25.6  | —      | 27.8    | —       | 27.4    | —       | 29.8    | —       |
|                        |             | —     | —      | (0.307) | —       | (1.646) | —       | (0.532) | —       |
|                        | Weight      | (7.1) | —      | (8.2)   | —       | 8.5     | —       | 9.8     | —       |
|                        |             | —     | —      | (0.257) | —       | (0.399) | —       | (0.464) | —       |

Table 18. Continued:

| Week beginning | Measurement | Age             |                 |      |        |      |        |
|----------------|-------------|-----------------|-----------------|------|--------|------|--------|
|                |             | 2.3             |                 | 1.4  |        | 2.4  |        |
|                |             | Male            | Female          | Male | Female | Male | Female |
| 9/07           | Length      | 31.0<br>(1.000) | —               | —    | —      | —    | —      |
|                | Weight      | 10.6<br>(1.200) | —               | —    | —      | —    | —      |
| 9/14           | Length      | —               | —               | —    | —      | —    | —      |
|                | Weight      | —               | —               | —    | —      | —    | —      |
| 9/21           | Length      | 30.5<br>(2.900) | 28.9<br>(0.668) | —    | —      | —    | —      |
|                | Weight      | 10.3<br>(2.300) | 9.3<br>(0.812)  | —    | —      | —    | —      |
| 9/28           | Length      | 30.3<br>(0.699) | —               | —    | —      | —    | —      |
|                | Weight      | 9.9<br>(0.493)  | —               | —    | —      | —    | —      |
| 10/05          | Length      | 30.5<br>(3.600) | 29.2<br>(0.869) | —    | —      | 30.2 | —      |
|                | Weight      | 10.3<br>(2.500) | 9.0<br>(0.456)  | —    | —      | 9.5  | —      |
| 10/12          | Length      | 30.2<br>(2.041) | —               | —    | —      | —    | —      |
|                | Weight      | 9.9<br>(1.073)  | —               | —    | —      | —    | —      |

Table 18. Continued:

| Week beginning               | Mea-<br>sure-<br>ment | Age             |                 |           |           |                 |        |
|------------------------------|-----------------------|-----------------|-----------------|-----------|-----------|-----------------|--------|
|                              |                       | 2.3             |                 | 1.4       |           | 2.4             |        |
|                              |                       | Male            | Female          | Male      | Female    | Male            | Female |
| 10/19                        | Length                | 29.5<br>(1.810) | 30.0<br>—       | —         | —         | —               | —      |
|                              | Weight                | 9.8<br>(1.763)  | 13.2<br>—       | —         | —         | —               | —      |
| 10/26                        | Length                | 31.9<br>(0.300) | 31.8<br>—       | 29.7<br>— | —         | —               | —      |
|                              | Weight                | 11.1<br>(0.500) | 11.2<br>—       | 9.1<br>—  | —         | —               | —      |
| 11/02                        | Length                | 30.5<br>(1.150) | 29.3<br>(0.733) | —         | 29.6<br>— | 32.0<br>(2.391) | —      |
|                              | Weight                | 10.1<br>(0.649) | 9.5<br>(0.938)  | —         | 9.8<br>—  | 11.6<br>(2.758) | —      |
| Weighted<br>seasonal<br>mean | Length                | 30.1<br>(0.917) | 29.6<br>(0.496) | 29.7<br>— | 29.6<br>— | 31.8<br>(2.254) | —      |
|                              | Weight                | 10.0<br>(0.797) | 10.3<br>(0.617) | 9.1<br>—  | 9.8<br>—  | 11.4<br>(2.600) | —      |
| Sexes<br>combined            | Length                | 30.0<br>(0.647) |                 | 29.7<br>— |           | 31.8<br>(2.254) |        |
|                              | Weight                | 10.1<br>(0.691) |                 | 9.4<br>—  |           | 11.4<br>(2.600) |        |



Table 19. Summary of the number and weight, by age and sex, of brown trout passed upstream at the Little Manistee River weir, fall 1986.

| Week beginning | Male   |        | Female |        | Total  |        |
|----------------|--------|--------|--------|--------|--------|--------|
|                | Number | Pounds | Number | Pounds | Number | Pounds |
| <b>Age 4.0</b> |        |        |        |        |        |        |
| 9/07           | —      | —      | —      | —      | —      | —      |
| 9/14           | —      | —      | —      | —      | —      | —      |
| 9/21           | —      | —      | —      | —      | —      | —      |
| 9/28           | —      | —      | —      | —      | —      | —      |
| 10/05          | —      | —      | —      | —      | —      | —      |
| 10/12          | 1      | 1      | —      | —      | 1      | 1      |
| 10/19          | —      | —      | —      | —      | —      | —      |
| 10/26          | —      | —      | —      | —      | —      | —      |
| 11/02          | —      | —      | —      | —      | —      | —      |
| Total          | 1      | 1      | —      | —      | 1      | 1      |
| (Percent)      | (1.0)  | (0.2)  | —      | —      | (1.0)  | (0.2)  |
| <b>Age 1.1</b> |        |        |        |        |        |        |
| 9/07           | —      | —      | 3      | 15     | 3      | 15     |
| 9/14           | 2      | 12     | 1      | 6      | 3      | 18     |
| 9/21           | 4      | 23     | 7      | 39     | 11     | 62     |
| 9/28           | 2      | 10     | 12     | 58     | 14     | 68     |
| 10/05          | —      | —      | 3      | 15     | 3      | 15     |
| 10/12          | 1      | 5      | 8      | 36     | 9      | 41     |
| 10/19          | —      | —      | 8      | 45     | 8      | 45     |
| 10/26          | —      | —      | 6      | 30     | 6      | 30     |
| 11/02          | —      | —      | 3      | 15     | 3      | 15     |
| Total          | 9      | 50     | 51     | 259    | 60     | 309    |
| (Percent)      | (8.9)  | (9.0)  | (50.5) | (46.8) | (59.4) | (55.8) |
| <b>Age 2.1</b> |        |        |        |        |        |        |
| 9/07           | 2      | 10     | 1      | 5      | 3      | 15     |
| 9/14           | —      | —      | —      | —      | —      | —      |
| 9/21           | 1      | 6      | 1      | 5      | 2      | 11     |
| 9/28           | —      | —      | —      | —      | —      | —      |
| 10/05          | —      | —      | —      | —      | —      | —      |
| 10/12          | —      | —      | 2      | 9      | 2      | 9      |
| 10/19          | —      | —      | —      | —      | —      | —      |
| 10/26          | —      | —      | —      | —      | —      | —      |
| 11/02          | —      | —      | —      | —      | —      | —      |
| Total          | 3      | 16     | 4      | 19     | 7      | 35     |
| (Percent)      | (3.0)  | (2.9)  | (4.0)  | (3.4)  | (6.9)  | (6.3)  |

Table 19. Continued:

| Week<br>beginning  | Male         |              | Female       |              | Total        |               |
|--------------------|--------------|--------------|--------------|--------------|--------------|---------------|
|                    | Number       | Pounds       | Number       | Pounds       | Number       | Pounds        |
| <b>Age 1.2</b>     |              |              |              |              |              |               |
| 9/07               | 2            | 9            | 3            | 18           | 5            | 27            |
| 9/14               | 1            | 7            | —            | —            | 1            | 7             |
| 9/21               | 6            | 40           | 1            | 7            | 7            | 47            |
| 9/28               | 2            | 16           | 2            | 16           | 4            | 32            |
| 10/05              | —            | —            | —            | —            | —            | —             |
| 10/12              | 3            | 22           | 5            | 26           | 8            | 48            |
| 10/19              | —            | —            | —            | —            | —            | —             |
| 10/26              | —            | —            | —            | —            | —            | —             |
| 11/02              | —            | —            | —            | —            | —            | —             |
| Total<br>(Percent) | 14<br>(13.9) | 94<br>(17.0) | 11<br>(10.9) | 67<br>(12.1) | 25<br>(24.8) | 161<br>(29.1) |
| <b>Age 2.2</b>     |              |              |              |              |              |               |
| 9/07               | —            | —            | 1            | 7            | 1            | 7             |
| 9/14               | —            | —            | —            | —            | —            | —             |
| 9/21               | —            | —            | —            | —            | —            | —             |
| 9/28               | —            | —            | 1            | 8            | 1            | 8             |
| 10/05              | —            | —            | —            | —            | —            | —             |
| 10/12              | —            | —            | —            | —            | —            | —             |
| 10/19              | —            | —            | —            | —            | —            | —             |
| 10/26              | —            | —            | —            | —            | —            | —             |
| 11/02              | —            | —            | —            | —            | —            | —             |
| Total<br>(Percent) | —            | —            | 2<br>(2.0)   | 15<br>(2.7)  | 2<br>(2.0)   | 15<br>(2.7)   |
| <b>Age 1.3</b>     |              |              |              |              |              |               |
| 9/07               | 1            | 3            | —            | —            | 1            | 3             |
| 9/14               | —            | —            | —            | —            | —            | —             |
| 9/21               | —            | —            | —            | —            | —            | —             |
| 9/28               | —            | —            | 1            | 10           | 1            | 10            |
| 10/05              | —            | —            | —            | —            | —            | —             |
| 10/12              | —            | —            | 2            | 20           | 2            | 20            |
| 10/19              | —            | —            | —            | —            | —            | —             |
| 10/26              | —            | —            | —            | —            | —            | —             |
| 11/02              | —            | —            | —            | —            | —            | —             |
| Total<br>(Percent) | 1<br>(1.0)   | 3<br>(0.5)   | 3<br>(3.0)   | 30<br>(5.4)  | 4<br>(4.0)   | 33<br>(6.0)   |

Table 20. Mean total length (inches) and weight (pounds), by age and sex, of brown trout passed upstream at the Little Manistee River weir, fall 1986. Two standard errors in parentheses.

| Week beginning | Measurement | Age       |        |                 |                 |                 |                 |
|----------------|-------------|-----------|--------|-----------------|-----------------|-----------------|-----------------|
|                |             | 4.0       |        | 1.1             |                 | 2.1             |                 |
|                |             | Male      | Female | Male            | Female          | Male            | Female          |
| 9/07           | Length      | —         | —      | —               | 21.7<br>(1.568) | 22.5<br>(0.900) | 21.8<br>—       |
|                | Weight      | —         | —      | —               | 5.1<br>(0.462)  | 5.2<br>(0.300)  | 4.9<br>—        |
| 9/14           | Length      | —         | —      | 23.4<br>(0.700) | 24.2<br>—       | —               | —               |
|                | Weight      | —         | —      | 6.2<br>(1.300)  | 6.1<br>—        | —               | —               |
| 9/21           | Length      | —         | —      | 22.4<br>(0.467) | 21.9<br>(0.906) | 23.0<br>—       | 21.7<br>—       |
|                | Weight      | —         | —      | 5.6<br>(0.481)  | 5.5<br>(0.907)  | 5.9<br>—        | 4.8<br>—        |
| 9/28           | Length      | —         | —      | 20.9<br>(1.300) | 21.4<br>(0.916) | —               | —               |
|                | Weight      | —         | —      | 4.8<br>(0.900)  | 4.8<br>(0.491)  | —               | —               |
| 10/05          | Length      | —         | —      | —               | 21.5<br>—       | —               | —               |
|                | Weight      | —         | —      | —               | 5.1<br>—        | —               | —               |
| 10/12          | Length      | 15.5<br>— | —      | 22.0<br>—       | 21.3<br>(0.648) | —               | 21.3<br>(2.100) |
|                | Weight      | 1.2<br>—  | —      | 4.9<br>—        | 4.5<br>(0.634)  | —               | 4.3<br>(0.500)  |

Table 20. Continued:

| Week beginning         | Measurement | Age       |        |                 |                 |           |           |
|------------------------|-------------|-----------|--------|-----------------|-----------------|-----------|-----------|
|                        |             | 4.0       |        | 1.1             |                 | 2.1       |           |
|                        |             | Male      | Female | Male            | Female          | Male      | Female    |
| 10/19                  | Length      | —         | —      | —               | 22.2<br>(0.769) | —         | —         |
|                        | Weight      | —         | —      | —               | 5.6<br>(0.510)  | —         | —         |
| 10/26                  | Length      | —         | —      | —               | 21.6<br>(1.450) | —         | —         |
|                        | Weight      | —         | —      | —               | 5.1<br>(1.101)  | —         | —         |
| 11/02                  | Length      | —         | —      | —               | 22.1<br>(0.467) | —         | —         |
|                        | Weight      | —         | —      | —               | 4.9<br>(0.200)  | —         | —         |
| Weighted seasonal mean | Length      | 15.5<br>— | —<br>— | 22.2<br>(0.117) | 21.7<br>(0.093) | 22.7<br>— | 21.5<br>— |
|                        | Weight      | 1.2<br>—  | —<br>— | 5.5<br>(0.120)  | 5.1<br>(0.073)  | 5.4<br>—  | 4.6<br>—  |
| Sexes combined         | Length      | 15.5<br>— |        | 21.8<br>(0.079) |                 | 22.0<br>— |           |
|                        | Weight      | 1.2<br>—  |        | 5.1<br>(0.064)  |                 | 4.9<br>—  |           |

Table 20. Continued:

| Week beginning | Measurement | Age             |                 |      |        |      |                 |
|----------------|-------------|-----------------|-----------------|------|--------|------|-----------------|
|                |             | 1.2             |                 | 2.2  |        | 1.3  |                 |
|                |             | Male            | Female          | Male | Female | Male | Female          |
| 9/07           | Length      | 22.3<br>(4.200) | 22.6<br>(2.800) | —    | 24.2   | 20.2 | —               |
|                | Weight      | 4.7<br>(2.000)  | 6.0<br>(1.834)  | —    | 7.4    | 3.4  | —               |
| 9/14           | Length      | 24.4            | —               | —    | —      | —    | —               |
|                | Weight      | 6.5             | —               | —    | —      | —    | —               |
| 9/21           | Length      | 23.7<br>(1.299) | 24.2            | —    | —      | —    | —               |
|                | Weight      | 6.7<br>(0.919)  | 7.4             | —    | —      | —    | —               |
| 9/28           | Length      | 25.3<br>(5.100) | 25.6<br>(3.300) | —    | 25.3   | —    | 27.0            |
|                | Weight      | 7.8<br>(2.100)  | 7.8<br>(1.700)  | —    | 7.6    | —    | 9.5             |
| 10/05          | Length      | —               | —               | —    | —      | —    | —               |
|                | Weight      | —               | —               | —    | —      | —    | —               |
| 10/12          | Length      | 25.0<br>(2.228) | 21.7<br>(2.065) | —    | —      | —    | 26.3<br>(3.600) |
|                | Weight      | 7.4<br>(1.988)  | 5.2<br>(2.273)  | —    | —      | —    | 9.8<br>(2.900)  |

Table 20. Continued:

| Week beginning         | Measurement | Age             |                 |           |           |           |           |
|------------------------|-------------|-----------------|-----------------|-----------|-----------|-----------|-----------|
|                        |             | 1.2             |                 | 2.2       |           | 1.3       |           |
|                        |             | Male            | Female          | Male      | Female    | Male      | Female    |
| 10/19                  | Length      | —               | —               | —         | —         | —         | —         |
|                        | Weight      | —               | —               | —         | —         | —         | —         |
| 10/26                  | Length      | —               | —               | —         | —         | —         | —         |
|                        | Weight      | —               | —               | —         | —         | —         | —         |
| 11/02                  | Length      | —               | —               | —         | —         | —         | —         |
|                        | Weight      | —               | —               | —         | —         | —         | —         |
| Weighted seasonal mean | Length      | 24.1<br>(0.245) | 22.9<br>(0.462) | —         | 24.8<br>— | 20.2<br>— | 26.5<br>— |
|                        | Weighted    | 6.7<br>(0.173)  | 6.1<br>(0.508)  | —         | 7.5<br>—  | 3.4<br>—  | 9.7<br>—  |
| Sexes combined         | Length      | 23.6<br>(0.256) |                 | 24.8<br>— |           | 25.0<br>— |           |
|                        | Weight      | 6.5<br>(0.217)  |                 | 7.5<br>—  |           | 8.1<br>—  |           |

**LITERATURE CITED**

- Hay, R. L. 1986. Little Manistee River harvest weir and chinook salmon egg-take report, 1985. Michigan Department of Natural Resources, Fisheries Technical Report 86-10, Ann Arbor.
- Pecor, C. H. 1987. Platte River harvest weir and coho salmon egg-take report, 1986. Michigan Department of Natural Resources, Fisheries Technical Report 87-1, Ann Arbor.
- 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.

Report approved by W. C. Latta

Typed by G. M. Zurek