

KWINIUK RIVER SALMON ENUMERATION STUDIES

1974

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ABSTRACT

A salmon counting tower project on the Kwiniuk River, completed its tenth season of operation in 1974. The Kwiniuk River escapement for 1974 was 35,161; 39,375; and 62 for chum salmon (Oncoryhnchus keta), pink salmon (O. gorbuscha), and king salmon (O. tschawytscha) respectively. A forecast of the 1975 chum salmon run using pink salmon brood year escapements was made, yielding a 1975 estimate of 30,658.

An aerial survey was conducted of the Tubutulik River in conjunction with counting tower operations on the Kwiniuk River. Subsistence and commercial catch sampling was also conducted to collect age, sex, and size information of the chum salmon.

INTRODUCTION

A salmon counting tower project was initiated in 1965 on the Kwiniuk River, 110 miles east of Nome (Figure 1). The Kwiniuk River, similar to other major rivers in Norton Sound, receives moderate runs of chum and pink salmon which are harvested by subsistence and commercial fishermen. To effectively manage the Norton Sound fisheries, it is important that frequent estimates of escapements during the season be obtained by either aerial survey counts or tower counts. The tower count is the more accurate method and provides a check on the aerial surveys conducted.

OBJECTIVES

The 1974 project objectives were to:

1. Obtain daily and seasonal timing and magnitude of salmon escapements.
2. Periodically sample the Moses Point commercial salmon catch and the Kwiniuk River escapement for age, sex, and size composition.
3. Obtain forecasts of chum salmon runs using pink salmon brood year escapements.
4. Conduct late season salmon carcass surveys of the Kwiniuk and Tubutulik Rivers to determine species composition and sex ratios.

METHODS AND MATERIALS

A portable 20-foot aluminum counting tower was erected on a small midstream island of the Kwiniuk River approximately five miles above the river mouth (Figure 2).

A 75-foot weir of 3/8" mesh hardware cloth was constructed to block a secondary channel formed by a mid-river sand bar. The weir was reinforced with beach seine webbing of 1 1/4" mesh to act as a debris and detritus catcher.

A power line with three 400-watt light bulbs housed in 18-inch diameter reflectors was strung across the main channel to provide illumination during periods of darkness and overcast. A 1250-watt generator provided electric current for the lights.

A three-man crew began 18-hour counting operations on June 18 and terminated counting operations on July 26. Each crew member counted salmon for two three-hour shifts daily from 1200 hours until 0600 hours the next day. Hourly counts were totaled. Salmon moving downstream were subtracted from the total count.

Ten-minute counts were made at the beginning of each counting hour to determine if 10-minute counts could be used as a basis for estimating hourly migration. Ten-minute counts were expanded by a factor of six to obtain an estimate of hourly migration.

At times it was impossible to make counts of salmon escapement due to inclement weather, generator trouble, etc. These missing counts were expanded by averaging the last complete hourly/daily count with the next complete hourly/daily count.

The commercial fishery catches were periodically sampled for age, sex, and size information at the buying station near the river mouth.

The escapement population was sampled at the tower site using fish caught by beach seines upstream of the counting tower for subsistence use by local natives of Elim.

Forecasts of chum salmon escapement were made, based upon pink salmon escapement of the same parent year (Mattson, 1966).

RESULTS

In 1974 a total of 62 king, 35,161 chum, and 39,375 pink salmon were counted past the tower. The main peaks of the chum run occurred during the periods June 26-July 6 and July 10-16, while the peak of the pink run passed the tower during the periods June 26- July 7 and July 13-18 (Table 1, Figure 3). The daily salmon migration was heaviest from 2200 to 0200 for chum salmon and a similar period from 2200 to 0200 for pink salmon (Figure 4).

Ten-minute counts resulted in an expanded escapement estimate of 33,372 chum salmon and 34,434 pink salmon (Table 2).

A total of 176 chums was sampled from the Moses Point commercial fishery and 151 chums were collected by beach seine from the spawning population of the Kwiniuk River (Table 3 and 4).

Carcass surveys of the Kwiniuk and Tubutulik Rivers planned for late July, early August had to be cancelled due to the heavy seasonal rainfall and subsequent river flooding experienced in late July.

An aerial survey conducted of the Tubutulik River via chartered Cessna 180 on August 6, 1974 yielded a count of 136 king, 9,560 chum and 17,940 pink salmon.

In 1974, commercial fishermen of the Moses Point subdistrict harvested 198 king, 12,821 pink, and 55,276 chum salmon totaling 68,295 fish. The subsistence salmon harvest consisted of 3 king, 2,382 pink, and 1,723 chum salmon.

DISCUSSION

Based upon research data from 1965 - 1969 the average chum salmon escapement during the six hours from 0600 until 1200 was 2.1 percent of the total run. The average pink salmon escapement during these hours was 3.66 percent (Hurd, 1972). Using these figures, the expanded total chum salmon escapement of 35,899 was 47.2% below the primary brood year escapement of 68,004 experienced in 1970 and 12.3% above the previous 9-year average of 31,940. The expanded pink salmon escapement of 40,816 was 34.6% below the brood year escapement of 62,461 experienced in 1972 and 34.1% below the previous 9-year average of 61,908.

The 1974 king salmon escapement of 62 was the highest recorded. There is evidence that the king salmon run is developing as indicated by the increasing escapement trend over the past documented years.

In 1974, 10-minute tower counts made at the beginning of each counting hour were expanded to obtain daily estimates of the salmon run. Correlation coefficients between expanded 10-minute counts and the daily counts was computed to be 0.9753 and 0.8626 for chum and pink salmon respectively. Such high values for correlation coefficients indicate a significant correlation between the expanded 10-minute counts and the actual counts. The percent error between the expanded 10-minute count estimate and the actual count was 5.09% and 12.55% for chum and pink respectively. Therefore, both the high correlation and low percent error between the expanded 10-minute counts and actual counts indicate that 10-minute count estimate could be used as an estimate of the actual escapement past the Kwiniuk River counting tower.

Determination of the 1971 brood year chum survival rate based upon known survival rate of the same brood year of pinks, which returned in 1973 was tested. Ten years of Kwiniuk River tower counts provided the basic data for comparison. In previous years the correlation for this determination has ranged from 0.98 (excellent) to 0.45 (poor) Hurd(1971). In more recent years the correlation has become significantly poorer with the annual accrual of additional escapement data. The occurrence of "outlier" years may have surpassed the ability of this technique to make forecasts of future chum salmon escapements but should be tested for several more years to determine their statistical validity. Population models utilizing more complex and sophisticated techniques will be pursued as budgetary funding becomes available.

A projected Kwiniuk River chum salmon escapement estimate of 30,658 was derived for 1975 using Mattson's technique. The techniques used to obtain the projected 1975 chum salmon return are presented in Table 5. This year's correlation coefficient of 0.4478 indicated a poor relationship exists between chum and pink salmon returns of the same brood year. As a means of determining the effect "outlier" years have upon resulting correlation coefficients, the outlier years of 1970 and 1972 for pink and chum salmon respectively were removed from the data. As demonstrated in Table 5, the correlation coefficient of 0.9807 is significantly high with a projected 1975 chum salmon run of 32,173.

In 1974 the Moses Point commercial harvest of 55,276 chum salmon and 198 king salmon was an all-time record for these species since the inception of the fishery in 1962.

The 1974 pink salmon harvest of 12,821 was near record, exceeded only by 231 fish in 1970.

The 1974 subsistence harvest of 4,108 salmon was a substantial increase over the 1973 low of 300.

LITERATURE CITED

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State of Alaska, Department of Fish and Game,
Commercial Fisheries Division.
2. Hurd, Charles L. 1972. Kwiniuk Tower Report, 1971.
A-Y-K Region Fishery Bulletin No. 8. Alaska
Department of Fish and Game. 21pp.
3. Mattson, Chester R. 1966. Forecasting Chum Salmon
Returns Based Upon Pink Salmon Abundance of Same
Brood Year. USFWS Informational Leaflet
No. 87. 84-92 pp.



Figure 1. Salmon Counting Tower Location, Kwiniuk River, 1974.

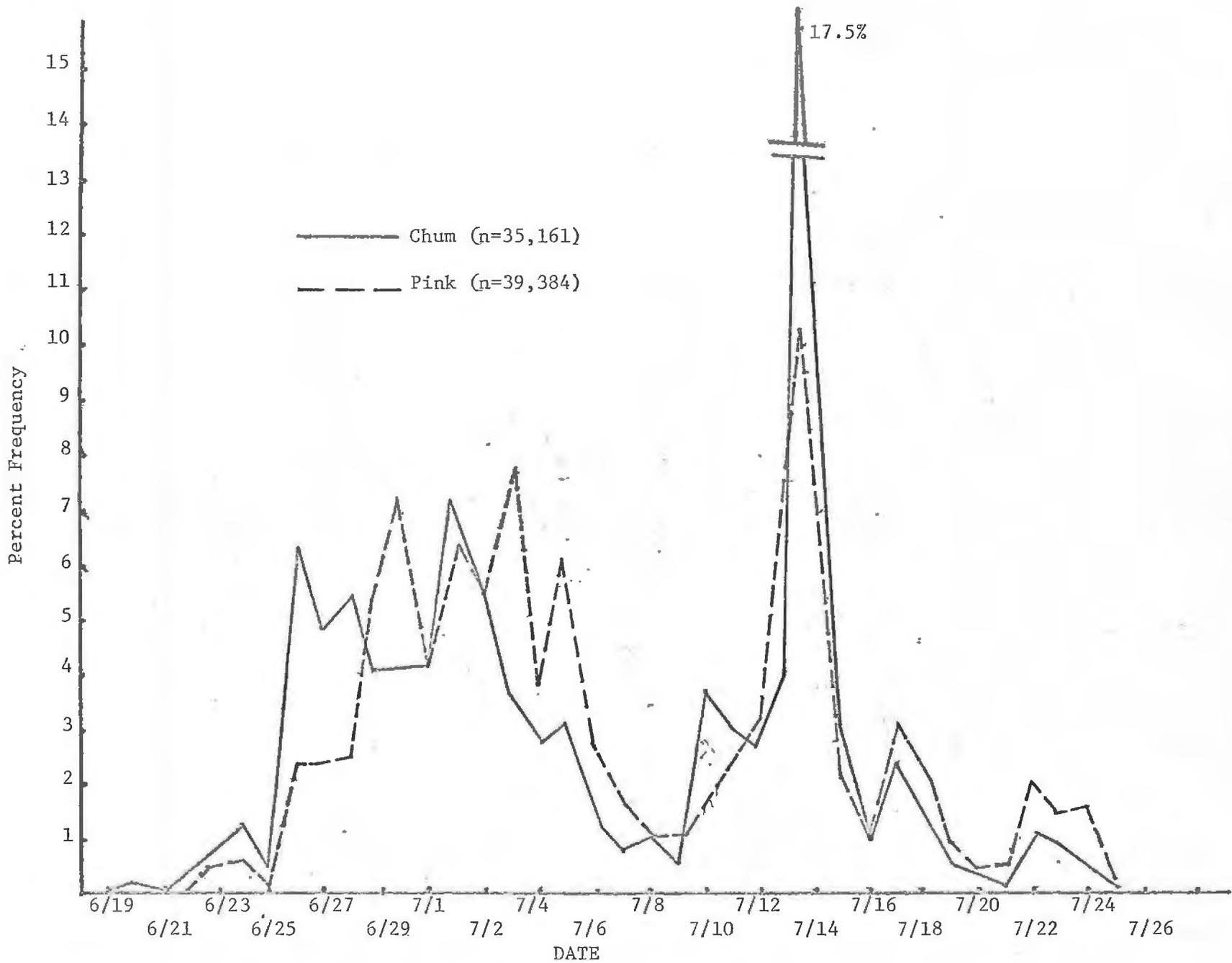


Figure 3. Daily Migration of Chum and Pink Salmon, Counted Past the Kwiniuk River, Salmon Counting Tower, 1974.

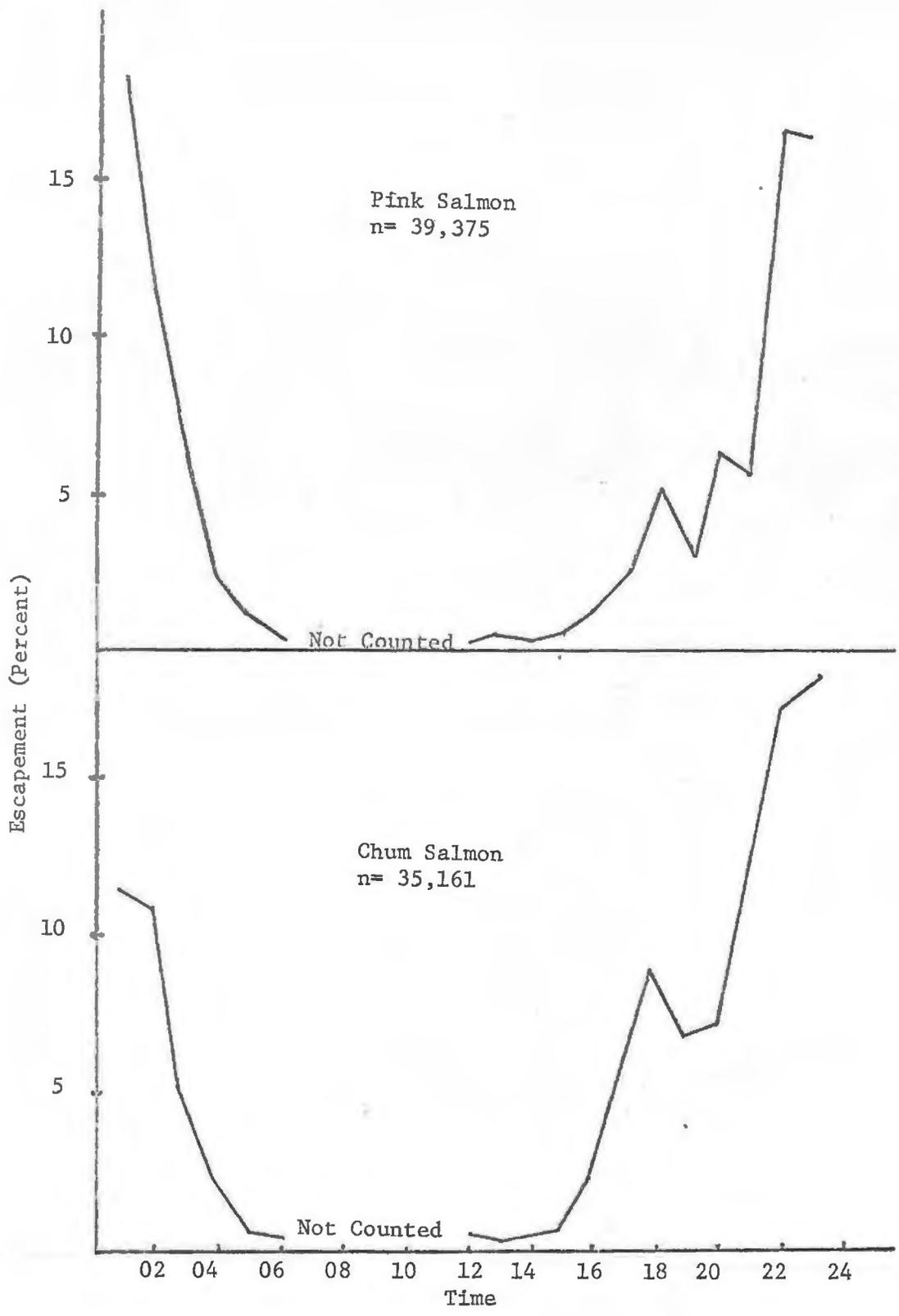


Figure 4. Hourly Migration of Chum and Pink Salmon Counted Past the Kwiniuk River, Salmon Counting Tower, 1974.

Table 1. Daily/Hourly Chum Salmon Migration past the Kwiniuk River Salmon counting tower, 1974

Species:Chum

| Hour | 0 | 1 | 2 | 3 | 4 | 5 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Daily total | |
|------|-----|-----|-----|-----|-----|----|----|-----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-------------|-------|
| Date | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 6/18 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 |
| 6/19 | - | - | - | 16 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 16 |
| 6/20 | - | 16 | 10 | - | - | - | - | - | - | - | - | - | - | - | - | 10 | 27 | - | - | 63 |
| 6/21 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | 1 |
| 6/22 | - | - | - | - | - | - | - | - | - | - | - | - | - | 9 | - | 6 | - | 107 | - | 122 |
| 6/23 | 18 | 21 | 14 | 4 | - | - | - | - | - | - | - | -1 | -2 | - | 109 | 54 | 23 | 37 | - | 277 |
| 6/24 | 57 | 56 | 16 | 6 | 1 | 2 | - | 8 | 18 | - | - | - | 7 | 51 | 118 | - | 25 | 106 | - | 471 |
| 6/25 | - | 9 | - | 2 | 2 | - | - | - | - | - | - | - | - | 5 | 7 | 20 | - | 118 | - | 163 |
| 6/26 | 18 | 11 | - | - | - | - | - | - | - | - | - | - | - | 797 | 303 | 76 | 763 | 235 | - | 2,203 |
| 6/27 | 162 | 63 | 16 | 29 | 1 | - | - | - | - | - | 33 | 5 | 116 | 538 | 121 | 127 | 364 | 156 | - | 1,731 |
| 6/28 | 184 | 429 | 44 | 16 | 7 | - | - | - | - | -1 | - | 49 | 4 | - | 44 | 121 | 294 | 704 | - | 1,895 |
| 6/29 | 52 | 36 | 19 | 39 | 6 | - | - | - | - | - | - | 3 | 47 | 6 | 11 | 173 | 590 | 434 | - | 1,416 |
| 6/30 | 283 | 116 | 51 | 25 | 11 | 1 | - | 3 | 17 | 2 | - | 1 | 145 | 42 | 154 | 134 | 240 | 222 | - | 1,447 |
| 7/1 | 109 | 245 | 109 | 14 | - | - | - | 2 | - | - | 51 | 114 | 202 | 122 | 93 | 155 | 130 | 115 | - | 1,461 |
| 7/2 | 242 | 287 | 413 | 126 | 29 | 22 | - | 147 | 33 | 18 | 6 | 11 | 18 | 55 | 255 | 51 | 581 | 216 | - | 2,510 |
| 7/3 | 338 | 248 | 79 | 125 | 26 | 26 | - | - | 23 | 19 | 78 | 125 | 341 | 19 | 6 | 55 | 128 | 262 | - | 1,898 |
| 7/4 | 300 | 168 | 134 | 70 | 13 | 43 | - | - | - | - | - | 53 | 180 | 25 | 48 | 73 | 108 | 96 | - | 1,311 |
| 7/5 | 222 | 98 | 22 | 26 | 65 | 9 | - | 31 | - | 28 | 11 | - | 101 | 113 | 31 | 63 | 43 | 124 | - | 987 |
| 7/6 | 51 | 22 | 31 | 6 | - | 5 | - | - | - | - | - | - | - | 187 | 15 | 101 | 500 | 171 | - | 1,089 |
| 7/7 | 14 | 119 | 53 | - | 13 | 4 | - | - | - | - | - | 2 | 63 | 7 | 21 | 12 | 50 | 60 | - | 418 |
| 7/8 | 44 | 117 | 19 | 3 | 1 | 1 | - | - | 8 | - | 16 | 5 | - | 48 | 10 | - | 3 | 12 | - | 287 |
| 7/9 | 25 | 63 | 16 | 16 | 9 | - | - | - | - | - | - | - | 4 | 7 | 9 | 111 | 31 | 69 | - | 360 |
| 7/10 | 15 | 42 | 3 | - | - | 1 | - | - | - | - | - | - | - | 8 | - | 21 | 17 | 109 | - | 221 |
| 7/11 | 252 | 188 | 105 | 3 | - | - | - | - | - | - | - | - | - | 5 | 3 | - | 20 | 710 | - | 1,286 |
| 7/12 | 303 | 78 | 27 | 4 | 12 | - | - | - | - | -2 | -1 | 6 | - | 54 | 33 | 67 | 492 | 39 | - | 1,112 |
| 7/13 | 212 | 31 | 61 | 38 | 105 | - | - | - | - | 3 | 62 | 18 | 12 | 12 | 89 | 31 | 151 | 112 | - | 937 |
| 7/14 | 110 | 711 | 52 | 78 | - | - | - | 2 | - | 20 | 15 | 6 | 71 | 40 | 83 | 10 | 113 | 87 | - | 1,402 |

Table 1. (continued) Daily/Hourly Chum Salmon Migration past the Kwiniuk River Salmon counting tower, 1974

Species:Chum

| Hour | 0 | 1 | 2 | 3 | 4 | 5 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Daily Total | |
|---------------|------|------|------|-----|-----|-----|----|-----|-----|-----|-----|-----|------|------|------|------|------|------|-------------|--|
| Date | | | | | | | | | | | | | | | | | | | | |
| 7/15 | 15 | 519 | 312 | 60 | 9 | 5 | - | - | 9 | 1 | 1 | 152 | 413 | 551 | 637 | 960 | 1158 | 1364 | 6,159 | |
| 7/16 | 555 | 81 | 15 | 4 | 1 | 3 | - | -2 | 1 | 8 | 2 | 68 | 7 | 12 | 90 | 4 | 7 | 80 | 936 | |
| 7/17 | 61 | 63 | 3 | 21 | 4 | 2 | - | 1 | - | 12 | 10 | 10 | - | 32 | 5 | 60 | 8 | 99 | 391 | |
| 7/18 | 142 | 70 | 16 | 6 | 1 | 2 | - | 8 | 2 | 11 | 6 | 17 | 109 | 60 | 53 | 15 | 168 | 132 | 818 | |
| 7/19 | 202 | 6 | 83 | 7 | - | 2 | - | - | 1 | 3 | 1 | 7 | 34 | 15 | 85 | - | 7 | 50 | 503 | |
| 7/20 | 44 | 3 | - | 1 | 2 | 1 | - | - | - | 1 | 1 | 18 | 4 | - | 6 | 33 | 64 | 15 | 193 | |
| 7/21 | 7 | 18 | - | 12 | 1 | 9 | - | - | -1 | 9 | 3 | 8 | 9 | 10 | 3 | - | 30 | 7 | 125 | |
| 7/22 | 14 | 3 | 3 | 1 | - | 1 | - | - | - | -1 | - | 1 | - | - | 17 | 5 | 12 | 29 | 85 | |
| 7/23 | 37 | 11 | - | 1 | 8 | - | - | - | - | 1 | 1 | 1 | 12 | 88 | 25 | 22 | 75 | 100 | 382 | |
| 7/24 | 16 | 36 | 12 | 1 | 1 | 4 | - | - | 1 | -1 | -3 | - | - | 36 | - | 59 | - | 141 | 303 | |
| 7/25 | 83 | 8 | 12 | - | 3 | 1 | - | - | - | - | -2 | 6 | 3 | 8 | 28 | - | 1 | - | 151 | |
| 7/26 | 3 | 4 | - | 1 | - | - | - | 1 | - | 1 | 1 | 1 | - | - | - | 18 | -5 | 6 | 31 | |
| Hourly Totals | 4190 | 3996 | 1755 | 761 | 331 | 148 | - | 201 | 112 | 132 | 292 | 686 | 1900 | 2962 | 2512 | 2648 | 6211 | 6324 | 35,161 | |
| %of Total Run | 11.9 | 11.4 | 5.0 | 2.2 | 0.9 | 0.4 | | 0.6 | 0.3 | 0.4 | 0.8 | 2.0 | 5.4 | 8.4 | 7.1 | 7.5 | 17.7 | 18.0 | | |

Table 1. Daily/Hourly Pink Salmon Migration past the Kwiniuk River Salmon counting tower, 1974.

Species: Pink

| Hour | 0 | 1 | 2 | 3 | 4 | 5 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Daily total | |
|------|-----|-----|-----|-----|----|-----|----|----|----|----|-----|-----|-----|-----|-----|-----|------|-----|-------------|-------|
| Date | | | | | | | | | | | | | | | | | | | | |
| 6/20 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | 1 |
| 6/21 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | 1 |
| 6/22 | - | - | - | - | 5 | - | - | 3 | - | - | - | - | - | - | - | 4 | - | 25 | - | 37 |
| 6/23 | 35 | 15 | 6 | 2 | 4 | - | - | - | - | - | 4 | -3 | -6 | - | 44 | 21 | 26 | 36 | - | 184 |
| 6/24 | 28 | 32 | 12 | 3 | - | - | - | 2 | - | - | - | 3 | 15 | 60 | 37 | - | 12 | 37 | - | 241 |
| 6/25 | - | 4 | 5 | - | 3 | 7 | - | - | - | - | - | - | - | - | 8 | 14 | - | 54 | - | 95 |
| 6/26 | 14 | 8 | - | - | - | - | - | - | - | - | - | - | - | 7 | 35 | 63 | 597 | 230 | - | 954 |
| 6/27 | 188 | 31 | 24 | 8 | 2 | - | - | - | - | - | 22 | - | 33 | 74 | 42 | 101 | 142 | 276 | - | 943 |
| 6/28 | 91 | 121 | 4 | 4 | - | - | - | - | - | - | - | 9 | 2 | - | 10 | 49 | 256 | 453 | - | 999 |
| 6/29 | 65 | 42 | 3 | 37 | 20 | - | - | - | - | - | - | 27 | 135 | 37 | 32 | 297 | 644 | 796 | - | 2,135 |
| 6/30 | 620 | 171 | 42 | 45 | 74 | 7 | - | 2 | 10 | 25 | - | -2 | 135 | 72 | 299 | 243 | 482 | 691 | - | 2,916 |
| 7/1 | 177 | 255 | 116 | 3 | - | - | 2 | - | 2 | - | 50 | 128 | 235 | 93 | 96 | 134 | 164 | 86 | - | 1,541 |
| 7/2 | 221 | 423 | 473 | 143 | 22 | 25 | 7 | 58 | 15 | 18 | 10 | 26 | 59 | 111 | 440 | 39 | 253 | 122 | - | 2,465 |
| 7/3 | 525 | 321 | 100 | 98 | 29 | 13 | - | - | 10 | 23 | 102 | 122 | 320 | 13 | 8 | 68 | 119 | 285 | - | 2,156 |
| 7/4 | 743 | 525 | 449 | 93 | 20 | 33 | - | - | - | - | - | 101 | 112 | 37 | 61 | 205 | 230 | 397 | - | 3,006 |
| 7/5 | 487 | 144 | 74 | 36 | 60 | - | - | 22 | - | 26 | 15 | - | 55 | 128 | 18 | 74 | 128 | 239 | - | 1,506 |
| 7/6 | 321 | 78 | 28 | 6 | - | 3 | - | - | - | - | - | - | - | 154 | 10 | 324 | 1168 | 328 | - | 2,420 |
| 7/7 | 11 | 248 | 109 | - | 27 | 5 | - | - | - | - | - | -3 | 61 | 13 | 44 | 46 | 191 | 316 | - | 1,068 |
| 7/8 | 410 | 65 | 50 | 43 | - | 7 | - | 1 | - | 1 | 1 | -2 | 4 | - | 3 | 17 | 51 | 66 | - | 717 |
| 7/9 | 91 | 3 | 8 | 1 | - | - | - | - | 2 | - | 7 | 1 | - | 1 | 64 | 78 | 39 | 101 | - | 396 |
| 7/10 | 65 | 62 | 41 | 5 | 5 | - | - | - | 1 | 1 | 12 | 16 | 8 | 30 | 62 | 12 | 41 | 45 | - | 406 |
| 7/11 | 213 | 51 | 23 | 10 | 7 | 5 | - | - | 1 | 1 | 3 | - | 4 | 9 | 55 | 11 | 81 | 103 | - | 577 |
| 7/12 | 199 | 111 | 4 | 110 | 21 | 3 | - | - | - | - | - | 1 | 2 | 47 | 30 | 20 | 83 | 209 | - | 840 |
| 7/13 | 43 | 6 | 24 | 3 | 82 | -15 | - | - | 6 | - | 25 | 18 | 88 | 53 | 12 | 98 | 283 | 510 | - | 1,236 |
| 7/14 | 631 | 482 | 101 | 92 | 31 | 4 | 6 | 85 | 51 | 62 | 201 | 55 | 541 | 73 | - | 3 | 2 | 76 | - | 2,496 |

Table 1. (continued) Daily/Hourly Pink Salmon Migration past the Kwiniuk River Salmon counting tower, 1974

Species:Pink

| Hour | 0 | 1 | 2 | 3 | 4 | 5 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | Daily total | |
|--------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|-------------|--|
| Date | | | | | | | | | | | | | | | | | | | | |
| 7/15 | 552 | 117 | 211 | 89 | 20 | 12 | 8 | 85 | 81 | 62 | 95 | 531 | 41 | 300 | 488 | 309 | 957 | - | 3,958 | |
| 7/16 | - | 6 | 302 | 13 | 5 | - | -5 | - | 7 | 12 | - | - | 51 | 6 | 336 | 15 | 78 | 40 | 866 | |
| 7/17 | 103 | 87 | 12 | - | - | 1 | - | -1 | -1 | 8 | - | 12 | 15 | 18 | 3 | 10 | 8 | 67 | 342 | |
| 7/18 | 347 | 731 | 30 | - | 4 | - | 1 | - | 1 | 12 | - | 2 | 12 | 8 | 17 | - | 3 | 20 | 1,188 | |
| 7/19 | 64 | 32 | 5 | - | 7 | -1 | - | 7 | - | - | 3 | - | 17 | 4 | 29 | 37 | 238 | 381 | 823 | |
| 7/20 | 300 | 79 | 4 | 12 | 1 | - | - | - | -1 | - | -1 | 12 | - | -3 | - | - | 4 | - | 407 | |
| 7/21 | 6 | 71 | 88 | 5 | -5 | 1 | 2 | 3 | 1 | 6 | 5 | 20 | 73 | 14 | 40 | -164 | - | - | 166 | |
| 7/22 | 5 | 83 | 7 | 1 | - | - | - | - | 1 | - | 12 | 4 | 1 | 42 | 40 | - | - | 16 | 212 | |
| 7/23 | 408 | 370 | 3 | 12 | 1 | 1 | - | - | - | 1 | - | 1 | -45 | 4 | 12 | 3 | 18 | 14 | 803 | |
| 7/24 | 56 | 26 | 14 | 5 | 31 | 1 | 1 | - | 21 | 3 | - | 7 | 3 | 4 | 9 | 12 | 41 | 333 | 567 | |
| 7/25 | 281 | 14 | 3 | 4 | - | - | - | - | - | - | - | 1 | 4 | 80 | 9 | 100 | 93 | 6 | 595 | |
| 7/26 | 18 | 23 | 6 | - | 1 | - | - | - | - | 1 | - | - | 1 | - | 2 | 4 | 54 | 2 | 112 | |
| Hourly | | | | | | | | | | | | | | | | | | | | |
| Total | 7318 | 4837 | 2381 | 883 | 477 | 112 | 22 | 267 | 208 | 262 | 566 | 1088 | 1976 | 1489 | 2395 | 2248 | 6486 | 6360 | 39,375 | |
| % of | | | | | | | | | | | | | | | | | | | | |
| Total | | | | | | | | | | | | | | | | | | | | |
| Run | 18.6 | 12.3 | 6.0 | 2.2 | 1.2 | 0.3 | 0.1 | 0.7 | 0.5 | 0.7 | 1.4 | 2.8 | 5.0 | 3.8 | 6.1 | 5.7 | 16.5 | 16.1 | | |

Table 2. Estimates of Daily Salmon Migration Past the Kwiniuk Tower, Using Expanded 10-Minute Counts, Kwiniuk River, 1974.

| Date | Chum Salmon | | Pink Salmon | |
|--------|-------------------------|---------------|-------------------------|---------------|
| | Expanded 10-min. Counts | Actual Counts | Expanded 10-min. Counts | Actual Counts |
| 6/18 | 0 | 0 | | |
| 6/19 | 0 | 16 | | |
| 6/20 | 96 | 63 | 0 | 1 |
| 6/21 | 0 | 1 | 6 | 1 |
| 6/22 | 102 | 122 | 24 | 37 |
| 6/23 | 144 | 277 | 120 | 184 |
| 6/24 | 222 | 471 | 186 | 241 |
| 6/25 | 30 | 163 | 12 | 95 |
| 6/26 | 1,980 | 2,203 | 1,134 | 954 |
| 6/27 | 2,070 | 1,731 | 684 | 943 |
| 6/28 | 1,356 | 1,895 | 720 | 999 |
| 6/29 | 1,626 | 1,416 | 1,620 | 2,135 |
| 6/30 | 834 | 1,447 | 1,296 | 2,916 |
| 7/01 | 1,428 | 1,461 | 1,686 | 1,541 |
| 7/02 | 1,902 | 2,510 | 1,764 | 2,465 |
| 7/03 | 1,188 | 1,898 | 1,912 | 2,156 |
| 7/04 | 1,428 | 1,311 | 3,030 | 3,006 |
| 7/05 | 912 | 987 | 1,140 | 1,506 |
| 7/06 | 1,362 | 1,089 | 1,944 | 2,420 |
| 7/07 | 264 | 418 | 996 | 1,068 |
| 7/08 | 240 | 287 | 606 | 717 |
| 7/09 | 336 | 360 | 252 | 396 |
| 7/10 | 360 | 221 | 366 | 406 |
| 7/11 | 1,206 | 1,286 | 138 | 577 |
| 7/12 | 1,134 | 1,112 | 666 | 840 |
| 7/13 | 990 | 937 | 2,586 | 1,236 |
| 7/14 | 1,944 | 1,402 | 3,720 | 2,496 |
| 7/15 | 5,946 | 6,159 | 3,318 | 3,958 |
| 7/16 | 960 | 936 | 1,086 | 866 |
| 7/17 | 438 | 391 | 336 | 342 |
| 7/18 | 858 | 818 | 780 | 1,188 |
| 7/19 | 498 | 503 | 294 | 823 |
| 7/20 | 246 | 193 | 354 | 407 |
| 7/21 | 162 | 125 | 204 | 166 |
| 7/22 | 120 | 85 | 294 | 212 |
| 7/23 | 468 | 382 | 996 | 803 |
| 7/24 | 390 | 303 | 546 | 567 |
| 7/25 | 114 | 151 | 456 | 595 |
| 7/26 | 18 | 31 | 162 | 112 |
| TOTALS | 33,372 | 35,161 | 34,434 | 39,375 |

$$\frac{35,161 - 33,372}{35,161} \times 100 = 5.09\% \text{ error}$$

$$\frac{39,375 - 34,434}{39,375} \times 100 = 12.55\% \text{ error}$$

Correlation between 10-min. counts and actual counts - 0.9753

Correlation between 10-min. counts and actual counts = 0.8626

Table 3. Age, Sex, and Size Composition of Kwiniuk River Chum Salmon Commercial Catch Sample with 5 1/4" - 5 7/8" Mesh Gill Nets, 1974. 1/

| Dates of Samples | Combined Sex | Age Classes | | Age 3 | | | Age 4 | | | Age 5 | | | Age 6 | | |
|------------------------|--------------|-------------|-------|-------|------|--------|-------|------|--------|-------|------|--------|-------|-----|--------|
| | | No. | % | No. | % | Length | No. | % | Length | No. | % | Length | No. | % | Length |
| 6/27- | Males | 12 | 48.0 | 1 | 4.0 | 549.0 | 6 | 24.0 | 586.4 | 4 | 16.0 | 623.8 | 1 | 4.0 | 640.0 |
| 6/29 | Females | 13 | 52.0 | - | - | - | 9 | 36.0 | 579.2 | 4 | 16.0 | 596.0 | - | - | - |
| | Subtotal | 25 | 100.0 | 1 | 4.0 | - | 15 | 60.0 | - | 8 | 32.0 | - | 1 | 4.0 | - |
| 7/4- | Males | 17 | 60.7 | 2 | 7.1 | 550.2 | 8 | 28.6 | 584.1 | 7 | 25.0 | 594.6 | | | |
| 7/6 | Females | 11 | 39.3 | - | - | - | 8 | 28.6 | 575.9 | 3 | 10.7 | 594.7 | | | |
| | Subtotal | 28 | 100.0 | 2 | 7.1 | - | 10 | 57.2 | - | 10 | 35.7 | - | | | |
| 7/8- | Males | 8 | 40.0 | 2 | 10.0 | 537.5 | 2 | 10.0 | 560.0 | 4 | 20.0 | 609.7 | | | |
| 7/10 | Females | 12 | 60.0 | 3 | 15.0 | 527.3 | 8 | 40.0 | 575.4 | 1 | 5.0 | 620.0 | | | |
| | Subtotal | 20 | 100.0 | 5 | 25.0 | - | 10 | 50.0 | - | 5 | 25.0 | - | | | |
| 7/11- | Males | 25 | 47.2 | 5 | 9.4 | 516.4 | 13 | 24.6 | 559.9 | 7 | 13.2 | 607.0 | | | |
| 7/13 | Females | 28 | 52.8 | 2 | 3.8 | 519.5 | 21 | 39.6 | 561.7 | 5 | 9.4 | 630.0 | | | |
| | Subtotal | 53 | 100.0 | 7 | 13.2 | - | 34 | 64.2 | - | 12 | 22.6 | - | | | |
| 7/15- | Males | 11 | 40.7 | 1 | 3.7 | 514.0 | 7 | 25.9 | 578.4 | 3 | 11.1 | 602.0 | | | |
| 7/17 | Females | 16 | 59.3 | 2 | 7.4 | 512.0 | 10 | 37.1 | 569.4 | 4 | 14.8 | 632.8 | | | |
| | Subtotal | 27 | 100.0 | 3 | 11.1 | - | 17 | 63.0 | - | 7 | 25.9 | - | | | |
| 7/18- | Males | 13 | 56.5 | 4 | 17.4 | 524.5 | 7 | 30.4 | 583.4 | 2 | 8.7 | 641.5 | | | |
| 7/21 | Females | 10 | 43.5 | 1 | 4.4 | 508.0 | 7 | 30.4 | 571.8 | 2 | 8.7 | 618.0 | | | |
| | Subtotal | 23 | 100.0 | 5 | 21.8 | - | 14 | 60.8 | - | 4 | 17.4 | - | | | |
| TOTALS | Males | 85 | 48.9 | 15 | 8.6 | 527.9 | 43 | 24.4 | 574.9 | 27 | 15.3 | 608.7 | 1 | 0.6 | - |
| | Females | 90 | 51.1 | 8 | 4.5 | 519.1 | 63 | 35.8 | 470.1 | 19 | 10.8 | 616.1 | - | - | - |
| | Total | 176 | 100.0 | 23 | 13.1 | - | 106 | 60.2 | - | 46 | 26.1 | - | 1 | 0.6 | - |
| Weighted ^{2/} | Males | | 50.6 | | 7.6 | | | 24.6 | | | 17.4 | | | 1.0 | |
| | Females | | 49.4 | | 3.5 | | | 34.4 | | | 11.5 | | | - | |
| | Total | | 100.0 | | 11.1 | | | 58.0 | | | 28.9 | | | 1.0 | |

1/ Type of measurement: mid-eye to fork of tail

2/ Weighted by commercial catch

Table 5 Forecasting Chum Salmon Returns Based Upon Pink Salmon Abundance of the Same Brood Year (Mattson 1966). Kwiniuk River- Moses Point, 1974.

| Year | <u>X</u> Pink Escapement | <u>Kwiniuk River Escapement Data</u> Chum Escapement | <u>Y</u> Escapement | Year |
|------|-----------------------------|---|------------------------|------|
| 1965 | 15,834 | | 24,444 | 1967 |
| 1966 | 10,629 | | 18,813 | 1968 |
| 1967 | 3,508 | | 19,687 | 1969 |
| 1968 | 126,764 | | 68,004 | 1970 |
| 1969 | 56,683 | | 38,679 | 1971 |
| 1970 | *235,131 | | *30,686 | 1972 |
| 1971 | 16,634 | | 28,617 | 1973 |
| 1972 | 62,461 | | 35,889 | 1974 |
| 1973 | 38,426 | | (30,658) | 1975 |

Correlation coefficient for first eight years = 0.4478
 $r^2 = 0.2006$ (20.06%)

$$Y = a+bx \therefore \underline{30,658} = 27,245.76 + 0.0887 (38,426)$$

*Correlation coefficient with 1970 pink and 1972 chum data removed = 0.9807
 $r^2 = 0.9619$
 (96.19%)

$$Y = a+bx \therefore \underline{32,173} = 17,604.41 + 0.3791 (38,426)$$

Appendix Table 1. Daily total cumulative salmon escapements, Kwiniuk River, 1965-1974

| Species | Date | YEAR | | | | |
|---------|------|------------------------------|----------------------------|------------------------------|----------------------------|---------------------------|
| | | 1965 | 1966 | 1967 | 1968 | 1969 |
| Chum | 6/18 | 6 | | | | |
| | 6/19 | | 24 | | | |
| | 6/20 | | 50 | | | |
| | 6/21 | | 158 | | | |
| | 6/22 | | 506 | | | |
| | 6/23 | | 759 | | | |
| | 6/24 | | 1,048 | 5 | | |
| | 6/25 | | 597 | 24 | 66 | |
| | 6/26 | | 1,060 | 77 | 231 | 57 |
| | 6/27 | 218 | 1,189 | 270 | 1,066 | 113 |
| | 6/28 | 983 | 1,697 | 315 | 1,812 | 427 |
| | 6/29 | 2,576 | 1,768 | 1,455 | 2,838 | 571 |
| | 6/30 | 3,445 | 2,180 | 2,148 | 3,509 | 1,475 |
| | 7/1 | 7,741 | 5,728 | 2,739 | 4,443 | 2,057 |
| | 7/2 | 8,794 | 7,619 | 3,027 | 5,971 | 2,744 |
| | 7/3 | 9,988 | 8,054 | 3,491 | 6,914 | 3,861 |
| | 7/4 | 11,050 | 10,050 | 5,647 | 8,427 | 6,056 |
| | 7/5 | 12,078 | 11,958 | 6,157 | 9,409 | 7,137 |
| | 7/6 | 12,602 | 13,184 | 9,605 | 10,247 | 8,107 |
| | 7/7 | 13,445 | 13,703 | 13,088 | 12,428 | 9,514 |
| | 7/8 | 13,824 | 15,703 | 15,691 | 15,033 | 10,568 |
| | 7/9 | 15,630 | 17,703 | 18,513 | 16,720 | 11,727 |
| | 7/10 | 19,147 | 17,472 | 21,487 | 18,003 | 12,197 |
| | 7/11 | 22,818 | 19,551 | 23,459 | 18,284 | 12,577 |
| | 7/12 | 23,491 | 24,549 | 26,165 | 18,349 | 13,200 |
| | 7/13 | 26,444 | 27,225 | 26,473 | 18,415 | 14,198 |
| | 7/14 | 32,026 | 27,579 | 26,459 | 18,431 | 14,879 |
| | 7/15 | 32,190 | 28,604 | 26,532 | 18,564 | 16,057 |
| | 7/16 | 32,437 | 28,336 | 26,584 | 18,590 | 16,364 |
| | 7/17 | 32,503 | 28,884 | 26,598 | 18,601 | 17,117 |
| | 7/18 | 32,861 | 29,965 | 26,625 | 18,636 | 18,345 |
| | 7/19 | | 31,584 | 26,631 | 18,760 | 18,707 |
| | 7/20 | | 32,154 | 26,681 | 18,815 | 18,918 |
| | 7/21 | | 32,398 | 26,661 | 18,847 | 19,233 |
| | 7/22 | | 32,723 | | 18,907 | 19,373 |
| | 7/23 | | 32,938 | | 18,951 | 19,390 |
| | 7/24 | | 33,030 | | 19,976 | 19,525 |
| | 7/25 | | 33,137 | | | 19,554 |
| | 7/26 | | 33,153 | | | 19,749 |
| | 7/27 | | 33,153 | | | |
| | 7/28 | | 33,184 | | | |
| | 7/29 | | 33,182 | | | |
| | | $\frac{-6,227^{2/}}{26,634}$ | $\frac{-396^{2/}}{32,786}$ | $\frac{-2,217^{2/}}{24,444}$ | $\frac{-163^{2/}}{18,813}$ | $\frac{-62^{2/}}{19,687}$ |

1/ 1970 was the first year of 18 hour counts, 12 noon until 6 a.m. the next day. The average escapement for the hours from 6 a.m. until 12 noon for the years 1965-1969 was 2.1 percent of the total escapement for chums and 3.66 percent for pink salmon.

2/ Subsistence catch.

Appendix Table 1. (continued) Daily total cumulative salmon escapements, Kwiniuk River, 1965-1974

| Species | Date | 1970 | 1971 | 1972 | 1973 | 1974 |
|---------|------|--------|--------|--------|--------|--------|
| Chum | 6/18 | | | | | |
| | 6/19 | | | | | 16 |
| | 6/20 | | | | | 79 |
| | 6/21 | | | | | 80 |
| | 6/22 | | | | | 202 |
| | 6/23 | | | | | 479 |
| | 6/24 | | | | | 950 |
| | 6/25 | 2 | | | 11 | 1,113 |
| | 6/26 | 17 | 23 | | 13 | 3,316 |
| | 6/27 | | 51 | | 17 | 5,047 |
| | 6/28 | | 95 | 33 | 17 | 6,942 |
| | 6/29 | 645 | 139 | 51 | 17 | 8,358 |
| | 6/30 | 2,302 | 196 | 158 | 26 | 9,805 |
| | 7/1 | 3,327 | 452 | 697 | 97 | 11,266 |
| | 7/2 | 6,420 | 728 | 1,375 | 207 | 13,776 |
| | 7/3 | 14,467 | 1,181 | 1,607 | 402 | 15,674 |
| | 7/4 | 20,873 | 3,362 | 2,793 | 1,514 | 16,985 |
| | 7/5 | 26,699 | 4,783 | 4,143 | 4,545 | 17,972 |
| | 7/6 | 30,596 | 6,178 | 5,314 | 4,933 | 19,061 |
| | 7/7 | 31,468 | 6,651 | 9,277 | 5,075 | 19,479 |
| | 7/8 | 34,695 | 10,677 | 12,100 | 8,495 | 19,766 |
| | 7/9 | 40,012 | 11,539 | 14,384 | 8,870 | 20,126 |
| | 7/10 | 40,362 | 13,401 | 16,242 | 15,022 | 20,347 |
| | 7/11 | 44,180 | 16,902 | 17,537 | 15,337 | 21,633 |
| | 7/12 | 47,305 | 18,694 | 21,735 | 16,303 | 22,745 |
| | 7/13 | 47,738 | 19,346 | 22,997 | 16,776 | 23,682 |
| | 7/14 | 50,304 | 20,566 | 24,998 | 18,944 | 25,084 |
| | 7/15 | 56,948 | 20,858 | 25,589 | 19,666 | 31,243 |
| | 7/16 | 60,275 | 21,909 | 25,805 | 20,138 | 32,179 |
| | 7/17 | 62,577 | 26,955 | 26,133 | 22,396 | 32,570 |
| | 7/18 | 63,065 | 27,836 | 27,284 | 24,075 | 33,388 |
| | 7/19 | 63,624 | 30,680 | 27,993 | 26,227 | 33,891 |
| | 7/20 | 65,673 | 33,800 | 28,371 | 26,995 | 34,084 |
| | 7/21 | 65,717 | 34,473 | 28,502 | 27,304 | 34,209 |
| | 7/22 | 66,062 | 35,237 | 29,020 | 27,341 | 34,294 |
| | 7/23 | 66,176 | 35,510 | 29,458 | 27,570 | 34,676 |
| | 7/24 | 66,336 | 36,185 | 29,756 | 28,008 | 34,979 |
| | 7/25 | 66,545 | 36,959 | 29,995 | 28,029 | 35,130 |
| | 7/26 | 66,584 | 37,680 | 30,055 | | 35,161 |
| | 7/27 | 66,599 | 38,107 | | | |
| | 7/28 | 66,602 | 38,186 | | | |
| | 7/29 | 66,604 | 38,243 | | | |

| | | | | |
|---------------------|---------------------|---------------------|---------------------|---------------------|
| x $\frac{2.1\%}{1}$ |
| 1,400 | 803 | 631 | 588 | 738 |
| +66,604 | +38,243 | +30,055 | +28,029 | +35,161 |
| 68,004 | 39,046 | 30,686 | 28,617 | 35,899 |
| | - 367 ^{2/} | | | |
| | 38,679 | | | |

Appendix Table 1. (continued) Daily total cumulative salmon escapement, Kwiniuk River, 1965-1974.

| Species | Date | YEAR | | | | |
|---------|------|---------------------|---------------------|--------------------|-----------------------|---------------------|
| | | 1965 | 1966 | 1967 | 1968 | 1969 |
| Pink | 6/18 | | | | | |
| | 6/19 | | | | | |
| | 6/20 | | | | | |
| | 6/21 | | | | | |
| | 6/22 | | | | | |
| | 6/23 | | | | | |
| | 6/24 | | | | | |
| | 6/25 | | | | | |
| | 6/26 | | | | | 17 |
| | 6/27 | | | | | 19 |
| | 6/28 | 174 | | | 48 | 41 |
| | 6/29 | 260 | | | 214 | 52 |
| | 6/30 | 220 | | | 534 | 117 |
| | 7/1 | 276 | | 1 | 755 | 131 |
| | 7/2 | 314 | 11 | 3 | 1,330 | 232 |
| | 7/3 | 349 | 29 | 4 | 1,732 | 378 |
| | 7/4 | 396 | 317 | 6 | 2,501 | 1,165 |
| | 7/5 | 388 | 517 | | 3,141 | 2,259 |
| | 7/6 | 390 | 533 | | 4,777 | 3,974 |
| | 7/7 | 412 | 568 | 18 | 13,719 | 6,415 |
| | 7/8 | 588 | 607 | 45 | 38,560 | 8,683 |
| | 7/9 | 650 | 673 | 521 | 67,509 | 11,406 |
| | 7/10 | 820 | 683 | 718 | 81,776 | 12,684 |
| | 7/11 | 1,120 | 722 | 1,282 | 105,997 | 13,539 |
| | 7/12 | 1,526 | 758 | 1,926 | 112,984 | 15,447 |
| | 7/13 | 1,653 | 817 | 2,685 | 113,323 | 18,250 |
| | 7/14 | 2,856 | 898 | 3,138 | 113,247 | 19,379 |
| | 7/15 | 4,488 | 1,205 | 3,160 | 114,504 | 25,056 |
| | 7/16 | 7,301 | 1,008 | 3,320 | 115,018 | 27,850 |
| | 7/17 | 7,456 | 1,206 | 3,348 | 117,172 | 34,863 |
| | 7/18 | 7,571 | 1,771 | 3,380 | 121,392 | 37,840 |
| | 7/19 | 8,668 | 3,269 | 3,406 | 124,510 | 43,897 |
| | 7/20 | | 3,894 | 3,432 | 125,848 | 47,626 |
| | 7/21 | | 4,190 | 3,567 | 127,088 | 51,943 |
| | 7/22 | | 5,558 | 3,587 | 128,002 | 54,177 |
| | 7/23 | | 6,777 | | 128,466 | 54,772 |
| | 7/24 | | 7,843 | | 129,052 | 55,741 |
| | 7/25 | | 10,015 | | | 56,217 |
| | 7/26 | | 10,691 | | | 57,497 |
| | 7/27 | | 10,798 | | | |
| | 7/28 | | 10,864 | | | |
| | 7/29 | | | | | |
| | | $\frac{- 367^{2/}}$ | $\frac{- 235^{2/}}$ | $\frac{- 79^{2/}}$ | $\frac{- 2,288^{2/}}$ | $\frac{- 814^{2/}}$ |
| | | 8,301 | 10,629 | 3,508 | 126,764 | 56,683 |

1/ 1970 was the first year of 18 hour counts, 12 noon until 6 a.m. the next day. The average escapement for the hours from 6 a.m. until 12 noon for the years 1965-1969 was 2.1 percent of the total escapement for chums and 3.66 percent for pink salmon.

2/ Subsistence catch.

Appendix Table 1. (continued) Daily total cumulative salmon escapement, Kwiniuk River, 1965-1974

| Species | Date | YEAR | | | | |
|---------|------|---------|--------|--------|--------|--------|
| | | 1970 | 1971 | 1972 | 1973 | 1974 |
| Pink | 6/18 | | | | | |
| | 6/19 | | | | | |
| | 6/20 | | | | | 1 |
| | 6/21 | | | | | 2 |
| | 6/22 | | | | | 39 |
| | 6/23 | | | | | 223 |
| | 6/24 | | | | | 464 |
| | 6/25 | 3 | | | 322 | 559 |
| | 6/26 | 13 | | | 831 | 1,513 |
| | 6/27 | 16 | | | 1,053 | 2,456 |
| | 6/28 | 17 | 9 | 15 | 1,276 | 3,455 |
| | 6/29 | 47 | 12 | 48 | 1,413 | 5,590 |
| | 6/30 | 198 | 31 | 513 | 1,575 | 8,506 |
| | 7/1 | 298 | 125 | 1,490 | 1,762 | 10,047 |
| | 7/2 | 465 | 182 | 2,780 | 1,854 | 12,512 |
| | 7/3 | 1,096 | 241 | 2,899 | 1,938 | 14,668 |
| | 7/4 | 4,643 | 552 | 4,210 | 2,190 | 17,674 |
| | 7/5 | 10,949 | 819 | 7,564 | 3,491 | 19,180 |
| | 7/6 | 20,413 | 1,221 | 10,521 | 3,556 | 21,600 |
| | 7/7 | 20,159 | 1,327 | 21,264 | 3,631 | 22,668 |
| | 7/8 | 25,359 | 2,343 | 27,662 | 4,795 | 23,385 |
| | 7/9 | 30,729 | 2,490 | 35,297 | 4,979 | 23,781 |
| | 7/10 | 31,459 | 3,061 | 39,082 | 7,079 | 24,187 |
| | 7/11 | 39,601 | 5,963 | 42,529 | 7,327 | 24,764 |
| | 7/12 | 50,921 | 6,462 | 47,520 | 8,539 | 25,604 |
| | 7/13 | 52,800 | 6,994 | 49,581 | 9,281 | 26,840 |
| | 7/14 | 59,521 | 7,418 | 52,553 | 12,512 | 29,336 |
| | 7/15 | 90,681 | 7,519 | 53,539 | 13,393 | 33,294 |
| | 7/16 | 127,335 | 7,732 | 53,923 | 14,569 | 34,160 |
| | 7/17 | 148,750 | 9,646 | 54,483 | 18,347 | 34,502 |
| | 7/18 | 155,935 | 10,401 | 55,674 | 21,214 | 35,690 |
| | 7/19 | 161,963 | 12,470 | 57,721 | 27,748 | 36,513 |
| | 7/20 | 179,160 | 13,938 | 57,698 | 30,789 | 36,920 |
| | 7/21 | 185,247 | 14,571 | 57,997 | 32,842 | 37,086 |
| | 7/22 | 198,958 | 15,123 | 59,024 | 33,249 | 37,298 |
| | 7/23 | 208,403 | 15,309 | 59,576 | 35,112 | 38,101 |
| | 7/24 | 214,233 | 15,485 | 59,892 | 36,956 | 38,668 |
| | 7/25 | 222,209 | 15,658 | 60,147 | 37,070 | 39,263 |
| | 7/26 | 225,546 | 15,818 | 60,246 | | 39,375 |
| | 7/27 | 226,712 | 15,996 | 60,256 | | |
| | 7/28 | 226,829 | 16,089 | | | |
| | 7/29 | 226,831 | 16,151 | | | |

| | | | | |
|-----------------------------|--|-----------------------------|-----------------------------|-----------------------------|
| $\times 3.66\% \frac{1}{1}$ | $\times 3.66\% \frac{1}{1}$ | $\times 3.66\% \frac{1}{1}$ | $\times 3.66\% \frac{1}{1}$ | $\times 3.66\% \frac{1}{1}$ |
| 8,300 | 591 | 2,205 | 1,356 | 1,441 |
| +226,831 | +16,151 | +60,256 | + 37,070 | + 39,375 |
| 235,131 | 16,742 | 62,461 | 38,426 | 40,816 |
| | = 108 ² / _{16,634} | | | |