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OBSERVATIONS ON JUVENILE CHUM AND CHINOOK AND SPAWNING CHINOOK IN THE NANAIMO RIVER, BRITISH COLUMBIA, DURING 1975-1981.

by

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ABSTRACT

Healey, M. C., and F. P. Jordan. 1982. Observations on juvenile chum and chinook and spawning chinook in the Nanaimo River, British Columbia, during 1975-1981. Can. MS Rep. Fish. Aquat. Sci. 1659: iv + 31 p.

During 1975, 1976, and 1979-1981 we monitored the downstream run of salmon fry in the Nanaimo River. During 1979 and 1980 we collected information on the migration and distribution of chinook smolts in the river and on the abundance and composition of spawning chinook. Chinook fry run totalled 132-752 thousand and chum fry run 13-52 million. Chum tended to be distributed at random across the river while chinook were concentrated near shore. Both species were more abundant near the surface than near the bottom. Chinook smolts migrated seaward mainly in early June and were concentrated near the centre of the river. Adult chinook were most abundant below the Island Highway bridge (2,000-2,500), less abundant below first lake (1,100-1,200), and scarce above second lake (65). Males outnumbered females in the spawning populations. Stream type fish were most abundant in the upstream spawning groups and upstream spawners were of smaller average size than downstream spawners. Some information on size of fry and smolts, and predators is also given.

Key words: Nanaimo River, salmon fry, smolts, chinook adults, abundance, size frequency.

RÉSUMÉ

Healey, M. C., and F. P. Jordan. 1982. Observations on juvenile chum and chinook and spawning chinook in the Nanaimo River, British Columbia, during 1975-1981. Can. MS Rep. Fish. Aquat. Sci. 1659: iv + 31 p.

En 1975, 1976, et de 1979 à 1981, nous avons surveillé la descente des alevins de saumon dans la rivière Nanaimo. En 1979 et 1980, nous avons recueilli des données sur la migration et la répartition des saumoneaux quinnats, et sur l'abondance et la répartition des sexes des reproducteurs de cette espèce. Le nombre des alevins quinnats, qui se rassemblaient près du rivage, s'élevait à 132 000 et 752 000, respectivement; celui des alevins kétas, répartis dans toute la rivière, s'élevait à 13 et 52 millions, respectivement. Les deux espèces étaient plus abondantes près de la surface qu'au fond. Les saumoneaux quinnats se tenaient au milieu de la rivière, lorsqu'ils migraient vers la mer, au début de juin pour la plupart. Les adultes quinnats étaient plus nombreux en aval du pont Island Highway (2 000 à 2 500), moins nombreux en aval du premier lac (1 100 à 1 200), et rares en amont du deuxième lac (65). Les populations de reproducteurs comptaient plus de mâles que de femelles. Les saumoneaux d'un an étaient plus nombreux dans les groupes se reproduisant en amont; ceux-ci étaient en moyenne de plus petite taille que les reproducteurs d'aval. Nous fournissons aussi quelques données sur la lonqueur des alevins et des saumoneaux, ainsi que sur les prédateurs.

Mots-clés: rivière Nanaimo, alevins, saumoneaux, adultes quinnats, abondance, fréquence des longueurs.

VINDAME TO A CONTROL OF THE PROPERTY OF THE PR

During 1975 and 1976, in connection with an investigation of the early sea life of chum salmon (Oncorhynchus keta) (Healey 1979, 1980a; Healey et al. 1977, 1978), we monitored the downstream run of salmon fry in the Nanaimo River. In 1979, 1980, and 1981, in connection with an investigation of the productivity of chinook salmon (Oncorhynchus tshawytscha), we again monitored fry runs in the river. In May and June of 1979 and 1980, we also sampled chinook smolts migrating seaward and we obtained some additional information on chinook smolts from the fry trapping in 1979-1981. During 1978-1980 we gathered information on the size composition and racial composition of spawning chinook in the river, and in 1979 and 1980 we estimated the size of the spawning chinook populations by mark and recapture. The purpose of this report is to summarize the data on juvenile and adult salmon collected during these investigations.

METHODS to operiods to windstaggeverstag to estendings of witch Sorter.

During 1975 and 1976 we fished five incline plane fry traps with mouth opening 75 X 90 cm in two side channels of the west branch of the Nanaimo River near the end of Makie Road at the upper margin of the estuary (Fig. 1). The trapping periods were March 9 to May 26, 1975 and April 2 to May 26, 1976. We fished the traps 24 h each day and removed the catch at 8:00 a.m., 8:00 p.m., and 12 midnight. These traps were downstream from all salmon spawning but were in a zone of tidal influence and their catch may have been affected by tides.

During 1979 and 1980, we fished two incline plane fry traps at a riffle about 200 m upstream from Cedar bridge (Fig. 1). The trap site was downstream from all chinook spawning, but was upstream from about 15% of the chum spawning. The traps were suspended from a cable stretched across the river, and on consecutive days we fished at five locations spaced equidistant across the river. During low flow periods site 1 on the east bank of the river was too shallow for the trap, and we dropped this fishing site from the usual rotation during low water. The trapping periods were March 21 to May 21, 1979 and March 12 to May 14, 1980. We fished the traps only at night.

A small side channel passing around an island on the west bank of the river at this site was not fished, although we did sample this channel by fyke net to confirm that fry moved down it. This channel carried, on average, about 15% of the surface river flow. During 1981 we fished a single incline plane fry trap intermittently at the riffle above Cedar bridge from April 3 to May 12. The trap was fixed in position in the main flow and was fished only during the night.

During 1975 we estimated trapping efficiency by releasing marked fry upstream from the traps and recording the numbers captured by the traps (Healey et al. 1978). Efficiency was not measured in 1976, but, as the traps were fished in exactly the same way as in 1975 we have assumed that they fished with the same average efficiency. In these 2 yr we estimated total run from the trap catch and the estimate of trapping efficiency.

During 1979 and 1980 we recorded water level at the trapping site, and measured the depth profile of the river at the trapping site during several discharge levels. We then estimated the total run from the ratio of the area sampled by the trap to the total cross section of the river at the trapping site.

In 1981 the fry run appeared to be at its peak in the first week of April, so that we missed about half of the run. For the days when the trap was fished, we estimated fry run, as in 1979 and 1980, from the proportion of the cross section of the river sampled. We estimated fry run for the days not fished by interpolating between fishing days. Interpolation was also used to estimate fry run for the few days when the traps were not fished in 1979 and 1980.

We took daily measurements of water temperature at the trapping site in 1975, 1976, 1979 and 1980. We obtained discharge data from the Water Survey of Canada gauging station upstream from the Island Highway bridge.

Sampling in 1975 and 1976 provided information on the daytime movement of fry, and the proportion of the daily run occurring before and after midnight. Sampling at five sites across the channel in 1979 and 1980 provided information on the horizontal distribution of fry in the river. To obtain information on vertical distribution of fry we sampled at the trapping site above Cedar Bridge with two small (30 cm deep by 60 cm wide) fyke nets set in a frame so that one net fished the top 30 cm of water and the second the bottom 30 cm. This sampling was conducted during May 1-3, 1980.

RESULTS The second beneated and an another belonging areas again and application of the second contact and a secon

Tables 1 to 5 show daily catch of chinook and chum fry in the incline plane traps, and estimates of daily run and total fry run for 1975 to 1981. Since the trapping technique varied between years, trap catch may only be compared between 1975 and 1976 and between 1979 and 1980. Chinook catch varied more than 2-fold for both these comparisons, and chum catch by less than 2-fold (Table 6).

The estimated total run of chinook fry ranged 307-752 thousand between 1975 and 1980, but was only 132 thousand in 1981. The estimate for 1981 is highly uncertain because of the limited trapping in that year. However, we also failed to find the usual numbers of chinook fry rearing in

the estuary in 1981, further suggesting that the run was low that year. Since escapement for the brood year was about average (see later), the poor chinook fry run in 1981 suggests poor egg to fry survival, probably owing to the midwinter floods that year.

The estimated total run of chum fry ranged 13-52 million from 1975-1981. Runs for 1979-1981 were low compared with 1975 and 1976. There was no indication that chum survival suffered to the extent that chinook survival did during the winter of 1981.

The timing of the chinook fry run was similar in 1975-1979, but was considerably earlier in 1980 and 1981. The chum run lagged behind the chinook run in all years except 1976, and was considerably later in 1980 (Table 6).

Temperature during the fry runs ranged about 4-14°C (Table 7). Although there were some differences between years (eg. 1979 and 1980 were warmer than 1975 and 1976) there was no apparent relationship between daily variation in temperature and variation in fry run.

River discharge during the fry run ranged about 400-6000 cfs, but exceeded 3000 cfs on only six occasions. Variations in discharge between years were comparativley small, and only in 1980 did high water ever effect trapping. There was no obvious relationship between fry catch and discharge for either chinook or chum. More subtle relationships may exist, however.

Catches of other salmonids in the fry traps were comparatively small. They consisted of a few hundred coho fry and smolts and a few chinook and steelhead smolts (Table 9). The trapping location in 1975 and 1976 was not suitable for capturing smolts, but should have been appropriate for coho fry. Over 400 coho fry were captured in 1975 but only 10 in 1976. The trapping location was better in 1979-1981, and more coho fry were captured in these years, particularly 1980 when 1,508 were captured. The catch of 115 in 1981, considering the few days of trapping, represents a large downstream migration of coho, perhaps comparable to 1980. The timing of the coho fry run was later than the chum and chinook fry runs, however, and moderate numbers of coho were still being caught at the termination of trapping each year (Table 9).

Fewer than 100 coho smolts were caught in every year except 1981. The catch of chinook and steelhead smolts was also high in 1981 (Table 9). Considering the small number of trapping days in 1981, these high catches indicate very good production of smolts in the spring of 1981. High discharge in the winter of 1981 apparently was not detrimental to overwinter survival, and may even have improved survival.

Only total fry counts were made for each daily time period in 1975 and 1976, not counts by species. Since chum fry predominated in the catch, the timing of the catch may indicate only the daily pattern of chum migration. In both years most of the catch was made after midnight (59 and 67% for 1975 and 1976 respectively), and relatively few were caught during the day (8 and 10% for 1975 and 1976, respectively).

In both 1979 and 1980 chum catches were greatest in high velocity water near the centre of the river, and catches were lowest near the east bank

where velocity was low. Chinook catches were similar at all trapping sites (Table 10). Catches were weighted according to velocity at the trap site to give an estimate of the relative density of fry per unit volume of water (Table 10). Relative density of chum was highest where velocity was high in 1979, but in 1980 chum density was highest on the west side of the river where velocity was low. Chinook density was greatest where velocity was lowest in both years. Chinook seem to be concentrated in low velocity water and near shore, while chum were generally distributed at random with respect to shore and velocity. Further evidence of the tendency of chinook to concentrate in low velocity water near shore comes from fyke net catches in the side channel on the west side of the river at the trapping site above Cedar Bridge. The ratio of chum to chinook fry in the fyke net catch ranged 0.6-14.2 to 1.0 while in the main river channel the ratio ranged 25.7-77.1 to 1.0 (Table 11).

Fyke nets set to fish the surface and bottom 30 cm of the river at the trap site above Cedar Bridge revealed that chum, coho and chinook fry were all more abundant at the surface than at the bottom, about twice as abundant in the case of chum and coho, and four times in the case of chinook (Table 12).

Non-random horizontal and vertical distributions of salmon fry can affect estimates of total run based on trapping data. Horizontal variation in fry abundance probably had little effect on total run estimates for the Nanaimo in 1979 and 1980 since all parts of the river were sampled about equally. Individual daily estimates are, however, likely to be biased high or low depending on the trapping site for that day. The effect of non-random vertical distribution is potentially more serious since we assumed that fry were equally abundant at all depths when we estimated total run size. For more than 30% of the time in both 1979 and 1980, however, the trap fished the whole water column, and, on average the trap fished more than 75% of the water depth. The potential overestimate of run size because of non-random vertical distribution, therefore, is on the order of 10%.

SMOLT TRAPPING

METHODS AND RESULTS

The first fishing for chinook smolts was carried out in June 1979. Our main objective in that year was to provide evidence that juvenile chinook rear in the Nanaimo River and are an additional run of fish to the juveniles which left the river as fry and reared in the estuary. We caught smolts with a fyke net at a downriver location below all spawning activity (Cedar Firehall) and at a mid-river location above the main fall chinook spawning areas (just below the highway bridge) (Fig. 1). We also obtained a sample of smolts from Whitewater Rapids in the upper Nanaimo River. This sampling confirmed the downstream movement of chinook smolts in June and that at least some smolts came from the upper reaches of the river (Table 13).

In 1980 we netted more extensively to determine better the timing, abundance, and vertical/horizontal distribution of smolts in the river.

We fished fyke nets 75 cm in diameter at a new mid-river location by Hub City gravel pit (Fig. 1) between 1900 and 0800 h the following morning on 16 nights between 7 May and 19 June. Peak catches at this sampling location were during the first 2 wk of June (Table 13). Some sampling was done at the downriver location, but catches there were generally equal to or smaller than catches in the upper river suggesting that most smolts came from the upper river (Table 13).

On two occasions we fished the fyke net during the day between 0900-1900 h. No fish were caught, suggesting that migration is limited to evening and night.

On June 10/11, we fished two identical fyke nets in water velocity of 1 m/sec at different distances from shore. Net 1 was positioned 15 m from shore, Net 2, 9 m from shore. The catches were 37 chinook and six trout in Net 1, and 12 chinook and one trout in Net 2. On June 12/13 and June 13/14, we fished three identical nets, again in water velocity of 1 m/sec but different distances from shore. Net 1 was 15 m from shore; Net 2 was 14 m from shore; Net 3 was 6 m from shore. The catches were as follows:

| | Net 1 | Net 2 | Net 3 |
|------------|-----------|------------|-----------|
| June 12/13 | 6 chinook | 16 chinook | 0 chinook |
| June 13/14 | 3 chinook | 13 chinook | 0 chinook |

Nets further from shore consistently caught more fish, suggesting that, unlike chinook fry, chinook smolts avoid the edge of the river. The difference in catches between Nets 1 and 2 on June 12-14 is not a result of distance from shore as these nets were side by side. Net 1 was fully submerged, however, and Net 2 only 2/3 submerged, so that it sampled a greater width of river at the surface. On one occasion nets were set specifically to sample the surface and bottom for smolts. Only six smolts were captured but these were all at the surface. If the smolts always move at the surface it would account for the different catches in Nets 1 and 2.

Chinook smolts apparently have non-random horizontal and vertical distributions during downstream migration. Consequently it would be difficult to estimate the runs of chinook smolts by trap netting or fyke netting without conducting extensive sampling to determine the distribution of the smolts in the river.

SIZE OF FRY AND SMOLTS

The length and weight of chum fry captured during the downstream run was recorded in 1975. These data are presented in detail elsewhere (Healey et al. 1978). The chum fry averaged 36 mm fork length and 0.41 g wet weight.

Fry captured during the first few days of the run were larger than those captured during the main part of the run. Chinook fry captured during 1975 averaged 38.3 mm fork length and 0.57 g wet weight.

We collected further information on the size of chinook fry and smolts in 1979 and 1980. In both years fry averaged 38-39 mm long and 0.5-0.6 g. Smolts migrating in June were almost twice as long, averaging 60-70 mm, and usually over 3 g in weight (Table 14).

PREDATORS OF MIGRANT FRY

During the last week of April, 1980, we captured juvenile rainbow trout (Salmo gairdneri), coast range and prickly sculpins (Cottus aleuticus, C. asper), and starry flounders (Platichthys stellatus) by beach seine after dark in the Nanaimo River at the trap site above Cedar Bridge. We examined the stomach contents of these fish to determine whether they were feeding on migrating chum and chinook fry. Fifteen rainbow juveniles ranging 75-249 mm fork length had fed mainly on insect adults and larvae. Five had fish or fish remains in their guts of which two could be definitely identified as salmon fry, although the species was uncertain. None of the trout had fed on fry immediately prior to capture. Eight starry flounder, 63-77 mm long were mainly empty, and none had fish remains in its stomach. Thirty-nine prickly sculpin, 62-124 mm long, had fed mainly on larval insects although one had an unidentified salmon fry in its stomach. Twenty-eight coast range sculpin 36-84 mm long had also fed mainly on insect larvae, but three had fish remains in their stomach of which one was positively identified as a salmon fry. The incidence of predation, therefore, appears low. Without knowing the population size of predators in the river, however, it is impossible to say what impact fish predators might have on migrating fry.

ADULT CHINOOK SALMON RUNS TO THE NANAIMO RIVER IN 1979 AND 1980

METHODS AND RESULTS

Chinook spawning occurs in three separate areas of the Nanaimo River: 1) In the lower Nanaimo River, between Cedar bridge and the Island Highway; 2) In the upper Nanaimo River, 1 mile downstream from first lake; 3) In the upper Nanaimo River, downstream from fourth lake and possibly other locations in the headwaters.

Traditionally the lower Nanaimo River has had the greatest number of spawners, followed by the upper Nanaimo below first lake and lastly the upper Nanaimo River below fourth lake where less than 100 chinooks spawn. To obtain

a more precise estimate of spawners, we conducted a mark and recovery program in both the lower and upper Nanaimo River below first lake in 1979 and 1980. We captured unspawned fish in holding pools prior to peak of spawning and marked them by clipping the dorsal fin. After spawning we inspected dead fish for marks and recorded their orbit hypural length and sex. The results are given in Table 15. In both years between 1100 and 1200 chinook spawned below first lake and 2000-2500 spawned in the lower river.

Skin divers floated the Nanaimo River between third and fourth lake and counted 65 fish in 1980. No estimate for 1979 is available.

The sex composition of chinook salmon sampled during mark recovery was as follows:

| | 19 | 79 | 19 | 80 |
|---------------------|------|-------|-------|-------|
| | No•Q | No. o | No. 9 | No. o |
| Lower Nanaimo River | 331 | 528 | 161 | 180 |
| Upper Nanaimo River | 23 | 113 | 136 | 91 |

Males thus outnumbered females in the spawning populations by about 1.4 to 1. The true ratio may be somewhat more biased in favour of males, as many small males were seined during marking but comparatively few were present in the mark recovery sampling of spawned out fish.

The orbit-hypural length of males sampled during mark recovery ranged 27-94 cm (Table 16). Three distinct size groups of males were present in the lower river in 1979, a group of small fish averaging about 38 cm, a group of intermediate size fish averaging about 65 cm and a group of large fish averaging about 80 cm (Table 16). Three groups could also be distinguished in the males sampled in 1980. The separation was less obvious, however, and the fish were smaller, the small fish averaging about 34 cm, the intermediate fish about 60 cm and the large fish about 75 cm (Table 16). Males sampled from the upper river represented a smaller range of sizes and there were no obvious size groups (Table 16).

Females ranged 44-94 cm in length, although only one female was less than 54 cm (Table 16). Only one size group of females was present in the lower river and these averaged about 76 cm in both 1979 and 1980. Only one size group of females was present in the upper river as well and they were smaller, averaging about 69 cm (Table 16).

We investigated the proportion of stream and ocean type chinook in samples from the spawning grounds during 1977-1980. The Nanaimo River system produces mainly 0+ fish but also some 1+ chinook smolts. Table 17 gives a breakdown of stream and ocean type fish sampled in different parts of the river each year. Virtually all spawners in the lower river were ocean type (296/298), some spawners in the upper river below first lake were stream type (32/420) and a high proportion of headwater spawners were stream type (18/39). The proportion of stream type fish among upriver spawning populations declined from 1977-1980.

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Table 1. Catch of chum and chinook by inclined plane fry trap in the west channel of the Nanaimo River in 1975 and estimated daily run. Trap efficiency for chum (chinook) determined by mark-recapture.

| Dat | e | Trap % efficiency | Chinook catch | Chinook run | Chum | Chum |
|-----|----|-------------------|---------------|-------------|--------|-----------|
| | LI | 8,084 188, | 2,511 | 681 | | 23 4,80 |
| Mar | 9 | 21,373 _ 615,1 | 048,0 | | 444 | (29,600) |
| | 10 | 21,265 - 324, | 0 | | 240 | (16,000) |
| | 11 | 2.42 | 0 | | 119 | 4,919 |
| | 12 | 3.35 | 184,14 | 57 | 220 | 6,569 |
| | 13 | 3.85 | 2 | 114 | 376 | 9,776 |
| | 14 | 1.05 | 6 | 258 | 335 | 31,993 |
| | 15 | 0.90 | 2 | 171 | 373 | 41,527 |
| | 16 | 0.65 | 3 | 171 | 246 | 37,884 |
| | 17 | 0.58 | 2 | 124 | 255 | 43,860 |
| | 18 | 0.86 | 4 | 228 | 257 | 29,940 |
| | 19 | 0.43 | 7 | 54 | 216 | 50,760 |
| | 20 | 0.83 | 1100,11 | 570 | 186 | 22,320 |
| | 21 | 1.99(16.6) | 9 | 457 | 273 | 13,718 |
| | 22 | 4.09 | 6 | 342 | 572 | 13,973 |
| | 23 | 2.98 | 8 | 37 | 948 | 31,826 |
| | 24 | 8.41 | 15 | 628 | 1,370 | 16,296 |
| | 25 | 10.3 (13.3) | 5 | 324 | 1,190 | 11,558 |
| | 26 | 8.36 | 6 | 342 | 867 | 10,367 |
| | 27 | 4.78 | 2 | 171 | 497 | 10,406 |
| | 28 | 2.67 | 2 | 171 | 418 | 15,675 |
| | 29 | 7.32 | 9 | 58 | 1,270 | 17,343 |
| | 30 | 1.34 | 11 | 855 | 2,554 | 190,528 |
| | 31 | 6.06 | 61 | 2,795 | 1,979 | 368,353 |
| Apr | 1 | 0.24 | 14 | 1,255 | 456 | 192,823 |
| | 2 | 0.55 | 49 | 2,224 | 894 | 161,546 |
| | 3 | 1.13 | 27 | 1,050 | 599 | 53,211 |
| | 4 | 1.31 | 54 | 927 | 1,194 | 90,863 |
| | 5 | 3.40 (3.43) | 36 | 2,111 | 1,617 | 47,574 |
| | 6 | 5.18 (6.14) | 57 | 1,996 | 1,412 | 27,239 |
| | 7 | 6.35 | 75 | 2,933 | 2,770 | 43,620 |
| | 8 | 6.24 | 67 | 5,696 | 3,404 | 54,511 |
| | 9 | 7.21 (3.14) | 92 | 4,620 | 4,586 | 63,571 |
| | 10 | 7.01 (3.04) | 173 | 79,631 | 7,137 | 101,826 |
| | 11 | 5.66 | 194 | 25,888 | 8,705 | 153,801 |
| | 12 | 2.65 (0.72) | 381 | 22,256 | 10,043 | 379,330 |
| | 13 | 0.70 (1.13) | 293 | 26,487 | 6,581 | 937,619 |
| | 14 | 1.21 (0.97) | 215 | 17,882 | 3,466 | 286,491 |
| | 15 | 0.56 (1.04) | 276 | 16,741 | 6,657 | 1,190,523 |
| | 16 | 0.58 (1.43) | 256 | 15,252 | 4,407 | 756,115 |
| | 17 | 0.91 (1.19) | 200 | 16,021 | 4,141 | 454,011 |
| | 18 | 0.80 (3.15) | 481 | 3,289 | 6,086 | 764,575 |
| | 19 | 1.81 (4.84) | 776 | 9,605 | 5,161 | 284,930 |
| | 20 | 4.02 (7.94) | 261 | 7,729 | 4,631 | 115,145 |
| | 21 | 0.86 (1.58) | 152 | 10,209 | 3,050 | 355,990 |
| | 22 | 3.81 (1.29) | 100 | 13,158 | 7,286 | 191,003 |

Table 1 (cont'd) To the graph because the 2001 at the second and the lemman's

| | | | Trap % | Chinook | Chinook | Chum | Chum |
|------|----|---------|-------------|---------|--------------|---------|------------|
| Dat | te | tourd 0 | efficiency | catch | run (contre) | catch | run |
| Apr | 23 | | 4.80 | 166 | 7,511 | 8,094 | 168,511 |
| | 24 | | 3.47 (1.73) | 227 | 6,844 | 21,373 | 615,897 |
| | 25 | | 6.56 (4.95) | 372 | 6,103 | 21,265 | 324,348 |
| | 26 | | 1.49 | 56 | 3,764 | 9,304 | 623,808 |
| | 27 | | 2.34 | 425 | 41,481 | 24,299 | 1,040,486 |
| | 28 | | 0.40 | 190 | 41,644 | 9,011 | 2,255,665 |
| | 29 | | 0.27 (0.60) | 249 | 12,564 | 9,720 | 3,575,526 |
| | 30 | | 0.38 (0.95) | 396 | 34,338 | 3,821 | 2,348,654 |
| May | 1 | | 0.32 (2.58) | 324 | 133,843 | 13,297 | 4,132,793 |
| | 2 | | 0.40 (1.48) | 509 | 10,667 | 11,826 | 2,992,674 |
| | 3 | | 0.55 (0.61) | 822 | 7,274 | 12,174 | 2,196,016 |
| | 4 | | 3.30 (1.57) | 167 | 9,446 | 14,160 | 429,548 |
| | 5 | | 2.18 (2.78) | 202 | 11,001 | 13,838 | 636,215 |
| | 6 | | 1.77 (1.41) | 133 | 8,424 | 10,247 | 578,52 |
| | 7 | | 2.83 (2.47) | 272 | 10,733 | 16,418 | 579,335 |
| | 8 | | 1.98 (2.78) | 234 | 16,023 | 14,171 | 715,928 |
| | 9 | | 2.33 (4.63) | 497 | 63,749 | 21,846 | 939,315 |
| | 10 | | 1.57 (2.75) | 440 | 20,650 | 24,647 | 1,566,288 |
| | 11 | | 0.58 (0.49) | 312 | 7,869 | 13,651 | 2,341,378 |
| | 12 | | 0.42 (0.50) | 104 | 9,727 | 9,665 | 2,289,323 |
| | 13 | | 0.14 (0.61) | 48 | 4,449 | 3,055 | 2,121,545 |
| | 14 | | 0.20 (0.67) | 65 | 2,807 | 7,669 | 3,746,508 |
| | 15 | | 0.43 | 51 | 3,365 | 6,568 | 1,544,794 |
| | 16 | | 0.73 (1.67) | 47 | 2,702 | 5,376 | 738,093 |
| | 17 | | 0.45 | 48 | 2,567 | 3,614 | 803,379 |
| | 18 | | 1.05 | 66 | 3,365 | 5,599 | 533,735 |
| | 19 | | 0.28 | 20 | 144 | 5,028 | 1,802,259 |
| | 20 | | 0.32 | 14 | 1,026 | 2,051 | 637,998 |
| | 21 | | 0.22 (3.47) | 5 | 343 | 1,981 | 907,10 |
| | 22 | | 0.30 | 4 | 342 | 3,030 | 996,36 |
| | 23 | | 1.67 | 3 | 114 | 4,110 | 246,080 |
| | 24 | | 1.73 | 1 | 57 | 3,006 | 174,198 |
| | 25 | | 2.47 | 0 | | 556 | 22,518 |
| | 26 | | 3.33 | 0 | | 547 | 16,410 |
| Tota | al | 279 | 0.86 (1.44) | 10,870 | 752,931 | 449,495 | 52,352,862 |

Table 2. Catch of chum and chinook by inclined plane fry trap in the west channel of the Nanaimo River in 1976. Run estimates based on overall 1975 trap efficiency.

| Date | Chinook | Chum | Date | Chinoc | k Chum |
|---------------|---------|--------|---------|-----------|--------------|
| National Text | Ho., | 1,441 | May 4 | noviE . | 9 3,032 |
| Apr 2 | 0 | 1,411 | may 4 | | 7 4,63 |
| 4 | 0 | 1,324 | 6 | | 3,064 |
| 5 | 0 | 1,338 | 7 | | |
| 6 | 0 | 2,230 | | 18 | |
| 381.7 | 0 | 1,836 | | | 2 02 |
| 8 | 27 | 3,965 | 9 | 24 | |
| 9 | 30 | 3,185 | | | 1,52 |
| 10 | 37 | 3,064 | | 263,000 | 4 1,56 |
| 10 11 | 251 | 11,297 | | 256,200 | 36 4,30 |
| 12 | 161 | 10,423 | 13 | | 4,30 |
| 13 | 53 | 5,591 | 15 | 200,100 | 0 73 |
| 14 | 63 | 9,692 | 16 | | 3 81 |
| 15 | 153 | 18,967 | 17 | OND, CAS | 10 58 |
| 16 | 19 | 2,456 | 18 | 001,001 | 3 20 |
| 17 | 58 | 5,432 | 19 | | 8 12 |
| 18 | 67 | 4,002 | 20 | | 5 20 |
| 19 | 56 | 3,473 | 21 | | 2 11 |
| 20 | 64 | 3,989 | 22 | | 0 17 |
| 21 | 47 | 3,347 | 23 | | 0 2 |
| 22 | 66 | 4,523 | 24 | | 0 32 |
| 23 | 86 | 5,376 | 25 | | 0 5 |
| 24 | 172 | 9,832 | 26 | | 0 |
| 25 | 357 | 11,814 | 80.8 | 082 280 | 000,0 |
| 26 | 259 | 10,592 | Total | catch 4,4 | 19 240,20 |
| 27 | 269 | 11,874 | | 256.260 | 002-21 |
| 28 | 306 | 14,264 | Estimat | ed | |
| 29 | 311 | 8,785 | run | 306,8 | 75 27,930,23 |
| 30 | 210 | 6,156 | 475 | 704 836 | 000500 |
| May 1 | 212 | 5,715 | | | |
| 2 | 190 | 6,683 | | | |
| 3 | 95 | 5,182 | | | |
| | | 100,11 | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Table 3. Catch of chinook and chum fry by inclined plane fry trap in the Nanaimo River above Cedar bridge in 1979, area sampled by the trap, river profile area and estimated daily run of chinook and chum.

| | | | | | | | BxC | | BxD |
|------|-------|------------------|-----|--------------------|---|---------|-----------|--------|-----------|
| | | A | | В | | C | A | D | A |
| | | Trap | | River | | No. | Estimated | No. | Estimated |
| | | opening | | profile | | chinook | total no. | chum | total no. |
| Date | 480, | (cm2) | | (cm2) | | caught | chinook | caught | chum |
| W | 21 | 10 900 | 181 | 256 200 | 8 | 41 | 973 | 84 | 1,993 |
| Mar. | 21 22 | 10,800 12,600 | | 256,200 315,600 | | 12 | 300 | 766 | 19,186 |
| | 23 | 12,600 | | 305,700 | | 23 | 558 | 761 | 18,463 |
| | 24 | 12,600 | | 243,000 | | 88 | 1,697 | 509 | 9,816 |
| | 25 | | | | | 29 | 688 | 24 | 569 |
| | 26 | 10,800 | | 256,200 338,700 | | 21 | 909 | 262 | 7,043 |
| | 27 | 12,600 | | 266,100 | | 36 | 760 | 770 | 16,262 |
| | 28 | 12,600 | | 206,700 | | 37 | 607 | 1,807 | 29,643 |
| | 29 | 11,700 | | 243,000 | | 111 | 2,305 | 887 | 18,422 |
| | 30 | 10,800 | | 256,200 | | 60 | 1,423 | 548 | 13,000 |
| | 31 | 11,700 | | 200,100 | | 139 | 2,377 | 1,314 | 22,473 |
| | 131 | 11,700 | | 200,100 | | | 084.2 | 82 | 64 |
| Apr. | 200 | 12,600 | | 173,700 | | 101 | 1,392 | 3,504 | 48,305 |
| ubr. | 2 | 10,800 | | 210,000 | | 118 | 2,294 | 1,190 | 23,139 |
| | 3 | 10,800 | | 223,200 | | 95 | 1,963 | 1,089 | 22,506 |
| | 4 | 10,800 | | 177,000 | | 184 | 3,016 | 2,791 | 45,741 |
| | 5 | 12,600 | | 206,700 | | 393 | 6,447 | 6,215 | 101,956 |
| | 6 | 10,800 |) + | 177,000 | | 532 | 8,719 | 1,309 | 21,453 |
| | 7 | 9,000 | | 239,700 | | 306 | 8,150 | 836 | 22,265 |
| | 8 | 11,700 | | 289,200 | | 408 | 10,085 | 1,452 | 35,890 |
| | 9 | 12,600 | | 282,600 | | 424 | 9,510 | 2,662 | 59,705 |
| | 10 | 13,500 | | 256,200 | | 557 | 10,571 | 2,222 | 42,169 |
| | 11 | 11,700 | | 193,500 | | 184 | 3,043 | 1,265 | 20,921 |
| | 12 | 12,600 | | 257,850 | | 466 | 9,536 | 1,331 | 27,238 |
| | 13 | 12,600 | | 368,400 | | 475 | 13,888 | 700 | 20,467 |
| | 14 | 12,600 | | 378,300 | | 513 | 15,402 | 2,825 | 84,817 |
| | 15 | 10,800 | | 388,200 | | 550 | 19,769 | 4,950 | 177,925 |
| | 16 | 12,600 | | 276,000 | | 301 | 6,593 | 3,795 | 83,129 |
| | 17 | 12,600 | | 307,350 | | 451 | 11,001 | 1,625 | 39,638 |
| | 18 | 12,600 | | 284,250 | | 553 | 12,475 | 4,151 | 93,645 |
| | 19 | 12,600 | | 252,900 | | 740 | 14,853 | 6,561 | 131,689 |
| | 20 | 12,600 | | 223,200 | | 1,011 | 17,909 | 17,579 | 311,399 |
| | 21 | 12,600 | | 223,200 | | 656 | 11,620 | 11,439 | 202,634 |
| | 22 | 11,700 | | 223,200 | | 765 | 14,594 | 7,226 | 137,850 |
| | 23 | 12,600 | | 219,900 | | 1,250 | 21,815 | 17,835 | 311,126 |
| | 24 | 12,600 | | 224,850 | | 538 | 9,600 | 24,600 | 438,992 |
| | 25 | 12,600 | | 246,300 | | 808 | 15,794 | 21,115 | 412,748 |
| | 26 | 12,600 | | 269,400 | | 1,002 | 21,423 | 5,638 | 120,546 |
| | 27 | 12,600 | | 325,500 | | 783 | 20,228 | 9,328 | 262,961 |
| | 28 | 12,600 | | 355,200 | | 984 | 27,739 | 29,366 | 827,842 |
| | 29 | 12,600 | | 361,800 | | 512 | 14,702 | 32,493 | 933,013 |
| | 30 | 12,600 | | 361,800 | | 412 | 11,830 | 26,343 | 756,420 |

Table 3 (cont'd)
Table 3 (cont 'd)
Table 5 (atch of chinock and chum fry by inclined plane fry trap in the Banaimo

| May 1 12,600 355,200 375 10,571 7,483 2 12,600 346,950 284 7,820 24,088 3 12,600 338,700 395 10,618 40,097 4 12,600 358,500 405 11,523 38,640 5 12,600 427,800 188 6,383 9,030 6 12,600 411,300 125 4,080 8,085 7 12,600 365,100 110 3,187 14,490 8 12,600 335,400 80 2,130 26,722 9 12,600 299,100 54 1,282 17,325 10 12,600 276,000 40 876 6,720 11 12,600 276,000 40 876 6,720 11 12,600 259,500 8 165 5,720 12 12,600 247,950 16 315 15,698 13 12,600 233,100 28 518 9,870 15 12,600 233,100 28 518 9,870 15 12,600 246,300 81 1,583 8,085 16 11,700 246,300 102 2,147 7,560 17 12,600 243,000 50 964 4,830 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 | 210,94 663,28 1,077,84 1,099,40 306,59 263,91 419,86 711,31 411,26 147,20 117,80 308,91 178,83 182,59 158,04 159,14 93,15 |
|--|---|
| 2 12,600 346,950 284 7,820 24,088 3 12,600 338,700 395 10,618 40,097 4 12,600 358,500 405 11,523 38,640 5 12,600 427,800 188 6,383 9,030 6 12,600 411,300 125 4,080 8,085 7 12,600 365,100 110 3,187 14,490 8 12,600 335,400 80 2,130 26,722 9 12,600 299,100 54 1,282 17,325 10 12,600 276,000 40 876 6,720 11 12,600 259,500 8 165 5,720 12 12,600 247,950 16 315 15,698 13 12,600 208,350 58 959 10,815 14 12,600 233,100 28 518 9,870 15 12,600 246,300 81 1,583 8,085 16 11,700 246,300 102 2,147 7,560 17 12,600 243,000 50 964 4,830 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 | 663,28 1,077,84 1,099,40 306,59 263,91 419,86 711,31 411,26 147,20 117,80 308,91 178,83 182,59 158,04 159,14 |
| 3 12,600 338,700 395 10,618 40,097 4 12,600 358,500 405 11,523 38,640 5 12,600 427,800 188 6,383 9,030 6 12,600 411,300 125 4,080 8,085 7 12,600 365,100 110 3,187 14,490 8 12,600 299,100 54 1,282 17,325 10 12,600 299,100 54 1,282 17,325 10 12,600 276,000 40 876 6,720 11 12,600 259,500 8 165 5,720 12 12,600 247,950 16 315 15,698 13 12,600 208,350 58 959 10,815 14 12,600 233,100 28 518 9,870 15 12,600 246,300 81 1,583 8,085 16 11,700 246,300 102 2,147 7,560 17 12,600 243,000 50 964 4,830 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 | 1,077,84 1,099,40 306,59 263,91 419,86 711,31 411,26 147,20 117,80 308,91 178,83 182,59 158,04 159,14 |
| 4 12,600 358,500 405 11,523 38,640 5 12,600 427,800 188 6,383 9,030 6 12,600 411,300 125 4,080 8,085 7 12,600 365,100 110 3,187 14,490 8 12,600 335,400 80 2,130 26,722 9 12,600 299,100 54 1,282 17,325 10 12,600 276,000 40 876 6,720 11 12,600 259,500 8 165 5,720 12 12,600 247,950 16 315 15,698 13 12,600 208,350 58 959 10,815 14 12,600 233,100 28 518 9,870 15 12,600 246,300 81 1,583 8,085 16 11,700 246,300 102 2,147 7,560 17 12,600 243,000 50 964 4,830 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 | 1,099,40 306,59 263,91 419,86 711,31 411,26 147,20 117,80 308,91 178,83 182,59 158,04 159,14 |
| 5 12,600 427,800 188 6,383 9,030 6 12,600 411,300 125 4,080 8,085 7 12,600 365,100 110 3,187 14,490 8 12,600 299,100 54 1,282 17,325 10 12,600 276,000 40 876 6,720 11 12,600 259,500 8 165 5,720 12 12,600 247,950 16 315 15,698 13 12,600 208,350 58 959 10,815 14 12,600 233,100 28 518 9,870 15 12,600 246,300 81 1,583 8,085 16 11,700 246,300 102 2,147 7,560 17 12,600 243,000 50 964 4,830 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 | 306,59 263,91 419,86 711,31 411,26 147,20 117,80 308,91 178,83 182,59 158,04 159,14 |
| 6 12,600 411,300 125 4,080 8,085 7 12,600 365,100 110 3,187 14,490 8 12,600 335,400 80 2,130 26,722 9 12,600 299,100 54 1,282 17,325 10 12,600 276,000 40 876 6,720 11 12,600 259,500 8 165 5,720 12 12,600 247,950 16 315 15,698 13 12,600 208,350 58 959 10,815 14 12,600 233,100 28 518 9,870 15 12,600 246,300 81 1,583 8,085 16 11,700 246,300 102 2,147 7,560 17 12,600 243,000 50 964 4,830 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 670 Est. 3,702 20 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 | 263,91 419,86 711,31 411,26 147,20 117,80 308,91 178,83 182,59 158,04 159,14 |
| 7 12,600 365,100 110 3,187 14,490 8 12,600 335,400 80 2,130 26,722 9 12,600 299,100 54 1,282 17,325 10 12,600 276,000 40 876 6,720 11 12,600 259,500 8 165 5,720 12 12,600 247,950 16 315 15,698 13 12,600 208,350 58 959 10,815 14 12,600 233,100 28 518 9,870 15 12,600 246,300 81 1,583 8,085 16 11,700 246,300 102 2,147 7,560 17 12,600 243,000 50 964 4,830 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 670 Est. 3,702 20 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 | 419,86 711,31 411,26 147,20 117,80 308,91 178,83 182,59 158,04 159,14 |
| 8 12,600 335,400 80 2,130 26,722 9 12,600 299,100 54 1,282 17,325 10 12,600 276,000 40 876 6,720 11 12,600 259,500 8 165 5,720 12 12,600 247,950 16 315 15,698 13 12,600 208,350 58 959 10,815 14 12,600 233,100 28 518 9,870 15 12,600 246,300 81 1,583 8,085 16 11,700 246,300 102 2,147 7,560 17 12,600 243,000 50 964 4,830 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 670 Est. 3,702 20 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 | 711,31 411,26 147,20 117,80 308,91 178,83 182,59 158,04 159,14 |
| 9 12,600 299,100 54 1,282 17,325 10 12,600 276,000 40 876 6,720 11 12,600 259,500 8 165 5,720 12 12,600 247,950 16 315 15,698 13 12,600 208,350 58 959 10,815 14 12,600 233,100 28 518 9,870 15 12,600 246,300 81 1,583 8,085 16 11,700 246,300 102 2,147 7,560 17 12,600 243,000 50 964 4,830 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 670 Est. 3,702 20 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 | 411,26 147,20 117,80 308,91 178,83 182,59 158,04 159,14 |
| 10 12,600 276,000 40 876 6,720 11 12,600 259,500 8 165 5,720 12 12,600 247,950 16 315 15,698 13 12,600 208,350 58 959 10,815 14 12,600 233,100 28 518 9,870 15 12,600 246,300 81 1,583 8,085 16 11,700 246,300 102 2,147 7,560 17 12,600 243,000 50 964 4,830 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 670 Est. 3,702 20 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 | 147,20 117,80 308,91 178,83 182,59 158,04 159,14 |
| 11 12,600 259,500 8 165 5,720 12 12,600 247,950 16 315 15,698 13 12,600 208,350 58 959 10,815 14 12,600 233,100 28 518 9,870 15 12,600 246,300 81 1,583 8,085 16 11,700 246,300 102 2,147 7,560 17 12,600 243,000 50 964 4,830 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 670 Est. 3,702 20 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 | 117,80 308,91 178,83 182,59 158,04 159,14 |
| 12 12,600 247,950 16 315 15,698 13 12,600 208,350 58 959 10,815 14 12,600 233,100 28 518 9,870 15 12,600 246,300 81 1,583 8,085 16 11,700 246,300 102 2,147 7,560 17 12,600 243,000 50 964 4,830 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 670 Est. 3,702 20 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 Total 19,078 436,066 530,140 | 308,91 178,83 182,59 158,04 159,14 |
| 13 | 178,83 182,59 158,04 159,14 |
| 14 12,600 233,100 28 518 9,870 15 12,600 246,300 81 1,583 8,085 16 11,700 246,300 102 2,147 7,560 17 12,600 243,000 50 964 4,830 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 670 Est. 3,702 20 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 Total 19,078 436,066 530,140 | 182,59 158,04 159,14 |
| 15 | 158,04 159,14 |
| 16 11,700 246,300 102 2,147 7,560 17 12,600 243,000 50 964 4,830 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 670 Est. 3,702 20 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 Total 19,078 436,066 530,140 | 159,14 |
| 17 12,600 243,000 50 964 4,830 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 670 Est. 3,702 20 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 Total 19,078 436,066 530,140 | |
| 18 Trap not fishing 817 Est. 4,266 19 Trap not fishing 670 Est. 3,702 20 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 Total 19,078 436,066 530,140 | |
| 19 Trap not fishing 523 Est. 3,702 20 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 Total 19,078 436,066 530,140 | 81,97 |
| 20 Trap not fishing 523 Est. 3,138 21 10,800 203,400 20 377 2,573 Total 19,078 436,066 530,140 | 70,80 |
| 21 10,800 203,400 20 377 2,573 Total 19,078 436,066 530,140 | 59,63 |
| Total 19,078 436,066 530,140 | 48,45 |
| 9,000 297,678 146 4,829 731 24,18 9,000 282,495 206 6,466 1,916 60,14 9,000 274,930 115 3,513 2,797 85,43 | 12,745,97 |
| | 12,745,97 |
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| 9,000 373,702 312 12,955 3,200 132,87 | |
| 9,000 .468,694 402 20,935 2,875 149,72 | |
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Table 4. Catch of chinook and chum fry by inclined plane fry trap in the Nanaimo River above Cedar bridge in 1980, area sampled by the trap, river profile area and estimated daily run of chinook and chum.

| en le 202 | muda | on leson | 1/500 1/000 r r/o | BxC | gari | BxD |
|-----------|----------|----------|----------------------|------------|--|-----------|
| | A | В | C | A | D | A |
| | Trap | River | No. | Estimated | No. | Estimated |
| | opening | profile | chinook | total no. | chum | total no. |
| Date | (cm2) | (cm2) | caught | chinook | caught | chum |
| Mar. 12 | 9,000 | 392,625 | 16 | 698 | 3 | 131 |
| 13 | 9,000 | 396,750 | 12 | 529 | 158 | 6,961 |
| 14 | 9,000 | 387,000 | 2 | 86 | 260 | 11,235 |
| 15 | 9,000 | 36,250 | 4 | 161 | 451 | 18,155 |
| 16 | 9,000 | 358,615 | 13 | 518 | 580 | 23,103 |
| 17 | 9,000 | 438,188 | 16 | 779 | 75 | 3,653 |
| 18 | 9,000 | 434,368 | 19 | 917 | 439 | 21,194 |
| 19 | 9,000 | 426,789 | 19 | 901 | 548 | 25,993 |
| 20 | 9,000 | 415,800 | 15 | 693 | 660 | 30,470 |
| 21 | 9,000 | 415,385 | 39 | 1,800 | 550 | 25,392 |
| 22 | 9,000 | 407,842 | 38 | 1,722 | 42 | 1,904 |
| 23 | 9,000 | 404,280 | 25 | 1,123 | 436 | 19,576 |
| 24 | 9,000 | 381,375 | 24 | 1,017 | 923 | 39,104 |
| 25 | 9,000 | 362,250 | 36 | 1,449 | 1,235 | 49,716 |
| 26 | 9,000 | 331,924 | 92 | 3,393 | 1,375 | 50,707 |
| 27 | 9,000 | 320,595 | 37 | 1,318 | 374 | 13,319 |
| 28 | 9,000 | 328,103 | 68 | 2,479 | 1,125 | 41,013 |
| 29 | 9,000 | 335,700 | 180 | 6,714 | 2,063 | 76,950 |
| 30 | 9,000 | 324,360 | 50 | 1,802 | 1,125 | 40,538 |
| 31 | 9,000 | 312,904 | 146 | 5,076 | 2,125 | 73,879 |
| Apr. 1 | 9,000 | 297,678 | 146 | 4,829 | 731 | 24,180 |
| 2 | 9,000 | 282,495 | 206 | 6,466 | 1,916 | 60,141 |
| 3 | 9,000 | 274,930 | 115 | 3,513 | 2,797 | 85,433 |
| 4 | 9,000 | 271,113 | 971 | 2,922 | 3,813 | 114,856 |
| 5 | 9,000 | 278,777 | 364 | 11,275 | 4,422 | 136,935 |
| 6 | 9,000 | 350,894 | 255 | 9,942 | 875 | 34,115 |
| 7 | 9,000 | 354,694 | 229 | 9,025 | 1,438 | 56,673 |
| 8 | 9,000 | 373,702 | 312 | 12,955 | 3,200 | 132,871 |
| 9 | 9,000 | 468,694 | 402 | 20,935 | 2,875 | 149,724 |
| 10 | 9,000 | 476,296 | 358 | 18,946 | 3,000 | 158,767 |
| 11 | 9,000 | 434,504 | 133 | 6,421 | 1,000 | 48,278 |
| 12 | 9,000 | 407,904 | 251 | 11,376 | 4,500 | 203,950 |
| 13 | 9,000 | 415,500 | 222 | 10,249 | 6,000 | 277,000 |
| 14 | 9,000 | 495,303 | 326 | 17,941 | 7,300 | 401,743 |
| 15 | 9,000 | 514,286 | 168 | 9,600 | 4,320 | 576,24 |
| 16 | 9,000 | 472,500 | 120 | 6,300 | 1,920 | 100,800 |
| 17 | 9,000 | 461,108 | 158 | 8,095 | 6,120 | 313,548 |
| 18 | Trap not | | | 7,671 Est. | and the same of th | 338,39 |
| 19 | Trap not | | | 7,247 Est | | 363,23 |
| 20 | Trap not | | | 6,823 Est | | 388,08 |
| 21 | 9,000 | 483,882 | 119 | 6,398 | 7,680 | 412,928 |
| | | | 154 | 7,175 | 11,880 | 553,522 |
| 22 | 9,000 | 419,318 | 1.34 | 1 4 4 1 3 | 11,000 | 2229260 |

Table 4 (cont'd)

| | | | | | BxC | | BxD |
|------|-----------------|------------------|------------------|-------------------|----------------------|---------|------------|
| | | A | В | C | A | D | A |
| | | Trap | River | No. | Estimated | No. | Estimated |
| Date | A\Cx ebasase | opening (cm2) | profile (cm2) | chinook caught | total no. chinook | chum | total no. |
| Apr. | 24 | 9,000 | 358,473 | 112 | 4,461 | 4,440 | 176,860 |
| whr. | 25 | 9,000 | 335,667 | 108 | 4,028 | 11,520 | 429,696 |
| | 26 | 10,800 | 324,290 | 298 | 8,948 | 18,300 | 549,508 |
| | 27 | 10,800 | 320,494 | 154 | 4,570 | 21,720 | 644,561 |
| | 28 | 10,800 | 331,920 | 75 | 2,305 | 19,920 | 612,171 |
| | 29 | 8,100 | 316,671 | 84 | 3,284 | 4,080 | 159,523 |
| | 30 | 10,800 | 301,493 | 131 | 3,657 | 16,560 | 462,300 |
| May | 1 | 8,100 | 301,472 | 64 | 2,382 | 16,120 | 600,022 |
| | 2 | 10,800 | 309,140 | 133 | 3,807 | 15,860 | 453,919 |
| | 3 | 10,800 | 282,555 | 80 | 2,093 | 8,160 | 213,444 |
| | 4 | 10,800 | 267,355 | 98 | 2,426 | 7,320 | 181,170 |
| | 5 | 10,800 | 290,079 | 213 | 5,721 | 12,480 | 335,227 |
| | 6 | 10,800 | 286,315 | 94 | 2,492 | 9,480 | 251,308 |
| | 7 | 10,800 | 267,408 | 25 | 619 | 2,921 | 72,295 |
| | 8 | 10,800 | 252,124 | 29 | 677 | 2,760 | 64,426 |
| | 9 | 10,800 | 233,100 | 48 | 1,036 | 4,920 | 106,190 |
| | 10 | Trap not fi | shing | | 975 Est. | 3,720 | 79,847 |
| | 11 | 10,800 | 229,312 | 43 | 913 | 2,520 | 53,503 |
| | 12 | 10,800 | 244,543 | 28 | 634 | 960 | 21,733 |
| | 13 | 9,900 | 236,893 | 14 | 335 | 720 | 17,229 |
| | 14 | 10,800 | 236,800 | 27 | 592 | 960 | 21,058 |
| Tota | 102,501 | 502.1 | 008,1 | 7,707 | 298,962 | 304,875 | 11,366,285 |

Table 5. Inclined plane trap catch of chinook and chum salmon fry in 1981 and estimated run. Run for days traps was not fished is from linear interpolation between catches.

| Date | A Trap opening (cm2) | B River profile (cm2) | C No. chinook caught | BxC/A Estimated chinook run | D No. chum caught | BxD/A Estimated chum run |
|---------|-------------------------------|--------------------------------|-------------------------------|--------------------------------------|----------------------------|--------------------------------|
| DA DA | 012 11 | 153 a | 931 | - CT#1 | 100 00 | 615 AS |
| Apr. 3 | 6,300 | 385,000 | 31 | 1,894 | 7,700 | 470,555 |
| 4 | | | | 3,059 | | 388,128 |
| 5 | | 200.0 | - 88 | 4,222 | FF | 305,701 |
| 6 | 6,300 | 465,000 | 73 | 5,388 | 3,025 | 223,274 |
| 08.8027 | | | 100 | 3,406 | 00 | 322,856 |
| 8 | 6,300 | 390,000 | 23 | 1,424 | 6,824 | 422,438 |
| 9 | | | | 1,334 | | 374,313 |
| 10 | | | | 1,244 | | 326,188 |
| 11 | | | 20 | 1,154 | | 278,063 |
| 12 | 6,300 | 335,000 | 20 | 1,064 | 4,249 | 229,939 |
| 13 | 1904 191 | 024,5 | | 1,220 | | 237,783 |
| 14 | | | | 1,376 | | 245,627 |
| 15 | | | | 1,532 | | 253,471 |
| 16 | | | | 1,688 | | 261,315 |
| 17 | | | | 1,844 | | 269,159 |
| 18 | 6,300 | 450,000 | 28 | 2,000 | 3,878 | 277,000 |
| 19 | 6,300 | 410,000 | | 2,026 | 3,700 | 240,794 |
| 20 | 07.0 "2 | | | 2,051 | | 213,996 |
| 21 | | | | 2,077 | | 187,198 |
| 22 | | | | 2,103 | | 160,400 |
| 23 | | | | 2,128 | | 133,798 |
| 24 | 6,300 | 522,000 | 26 | 2,154 | 1,289 | 106,803 |
| 25 | 0,000 | 100,00 | 107, | 1,899 | | 102,503 |
| 26 | | | | 1,644 | | 98,203 |
| 27 | | | | 1,389 | | 93,903 |
| 28 | 6,300 | 420,000 | 17 | 1,133 | 1,344 | 89,600 |
| 29 | 6,300 | 445,000 | | 975 | 647 | 45,700 |
| 30 | 0,500 | 445,000 | | 816 | 047 | 47,013 |
| | | | | 658 | | 48,326 |
| May 1 | | | | 500 | | 49,952 |
| 3 | 6 300 | 429 000 | 5 | 340 | 750 | 50,952 |
| | 6,300 | 428,000 | , | 227 | 750 | 42,577 |
| 4 5 | | | | 114 | | 34,202 |
| | . 200 | 260 000 | 0 | 0 | 452 | 25,828 |
| 6 | 6,300 | 360,000 | 0 | 0 | 432 | 17,556 |
| 7 | | 2/0 000 | 0 | | 172 | 9,283 |
| 8 | 6,300 | 340,000 | 0 | | 1/2 | 5,808 |
| 9 | | 200 000 | 0 | | 49 | 2,333 |
| 10 | 6,300 | 300,000 | 0 | | 49 | |
| 11 | | 070 000 | ^ | | 1.7 | 1,530 |
| 12 | 6,300 | 270,000 | 0 | | 17 | 120 |
| Total | | | 223 | 56,085 | 34,096 | 6,694,483 |

Table 6. Summary of total catch, median catch date, and total run estimate for chinook and chum fry, 1975-1981.

| Statistic | 1975 | 1976 | 1979 | 1980 | 19813 |
|-------------|------------|------------|----------|----------------------|-------------|
| Chinook | | | | | |
| Catch | 10,870 | 4,419 | 19,078 | 7,707 | 223 |
| Median date | Apr. 27 | Apr. 27 | Apr. 21 | Apr. 10 | ~Apr. 5 |
| Run | 752,931 | 306,875 | 513,0191 | 351,678 ¹ | ~132,000 |
| | | | | | |
| Chum | | | | | |
| Catch | 449,495 | 240,200 | 530,140 | 304,875 | 34,096 |
| Median rate | Apr. 30 | Apr. 24 | May 1 | Apr. 26 | ~Apr. 5 |
| Run | 52,352,862 | 27,930,233 | | 13,372,1002 | ~15,800,000 |

¹ Assumes 15% of chinook use side channel at trap site.

²Assumes 15% of chum spawn below trap site.

³Assumes run was half over when trapping began; that 15% of chinooks used side channel at trap site and that 15% of chum spawn below trap site.

Table 7. Temperature (°C) of the Nanaimo River taken in the morning at the trapping site during 1975-80.

| Date | | 1975 | 1976 | əvei 19 | 979 | 1980 |
|-------|----------|------------|------------|----------------|------------|------------|
| Mar. | 9 | 3.1 | | | | |
| | 10 | 3.4 | | | | |
| | 11 | | | | | |
| | 12 13 | 4.0 | | | | |
| | 14 | 4.8 | | | | |
| Mar. | 15 | 4.1 | | | | 5.0 |
| rial. | 16 | 4.4 | | | | |
| | 17 | 4.3 | | | | |
| | 18 | 3.9 | | | | 5.0 |
| | 19 | 3.8 | | | | 5.0 |
| | 20 | 4.2 | | | 5.5 | 5.0 |
| | 21 | 4.0 | | | 6.5 | 0.0 |
| | 22 | 4.2 | | AND THE STREET | 7.0 | 2.0 |
| | 23 | 3.8 | | | 1.0 | 5.0 |
| | 24 | 3.5 | | | 7.0 | 5.0 |
| | 25 | 3.8 | | | 7.0 | 5.0 |
| | 26 | 3.3 | | | 6.5 | 5.0 |
| | 27 | 3.9 | | | 6.5 | 6.0 |
| | 28 | 5.6 | | | 6.5 | 6.0 |
| | 29 | 5.9 | | | 6.5 | 6.0 |
| | 30 | 4.6 | | | 6.0 | 6.0 |
| | 31 | 4.5 | | | 6.0 | 7.0 |
| Apr. | 1 | 6.3 | | | 6.0 | 7.0 |
| | 2 | 4.9 | | | 6.0 | 7.0 |
| | 3 | 6.1 | | | 7.0 | 6.0 |
| | 4 | 6.8 | 6.0 | | 8.5 | 8.0 |
| | 5 | 6.8 | 6.0 | | 8.0 | 7.0 7.0 |
| | 6 | 7.4 7.7 | 5.4 7.0 | | 7 5 | 7.0 |
| | 8 | 8.0 | 5.5 | | 7.5 8.0 | 7.0 |
| | 9 | 8.5 | 6.5 | | 8.0 | 7.0 |
| | 10 | 8.5 | 6.0 | | 7.5 | 8.0 |
| | 11 | 8.6 | 6.5 | | 8.0 | 8.0 |
| | 12 | 7.3 | 7.5 | | 7.0 | 9.0 |
| | 13 | 7.7 | 5.5 | | 6.5 | 9.0 |
| | 14 | 8.1 | 5.5 | | 6.5 | 9.0 |
| | 15 | 7.5 | 6.0 | | 7.5 | 9.0 |
| | 16 | 7.3 | 5.5 | | 7.5 | 8.0 |
| | 17 | 7.5 | 6.0 | | 7.0 | 9.0 |
| | 18 | 6.5 | 7.0 | | 7.0 | 9.0 |
| | 19 | 6.5 | 7.0 | | 8.0 | |
| | 20 | 6.0 | 6.7 | | 8.5 | 0.0 |
| | 21 | 6.8 | 6.7 | | 8.0 | 9.0 |
| | 22 | 6.4 | 6.7 | | 8.5 | 9.0 |
| | 23 | 6.8 | 6.7 | | 0.5 | 9.0 |
| | 24 | 6.8 | 7.0 | 1 | .0.5 | 9.0 |

Table 7 (cont'd)

| Date | 1975 | 1976 | 1979 | 1980 |
|--------|-----------|-----------|--------------|-----------|
| 25 | 7.0 | 6.5 | 11.0 | 9.0 |
| 26 | 7.5 | 7.0 | 11.5 | 9.0 |
| 27 | 7.3 | 7.3 | 12.0 | 10.0 |
| 28 | (00, 6.5 | 8.2 | 12.5 | 008 11.0 |
| 29 | 7.3 | 8.7 | 12.5 | EBB 11.0 |
| 30 | 7.7 | 8.8 | 12.0 | 12.0 |
| May 1 | 7.5 | 9.3 | 11.5 | 11.0 |
| 2 | 7.5 | 9.1 | 11.0 | 04 12.0 |
| 3 | 6.8 | 8.5 | 10.5 | 0451 12.0 |
| 4 | 7.6 | 9.0 | 10.5 | 12.0 |
| 5 | 7.3 | 8.5 | 11.0 | 0801 12.0 |
| 6 | 112.1 7.7 | 8.5 | 11.0 | Deal 11.0 |
| 184 7 | 7.9 | 850,1 9.4 | 10.5 | 0081 12.0 |
| 8 A 30 | 8.7 | 10.8 | 11.0 | 0851 11.0 |
| 9 | 9.2 | 10.6 | 12.0 | 10.0 |
| 10 | 8.3 | 10.5 | 11.0 11.0 | 12.0 |
| 11 | 8.3 | 9.7 | 11.5 | |
| 358 12 | 8.3 | | 11.5 | |
| 13 | 9.5 | 0 0 | 13.0 | 13.0 |
| | | 10.6 | 13.0 | 699 |
| 15 | 9.7 | 11.2 | | |
| 200 17 | 8.9 | 10.3 | | |
| 18 | 9.0 | 10.0 | | |
| 19 | 9.3 | 9.7 | | |
| 20 | 088 10.2 | 10.7 | | |
| 21 | 10.3 | 10.3 | | |
| 22 | 9.4 | 10.7 | | |
| 23 | 088 9.2 | QEA 11.0 | | |
| 24 | 083 10.1 | 11.2 | | |
| 25 | age 11.3 | 10.3 | | |
| 26 | 250 10.3 | 207 10.3 | | |
| West | 2.00 (1 | 001 | 0047 | 0.49 |
| | | | | |
| | | | | |
| | | | | |
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| | | | | |

Table 8. Nanaimo River flow in cfs at Granby Gauge above the Island Highway bridge in 1975-1981.

| Mar. 9 10 11 12 | 1975 961 898 869 | 1976 | 5,0 | 1979 | | 1980 | 198 | 11 |
|--------------------------|---------------------------|--------------|------|--------------|-----|-------------|------|-----|
| 10 11 | 898 | 11.5 | 2.14 | | | | | |
| 10 11 | 898 | | | | 2.7 | | 25 | |
| 11 | | | | | | | | |
| 12 | 009 | | | 1,686 | | 1,091 | 5 | 88 |
| | 883 | | | 1,694 | | 1,210 | | 60 |
| 13 | 876 | | | 1,614 | | 1,315 | 08 5 | 540 |
| 14 | 969 | | | 1,455 | | 1,259 | | 520 |
| 15 | 0.51 1140 | | | 1,590 | | 1,157 | 4 | 98 |
| 16 | 1240 | | | 1,855 | | 1,027 | 5 | 520 |
| 17 | 1550 | | | 1,670 | | 1,011 | 5 | 524 |
| 18 | 1680 | | | 1,399 | | 912 | 5 | 513 |
| 19 | 1460 | | | 1,151 | | 1,511 | 4 | 483 |
| 20 | 1300 | | | 1,038 | | 1,455 | 4 | 458 |
| 21 | 1280 | | | 1,000 | | 1,476 | 4 | +30 |
| 22 | 1200 | | | 978 | | 1,455 | 4 | +12 |
| 23 | 1070 | | | 1,000 | | 1,455 | 4 | 440 |
| 24 | 957 | | | 1,073 | | 1,350 | | 494 |
| 25 | 847 | | | 1,151 | | 1,189 | | 528 |
| 26 | 756 | | | 1,097 | | 1,055 | | 374 |
| 27 | 696 | | | 961 | | 956 | | 346 |
| 28 | 669 | | | 824 | | 873 | | 771 |
| 29 | 796 | | | 730 | | 961 | | 390 |
| 30 | 848 | | | 630 | | 956 | 1,0 | |
| 31 | 850 | | | 567 | | 895 | 1,6 | 20 |
| | | | | | | 000 | 71 | |
| Apr. 1 | 862 | | | 515 | | 830 | 2,0 | |
| 2 | 865 | 1380 | | 480 | | 750 | 1,7 | |
| 3 | 851 | 1170 | | 448 | | 695 | 1,4 | |
| 4 | 814 | 1090 | | 439 | | 680 | 1,2 | |
| 5 | 774 | 1100 | | 504 | | 680 | 1,9 | |
| 6 | 769 | 1490 | | 607 | | 956 | 2,3 | |
| 7 | 772 | 1770 | | 705 | | 1,022 | 1,9 | |
| 8 | 824 | 1960 | | 730 | | 1,000 | 1,5 | |
| 9 | 940 | 2140 | | 775 | | 1,385 | 1,3 | |
| 10 | 1,140 | 2060 | | 770 | | 2,170 | 1,1 | |
| 11 | 1,480 | 2370 | | 710 | | 1,966 | 1,1 | |
| 12 | 1,770 | 2560 | | 645 | | 1,567 | 1,1 | |
| 13 | 1,680 | 2170 | | 1,455 | | 1,455 | 1,0 | |
| 14 | 1,610 | 1800 | | 1,872 | | | | |
| 15 | 1,720 | 1540 1280 | | 1,614 | | 2,554 2,320 | 1,0 | |
| 16 17 | 1,750 | 1160 | | | | 1,766 | 2,2 | |
| 18 | 1,710 1,760 | 1080 | | 1,016 862 | | 2,000 | 2,0 | |
| 19 | 1,620 | 1010 | | 780 | | 6,070 | 1,6 | |
| 20 | 1,410 | 913 | | 680 | | 5,400 | 1,5 | |
| 21 | 1,270 | 833 | | 630 | | 2,975 | | 360 |
| 22 | 1,250 | 741 | | 585 | | 1,872 | 1, | |
| 23 | 1,250 | 755 | | 594 | | 1,434 | | 500 |
| 24 | 1,270 | 916 | | 612 | | 1,189 | | 444 |

Table 8 (cont'd)

| Date | 1975 | 1976 | 1979 | 1980 | 1981 |
|-------|-------|-------|-------|-------|-------|
| 25 | 1,220 | 966 | 680 | 1,067 | 2,742 |
| 26 | 1,330 | 940 | 813 | 961 | 1,916 |
| 27 | 1,360 | 965 | 1,000 | 895 | 1,374 |
| 28 | 1,280 | 1,080 | 1,315 | 950 | 1,740 |
| 29 | 1,220 | 1,360 | 1,515 | 967 | 2,004 |
| 30 | 1,280 | 1,980 | 1,552 | 890 | 1,900 |
| May 1 | 1,570 | 2,620 | 1,530 | 807 | 1,716 |
| | 3,050 | 3,230 | 1,441 | 990 | 1,740 |
| 2 3 | 3,130 | 2,790 | 1,315 | 9/.6 | 1,820 |
| 1. | 2,470 | 0 210 | 1,385 | 755 | 1,740 |
| | 2,060 | 2 020 | 1,670 | 745 | 1,500 |
| 16 69 | 1,820 | 1 7/0 | 2,190 | 857 | 1,278 |
| 7 | 1,720 | 1,760 | 1,750 | 813 | 1,182 |
| | 2,030 | 2,080 | 1,385 | 730 | 1,134 |
| 9 | 3,000 | 2,490 | 1,145 | 645 | 1,055 |
| 10 | 3,530 | 2,780 | 070 | 594 | 961 |
| 11 | 2,950 | 2,630 | 835 | 505 | 890 |
| 12 | 2,290 | 2,070 | 730 | 670 | 796 |
| 13 | 2,230 | 1,680 | 680 | 665 | 735 |
| 14 | 2,500 | 1,500 | 680 | 598 | 712 |
| 15 | 2,260 | 1,330 | 690 | 550 | 676 |
| 16 | 2,010 | 1,320 | | | |
| 17 | 2,030 | 1,400 | | | |
| 18 | 1,920 | 1,310 | | | |
| 19 | 1,560 | 1,160 | | | |
| 20 | 1,370 | 1,010 | | | |
| 21 | 1,320 | 934 | | | |
| 22 | 1,300 | 898 | | | |
| 23 | 1,140 | 855 | | | |
| 24 | 1,000 | 894 | | | |
| 25 | 954 | 1,050 | | | |
| 26 | 954 | 1,620 | | | |

Table 9. Catch of coho fry and smolts, 90-day and yearling chinook smolts and steelhead smolts by inclined plane fry traps in the Nanaimo River 1975-1981. Coho fry and smolt catches are shown by 5-day period, chinook and steelhead only by year.

| TAY. | 19 | 975 | 19 | 976 | 19 | 979 | 198 | 30 | 19 | 981 |
|---------------------|-----|-------|-----|--------|-----|---------|-------|-------|-----|-------|
| Species and date | Fry | Smolt | Fry | Smolt | Fry | Smolt . | Fry | Smolt | Fry | Smo1t |
| Coho | 5 | 967 | | 1,515 | | 080 | | 1,220 | | 25 |
| March | 0 | 0 | _ | 1,532 | 2 | 1 086 | 4 | 1,250 | _ (|)E _ |
| Apr. 1-5 | 0 | 0 | 1 | 0 | 1 | 3 | 5 | 0 | 10 | 2 |
| 6-10 | | 0 | 0 | 0 | 1 | 3 | 1 | 01 | 30 | 13 |
| 11-15 | 0 | 0 | 0 | 1 | 1 | 7 085 | 11 | 3,600 | 20 | 20 |
| 16-20 | 0 | 0 | 0 | 1,315 | 0 | 790 | 10 | 2 | 13 | 23 |
| 21-25 | 0 | 0 | 0 | 0 888 | 0 | 2 | 55 | 13 | 10 | 14 |
| 26-30 | 0 | 0 | 0 | 1049'1 | 2 | 17 | 248 | 6 | 25 | 41 |
| May 1-5 | 2 | 1 | 1 | 0 | 31 | 6 | 573 | 1 | 4 | 2 |
| 6-10 | 201 | 3 | 5 | 1 250 | 53 | 5 | 429 | 0 | 3 | 13 |
| 11-15 | 176 | 0 | 3 | 0 | 138 | 0 | 172 | 0 | 0 | 55 |
| 16-20 | 30 | 1 | 1 | 0 | 222 | 0 | | 3,000 | _ 0 | - |
| 21-25 | 22 | 0 | 0 | 1 | 142 | 1 081 | _ | 3,530 | 0 | 72 |
| 26-30 | 0 | 0 | 0 | 0 | - | 000 | _ | 2,950 | 0 | 12 |
| Total | 431 | 5 | 10 | 5 | 593 | 46 | 1,508 | 25 | 115 | 267 |
| | | | | | | | | | | |
| Chinook | | | | | | | | | | |
| 90-day | | - | | - | | 320_ | | 2,010 | | 63 |
| Yearling | | - | | - | | 2 | | 6 | | 10 |
| Steelhead | | - | | - | | 24 | | 47 | | 67 |

Table 10. Percent of chinook and chum fry captured at trap positions 1-5 during 1979 and 1980, relative water velocity at each position, and relative density of chum and chinook at each position. Velocity and density shown relative to position with greatest velocity or density.

| | | | | Trap position | | | | | | | | |
|----------------|---------------------|---------|------------|---------------|--------------|--------------|--------------|--------------|--|--|--|--|
| Feature | e _{oonlab} | Y | ear | ol i loog | 2 01 | 3 3 | on 1.4 | 5 | | | | |
| Chum catch | | MAT. N. | 979 980 | 5.8 4.9 | 13.2 16.9 | 28.5 25.3 | 33.9 27.0 | 18.6 25.8 | | | | |
| Chinook catch | | | 979 980 | 21.0 15.8 | 16.0 17.7 | 19.6 21.2 | 20.1 | 23.2 26.4 | | | | |
| Relative veloc | ity | | 979 980 | 0.46 | 0.67 | 0.98 | 1.0 | 0.69 | | | | |
| Relative chum | density | | 979 980 | 0.37 0.14 | 0.58 0.31 | 0.86 | 1.0 | 0.79 | | | | |
| Relative chino | ok densit | 4 | 979 980 | 1.0 | 0.52 | 0.44 | 0.44 | 0.74 | | | | |

Table 12. Catch of chinook, coho and chum try in fyke ners set to fish the

Chinook fry 13 Coho fry 7

Chum fry 1842

Coho fry 28

Table 11. Catch of chum and chinook fry by fyke net in the side channel at the trap site above Cedar bridge compared with the catch by inclined plan trap in the main river channel, and the ratio of chum to chinook.

| | Side- | channel f | yke net | Ma | Main channel trap | | | | | |
|------------|-----------|--------------|--------------|------------------|-------------------|--------------|--------------|--|--|--|
| Date | A Chum | B Chinook | A/B Ratio | Trap Position | A Chum | B Chinook | A/B Ratio | | | |
| Apr. 15/16 | 123 | 191 | 0.6 | B-01 | 4320 | 168 | 25.7 | | | |
| 21/22 | 209 | 69 | 3.0 | 3 | 7680 | 119 | 64.5 | | | |
| 22/23 | 327 | 23 | 14.2 | 4 | 11880 | 154 | 77.1 | | | |

Table 12. Catch of chinook, coho and chum fry in fyke nets set to fish the top 30 cm and bottom 30 cm of the depth profile at the trapping site above Cedar bridge.

| | | Cat | tches |
|-------------|-------------------------|------|--------|
| | | Тор | Bottom |
| May 2, 1980 | Chinook fry Coho fry | 13 | 3 2 |
| | Chum fry | 1842 | 597 |
| May 3, 1980 | Chinook fry | 24 | 7 |
| | Coho fry | 28 | 13 |
| | Chum fry | 3023 | 1536 |

Table 13. Catch of chinook smolts by fyke net in the upper (above highway bridge) and lower (above Cedar bridge) Nanaimo River in 1979 and 1980.

| | | Upper | river | | | | Lowe | r rive | ver | | |
|----------|-------|--------|-------|--------|---|-----|--------|------------|--------|--|--|
| Date | 1 | .979 | 1 | 980 | Ĕ | | 1979 | ā 1 | 1980 | | |
| May 7/8 | Not | fished | | 0 | | Not | fished | Not | fished | | |
| 22/23 | | 20 " 3 | | 13 | | ** | " | | " | | |
| 26/27 | E . 8 | | | 4 | | " | | " | " | | |
| 28/29 | | ** | | 4 | | | ** | . (38) | 09 " | | |
| 29/30 | 0.2 | 193 | | 7 | | | | .88 .88 | 00 | | |
| June 2/3 | Not | fished | | 33 | | Not | fished | Not | fished | | |
| 2/3 | " | " | Not | fished | | " | | | 51 | | |
| 4/5 | " | | | 56 | | " | 1-04 0 | | 31 | | |
| 6/7 | " | " | | 53 | | " | " | | 24 | | |
| 8/9 | ** | " | | 45 | | " | " | | 20 | | |
| 11/12 | " | " | | 37 | | | 40 | Not | fished | | |
| 12/13 | | 2 | | 16 | | Not | fished | " | " | | |
| 13/14 | Not | fished | | 13 | | " | ** | " | " | | |
| 16/17 | " | " | | 0 | | ** | " | " | ** | | |
| 17/18 | | 12 | | 1 | | ** | " | | 10 | | |
| 18/19 | | 6 | | 0 | | ** | ** | | 3 | | |
| 19/20 | Not | fished | Not | fished | | | 18 | | | | |
| 20/21 | " | " | ** | " | | | 3 | | | | |

able 15. Population estimates of might chincol spawners in the Manelantiver from mark and recepture information collected in 1979 and 1980.

per Manadaco Hiver 1979 136 18 149 at 361 361 182 22 234

(Charley to Cedar) 1980 228 34 306

Table 14. Fork length (mm) and preserved weight (g) of chinook fry and smolts captured in the Nanaimo River in 1979 and 1980. * represents the first catch of smolts. Catches prior to this date were all fry, catches after were all smolts.

| | | | 1979 | 9 | | | | 198 | 1980 | | | |
|-----------|-----|------|-------|------|-----------|-------|---------|-------|------|-----------|--|--|
| Date | N | ī | Range | W | Range | N | Ī | Range | W | Range | | |
| Apr. 9 | 30 | 38.8 | 35-41 | 0.53 | 0.36-0.65 | borts | Not fil | - | 8/7 | aM_ | | |
| 17 | | | - | | - 64 | 20 | 39.3 | 36-41 | 0.54 | 0.41-0.64 | | |
| May 1-10 | 60 | 38.2 | 35-40 | 0.56 | 0.41-0.69 | | | - | | - | | |
| 11-20 | 30 | 38.6 | 37-44 | 0.57 | 0.42-1.00 | | | - | | - | | |
| 21-31 | 30 | 39.4 | 36-48 | 0.58 | 0.42-1.24 | 25* | 60.2 | 52-70 | 2.61 | 1.64-4.29 | | |
| June 1-10 | | | - | | - | 50 | 64.5 | 49-75 | 3.22 | 1.29-5.30 | | |
| 11-20 | 78* | 67.6 | 52-84 | 3.76 | 1.65-6.57 | 20 | 65.9 | 55-76 | 3.52 | 1.98-5.40 | | |
| 21-30 | 3 | 70.0 | 65-76 | 4.14 | 3.30-5.22 | | | - | | - | | |
| | | | | | | | | | | | | |

Table 15. Population estimates of adult chinook spawners in the Nanaimo River from mark and recapture information collected in 1979 and 1980.

| Location | Year | No. marked | No. recov. | No. inspected | Pop. estimate |
|-----------------------|------|---------------|---------------|------------------|------------------|
| Upper Nanaimo River | 1979 | 136 | 18 | 149 | 1126 |
| (1 mi below 1st Lake) | 1980 | 112 | 22 | 234 | 1191 |
| Lower Nanaimo River | 1979 | 283 | 99 | 859 | 2456 |
| (Cassidy to Cedar) | 1980 | 228 | 54 | 506 | 2136 |

Table 16. Length frequencies (orbit-hypural length) of dead spawned chinook salmon sampled in 1979 and 1980.

| | | | 19 | 79 | | 1980 | | | | | | | |
|----------------------|---|------------------|---|-----------------------|-----------------------|------|-------|---------|-------|-------------|----|--|--|
| | | Lowe | er R. | Uppe | r R. | | Lower | R. | Lower | Upper | R. | | |
| HyP.L. (cm) | | 9 9 | 8 | 9 | 3 | | \$ | ð | | ç | ð | | |
| | 8 | 14 | 8 | 6 | | 2 | 8 | 13 | 13 | | | | |
| 25 | | 01 - | - 5 | h - | - | | 8 - | - | | - | - | | |
| 26 | | 64 - | (- | E - | - | | 2 - | 8 | | - | - | | |
| 27 | | - | -1 | 3 - | - | | 8 - | (73 | | - | - | | |
| 28 | | 8 - | 1 | 01 - | - | | - | 17 | | - | | | |
| 29 | | - | 1 | 6 - | - | | 9 - | 1 | | - | - | | |
| 30 | | - | 5 | 01 - | 1 | | - | - | | - | - | | |
| 31 | | - | 5 | 0 - | - | | - | 3 | | - | - | | |
| 32 | | - | 5 | 11- | 1 | | - | 8 | | - | | | |
| 33 | | - | 7 | | 1 | | - | 6 | | - | | | |
| 34 | | - | 16 | 0.0 - | 1 | | - | 13 | | - | | | |
| 35 | | - | 13 | | _ | | - | 7 | | - | | | |
| 36 | | - | 22 | 1.6 | - | | - | 11 | | - | | | |
| 37 | | - | 30 | 0 | _ | | - | 8 | | _ | 1 | | |
| 38 | | - | 17 | 8 - | 1 | | _ | 9 | | - | | | |
| 30 | | - | 15 | | 1 | | _ | 6 | | _ | | | |
| 39 | | - | 19 | 3 | | | - | 2 | | | | | |
| 40 | | | 19 | 3 | , | | _ | 5 | | | | | |
| 41 | | - | 16 | à - | 1 | | - | | | - | | | |
| 42 | | | 12 | 1 - | - | | - | 2 | | - | | | |
| 43 | | - | 14 | | 3 | | | 2 | | - | | | |
| 44 | | 1 | 16 | - | 1 | | - | 4 | | - | : | | |
| 45 | | - | 8 | - | 3 | | - | 2 | | - | | | |
| 46 | | - | 7 | 2 - | 1 | | - | 2 | | - | | | |
| 47 | | - | 6 | - | 1 | | - | 4 | | - | 1 | | |
| 48 | | _ | 3 | - | 1 | | - | 4 | | - | | | |
| 49 | | - | 2 | - | 1 | | - | 2 | | - | | | |
| 50 | | | 1 | - | 3 | | _ | 2 | | _ | | | |
| 51 | | | 3 | _ | 5 | | _ | 4 | | - | | | |
| 52 | | - | 1 | - | 1 | | - | 6 | | - | | | |
| 53 | | _ | 5 | _ | 3 | | - | 8 | | - | | | |
| | | _ | 5 | _ | 2 | | _ | 10 | | - | | | |
| 54 55 56 57 | | | 3 | 2 | | | _ | 9 | | 1 | | | |
| 55 | | 1 | 0 | - | 2 | | 1 | 9 | | 1 | | | |
| 50 | | 1 | 9 | | 1 2 2 | | 1 | 10 | | - | | | |
| 5/ | | 3 | 0 | - | - 4 | | | 16 | | 2 | | | |
| 58 | | 1 | 6 | 2 | 4 | | - | 16 | | 2 2 | | | |
| 59 | | 2 2 2 4 | 3 9 8 6 4 10 9 12 15 14 10 9 | - | 3 8 | | 1 | 21 | | 2 | , | | |
| 60 | | 2 | 10 | 2 3 6 2 4 | 8 | | 1 | 16 | | 3 1 6 | | | |
| 61 62 63 64 | | 2 | 9 | 3 | 1 2 5 1 1 | | 2 4 | 9 | | 1 | - | | |
| 62 | | | 12 | 6 | 2 | | 4 | 19 7 | | 6 | | | |
| 63 | | 4 | 15 | 2 | 5 | | 4 | 7 | | 7 | | | |
| 64 | | 4 | 14 | 4 | 1 | | 2 | 13 | | 8 | | | |
| 65 | | 8 | 10 | 6 | 1 | | 1 | 12 | | 10 | | | |
| 66 | | 8 | 9 | 4 | 2 | | 8 | 4 3 | | 13 | | | |
| 67 | | 12 | 10 | 6 | 4 | | 2 | 2 | | 7 | | | |

Table 16 (cont'd) as be so lo (digral length) of dead spirit and 1980.

| | | 080 | 1 | 979 | | | 1980 | | | | | | | |
|--------|--|-------|-----|-------|------|-------|------|---|------|------|-------|------|------|--|
| HyP.L. | | Lower | R. | Lower | Uppe | er R. | | | Lowe | r R. | 19WO. | Uppe | r R. | |
| (cm) | | 9 | ਰੱ | | Ş | ď | 1 | 0 | \$ | ď | | ð | ₫ | |
| 68 | | 13 | 13 | | 8 | 2 | | | 9 | 8 | | 14 | 5 | |
| 69 | | 14 | 7 | | 8 | 1 | | | 4 | 5 | | 10 | 2 | |
| 70 | | 17 | 8 | | 2 | 3 | | | 3 | 7 | | 14 | 7 | |
| 71 | | 12 | 10 | | 5 | 3 | | | 6 | 5 | | 5 | 2 | |
| 72 | | 16 | 11 | | 1 | 2 | | | 10 | 6 | | 6 | 9 | |
| 73 | | 20 | 4 | | 2 | 1 | | | 2 | 4 | | 7 | 1 | |
| 74 | | 13 | 3 | | 1 | - | | | 10 | 1 | | 6 | 2 | |
| 75 | | 22 | 3 7 | | - | 1 | | | 9 | 4 | | 5 | 3 | |
| 76 | | 27 | 6 | | 1 | _ | | | 11 | 4 | | 2 | 1 | |
| 77 | | 22 | 4 | | 1 | 2 | | | 5 | 3 | | 2 | 2 | |
| 78 | | 26 | 16 | | _ | _ | | | 10 | 1 | | 3 | _ | |
| 79 | | 18 | 7 | | 1 | - | | | 16 | 6 | | - | _ | |
| 80 | | 17 | 17 | | - | - | | | 6 | 3 | | 1 | - | |
| 81 | | 10 | 8 | | - | - | | | 8 | 2 | | _ | 1 | |
| 82 | | 7 | 15 | | - | - | | | 4 | 2 | | _ | _ | |
| 83 | | 11 | 3 | | _ | - | | | 3 | 1 | | - | - | |
| 84 | | 4 | 4 | | - | - | | | 3 | 2 | | - | - | |
| 85 | | 3 | 3 | | - | - | | | 4 | 2 | | - | - | |
| 86 | | 3 | 4 | | - | - | | | 4 | 1 | | - | - | |
| 87 | | 4 | 1 | | - | - | | | 3 | AI. | | _ | _ | |
| 88 | | 4 | 4_ | | _ | _ | | | 2 | 0] | | _ | - | |
| 89 | | _ | 1 | | _ | - | | | _ | 8_ | | _ | _ | |
| 90 | | _ | 1 | | _ | _ | | | 2 | - | | _ | - | |
| 91 | | 1 | 1 | | _ | - | | | _ | 0_ | | - | _ | |
| 92 | | _ | 0_ | | _ | - | | | 1 | - | | - | - | |
| 93 | | - | _2 | | - | - | | | _ | _2 | | _ | _ | |
| 94 | | 1 | 1 | | _ | - | | | _ | 1_ | | _ | _ | |

Table 17. Number of stream and ocean type spawning chinook in samples from the Nanaimo River (from scale readings).

| | 1977 | | 1978 | | 1979 | | 1980 | |
|---------------------|--------|-------|--------|--------|------|----|------|----|
| Location | 0+ | 1+ | 0+ | 1+ | 0+ | 1+ | 0+ | 1+ |
| Cedar-Cassidy | 21 | 1 | 91 | 1 | 74 | 0 | 110 | 0 |
| 1 mi below 1st Lake | 12 | 6 | 34 | 11 | 131 | 10 | 211 | 5 |
| Above 3rd Lake | Not sa | mpled | Not sa | ampled | 1 | 5 | 20 | 13 |

Table 17. Number of stream and ocean type spawning chinook in samples from the Namaimo River (from scale readings).

Fig 1. Map of the Nanaimo River showing major landmarks. 1: Incline plane trapping site in 1975 and 1976. 2: Incline plane trapping site in 1979-81. 3: Cedar Firehall fyke netting site. 4: Island highway fyke netting site. 5: Gravel pit fyke netting site. 6: White water rapids fyke netting site.