The Spawning Run to Williams Creek 1954

The objective of the adult study at Williams Creek is to determine the annual deposition and assess the factors controlling and limiting this deposition. To this end the present program provides data on the following characteristics of the spawning run.

The number of fish.

Timing (diurnal and daily) fluctuations.

Sex composition condition with regard to injuries.

Length composition of the live unspawned and dead spawned out fish.

Time spent in lake (recapture of river tags).

Time spent in stream (recapture of "Williams applied" tags).

Mortality in lake.

Distribution of fish on spawning ground.

Stream temperature and levels during run.

In previous years samples of females were taken to provide the length-fecundity relationship. This data has provided a nomograph which is considered accurate (File Rept. Egg Sampling at Williams and Scully Creek 1939 to 1953 J.G. McDonald).

The fences were put in July 26. A stream survey on July 27 confirmed that no fish had gone upstream yet. Sockeye were first spotted off the mouth of the creek on July 29th and sighted in the creek August 3rd. The first attempt to move upstream was observed August 7th. The first group of fish went through the fence on August 8th. The graph (fig. I) describes the fluctuations in the run.

The fish were passed through double-gated pens. Each fish was inspected as it went through and injuries were recorded. A tagged fish passing through is trapped by dropping both the upstream and downstream gates. Tagged

fish along with fish to be tagged and sampled were captured in this way and transferred to a central holding pen where they remained until the run dropped off. In this way the possibility of introducing odour repellents and delaying the run was minimized. The double-gated chute provided a method of taking a representative sample. That is every 20th fish could be taken and placed in the holding pen. In the past the last few fish in the days run provided the sample. In actual practice approximately 10 fish were taken for a sample after approximately 200 had passed through.

Every effort was made to pass the fish through as they arrived at the fence. In this way it is believed that normal distribution on the spawning ground will occur. At least two factors operate to mask the normal fluctuations in the run. One is the blockage provided by the fence itself. The second is adulteration of the stream water by odour originating from the human skin. This odour is very effective early in the run, lessens in degree of effectiveness with time. This is ~~probably~~ possibly a result of a steady increase in intensity of "~~motivation~~ motivation" of the fish coupled with an increase in the amount of masking odours which result from emmissions of the spawning fish. Fish at the height of their spawning act can not be moved by human odour repellents. Fence operators were always careful to avoid repelling fish but numerous tourists and anglers wading in the stream often caused the run to drop off. For this reason it is believed that the true picture of the run is not that shown by the graph (fig. 1) but one more closely approximating a normal curve the characteristics of which are defined by variations in the maturation rate. It is quite likely that if there were no fence and no interference with the water the fish would commence migration at dawn and continue throughout the day until all the fish past the "maturation threshold" were upstream. At present with interference as it is fish can consistently be counted on to be at the fence at dawn. They frequently run at about 4 P.M. and shortly before midnight. It is possible that the 4 P.M. influx

can be associated with local winds that characteristically spring up at this time. The midnight run could be an accumulation of fish that have dropped back and fish that have reached the maturation threshold during the day and were kept back by odours in the stream.

The total count through the fence was 3213 males and 3576 females. With 55 spawning below the fence the total count for the stream was 6844 fish. The sex ratio on the spawning ground showed a slight excess of males in the first week of spawning and a slight excess of females during the following two weeks. This differential is not considered serious since no evidence of unattended females on the spawning ground was found. It was evident that partially spent males grouped together to attend some of the fresh females that arrived late.

Length samples were taken of live fish moving upstream, dead fish drifting down on the fence and fish dead on the spawning ground. The results of these three length samples showed a considerable difference. The large dead fish sample (1100 of the 6800 total) showed the mean length to be much lower than that of the smaller but theoretically representative live fish sample. The small sample on the spawning ground was midway between the two (as was the sample taken at the river 47 days previous). The mean lengths derived from the three samples is 59.0 cm for females and 63.7 for males. By nomograph a female of length 59.0 cm. contains 3680 eggs. Therefore the maximum deposition is 3576 x 3680 = 13,159,680. From this figure the number of eggs retained by females 243,600 must be subtracted. This gives a maximum deposition of 12,916,080. This loss by egg retention is higher by 1/3 then it should be under normal conditions. A freshet during the spawning period washed several unspawned fish onto the fence. There are certainly other losses that would reduce the deposition but they have not been assessed. Predation of spawning fish by bears and eagles can be serious. However observations show that it is generally late in the run when these predators are most active and by this time most of the eggs have been deposited. The fresh run fish are more difficult to catch then those that have spawned, as a consequence the loss from this cause is not as

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great as it might appear to be at first glance.

Tag recaptures at Williams Creek show that the fish spend 47 days in the lake. This length of time is not influenced greatly by injury. The fish that are injured enter the spawning creek on an average of two days earlier then the uninjured.

Fish that were tagged and recorded for injuries at the entrance to the lake were recaptured and examined for injuries at Williams Creek. It is seen firstly that approximately half the tagged fish make it to the spawning ground. Secondly those fish that were injured (prior to entering the lake) are not necessarily the main contributors to the lake mortality. The following table shows the % of each injury classification that entered the spawning stream.

Searious injuries	40.6%
Minor injuries	38.8%
Very slight injuries	45.0%
Uninjured	53.6%

Thus while more of the injured tagged fish did not make the spawning stream the difference is not very great. This is in contrast to the evidence from tagged fish recovered in the lake. Most of these ~~were~~ when tagged, were classed as seriously injured fish.

The tag recaptures also point out a 14% inaccuracy in sexing at the river fence. Two-thirds of these errors were the result of calling female males. Tags were applied at the Williams Creek fence to provide information on time spent in the stream, distribution of the run and a method of estimating stream populations. In this tagging as in the river tagging double white discs were used in preference to colour combinations for accuracy in spotting. It was found ~~first~~ last year that when two colours were used on the same tag it was necessary to observe the fish from the right and the left side. It was also found that coloured discs were more difficult to see and more difficult to identify to colour. (e.g. an orange tag was harder to

spot and was often mistaken for red or yellow). To provide combinations the white tags were placed on different positions of the fish, i.e. shoulder dorsal and caudal. It should be noted that returns from dead fish indicate that many of the caudal tags may be lost.

The tags in the dead fish sample show the average life span to be 19 days from the time they enter the spawning stream until they are sampled on the fence. The fish are probably dead for two days prior to this consequently the life span is 17 days.

Graphing the live run against the dead run shows a different picture. From this it is evident that there are 22 days between the time the fish pass through the fence and the time that they wash down dead. With 2 days allowed for the fish to drift downstream and be picked up the life span is 20 days.

The distribution of the run on the spawning ground was followed by a series of stream surveys this year the stream was divided into 4 sections:-

1. Fences to the first gravel bar
2. Gravel bar to the Island
3. Right side of Island (3a) and left side of island (including Eliza Cr.) (3b)
4. All above Island.

On each survey two pairs of men shared the total spawning area. The same methods and observations as in 1953 were followed. The major spawning area is covered a day or two before the run begins to provide evidence of possible leaks in the fences. The first real stream survey is carried out after 200 to 500 fish. One survey a week works out well with the character of the run i.e. the second survey shows a large body of fresh fish in the most select positions of the stream. The third survey takes place when the major portion of the run are on the spawning beds. Many are spawned out, many are spawning and none have died. Predation is starting in earnest by this time. The last survey provides a good sample of dead fish.

A summary of the relative distribution appears in the following table. Sections 1, 2 and 3 compare with the downstream area reported in 1952 and 1953 annual reports while section 4 compares with the upstream area.

Date	Total No. observed	Sect 1	Sect 2	Sect 3	Sect 4
Aug 9	75	24.0	64.0	12.0	0.0
16	2332	9.3	39.2	29.5	22.0
24	4026	13.9	39.7	30.4	15.7
Sept 3	1010	20.0	55.8	9.8	14.4

The table points out that roughly 20% of the run spawned in Section 4. This is in striking contrast to the distribution in the previous two years when 67% and 57% spawned in this area. One of the main reasons for this difference is that in the upper reaches of the creek, less spawning ground was available this year. The stream divided above this area and the new branch cut through a heavily wooded area with few stretches of gravel. Another possible reason is that a marked improvement occurred in the stream bed immediately downstream from this area. Winter freshets apparently cleared debris and created new spawning stretches. A third possible reason is that the run was 20% smaller than that of 1953 and 40% smaller than that of 1952. It may be that reduced population pressure in the lower stretches obviated the full utilization of the upstream area. The stream survey data provides further value in the study of a method of estimating spawning population (see file report: Estimation of spawning population at Lakelse Lake - by M.P. Shepard.).

Item	Total No. [illegible]	Item 1	Item 2	Item 3
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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