

Experiments with Sockeye Yearlings - 1947

Two experiments of a fundamental nature were initiated during the period of marking and enumerating downstream migrating sockeye yearlings as they passed through the Lakelse River fence. Both time and facilities limited the duration and attention devoted to these experiments, but certain shortcomings of method have become apparent, some conclusions can be inferred and the basis for future similar type experiments set forth.

1. Differential mortality between marked and unmarked sockeye yearlings -

The first experiment was designed to ascertain the differential mortality between marked and unmarked sockeye without particular regard for the actual mortality itself.

The importance of this experiment is well illustrated by the results obtained at Cultus lake where it appeared that the mortality in marked as opposed to unmarked yearlings was 60% in excess of the latter when determined from returns in the adult stage. What fraction of this occurs directly as a result of the operation and what fraction is a product of the straight lack of these fins might well be ascertained through holding experiments.

Two hundred yearlings were transferred from the trap to a floating pound made of netting ($\frac{1}{2}$ inch stretched mesh) and closed off at the top by a removable lid of similar netting. Particular care was taken to reduce the handling to a minimum in an effort to provide "controls" which were no more affected by the process than the normal run. At the same time two hundred marked yearlings (two pelvic fins removed) were released into the same pound directly following the removal of the fins. The progress of the respective mortalities was traced simply by removing the dead at the start of each day and recording the most obvious signs of impairment in each of the two groups.

Unfortunately not longer than two weeks was devoted to this investigation during which time some 30% of the marked and 20% of the unmarked succumbed. The results indicate that the initial mortality was greater in marked fish and that

the commencement in the marked of a rather steady loss, perhaps as a result of the confinement, was prior to that of the unmarked although not greater in rate (Figure 1). It would consequently appear that there is a lowered resistance to general adversities amongst the marked, at least in some, and that once these have succumbed then the general condition is the same.

These are somewhat far reaching conclusions for such a curtailed experiment. One limitation was the type of pound used which, although imposing a similar environment on the two groups, caused losses through the constant effort of the yearlings to escape resulting in ceaseless rubbing against the netting and consequent abrasion of certain portions of the body, particularly the lower jaw. Minor haemorrhage of the fin tips was prevalent throughout the dead. Undoubtedly the experiment would profit by the use of wooden or metal troughs supplied with running water.

It is interesting to note that no regeneration of any of the clipped fins was observed macroscopically in those few that were held for slightly over a month.

2. Efficiency of counting block and possibly delay caused thereby to Migration -

The object of the second experiment was to test the efficiency of the fence and to determine the possible delay in migration caused by such an obstacle in the path of the downward migration of the yearlings. This was commenced on May 29 by releasing 958 marked yearlings immediately above the centre of the north arm of the netting and inspecting the complete run from that date to the termination of operations on June 13. It was necessary to pick the last stages of the run in order that inspection of the sum total could be performed.

The whole procedure is complicated by a number of features which restrict the conclusions. These may be listed as (1) Effect of marking on migration tendency of the young fish. In this respect it has been observed that "injured" or handled fish tend to swim upstream and are apparently sufficiently preoccupied with readjustment and recovery to be classified as abnormal, at least for a short

period of time. (2) A natural as well as a differential mortality as a result of marking is effective in reducing the total numbers of marked fish (above and later in the portion below the fence) during the time of tracing their reappearance in the trap, making it necessary to recalculate the number remaining above the fence on the basis of a constantly changing population (reduced by migration and mortality). (3) At the time when this experiment was performed large fish (particularly suckers) were entering the trap and constantly interfering with the rate of entry of the young sockeye and therefore increasing the delay in downstream migration.

The results of returns in marked yearlings have been plotted in Figure II. In addition the trend in mortality amongst a group of marked sockeye (97) has also been plotted for the same period and by applying the rate of mortality in this group to those used in the efficiency test experiment a calculated resultant has been obtained, providing the probable figure for the number of marked fish remaining above the fence or lost in some manner from the complete count. This would place the efficiency of operation at a minimum of 90% which confirms the belief from constant and close inspection of the structure that, although some undoubtedly escaped in 1947 through very temporary breaks in the netting, the general operation provides a very close count of the total number of migrants.

With respect to the delay, marked fish were still being picked up at the end of two weeks following the day of "planting" them above the fence. If only those which did appear are considered then 50% had returned by the fifth day. This cannot be considered too seriously in the light of the restricting influences mentioned earlier but it would appear wise when relating cause and effect of physical changes in the environment and possible manifest results in migration tendency to average the daily counts in running groups of five and to expect a distinct lag in the general relation if present.

Comments -

Given adequate facilities it would be very easy to obtain and hold a good many thousand young sockeye for experimental purposes at any time during May and June. Their thermal resistance includes temperatures up to 19° C. and possibly higher, so that lake water should suffice for holding purposes.