International Council for the
Exploration of the Sea

C.M. 1962

Salmon and Trout Committee
No. 121

Assessment of the Readiness of Salmon Fingerlings for Wintering determined by the Conditions of Summer Fattening

by

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In 1961 the physiological investigations of the young salmon in the Latvian rivers were started with the purpose of 1) obtaining data for assessment of physiological state of the young salmon living in natural environments (by other words determination of "a standard" condition of such young salmon); 2) examining criterions for estimation of mortality rate of the young salmon and the duration of their period of life in the river according to their condition of life and physiological state.

Among these investigations the development of indices for assessment of a degree of the readiness of the salmon fingerlings for wintering was of great importance. With a view to taking a preliminary decision on this problem, variations of the basic characteristics of the young salmon in the summer-autumn period were studied, i.e., weight (P), length (L), total fat content in percentage (F to raw weight), coefficients of the variations of weight and length (C.V.P., C.V.L.).

The work was conducted primarily in the Zapadnaya Dvina River. (see Table I.)

In 1961 the main part of the fingerling population left summer feeding grounds for wintering areas early in October. The number of fingerlings at the feeding grounds was, as some catches indicated, much reduced during the September-October period. As shown in Table I. regular variations was shown during autumn of the basic characteristics of the young salmon caught at the feeding grounds.

Table I. The basic indices, which are characteristic of the condition of Salmon fingerling population in the Zapadnaya Dvina River 1961.

period	F %	L cm	P g	c.v.L %	c.v.P %	$\frac{P}{L}$ F% mg/cm	n
July	5.9	7.6	6.4	8	26	39.8	23
September	3.5	9.6	9.9	10	33	35.8	30
October	2.8	9.4	9.2	10	46	24.7	19
November	2.4	8.9	8.0	10	20.6	19.1	10

Table II. The distribution of the young salmon according to the index "B" by months at fattening areas in the Zapadnaya Dvina, 1961

$B = \frac{P}{L}$	months		
	September	October	November
over 23 mg/cm	86 %	45 %	0 %
below 23 mg/cm	14 %	55 %	100 %
total	100 %	100 %	100 %

These variations were caused by the departure from the feeding grounds of the fattest and largest fish which were already preparing for wintering.

A part of a fingerling population was found on fattening areas as far back as in November, when the growth and feeding of the young salmon was practically discontinued. Such fingerlings are therefore believed not to be prepared for wintering and will perish during the winter period.

It was during September, so to speak, that the process of preparing the young salmon for wintering reached its peak; during this month the fish at the feeding grounds were the largest both in length and weight.

Thus, September indices (Table I.) might be used as parameters for appraisal of degree of readiness of the fingerlings for wintering. According to the data given in Table I. we could give at least tentative estimation of a number of the young which are not ready for wintering. For this purpose index "B" $/B = \frac{P \cdot F}{L}/$ was used.

On November "B" index at feeding grounds did not exceed 23 mg/cm /Table I. and II.; all the fish characterised by "B" over 23 mg/cm shifted to wintering areas. Therefore, by the "B" index we could approximately determine what part of the population had not yet reached the conditions required for wintering (Table II) in September and October, 1961 (when almost all fingerlings keptto feeding grounds) 14% of the fingerling population was unprepared for wintering, as "B" was below 23 mg/cm. This value (14%) was, certainly, the upper limit, because a part of these fish could be transferred before November to the category of fish prepared for wintering. But even in such a case the obtained indices were of practical value.

Conclusions

1) During the summer-autumn period of 1961 the methods of appraising the readiness of salmon fingerlings for wintering was developed in the Zapadnaya Dvina River with the object of estimating mortality rate of the young salmon determined by the condition of life and physiological state of the fish.

2) In processing the data the following characteristics had been used, i.e., weight (P), length (L), total fat content (F), coefficients of weight and length variations (c.v.p., c.v.L)

3) For the purpose of direct appraisal of readiness of the young salmon for wintering "B" index (fat quantity per length unit) by the formula $B = \frac{P \cdot F}{L}$ had been used.

4) Beginning from October most fat young salmon left summer fattening areas. As most fat young salmon leave for wintering areas, the indices (L; P; F and C.V.P.) relating to the young salmon which remained at summer fattening areas decrease.

5) The fingerlings with "B" index exceeding 23 mg/cm, move from feeding grounds to wintering areas; the fish with "B" index below 23 mg/cm, remain at feeding grounds for fattening.

6) "B" index pertaining to fingerlings,remaining at feeding grounds in November, was an average - 19 mg/cm; apparently these fish would die during the winter, since in November there was practically no feeding of the young salmon and the remaining fish are not able to reach the necessary conditions.

7) "B" index (in combination with other indices considered) is very useful for studying feeding processes and transition of the fingerling polulation into the stage of wintering as well as for estimating a possible mortality rate of young salmon during the first year of their life.