

## **Methodological instructions for the control of the escapement of Pacific Salmon spawners into the rivers of the Sakhalin Oblast through fish counting barriers**

The present methodological instructions have been developed in order to organize the regulated escapement of Pacific Salmon spawners into rivers where Salmon fish hatcheries operate. In coordination with SakhalinRybVod and SakhNIRO, these instructions may also be utilized for organizing such operations on the other rivers of Sakhalin Oblast as well.

Regulation of Pacific Salmon escapement into the rivers presupposes the restriction of the numbers entering the river each day.

For these purposes, a fish counting barrier is erected so as to control the passage of fish and to permit a partial harvest of the surplus spawners, the temporary detainment of spawners and a daily counting of the number of fish allowed to enter the river.

The fish counting barrier is erected at the mouth of a river or tributary in coordination with and compliance with current law.

The regulation of salmon escapement into the rivers accomplishes the following goals:

- it allows the spawning sites to be filled with the optimal number of spawners;
- it provides for the harvest of the fish needed for purposes of artificial reproduction;
- it optimizes the conditions of the spawning run, preventing mass pre-spawning salmon mortality;
- it preserves the genetic diversity of the populations.

Control over the escapement of salmon is exercised by a fishing brigade working for the salmon hatchery, or by another fishing organization. The organization responsible for control of the escapement of spawners into the river appoints a manager for the project. All operations are conducted under the auspices of specialists from SakhalinRybVod.

Escapement control is conducted under a spawner escapement schedule developed on the basis of information on the presence of spawning areas for the respective salmon species and the salmon hatchery's need for spawners, and approved by SakhalinRybVod and SakhNIRO.

### **The salmon spawner reproduction escapement schedule**

The total number of spawners for escapement is determined from the sum of the number of spawners needed for artificial and natural reproduction using the following formula:

$$N = N_e + N_i,$$

where  $N_e$  is the number of salmon spawners needed for natural spawning (individuals);  
and  $N_i$  is the number of salmon spawners needed for hatchery reproduction (individuals).

The number of salmon needed for natural spawning is determined by multiplying the spawning area of the river basin by the normal (recommended) number of spawners per square meter for the particular species.

$$N_e = S * n,$$

where  $S$  is the area of the spawning site in square meters;  
and  $n$  is the optimum number of salmon spawners needed to fill the spawning areas (individuals/square meter).

The spawning area of the river is taken from data presented in the documentation for the spawning waters, as approved by the organization responsible for listing the spawning waters.

The value for the optimum number of salmon spawners to fill the spawning areas is unique for each salmon species and individual bodies of water, and is determined in coordination with SakhalinRybVod and SakhNIRO.

Upon coordination of the spawner escapement schedule, the cover letter must show the calculated values used and the methodology for the calculations.

The number of spawners for artificial reproduction is calculated on the basis of the volume of the respective quotas (in the order for reproduction quotas allocated to the salmon hatchery for the



methods can be used to count the fish escapement.

### **Full individual piece count**

The counter counts all of the escapement fish. This method is used when the numbers of fish for escapement are small, or the spawners are striving with some intensity to move upstream. For convenience, it is expedient to use push-button hand counters, with each digit representing tens or hundreds of fish. If no push-button counters are available, then the "dot square" method of counting may be used, using each dot to also represent tens or hundreds of fish.

### **Temporal count**

This method is used when the fish run is less intensive, but occurs evenly over time.

First, all of the fish are counted individually over a selected interval of time, usually 5-10 minutes. Then the time needed to allow the daily escapement amount is calculated. During the escapement, several more checks are made (full counts, usually three measurements per hour) over the same amount of time. All of the measurements are added together, and the average per unit of time is found, and the calculation is made for the entire period.

#### *Example:*

*Today we need to allow an escapement of 5,000 fish.*

- 1. In 5 minutes, 100 fish passed through.*

*Time needed is  $5,000/100 * 5 \text{ minutes} = 250 \text{ minutes}$*

*Number of measurements over 250 minutes - 12*

- 2. In 5 minutes, 88 fish passed through.*
- 3. In 5 minutes, 72 fish passed through.*
- 4. In 5 minutes, 104 fish passed through.*
- 5. In 5 minutes, 111 fish passed through.*
- 6. In 5 minutes, 92 fish passed through.*
- 7. In 5 minutes, 98 fish passed through.*
- 8. In 5 minutes, 100 fish passed through.*
- 9. In 5 minutes, 84 fish passed through.*
- 10. In 5 minutes, 98 fish passed through.*
- 11. In 5 minutes, 98 fish passed through.*
- 12. In 5 minutes, 78 fish passed through.*

*Total:  $1123 \text{ fish} / 12 = 93 \text{ fish in 5 minutes.}$*

*To find the total escapement amount -*

*$250 \text{ minutes} / 5 \text{ minutes} * 93 \text{ fish} = 4650 \text{ fish.}$*

### **Control over escapement**

All calculations and data on the amount of daily fish escapement must be entered into a special log with sewn and numbered sheets. This log must bear a name indicating the fish counting barrier to which it refers, and must be registered in the fish conservation agency [RyboOkhrana].

During the spawning run, the SakhalinRybVod specialists are to monitor the numbers of fish at the spawning sites and the correspondence of the data in the log on fish escapement and its actual presence at the spawning sites. After each check, a notation to that effect is made in the log.

Upon completion of the spawning run, a report is compiled on the work completed on escapement of spawners. This report must indicate the location where the work was done (the name of the body of water, name of the fish hatchery to which the fish counting barrier belongs), the names of the persons who participated in the escapement work, the duration of the work, and the total number of spawners allowed through. If for any objective reason the numbers of fish allowed through does not correspond to the planned schedule, then this fact must also be reflected in the report and indication

made as to the reasons for this. This report must then be forwarded to SakhalinRybVod.

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