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QUALITATIVE AND QUANTITATIVE CHARACTERISTICS OF ROACH (*RUTILUS RUTILUS CASPICUS* JAKOWLEW, 1870) FROM ANGLERS' CATCHES IN THE VOLGA RIVER DELTA IN 2011

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КАЧЕСТВЕННЫЕ И КОЛИЧЕСТВЕННЫЕ ХАРАКТЕРИСТИКИ ВОБЛЫ (*RUTILUS RUTILUS CASPICUS* JAKOWLEW, 1870) ИЗ УЛОВОВ РЫБОЛОВОВ-ЛЮБИТЕЛЕЙ В ДЕЛЬТЕ РЕКИ ВОЛГИ В 2011 ГОДУ

Qualitative and quantitative characteristics of roach from catches of anglers in the Volga River delta during spring and autumn are evaluated; the volume of total harvest of recreational fishery is determined. The presented materials have indicated quite a significant anthropogenic impact of recreational fishery on roach stock while the roach population is in depression. A total of 835.0 tons of roach was taken by recreational fishery in 2011, that is 35.6 % of the total allowable catch.

Key words: roach, recreational and sport fishing, stock.

Проведена оценка качественных и количественных характеристик воблы из уловов любительского рыболовства в весенний и осенний периоды в дельте реки Волги, определен объем общего вылова рыбаками-любителями. Полученные результаты показали достаточно вескую антропогенную нагрузку любительского рыболовства на запас воблы, в то время как популяция воблы находится в депрессивном состоянии. Любительским рыболовством в 2011 г. всего было выловлено 835,0 т воблы, что составило 35,6 % общего допустимого улова.

Ключевые слова: вобла, любительское и спортивное рыболовство, запас.

Introduction

The Volga River delta is a unique area with complicated interlacement of numerous channels and arms. It is inhabited by more than 40 fish species including roach, once the most abundant species. Because of existing conditions (the Volga River damming, several low water years at a run, fishing pressure, unaccounted catches etc.) the number of roach decreased considerably. While in 1992 19 000 tons of roach were fished commercially in 2010 its catches decreased by a factor of 7.3 reaching only 2 600 tons. The situation became even worse when new Fishing Rules were adopted (2009) and quantitative restrictions on anglers' catches were removed. A lot of anglers may be seen in the Volga River delta. These are local residents and people from other regions of Russia and the near abroad. On the banks of numerous channels and arms of the delta there were set up camps and roach were actually fished on a commercial scale. Besides, during the spring period when roach run there are no vacancies at all fishing-tourist bases. Therefore the aim of our paper is to estimate qualitative and quantitative characteristics of roach in anglers' catches in the Volga River delta during the spring and autumn periods and determine the size of the total catch taken by anglers.

Materials and research methods

Studies of the influence of recreational and sport fishing on the state of the roach population were conducted in water courses of the Volga River delta (the Main, Kirovski, Gandurinski, Karalatski and Belinski banks). When studying, the number of anglers and the length of water courses were taken into consideration. Two methods were used to determine recreational fisheries intensity: sighting and experimental work. Sighting was carried out at a certain section of the water course where roach were caught by anglers. Watchers recorded fishing duration for the whole day, the amount of roach caught

and a time lag after each fish was caught. Experimental works included fish angling carried out by research workers of the core laboratory with fishing gears used by anglers. Fish was caught in different water courses where, as in case of sighting, time lags between catches were recorded. In addition, when doing experimental works roach caught were subjected to a complete biological analysis using A. F. Pravdin's methods [1]. Works were carried out in spring (April – May) and autumn (October – November).

The amount of roach caught by anglers in water courses and water bodies of the Volga River delta was determined using GosNIORKh guidelines [2].

During the period of investigations 30 catches were taken, a complete biological analysis of 200 specimens of roach was made.

Analysis of research materials for estimation of anthropogenic impact of recreational fisheries on the roach stock in the Volga River delta indicated two seasons of roach angling – spring and autumn.

In spring 2011 during the period of roach spawning migration into the Volga River delta (April – May) a lot of anglers were seen both at the main stream canal and at some arms of the delta. Anglers caught roach using fishing rods with floats, bottom rods and spinning rods with earthworms, maize and dough as bait. At that most anglers caught roach using several (up to 3–4) fishing rods at a time. In late April (before meadows were flooded) the main fishing gears were bottom rods (38.6 %) and spinning rods (52.1 %). In May when the roach entered flooded meadows it was caught using fishing rods with floats (35.6 %) (tab. 1).

Table 1

The ratio of anglers' fishing gears used for roach fishing during the spring-autumn period of 2011

Month	Anglers' fishing gears, %			Total, %
	Fishing rods with floats	Spinning rods	Bottom rods	
April	9.3	52.1	38.6	100
May	35.6	31.2	33.2	100
October	0.3	35.2	64.5	100
November	0.3	25.1	74.6	100

Roach angling was mainly conducted in water courses of five banks (Main, Kirovski, Gandurinski, Karalatski and Belinski). The main pressure of recreational fisheries during the period of roach migration was recorded in water courses of the Main, Kirovski and Gandurinski banks. More than 188 000 anglers were registered at water courses and water bodies of the Volga River delta: more than 132 000 in spring and more than 55 000 in autumn.

The proportion of roach in catches varies considerably depending on season. In 2011 the roach began dominating anglers' catches stably in the middle of the second 10-day period of April when fishing intensity reached 0.82 fish per fishing hour. During that period its spawning migration into flooded meadows of the Volga River delta began. The maximal intensity of roach fishing by anglers in spring was recorded in May when its catches reached on average 15.6 fish/man-hour or 1.04 kg/man-hour (tab. 2).

Table 2

Average intensity of roach fishing using anglers' fishing gears in the Volga River delta in 2011

Parameter	Month								
	March	April	May	June	July	August	September	October	November
Fish/man-hour	1.8	8.2	15.6	1.2	0.5	0.2	0.3	1.0	3.3
Kg/man-hour	0.14	0.65	1.04	0.09	0.04	0.02	0.02	0.08	0.26

At the same time according to A. I. Sergeeva's data [3], when test fishing using fishing rods was carried out in spring 1967 the intensity of roach fishing was 45 fish/man-hour or 1.8 kg that is 2.9 times larger than that in number and 1.7 times higher than that in weight in comparison with the same parameters in 2011.

During the summer period the intensity of roach fishing by anglers decreases to 0.2 fish/fishing hour which is attributed to its feeding migration into the delta front and the Northern Caspian. In autumn roach catches remain quite low. In late November when it becomes cooler the roach begins its migration to wintering grounds located in the lower part of the Volga River delta. During that period the number of roach in anglers' catches increases markedly, but its fishing intensity yields to that in spring averaging 3.3 fish/fishing hour.

Using calculation methods it was determined that in 2011 anglers took some 850 tons of roach including 125 tons taken by anglers from tourist bases of the Volga River delta. Roach catches reached 35.8 % of the total allowable catch and 55.9 % of the commercial harvest.

When studying biological characteristics of roach from anglers' catches it was noted that in spring they were dominated by individuals from 10.5 to 20.0 cm in length, 15.5 cm on average. But the length of roach allowed by the Fishing Rules (2009) for taking by anglers should be not less than 17 cm. Anglers' catches of roach in spring 2011 consisted mainly, except for some specimens, of fish 9.7–20.0 cm in length. More than 90 % of all the roach caught was of that size. The number of fish more than 17 cm in length did not exceed 10.2 %.

Roach weight varied from 10.2 to 193.8 g, 66.2 g on average. Sex ratio was close to 1 : 1. The age composition of roach in anglers' catches included six generations. Catches were dominated by 3- and 4-year old fish that made up 66.8 %. The average age of fish caught was 3.3 years (tab. 3).

Table 3

Biological characteristics of roach from anglers' catches in the Volga River delta in spring 2011

Parameter	Generation						Average
	1	2	3	4	5	6	
Age composition, %	3.4	19.6	32.7	34.1	9.6	0.6	3.3
Length, cm	9.7	13.7	15.3	16.8	18.0	20.0	15.6
Weight, g	10.2	37.5	61.1	98.1	132.3	193.8	66.2
Condition factor according to Fulton	1.1	1.4	1.7	2.0	2.2	2.4	1.7

Analysis of biological characteristics of roach showed that the length and weight of roach in anglers' catches in autumn were appreciably higher than those in spring. The length of roach varied from 12.3 to 21.2 cm, 16.1 cm on average. Most of the fish in autumn catches (about 87 %) were within 14–18 cm in length. The number of fish as long as 17 cm and more exceeded 15 %. Thus, despite increase in roach size during the autumn period the average size of fish in anglers' catches proved to be smaller than that permitted by the Fishing Rules.

Roach weight varied in autumn between 35.3 and 195.7 g with average 89.7 g which is by 28 g higher than that in spring. As to sex composition catches were dominated by females (62.3 %). The age structure of roach in anglers' catches included six generations. The catch was based on 5-year old (43.9 %) and 4-year old (26.4 %) fish. The average age of fish caught was 3.5 years (tab. 4).

Table 4

Biological characteristics of roach in anglers' catches in the Volga River delta in autumn 2011

Parameter	Generation						Average
	1+	2+	3+	4+	5+	6+	
Age composition, %	2.1	16.0	26.4	43.9	9.9	1.7	3.5
Length, cm	12.4	13.9	15.5	16.7	18.6	21.2	16.1
Weight, g	35.3	41.2	64.3	101.7	175.8	195.7	89.7
Condition factor according to Fulton	1.8	1.5	1.7	2.1	2.7	2.0	2.1

The roach condition factor during the period of investigations was close to the average long-term one (the minimal condition factor was recorded in spring, the maximal one was in autumn). At that, sightings revealed no abnormalities in fish development and diseased fish in anglers' catches both in spring and in autumn.

Conclusion

Thus, studies of qualitative and quantitative characteristics of roach in anglers' catches in the Volga River delta indicated quite a significant anthropogenic impact on the roach stock while its population is in depression. Analysis of qualitative characteristics showed that recreational fisheries took mainly immature fish that did not reach the size allowed by the Fishing Rules. All that negatively affects both the state of roach stock (decrease in the abundance of the recruit-stock) and the size of commercial catches (no gain in ichthyomass).

In the course of the year recreational fisheries mainly takes fish that did not reach the commercial size (17 cm in length). Catches consisted of fish with an average length 15.6 cm in spring and

16.1 cm in autumn More than 60 % of the catch is fish that did not reach the commercial size. During the autumn-winter period when roach fishing concentrates mainly in areas of wintering aggregations larger fish are taken, they constitute the commercial population of roach. All that leads to premature decrease in the abundance of spawners thus reducing the reproductive ability of the population.

In 2011 recreational fisheries took some 835.0 tons of roach, that is 35.6 % of the total allowable catch. Most of the fish was caught in spring when fishing intensity reached 15.3 fish/fishing hour. In comparison with the 1960s roach catches taken with anglers' fishing gears decreased by a factor of 2.9 in abundance and by a factor of 1.7 in weight which indirectly indicates the unsatisfactory state of roach stock at the present stage.

To minimize the negative impact of recreational fisheries on the roach population some measures are proposed which mainly include roach catch rationing (3–5 kg), increase in control of fishing control authorities over size limit of fish caught and popularization of the "caught-release" principle among anglers.

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