Analysis of age and growth indicators of white sla fish (*Sander luciperca*) in Tuzkon lake (Aydar-Arnasay Lake System), Uzbekistan

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Abstract. This article provides information on the growth of pike perch (*Sander lucioperca*) of Lake Tuzkon, which is part of the Aydar-Arnasay system of lakes. As a result of the research carried out, the age composition of the catches was determined: at the age of 1+ - 16.5%; 2+ - 38.5%; 3+ - 17.5%; 4+ - 12%; 5+ - 7.6% and 6+ - 8.0%. It was determined that pike perch in the first year of life grows to an average of 26.40 cm, in the second year - up to 44.45 cm, in the third - up to 53.35 cm, in the fourth - up to 67.37 cm, in the fifth and sixth years, respectively - up to 70.39 and 76.20 cm.

1 Introduction

The rapid growth of the world's population is leading to an increase in their demand for agricultural products, including fish and fish products. However, the remoteness of many countries from the seas and oceans and the limited freshwater basins require the establishment of fisheries adapted to local conditions in arid regions and the development of fisheries in existing water sources. Accordingly, the development of convenient technologies for the development of fisheries and increase productivity in different types of water bodies is of great scientific and practical importance [1, 2].

The study of the biological properties of fish allows their use in the national economy and the development of measures to combat some harmful species. The study of biological and ecological properties of fish allows developing measures for their rational use, acclimatization and productivity. One of the most important issues today is a comprehensive study of fish species in the country, in particular, white sla fish living in different basins and different depths of the basin, their adaptation to oxygen, salt and thermal regimes in the water, breeding and artificial reproduction of fish [1, 3].

Due to the geographical location of our country, which is far from the world's oceans and seas, one of the most pressing issues is to determine the current state of fish stocks in inland waters [3]. There is no doubt that the data obtained will make a significant contribution to the development of the country's economy. In recent years, the study of the

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biological properties of fish and, consequently, the increase in their production has become increasingly important [3, 5].

Today, the Aydar-Arnasay lake system (AALS) is one of the largest and most developed fisheries in the country. There are a number of fish of hunting importance in the lake system [6, 10], including the white sla fish is one of the main fish caught in the lake system. The study of its biological properties is of scientific and practical importance.

The White Sla is the natural habitat of the Baltic, Black, Azov, Caspian Sea basins, the lower reaches of the Amudarya and Syrdarya, and the Sarisu Rivers. In addition to local populations, it was brought from the Ural River in 1963 to the Syrdarya, Amudarya, as well as the Zarafshan River and Kashkadarya water basins. Currently, it is found in all plains of Uzbekistan, formerly also in the Aral Sea [5, 7].

2 Materials and methods

The shoulder blade of the white sla fish has two unbranched XII-XVII in the first, 17-25 unbranched in the second II-III. The anal fin has II-III unbranched, 9-14 branched rays. The number of scales on the side line is 80-111. The number of columns in the first arc is 10-13. The lower and upper jaws have strong partial pile teeth. The shell cover is partially covered with scales. It has a border next to its body [6, 8] (Figure 1).

Fig. 1. *Sander lucioperca* (Linnaeus)

A large, fast-growing fish that can grow up to 130 cm in length, weigh 12 kg and have a lot of flour. Very eco-friendly type of plastic, that is, it adapts quickly to the living environment. Inhabits open areas of rivers, lakes and reservoirs. There are semi-transient and permanent living forms, very demanding on dissolved oxygen in water. It matures sexually in 2-4 years of its life when it reaches 29-31 to 38-40 cm in different lengths in different reservoirs [9, 10]. Growing takes place in March-April, when the water temperature reaches 8-17°C. Builds a simple in the form of a pit or puts the caviar on the

roots of reeds and other plants to a depth of 0.5–1.5 m. The caviar sticks to sticky plants. The diameter of the caviar is 0.7–1 mm [9, 10].

The study was conducted in February–September 2020 on Lake Tuzkon. Collection, processing, and analysis of research sources were performed in accordance with generally accepted ichthyological methods. We caught fish using nets with a cage size of 30 - 65 mm, a length of 60 meters and a width of 3-10 meters. For the study, 50 white slaves, a total of 200, were studied during each control hunt. The length of the white sla fish was measured using a caliper to 1 mm, and the total body weight was measured to the nearest 1 gram. The age and growth rate of fish were determined using drugs made from their scales [10].

3 Results and discussion

AALS In our control hunts on Lake Tuzkon, 4 species of fish were recorded: island trout, white sla, carp, silver carp (Figure 2). Other fish species are not found in sufficient quantities to be caught on an industrial scale. Whitefish were only found in control hunts in August and September. As a reason for this, we assumed that the water of the Sardoba Reservoir was directed to AALS.

Fig. 2. Weights of fish species encountered in the control hunts in 2020

The weights of *Sander lucioperca* fish caught in the control hunts conducted in February–September 2020 are given in Table 1. The weight of the white sla fish caught in the control hunts was almost the same as the weight of the carp, which in turn ranked after the island shrimp.

Table 1. Weight of *Sander lucioperca* in the control hunts (2020)

Fish species	Date of control hunts and weight of fish				Total
	18-22.02.2020	03-08.03.2020	04-08.08.2020	04-09.09.2020	
<i>Sander lucioperca</i>	279.6	295.6	140.6	312.0	1027.8

From our control hunts conducted in February-September 2020, we selected 200 white sla fish for scientific research, according to which 16.5% of 1+ year olds; 38.5% aged 2+; 17.5% aged 3+; 12% of 4+ year olds; It was found to be 7.6% for 5+ year olds and 8.0% for 6+ year olds. Data on the results of control hunts are given in Table 2.

Table 2. Age-size indicators of caught white sla fish
(Lake Tuzkon, 2020; limit/average)

Age categories	Indicators			
	Length, cm	Weight, g	n	%
1+	<u>24.1 - 36</u> 31.3	<u>210 - 717</u> 430	33	16.5
2+	<u>37 - 48.5</u> 42.7	<u>650 - 1485</u> 984	77	38.5
3+	<u>42.5 - 50.4</u> 49.3	<u>1175 - 2035</u> 1546	35	17.5
4+	<u>49.5 - 61.2</u> 54.4	<u>1682 - 3100</u> 2104	24	12
5+	<u>57.2 - 59.5</u> 58.5	<u>2500 - 2700</u> 2610	15	7.5
6+	<u>74 - 78</u> 76	<u>6000 - 6500</u> 6250	16	8.0

The data in Table 2 show that the white sla fish in Lake Tuzkon account for 84.5% of the total fish caught under 4+ years of age. Fish aged 5+ and 6+, respectively 15.5%.

Figure 3 shows the graph of the increase in length and weight of a white sla fish relative to its age.

Fig. 3. Growth trend of white sla fish (n = 175)

Scales of white sla fish caught in control hunts were taken and drugs were prepared to determine their age. You can see the results of the recalculation using the Einar-Lea method (Pravdin, 1966) in the "Microfot PO-5", which is designed to determine the age of fish through scales, and the results of the calculations are shown in Table 3.

Table 3. Growth rate of *Sander lucioperca* in Tuzkon lake of Aydar-Arnasay lake system (2020)

Species	Age	Total length, cm						n
		l ₁	l ₂	l ₃	l ₄	l ₅	l ₆	
<i>Sander lucioperca</i> (Linnaeus)	1	24.10						33
	2	26.13	43.11					77
	3	25.26	42.35	52.80				35
	4	28.31	50.29	63.14	69.23			24
	5	23.41	37.23	50.40	61.07	68.25		15
	6	26.24	41.48	54.76	62.05	72.17	76.20	16
Average		26.40	44.45	53.35	67.37	70.39	76.20	Total =200
Average growth, cm/year		26.40	18.05	8.90	14.02	3.02	5.81	

Based on the data in the table, the annual growth of white sla fish (annual growth) is 26.40 cm at 1 year, 18.05 cm at 2 years, 8.90 cm at 3 years, 14.02 cm at 4 years, 3.02 and 5.81 at 5 and 6 years. These data, in turn, suggest that the growth rate of white sla fish in Tuzkon Lake is considerably high.

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In summary, in fish caught from Lake Tuzkon, the share of one-year-old white slas was 8.5%, two-year-olds 20.3%, three-year-olds 32.2%, four- and five-year-olds 24.6% and 14.4%, respectively formed. Also, white sla fish average 26.40 cm in the first year of life, 44.45 cm in the second year (annual growth-18.05 cm), 53.35 cm in the third year (annual growth-8.90 cm), 67.37 cm in the fourth year (annual growth-14.02 cm), and in the fifth and sixth years it was 70.39 (annual growth-3.02 cm) and 76.20 cm (annual growth-5.81 cm), respectively. The average annual growth of the white slate was 12.7 cm.

Based on the above, we can conclude that the AALS, having studied the age and growth rates of white sla fish in Lake Tuzkon, indicates that the industrial hunting carried out in the watershed does not have a negative impact on these fish stocks.

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