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MORPHOLOGICAL CHARACTERISTICS OF PIKE PERCH, *SANDER LUCIOPERCA*, AIDARO-ARNASAI SYSTEM OF LAKES OF UZBEKISTAN

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ABSTRACT

The morphological characteristic of pike perch (Sander Lucioperca) - invasive species in the middle stream of the River Syrdarya - which has become one of the main commercial species in the Aydar-Arnasay Lake System in Uzbekistan. The formula of dorsal fin rays was XIII-XV, II-III 19-22, of anal fin rays II – III, 11 - 12, 87 - 103 scales in lateral line and 64 - 198 gil rakers were determined. The presence of 10 - 13 pyloric appendages was revealed at pike-perch. Indices of plastic signs are given.

KEYWORDS: *Pike-Perch, Sander Lucioperca, Fish Morphology, Invasive Species, Aydar-Arnasay Lake System, Sirdarya River, Uzbekistan.*

INTRODUCTION

In addition to the general biological value in determining intraspecific (interpopulation) variability and microevolutionary processes, the study of morphological features is important for managing the rational use of fish resources, studying the structures of fish populations, and addressing issues of protecting endangered species, as it gives a quantitative assessment of the variability of individuals [8, 11,12,13]. A large amount of data in the development of research is provided by the morphological analysis of fish according to certain recognized patterns [4, 9, 10,]

Pike perch (Sander lucioperca) is an invasive species in the flat part of the middle reaches of the Syrdarya in the territory of Uzbekistan. The natural range of the species includes freshwater reservoirs of the basins of the Baltic, Black, Azov, and Caspian Seas; in the Aral Sea basin, the species was noted in the sea itself and in the deltas of the Amudarya and Syrdarya [1,5]. It was introduced into the flat part of the rivers of Uzbekistan from the Ural River in the first half of the

1960s. Under local conditions, pike perch found favorable conditions, began to reproduce, and became one of the main commercial fish in the basins of the Syrdarya, Zarafshan, Kashkadarya, Amudarya [2,7]. At the same time, works on the study of the biology of zander, including morphology, are fragmentary and were carried out as early as the 20th century [3, 6].

The material was collected in the Tuzkan and Aydarkul lakes in March April 2021 and 2022 during the annual expeditions of the Institute of Zoology of the Academy of Sciences of Uzbekistan. Fish were caught with fixed nets with a mesh size of 16–100 mm. In caught fish, the standard body length (to the end of the scale cover) (SL) was determined with an accuracy of 1 mm, the total body weight (W) with an accuracy of 1 g. Meristic characters were calculated. The fish were fixed in a 4% formalin solution; plastic characteristics were measured under laboratory conditions according to the measurement scheme for cyprinids [4]. For all plastic features, indices were calculated from the standard body length (%%), as well as indices of head measurements - from the head length (%%).

The numerical material was processed by the methods of variation statistics, calculating the arithmetic mean (X_{mean}), the error of the arithmetic mean (S_d), the coefficient of variation (C_V, %).

In our sample, there were only sexually mature fish of both sexes (the gonads were at III-IV and IV stages of maturity), they had a standard length of 34.5 - 56.2 cm, with a total weight of 562 - 2030. Differences between the sexes in terms of morphological characters were not revealed, as a result, fish of both sexes were combined into one group.

In zander of the Aydar-Arnasay system of lakes, the formula of rays was determined in two dorsal fins - D XIII-XV, II-III 19-22, in the anal fin A II - III, 11 - 12. In the lateral line, the presence of 87 - 103 scales was determined, on the first branchial arch 64 - 198 rakers. The presence of 11–13 pyloric appendages was determined in pike perch in the studied system of lakes.

Indices of plastic features from the standard body length are given in Table 1. Indices of measurements of the head from the length of the head are shown in Table 2.

TABLE 1 INDICES OF INDICATORS OF PLASTIC TRAITS OF SEXUALLY MATURE ZANDERS OF THE AIDAR-ARNASAI SYSTEM OF LAKES (%%), 2021 – 2022 (N = 40 SPECIMENS)

Index, %	*Min - Max*	*X avg. + S_d*	***Cv%***
Base length ID	22.4 - 28.6	26.5 + 0.18	4.4
Height ID	10.5 - 15.1	12.0 + 0.13	6.8
Base length II D	22.2 - 27.2	24.7 + 0.18	4.6
Height II D	9.0 - 13.4	10.9 + 0.15	8.5
Base length A	12.1 - 14.2	13.0 + 0.08	4.0
Height A	9.8 - 15.4	11.9 + 0.20	10.8
Head length	22.6 - 29.3	27.9 + 0.19	4.4

snout length	6.1 - 8.2	7.0 + 0.08	7.3
Eye diameter	2.6 - 4.9	3.5 + 0.09	15.9
Postorbital region of the head	15.7 - 19.6	17.6 + 0.12	4.4
Head height at the back of the head	11.9 - 16.5	13.4 + 0.16	7.5
forehead width	3.7 - 4.9	4.3 + 0.04	5.9
Length height of adipose fin	14.0 - 16.2	15.0 + 0.07	3.1
Mandible length	11.6 - 13.0	12.4 + 0.05	2.8
Upper jaw length	22.9 - 32.5	30.8 + 0.23	4.8
maxillary bone	40.2 - 45.1	42.2 + 0.15	2.3
Antidorsal distance	27.1 - 33.8	31.8 + 0.20	4.1
Postdorsal distance	60.0 - 63.1	62.2 + 0.12	1.2
Antiventral distance	18.5 - 24.1	20.8 + 0.25	7.5
Anti-anal distance	6.8 - 8.7	7.8 + 0.06	4.8

Greatest body height	22.0 - 26.6	24.8 + 0.17	4.3
The smallest body height	13.6 - 19.8	16.2 + 0.21	8.4
Caudal peduncle length	12.6 - 17.7	14.8 + 0.19	8.1
Upper blade length C	14.4 - 17.6	15.8 + 0.09	3.7
Lower blade length C	15.1 - 17.4	16.1 + 0.08	3.2
Pectoral fin length P	6.3 - 7.6	7.2 + 0.06	5.2
Pelvic fin length V	30.4 - 32.8	32.3 + 0.12	2.3
Pict ventral distance PV	2.5 - 3.5	3.0 + 0.04	8.2
Ventroanal distance VA	0.9 - 1.9	1.4 + 0.03	15.0

TABLE 2 INDICES OF HEAD MEASUREMENTS VERSUS HEAD LENGTH OF ZANDER IN THE AYDAR-ARNASAI SYSTEM OF LAKES (%%), 2021 – 2022 (N = 40 IND.)

Index	*Min. – max.*	*X avg. + S_d*	*Cv, %*
Snout length	21.6 - 33.0	25.2+ 0.35	8.9
Eye diameter	9.0 - 17.5	12.5 + 0.33	16.9
Postorbital region of the head	58.5 - 143.4	65.3 + 2.06	20.0
Head height at the back of the Head	42.5 - 72.8	48.4 + 0.78	10.2
Forehead width	13.4 - 20.4	15.5 + 0.22	8.8

Pike perch has a very wide range of natural distribution, and is also introduced into many reservoirs of Eurasia. In particular, it was introduced into the flat areas of all major rivers of the Aral Sea basin, and it was introduced from the Ural River. There at the walleye they notedD XIII

- XV, I-III 19 - 23, A II - III, 11 - 13, 85 - 103 scales in the lateral line, 11 - 15 rakers on the first gill arch (Fish…, 1989).

More than 10 generational changes took place in the conditions of the middle course of the Syrdarya. Comparison of morphological data of zander in the Aydar-Arnasai system of lakes with zander from the Ural River shows that no changes in meristic characters (which are of great systematic importance) have occurred. There are some differences in plastic features.

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