UDC 639.2.053.7(28) (574.1)
IRSTI 34.41.37
DOI 10.37238/1680-0761.2022.88(4).149

[1]Dnekeshev Alibik, [2]Kakishev Murat*, [3]Dnekeshev Amanzhol

[1]LLP «Fisheries Research and Production Center» West Kazakhstan branch, Uralsk, Kazakhstan
[2]M. Utemisov West Kazakhstan University, Uralsk, Kazakhstan
[3]West Kazakhstan Innovation and Technological University, Uralsk, Kazakhstan
***Correspondence:** kakishev_murat@mail.ru

E-mail: dnekeshev62@mail.ru, kakishev_murat@mail.ru

BIOLOGICAL INDICATORS OF COMMERCIAL FISH OF THE RESERVOIR ON THE RIVER SOLYANKA WKR

Annotation. The article provides the weight ratio of fish caught in various fishing gear, the reservoir on the Solyanka River of the West Kazakhstan region for 2020, in order to determine the maximum allowable catch for 2021-22 in the future. The following main fish species are represented in the Solyanka River in percentage terms: bream - 7.7%, crucian carp - 23.1% each, roach - 38.4%, rudd and perch - 15.4%. When calculating the total allowable catches of the reservoir on the river. Solyanka, the following circumstances were taken into account in the study of biological indicators of fish: the presence of sexually mature individuals that have reached the commercial level, the mandatory presence of females in the population, as the main evidence of the presence of population reproduction. In general, the state of populations of species living in the reservoir can be assessed as satisfactory..

Keywords: reservoir on the Solyanka River; West Kazakhstan region (WKR); quantitative and weight ratio of fish; fatness of fish according to Fulton; total allowable catch.

Introduction

The development of new artificial reservoirs on slow-flowing rivers, such as Solyanka at the West Kazakhstan Regional Reserve Fund, is important for the development of fish farming in the program for solving the agricultural industrial complex of this region. An increase in the volume of fishing in artificial reservoirs helps to reduce the fishing load on fish stocks in large natural and artificial reservoirs of republican significance.

In the West Kazakhstan region, there are a number of primary research medium-sized artificial reservoirs, which represent a good prospect for the development of fisheries and aquaculture. The planned management of fisheries in local medium-sized reservoirs is important for this branch of agriculture, on a regional scale, assigned to private nature users [1, 2].

The reservoir on the Solyanka River is a promising reservoir for highly productive fish farming, where there is a stable hydrological regime. At the same time, one cannot fail to note the need to carry out a number of land reclamation and fish breeding works to improve the living conditions and reproduction of valuable fish, optimize the structure of the commercial ichthyofauna, and increase fish productivity.

Materials and research methods

Materials for research were collected in the summer and autumn period (June-September) 2020, in accordance with the work program of the research work. The biological justification of the maximum allowable catches (MAC) for the reservoir on the Solyanka River was statistically processed for the period from July 1, 2021 to July 1, 2022. The collection of material for calculating

the number of fish populations was carried out according to the methods generally accepted in ichthyology [3, 4].

Due to the high degree of overgrowth of the studied water body with hard coastal and soft true aquatic vegetation, the only possible tool for ichthyological research was used passive fishing gear - fixed gillnets. For the greatest coverage of the populations of the studied fish species, nylon nets with mesh sizes of 20, 30, 40, 50, 60, 70 mm were used. To determine the species composition in the field book, each fish species caught was indicated. For biological analysis, the weight of each fish, the absolute length of the body of the fish, and the length of the body without taking into account the caudal fin were determined in situ. The sex of the fish was determined after autopsy. To determine the age of the fish, scale material and the first rays of the pectoral fins were taken from the dorsal side of the body for further age determination in the laboratory.

The determination of the total number of fish and the commercial stock was carried out according to the probabilistic method for estimating the number by catches by passive tools of A.I.Kushnarenko and E.S.Lugareva [5, 6, 7, 8, 9, 10].

Research results

The reservoir on the Solyanka River was formed by regulating the Solyanka River, which flows from the northern slopes of the Poduralny Plateau into the Zhaiyk River. Administratively, the reservoir is located in the vicinity of the village. Shoptykol, Dolinsky rural district, Terektinsky district, West Kazakhstan region. The general view of the reservoir is shown in the figure. The area of the reservoir is 115 hectares. The reservoir was studied for the first time by employees of the West Kazakhstan branch of the «Fisheries Research and Production Center» The reservoir has a contour typical for this type of reservoirs. Due to its location in a hilly area, the reservoir has several separate branches, the two largest of which flow into the eastern bank. For the reservoir, a moderate overgrowth of higher aquatic vegetation was noted - no more than 20% of the projective cover area.

The average depths in the reservoir are 4 m. The maximum recorded depth was 6 m. The transparency of the water was 0.8 m. The water had a greenish tint associated with the development of microscopic algae. The water temperature during the survey period was 20-21 °C depending on the depth (Figure 1).

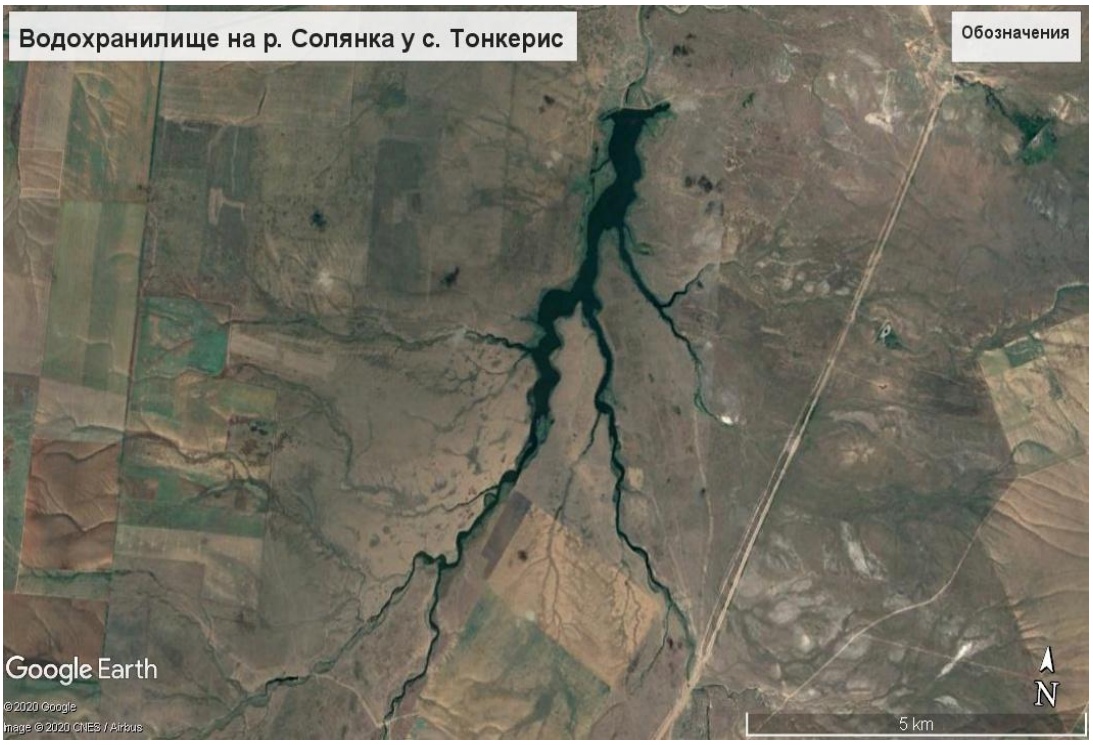

Figure 1- General view of the reservoir on the Solyanka River (satellite photo)

Five species of native ichthyofauna were present in the research catches of 2020 - bream, silver carp, roach, rudd and perch (Table 1).

Table 1 - Species composition of commercial fish species in scientific net catches in the reservoir on the Solyanka River

Type name	View status
*Abramisbrama*L., 1758	prom. / ab.
Carassiuscarassius (L., 1758)	prom. / ab.
Rutiluscaspicus (Yakovlev, 1870)	prom. / ab.
Scardiniuserythrophthalmus (L., 1758)	prom. / ab.
*Percafluviatilis*L., 1758	prom. / ab.
Total: 5 species in 2020 catches	

The quantitative and weight ratio of fish by different fishing gear is presented in tables 2 and 3. As can be seen from the tables, in quantitative terms, the catch with nets with a mesh diameter of 20 mm was more effective, while by weight a significant part of the catch fell on nets with a mesh diameter of 50-60 mm. (Table 2, 3).

Table 2 - The quantitative ratio of fish in various fishing gear in the reservoir on the Solyanka River, 2020

Species		Characteristics of fishing gear						
		Fixed gill nets						
		Total, specimen	d=20 mm	d=30 mm	d=40 mm	d=50 mm	d=60 mm	d=70 mm
Bream	%	1	0	0	50	0	0	0
carp	%	3	0	0	0	50	100	0
Roach	%	5	80	50	0	0	0	0
rudd	%	2	20	50	0	0	0	0
Perch	%	2	0	0	50	50	0	0
Total:	specimen.	13	5	2	2	2	2	0
	%	100	38,4	15,4	15,4	15,4	15,4	0

Table 3 - The weight ratio of fish in various fishing gear in the reservoir on the Solyanka River, 2020

species		Characteristics of fishing gear						
		Fixed gill nets						
		Всего, кг	d=20 mm	d=30 mm	d=40 mm	d=50 mm	d=60 mm	d=70 mm
Bream	%	0,123	0	0	37,6	0	0	0
carp	%	1,011	0	0	0	41,4	100	0
Roach	%	0,404	85,6	56,8	0	0	0	0
rudd	%	0,149	14,4	43,2	0	0	0	0
Perch	%	0,583	0	0	62,4	58,6	0	0
Total:	kg	2,27	0,312	0,241	0,327	0,647	0,743	0
		100	13,7	10,6	14,4	28,5	32,7	0

In general, the total catch in quantitative terms was small. The total weight of all fish caught was 2.27 kg, which characterizes the ichthyofauna of the reservoir on the Solyanka River as average.

Bream in research catches at the reservoir on the Solyanka River was represented by 7.7% of the total number of fish caught per one four-year-old female. Its main biological indicators are presented in Table 4. The fatness of the caught fish according to Fulton was 2.04, according to Clark - 1.91.

Table 4 - The main biological indicators of bream and crucian carp from the reservoir on the river. Solyanka, 2020

Age range	Length, cm (min-max)	Average length, cm	Weight, g (min-max)	Average weight, g	Quantity, samples	%
Bream						
4+	-	18,2	-	123	1	100
golden crucian						
5+	18,2-20,3	19,3	268-354	311	2	66,7
6+	-	21,1	-	389	1	33,3
N	18,2-21,1	19,9	268-389	337	3	100

The share of goldfish in research catches from the reservoir on the Solyanka River was 23.1% of the total number of fish caught. The sample included five-six-year-old males, the main biological indicators of which are presented in Table 4. The fatness of the caught fish according to Fulton was on average 4.27, according to Clark - 3.91.

Roach in research catches at the reservoir on the Solyanka River was represented by 38.4% of the total number of fish caught. The sample consisted of four-five-year-old females. Their main biological indicators are presented in Table 5. The fatness of the caught fish according to Fulton averaged 2.04, according to Clark - 1.82.

Table 5 - The main biological indicators of roach, rudd and perch from the reservoir on the river. Solyanka, 2020

Age range	Length, cm (min-max)	Average length, cm	Weight, g (min-max)	Average weight, g	Quantity, samples	%
Roach						
4+	14,2-15,5	14,8	56-81	66	4	80
5+	-	18,8	-	137	1	20
N	14,2-18,8	15,6	56-137	80	5	100
rudd						
3+	-	12,1	-	45	1	50,0
5+	-	16,5	-	104	1	50,0
N	12,1-16,5	14,3	45-104	75	2	100
Perch						
5+	-	21,8	-	204	1	50,0
6+	-	24,7	-	379	1	50,0
N	21,8-24,7	23,3	204-379	292	2	100

The share of rudd in research catches at the reservoir on the Solyanka River was 15.4%. The sample included 3- and 5-year-old females. Their main biological indicators are presented in Table 5. The fatness of the caught fish according to Fulton averaged 2.43, according to Clark - 2.19.

Perch in the research catch at the reservoir on the Solyanka River was represented by 15.4% of the total number of fish caught per five- and six-year-old females. Their main biological indicators are presented in Table 5. The fatness of the caught fish according to Fulton was 2.25, according to Clark - 2.07.

Conclusion

Thus, as we can see, in our research catches of the total number of fish caught in the reservoir on the Solyanka River, the following main fish species are represented in percentage terms: bream - 7.7%, crucian carp - 23.1%, roach - 38, 4%, rudd and perch -15.4%. When calculating the total allowable catches for 2021-2022, the reservoirs on the river. Solyanka, the following circumstances were taken into account in our study of the biological indicators of fish: the presence of sexually mature individuals that have reached the commercial level, the obligatory presence of females in the population, as the main evidence of the reproduction of the population. Summing up, assessing the state of the populations of the commercial ichthyofauna of the reservoir on the Solyanka River, one should pay attention to the predominance of low-value low-growing species in the ichthyofauna. The concentration of ichthyofauna is sparse. Nevertheless, the state of populations of species living in the reservoir can be assessed as satisfactory.

REFERENCES

[1] Instruktsiya po sboru, oformleniyu i predstavleniyu dannykh dlya razrabotki biologicheskikh obosnovaniy na ispol'zovaniye promyslovykh zapasov ryb i drugikh promyslovykh zapasov ryb i drugikh promyslovykh vodnykh zhivotnykh rybokhozyaystvennykh vodoyemov Respubliki Kazakhstan, utv. prikazom TOO «KazNIIRKH» № 18 ot 15.03.2012 g. [Instructions for the collection, registration and presentation of data for the development of biological justifications for the use of commercial stocks of fish and other commercial stocks of fish and other commercial aquatic animals of fishery reservoirs of the Republic of Kazakhstan, approved by the order of KazNIIRH LLP No. 18 dated 03/15/2012.] [in Russian].

[2] O vnesenii izmeneniy v Postanovleniye akimata ZKO ot 22.12.2014 g. № 325 «Ob utverzhdenii perechnya rybokhozyaystvennykh vodoyemov i (ili) uchastkov mestnogo znacheniya». Postanovleniye akimata ZKO ot 16.06.2017 g. № 176 [On amendments to the Resolution of the Akimat of the West Kazakhstan Region dated December 22, 2014 No. 325 "On approval of the list of fishery reservoirs and (or) sites of local significance". Resolution of the Akimat of the West Kazakhstan Region No. 176 dated 16.06.2017.] [in Russian].

[3] Murzashev, T.K., Kim, A.I., Dnekeshev, A.K. (2015) Ikhtiofauna srednego i verkhov'yev nizhnego techeniya reki Zhayyk (Ural) [Ichthyofauna of the middle and upper reaches of the lower reaches of the Zhaiyk River (Ural)] // Nauchno-prakticheskiy zhurnal ZKATU im. Zhangir khana «Nauka i obrazovaniye» - Scientific and practical journal of WKATU named after. Zhangir Khan "Science and Education", *3, 96-98* [in Russian].

[4] Dnekeshev, A.K. (2018) Otsenka ulova plotvy v zavisimosti ot razmerno-vozrastnykh pokazateley na ozere Saryshaġanak Zapadno-Kazakhstanskoy oblasti [Assessment of the roach catch depending on the size and age indicators on the Saryshaganak lake of the West Kazakhstan region]// «Nauka i obrazovaniye» - "Science and Education", *2, 99-104* [in Russian].

[5] Pravdin, I.F. (1966) Rukovodstvo po izucheniyu ryb [Fish Study Guide] // M.: Pishchevaya promyshlennost' - Moscow: Food industry, 374. [in Russian].

[6] Chugunova, N.I. (1959) Metodika izucheniya vozrasta i rosta ryb [Methodology for studying the age and growth of fish]// M.: Iz-vo Akademiya nauk SSSR - M .: From the Academy of Sciences of the USSR, 164. [in Russian].

[7] Kushnarenko, A.I., Lugarev, E.S. (1983) Otsenka chislennosti ryb po ulovam passivnymi orudiyami lova [Estimation of the number of fish by catches with passive fishing gear] // Voprosy ikhtiologii - Issues of ichthyology, *6, 921-926* [in Russian].

[8] Sergaliev, N.Kh., Kakishev, M.G., Ginayatov, N.S., Andronov, E.E., Pinaev, A.G.(2019) Izucheniye mikrobioma shipov, vyrashchivayemykh v usloviyakh zamknutogo vodosnabzheniya s primeneniyem metodov metagenomiki [Study of the microbiome of thorns grown in recirculated water supply using metagenomic methods] Vestnik Izhevskoy gosudarstvennoy sel'skokhozyaystvennoy akademii - Bulletin of the Izhevsk State Agricultural Academy, *2 (58), 19-28* [in Russian].

[9] Sergaliev, N.Kh., Kakishev, M.G., Ginayatov, N.S. (2019) Primeneniye metodov metagenomiki pri otsenke raznoobraziya mikrobioma osetrovykh vyrashchivayemykh v UZV [Application of metagenomic methods in assessing the diversity of the microbiome of sturgeons grown in RAS] // Veterinarnyy vrach – Veterinarian, *5, 38-45* [in Russian].

[10] Nurlan Khabibullovich Sergaliev, Murat Galikhanovich Kakishev, Nurbek Satkanuly Ginayatov, Farida Khamidullievna Nurzhanova and Evgeny Evgenievich Andronov (2021) Microbiome structure in a recirculating aquaculture system and its connection to infections in sturgeon fish, Veterinary World, *14, 166–174* [in English].

Днекешев А. К., Какишев М.Г., Днекешев А. К.

БҚО СОЛЯНКА ӨЗЕНІНДЕГІ СУ ҚОЙМАСЫНЫҢ КӘСІПТІ БАЛЫҚТАРЫНЫҢ БИОЛОГИЯЛЫҚ КӨРСЕТКІШТЕРІ

Аңдатпа. Мақалада алдағы уақытта 2021-22 жылдарға жалпы рұқсат етілген аулауды анықтау мақсатында Батыс Қазақстан облысының Солянка өзеніндегі су қоймасының 2020 жылға арналған әртүрлі аулау құралдарында ауланған балықтардың сандық және салмақтық қатынасы сипатталған.

Солянка өзеніндегі су қоймасынан ауланған балықтардың жалпы санының зерттеу аулауларында мынадай негізгі балық түрлері пайыздық қатынаста көрсетілген: табан – 7,7%, мөңке – 23,1%, торта – 38,4%, қызылқанат пен алабұға –15,4 %.Өзендегі су қоймасының жалпы рұқсат етілген аулауларын есептеу кезінде. Солянкаөзеніндегі су қоймасының балықтардың биологиялық көрсеткіштерін зерттеуде келесі жағдайлар ескерілді: кәсіптік деңгейге жеткен жыныстық жетілген балықтардың болуы, популяцияда аналықтардың міндетті түрде болуы, популяцияның көбеюінің болуының негізгі дәлелі ретінде. Жалпы, су қоймасында тіршілік ететін балық түрлердің популяцияларының жағдайын қанағаттанарлық деп бағалауға болады.

Кілт сөздер: Батыс Қазақстан облысы (БҚО), Солянка өзеніндегі су қоймасы, балықтың сандық және салмақтық арақатынасы, Фултон бойынша балықтың семіздігі, жалпы рұқсат етілген аулау.

Днекешев А. К., Какишев М.Г., Днекешев А. К.

БИОЛОГИЧЕСКИЕ ПОКАЗАТЕЛИ ПРОМЫСЛОВЫХ РЫБ ВОДОХРАНИЛИЩА НА РЕКЕ СОЛЯНКА ЗКО

Аннотация. В статье предоставляется весовое соотношение рыб, выловленные в различных орудиях лова,водохранилищена реке Солянка Западно-Казахстанской области за 2020 год, для определения в дальнейшем предельно допустимого улова на 2021-22 годы.В научно-исследовательских уловах от общего количества пойманной рыбы водохранилища на р.Солянка представлены в процентном соотношении следующие основные виды рыб: лещ - 7,7 %, карася по 23,1%, плотвы -38,4 %, краснопёрки и окуни -15,4 %. При расчете общих допустимых уловов водохранилища на р. Солянка принимались во внимание при исследовании биологических показателей рыб следующие обстоятельства: наличие половозрелых особей, достигших промысловой меры, обязательное наличие в популяции самок, как основное доказательство наличия воспроизводства популяции. В целом состояние популяций обитающих в водоёме видов можно оценить как удовлетворительное.

Ключевые слова: водохранилище на реке Солянка; Западно-Казахстанская область (ЗКО); количественное и весовое соотношение рыб; упитанность рыб по Фультону; общий допустимый улов.