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NAS RK is pleased to announce that Bulletin of NAS RK scientific journal has been accepted for indexing in the Emerging Sources Citation Index, a new edition of Web of Science. Content in this index is under consideration by Clarivate Analytics to be accepted in the Science Citation Index Expanded, the Social Sciences Citation Index, and the Arts & Humanities Citation Index. The quality and depth of content Web of Science offers to researchers, authors, publishers, and institutions sets it apart from other research databases. The inclusion of Bulletin of NAS RK in the Emerging Sources Citation Index demonstrates our dedication to providing the most relevant and influential multidiscipline content to our community.

Қазақстан Республикасы Ұлттық ғылым академиясы "ҚР ҰҒА Хабаршысы" ғылыми журналының Web of Science-тің жаңаланған нұсқасы Emerging Sources Citation Index-те индекстелуге қабылданғанын хабарлайды. Бұл индекстелу барысында Clarivate Analytics компаниясы журналды одан әрі the Science Citation Index Expanded, the Social Sciences Citation Index және the Arts & Humanities Citation Index-ке қабылдау мәселесін қарастыруда. Web of Science зерттеушілер, авторлар, баспашылар мен мекемелерге контент тереңдігі мен сапасын ұсынады. ҚР ҰҒА Хабаршысының Emerging Sources Citation Index-ке енуі біздің қоғамдастық үшін ең өзекті және беделді мультидисциплинарлы контентке адалдығымызды білдіреді.

НАН РК сообщает, что научный журнал «Вестник НАН РК» был принят для индексирования в Emerging Sources Citation Index, обновленной версии Web of Science. Содержание в этом индексировании находится в стадии рассмотрения компанией Clarivate Analytics для дальнейшего принятия журнала в the Science Citation Index Expanded, the Social Sciences Citation Index и the Arts & Humanities Citation Index. Web of Science предлагает качество и глубину контента для исследователей, авторов, издателей и учреждений. Включение Вестника НАН РК в Emerging Sources Citation Index демонстрирует нашу приверженность к наиболее актуальному и влиятельному мультидисциплинарному контенту для нашего сообщества.

Типографияның мекенжайы: «Аруна» ЖК, Алматы қ., Муратбаева көш., 75.

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WAYS TO INCREASE THE PRODUCTIVITY OF ICHTHIOFAUNA IN THE LAKES OF THE ARAL-SYR DARYA BASIN SYSTEM

Abstract. The article considers the current status of ichthyofauna in lake systems and suggests ways to increase productivity in the future. One of the key issues for the effective use of lakes is the quality of the planting of fish and it has been established that as a result of breeding activities it is possible to provide lacustrine repair systems to broodstocks and to implant them in the production of quality viable species. The ravines of the channel near the towns of Koszar and Tastak in the Aral region are a favorable place for fish breeding. Therefore, 34 reservoirs on 224 hectares of territory are concentrated here to increase the number of livestock and the number of living organisms in the sea. Fish caught from these reservoirs should be subject to biometric measurements.

Key words: systems of lakes, ichthiofauna, fry, biological diversity, environment, area, flooding.

In the Law of the Republic of Kazakhstan No. 593 of 9 July 2004, "Protection of wildlife, reproduction and use in the field of scientific research" paragraph 22: this law regulates social relations in the field of protection, reproduction and use of wildlife and is aimed at providing conditions for the conservation of wildlife and its biological diversity, sustainable use of wildlife to meet environmental, economic, aesthetic and other human needs, taking into account the interests of the current and The future of generations to come.

Introduction. The total volume of large and small lakes in the Republic of Kazakhstan is more than 7 million hectares. Large and small lakes constitute a system of lakes and are provided with water from one lake or water coming from mountains or sources. Recent studies of river water have shown that in a certain period the water level is stable, and in some period there is no stability, that is, the annual volume of runoff decreases, which adversely affects the lake system. Due to such adverse effects, all living creatures living in lakes (hydrobionts) can reach a dangerous critical situation, decrease in quantity or possibly disappear. In order to prevent these problems, research and monitoring of the state of lakes is necessary. In the spring-and-summer period, the water in the lakes decreases, and in some, the lack of water leads to drying out. Drying of lakes is possible in the event that special amelioration works have not been carried out, this leads to a decrease in the level of the rivers, the water canals dry up or the permeability of water is limited. The main reason for the filling of lakes is the instability of the lower reaches of the Syr Darya, the uneven flow of high waters and irrigation of sown areas. Spring flooding in the lower reaches of the Syr Darya begins at the end of March. In certain years, because of early spring, the flood began before time. (2007-2014). In the Karateren point, compared to the Kazaly hydro-station, high water begins 15 days earlier. In 2010-2011, the onset of spring high water was observed in one period [1-3].

Table 1 – Periods of spring tide inthe water body of the lower reaches of the Syr Darya, according to Kazhydromet

Year	Gaugingstation in Kazalinsk	Gaugingstation in Karateren
2013	23.03	25.03
2014	25.03	26.03
2015	02.01	15.03
2016	06.02	12.03
2017	27.03	28.03

Analysis of the flow of water over the last 6 years from the Syr Darya to the Small Aral Sea, according to the RMK center of the Kyzylorda branch of Kazhydromet. In 2010, the indicators were at the level of 9198 million m^3. In 2011, the annual high water flow was 4636 million m3, this decrease is due to the collection of water in the summer-autumn period. As a result of data analysis for 2012-2014, this figure was 4.106-5134 million m3. In 2015, the indicators of 7 months were 3.473 million m3, and for 8 months in 2016 - 2.6 million m3. This trend is towards an annual decrease, and the indicators of 2017 in comparison with 2010 are approximately at the same level.

The volume of water flow loss from Kazalinsk to Karateren (86 km), the loss varies from 65 to 450 m^3. Such a difference in the water points of Kazalinsk and Karateren is aimed at replenishing coastal rivers [4].

Most unrelated floodplain lakes in the valley are subject to loss processes as a result of evaporation or penetration into the soil. According to the data of the RMK center of the Kyzylorda branch of Kazhydromet, figure 1, 2 shows the average and average annual dynamics of the lower reaches of the Syr Darya River.

Intensive heating of water in rivers begins from March (0,0-4 ° C) to June (23,8-26,5 ° C), the highest temperature of water is in July (28,6 ° C), (figure 3). Over the past three years there has been a deviation in the rate of rise in temperature between March and May, which definitely affects fish that spawn.

The difference in temperatures of river water is an indicator of spring-summer growth, and annual dynamics is an abiotic factor determining the ecological state of aquatic organisms.

The regime of the river's heat, the time and intensity of spawning and relocation of fish, the salvation of young from the spill to the rivers depend on the strength of the volcano, especially in the spring-summer period, so the efficiency of reproduction of production fish in the natural environment is determined by the flow of water and other species of the animal world.

To maintain a stable level of eco-biological development in rivers, an automatically closing dam is needed, protective installations for fish, part of the open canal should operate according to the period, and along with the hydrochemical and hydrobiological state of water, the level of vital activity should be monitored.
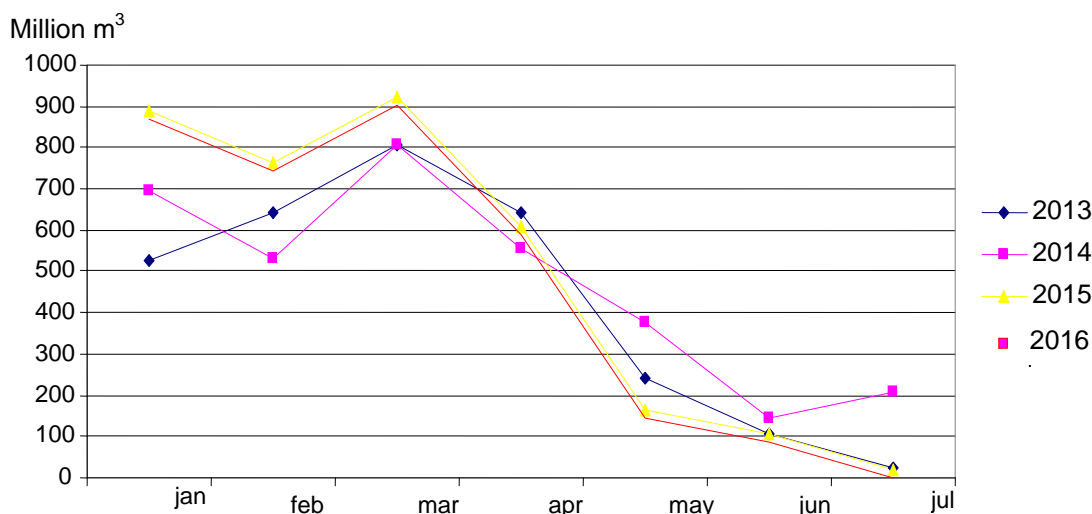
Figure 1 – Average and mid-annual dynamics of the current at the Karateren water post in 2013-2016
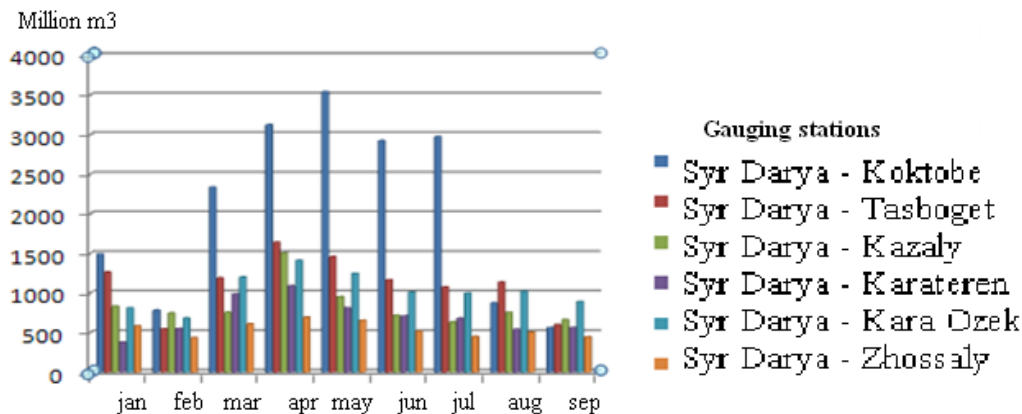
Figure 2 – Average monthly dynamics of the current in the Kyzylorda water station for 2017 (million m³)
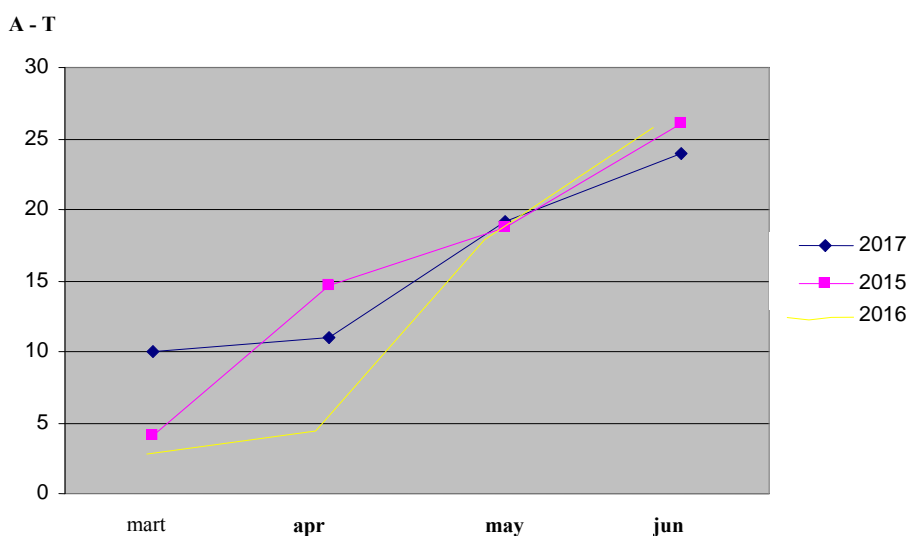
Figure 3 – The average monthly temperature dynamics in the Karateren water station of the Syr Darya
in 2015-2016 according to Kazhydromet

Unfortunately, the number of fish decreases every year, this is due primarily to environmental conditions and numerous diseases. Infectious, invasive and non-contagious diseases have become widespread. As a result of human activities (for example, the construction of water facilities, water pollution, etc.) has led to a deterioration in the reproduction of fish in natural reservoirs and even the disappearance of some fish species, so there was a need to ensure the reproduction and augmentation of quality fish species [5].

Most of the biological products are formed in the reservoirs, and the rivers serve to increase the fish stock. Therefore, in an isolated part of the coast, an important problem is the exchange of the gene pool and the connection of biocenoses. For an example, let's look at the state of the ichthyofauna of the Aral-Syrdarya basin, at the level of its development at the present time.

At the tributary of the Syr Darya River, all the pits and hollows along the canals are filled with water, the water reaches hundreds of lakes of the Atyrau plains between the current Zhanakorgan and the Aral Sea. According to the previous data, in the lower reaches of the Syr Darya in the Atyrau plains, the number of lakes was supposedly 2582. These numbers not including the small lakes, the surface of each of its was 45.0-50.0 thousand hectares. Lakes such as Karauzek, Kararyn, Birkazan, Torangylsay, Kandyaral, Aksay-Kuandarya composed the system of lakes. And now there is only half of the lakes remain from this system. Most of them, of course, will not be the same, but with the necessary care, it is certainly possible to use as an economic object for increase in fish production. Until 1960, their total area reached 160 thousand hectares, and the catch rates of fish - up to 10 thousand tons. Due to the limited access of river water

to the dams of Shardar, Kyzylorda and Kazalinsk, the lake dried up, most of them disappeared. Reduction of the volume of water affected primarily the system of small lakes. Lakes Kustankarakol and Акbay-akirek completely dried up. In comparison with them, the lakes Kamystybas and Akshatau, due to their depth, retained their former state. At present, the mouth of the Syr Darya River is about 1100 thousand hectares. Approximately 350 thousand hectares of land are changes that occurred over 30 years. The structure of the direction of the water in the Syr Darya is divided into 6 lake systems: Aksay, Kuandaria, Kamystybas, Akshatau, the coastal zone and the Right-bank system of lakes. Each system of lakes consists of natural and artificial canals, connected by a complex system of lakes and marshes. According to the geographical situation, the system of lakes has special features: the Syr Darya is located in narrow gorges, in irrigational economic regions (the system of lakes Kuandaria, Aksai, Kamystybas and Akshatau), the lakes of the Primorsky zone are located in the dried, near the sea zones (Pravoberezhnaya and Levobe-rezhnaya system of lakes) (figure 4).
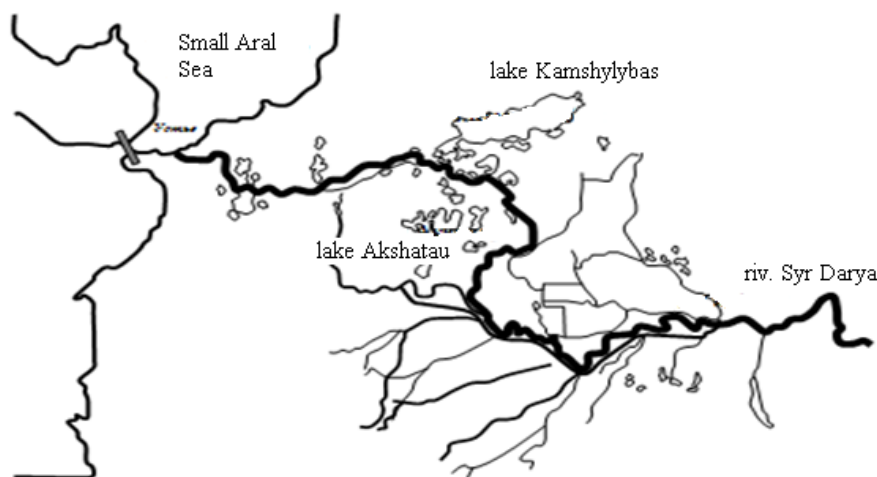
Figure 4 – The hydrogeographic system of the lower reaches of the Syr Darya, together with the reservoirs

At present, the system of lakes Kamystybas and Akshatau, as well as the system of lakes of Aksai-Kuandaria, have remained important for the fishing industry. The above-mentioned lake systems, in addition to the importance in fisheries, influence the development of the fish fund in the basin in the future through the need for places for spawning, temporary storage of fish species. Nevertheless, there is a decrease in the breed of carp and an increase in the breeds of carnivorous fish.

Thus, the hydrogeographic characteristics of the Aral-Syrdarya basin show that the basin covers more than 300 small and medium lakes, reservoirs and controllers. In the plain reservoirs there is a deviation in the amount of water and area in the inter-seasonal and annual periods, this may lead to adverse effects on the activity of the ichthyofauna.

The economic crisis of the RK and the lack of funding for research after 1996 led to the inability to study the lakes of the Syr Darya estuary. After a long break in 2004, the Ministry of Agriculture of the Republic of Kazakhstan commissioned a fish farm and, in accordance with the requirement "Assessment of the state of schools of fish in reservoirs of regional importance, having commercial importance and determining the catch level", work is underway in the Kyzylorda Oblast to investigate reservoirs.

In 1990-2005 there was no fish farm in the republic. In these years, the catch of fish decreased to 210 tons. During the transition to new economic relations, the system for state regulation of the fishing industry did not work. The lack of republican development programs in this direction has not allowed the implementation of full-fledged activities in this field.

Species of fish of commercial significance, not having a high level of reproduction, their fry are grown artificially, then sent to the natural environment. To improve the quality of the ichthyofauna in the waters where the catch of fish is going on, acclimatization of commercial fish species is necessary [6, 7].

After the restoration of hydraulic installations in the system of rivers, their irrigation condition improves, which will allow them to be used for fish farming.

It should be noted that there are all opportunities to increase the pace of traditional fishing from natural lakes, this is due to the increase in fish stocks.

Further, it is necessary to increase the importance of these lakes for fish farming through the breeding of fish, primarily to form the ichthyofauna purposefully, to grow fry of valuable fish species.

The use of lakes for fisheries is carried out using two main technologies: extensive and intensive. An extensive system is based on growing fish through natural food. That is, to launch fry of valuable fish species into the lakes, after growing them, they are caught. Work is underway for additional irrigation, reed mowing, catch of fish that have no production value, and peridic reclamation work. With an intensive system, it is planned to increase the rate of growth of fish through natural food, as well as additional organic and mineral additives, feeding fish, and cultivating water birds.

Effective use of natural fodder reserves of the lake in the system of commodity fisheries is one of the main requirements.

To do this, it is necessary: first, to clear the lake of fish that do not have local value and are slowly growing, which inefficiently use the natural forage reserve, i. If possible, it is necessary to catch them completely. Secondly, in the technology for growing commercial fish, the main direction is polyculture, that is, the need to grow fish that are not competitors to each other in using the natural forage reserve: carp, carp, white cupid, sturgeon, paddlefish and others.

In this regard, in the lakes Kamystybas, Akshatau-Sorgak, the harvesting of valuable fish species is a complex and long process, the use of food additives will lead to expenditures, so that the fattening of fish is costly and unassuming. Therefore, the use of extensive technology is much more effective. An even more effective way of growing fish in lakes with a large area is during the process of stocking, to let two year old fry of valuable fish species in the pond, which will not be food for carnivorous fish: carp, carp, white carp [8].

And in small lakes, depending on the size, useless, invaluable in the given area, and also predatory breeds of fish it will be easy to catch, together with it it is convenient to conduct all works on an intensive method. Therefore it is very beneficial to use these lakes as a pond.

To increase the productivity of fishing in lakes, the following measures can be taken:

– use of reed and cattail as fertilizer;

– introduction in the first place of valuable nutritional components-daphnia and mysids

– let to lift the biogenic mass and microelements that migrate under water, mineralize organic matter and increase the level of natural nutrition. During the winter months, the sections of underwater mud have a high concentration of oxygen.

One of the key issues of effective use of lakes is the quality of valuable small fish. As a result of breeding, it is possible to create a qualitative reproduction of valuable fish and it will be possible to provide a quality lake with viable fish by introducing them into production. Fishing nets "Kamystybas" operate that provide a system of sea and lakes in the Aral-Syrdarya basin.

Currently, the Kamyshibas fish garden increased to five levels up, and the number of frystables on the 15 million per year. In the period from 2010 to 2017, 80079 thousand annual and 2099 thousand biennial carps, carnivores and white cupids were sent to the fish farming fish farm Kamystybas by the end of the Syr Darya.

This is enough not only for this region, but also to ensure the water area of other regions. The ravines of the channel near the towns of Koszar and Tastak in the Aral region are a favorable place for fish breeding. Therefore, 34 reservoirs on 224 hectares of territory are concentrated here to increase the number of livestock and the number of living organisms in the sea. Fish caught from these reservoirs

Table 2 – The number of fry released from the fish farm Kamystybas

Years	Annual age (thousands)				Biennial (thousands)			
	carp	carpenter	grass carp	total	carp	carpenter	grass carp	total
2010	7618	3575	1607	12800	221	127	72	420
2011	8412	5580	810	14802	270	113	36	419
2012	9672	4494	634	14800	284	99	37	420
2013	4598	3069	410	8077	294	89	37	420
2014	8409	5691	700	14800	279	96	45	420
2015	8468	5659	673	14800	298	88	34	420
2016	8402	5720	678	14800	252	134	34	420
2017	8369	5735	696	14800	220	168	32	420

should be subject to biometric measurements. To improve the conditions of the fishery, it is necessary to annually carry out reclamation measures.

The economic benefit of stocking with quality fry is the proof of the acceptability that the quality of stocking productivity will improve, the time of reproduction and increase in the number of livestock will be reduced, and the quality of stocking with the least cost will generally improve.

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АРАЛ-СЫРДАРИЯ БАССЕЙІНДЕГІ КӨЛДЕР ЖҮЙЕСІНДЕ ИХТИОФАУНА ӨНІМДІЛІГІН АРТТЫРУ ЖОЛДАРЫ

Аннотация. Мақалада қазіргі кезеңдегі көлдер жүйесінде ихтиофауна жағдайы зерттеліп, келешекте өнімділін арттыру жолдары қарастырылған. Көлдерді тиімді пайдаланудағы негізгі мәселелердің бірі - отырғызылатын құнды балық шабақтарының сапалылығын анықтап, селекциялық жұмыстар нәтижесінде түрлі құнды балықтардың сапалы аналық-аталықтарын құрып, өндіріске енгізу арқылы көлдерді тиісті көлемде сапалы, өміршең шабақтармен қамтамасыз ету міндетті. Арал ауданындағы Қосжар мен Тастақ ауылдарындағы ирімді арналар балық қорын көбейтуге қолайлы орын. Сондықтан осы жердегі 224 гектарлық аумаққа теңіздегі тіршіліктің түлеуіне тірек болған 34 су тоғаны шоғырланған. Сол тоғандардан сүзілген балықтар саны мен салмағына дейін өлшеуден өткізіледі.

Түйін сөздер: көлдер жүйесі, ихтиофауна, шабақтандыру, биологиялық әртүрлілік, қоршаған орта, ареал, су тасқыны.

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СПОСОБЫ ПОВЫШЕНИЯ ПРОДУКТИВНОСТИ ИХТИОФАУНЫ В ОЗЕРАХ БАССЕЙНА АРАЛЬСКО-СЫРДАРЬИНСКОЙ СИСТЕМЫ

Аннотация. В статье рассматривается современное состояние ихтиофауны в озерных системах и предлагаются способы повышения производительности в будущем. Одним из ключевых вопросов для эффективного использования озер является качество посадки рыбы и было установлено, что в результате селекционных работ можно обеспечить озерные системы ремонтно-маточных стадами и внедряя обязательно в производство качественных жизнестойких видов особей. Овраги канала вблизи городов Кошар и Тастак в Приаралье являются благоприятным местом для разведения рыбы. Поэтому здесь сосредоточено 34 водохранилища на 224 гектарах территории, чтобы увеличить поголовье скота и количество живых организмов в море. Рыба, пойманная из этих водоемов, должна подвергаться биометрическим измерениям.

Ключевые слова: системы озер, ихтиофауна, малькообразование, биологическое разнообразие, окружающая среда, ареал, наводнения.

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