GROWTH AND DEVELOPMENT CHARACTERISTICS OF GRASS CARP (Ctenopharyngodon idella) FISH IN LAKE EAST KARATEREN

Kochanov D[1].., Genjebaev M[2] ..,

1. Uzbekistan State university of physical education and sports, Nukus branch2. Karakalpak State University named after Berdakh

Annotatsiya. Ushbu maqolada Amudaryo quyi oqimi suv havzalarida tarqalgan dominant o'simlikxo'r baliq turlarining Qoraqalpog'istonning shimoli-sharqiy hududidagi suv havzalaridagi (Sharqiy Qarateren' ko'li) baliqchilik xo'jaliklarin monitoring qilish vaqtida olingan ilimiy nátijalar haqida yozilgan.Bunda asosan biomeliorator baliq oq amur singari eng ko'p sondagi tadqiqot maqsatida ovlangan,o'rganilgan baliq turining morfologiyasi,yosh xusisiyatlari,rivojlanishi bo'yicha ma'lumotlar keltirilgan.Natijalar maksimal,minimal va o'rtasha ko'rsatkishlar bo'yisha so'lishtirilgan.

Kalit so'zlar. dominant, morfologiya, biomeliorator, ixtiofauna, aqvakultura, meristik, sklerit , morfologiya, lateral.

Аннотация. В данной статье изложены научные результаты, полученные в ходе мониторинга доминирующих видов растительноядных рыб, распространенных в низовьях водоемов Амударьи в водоемах северо-восточного региона Каракалпакстана (оз. Восточный Каратерен). При этом с целью исследования были отловлены морфология, возрастные особенности и развитие наиболее изученных видов рыб, таких как биомелиоративные рыбы, такие как белый амур. Результаты сравниваются по максимальному, минимальному и среднему значениям.

Ключевые слова: доминанта, морфология, биомелиоратор, ихтиофауна, аквакультура, меристика, склерит, морфология, латераль.

Abstract. This article describes the scientific results obtained during the monitoring of the dominant herbivorous fish species distributed in the lower reaches of the Amu Darya River in the northern-eastern region of Karakalpakstan (East Karateren lake). It mainly presents data on the morphology, age characteristics, and development of the studied fish species, such as the biomeliorator fish grass carp, which was caught in the largest number for research purposes. The results are compared according to maximum, minimum, and average indicators.

Keywords. dominant, morfology, biomeliorator, ichtiofauna, aquacultura, meristic, sclerit, samets, morfometry, lateral,

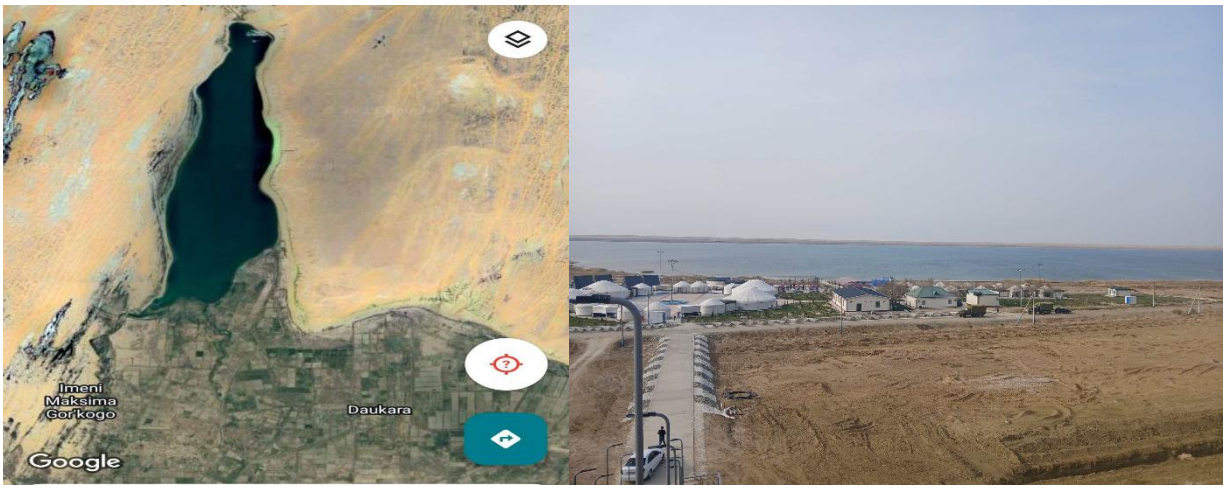
Introduction. Herbivorous fish in the natural reservoirs of the lower reaches of the Amu Darya River were first acclimatized to the local ichthyofauna in the 1960s. Of these, about 20 fish were imported from foreign countries during the Aral Sea

crisis, and only a certain number of them were able to adapt to local ecological conditions. Of these, 400 thousand fish fry of white bream and grass carpwere sent to the Karakum canal. Later, these species became widespread in the 1970s, and their number began to increase [2;3-4]. Previously, predatory fish were mainly caught, but now freshwater aquaculture is mainly breeding herbivorous fish, and artificial incubation is increasingly used.

We studied the biology of these fish species while monitoring the ichthyofauna of natural lakes. We also studied the morphology, growth and development of herbivorous fish dominant in the southern and northern regions of the Republic of Karakalpakstan. We methodologically examined fish caught by local fishermen and caught by us with nets in the Saykul lakes of the Amu Darya district and the Qarateren lakes of the Takhtakopir district. We killed the samples. Then we studied their age and growth using a laboratory binocular microscope. The fish we studied mainly belong to the carp family, which is considered phytoplankton and macrophytophagous in its nutrition. Therefore, we carried out research on the methods of measuring the grass carp family.

The aim of this work was to study the morphology, age, and growth of herbivorous fish in natural water bodies in ecosystems in the northern regions of the lower reaches of the Amu Darya River under current conditions.

Materials. According to the ichthyological methodology, various sizes of grass carpfish were taken, measured and materials were collected in the autumn of 2024. During this period, data were studied on the geography of Lake Karateren, the results of hydrological studies.



East Karateren Lake is located in the north of the Republic of Karakalpakstan, at the foot of the Beltau Mountains. The nearest settlement is Takhtakopir district, located 25 km from the lake. The total area of the lake is 4,000 hectares, its length is 11.1 km, its width is 2.9 km, its maximum depth is 30 m, its minimum is 0.7 m, and its average water transparency is 0.5 m. The lake is the final outlet of the Kuanishjarma Canal. A pumping station was built on the northern edge of the lake to

regulate the level and pump excess water to the Aral Sea. The lake waters are not used for irrigation. The transparency of the water does not exceed 1-1.2 m, and in places where it flows, it is 20-30 cm. The main soil is gray soil with a mixture of sand, clay, organic residues and shell rocks. The main types of plants in the water body are hydrophytes (true aquatic plants) and helophytes (marsh plants). Higher aquatic plants in the form of reeds and cattails, which grow below the surface of the lake (no more than 10% of the water area), are mainly concentrated in the coastal zone of the northwestern part of the lake.(picture-1)

Picture-1. East Karateren lake in Taxtakypir district

In total, about 50 samples (fish scales, gills, gonads) were collected. When fish caught without selection from natural reservoirs were studied, 24 plastic and 5 meristic signs were compared with grass carp samples. First, the color of the fish, the shape of the scales were examined. Then, plastic signs such as total (TL, cm) and standard (SL, cm) body length, head height and length of the fish were measured. The whole body of the fish was fixed in a 40% formalin solution. In laboratory conditions, scales collected from the lateral side of the fish were studied. The age and growth of the fish were examined from the samples and photographs were taken. Age was determined by the scales collected from the middle of the body above the lateral line under the dorsal fin. All measurements were taken from the left side of the caught fish in order to compare the results of the same morphometric measurements. According to Pravdin (1966), meristic and plastic characters were measured separately to the nearest 0.1 mm using a meter, calipers. [2,5].

Length-weight relationships. There were no significant differences in length between the sexes, so all calculations were made using the combined date (male+female). The age, total length, and weight of the specimens ranged from +1 to 5 years, from 14 to 75 cm, and from 300 to 6000 g, respectively. The relationship between total length and weight was plotted for the combined sexes. The relationship between total length (TL) and standard length (SL) can be described by a linear equation:

The limits, average length, and weight of grass carpfish of different ages were measured. The backward calculated growth of grass carpis given in Table 1.

Results. A total of 72 grass carp fish were sampled, of which 24 were samka and 48 were samets. The overall sex ratio between samka and samets was 1: 1.1.

Morphometry. Meristic and morphometric (total length and percentage of standard length) characters are given separately for both sexes (Tables 1, 2).

The normal scales are cycloid with a central focus and flat edges. The number of scales varies slightly in fish of different ages. In white amur, the number of lateral line spicules varied from 40 to 45 (average 40).

In the cold months, the sclerites (ridges) on the scales are crowded together in the scales; in the warm months, the sclerites are located farther apart (wider apart).

Annual rings (a sign of the true year) are characterized by sclerites. Often, false rings can be found in the life of the grass carpas a result of various unusual events during the growing season (when growth stops). False rings are thin and open-ended, not visible around the entire scale, are located in the zone of sclerites from each other. [3].

In immature white amur, annual rings appear in March, and in mature fish in May (after spawning, which occurs in the second half of April - early May).

Annual rings are visible in all studied tangs, but in the diagonal radius between the lateral and anterior sections, the rings are closer. Therefore, we used a microscopic method to measure the size and ring size.

The total length-scale size relationship has a strong positive significance for the studied transect. The relationship between the standard size of the fish and the total length is depicted in the figure, where TL = total length, cm, SL-standard body length, W-total weight. The body of the grass carpis covered with elongated medium and large tangs. The entire lateral line, medial to the caudal side, consists of 40-45 tangs. Dorsal and anal fins are short and spineless. The number of pharyngeal teeth is 1.4-5.2. The wing formula is: D-III, 7-8, A-III, 8-9, V-10 rays.

The growth table shows the average values of standard body length by age groups. 1. The restored growth rate of fish by age groups is given in the table. 2. It is clear from this that the Lee phenomenon did not manifest itself in Lake Qarateren in the Amu Darya basin.

Table-1

Mean length (TL),standart length (SL)and weight (W) of grass carp by age groups

Signs	Age groups				
	I	II	III	IV	V
TL (cm)	14 -22 22,5	24 -43 32,5	34 -52 42,5	64 -82 72,5	84 -98 84,5
SL (cm)	9 -12 18,5	18 -32 26,5	28 -44 36,5	54 -76 62,4	76 -92 84,6
W (gr)	46 -450 220	550 -2050 1670	2400 -6250 4660	5150 -8050 6250	8600 -10500 9460
Fish number	22	16	14	12	8

Discussion. When studying the biology of herbivorous fish, it was necessary to know the morphological characteristics of fish in the Lower Amu Darya basins, as well as the age and developmental characteristics of fish in the northern basins. This is because growth and development are not the same in different basins. The hydrochemical and hydrobiological properties of the water differ. Therefore, when we studied the biology of fish in Lake Karateren, we identified the distinctive features of the fish in those basins.

Table-2

Growth rate of the grass carp in the Qarateren lake (according to the reverse calculation), females and males are combined

Age	Number fish	Standart lengh body, sm				
		SL_1	SL_2	SL_3	SL_4	SL_5
1	22	11,2				
2	16	12,4	26,2			
3	14	12,5	26,4	32,2		
4	12	13,6	25,6	32,4	42,2	
5	8	12,8	24,3	31,8	40,3	46,2
Middle growth rate,sm		12,2	26,4	32,6	40,5	46,6
Middle year increase, sm		1,42	14,2	7,4	4,78	6,8

To determine the age and growth of fish, the scales of the fish were first counted. The grass carpfish were measured using a widely used method and it was determined that the marks under the binocular microscope should be taken as the annual growth zone, the end of which should be in the annual ring. The researchers used the Lea-Fresher method to calculate the growth inversely, based on the correct relationship between the body length and the size of the scales, measured from the middle of the body above the lateral line under the base of the hind fin.[4,6].

So, in the table. we have combined the data from our research work using the standard and total body length of fish and showed some data on the growth of populations of large stagnant water bodies (lakes, reservoirs). It was found that Lake Karateren has one of the slowest growth rates of fish. Factors such as the northern location of the reservoirs (south of the temperate climate), favorable conditions in the lake itself, including fishing methods, affect the ichthyofauna. Morphometry was used to identify and classify fish, including to study the population structure of species in the lake. Quantitative changes in morphological characters have been widely used to describe the population structure in many organisms.

Conclusion. The grass carpfish in our study area is one of the most important aquaculture species cultivated in freshwater bodies of water in the world (FAO, 2023). In Uzbekistan, this fish species is considered an important species for aquaculture, as

well as for improving commercial ichthyofauna and eliminating weeds in irrigation systems, including in reservoirs and lakes, for breeding and conservation. In the Lower Amu Darya reservoir, herbivorous fish species have been caught for several years in fish farms established mainly in Lake Qarateren. One of the larger fish species (over 2 kg) in these lakes is the grass carp(100 cm, 12 kg) and other herbivorous fish species.

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