International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2018): 7.426

Ecological Study of the Nutrition of Juvenile Fish of Collector-Drainage and Rice Systems for Fisheries Development in the Lower Amu Darya

Koshchanov Dauletbay Yerezhepovich

Lecturer at the Faculty of Biology, Karakalpak State University, Republic of Karakalpakstan

Abstract: ***The article discusses the ecological study of the nutrition of juvenile fish of collector-drainage and rice systems in the lower reaches of the Amu Darya. The nutritional spectrum of juveniles of all fish of the studied species changed as they grew; in these reservoirs, juvenile fish mainly fed on animal food, and there are favorable food conditions for this, in modern water regimes, these reservoirs can serve as feeding grounds for juveniles.***

Keywords: Amu Darya, Southern Aral Sea, feeding of juvenile fish, rice fields, collector, lower planktonic crustaceans, chironomids, insects

1. Introduction

In modern conditions of the water regime of the South Aral Sea region and the resource-saving plan of the Republic of Uzbekistan, it is planned to intensify fisheries as much as possible and rationally use the biological resources of inland water bodies, irrigation and collector-drainage systems.

In hydrological terms, the current stage of the South Aral basin existence is characterized by a significant amplitude of seasonal fluctuations in the water level in the delta, formed up to zero incomes by erecting artificial channels, an extensive network, a secondary channel system, a drop in sea level, and an increase in water salinity. In connection with this hydrological change in the lower reaches of the Amu Darya, aboriginal species of fish, such as the Aral barbel, pike asp, Aral spike, large Amudarya pseudo-potonos, small Amudarya pseudo-pedonos, almost completely disappear.

Given the current state of the natural and ecological environment of the South Aral Sea basin, it is very important to preserve the aquatic fauna and develop rational fisheries in the channel of the Amu Darya, irrigation systems, lakes, and into vast rice systems of farms in the Republic of Karakalpakstan. In rice systems throughout the irrigation season, large numbers of young commercial fish are caught in large numbers.

There was an urgent need to study the fish resources of the rice systems of the Republic of Karakalpakstan, when in the latter the Aral Sea with numerous fishing reservoirs, as well as the formation of a single Amu-Karakum fishing basin failed [4].

Thus, the ichthyologists and hydrobiologists of Karakalpakstan faced the important task of preserving valuable fish species in reservoirs, increasing their fishing stock, implementing fish-reclamation measures and increasing the fish productivity of reservoirs.

The purpose and objectives of the study

The aim of the research is to study the nutrition of juvenile fish in the collector CS-1, rice systems of the lower reaches of the Amu Darya and fishery development of these reservoirs.

Knowledge

Water depletion of the Aral Sea, which caused negative changes in its regime, the composition of the ichtiofauna, food supply, etc. put forward the urgent problem of bringing the sea back to life, while interest in fish nutrition decreased. Small trophological works in recent years are known, which describe seasonal changes in the food spectrum of fish of different ages and sizes, the species composition of food and the weight ratios of food components and their frequency of occurrence [1, 3, 10, 7, 6].

Currently, due to water shortages in the Amu Darya river, numerous fishing bodies in the lower reaches of the Amu Darya have dried up. Under the prevailing unfavorable hydrological regime in the south of the Aral Sea, many scientists of Uzbekistan envisage the creation of lake-commodity and pond farms in the Republic of Karakalpakstan. In solving this problem, collector waters, the origin of which is associated with the development of irrigated agriculture, can be used as an additional water reserve [4, 8].

2. Materials and Research Methods

The material for the work was the collections of 2006-2018. rice checks, Nukus collector (Nukus district).

The material was collected by various fishing gears depending on the seasons of the year and the places of catching juveniles. In the spring in rivers and collectors - fishing rods, fixed nets, nonsense (25 m long, 2 m high, 0.6 mm mesh, sheathed with gauze inside), in summer and autumn in rice fields with fry drag (5 m long, diameter 80 cm, with a mesh of 0.6 mm.) and netting of different sizes. All juveniles caught were fixed with a 4-6% formalin

solution, then they were measured, weighed, and dissected under laboratory conditions.

Intestinal contents were analyzed to determine nutrition. When processing the contents of the digestive tract, a weighted technique was applied with the calculation of the total index of filling the intestinal tract. The value of food organisms in% by weight was determined [2, 9].

3. Results and its Discussion

Nutrition of juvenile fish of different size groups. The nutritional pattern of juvenile fish of the studied species changed as they grew. Three young size groups were identified in the young roach(table 1). The main food of the roach is 8.2-10.0 cm long. composed of higher plants, chironomids, insects and lower planktonic crustaceans, the role of detritus was quite noticeable, and the role of the rest

Table 1: The role of some organisms in the food of juveniles in roach, bream and common carp of different size groups in the collector CS-1 and rice receipts (in% by weight).

Food organisms	Eastern bream			Aral Roach			Common Carp		
	Length, cm								
	4,4-7,0	7,1-10,0	10,1-15,2	8,2-10,0	10,1-12	12,1-14,8	4,1-6,0	6,1-10	10,1-14,8
Cladocera	5 ,2	2,9	0,7	10,1	7,4	5,2	9,3	7,1	2,2
Copepoda	3 ,3	1,9	0,1	6,3	3,9	1,9	4,5	2,2	0,9
Mysidacea	4,5	5,4	8,5	1,9	2,7	1,1	0,9	1,2	1,4
Polycheeta	12,8	15,6	18,1	1,1	1,2	3,7	0,1	1,4	2,1
Mollusca	-	0,2	0,3	-	0,4	0,5	51,1	49,1	53,7
Insecta	11,0	12,0	14,3	12,5	18,7	22,2	7,3	8,9	9,2
Chironomidae	17,9	18,1	17,8	23,8	28,9	17,4	9,4	10,3	10,7
Higher plants	32,7	31,4	28,2	39,3	31,2	39,1	6,6	9,8	10,8
Detritus	12,6	12,5	12,1	5,0	5,6	8,9	10,8	10,1	9,0
Total intestinal filling index ‰ 0	164,2	176,9	137,3	128.7	88,9	131,3	108,1	86,4	142,7
The number of fish.	87	61	31	92	71	18	94	87	28
V.h.c is empty intestines.	19	13	8	33	21	4	17	13	7

organisms (mysids, nereises and mollusk) - is small. In the middle (10.1-12.0 cm), the role of crustaceans decreases and chironomide increases; in large (12.1-14.8 cm.) the value of lower crustaceans, as well as chironomids, decreases, while insects and nereis increase. Thus, juvenile roach of all size groups feed mainly on higher plants, chironomids, with the growth of roach, the role of insects and nereis in its food increases, and chironomids and lower crustaceans decrease. The bream also had three size groups: 4.4-7.0; 7.1-10.0 and 10.1-15.2 cm. The basis of the nutrition of bream of all sizes is higher plants, chironomids, insects, nereis, detritus and lower planktonic crustaceans, and with the growth of the role of lower crustaceans and higher plants decreases, insects, mysid and nereis - increases, and chironomids and detritus practically does not change.

Young carp was divided into three groups. In food juveniles 4.1-6.0cm. mollusks (51.1%) and dithrite (10.8%) prevailed, planktonic crustaceans and chironomids played a prominent role; mollusks (49.1%) and chironomids (10.3%) predominated in the carp food 6.1–10.0 cm long; detritus (10.0%) and higher plants (9.8%) occupied a large place. as well as insects and planktonic crustaceans. Mollusks (53.7%), as well as higher plants (10.8%) and chironomids (10.7%) made up the main diet of juveniles 10.1-14.8 cm in size, insects and detritus played a noticeable role, other organisms were found insignificant amount. As carp grows, the importance of higher plants, chironomids and insects in its diet increases — the proportion of planktonic crustaceans and nereis decreases, mollusks prevail in food of all size groups.

The crucian considered the nutrition of two size groups (table 2). In small juveniles (6, -10.0 cm.), detritus accounted for almost half of the food lump, the lower planktonic crustaceans also played a noticeable role, the role of chironomids and insects was quite noticeable.

In larger juveniles (10.1-15.0 cm.), more than half are detritus (58.4%), as well as chironomids. Thus, with the growth of crucian carp, the role of detritus and chironomids in its food increases, but the role of lower planktonic crustaceans and insects decreases.

Shemai juveniles were divided into two size groups. Lower planktonic crustaceans (48.9%) and chironomids (26.1%) predominated in juvenile food of 6.6–10.0 cm in length, insects (18.2%) played a significant role. Shemai juveniles 10.1–13.4 cm in size mainly fed on chironomid larvae; the role of lower crustaceans, insects, and fish remains is noticeable. Thus, as a shemai grows, its nutrition value increases for chironomid larvae, fish remains, and the proportion of lower planktonic crustaceans and insects decreases.

An analysis of the nutrition of two size groups of juvenile asp has shown that insects (38.9%) and fish (32.5%) predominated in asp, with a length of 4.2–6.0 cm; chironomids also played a significant role (26.7%); in asp 6.1–8.1 cm long, the value of insects decreased, and that of fish increased. Thus, with the growth of juvenile asp, the value in its diet of insects and larvae of chironomids decreased, and fish increased.

The basis of the nutrition of the two studied size groups of pikeperch was the Amur goby, the eastern bellied beetle, the Amur roe deer and juvenile roach, as well as a significant amount of planktonic crustaceans, insects and chironomids (11.1, 2.7 and 1.8%). Pikeperch 8.1-12 cm long was fed

almost exclusively by fish, and the role of invertebrates sharply decreases with growth (Table 3).

Two young size groups were analyzed in juvenile catfish. Individuals of both groups mainly ate safferels, gobies and oriental bellies, catfish fry 4.8–10.0 cm long also consume insects in a significant amount (12.4%).

Table 2: The role of some organisms in the food of juvenile crucian carp, sewn, asp of different size groups in the collector CS-1 and rice receipts (in% by weight)

Food organisms	Goldfish		Aral Shemaya, Aral Danube Bleak		Aral Asp	
	Length, cm					
	6-10	10,1-15	6,6-10	10,1-13,4	4,2-6	6,1-8,1
Cladocera	12,2	7,3	29,7	19,3	-	-
Copepoda	9,1	2,4	19,2	6,4	-	-
Mysidacea	-	0,1	-		0,2	-
Polycheeta	-	0,2	-		0,3	-
Insecta	6,5	5,2	18,2	15,7	38,9	18,1
Chironomidae	8,7	5,8	26,1	38,1	26,7	14,3
The remains of fish.	-	-	-	9,4	32,5	66,9
Higher plants	17,8	19,6	0,1	2,2	1,3	0,7
Detritus	45,7	58,4	6,7	8,8	0,1	-

Table 3: The role of some organisms in the food of juvenile pike perch, catfish, and snakehead in the collector CS-1 and rice checks (in% by weight).

Food organisms	Pike Perch, Sander		Wels Catfish		Snake head	
	5,2-8	8,1-12	4,8-10	10,1-15,6	4,4-10	10,1-17,6
Cladocera	7,9	1,7	0,2	-	0,9	-
Copepoda	3,2	0,1	0,01	-	-	-
Insecta	2,7	1,9	12,4	5,9	4,7	1,1
Chironomidae	1,8	0,9	0,2	-	13,3	3,7
Aral roach	2,8	4,7	-	-	-	1,2
Eastern bream	-	-	-	-	10,2	12,3
Young Chebachka	7,8	11,3	31,7	32,3	21,8	9,7
Young Muskrat	31,7	40,3	24,7	27,4	1,3	0,8
Goldfish	-	-	-	-	10,2	12,3
Amur bull	42,1	39,1	30,8	28,8	0,7	0,1
Fish remains	-	-	-	5,6	-	
Already water Dised snake, tes-selated (water) snake	-	-	-		-	4,3
Toad lake Marsh [lake, laughing] frog	-	-	-		-	8,7
Tadpoles	-	-	-		-	7,1

In the stomach of the studied two size groups (4.4-10.0 and 10.1-17.6 cm), the young of the snakehead is almost half the crucian fry (47.1 and 51.0%, respectively), but a noticeable amount of young calf (respectively 21.8 and 9.7%), Aral bream (respectively 10.2 and 12.3%). In the stomach of the first group, larvae of chironomids (13%) and insects (4.7%) were found. Relatively larger individuals of the snakehead (second group), besides the above mentioned organisms, fed on toads (8.7%), tadpoles (7.1%), aquatic (4.3%); these food organisms were not found in the stomach of other predatory fish described above. Thus, as predatory fish grow in its diet, the role of invertebrates decreases, while vertebrates increase.

The nutritional spectrum of juveniles of all fish of the studied species changes as they grow. Thus, the proportion of planktonic crustaceans in food decreases as they grow in roach, bream, common carp, crucian carp, shemai and pike perch, the role of insects increases in roach, bream, common carp and does not change in crucian carp, shemai, decreases in predatory fish. Chironomide increases in carp, shemai; decreases in roach, asp, zander, and snakehead and does not change in bream, crucian carp; nereis - increases in roach, bream, carp, and decreases in asp; mysids - increase in bream and decrease in roach, but does not change in common carp; mollusks - increase in common carp, the role of higher plants increases in common carp and roach, and decreases in bream; detritus increases in roach, crucian carp, shemai and remains almost unchanged in bream, common carp; the role of fish increases in all studied predatory fish.

Thus, the studied juvenile fish that feed in the collector and rice receipts in the lower reaches of the Amu Darya find favorable feeding conditions, which is probably due to better warming of the water and an increased content of nutrients. These ponds occupying a huge water area, choose a large number of fish, and this adversely affects the reproduction of fish herds in the Amudarya river basin.

If, with proper fisheries management (rescue of juveniles, adaptation of rice fields and collectors for fish farming), these reservoirs could be used as feeding areas for juvenile fish and in the fight against overgrowing of collectors, and secondly, checks could serve to prepare planting material without any investment due to natural feed. For this, good conditions are found in rice fields and collectors.

References

[1] Adenbaev E. Nutrition of bream (Abramis brama orientalis Berg) in the south of the Aral Sea. “Bulletin of the Karakalpak branch of the ANUzSSR” No. 2. pp.20-25.
[2] Aripov D.A., Mukhamediev A.M. 1966. The wet weight of the components of zooplankton in the rice fields of the lower Amu Darya. “Bulletin of the Karakalpak branch of the ANUzSSR” N 1.pp.47-52.
[3] Bekbergenov D.B. 1981. Abstract of dissertation for the degree of Ph.D. Nutrition of juvenile commercial fish in water bodies of the south of the Aral Sea under conditions of regulated river flow.
[4] Zholdasova I.M., Pavlovskaya L.P., Guseva L.N., Utebaeva V.G. 1990.
[5] The status of populations of rare and endangered species of fish of the Amu Darya river and measures for their protection. Information message N 483. Tashkent, “FAN”. p.12.
[6] Kamilov G.K., Kholmatov N.M., Abramov Yu.V., Voronov I.V. Recommendations on the use of herbivorous fish as biomeliorators in the irrigation system of the Uzbek SSR. Printing house of Tashkent State University. 1985. p.20.
[7] Koshchanov D, E., Khegay V.N. Nutrition of the white silver carp Hypophtalmichtys molitrix of the rice

systems of the lower Amu Darya. Uzbek Biological Journal of the Academy of Sciences of the Republic of Uzbekistan. 2001. No. 1. pp. 50-53.

[8] Koshchanov D., Tleuov R. Peculiarities of feeding fish of different size groups of the Southern Aral Sea. International Scientific Conference "The structure and functional role of the animal population in natural and transformed ecosystems." Dnepropetrovsk. 2001.pp. 46-49

[9] Koshchanov D, E. Rational use of juvenile fish in rice systems for fishery development in the lower reaches of the Amu Darya. The journal "Scientific Integration". Moscow, 2017, No. 6. pp. 229-230.

[10] A methodological study of the nutrition and nutritional relationships of fish in vivo. 1974. Ed. Borutsky. “Science”, M. p.254.

[11] Shamshetov P., Sagitov N. About the results of studying the biology of herbivorous fish in the lower Amu Darya. The current state of natural resources of Karakalpakstan. Tashkent. Fan, 1977. pp.105-114.