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A CHECK LIST OF FISH SPECIES IN THE KAZAKHSTAN PART OF THE BASIN OF THE CHU RIVER

Results of investigations of fish diversity in the Kazakhstan part of the Chu watershed are presented. About 34-35 fish species were revealed, 20 species among them were indigenous. Severtsov's loach Triplophysa sewerzowii (G.Nikolsky, 1938) is a new fish species for the basin. Origin of populations of spotted thicklip loach Triplophysa strauchii strauchii (Kessler, 1874), plain thicklip loach Triplophysa labiata (Kessler, 1874) and Severtsov's loach is disputable. The area of indigenous roach, ide, carp, perch, rosy bitterling as well as alien snakehead, rosy bitterling and beautiful sleeper extended in contrast to the previous reports. On the contrary, tench and Balkash perch were not revealed. Surviving of small populations of barbells, Seven River's minnow and wels catfish were confirmed. No one finding of Chu sharpray was reported during last 30 years, and so this subspecies should be considered as extinct in the wild (criteria E of the IUCN). Obtained results indicated high value of Kazakhstan part of the Chu watershed as a hot spot for conservation of diversity of indigenous specific fishes as well as big potential for fishery production. Except roach, distribution of all indigenous fishes in the watershed was lace-like and number of their populations fluctuated deeply. Therefore, fish diversity in every site was much less that was indicated in the check list. Reasonable public management of nature of the region should be the best way to the fish diversity conservation and sustainable use.

Key words: Chu River, ichthyofauna, indigenous, alien, diversity

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Шу өзені бассейніндегі балықтар тізімі

Шу өзені бассейнінің қазақстандық бөлігінде жүргізілген балық алуантүрлілігін зерттеу нәтижелері. Балықтың 34-35 түрінің тіршілік ету ортасы анықталды. 20 – жергілікті балық түрлері. Бассейнде северцов талма балығы жаңа түрлердің бірі болып табылады. Теңбіл талма балық Triplophysa strauchii strauchii (Kessler, 1874), біртүсті талма балық Triplophysa labiata (Kessler, 1874) және Северцов талма балықтарының Triplophysa sewerzowii G.Nikolsky, 1938 популяциялық шығу тегі әлі күнге дейін талқылануда. Элеотрис, жыланбас – балық, теңбіл кекіре, кәдімгі алабұға, тұқы, аққайран және торта балықтарының тіршілік ету ортасы әдебиет көздерімен салыстырғанда кеңейген. Оңғақ және балқаш алабұғасы зерттеуімізде кездеспеді. Шу өзенінің бассейнінің популяциялық саны жағынан аз каяз, жетісу гольяны, жайын және шу сүйрікқанат балықтарының жойылуы расталды. Мүмкін, шу шүйрікқанатының табиғи ортадағы түр астын қарастыру керек. Шу шүйрікқанаты балығы Қазақстан аумағындағы нақты түрлерінің алуантүрлілігін сақтау үшін және балықты қорекпен қамтамасыз ету үшін айтарлықтай маңызды болып табылады. Торта балығынан басқа барлық табиғи ареалдардағы аборигенді балықтар тіршілік ететін жерлерімен ерекшеленеді және олардың санының ауытқуы маңызды болып табылады. Сондықтан да, бассейн

учаскесіндегі балық алуантүрліліктерінің саны аз болуы мүмкін. Жергілікті балық түрлерінің алуантүрлілігін сақтау және оларды орнықты пайдалану аймақтың табиғи жағдайын тұрақты басқаруды талап етеді.

Түйін сөздер: Шу өзені, ихтиофауна, жергілікті, бөгде, алуантүрлілік.

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Видовое разнообразие рыб в казахстанской части бассейна реки Шу

Представлены результаты исследования разнообразия рыб, проведенного в казахстанской части бассейна р.Шу. Было установлено обитание 34-35 видов рыб. Аборигенными видами являются 20. Новым для бассейна видом рыб является голец Северцова. Происхождение популяций пятнистого губача Triplophysa strauchii strauchii (Kessler, 1874), одноцветного губач Triplophysa labiata (Kessler, 1874) и гольца Северцова Triplophysa sewerzowii (G.Nikolsky, 1938) является дискуссионным. В сравнении с предшествующими данными расширились зоны обитания плотвы, язя, сазана, обыкновенного окуня, глазчатого горчака, змееголова и элеотриса. Не были обнаружены линь и балхашский окунь. Подтверждено существование в бассейне р.Шу малочисленных популяций усача, семиреченского гольяна и сома и исчезновение чуйской остролучки. Вероятно, чуйскую остролучку следует считать подвидом, исчезнувшим в естественной среде. Казахстанский участок бассейна р.Шу имеет большое значение для сохранения разнообразия специфических форм рыб и располагает значительным потенциалом для продовольственного снабжения населения рыбой. За исключением плотвы, ареал обитания всех остальных аборигенных видов рыб характеризуется прерывистостью, а их численность испытывает значительные колебания. Поэтому разнообразие рыб на каждом участке бассейна меньше потенциально возможного. Для сохранения разнообразия аборигенных видов рыб и их устойчивого использования необходимо уравновешенное государственное управление природным потенциалом региона.

Ключевые слова: река Шу, ихтиофауна, аборигенный, чужеродный, разнообразие.

Introduction

The present time is called as the Anthropocene epoch because humans become the dominant driver of environmental change (Steffen et al., 2011:842; Zalasiewicz et al., 2011:835). Human impact on freshwater biodiversity is so strong that almost 40% of fishes in Europe and the U.S.A. are imperiled (Kottelat, 1998:65; Kottelat, Freyhof, 2007:1-362; Ricciardi, Rasmussen, 1999:1220-1222; Jelks et al., 2008:372-407). This illustrates the more general point that freshwater ecosystems tend to have a higher portion of species threatened with extinction than their marine or terrestrial counterparts (Revenga et al., 2005:397-413; Dudgeon et al., 2006:163-182; Strayer, Dudgeon, 2010:344-358). Freshwater ecosystems are currently experiencing an alarming decrease in biodiversity and ecosystem integrity as a result of numerous different stressors (Cooke et al., 2012:179-191). Consequently freshwater fishes face a global crisis (Dudgeon, 2011:1487-1524).

The knowledge on the geographical distribution of species is essential for conservation planning, building biogeographical and macroecological hypotheses, effective biodiversity management. However, information on this regard is not distributed uniformly in space and usually come from biased sampling (Oliveira et al., 2017:1481–1493). Firstly it was shown on plants that the variables that affect the distribution of a species change with the change of observation scale (Crawley, Harral, 2001:864–868; Blank, Carmel, 2012:72–81). At the same time, presence-only data may be subject to large errors due to small sample size and biased samples (Phillips, Elith, 2013:1409–1419). A systematic data-collection survey, designed to collect data at precise locations should largely reduce these biases, and is the first step to construct species distribution models – SDMs (Nezer et al., 2017:421-437). In order to address declines of fish diversity, decision-makers need accurate assessments of the status of and pressures on biodiversity.

The problem of freshwater biodiversity protection is sharp for the Asia in regards to high density of human population, scarcity of freshwaters and poor management of water resources.

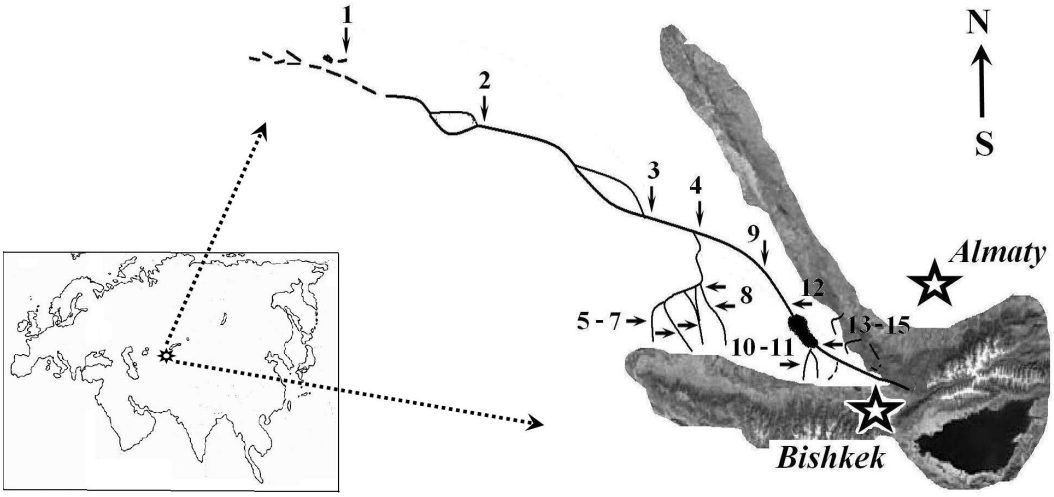
The Chu is one of the big rivers situated at Central Asia. The river originates in the Central Tien

Shan Mountains and dissipates into the Muyunkum desert. The river flows through the territories of Kyrgyzstan and Kazakhstan. The catchment area of the Chu River is 71600 km^2 and its maximum length is about 1067 km (Sovietskii entsiklopedicheskii slovar', 1990:1-1632). Therefore, the Chu watershed is one of the big hot spots of biodiversity. The region is favorable for agriculture. During last century the landscape of the watershed was significant changed after construction many of dams and irrigation canals on the river and its tributaries. Some alien fish species were intentionally and nonintentionally introduced here the same time. Hence, the problem of rational use and protection of native fishes is important for the river.

The first data on the fish fauna were collected by Nikolay Severtsov in 1864-1868 (Severtsov, 1873:1-462). Special researches of fish fauna were carried out several times during XX-th century by G.V.Nikol'skii (1931:227-268), P.A. Dryagin (1936:49-87), F.A. Turdakov (1963:1-279), I.A. Pivnev (1985:1-190), G.M. Doukravets et al. (2001:94-104). Investigations of some sites and fish species were provided in XXI-st century by F.V. Klimov (2005:186-193), N.Sh. Mamilov (2011:112-119), and D.K. Zharkenov and K.J. Seitbaev (2012:21-26). The long history of fish fauna investigations allowed us to check recent changes in fish diversity and distribution there.

Materials and methods

Investigations of fish diversity were carried out during summer seasons in 2009-2017. The fish were caught with a fine-mesh dragnet 15 m long with a 3 mm mesh and a rectangular landing net 500 × 700 mm with a 3 mm mesh. Fishes from commercial catches and fishermen were investigated too. A schematic map of the investigated area is presented on figure 1.



1 – Malye Kamkaly, 2 – Karabuget village, 3 – Moyinkum settlement, 4 – Kenes village, 5-7 – Kuragaty, Koltogan, Aspara rivers; 8 – water reservoirs (ponds) and lower reach of the Aspara river, 9 – Chu town, 10-11 – Karabalta and Aksu rivers; 12 – lower the Tasutkel water reservoir, 13-15 – Tasutkel water reservoir and the Chu upstream, Kakpatas, Kolguty, Kishi-Kolguty and and Yrgaiyty tributaries

Figure 1 – Schematic map of the investigated area

The diversity of the fish communities was assessed using the following indexes: S is the total number of species in the community (species richness), D is the Simpson diversity index, E is the uniformity of distribution according Simpson, H is the Shannon index, and J is the uniformity of distribution according to Shannon (Bigon et al.,1989:1-477). The Shannon index was calculated using the binary logarithm. The abundance of each species was estimated as: «abundant» consisted 10% and more for site, «common» consisted between 1 and 10%, «fluctuating» species number was not stable and «rare» consisted under 1%.

Results and discussion

The list of fish species with general information on their life-style, distribution and relative abudance is given in table 1 in contrast with previous data

(Doukravets et al.,2001:94-104). Presented check list seems shorter than prvious ones. Mentioned by other researchers (Turdakov, 1963; Pivnev,1985; Doukravets, Mitrofanov, 1992:414-418; Konurbaev, Timirkhanov, 2003:1-120) alien Amudarya trout – *Salmo trutta oxianus* Kessler, 1874, ischan – *Salmo ischchan* Kessler, 1877 as well as indigenous scaly osman – *Diptychus maculatus* Steindachner, 1866, naked osman -*Gymnodiptychus dybowskii* (= *Diptychus dybowskii* Kessler, 1874) inhabited upstream of the river and so were not found in the Kazakhstan part of the river.

Table 1 – Fish diversity in the Kazakstan segment of the Chu watershed

№	Species *Latin name* – common name	Origin, life-style	1991-1993 by Doukravets et al., 2001	River segments, 2015-2017		
				Top	Middle	Lower reach
Order Esociformes, family Esocidae						
1	Northern pike – *Esox lucius* Linnaeus, 1758	Ind, L	+	0	r	flu
Oder Cypriniformes, family Cyprinidae						
2	Aral roach – *Rutilus rutilus aralensis* (Berg, 1916)	Ind, F	+	flu	a	a
3	Aral asp *Aspius aspius ibliodes* Kessler, 1872	Ind, L	+	0	flu	flu
4	Aral carp – *Cyprinus carpio aralensis* Spitczakov, 1935	Ind, L	+	r	flu	r
5	Aral barbarbel – *Barbus brachycephalus brachycephalus* Kessler, 1872	Ind, L	0	0	r?	r?
6	Turkestan barbell – *Barbus capito conocephalus* Kessler, 1872	Ind, L	0	0	r?	r?
7	Balkhash marinka – *Schizothorax argentatus argentatus* Kessler, 1874	Ind, L	+	r	r	0
8	Chu sharpray – *Capoetobrama kuschakewitschii orientalis* G.Nikolsky, 1934	Ind, ?	0	0	0	0
9	Eastern bream – *Abramis brama orientalis* Berg, 1949	Mix, L	+	flu	c	r
10	Rudd *Scardinius erythrophthalmus* (Linnaeus, 1758)	Ind, L	+	0	r	r
11	Seven River's minnow – *Phoxinus brachyurus* Berg, 1912	Ind, F	0	r	r	0
12	Striped bystryanka – *Alburnoides taeniatus* (Kessler, 1874)	Ind, F	+	flu	r	0
13	Siberian dace – *Leuciscus leuciscus baicalensis* (Dybowski, 1874)	Ind, F	+	flu	flu	r
14	Turkestan ide – *Leuciscus idus oxianus* (Kessler, 1874)	Ind, L	+	r	r	r
15	Turkestan gudgeon – *Gobio lepidolaemus* Kessler, 1872	Ind, F	+	c	c	r
16	Goldfish – *Carassius gibelio* (Bloch, 1782)	Aln, F	+	r	r	r
17	Abbottina (Amur fase gudgeon) – *Abbottina rivularis* (Basilewsky, 1855)	Aln, F	+	r	r	r
18	Topmouth gudgeon – *Pseudorasbora parva* (Temminck et Schlegel, 1846)	Aln, F	+	r	flu	r
19	Tench – *Tinca tinca* (Linnaeus, 1758)	Aln, L	0	0	0	0
20	Sharpbelly – *Hemiculter leucisculus* (Basilewsky, 1855)	Aln, F	+	flu	flu	flu
21	Grass carp – *Ctenopharyngodon idella* (Valenciennes, 1844)	Aln, L	+	0	r	r
22	Silver carp – *Hypophthalmichthys molitrix* (Valenciennes, 1844)	Aln, L	+	r	r	0
23	Rosy bitterling – *Rhodeus ocellatus* (Kner, 1866)	Aln, F	0	flu	c	r
family Balitoridae						
24	Tibetan stone loach *Triplophysa stoliczkai* (Steindachner, 1866)	Ind, F	st	r	0	0
25	Grey stone loach – *Triplophysa dorsalis* (Kessler, 1872)	Ind, F	st	r	r	0
26	Spotted thicklip loach – *Triplophysa strauchii strauchii* (Kessler, 1874)	Ind, F	?	r	r	0

Continuation of table 1

№	Species *Latin name* – common name	Origin, life-style	1991-1993 by Doukravets et al., 2001	River segments, 2015-2017		
				Top	Middle	Lower reach
27	Plain thicklip loach – *Triplophysa labiata* (Kessler, 1874)	Ind, F	?	r	0	0
28	Severtsov's loach – *Triplophysa sewerzowii* (G.Nikolsky, 1938)	Ind, F	0	0	r	0
	family Cobitidae					
29	Aral spined loach – *Sabanejewia aurata aralensis* (Kessler, 1877)	Ind, F	c	c	r	r
	Order Siluriformes, family Siluridae					
30	Wels catfish – *Silurus glanis* Linnaeus, 1758	Ind, L	0	0	r	r
	Order Beloniformes, family Adrianichthyidae					
31	Japanese rice fish – *Oryzias latipes* (Temminck et Schlegel, 1846)	Aln, F	+	flu	flu	flu
	Order Cyprinodontiformes, family Poecilidae					
32	Eastern mosquitofish – *Gambusia affinis holbrooki* (Girard, 1859)	Aln, F	+	flu	flu	flu
	Order Gasterosteiformes, family Gasterosteidae					
33	Aral stickleback – *Pungitius platigaster aralensis* (Kessler, 1877)	Ind, F	+	0	flu	0
	Order Perciformes, family Percidae					
34	Perch – *Perca fluviatilis* Linnaeus, 1759	Ind, L	+	c	r	C
35	Balkhash perch – *Perca schrenkii* Kessler, 1874	Aln, L	+	0	0	0
36	Sander, or pike-perch – *Sander lucioperca* (Linnaeus, 1758)	Aln, L	+	r	r	R
	family Odontobutidae					
37	Beautiful sleeper – *Micropercops (Hypseleotris) cintus* (Dabry et Thiersant, 1872)	Aln, F	+	r	r	R
	family Gobiidae					
38	Chinese goby – *Rhinogobius cheni* (Nichols, 1931)	Aln, F	+	flu	flu	R
	family Channidae					
39	Amur snakehead – *Channa argus* (Cantor, 1842)	Aln, L	+	st	c	c
	Total	39	29-31	26	33-34	25-26
	Alien among them	14	13	12	12	12
	Fast living (short-life) among them	20	16-18	19	19	12
Footnote: Ind – indigenous, Aln – alien; Mix – indigenous and native; L – long mature, F – fast mature; + revealed, 0 – was not revealed, ? – probably; a-abundant, c – common, flu – fluctuating, r – rare						

Several changes have occurred in the fish composition since beginning of 1990-thies. Modern check list conists from about 34 – 36 fish species. Most probably that the sabrefish (or rathorfish) *Pelecus cultratus* (Linnaeus, 1758) and Amur sleepr *Percottus glenii* Dybowski, 1877 were erroneously mentioned by I.A.Pivnev (1985) for fish fauna of the Chu River because no description of the fishes was given by himself and no one after him mentioned those species (Doukravets, Mitrofanov, 1992; Doukravets et al., 2001; Konurbaev, Timirkhanov, 2003). Including Syrdrya dace *Leuciscus squalisculus* in the fish fauna seems disputable because it was mentioned for the Chu watershed only once (Reshetnikov, Shakirova, 1993:) and was not be confirmed in other reports (Doukravets et al., 2001; Konurbaev, Timirkhanov, 2003; Klimov, 2005; Mamilov, 2011; Zharkenov, Seitbaev, 2012: 21-26).

Different species and subspecies of minnow as Seven River's minnow *Phoxinus brachyurus*, Issyk-kul' minnow *Phoxinus issykkulensis* with subspecies *Phoxinus issykkulensis relictus,* and the Chu minnow *Rhynchocypris (Phoxinus) dementjevi* were indicated for the Chu basin. We did not observe taxonomically important differences

between all examinated specimens and so indicated all minnows under the name Seven River's minnow *Phoxinus brachyurus*. This species inhabited only some right side tributaries of the river. It was not observed in 1991-1993 (Doukravets et al., 2001) and now number of populations varies drastically as well as the other indigenous species like the Aral stickleback. Both species were quite numerous in 2012-2013 and 2015, but only a few specimens were observed in 2014, 2016 and 2017.

A new alien fish species like the rosy biiterling *Rhodeus ocellatus* had been found here (Mamilov, 2011) and now spread around all Kazakhstan part of the watershed. On the contrary, other alien fish species like the Balkhash perch *Perca schrenkii* was not observed as well as the tench *Tinca tinca*. We have not observed any sample of the Chu sharpray – *Capoetobrama kuschakewitschii orientalis*. No one scientific report about finding this rare local subspecies was published during last 30 years despite quite numerous investigations there. The minimal reproduction time for the species is 3 full years (Doukravets, 1988). Therefore the Chu sharpray have not been observed during 10 generations and should be considered as extinct in the wild according to the criteria E of the World Conservation Union (IUCN, 2010:1-85).

The barbels and the wels catfish were observed in 1991-1993, but young fishes of both species were found in 2015-2017. The Turkestan ide *Leuciscus idus oxianus* and perch *Perca fluviatilis* previously were found mostly in lower reach, but now they were revealed in the some tributaries of the middle part of the watershed (upper part of the Kazakhstan sector of the river).

Origin of the spotted thicklip loach and plain thicklip loach is disputable. By F.A.Turdakov's opinion (1968:50-52) both species had penetrated in the Chu watershed at the end of 1950-thies when carps from the Almaty fish farms were brought here. We can guess natural origin of these species. Furthermore a new population of the Severtsov's loach was discovered in 2017 in the Kuragaty River.

Morphological analysis of the alien Chinese goby revealed some particularities in contrast with other populations. E.D.Vasil'eva and T.I.Kuga (2008:29-36) on the basis of the founder principle explained high differences between introduced populations of the goby in the water bodies of Central Asia. After these authorities in taxonomy of fishes of the Eastern Asia we used the name *Rhinogobius cheni* (Nichols, 1931) for goby inhabited the Chu watershed.

It is unclear how we should consider state of the grass carp and silver carp. Specimens of both fish species sporadically were observed in different parts of the watersheds, but any possibility of their self-reproduction is ambiguous.

The upstream of the Yrgaity river only remains still free from alien fishes. All other parts of the investigated area are inhabited now by the indigenous and alien fish species. Fast matured fish species take important part of common diversity for the each investigated site. Abundance of fast matured and alien fish species usually indicates unstable environmental conditions.

The wide spread and quite numerous fishes were indigenous roach, dace, Turkestan gudgeon and alien topmouth gudgeon. In contrast, barbels, stripped bystryanka, Severtsov's loach and Aral stickleback took up only single locations.

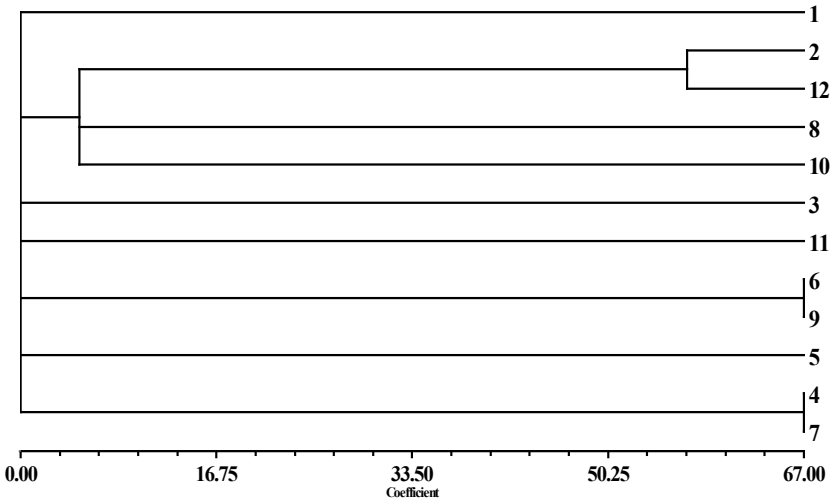
Indexes of diversity of fish communities for different sites are presented in table 2. In spite of the large list of fish species for the Kazakhstan part of the watershed, only few fish species were observed in each location. The presented data show large fluctuations of fish number as well as diversity for every location.

Table 2 – Indexes of diversity of fish communities

River	Year	Indexes					
		S	n	D	E	H	J
1	2	3	4	5	6	7	8
Chu, upper the Tasutkol water reservoir	2015	8	205	3.93	0.49	2.25	0.75
	2016	7	111	4.01	0.57	2.28	0.81
	2017	8	66	3.48	0.44	2.26	0.75
Chu, lower the Tasutkol water reservoir	2015	10	147	3.41	0.34	2.22	0.67
	2016	2	25	1.68	0.83	0.85	0.85

Continuation of table 2

River	Year	Indexes					
		S	n	D	E	H	J
	2017	7	44	3.56	0.51	2.14	0.76
Chu, lower the Moyinkum settlement	2015	5	278	2.23	0.45	1.40	0.60
	2016	4	76	1.76	0.35	1.27	0.54
	2017	5	143	1.76	0.35	1.22	0.53
Kishi-Kolguty	2011	2	32	1.91	0.47	0.85	0.42
	2012	3	34	2.36	0.79	1.36	0.86
	2013	6	68	3.76	0.63	2.12	0.82
	2014	1	11	1	1	0	0
	2016	6	31	4.27	0.71	2.28	0.88
	2017	5	31	3.52	0.70	2.02	0.87
Kolguty, submountain part	2012	4	14	2.80	0.7	1.69	0.84
	2013	2	6	1.38	0.69	0.65	0.65
	2014	3	62	1.77	0.59	1.12	0.70
	2017	5	19	3.50	0.70	2.02	0.87
Kolguty, mountain part	2012	2	32	1.80	0.90	0.92	0.92
Koltogan	2012	6	20	3.33	0.55	2.02	0.78
	2013	7	55	3.58	0.51	2.26	0.80
	2014	8	167	1.87	0.23	1.53	0.51
	2016	2	5	1.47	0.73	0.72	0.72
	2017	10	123	4.45	0.44	2.49	0.75
Yrgaity	2010	2	5	1.92	0.96	0.97	0.97
	2012	0	0	0	0	0	0
	2013	0	0	0	0	0	0
	2014	0	0	0	0	0	0
	2016	4	118	2.46	0.61	1.48	0.74
	2017	4	67	2.40	0.60	1.43	0.71
Kuragaty	2012	6	51	4.15	0.69	2.29	0.89
	2016	8	117	4.80	0.60	2.52	0.84
Aksu	2016	3	33	1.20	0.40	0.52	0.32
	2017	6	69	2.71	0.45	1.73	0.67
Karabalta	2009	5	90	2.38	0.47	1.49	0.64
	2010	6	32	3.97	0.66	2.20	0.85
	2013	7	53	2.65	0.38	1.86	0.66
	2016	3	4	2.67	0.88	1.5	0.94
	2017	5	43	2.50	0.50	1.55	0.67



Footnote: 1 – Karabalta river, 2009; 2 – Karabalta river, 2010; 3 – Aspara impoundment, 2007; 4 – Kishi-Kolguty, 2011; 5 – Kishi-Kolguty, 2012; 6) Kolguty, 2012; 7 – Koltogan, 2012; 8 – Kuragaty (lower reach), 2012; 9 – Kuragaty (upper reach), 2012; 10 – Yrgaiyty, 2010; 11 – Chu, upper the Tasutkol water reservoir, 2012; 12 – Chu lower the Tasutkol water reservoir, 2012.

Figure 2 – Similarity of fish composition in the Chu watershed based on the Sorensen's index of diversity (Sorensen, 1948:1-43). Complete linkage.

Similarity of some samples based on the Sorensen's index of diversity (1948:1-43) is shown on the figure 2.

How it is presented on the figure 2 fish composition varied significantly from sites and years. Similarity is not clear, even for the same location it varied from years.

Volume of water in the Chu River depends on precipitations and regulated by several impoundments. It depends on the agriculture activity and sown area. Therefore level of water in the all water bodies in the Kazakhstan part of the watershed can vary drastically that impact on fish diversity.

Conclusions

Existence of the 34-35 fish species was confirmed for Kazakhstan part of the Chu watershed as result of the investigation. About 20 of them were indigenous. Origin of populations of spotted thicklip loach, plain thicklip loach and Severtsov's loach are disputable. The area of indigenous roach, ide, carp, perch, rosy bitterling as well as alien snakehead, rosy bitterling and beautiful sleeper extended in contrast to the previous reports. On the contrary, tench and Balkash perch were not revealed. Surviving of small populations of barbells, Seven River's minnow and wels catfish were confirmed. No one finding of Chu sharpray was reported during last 30 years, and so this subspecies should be considered as extinct in the wild (criteria E of the IUCN).

Obtained results indicated high value of Kazakhstan part of the Chu watershed as a hot spot for conservation of diversity of indigenous specific fishes as well as big potential for fishery production. Except roach, distribution of all indigenous fishes in the watershed was lace-like and number of their populations fluctuated deeply. Therefore fish diversity in every site was much less that was indicated in the check list. Reasonable public management of nature of the region should be the best way to the fish diversity conservation and sustainable use.

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