ICHTHYOFAUNA OF THE LOWER COURSE OF THE PRUT RIVER (LARGA RIVER SECTOR (KM 120) - CONFLUENCE WITH RIVER DANUBE)

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Summary

The present written work represents the results of the research of the ichthyofauna from the lower course of the Prut River (including the Manta puddle and the Belevu lake) in terms of succession. It was established that, as a result of anthropogenic actions (drying of over 27-30 thousand ha of puddles, dam of the banks of the Prut River and its tributaries, extraction of sand and river stone from the minor riverbed, irreversible use of water in irrigation and industries, pollution, construction of the Costești-Stânca dam, destruction of wood cuts for lithophile and phytophilic species, etc.) in the ichthyofauna on the lower course of the Prut River, there were significant changes in diversity, quantitative and qualitative composition, and functional status of fish populations.

Introduction

The Prut River on the km section 120 (mouth of the river Larga (left tributary) to the confluence with the Danube River is characterized by a slow flow regime (instability during floods and showers) with major floodplain.

The flow and water level depends on the amount of atmospheric deposits that vary according to the type and seasonal changes, being unevenly distributed throughout the basin - the water level withstands large fluctuations. The lowest atmospheric deposits occur in winter and the highest in summer in the form of showers. Melting snow and spring rains as well as summer showers condition the spring and summer floods. Spring floods usually begin in late February - early March, approximately with the thawing of ice.

Raising the water level during this period, on average, is 0.3-0.6 m reaching up to 1m over 24 hours. During the summer floods (most intensive in July - August) the rise of the level also occurs quite abruptly. In the last 3 years, the spring-summer floods have shifted in May-July.

On this section, the river has many meanders, and the banks have low slopes - floodplain. Both banks are covered with tree roots, shrubs and macrophytes on which favorable conditions are created for the natural reproduction of the main fish species. For fattening, mainly Manta puddle and Belevu lake are used.

Methods and materials applied

During the years 2020 – 2021, the ichthyological material was collected by carrying out control fishing with nets and stationary and drifting with the size of the eye on the side 32-40-45-50-55-70-100 mm, with a length of 25 m and 50 m, the net for brood L - 5 - 20-50m, h - 1,5 - 2m, Ø 10x10 - 20x20 mm, ichthyoplankton mesh and fishing net race. The determination and

analysis of the ichthyological material was performed using classical ecological and ichthyological methods [8, 9,10,17,19,20,21]. The data obtained were statistically processed using the program Excel - 2007. In total, 2183 fish were collected in the years 2020 – 2021.

Also, for the synthesis analysis of the results of multiannual scientific research of the Laboratory of Ichthyology and Aquaculture of the Institute of Zoology on the state of fish fauna in the Prut River (lower course) from the mouth of the river Larga (km 120) to the confluence with the Danube.

In the quantitative and qualitative description of the ichthyofauna on this segment of the Prut River were also used the results of the scientific research carried out by the Research Station in the Field of Fish Culture, the Department of Zoology of the Pedological Institute from Tiraspol, Research-Development Institute for Aquatic Ecology, Fisheries and Aquaculture Galati, as well as ichthyologic observations made by the State Inspectorate for the Protection and Reproduction of Fishery Resources and Fisheries Regulation in the Republic of Moldova.

Results obtained and discussions

Scientific research carried out (since the 50th century and until now) on the fish fauna of the lower course of the Prut River has found that until the regularization of the flow of the Prut River (Costești - Stâncă dam, 1978) the ichthyofauna of the Prut River basin, after some authors, it consisted of 98 species and subspecies of fish, assigned to 23 families [3, 4, 6, 18]. After the regularization of the flow as well as the development of massive amelioration measures (drying of the puddles in the lower course - about 27-30 thousand ha and damming of the banks) essential changes have taken place in the specific diversity of the ichthyofauna. Valuable species have disappeared such as: - starlet, basratd strurgeon, burbot, eel.

The population of some semi-migratory species and potamodromes have significantly decreased (ide, carp, vimba bream, sichel). Simultaneously with the introduction of valuable fish species, from the Amur River, new species have completed the ichthyofauna – silver carp, bighead, mackerel, etc. Therefore, at the end of the 70s (last century) the fish fauna of the lower course of the Prut River consisted of 54 species and subspecies of fish assigned to 19 families (aa. 1960-1974 - 16 families, a. 2017 -15 families).

The next period (from the mid-1980s to the present) is characterized by intensified negative anthropogenic influence, regularization of tributary flows, pollution, damming of many parts of banks against floods, excavation and extraction of sand, gravel and river stone, irreversible use of water for irrigation, industries and other activities related to the aquatic ecosystems.

These productive activities have caused substantial changes in the specific diversity of fish fauna and have led to a change in the ecological status of many fish species as well as to the degradation of the populations of economically valuable and endangered species.

From the composition of the ichthyofauna, burbot, Danube streber, barbel, huchen, crucian carp have practically disappeared. The population of starlet, ide, eastern mudminnow, etc. is on the verge of extinction. They passed in the category of rare species - mackerel of Danube, sichel, tench, barbel, spined loach [3, 4]. The populations of economically valuable species

(previously numerous) have been considerably reduced – asp, pike-perch, carp, catfish, freshwater bream, vimba bream, pike. On the other hand, some species have adapted to the new environmental conditions, expanded their range, and their populations are progressing. The mentioned ones refer first to the species without economic value (Stone moroko, gudgeon, bleak, rudd, european perch, silver crucian carp (forms with low growth rate).

In connection with the border regime, industrial / commercial fishing in the Prut River was not practiced, this being the reason why no obvious statistics were taken. Industrial / commercial fishing was practiced only in the puddles located downstream of Țiganca. In the period immediately after the Second World War, starting with 1946, industrial / commercial fishing was organized and, annually, until 1967, 495 tons were fished.

Until 1959, carp predominated in catches - 150 tons (30% of catches), followed by pike 90 tons (18% of catches), catfish - 16 tons and freshwater bream- 7 tons [7].

The drying of over 27000 ha of ponds during the years 1950 - 1960, essentially modified the aquatic ecosystems in this area, and from the famous puddles only the puddles from the village of Manta (2200 ha) and Lake Beleu from the area of Slobozia Mare (900 ha) remained.

With the drying of the ponds, important areas for the reproduction of many valuable species, the development of juveniles fish, the growth and fattening of fishing species (carp, freshwater bream, pike-perch, pike, tench, catfish, etc.) were liquidated.

Catches of industrial / commercial fishing, during the years 1968-1970, decreased to 227 tons, and towards the end of the 70s of the last century up to 100 tons dominant in catches becoming the silver crucian carp - 28 tons and bream -20 tons [7] (Tab. 1).

Tab. 1 The dynamics of industrial fishing in Manta puddle and Lake Beleu in the Prut River basin (tons).

Years	Carp	Freshwater Bream	Pike-Perch	Asp	Catfish	Crucian Carp	Pike	Tench	Rudd	European Perch	Other species *	Total
1	2	3	4	5	6	7	8	9	10	11	12	13
1946	178,4	24,1	32,4	0	41,0	0	27,0	0	35,0	16,0	141,9	495,8
1947	21,9	4,8	1,1	-	6,1	-	13,7	-	-	-	84,7	132,3
1948	211,4	5,1	5,7	-	2,4	-	2,4	-	-	-	530,0	757,0
1949	349,7	23,8	4,6	-	19,7	-	107,9	-	-	-	352,1	857,8
1950	374,2	27,6	1,7	6,0	11,6	-	89,4	-	-	-	266,8	777,3
1951	102,3	14,7	-	1,2	6,1	-	43,1	-	-	-	237,4	404,8
1952	96,1	10,1	0,1	1,2	5,3	6,4	60,0	3,6	21,3	10,7	206,2	421,0
1953	120,6	12,8	0,4	-	6,6	2,8	43,9	2,0	23,8	18,5	176,1	407,5
1954	74,0	11,9	-	-	4,2	8,3	41,6	5,9	8,5	2,3	126,4	283,1
1955	112,1	6,5	-	0,2	20,6	-	98,7	5,6	5,0	13,0	143,6	405,3
1956	128,6	22,5	0,7	1,0	36,9	32,8	355,0	38,3	51,4	48,6	207,5	923,3
1957	159,0	5,6	0,3	0,5	28,0	8,7	162,4	13,6	10,3	9,6	236,0	634,0
1958	77,0	4,9	-	-	18,2	10,0	94,4	25,0	17,2	7,0	191,4	445,1
1959	80,0	3,6	-	-	18,8	9,2	103,9	20,0	15,0	5,0	187,8	443,3

1960	22,7	0,4	-	-	16,8	-	101,2	20,0	16,0	5,0	227,5	409,6
1961	12,4	1,4	-	0,5	10,7	8,4	67,7	40,2	-	13,4	232,0	386,7
1962	17,3	2,1	-	-	3,1	106,0	63,6	23,7	19,9	34,4	126,8	396,9
1963	11,0	1,7	-	-	7,1	91,5	117,8	-	31,6	46,2	171,5	478,4
1964	13,9	1,6	-	-	3,9	45,6	44,7	-	9,1	23,3	102,4	244,5
1965	4,8	4,5	-	0,9	16,0	1,0	71,9	-	15,6	29,9	188,2	332,8
1966	6,4	31,4	1,5	0,3	39,5	43,8	68,5	-	10,8	25,0	187,6	414,8
1967	15,4	9,0	0,7	0,2	18,2	78,4	51,3	0,4	10,0	27,9	199,5	411,0
1968	1,4	4,4	0,2	-	8,2	3,7	35,6	0,1	11,0	4,8	157,7	227,1
1969	2,0	4,8	-	-	11,0	34,5	43,6	6,7	82,7	19,0	67,7	272,0
1970	6,1	3,6	0,1	-	8,1	4,4	44,8	11,2	43,7	4,4	96,8	223,2
1971	4,0	3,5	1,4	-	6,2	18,4	22,4	5,4	33,3	13,2	45,9	153,7
1972	5,1	3,8	3,2	-	12,0	22,6	13,7	1,2	20,4	5,2	90,6	177,8
1973	5,0	14,0	6,0	-	-	13,0	8,0	-	18,0	6,0	42,0	112,0
1974	3,0	17,7	4,4	-	19,1	52,4	12,9	-	-	-	58,7	168,2
1975	18,8	34,7	9,3	-	14,6	43,7	6,8	-	10,1	15,1	35,1	188,2
1976	38,0	11,9	22,5	-	3,3	24,2	3,7	-	24,2	14,0	13,2	155,0
1977	20,6	2,4	3,4	-	9,4	9,5	-	-	30,2	30,0	19,1	124,6
1978	25,4	5,3	1,9	-	11,6	45,3	-	-	-	-	22,8	112,3
1979	24,0	17,9	2,8	-	7,0	41,1	1,8	-	17,0	21,0	7,4	140,0
1980	13,6	17,3	5,7	3,2	9,0	35,9	3,2	-	5,9	6,0	2,2	102,0
1981	7,8	30,1	6,8	1,4	5,6	30,8	2,2	-	1,5	11,0	13,0	110,2
1982	12,4	29,9	7,0	0,6	3,3	39,9	-	-	1,5	-	5,0	99,6
1983	12,5	48,6	6,9	-	2,5	24,8	-	-	-	-	3,6	98,9
1984	9,4	48,8	7,7	-	4,8	29,2	-	-	-	-	8,4	108,3
1985	32,0	28,8	2,1	1,7	1,9	38,4	1,0	-	2,0	2,2	9,4	119,5
1986	5,0	11,0	1,2	1,3	-	19,0	0,8	-	-	3,7	3,1	45,1
1987	12,8	5,3	0,1	1,3	0,2	10,6	1,0	-	-	-	5,0	36,3
1988	26,7	10,9	4,6	-	3,1	11,3	-	-	-	-	22,1	78,7
1989	29,2	12,8	1,3	-	2,2	14,4	-	-	-	-	24,9	84,8
1990	10,3	8,6	0,5	-	0,1	5,0	-	-	-	-	7,6	32,1
1991**	-	-	-	-	-	-	-	-	-	-	-	-
1992	2,2	4,8	-	-	-	5,0	-	-	-	-	12,2	24,2
1993	0,7	1,2	1,0	-	-	10,1	-	-	-	-	17,0	30,0
1994	-	0,8	-	-	-	0,2	-	-	-	-	2,4	3,4
1995	-	-	-	-	-	1,1	-	-	-	-	1,7	2,8
1996	0,2	1,1	-	-	-	-	-	-	-	-	-	1,3
1997	-	-	-	-	-	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-	-	-	-	-	-
1999	-	-	-	-	-	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-	-	-	-	0,6	0,6

2001	-	-	-	-	-	-	-	-	-	-	0,2	0,2
2002	-	-	-	-	-	0,14	-	-	-	-	0,05	0,19
2003	0,26	0,15	0,1	-	-	1,0	-	-	0,11	0,1	0,18	1,9
2004	-	-	-	-	-	-	-	-	-	-	-	-
2005	0,4	0,2	0,2	-	-	0,4	0,2	-	-	-	-	1,4

* Other species included: white bream, white-eye-bream, roach, ruffe, common nase, fitofagus, round goby, bleak, sichel.

**In connection with the inclusion of Lake Beleu in the component of the nature reserve "Prutul de Jos", since 1991, industrial fishing took place only in the Manta puddles where, since 2006, it is no longer practiced.

Control and scientific fisheries conducted during the years 1981-1991 as well as the analysis of catches from industrial / commercial fishing found that ichthyofauna was represented by 36 species of which 12 species from the fishing group, but only 9 species of all were of economic importance: roach, asp, freshwater bream, vimba bream, white-eye-bream, silver crucian carp, carp, catfish, pike-perch[11, 22] (Tab. 2, 3).

In the catches, the following species were completely missing: starlet, ide, barbel, sichel, white bream etc., which in previous years were found very common. Of the rare species, in June 1991, one eel (length 1.05 m, weight 1.2 kg) was caught in the Manta puddles and another eel of 58 cm in length was fished in May 2003, as well as starlet (from fishermen's reports have not been reported in this area since 1984).

Tab. 2 The qualitative and quantitative composition of the fish fauna from the Prut river in the area of Văleni village a. 1981

Fish species	No. of fish examined	Species ratio %	Body length, cm				Ichthyomas, g		
		abundance	Values			Values			
			Ichthyomas	average	min	max	average	min	
<i>Freshwater bream</i>	38	33,33	14,0	19,5	12,0	35,0	205	45	650
<i>European Perch</i>	16	14,07	6,0	17,5	16,0	24,3	200	70	330
<i>Asp</i>	15	13,15	30,3	40,6	30,3	62,0	1220	500	3270
<i>Pike</i>	11	9,64	7,8	31,7	26,8	40,0	409	170	725
<i>Pike-perch</i>	10	8,77	8,3	32,1	27,9	34,8	471	290	595
<i>Catfish</i>	9	8,89	12,3	41,9	29,8	78,5	795	250	3470
<i>Carp</i>	6	5,26	11,0	36,0	24,0	51,0	450	300	600
<i>Silver crucian carp</i>	7	6,14	4,6	2,5	21,3	28,0	368	325	440
<i>Barbel</i>	2	1,75	5,5	50,0	46	54,0	1510	1120	1900
<i>In total</i>	114								

Tab. 3 The qualitative and quantitative composition of the fish fauna from the Prut river on the segment of Brînza village - Câșlița village in the aa period. 1990-1991

Fish species	No. of fish examined	Species ratio %	Body length, cm				Ichthyomas, g		
		abundance	Values			Values			
			Ichthyomas	average	mini	max	average	min	
<i>Eel</i>	1	-	-	-	-	-	-	-	-
<i>Roach</i>	78	12,5	5,2	15,7	13,7	18,8	165,6	120	190,5
<i>Asp</i>	54	8,6	5,7	31,7	22,2	58,1	260,1	205	305,5
<i>Freshwater bream</i>	85	13,5	8,8	31,0	16,4	35,5	256,8	205	305,5
<i>White-eye-bream</i>	66	10,6	3,0	16,6	15,2	24,2	12,7	100	210,0
<i>Vimba bream</i>	4	0,6	1,4	16,2	10,5	24,2	103,2	34	150
<i>Silver crucian carp</i>	202	32,5	25,2	14,1	8,2	25,8	197,4	20	365
<i>Carp</i>	100	16,0	43,2	33,6	8,4	41,3	1060,1	850	2332,0
<i>Catfish</i>	18	2,9	3,9	36,9	25,2	62,5	525,0	275	3350,0
<i>Pike-perch</i>	17	2,8	3,5	33,4	25,5	40,2	499,3	280	7905
<i>In total</i>	624	100							

Annually, in the pre-reproductive period, there are massive migrations of carp, freshwater bream, roach, crucian carp, asp, catfish and other species from the Danube River to the breeding sites. From May to the beginning of July, the juveniles and the young fish are taken by the current of the river water downstream to fl. Danube. In years 1990-1991 according to the numerical abundance, roach, freshwater bream, crucian carp and carp predominated and after ichthyomas (specific weight): carp, catfish, crucian carp, freshwater bream, asp. The significant decrease in ichthyofauna was due to low water levels, intensive pollution, lack of natural floods and showers, low water levels in the Danube River, which disturbed the natural reproduction, development and growth of fish in various ontogenetic stages.

Another negative factor that contributed to the reduction of fishery resources on the lower course of the Prut, Manta puddles and in Lake Belevu was the regularization of water flows by building the Costești-Stânca dam (1979), changing the hydrological regime of the river.

The current state of the fishery resources in the Prut puddles entirely depends on the degree of water supply and the penetration of fish from the Danube-Prut river system. As a result of systematic ichthyological research and observations, it was found that the intensive entry of fish for reproduction and fattening in the Manta puddle and Belevu lake occurred during the periods with the average annual flow of the Prut River of 80m³/s and the increase of water level in river Danube.

With the regularization of the Prut flow, the average annual water flow is 50m³ / s with variations from 31 m³ / s to 77m³ / s. In such conditions, fish no longer enter the Prut puddles,

and industrial fishing, from the years 90 (last century), are no longer practiced and have lost their importance for reproduction where the areas of cattle breeders were about 750-900 ha in Manta puddle and 300-500 ha in Lake Belev [16].

A negative impact on the aquatic biological resources in the Prut River basin was also caused by various economic activities: extraction of sand, gravel and river stone (only the Republic of Moldova, since the sixth decade, last century, annually excavated from the minor riverbed 360 - 380 thousand m³ of sand and gravel); irreversible use of water for various purposes (on the left bank there were 35 pumping stations - most were operated without fish protection facilities); wastewater pollution; irrational exploitation of fishery resources (lack of a common agreement with Romania on joint research on the state of fishery resources, regulation and record of fishing, improvement of fisheries measures, prevention of illegal fishing) [7].

Significant changes in the water level and flow regime occurred, especially in the lower course after the regularization of the Prut River flows and the commissioning of the Costești-Stânca reservoir. Over the years, with more water, during the period of increasing level, to a greater or lesser extent, the puddles and lakes in the Prut meadow are connected to the riverbed by ravines and canals which are often barred (clogged) and cannot ensure the normal water supply of lakes with average depths of 1-2m. In some years, for example in 1990, Lake Belev has dried up completely and the entire surface was covered with macro-vegetation, losing its fishing importance. During the great floods of spring and summer and the flooding of the lakes, as it was in 1991, due to the abundant atmospheric deposits, favorable conditions were created for the reproduction of the fish and the fattening of the juveniles fish. Downstream of the town. Leova riverbed, until 1967, was bordered by lakes and puddles. After their drying (approximately 27000 - 30000 ha) only the Manta puddle (2100 ha) and the Belev lake (900 ha) were preserved, which are fed with water, predominantly from the Prut River, and a large part of the lake surfaces they are covered with macrophytes constituting the main places for the natural reproduction of many species of fish, the development and fattening of the juveniles fish.

The influence of water flow on the effectiveness of natural reproduction is demonstrated by the years 1989-1990, that are completely different due to the water flow in the spring-summer period. In 1990, only 10 species of fish were identified compared to 1989 (19 species), and the share of species with economic value decreased 3 times from 8.7 million. (a. 1989) up to 2.9 million. (year 1990), (Tab. 4). It should be mentioned that in all ichthyological samples it was found the presence of species that live permanently in small waters (coastal areas, bays) where the water heats up faster, rich in feed organisms and has a low flow. In these areas, the following species predominate: - bleak, gudgeon, bitterling, round goby, stone moroko, whose share is - 81.4%.

Tab. 4 The diversity and abundance of juvenile fish during the passive migration in the lower course of the Prut river (the segment of the village Brânza - the village Câșlița), (thousands of individuals

Fish species	Years							
	1989	1990	1991	2000	2002	2005	2009	2012
Fam. Clupeidae								
Mackerel of Danube	–	24,0	-	–	–	–	-	-
Black sea shad	–	–	-	155,6	45,1	158,6	106,0	14,7
Fam. Cyprinidae								
Roach	1272,6	288,3	2716,0	757,6	45,7	1110,2	1082,0	175,1
Chub	205,2	–	-	9829,1	248,0	1823,8	1035,5	24,0
Asp	246,0	–	-	20165,6	78,9	634,4	752,0	35,0
Bleak	1252,1	841,0	7663,7	1509,2	1590,5	2379,0	2933,0	220,2
White bream	184,7	–	2182,7	323,4	320,1	555,1	526,0	51,3
Freshwater bream	492,6	48,8	3880,5	982,9	2797,6	475,8	403,0	77,6
White-eye-bream	–	–	-	196,6	327,1	396,4	342,0	61,7
Vimba bream	143,7	–	-	196,6	–	79,3	323,5	28,9
Carp	718,4	–	1067,1	1249,2	1545,4	1030,8	653,0	54,5
Silver Crucian Carp	533,7	96,1	2619,2	3360,9	879,8	951,6	858,5	88,4
Barbel	164,2	–	-	–	248,1	79,3	61,5	-
Common nase	–	–	-	2029,2	45,5	237,9	221,5	-
Stone moroko	–	48,1	242,5	196,6	248,1	79,3	53,5	8,2
Gudgeon	985,3	192,2	970,0	1572,0	169,2	1506,7	1288	144
Ide	–	–	-	66,2	–	–	-	-
Tench	–	–	-	63,8	–	–	-	-
Rudd	821,0	–	145,5	–	124,0	–	76,0	5,7
Belica	410,5	–	194,0	–	–	–	-	-
Bitterling	20,5	1129,3	970,0	–	–	–	-	-
Fam. Percidae								
Pike-perch	102,6	–	533,3	11287,7	710,6	1665,3	1327,5	97,7
European perch	–	–	97,0	589,7	124,2	634,4	522,0	82,6
Ruffe	82,1	–	-	–	–	1903,2	1366,5	175,8
Fam. Siluridae								
Catfish	41,0	–	145,5	1179,5	169,2	475,8	426,0	49,6
Fam. Odontobutidae								
Round goby	780,0	216,2	485,0	5834,1	1083,0	3568,5	2515,5	329,7
Fam. Cobitidae								
Burbot	287,4	72,1	242,5	60,2	925,0	555,1	490,0	51,2
Fam. Centrarchidae								
Danube streber	–	–	-	63,1	–	–	-	-
Sun Perch	-	-	48,5	-	-	-	-	-
Total	8743,2	2956,1	23330,7	61668,8	11725,1	20299,6	17362,5	1775,9

Note : years 1989, 1990, 1991 - Scientific Research Station in the field of Fisheries, years: 2000, 2002 – Service of Fisheries, years: 2005, 2009, 2012 - Institute of Zoology

The onset of mass brood migration usually occurs in the second decade of May. The migration of juvenile fish, with some decreases, in significant quantities continues until the third decade of July, which is probably related to the gradual exit of juvenile fish, as they grow, from Manta and Beleu lakes.

In 1990, the Manta puddles were supplied with water at the minimum level and their area decreased by 420 ha. In 1991, after long rains, the water level in the Danube River and in the Costești-Stânca accumulation lake and starting with April 30, the water level in the Prut River rose suddenly. Lake Beleu, which dried up completely in 1990, at the end of May was filled with water and the migration of fish to the breeding sites was found. But the unstable hydrological regime and the low water level in the Manta puddles and Beleu lake require the fattening of the migratory juvenile fish only in the Danube River [11, 13].

Therefore, it can be concluded that the lower course of the Prut River is generally used for breeding, and its fishery resources are directly dependent on the water flows during the breeding period and the state of the fishery resources on the lower course of the Danube River.

Research conducted in 2014 on the Chircani – Cahul segment showed that among the economically valuable species, resulting from the migration of juvenile fish, predominated the populations of freshwater bream (73.3 thousand ex.) and pike-perch (68.1 thousand ex.) followed by the populations of carp (20.9 thousand ex.) and catfish (10.5 thousand ex.) (Tab. 5). Among the species with lower economic value, the populations of roach (120.4 thousand ex.) and silver crucian carp (78.5 thousand ex.) had the highest productivity, followed by those of white bream (60.3 thousand ex.) and perch (26.2 thousand ex.). The highest productivity had the economically inalienable species: bleak (268.6 thousand ex.), round-goby (387.0 thousand ex.), ruffe (206.8 thousand ex.) and gudgeon (163.8 thousand ex.).

Tab. 5 Abundance of sapling in the Prut River on the section between Chircani village - Cășlița village during the migration period of 2014 (thousands of individuals)

Fish species	segment S. Chircani - or. Cahul		segment s. Brînza - s. Cășlița	
	Abundance	Percentage ratio%	Abundance	Percentage ratio%
Black sea shad	17,3	1,1	16,6	0,9
Roach	120,4	7,7	99,1	5,3
Chub	-	-	16,5	0,9
Asp	-	-	35,6	1,9
Freshwater bream	73,3	4,7	71,6	3,9
White-eye-bream	-	-	60,6	3,3
Silver crucian carp	78,5	5,0	82,6	4,4
Vimba bream	-	-	5,5	0,3
Rudd	6,0	0,4	5,7	0,3
White bream	60,3	3,8	57,8	3,1

Bleak	258,6	16,7	247,5	13,5
Carp	20,9	1,3	88,1	4,7
Gudgeon	163,8	10,4	157,0	8,5
Stone maroko	8,6	0,5	8,2	0,4
SCatfish	10,5	0,7	49,6	2,7
Freshwater bream	26,2	1,7	82,6	4,4
Pike-perch	68,1	4,3	143,2	7,7
Ruffe	206,8	13,2	198,2	10,7
Burbot	60,3	3,8	57,8	3,1
Round goby	387,8	24,7	371,7	20,0
Total	1567,4		1855,5	

In the lower course of the Prut River small species with low economic value predominate (55.5%) and are represented by silver crucian carp - 15.3% with 7 age groups in which 2 years old groups predominate (24.5%), as well as 3 years (27.5%) and 4 years (29.5%).

Compared to the period 2010-2015, the silver crucian carp populations decreased by 19.4% when they had a share of 34.7%. This is explained by the disturbance of natural reproduction (low water levels in recent years during the breeding period, so that the bushes in Manta and Lake Beleu puddles were not covered with water on their entire surface, the small number of carp breeders and freshwater bream, etc.).

The crucian carp is followed by european perch 15.3% (during the years 2008-2014 - 5.0%). The European Perch population is represented by 6 dominant age groups, the groups of 2 years (14.6%), 3 years (34.8%) and 4 years (33.8%). White-eye-bream with flattened muzzle constitutes 11.2% (during the years 2008-2014 - 23.3%) and is represented by 6 dominant age groups being the groups of 2 years (11.1%), 3 years (34.8%) and 4 years (33.8%).

Large species constitute 36.3%, being represented by freshwater bream 11.9% (2.3 times higher than in the year 2008-2014) and by 6 dominant age groups being the 2-year groups (33.3%), 3 years (22.7%) and 4 years (16.7%). Carp follows- 8.5% represented by 7 dominant age groups being the groups of 2 years (16%), 3 years (30.5%) and 5 years (19.6%).

The pike-perch constitutes 6.8%, but the population is found in small numbers. A slight increase was reported to catfish (3.0%). Species without economic value constitute 8.2% [7].

Conclusions

The ichthyofauna of the lower course of the Prut River is mostly influenced by anthropogenic actions (drying of ponds - about 30 thousand ha only on the territory of the Republic of Moldova, construction of Costesti-Stânca dam, tributary regularization, sand excavation, pebbles and river stone). from the minor riverbed, pollution with untreated wastewater and domestic water, etc.) is in continuous quantitative and qualitative decline, especially of species with economic value (starlet , basratd strungeon, burbot, ide , eel).

Many species currently introduced in the Red Book (3rd ed.) Of the Republic of Moldova have become extinct or are on the verge of extinction.

There are no, on both sides, systematic studies on the state of fishery resources, structural-functional changes of fish populations in current and future ecological conditions.

Bibliography

1. ANTIPA, Gr. Fauna ihtiologică a României. București, 1909. 289 p.
2. BĂNĂRESCU, P. Fauna Republicii Populare Române: Pisces - Osteichthyes. Ed. Academiei Republicii Populare Române, 1964. 959 p.
3. BULAT, DM. Ihtiofauna Republicii Moldova: amenințări, tendințe și recomandări de reabilitare. Chișinău: Foxtrod, 2017. 343 p. ISBN 978-9975-89-070-0.
4. BULAT, DM., BULAT, DN., DAVIDEANU, A., IRINEL E., POPESCU, DAVIDEANU, GR. Studiu comun Romania – R. Moldova cu privire la ihtiofauna din lacul de acumulare Stânca-Costești. In: AACL Bioflux 9(3): 2016, pp. 550-563. ISSN 1844-8143.
5. BULAT, DM., BULAT, DN., TODERAȘ, I., USATÎI, M., ZUBCOV, E., UNGUREANU, L. Biodiversitatea, Bioinvazia și Bioidicația (în studiul faunei piscicole din Republica Moldova). Chișinău: Foxtrod, 2014, 430 p.
6. DAVIDEANU Gr. ș.a. Ihtiofauna râului Prut. Societatea ecologică pentru Protecția și Studierea Florei și Faunei Sălbatică "Aquaterra", Societatea Bioremedierii Ecosistemelor Acvatice și Umede "Euribiont". Iași, 2008, 80 p.
7. Inspectoratul de Stat pentru protecția și reproducerea resurselor piscicole și reglementarea pescuitului. Rapoarte anuale, aa. 1952, 1955, 1982, 1983, 1985, 1987, 1992, 1993, 1996, 1998, 2001, 2002, 2005.
8. Institutul de Cercetare-Dezvoltare pentru Ecologie Acvacultică, Pescuit și Acvacultură Galați, Raport Tehnico-Științific privind situația stocurilor de resurse acvatice vii (pești) din râul Prut și lacul de acumulare Stânca-Costești în perioada 2006-2007.
9. Institutul de Zoologie, Evaluarea stării resurselor piscicole. Chișinău: "Balacron", 2017, -142 p. ISBN 978-9975-128-92-6. [574.5/.5+639.2](478) E-93.
10. Năvodaru I. ș. a. Estimarea stocurilor de pești și pescăriilor. Metode de evaluare și prognoză a resurselor pescărești. Ed. Dobrogea, 2008, p. 46-61.
11. Stațiunea de Cercetări Științifice în Domeniul Pisciculturii. Rapoarte, 1988, 1998, 2004.
12. USATÎI Adrian, USATII Marin, TODERAȘ Ion, ȘAPTEFRAȚI Nicolae. ATLAS: "Peștii apelor Moldovei". Academia de Științe a Moldovei, Institutul de Zoologie. – Chișinău: S. n., 2015 (F.E.-P. "Tipografia Centrală"). – 192 p. ISBN 978-9975-53-578-6. CZU 597.2/.5(478) (03) P 53.
13. USATÎI, AD., USATÎI, M., ȘAPTEFRAȚI, N., DADU, A. Resursele piscicole naturale ale Republicii Moldova, ed. Balacron, Chișinău, 2016, 124 p.
14. USATÎI, M. Evoluția, conservarea și valorificarea durabilă a diversității ihtiofaunei ecosistemelor acvatice ale Republicii Moldova. Autoreferat al tezei de doctor habilitat în științe biologice, Chișinău, 2004, 48 p.
15. USATÎI, M., ȘAPTEFRAȚI, N., BULAT DM. ș.a. Starea ihtiocenozelor din ecosistemele acvatice naturale și măsuri de ameliorare. Tipograf. "Balacron". Chișinău, 2018, 48 p. ISBN 978-9975- 3255-6-1.
16. ГРИМАЛЬСКИЙ, В.Л. Очерк рыбного хозяйства р. Прут. Кишиневский Сельскохозяйственный Институт им. М.В. Фрунзе. Кишинев, 1958, 143 с.
17. Дементьева Т. Ф. Биологическое основание промысловых прогнозов. Изд. Пищевая

-
- промышленность. Москва, 1976.
18. ДОЛГИЙ, В.Н. Ихтиофауна Днестра и Прута (современное состояние, генезис, экология и биологические основы рыбохозяйственного использования). Изд. Штиинца. Кишинев, 1993, 323 с.
  19. Коблицкая А.Ф. 1981. Определитель молоди пресноводных рыб. М.: Наука, с. 208.
  20. Малкин Е.М., Александров А.К., Воронин В.М., Полторацкий С.В. 1981. Методические рекомендации по контролю за состоянием рыбных запасов и оценке численности рыб. М. : ВНИРО. с. 15.
  21. Никольский Г.В. Теория динамики стада рыб как биологическая основа эксплуатации и воспроизводства рыбных ресурсов. Изд. Пищевая промышленность. Москва, 1974, 447 с.
  22. ПОПА, Л.Л. Рыбы Молдавии. Справочник - определитель. Изд. Картя Молдовеняскэ. Кишинев, 1977, 200 с.
  23. ПОПА, Л.Л. Рыбы бассейна р. Прут. Изд. Штиинца. Кишинев, 1976, 85 с.