THE BIRDS OF THE MUREŞ (MAROS) RIVER

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Introduction

In 1991, we conducted a 5th survey in a 22-year period for the estimation of the avifauna of the Mureş River (see References). On the previous occasions we examined a water course of 490 and 650 km respectively; only in 1991 did we succeed in researching the entire length of the 766-km river. We took our observations by line transect, following the water course on foot or by boat. In this way, between June 13th and July 25th, we observed a water course of 719 km, from the spring (Izvorul Mureşului) to the border with Hungary. In August we reexamined the whole length of the river (766 km) by car, completing our former data by the points system.

Material and method

We divided the entire length of the river in 50-km-long sections; the last (15th) section was longer (66 km). We numbered them starting from the spring (Izvorul Mureşului). At the 2nd and 15th courses we used the points system, while at the others we took notes continuously. The various results of the two working methods are arranged in the tables and graphs. The occuring lower values (at the 2nd and 15th courses) are the result of the points system.

Results

On the whole, we observed 123 bird species. Table 1. contains our complete notes, prospected on the 50-km sections. The last three columns include the following indices:

T = the total individual number of a species

F = the frequency of a species (= with the number of observations)

Q = the percentage of a species reported to the number of the individuals from all species(N) Q=T*100/N

Now we shall speak more widely about each species:

Ciconiformes: The order is represented by 7 species, Ardea cinerea was the most frequent and had the greatest number of individuals. We found a single breeding colony in the 14th section.The night heron (Nycticorax nycticorax) was observed begining from the 5th section, the last investigations showing a certain numerical increasing (Table 2.).

Table 1. Species composition of bird communities at different sections of Maros valley

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	T	F	Q
Phalacrocorax carbo	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	9	2	0,053
Ixobrychus minutus	-	1	-	-	5	2	-	-	-	1	-	-	-	-	-	9	9	0,053
Nycticorax nycticorax	-	-	-	-	16	2	6	2	2	15	3	3	3	2	3	57	34	0,337
Ardeola ralloides	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	1	0,006
Egretta alba	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	1	0,006
Egretta garzetta	-	-	-	-	-	-	-	-	-	-	-	-	1	8	8	17	13	0,100
Ardea cinerea	-	-	-	1	25	-	2	36	21	29	39	59	33	44	1	290	104	1,712
Ciconia ciconia	21	1	60	4	9	4	-	10	4	2	1	1	-	3	-	120	38	0,709
Ciconia nigra	-	-	-	-	-	-	-	-	1	1	-	5	-	-	-	7	6	0,041
Anas platyrhynchos	1	-	4	33	23	-	29	29	31	5	-	3	1	9	37	205	43	1,210
Anas strepera	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	1	0,006
Anas querquedula	9	-	-	1	3	-	-	2	-	-	-	-	-	-	-	15	4	0,089
Milvus migrans	-	-	-	-	-	-	-	-	1	-	1	-	-	11	-	13	10	0,077
Accipiter gentilis	-	-	-	-	-	-	-	-	-	-	-	-	1	5	-	6	5	0,035
Accipiter nisus	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	2	2	0,012
Buteo buteo	5	1	3	-	-	-	-	2	3	4	5	3	2	3	-	31	28	0,183
Aquila pomarina	1	-	-	-	-	-	1	1	-	-	-	-	-	2	-	5	4	0,030
Aquila heliaca	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	0,006
Circaetus gallicus	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	0,006
Circus cyaneus	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	0,006
Circus aeruginosus	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2	2	0,012
Falco subbuteo	1	2	-	1	1	4	11	2	3	5	1	3	1	3	-	38	26	0,224
Falco vespertinus	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	5	2	0,030
Falco tinnunculus	-	-	-	-	7	4	11	19	10	1	5	6	5	4	3	75	59	0,443
Perdix perdix	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	1	0,006
Coturnix coturnix	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	0,006
Phasianus colchicus	-	-	1	2	8	1	1	2	-	1	1	-	5	-	2	24	21	0,142
Crex crex	1	-	-	-	-	-	-	-	-	-	1	1	-	-	-	3	3	0,018
Gallinula chloropus	3	-	-	-	4	-	-	-	-	-	-	-	-	-	-	7	2	0,041
Charadrius dubius	-	-	3	2	-	7	6	9	1	-	-	14	39	-	-	81	43	0,478
Vanellus vanellus	-	-	-	40	53	-	8	1	2	-	-	-	-	5	-	109	12	0,644
Calidris minuta	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	5	4	0,030
Tringa totanus	-	-	-	-	-	-	1	3	-	-	-	-	4	-	-	8	3	0,047
Tringa nebularia	-	-	-	2	-	5	-	4	-	-	-	-	15	5	-	31	17	0,183
Tringa ochropus	-	-	-	-	-	-	5	3	2	-	2	-	4	6	-	22	14	0,130
Tringa glareola	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	2	0,012
Tringa hypoleucos	-	-	10	4	19	7	41	18	27	15	9	7	31	17	7	212	156	1,252
Gallinago gallinago	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	0,006

Table 1. (continued)

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	T	F	Q
Larus ridibundus	-	-	1	16	39	8	5	6	46	6	-	-	146	5	271	549	42	3,242
Larus fuscus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	0,012
Larus argentatus	-	-	-	2	-	-	-	-	-	-	-	-	1	1	-	2	2	0,012
Sterna hirundo	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	2	1	0,012
Columba palumbus	13	-	-	-	-	-	-	-	-	10	16	11	-	8	-	58	24	0,342
Streptopelia decaocto	-	2	4	2	27	22	22	-	1	6	2	-	7	3	40	138	51	0,815
Streptopelia turtur	49	-	-	-	1	-	1	2	2	-	6	8	-	-	-	69	20	0,407
Cuculus canorus	-	-	-	6	3	2	3	2	1	1	-	1	2	5	4	30	27	0,177
Asio otus	-	-	-	-	-	-	2	-	-	-	-	-	1	-	-	3	2	0,018
Otus scops	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	1	0,006
Strix aluco	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	1	0,006
Caprimulgus europaeus	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	2	2	0,012
Apus apus	-	-	-	-	-	-	-	-	-	-	-	-	-	63	-	63	2	0,372
Alcedo atthis	-	-	9	1	9	7	16	10	20	18	14	14	7	6	1	132	107	0,779
Merops apiaster	-	-		-	4	-	7	9	28	1	-	13	89	201	-	352	47	2,079
Coracias garrulus	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	2	0,012
Upupa epops	7	-	-	-	2	2	-	3	2	-	-	-	1	1	-	18	13	0,106
Picus viridis	-	-	-	-	12	3	4	1	2	-	5	-	4	1	1	33	30	0,195
Picus canus	-	-	-	-	4	-	-	-	1	1	1	3	-	-	-	10	8	0,059
Dryocopus martius	-	-	-	-	-	-	-	-	-	-	2	1	1	1	-	5	4	0,030
Dendrocopos major	-	-	-	-	2	3	-	-	-	-	1	2	-	1	2	11	8	0,065
Dendrocopos syriacus	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-	3	2	0,018
Dendrocopos minor	-	-	-	-	-	-	-	-	-	1	1	2	-	-	-	4	4	0,024
Galerida cristata	-	-	-	7	-	4	-	6	-	-	-	-	1	-	-	18	9	0,106
Lullula arborea	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2	1	0,012
Alauda arvensis	2	-	-	-	-	6	4	6	9	4	2	1	-	-	-	34	20	0,201
Riparia riparia	-	-	136	57	44	143	369	276	304	159	106	20	725	727	130	3196	92	18,873
Hirundo rustica	59	3	10	31	43	98	187	179	63	73	64	18	60	74	21	983	96	5,805
Delichon urbica	-	-	-	10	3	-	4	13	60	30	3	-	70	-	-	193	11	1,140
Oriolus oriolus	-	1	-	-	24	14	24	22	29	38	43	39	14	8	5	261	171	1,541
Garrulus glandarius	-	-	-	-	1	4	3	1	7	3	14	16	1	2	-	52	38	0,307
Pica pica	32	5	46	94	75	47	81	39	46	59	334	13	17	8	7	603	198	3,561
Nucifraga caryocatactes	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	0,006
Corvus monedula	-	-	37	7	353	35	65	16	3	100	20	-	-	50	-	686	31	4,051
Corvus frugilegus	-	-	15	-	5	41	137	638	60	-	-	-	6	-	-	902	18	5,327
Corvus cornix	7	1	16	77	20	8	46	63	67	32	30	53	65	19	5	509	164	3,006
Corvus corax	2	2	-	-	-	2	-	4	8	2	11	2	-	-	-	33	19	0,195
Parus palustris	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	3	2	0,018

Table 1. (continued)

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	T	F	Q
Parus ater	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	0,006
Parus caeruleus	-	-	3	-	-	-	-	4	2	5	8	14	1	-	2	39	21	0,230
Parus major	5	-	3	-	6	2	3	14	-	6	13	15	13	-	3	83	40	0,490
Aegithalos caudatus	-	-	1	-	-	-	-	-	-	-	-	12	-	-	-	13	3	0,077
Sitta europaea	-	-	-	-	-	-	2	-	-	-	2	-	-	-	-	4	3	0,024
Troglodytes troglodytes	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	2	2	0,012
Saxicola rubetra	21	-	1	-	-	2	2	1	1	-	-	-	-	-	-	28	11	0,165
Saxicola torquata	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	3	3	0,018
Phoenicurus ochruros	9	-	1	1	-	-	-	-	-	-	-	-	-	-	-	11	7	0,065
Erithacus rubecula	-	-	1	-	-	-	-	-	-	-	4	-	-	-	-	5	3	0,030
Luscinia megarhynchos	-	-	-	-	-	-	-	-	1	-	1	-	1	-	-	3	3	0,018
Luscinia luscinia	-	-	5	-	-	1	4	3	1	-	-	-	-	-	-	14	13	0,083
Turdus pilaris	18	1	7	-	-	-	8	-	-	-	-	-	-	-	-	34	12	0,201
Turdus merula	-	-	1	-	1	-	-	-	-	-	1	1	-	-	1	5	5	0,030
Turdus philomelos	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	3	2	0,018
Turdus viscivorus	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	6	1	0,035
Locustella luscinioides	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	3	2	0,018
Locustella fluviatilis	-	-	-	-	-	-	1	1	4	4	6	8	2	1	-	27	25	0,159
Acrocephalus palustris	1	-	10	10	8	13	12	7	-	2	-	1	-	-	-	64	46	0,378
Acrocephalus scirpaceus	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	6	4	0,035
Acrocephalus arundinaceus	-	-	1	1	-	-	-	-	-	1	-	-	-	-	-	3	3	0,018
Sylvia borin	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	0,018
Sylvia atricapilla	-	-	2	-	2	5	9	5	12	17	30	18	8	6	2	116	95	0,685
Sylvia communis	-	-	10	3	4	10	3	9	4	6	4	1	4	-	-	58	51	0,342
Sylvia curruca	-	-	-	4	2	9	10	5	7	1	-	-	-	-	-	38	36	0,224
Phylloscopus collybita	-	2	2	-	1	-	3	-	1	4	9	4	3	1	-	30	25	0,177
Muscicapa striata	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	1	0,006
Anthus trivialis	14	-	-	-	-	-	1	-	-	-	-	-	-	-	-	15	5	0,089
Motacilla flava	2	-	-	2	-	2	-	-	-	-	2	-	-	-	-	8	4	0,047
Motacilla cinerea	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	0,012
Motacilla alba	39	4	47	29	12	5	24	15	17	21	7	6	7	-	3	236	110	1,394
Lanius collurio	2	2	8	1	1	-	-	1	-	2	-	1	-	2	-	20	15	0,118
Lanius minor	-	-	-	-	-	-	-	1	1	1	-	-	-	-	1	4	4	0,024
Lanius excubitor	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	0,024
Sturnus vulgaris	2316	-	21	290	405	492	21	8	197	36	64	122	124	33	209	4338	93	25,617
Passer domesticus	4	3	2	66	40	54	22	27	13	16	6	12	36	-	-	301	37	1,777
Passer montanus	11	-	142	42	84	27	210	140	63	19	28	14	25	24	5	834	102	4,925

Table 1. (continued)

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	T	F	Q
Fringilla coelebs	3	-	3	-	-	-	1	-	8	3	2	1	-	3	-	24	19	0,142
Serinus serinus	1	1	-	-	-	-	-	-	-	-	1	-	-	-	-	3	3	0,018
Carduelis chloris	8	-	-	-	-	2	2	-	3	1	1	5	3	2	-	27	17	0,159
Carduelis carduelis	5	1	-	6	6	5	10	5	1	10	5	2	3	2	3	64	32	0,378
Carpodacus erythrinus	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	0,018
Acanthis cannabina	22	2	-	-	-	-	-	-	-	1	-	-	-	-	-	25	8	0,148
Coccothraustes coccothraustes	-	-	-	-	-	-	-	1	-	3	14	-	1	-	-	19	5	0,112
Emberiza calandra	-	-	-	-	-	1	1	-	1	-	-	-	2	-	-	5	5	0,030
Emberiza citrinella	1	-	2	-	-	1	-	-	-	1	4	3	-	-	-	12	12	0,071
Emberiza schoeniclus	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	0,012
Total individual number	2715	37	629	868	1424	1118	1452	1695	1205	786	657	570	1599	1401	778	16934		
Percentage individual number	16,0	0,2	3,7	5,1	8,4	6,6	8,6	10,0	7,1	4,6	3,9	3,4	9,4	8,3	4,6			
No. of species	46	19	37	37	49	45	51	58	52	53	53	48	50	46	28			
Relative Species Richness index (%)	37,4	15,5	30,0	30,0	39,8	36,6	41,5	47,2	42,3	43,1	43,1	39,0	40,7	37,4	22,8			

Anseriformes: Only the Anas plathyrhinchos is frequently found, occasionally with young.

Falconiformes: The most frequent species are Buteo buteo, Falco tinnunculus and Falco subbuteo. We encountered nests of the last two species, as well as of Milvus migrans and Accipiter gentilis. In the 14th section, the young of Falco vespertinus had already left their nests.

Charadriiformes: The most characteristic of the species is Tringa hypoleucos. Its coherent line distribution begins from the 3rd section. The population fluctuated in the course of years. The black-headed gull (Larus ridibundus) occured only seldom in a limited number on summer before 1975, but it could be lately observed more frequently and in larger number of individuals (Table 2.).

Table 2. Dynamics of some bird species in the Maros valley

Species	1970	1971	1978	1989	1991
Nycticorax nycticorax	17	19	4	49	57
Tringa hypoleucos	317	91	251	96	212
Larus ridibundus	-	12	18	27	549
Streptopelia decaocto	38	65	90	131	138
Streptopelia turtur	764	754	136	14	69
Alcedo atthis	7	30	26	196	132
Merops apiaster	113	181	54	116	352

Columbiformes: While the tutle dove (Streptopelia turtur) population is diminished wit 91 % in the last 22 years, that of collared turtle dove (Streptopelia decaocto) one increased 3,5 times in the same period (Table 2.).

Coraciiformes: The species of kingfisher (Alcedo atthis) and bee-eater (Merops apiaster) present line distributions; their population is fluctuated too (Table 2.). We have found 29 breeding colonies of this latter.

Piciformes: The occurrence of Dryocopus martius this year was a novelty for us, even if we have known that it had breeding grounds before in the flooded area of the 14th section. It also appeared in 1991, in the 11th and 13th sections.

Table 3. The dinamics of the species Riparia riparia on the river Maros

Year	Length of examined section	Nr. of colonies	Nr. of nests	Total number	(Q)
1970	490 km	26	1297	688	4,58
1971	650 km	77	4544	2136	15,39
1978	650 km	50	2698	1542	13,56
1989	650 km	83	11908	4924	26,50
1991	766 km	93	9236	3196	18,87

Passeriformes. The most frequent species of this order is Riparia riparia, and its changes in number are reflected by Table 3. We think it is important to mention the expansion of Locustella fluviatilis in the Mureş valley. In the last 20 years it has extended its area approximately 360 km upstream, starting from the 14th section. Carpodacus

erythrinus can be found regularly in the 1st section in the last couple of years.The fieldfare (Turdus pilaris), as species in expansion coming from north, reached the Giurgeu depression in 1973, when two mature and three young individuals have been observed (Monteanu 1976). We found it for the first time nesting in 5th July 1978 near Senetea, where in a nest were four eggs. Following the flow of Mureş the first data in the succeeding localities were as follows: Joseni 5. 7. 1978 - one nest with three young, two empty nests and some fly off young; Sărmaş - 1.7.1984. foddering parents in a nest; Gălăuţaş- 13.6.1984 one nest; Reghin- 18.5.1984 fodding parents in a nest, and 2.6.1984 in the same place the parents foddered already in six places; Glodeni- 26.6.1985- four pair of birds carried the foods into the trees on the roud: Cipău- 27.6.1985 one nest with five eggs, on another nest a bird was brooding, and we found further four nests in building; Dateş - 10.6.1989 a food carrying mature bird. Based on this observations it is possible to demonstrate that the fieldfare (Tudrus pilaris) has extended this area with about 250 km in Mureş valley. Begining with the mentioned data the species breeds regularly in this area. On the occasion of our investigations of 1989 this species occured already along a section of 450 km.

Table 4. contains the species similarity indices (the Jaccard number). We compared each river section with the others on the basis of following formula: Ja = A*100/B
where A = the number of species that occur in both sections
B = the number of the species that do or do not occur in both courses.

Table 4. Quotient of Similarity (in percents) between pairs of sections

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
1	14	21	17	32	28	29	24	23	26	25	28	23	28	27	
2	18	20	19	24	24	29	22	18	19	23	24	22	25		
3	35	28	34	42	36	45	39	38	41	41	41	42			
4	33	32	37	31	29	41	40	44	40	44	46				
5	45	44	46	47	44	52	52	53	52	52					
6	40	38	48	43	44	48	54	56	55						
7	39	45	58	46	46	51	66	60							
8	37	40	57	45	42	54	62								
9	38	51	72	54	54	59									
10	40	41	47	63	56										
11	40	43	47	63											
12	38	45	44												
13	50	51													
14	40														
15															

These results are like the values we have shown in prior years, alternating between 14-66%.

The graph reflects the quantity and quality dividing of species in each river section. Besides the species observed in 1991, at the four previous occasions, we met the following species:

1. Ardea purpurea
2. Aythya ferina
3. Aythya nyroca
4. Pernis apivorus
5. Aquila chrysaetos
6. Falco peregrinus
7. Pluvialis squatarola
8. Philomachus pugnax
9. Tringa erythropus
10. Larus minutus
11. Chlidonias niger
12. Chlidonias leucoterus
13. Columba oenas
14. Athene noctua
15. Jynx torquilla
16. Dendrocopos medius
17. Dendrocopos leucotos
18. Remiz pendulinus
19. Certhia familiaris
20. Cinclus cinclus
21. Oenanthe oenanthe
22. Phoenicurus phoenicurus
23. Turdus torquatus
24. Acrocephalus schoenobaenus
25. Sylvia nisoria
26. Phylloscopus sibilatrix
27. Anthuas pratensis
28. Sturnus roseus
29. Pyrrhula pyrrhula

If we take into account these species, too, based on the observations made on five occasions in the last 22 years, then we can say that the avifauna of the Mureş valley consists of 152 species.

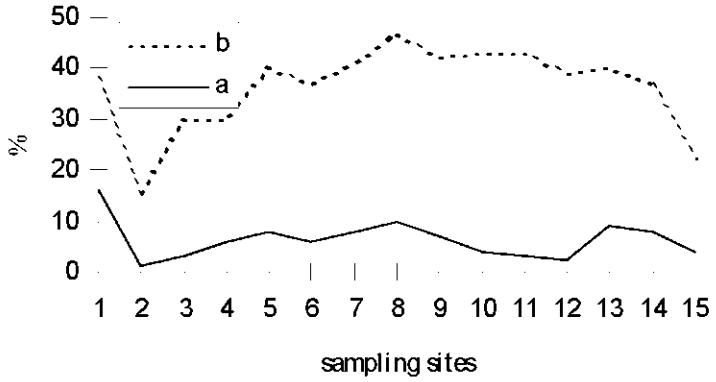

Fig. 1. The qualitative percentage division of the species (a), in each section, compared to a number of 123 species, and that of individuals (b) in each section, compared to the number of 16934.

Conclusions

The changes of the surroundings in the Mureş valley (changes in the river channel, deforestation, pollution) have influence upon the avifauna, too.

At the highest marsh course the deviation of the Mureş into a dug river bed threatens the marshes with drainage, and endangers the existence of several bird species (Gallinago gallinago). Here Carpodacus erythrinus populations nest, whose faunal importance can not be under estimated.

By the abolishment of branches, arms of the river, meanders, the places for nests will be suppressed, and these parts will be used only for rest. For example, Ardea purpurea once nested in the reed of the branch in Iernut, but now the new artificial ponds give no possibilities for birds to nest here.

The cutting of trees and bushes along the river influences also the breeding population. So, in the last years Remiz pendulinus was missing, a species that lived here before. Probably, the lack of places where they can build their nests, caused its absence. We have met this species in the last time in regions further away from the Mureş valley (Niraj valley, upstream from Reghin).

If the influence caused by water pollution cannot be seen immediatly, the avifauna is menaced by the disappearance of the inferior order of animals.

Proposals

Since not any bird reservation exist along the entire length of the river, and based on our investigations made during a period of 20 years, we propose to be declared as protected area the following:

1. The section Voşlobeni and nearly peat bog.

2. All isles of the river, as well as the protection of lines of trees and shrubs bordering there.

3. The peat bog and the flood plain forest of Bezdin - Prundu Mare, where, among others, occure not less than 171 species pf birds. From these eleven are in danger, six are rare, ten are disappeared as a result of changed living conditions and chase.

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