

# **An importance of protected areas for European Bison Reintroduction in Russia**

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**Abstract:** The European bison is the symbol for the whole nature conservation movement focused on threatened and endangered species. Sawn through the captive breeding the European bison is still maintained in captivity but also successfully reintroduced to the wild. This article analyses the reasons for European bison extinction, highlights the restitution phases and the present population. Successful European bison restitution into multiple Protected Areas of Russia is demonstrated; reasons for the decrease of European bison population size throughout Russia in the 1990's are discussed. Highlighted is an importance of European bison breeding centres – the Prioksko-Terrasnyi biosphere reserve and the Oksky reserve in conservation of its genetic diversity and establishment of new populations. Indicated is the direction to resolve the challenges of European bison restitution in Russia.

**Key words:** European bison, breeding, protected area.

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## **Introduction**

European bison, the largest animal of Europe, has found it particularly difficult to find a space for itself due to the wildlife management within the continent in last centuries. It symbolizes the whole nature conservation movement focused on threatened and endangered species.

Its limited availability and impressive appearance made it a so called “royal animal” and its fate was often decided by many royal families throughout the European history. The role of Russian emperors in protection of the European bison is particularly important. The Alexander II the Liberator was the first in Russia to see the European bison protected. With the empire borders fortified, the last sanctuaries of European bison were granted the protective status, started to be publicly funded, and were staffed with specialists to guard, feed and breed the European bison. The first studies on the species were undertaken in those times. Shooting of European bison was prohibited in the USSR in 1923.

Poland was the first to introduce the active protection of European bison into practice. In 1929–30, two individuals followed by other five, acquired from Germany and Sweden, were resettled into the Białowieża Forest where a European bison breeding centre was established for this purpose.

By 1939, the effort to breed the species brought the European bison population to 96 animals in Europe. However, the breeding was abandoned

for the next 6 years, the animals were fortunate to survive the war and the restitution effort was resumed in 1946. At that time, 5 European bison were transported into the part of Białowieża Forest that was included into the USSR and those animals became the founders of the Belorussian herd.

The area populated now by European bison in Russia was arranged according to the rules applied to reintroduction of herbivores bred in captivity (in specialized breeding centres) into their natural habitats. The first phase of the strategy for the protection and restitution of the European bison was based upon the establishment of isolated populations, while a habitat improvement for the species was supposed to be done later when separate herds would make a contact a natural way. There are two regions in Russia populated now with European bison herds: Northern Caucasus and territories in the Central European part of Russia. In Northern Caucasus, there are two populations established: the first inhabits the territory of the North-Ossetian National Nature Reserve, Tsei special nature reserve and North-Ossetian hunting sector; the second inhabits the Arkhyz territory of the Teberdinsky Biosphere Nature Reserve. European bison that populated the Ingushetia territory (Sunzhenskoe hunting sector), the Chechnia territory (Assinsky Biosphere Nature Reserve), Nalchik Biosphere Nature Reserve, and Ismailinsky Biosphere Nature Reserve happened to be within the area affected by a war and became extinct. Also, the group of European bison that populated the Fominsky Biosphere Nature Reserve (located in the Rostov region) became extinct. The European part of Russia is populated by isolated herds of the species: in the Tver region (Sknjatinskoe hunting sector), the Vladimir region (Klyazma-Lukh reserve and Muromsky reserve), the Vologda region (Ust-Kubenskoe hunting sector). A large population of European bison (population size of about 250) inhabits the territories of the Orlov region, the Bryansk region, and the Kaluga region.

### **European Bison Breeding Centre**

The European Bison Breeding Centre (EBBC) was founded in Prioksko-Terrasnyi Biosphere Reserve following the pressing need to preserve one of the most precious species of wild fauna on the European territory of Russia. It should be mentioned that the initial phase (organizational) was concerned with preservation of this animal as a species. It was supposed to resolve the primary tasks such as establishment of a breeding centre, ensuring safety for the animals, and preventing human interference with their natural way of life. Captive breeding of European bison mitigated the loss in genetic diversity and brought the numbers of animals to a sufficient level to establish new free-ranging herds.

In 1948–1951, 7 (3, 4) pure-blood European bison were transported from Poland to the breeding centre. In May 1950, our first calves were born:

a bull-calf named Moskvityanin and a female named Muravka. Later, the herd was enlarged with our own calves, whereas transportation of European bison from abroad became scarce. A 12-year-old bull was delivered from the Khopyorsky Biosphere Reserve in 1965, another bull was brought from the Białowieża Forest in 1967, and a bull with a cow were delivered from Rotterdam in 1968. Later, 1 bull was obtained in 1974 (from Poland), 1 bull from the Moscow Zoo in 1978, and 2 cows from the Ruhr Zoo (Federal Republic of Germany) and the Moscow Zoo in 1980. Finally 1 bull was delivered from the Avesta breeding centre in Sweden in 1981. During the following 19 years, the European bison population in our breeding centre never saw new blood, which resulted in a decrease of birth rate, decreasing survival abilities of our calves, increased frequency of illnesses, decreased resistance, deaths and genetic degradation of the animals. It was only in the late 2000s that we managed to deliver 7 new European bison to our European Bison Breeding Centre from Western Europe and add new blood to our stock.

The breeding centre now keeps 60 European bison. They live in enclosures of 50 hectares with feeding facilities, where we feed the animals twice a day. Apart from the natural food available for them at the pasture, we feed our European bison with special mixed feed and wood feed (aspen and willow trunks and branches) throughout a year and additionally with hay and root vegetables (carrot, beetroot) during winter months. Within each pen salt bricks with minerals are available.

Since 1951, the European bison has been transported out of the centre under the framework of the distribution initiative and since 1961, animals have been transferred to establish free-ranging populations. Throughout its history, in our breeding centre 602 calves were born, out of which 518 grew to yearlings. About 67% (349) of them were transported throughout Russia and abroad. They supplemented over 30 free-ranging bison herds and over 33 bison breeding centres.

The European Bison Breeding Centre is the central site for European bison restitution research. There are conducted studies in the fields of European bison morphology, classification, genetics, evolution, ecology, ethology, and challenges of the restitution. Here we have been developing the methods to keep, feed, transport European bison, and study its practical use.

For the time being, the European bison breeding centre of Prioksko-Terrasnyi Biosphere Reserve is striving to preserve the European bison backup gene pool in the Russian Federation, distributing the animals to form new free-ranging populations, and providing a temporary place and care for animals born in zoos of Western Europe to ensure their acclimatization in Russian forests.

The effort of the European Bison Breeding Centre made the European bison the only species in Russia preserved through captive breeding and still being successfully reintroduced.

## **European bison breeding centre at the Oksky Biosphere Reserve**

European bison breeding centre of the Oksky Biosphere Reserve was founded in 1959. We were establishing our breeding stock from 1959 until 1962 starting with 11 animals transported from the European Bison Breeding Centre of Prioksko-Terrasnyi Biosphere Reserve. Later on, there were multiple bulls delivered to improve the gene pool from other breeding centres. Namely, the herd was supplemented with 41 European bison from zoos in Germany, Finland, the Netherlands, Switzerland, and Belgium during 1999–2002. Among them, only 6 animals were chosen for breeding. There were 33 European bison delivered for breeding into the Oksky breeding centre, with only 23 accepted for breeding (from EBBC of Prioksko-Terrasnyi Biosphere Reserve (16 animals), Germany (2), Switzerland (2), Finland (2), Bialowieza Forest, Belarus (1)).

From 1960 until 2011, there were 392 (210; 182) European bison calves born in our breeding centre.

Since 1967, the breeding centre has been promoting the reintroduction of European bison. In total, 236 European bison born and grown in the breeding centre were exported (209 released to the wild) and 35 European bison that were temporarily kept in the breeding centre were also used for reintroduction (Tabl. 1).

## **Altai**

The Cherga breeding centre is located in the north-western part of the Altai Mountains. It was founded in 1982. The founders of the population were the 12 lowland E. bison (3;9) from Prioksko-Terrasnyi Biosphere Reserve. A purpose for the establishment of the herd was the restitution of the extinct species into its original habitat. The last subspecies of European bison was assumed to live in mountain valleys until the 18<sup>th</sup> century. Now, in the breeding centre live about 40 European bison. These animals are fully adapted to mountains and the terrain. However, there was no calving recorded in this breeding centre for 30 years. Also there were no animals imported or exported there, which resulted in inbreeding depression. Among observed symptoms were a decrease in the number of calves and an increase in calf death rate. Therefore, necessary is the import of the breeding stock from other breeding centres in order to improve the gene pool.

## **Vladimir region**

There are two areas involved in European bison restitution within the Vladimir region: the Muromsky special nature reserve (in the Muromsky domain) and the Klyazma-Lukh special nature reserve (in the Vazniki

**Table 1.** Numbers of European bison originating from EBBC and Oksky Biosphere Reserve supplementing various herds in former USSR

No	Place of release	Oksky biosphere reserve	EBBC
<b>Ukraine</b>			
1.	Nadvornyansky forest plant (Ivano-Frankivsk region)	16	2
2.	Bakhchisaraisk state forest hunting grounds (Crimea)	5	7
3.	<b>Bukovinskoe hunting sector (Chernovtsy region)</b>	<b>9</b>	<b>4</b>
4.	Danevskoe		2
5.	Zubrovitsy		4
<b>Belarus</b>			
6.	<b>Pripyatsky National park</b>		<b>3</b>
7.	<b>Berezinsky biosphere reserve</b>		<b>13</b>
8.	<b>Bialowieza Forest</b>		<b>22</b>
<b>Baltic countries</b>			
9.	<b>Naujemiesčio (Panevėtys)</b>		<b>10</b>
<b>Kyrgyzstan</b>			
10.	<b>Sary-Cheleksky biosphere reserve</b>		<b>13</b>
<b>Russia Caucasus and South Caucasus</b>			
11.	Nalchik state forest hunting grounds (Kabardino-Balkaria)	13	3
12.	Chechen-Ingush state special nature reserve (Assinsky)	42	4
13.	Sunzhenskoe hunting sector (Checheno-Ingushetia)	10	
14.	<b>Teberdinsky biosphere nature reserve</b>	<b>17</b>	<b>11</b>
15.	<b>Caucasian biosphere reserve</b>	<b>5</b>	<b>9</b>
16.	Ismaillinsky biosphere nature reserve (Azerbaijan)	8	4
17.	<b>Tsei special nature reserve</b>		<b>22</b>
<b>Central Russia</b>			
18.	<b>Sknjatinskoe hunting sector (Tver region)</b>	<b>20</b>	<b>13</b>
19.	<b>Orlovskoe Polesie national park (Orlov region)</b>	<b>19</b>	<b>26</b>
20.	<b>Bryanck forest biosphere reserve (Bryansk region)</b>	4+5	5
21.	<b>Karachaevsky special nature reserve (Bryansk region)</b>	5	4
22.	<b>Petrovskoe hunting sector (Kaluga region)</b>	<b>6</b>	<b>3</b>
23.	<b>Kaluga Zaseki biosphere reserve</b>		<b>10</b>
24.	Velikoozerskoe hunting grounds (Vladimir region)		11
25.	Vyazniki forestry (Vladimir region)		9
26.	<b>Muromsky special nature reserve (Vladimir region)</b>	<b>6</b>	<b>5</b>
27.	<b>Klyazma-Lukh special nature reserve (Vladimir region)</b>	<b>4</b>	<b>2</b>
28.	<b>Ust-Kubenskoe hunting sector (Vologda region)</b>	<b>15</b>	<b>5</b>
29.	<b>Cherga, Altai</b>		<b>12</b>
	Total:	209	238

Existing populations are marked with the bold font. Mrs. Ekaterina Tsibizova gracefully presented the information on the breeding centre activities of the Oksky biosphere reserve.

domain). Attempts to increase the European bison population size started there in 2004.

The first European bison herd was transported into the Vladimir region in 1989 from the Prioksko-Terrasnyi Biosphere Reserve. Eleven animals were released onto the territory of the Velikoozerskoe hunting sector in the Vyazniky domain, where a State special nature reserve was founded in 1994. The Klyazma-Lukh special nature reserve received regional funding. It stretches over 43,450 hectares. 9 animals were released in the Vyazniky hunting sector. Presently there are 21 European bison living at this territory.

Also, in 2003, 21 European bison were imported into the Muromsky state special nature reserve. The reserve was founded in 1968 and is federally funded. This special nature reserve of 56,200 hectares is located in the Oka river valley on the territory of the Muromsky domain and the Gorokhovets domain in the Vladimir region. The Muromsky special nature reserve now comprises 25 European bison.

In the Vladimir region, the anthropogenic pressure is significant, the transportation network is dense, and the security measures are poor, which prevents the establishment of a single large herd of European bison there.

## **Vologda region**

The European bison population in the Vologda region was established in 1991 with the import of 3 (1;2) European bison into the Kirillov domain and with 2 more cows imported in 1994. By 2008, at the territory of Ust-Kubenskoe hunting sector, where the European bison had settled lived 23 individuals despite the fact that there was no more imports of animals. Twins were born twice, and all calves survived. The facts confirm that the territory provides good habitat conditions. During 2009–2010, 15 more European bison were imported into the Ust-Kubenskoe hunting sector, with the current population size amounting to 50. The reproduction success of the herd could have been higher if the initial number of breeding stock was larger.

The Ust-Kubenskoe hunting sector stretches over 260 km<sup>2</sup> of land. On the west, there is the Russian North national park stretching over 1,664 km<sup>2</sup>. On the south, there is the Kubenskoe lake. On the north and east, the sector borders the grounds of the State forest resource stretching over 8,000 km<sup>2</sup>, of which 64% is forest. There is a lot of clearings, vast expanses of former farmland that are now deserted and overgrown, which attracts European bison. The food supply is fine, there are no roads with heavy traffic, safety measures are sound, which ensures well being and security for our animals. In accordance with the "Strategy for conservation of the European bison in the Russian Federation" (2002), the territory is expected to host over 1,000 European bison. However, to prevent an increase of inbreeding, additional animals must be imported into the Vologda region.

## The regions of Orlov, Bryansk, Kaluga

The forest-meadow lands within the Orlov, Bryansk, and Kaluga regions offer a complex of safeguarded nature grounds. The "Orlovskoe Polesie" national park is located in the centre of the complex, with 360 km<sup>2</sup> of forest. Its boundary of about 50 km runs along the border with the Kaluga region adjoining the Bryansk forest area stretching over 1,000 km<sup>2</sup>. In the south of the forested area, the "Bryanck forest" biosphere reserve is located, covering 122 km<sup>2</sup>. In the north-east, the park borders the "Kaluga Zaseki" biosphere reserve of 185 km<sup>2</sup>, which is located within a large Kaluga forest area, and the "Ugra" national park of 986 km<sup>2</sup>.

First European bison were settled in the region back in 1996 on the grounds of the "Orlovskoe Polesie" National Park. In 1997, the inter-regional Programme for the conservation of the European bison in Russia was elaborated and ratified by the governors of the three regions (the Orlov, Kaluga, and Bryansk regions), with the help of the RF Environment Protection Committee. The initial phase of the Programme included the establishment of reproductive herds of European bison consisting of animals imported from Russian breeding centres and zoos from western Europe. In total there were 85 individuals imported there from Russian breeding centres, Belarussian part of the Białowieża Forest, Holland, Germany, and Switzerland.

There are 217 European bison currently living in the Orlovskoe Polesie National Park. A herd of 13 individuals was established in Kaluga Zaseki Biosphere Reserve in 2001. In 2008, the southern part of this biosphere reserve was enlarged with another 10 European bison from the breeding centre of the Prioksko-Terrasnyi Biosphere Reserve.

In 2006, 9 European bison were released into the grounds of the Karachaevsky special nature reserve in the Bryansk region, which borders the Orlovskoe Polesie National Park in the south. In 2007, 9 individuals were imported into the Petrovskoe hunting sector of the Kaluga region, located 70 km to the north from the Kaluga Zaseki Biosphere Reserve. In 2011, 10 European bison were settled within the Bryansk Forest Biosphere Reserve.

The population being established in the region presents the best potential from the genetic point of view as compared to the other European bison herds worldwide. This territory provides the best opportunities to establish a single herd of over 1,500 individuals (see the Strategy for conservation of the European bison in the Russian Federation, 2002). The region now hosts about 270 European bison, but additional introductions are still necessary there to achieve the planned population size.

## Caucasus

In 1968 and 1978, 28 European bison were released into the Arkhyz territory of the Teberdinsky Biosphere Nature Reserve. The animals adapted to

the conditions of mountain life well. The population of European bison had been increasing until the late 1980s, with the maximal population size reaching 56 animals. The aspect hindering the distribution of the species is scarcity of ranges suitable for European bison and being under strong anthropogenic pressure. The population size of 30–40 is the acceptable maximum for the Arkhyz territory, which is the only one suitable for the European bison. All areas bordering the biosphere reserve are meadows and farms with vast numbers of grazing livestock. There are about 15 European bison living there now.

In North Ossetia, 47 European bison were released during 1964–1968 into the Tsei state special nature reserve. In 1991, the European bison stock reached 270 individuals, but by 2002, remained there only 30 European bison as a result of deteriorating living conditions, migrations of the animals, and poaching. In 2010, 10 European bison were transported there from the Prioksko-Terrasnyi Biosphere Reserve. The animals adapted well and have joined both local herds. For the population increase and an improvement of genetic diversity additional animals should be introduced.

### **Population size of European bison in Russia**

Table 2 shows the population size of pure bred European bison in the USSR and Russia (according to European Bison Pedigree Book).

Up to the late 1980s, a majority of European bison were exported into the former CIS countries and to Caucasus as it was recommended by the USSR E. bison breeders. Thus, in 1990s, the animals politically became foreigners and finally almost all have extinguished; in the Caucasian region they happened to be in the war-affected area and disappeared, whereas in the Central Russia there were only few individuals left.

Today, the initial phase of European bison conservation is successfully completed and the threat of extinction is removed for the near future. However, the species still belongs to the endangered (VU) category due to the A (reduction of population size and severe fragmentation) and C (small total population size) risk factors (IUCN 2012). According to the RF Red Book (1998) in Russia the European bison belongs to category 1: Endangered.

### **Conclusions**

A chain of successful results did not however remove all obstacles from the path of bison breeders. As the bison breeding progressed, other challenges appeared in the form of the availability of natural food for European bison in the forests that are far from being natural due to being heavily populated with other ungulate species that are hunted and thus maintained in high densities. Other factors include the low population size (about 20 individuals on average), isolation of wild herds with low potential for migration and a tendency



1950	1960	1970	1980	1985	1990	1995	2000	2005	2010
<b>CIS + Russia</b>					<b>Russia</b>				
22 (14+8)	124 (64+60)	364 (195+169)	809 (493+316)	1141 (732+409)	525	417	308	376	612
<b>Including free ranging populations</b>									
		258	439+202	677+243	383	286	206	231	456
<b>Population size of European bison in the world</b>									
143	469	1200 (551;649)	2326 (1007;1319)	2862	3332	3099	2864	3439	4431
<b>Including free ranging populations</b>									
		500 (230;270)	1079 (494;585)	1408	1855	1870	1710	2134	2956

for a sedentary life which causes an overexploitation of the food supply within home ranges of herds. Another significant factor is inadequate protection and financing by the state as well as economical and practical problems to obtain European bison from abroad in order to improve the genetic diversity of the breeding stock in the breeding centres.

There is no public strategy elaborated to recover the European bison population size, which should have specified the locations for their release, the number of animals, the year of import, which resulted in the large number of young individuals ready for transportation, that are kept in breeding centres.

The European bison is still the only species in the world that was successfully restituted after being extinct in the wild and surviving only in captivity. The success was due to the long-term agreed efforts of bison breeders all over the Europe. However, this does not mean a complete restitution of European bison. An efficient population size is based on the number of reproductive animals and the sex ratio. For ungulates it requires to be 25–35% of the total population size. Thus, for European bison conservation to be a success in Russia, we need a single population of the species in the wild of 1,500–2,000, which would equal the population size that is the minimum for the species to survive.

Free-ranging breeding of European bison, which is the main method, must be accompanied by maintaining of a "safety" stock in breeding centres. Captive breeding of European bison mitigates the loss of genetic diversity and allows us to obtain animals suitable for establishment of new free-ranging populations. The maintenance of a breeding reserve in captivity together with establishment and enlargement of free-ranging herds allowed us to increase the total population size of the species in 2010 up to 4,433 animals (according to European Bison pedigree book) during a relatively short period of time.

European bison is now considered a species that escaped the threat of extinction. However, the problem of ensuring survival of the species is still on the agenda. The current situation requires more than the traditional ways of work of European bison breeding centres. The problem of European bison conservation can only be resolved through combined effort of scientists throughout Europe along a common comprehensive strategy. Appropriate measures must be taken to enlarge the gene pool of European bison in Russia by importing breeding stock from zoos in Germany, Holland or Sweden. Captive breeding oriented towards the enrichment of gene pool is necessary for successful establishment of large free-ranging herds of European bison throughout Russia.

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### **Tereny chronione dla reintrodukcji żubra w Rosji**

**Streszczenie:** Żubr jest symbolem ochrony przyrody i działań skierowanych na gatunki zagrożone. Uratowany dzięki hodowli w niewoli, żubr jest nadal utrzymywany w ośrodkach zamkniętych, ale również z sukcesem wypuszczony na wolność. W prezentacji analizowane są przyczyny wymierania populacji żubra, ważne punkty procesu restytucji oraz aktualna sytuacja gatunku. Przedstawiony jest sukces restytucji żubra w wielu Obszarach Chronionych Rosji, przyczyny spadku wielkości populacji tego gatunku w latach 90. Podkreślona jest też rola ośrodków hodowli żubrów w rezerwach Prioksko-Terrasnyi i Oksky w kontekście ochrony różnorodności genetycznej i tworzenia nowych populacji. Wskazane są sposoby rozwiązania problemów restytucji żubra w Rosji.

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