

The European bison in Belarus – problems and prospects

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Abstract: The present state of populations and breeding centers of the European bison (*Bison bonasus*) in Belarus is reviewed. Presented are the population dynamics, state of their development and formation of the whole Belarusian metapopulation. Due to various factors and different protective measures, particular E. bison populations are at different stages of development: some remain at the beginning phase of their formation and some have already reached numbers, exceeding ecological capacity of the environment. The plan for the management of European bison metapopulation is developed, including an estimated of the optimal numbers of European bison in Belarus. Solutions for the problems related to excess E. bison numbers in some populations are presented.

Key words: *Bison bonasus*, population dynamic, Belarusian conservation program

Introduction

There were three free-living European bison populations in Belarus in 1994. They lived in two national parks (NP) – “Belovezhskaya Pushcha” and “Pripiatskijj”, and in Berezinskijj Biosphere Reserve (BBR). The 1st stage of “The program for conservation, distribution and management of European bison in Belarus” (hereinafter Program “Zubr”), was conducted between 1994–2000 (Kozlo 1999). Six new herds were then created. In total 105 animals, caught in separate herds of NP “Belovezhskaya Pushcha”, were the founders of new herds. Their acclimatization was very effective: E. bison numbers increased from 347 in 1994 to 1 354 individuals (1283 in analyzed populations) in the December 31st of 2014. One new population is being created now and another one is planned to be established in few years.

The national program for European bison conservation in 2010–2014 (Program “Zubr”)

The zoological part of the national program for conservation of European bison in 2010–2014 included two stages of research:

- data collection and the development of plan of actions for European bison conservation for 8 E. bison populations – between 2011–2013;
- development of the plan for European bison metapopulation management in Belarus on the base of results obtained in the first stage of research – in 2014.

Table 1. Basic parameters of European bison populations in Belarus

Population	No. of years since establishment	No. of released animals	Number on 31.12.2014	Optimal population size
optimally developed populations				
Belovezhskaya	49	44	462	350
Osipovichskaya	18	15	308	130
Ozerskaya	17	18	196	160
well developed populations				
Volozhynskaya	21	15	88	80
Polesskaya	19	18	113	110
Ozeranskaya	28	10	55	60
unsatisfactorily developed populations				
Berezinsko-Borisovskaya	41	7	28	60
Naydianskaya	15	13	20	80
Lyaskovichskaya	10	16	13	20
Total		156	1 283	1 050

During the first stage of the national program in 2011–2013 it was found that Belarusian populations can be divided into 4 categories (Table 1):

Declining population:

Berezinsko-borisovskaya population counting 28 individuals and consisting of 26 adult old animals (2 males and 24 females) and 1 calf. For its maintenance it would be necessary to introduce at least 10 new animals.

Unsatisfactorily developed populations:

Lyaskovichskaya population was formed in 1999, and still its number equals to only 13 individuals – the same, like the group that was initially transferred from NP “Belovezhskaya Pushcha”. The main obstacle for proper development of this population were enclosures of the game safari park constructed within the home range of this herd. In fact this population is now a semi-free living herd.

Naydianskaya population was formed in 2005. During 10 years of its number grew up from 14 to 20 individuals. In 2005 home ranges of *Naydianskaya* and *Lyaskovichskaya* populations became connected and 2 males from *Lyaskovichskaya* population moved to *Naydianskaya*.

Well developed populations:

Ozeranskaya population was created in 1987. Now its numbers (55 individuals) has almost reached optimal level, estimated for 60 individuals according to environmental capacity. Its home range is surrounded by marshes of NP “Pripiatskij”.

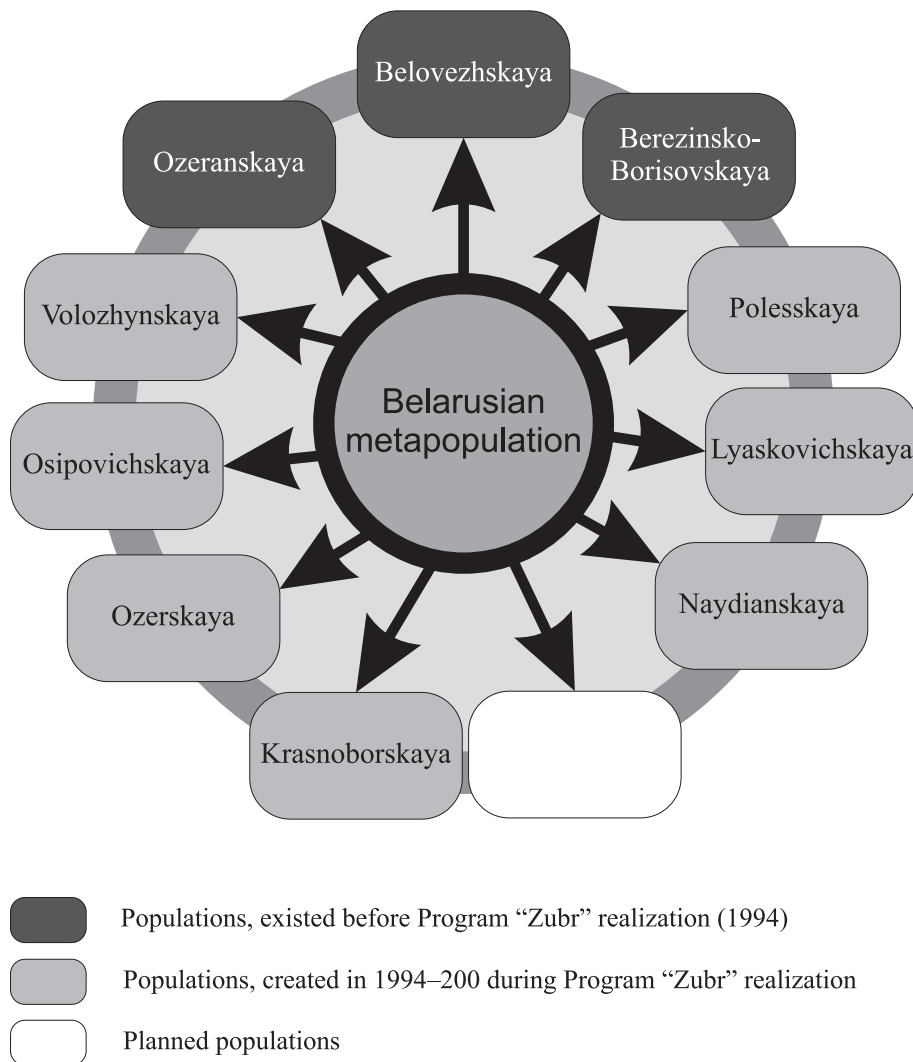


Fig. 1. The structure of Belarusian metapopulation model.

Volozhynskaya population was the first population created under the framework of Program "Bison" in 1994, in large forest called "Nalibokskaya Pushcha". Its growth rate was stable until establishment on this territory the landscape reserve "Nalibokski" in 2005. Since then, hunting activity has stopped as well as supplemental feeding of game species and European bison. The population extended then its distribution over whole 100 thousand ha of the forest. Some of them have never come back. Few animals went even to Lithuania. This population on 31.12.2014 counted 88 individuals. Its optimal numbers were estimated for 80 individuals.

Polesskaya population was created in 1996 on the territory of “The Polesskij radiation and ecological reserve”. Due to radioactive pollution after Chernobyl disaster in 1986, the area is free from inhabited human settlements. The numbers of other large herbivore species (red deer, roe deer and elk) had grown in spite of radiation. During first 5–7 years, the population growth rate was quite slow, but later animals adapted to those environmental conditions and their present numbers (on 31.12.2014) are estimated for 113.

Optimally developed populations are populations that have exceeded optimal environmental capacity.

Ozerskaya population was created in 1998 and its numbers grew up 10 fold during this period. Now it counts 196 individuals, excluding 35 animals captured to create free-living population on the northern of Belarus called “Krasnoborskaya”. The optimal numbers were estimated for this population at the level of 160 individuals.

Osipovichskaya population was created in 1997. During only 18 years its numbers increased from 15 to as much as 308 individuals. The size of the population and its density are so high that other large herbivores (especially red deer) were forced outside of its home range. The optimal population numbers of this population were estimated for 130 individuals.

Belovezhskaya population is the oldest in Belarus. It counts now 462 individuals. Its optimal size was estimated for 350 individuals.

Binary subpopulation status – the way to success

According to its present legal status, the European bison a species is under protection. In exceptional cases, with special permission of the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus, culling and elimination of injured, hopelessly sick and very old, useless in reproduction animals is allowed. Strict protective status, on one side, and substantial financial costs for creating a new and ecological researches – on the other side, were very serious barriers for implementation of the Program “Zubr”. To solve contradictory legal problems, that prohibit from distribution, breeding, forming highly productive sex-age structure of *E. bison* populations that obstructed the program, there was necessary to change the status of the species in current legislation. We proposed to give different status to particular *E. bison* subpopulations, depending on the character of the area of their home ranges:

1. **“Maintain or insurance gene pool”** – for *E. bison*, living in reserves and national parks. Protection and management of subpopulations belonging to this category should be carried out according to the rules provided for animal species included in the Red Book of the Republic of Belarus.
2. **“Reserve gene pool”** – for subpopulations, living within areas of general economical use, i.e. commercial forests, hunting grounds etc. After reaching prescribed

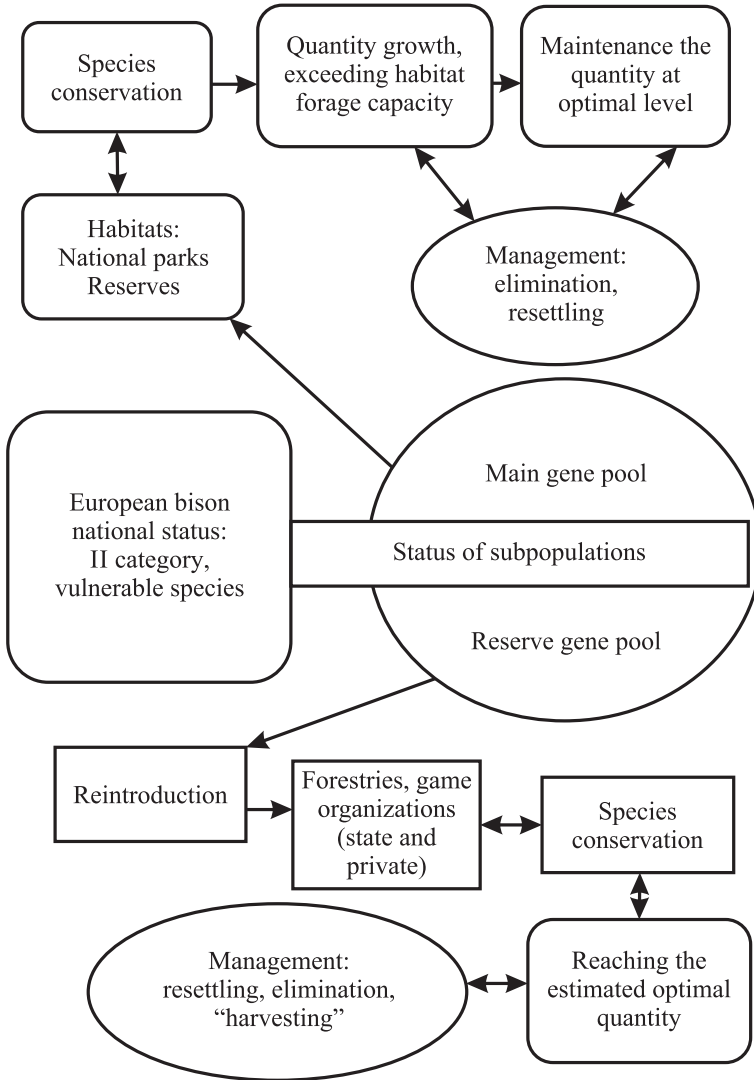


Fig. 2. The scheme of recommended functioning for both categories of E. bison subpopulations.

limit for population numbers, animals belonging to subpopulations of reserve gene pool may be hunted according to special rules. The scheme of recommended functioning for both categories of E. bison subpopulations is shown at Fig. 2. Such dual status for E. bison populations is a new concept for this species conservation, that allows to reintroduce it into areas being economically managed, and optimize there its sex-age and social structure towards obtaining high productivity of such subpopulations. This management approach should

Table 2. Population dynamics of E. bison in Belarus.

Year	Population									Total
	Belovezhskaya	Borisovskaya	Ozeranskaya	Volozhinskaya	Poleskaya	Osipovichskaya	Ozerskaya	Lyaskovichskaya	Naydianskaya	
	Existing before 1994; insurance gene pool			Created between 1994–2000 under the frame- work of Program “Zubr”; reserve gene pool						
1991	315	26	12							353
1992	295	33	16							344
1993	308	32	20							360
1994	290	34	23	15						347
1995	280	34	28	17						359
1996	251	34	29	24	17					355
1997	232	33	25	28	20	15				353
1998	238	34	27	36	23	18	18			394
1999	248	33	31	37	24	25	25	13		432
2000	265	33	30	39	26	28	35	12		468
2001	275	34	37	43	30	37	39	11		506
2002	277	36	42	46	33	40	46	14		534
2003	277	36	45	49	35	50	52	16		560
2004	292	38	54	53	42	59	60	16		610
2005	312	39	59	57	47	63	69	20	14	680
2006	334	38	57	60	56	72	79	16	18	730
2007	347	36	61	62	61	92	93	21	17	790
2008	364	35	65	67	68	114	110	18	23	864
2009	392	35	66	76	72	135	110	12	16	914
2010	400	35	60	79	72	150	120	11	16	943
2011	429	35	56	79	85	186	164	9	18	1061
2012	456	27	56	80	93	204	185	12	20	1133
2013	460	24	55	86	93	254	209	13	19	1213
2014	462	28	55	88	113	308	196	13	20	1283

consider maintaining of population equilibrium, habitat carrying capacity, and active selection of individuals through elimination of defective animals.

The effectiveness of Program “Zubr”

Data on effectiveness of Belarusian Program “Zubr” are given in Table 2. Analysis of factors determining population growth has been presented in few articles: (Kozlo 2005; Kozlo and Bunevich 2009).

Up to the end of 2014 in Belarus, there were 1354 wisents in total: 826 (61.0%) in main or insurance gene pool category, and 528 (39.0%) in reserve gene pool. Animals living in enclosures (93), were included into the category of reserve gene pool. Results of the program initiated in 1994: the metapopulation model and different status for two categories of subpopulations, proved to be effective. At present, in Poland and Belarus live over 50% of world population of this species (Kraśińska and Kraśiński 2004; Kozło and Bunevich 2009).

Belarus contributed significantly to conservation and increase of the European bison numbers. Scientific concepts and new approach towards proposed by Belarus received high international appreciation. In 1997, the project of “Zubr” program was honored with award and prize of the foundation “Henry Ford European Conservation Awards” together with UNESCO World Heritage Centre and European Council for the cultural heritage and environmental conservation.

What to do with E. bison, saved from disappearance?

The progress in creating new subpopulations and wisents' population growth were the result of implementation of metapopulation model and dual status for E. bison subpopulations under the framework of the Program “Zubr”. Herds' owners were interested to reach determined maximal level for each subpopulation numbers in possibly shortest periods of time. For this purpose they introduced effective protective measures and supplied animals with additional food during cold seasons. Some subpopulations of reserve gene pool – Osipovichskaya (308 individuals), Ozerskaya (187), Volozhynskaya (88) have reached or even exceeded prescribed optimal size. The present problem is to apply qualitative criteria regarding the condition of animals and optimal sex-age structure allowing for high population productivity through active management involving selection of individuals instead of maintaining quantitative parameters of population growth. That includes also the maintenance of optimal living conditions however considered should be inevitable significant financial costs.

A critical turning point in dealing with this issue was the enactment of The Council of Ministers of the Republic of Belarus from 21.04.1999 “About additional arrangement for European bison protection and use”, which was cancelled by the new enactment from 27.10.2007 – N1408 “Rules of protection and efficient management of European bison”. In this last enactment the idea of dual status for E. bison subpopulations was malformed and its main point was distorted. As a result of the last changes the originally created system and its mechanisms ceased to work.

Therefore now it become necessary to develop and accept basic documents of international value, concerning elimination or transportation of excess wisents among various populations. In 2014, the plan of European bison metapopulation

management has been developed, however there are some important issues to be solved:

- the scheme for exchange of animals between particular populations;
- a need for creating 2–3 new populations to reach a total level of 1 500 individuals i.e. estimated optimal population numbers of European bison in Belarus.

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Żubr w Białorusi – problemy i perspektywy

Streszczenie: Omówiono aktualny stan wolnych populacji i ośrodków hodowli żubra (*Bison bonasus*) w Białorusi. Przedstawiono dynamikę populacji, stopień ich rozwoju oraz sposób tworzenia wolnych populacji. Z powodu różnych przyczyn i czynników tempo rozwoju poszczególnych stad jest odmienne; niektóre są na początkowym etapie formowania i niektóre osiągnęły już liczebność przekraczającą pojemność środowiska. Plan dalszego rozwoju metapopulacji żubra w kraju jest rozwijany, z określeniem optymalnej liczebności tego gatunku w Białorusi. Przedstawione są proponowane rozwiązania związane z kontrolą liczebności w niektórych populacjach.
