European Bison Conservation Newsletter Vol 4 (2011) pp: 37–44

European bison *(Bison bonasus)* in Belarus: the state and problems of management

Piotr Kozlo

The State Research-Production Association "The Scientifically-Practical Centre of The National Academy of Sciences of Belarus for Bioresources", Minsk

Abstract: The paper summarises results of realization of the 1st stage of "The program for conservation, distribution and use of European bison in Belarus". The program was theoretically based upon the model of bison metapopulation in Belarus and management strategy considering dual status of its subpopulations. As the main insurance for the gene pool regarded are animals living in nature reserves and national parks while those living in forestries and hunting enterprises are treated as a reserve. Populations that are designated to secure the gene pool are protected according to rules for species listed in Red Book, other populations after reaching maximal foreseen numbers may be hunted. Six new free-living subpopulations of European bison were created between 1994–2005. Numbers of this species (excluding natural mortality and elimination) increased from 347 in 1994 to 1014 individuals in 2010. The question has been raised: what to do with that species saved from extinction? Discussed is the necessity of changes in legislature allowing for the practical management of bison subpopulations outside of nature reserves and national parks.

Key words: European bison, dual status of subpopulation, management and conservation strategy

Introduction

There were three free-living European bison populations in Belarus in 1994. They lived in two national parks (NP) – "Belovezhskaya Pushcha" and "Pripyatsky", and in Berezinsky Biosphere Reserve (BBR). The 1st stage of "The program for conservation, distribution and use of European bison in Belarus" was realized during the period 1994–2000 (hereinafter referred to as Program "Bison") (Kozlo 1999). Six new micropopulations were created. In total 105 animals, caught in various isolated herds within NP "Belovezhskaya Pushcha", were the founders of new herds. The re-acclimatization was very effective: bison numbers increased from 347 in 1994 to 974 individuals in 2010. In 2000, Belarus took the second place in the world regarding European bison numbers after Poland. Successful re-acclimatization was possible because of adaptation of attractive and very realistic strategy leading to an optimal management model in present economical conditions. Nowadays in Belarus, the problem what to do with this species saved from extinction is a difficult issue.

Belarusian model and the concept of Program "Bison"

Our study shows, that in present ecological conditions in Belarus, the most realistic model allowing to solve the problem of a compromise between bison conservation and management, is so called "metapopulation model or strategy" (Kozlo *et. al.* 1997; Kozlo 1999). It is based on the concept of European bison living in patchy space, i.e. a number of small (80–150 individuals) free-living, isolated populations. Apparently, there is no alternative strategy for bison conservation in present Belarusian conditions. Program "Bison" foresees 10–12 small populations summing up to the total number of 550–600 individuals by the period 2008–2010. Altogether they are supposed to form the national Belarusian metapopulation (Fig. 1). A fundamental part of this strategy is to give separate status to particular subpopulations of the species and a general status to national metapopulation. For the conservation of

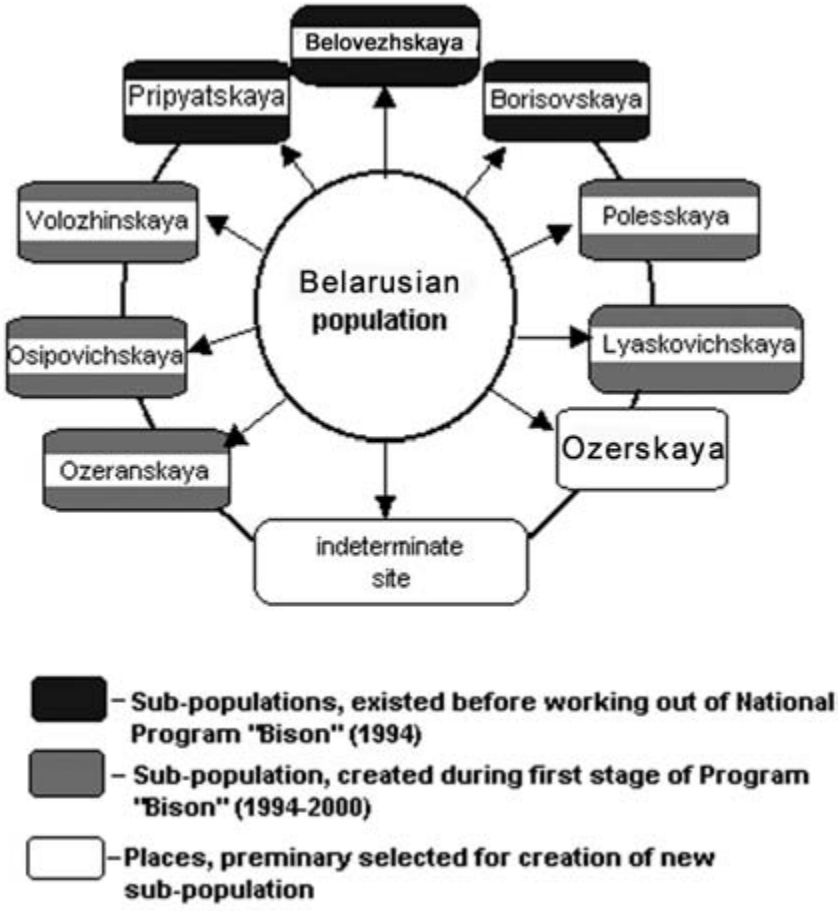

Figure 1. The structure of Belarusian metapopulation of European bison

already existing genetic diversity we recommended breaking up isolation among herds, and induced exchange of genetic material through introduction of planned capture-release pattern of valuable males, 1–2 times per generation. According to Soulé 1989, for the maintenance of artificial panmixia it is enough to introduce one individual per generation to every subpopulation, providing that these individuals will take part in reproduction. Such exchange should be based on the results of genetic studies, animals' certification, proper marking, and detailed database. In regions, where geographical distances between subpopulations are not large, the natural emigration through ecological corridors should be promoted. Following suggestions of Soulé 1989, a set of geographically isolated populations may have higher genetic variability, then one united large population of similar numbers. It is explained as an increased probability of higher frequency of certain alleles and different directions of natural selection in each subpopulation, which may produce heterogeneity among subpopulations, and contribute to conservation of genetic variability within the species.

A dual status of subpopulations – the way to success

According to the present legal status, the European bison is under strict protection. In exceptional cases, by 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, otherwise useless in reproduction animals, is allowed. Strict protection of European bison, and considerable financial costs ($40–50 for creation of one subpopulation and further ecological monitoring), were very serious obstacles for implementation of the Belarusian Program "Bison". To solve these contradictory problems of legal status prohibiting the practical approach oriented on distribution, breeding, forming of highly productive sex-age structure and healthy bison subpopulations that generally made impossible to introduce the "Bison program" into the practice, it became necessary to change the legal status of particular subpopulations. According to this concept, to solve financial, biological, ecological and other aspects of the problem, the status of a given European bison subpopulation would depend on the area of it home range, namely:

1. The status of *"Main reservoir of gene pool"* insuring existing genetic variability – would be granted for animals, living in nature reserves and national parks. Conservation measures for those subpopulations would follow rules foreseen for animal species listed in the Red Book of the Republic of Belarus.
2. The status of *"Reserve gene pool"* – would concern bison subpopulations, living within areas commercially managed, i.e. forestries, forest-hunting and hunting enterprises. After reaching by those herds, numbers that are scientifically estimated as approaching the carrying capacity limits, such subpopulations may be hunted according to special rules.

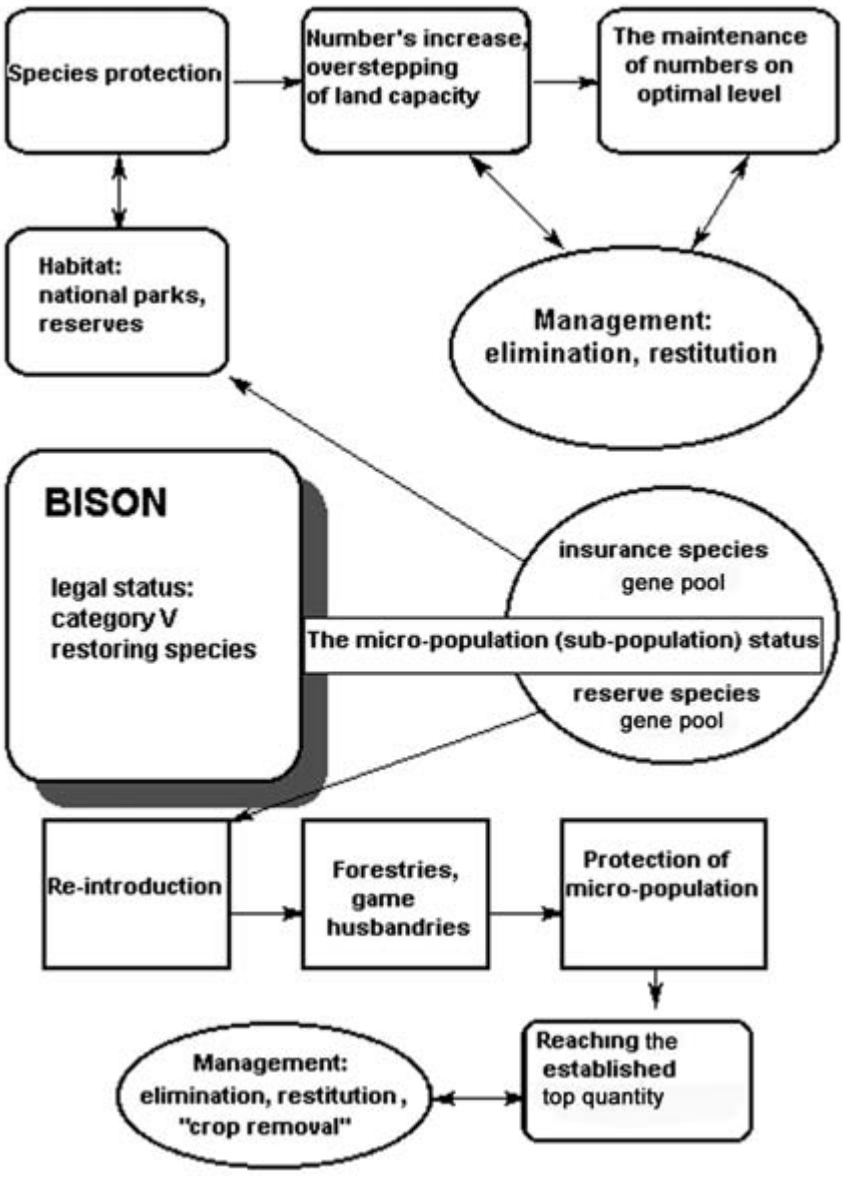

Figure 2. The recommended functioning of European bison subpopulations of both statuses

The scheme of recommended functioning of bison subpopulations representing both types of the legal status is shown at Fig. 2. Granting various legal status to different populations of European bison is à new approach towards the conservation this species. Hopefully, after being applied in commercially managed forest complexes it may help to optimize sex-age and social structure

Table 1. Population dynamics of European bison subpopulations in Belarus

Year	Subpopulation									Total
	Belovezhskaya	Borisovskaya	Ozeranskaya	Volozhinskaya	Polesskaya	Osipovichskaya	Ozerskaya	Lyaskovichskaya	Naydianskaya	
	Existing before 1994; "Main reservoir of gene pool"			Created in 1994–200 under Program "Bison" "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	435	110	12	16	914
2010	415	35	60	79	76	152	139	11	16	983*

***Notice:** Additionally, 31 individuals remain in enclosures (zoos, national parks and reserves).

towards high productivity of bison subpopulations. The management of bison herds should include the stabilisation of population numbers, carrying capacity of bison habitats and introduction of artificial selection by means of elimination of unfit or otherwise unproductive individuals.

The effectiveness of the Program "Bison"

The effectiveness of the Belarusian Program "Bison" is presented by data in Table 1, which characterize quantitatively the process of Belarusian subpopulations forming. Analysis of factors determining population growth was done in following articles (Kozlo 2005; Kozlo, Bunevich 2009).

Up to the end of 2010 there were 983 bison in total: 586 (59.6%) of them there treated as main gene pool, and 397 (40.4%) – as reserve gene pool to

which 31 animals, living in enclosures, should be added. There were 1014 individuals in Belarus totally. These results are an evidence of the effectiveness of the strategy (metapopulation model and dual status of subpopulations), that was adopted in Belarus in 1994. On the other hand, the approach of breeding large numbers of European bison in enclosures, how it is practiced in some countries, especially in Germany, where 449 bison live in 77 localities (Raczyński 2008), in present stage, when the risk of species' extinction is much lower, has also played a positive role.

Nowadays Poland and Belarus have more than 50% world bison resources (Krasińska, Krasiński 2004; Kozlo, Bunevich 2009). Belarus made a significant contribution to conservation of the species and an increment of European bison numbers. Scientific concepts and approaches originated in Belarus took high international appreciation. In 1997 the project of the program was honoured with the award of the foundation "Henry Ford European Conservation Awards" together with UNESCO World Heritage Centre and European Council for the culture legacy and environment conservation.

What to do with European bison, saved from extinction?

The progress in creating new subpopulations and the growth of European bison numbers were the result of metapopulation model and dual status of subpopulations introduced in the Program "Bison". Herds' owners were interested to reach maximal numbers planned for each subpopulation in possibly shortest periods of time. For this purpose they provided effective protection and supplied animals with supplemental food during winters. Some subpopulations having status of "reserve gene pool" – Osipovichskaya (152 individuals), Ozerskaya (139 individuals.), Volozhynskaya (79 individuals.) have quickly reached numbers considered to be maximal. There is however still existing problem to turn towards an improvement of animals' condition and sex-age structure optimal for high productivity, by means of population management through the selection, instead of promoting the quantitative growth of herds. Declaration of the European bison as strictly protected species and listing it the Red Book is insufficient. Proper living conditions must be created, but it costs significant financial expenditure.

There is a serious breakthrough in solving this problem: the regulation of The Council of Ministers of the Republic of Belarus on 21.04.1999 "About additional arrangement for European bison protection and use" was cancelled by the new regulation on 27.10.2007 N1408: "Rules of protection and efficient use of European bison". In the most recent document, the idea of a "dual status" was omitted and its main point was distorted. As a result of these changes the originally created system and mechanisms were stopped.

In conclusion I would like to appeal for the support for the idea of a dual status of E. bison subpopulations and acceptance of an active population

management of this part of the population which remains outside of protected areas i.e. is regarded as not significant for the protection of gene pool of the species. It is necessary to introduce international agreements regarding an exchange of E. bison individuals and regulating rules for their transport and supplementation into other populations.

Otherwise a question about excluding the European bison from Red Book may appear. That could reverse present trend towards an increase of E. bison numbers and bring undesirable effects for the species.

References

Baker R., Barrowklough G.F., Belovski G.E., Brockwell P.J., Brussard P.F., Ewens W.J., Gani J.M., Giplin M.E., Goodman D., Lande R., Maguire L.A., Resnick S.I., Salwasser H., Schonewald-Cox C., Seal U.S., Shaffer M., Soulé M.E. 1989. Viable Populations for Conservation. (edited by Michael E. Soulé) Transl. from English, Moscow: 224 pp. [in Russian]

Kozlo P.G. 2005. The estimation of the present condition of the population of European bison (*Bison b. bonasus* L.) and national program of action for the conservation of the species. In: Proceedings of the National Academy of Sciences of Belarus. Biological series. 4: 90–99. [in Russian with English abstract]

Kozlo P.G. 1999. The program for conservation, distribution and use of European bison in Belarus. Minsk: 48 pp. [in Russian]

Kozlo P.G., Bunevich A.N. 2009. European bison in Belarus. Minsk: 318 pp. [in Russian]

Kozlo P.G., Bunevich A.N., Stavrovsky D.D., Uglanets A.V. 1997. Belovezhskaya Puscha. In: Forest Biodiversity Conservation: 196–208.

Krasińska M., Krasiński Z.A. 2004. Żubr. Monografia przyrodnicza. Warszawa–Białowieża: 312 pp.

Raczyński J. 1998. Księga Rodowodowa Żubrów. Białowieski Park Narodowy.

Żubr *(Bison bonasus)* w Białorusi: stan i problemy ochrony populacji

Streszczenie: W pracy podsumowano wyniki realizacji pierwszego etapu "Programu ochrony, rozprzestrzenienia i użytkowania żubra w Białorusi". Program był oparty teoretycznie na modelu metapopulacji białoruskiej i zakładał strategię gospodarowania uwzględniającą podwójny status poszczególnych subpopulacji. Jako główny trzon krajowej populacji i jądro puli genowej uznano zwierzęta żyjące w rezerwatach i parkach narodowych, podczas gdy osobniki przebywające w lasach i gospodarstwach łowieckich stanowią ilościową rezerwę. Populacje, które są wyznaczone do ochrony puli genowej gatunku są chronione zgodnie z zasadami dla gatunków wymienionych w Czerwonej Księdze, inne populacje po osiągnieciu maksymalnego zaplanowanego stanu ilościowego mogą być gospodarowane łowiecko. Sześć nowych wolnych populacji żubra utworzono w latach 1994–2005. Liczebność gatunku (z uwzględnieniem naturalnej śmiertelności i eliminacji) wzrosła od 347 w 1994 do 1014 osobników w 2010 roku. Powstało pytanie, co robić z gatunkiem uratowanym od zagłady? Dyskutowana jest konieczność zmian w prawie pozwalających na praktyczne zarządzanie populacjami żubra poza rezerwatami i parkami narodowymi.