

The prospects for *Bison bonasus* (L.) restoration to the Eastern Carpathians in the Ukraine

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Abstract. The restitution of European bison to the Ukrainian Eastern Carpathians has been conducted since 1965. In the early 1990s, the bison numbers reached their peak i.e. about 270 individuals. Three bison sub-populations (Maydan, Nadvirna, Bukovyna) existed then. By the 1990s, the bison numbers had declined considerably. The last bison of the Nadvirna sub-population were recorded in the late 1990s; the last animals of the Maydan sub-population died, probably, during the winter of 2008–2009; the number of animals in the Bukovyna sub-population is constantly decreasing. Present numbers of European bison in the Eastern Carpathians are slightly over 40 individuals, which makes necessary to introduce appropriate conservation measures towards an increase of bison numbers in this region. This task requires the implementation of following program: (1) the establishment of breeding stations within area of Skolyvski Beskydy National Nature Park and Vyzhnytsya National Nature Park; (2) introduction of animals from the Uladiv sub-population (Ukraine), Belarus, Poland, Russia, and other European countries for the purpose of establishing viable bison herds in the newly created breeding stations; (3) identification of habitats suitable for e. bison in the Eastern Carpathians within Ivano-Frankivsk region; (4) supplementation with new animals the sub-population of Bukovyna.

Key words: restitution, sub-population, population numbers, breeding station.

Introduction

The restitution of European bison (*Bison bonasus* L.) to the Eastern Carpathians was initiated in the second part of the 20th century. During the period of 1965–1982, three sub-populations of E. bison were established in the mountain region of Ukraine: the Maydan sub-population (Lviv region), the Bukovyna sub-population (Chernivtsi region) and the Nadvirna sub-population (Ivano-Frankivsk region). The largest number of bison in the Eastern Carpathians (about 270 individuals) was recorded in early 1990s. In the mid-1990s, a decrease in the population numbers was recorded. By the end of the 20th century, the Nadvirna sub-population ceased to exist (Khoyetsky 2002, 2003, 2009). The factors responsible for the decrease in bison numbers in the Eastern Carpathians were thoroughly analysed by many authors (Tatarynov 1973, Bondarenko *et al.* 1999, Herus, Kryzhanivsky 2005, Khoyetsky 2010, 2011, and others). Currently, the number of bison in the Eastern Carpathians is estimated for little over 40 individuals. Therefore, the problem of European

bison conservation in the Eastern Carpathians requires an urgent action towards elaboration and implementation of measures for protection and restoration of the species as well as a program for the extension of *E. bison* herds' distribution.

Material and methods

The study on population dynamics of *E. bison* in the Eastern Carpathians was conducted during the period of 1999–2011. To analyse the bison numbers, we used statistical data of Ukraine's Ministry for Environmental Protection for the period of 1961–2011 as well as the author's own investigation results (Khoyetsky 2002; 2003).

In order to determine the time and causes of the animals' death, a number of witnesses, namely, the forest guards, hunters, forestry workers, were interviewed and surveyed by questionnaire (Bondarenko, Delehan 1989). For the analysis of the causes of death, the veterinarian reports on autopsy of dead animals were used.

The habitat suitability for bison restitution was assessed on the basis of complex analysis of the environmental conditions. The following abiotic factors were studied and analysed: the characteristics of the relief, temperature regime, the snow cover depth and duration. Among analysed biotic factors were: food availability and habitat fragmentation.

Results and Discussion

In 1965, ten *E. bison* from the Belovezhskaya Pushcha (Belarus) were brought into the mountainous part of Lviv region, the area of the Maydan Game Enterprise; these gave the origin to the Maydan sub-population. In 1970, second sub-population was established on the basis of 19 animals brought from the Berezynsky – (Belarus), the Oksky – and the Prioksko-Terrasny (Russia) reserves to the area of the Bukovynske State Game Enterprise (Chernivtsi region). The third sub-population – the Nadvirna (Ivano-Frankivsk region) was created between 1976 and 1982 by introducing 18 individuals from Russian reserves (Oksky and Prioksko-Terrasny).

In the early 1990s, *E. bison* numbers in the Eastern Carpathians reached their peak. During the period between 1991 and 1995, the total bison numbers in these three sub-populations varied within the range of 250 to 270 individuals. The average number of animals during the 47-year period amounted to 119.8 ± 11.4 individuals (Fig. 1).

By the mid 1990s, the average annual decrease of *E. bison* numbers in the Eastern Carpathians amounted to $9.1 \pm 1.3\%$. The Nadvirna sub-population died out due to a purulent necrotic disease of reproductive organs in males, bronchial pneumonia, transport accidents etc. The last 4 individuals were recorded there in 1999.

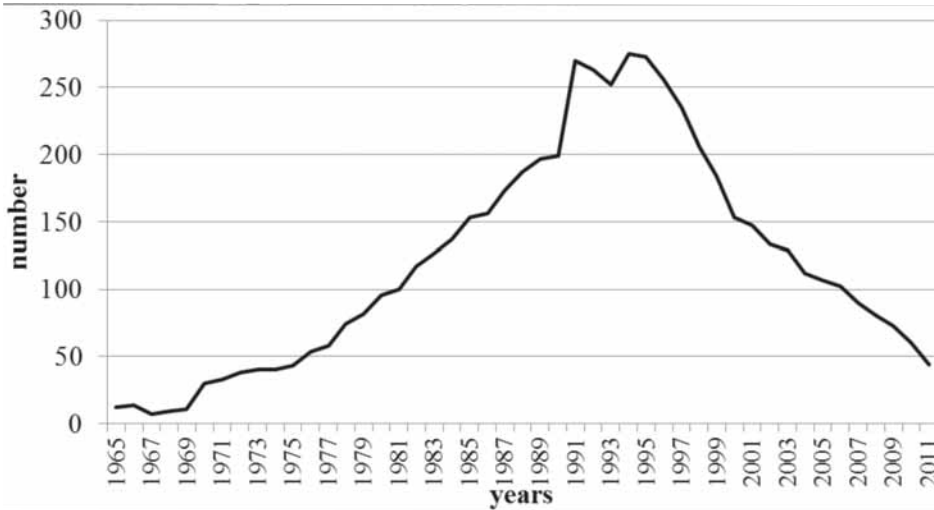


Figure 1. Population dynamics of the *Bison bonasus* in the Eastern Carpathians

The bison numbers of the Maydan and Bukovyna sub-populations were affected by snowy winters with long spells of frosty weather; because of heavy snow depth, the animals had limited access to the food, which resulted in their exhaustion and death.

Numbers of the Bukovyna sub-population reached their maximum in 1994–1995 when amounted to roughly 225 individuals. A decrease of their numbers by 2.6 times was recorded during the period from 1966 to 2001, at average annual level of $11.4 \pm 2.8\%$. Currently, the numbers of bison in the Bukovyna sub-population are estimated at about 30 individuals, therefore necessary is the introduction of animals from other strong populations of E. bison. One of main causes of the decline of the Bukovyna and the Maydan sub-populations was illegal hunting; poaching was responsible for a 14.5% of bison death cases. In 1999, the home range of the Maydan sub-population was included to the Skolyvski Beskydy National Nature Park. The protection of animals became better organized, and, as a result, the number of poaching cases was reduced. However, the attempts to preserve the bison that were descendants of those brought in 1965, failed. The last animal died, probably, in February 2008.

For the purpose of restitution of the species, the project "Restoration of the European bison population in the Eastern Carpathians", was developed in 2005, financed by "Large Herbivore Foundation" from Holland, in collaboration with the Polish "European Bison Friends Society". Under the framework of this project, in June 2009, six bison were brought into the enclosure of the Maydan forest district (the Skolyvski Beskydy National Nature Park) from the Gera Wildlife Park (Germany). In November 2010,

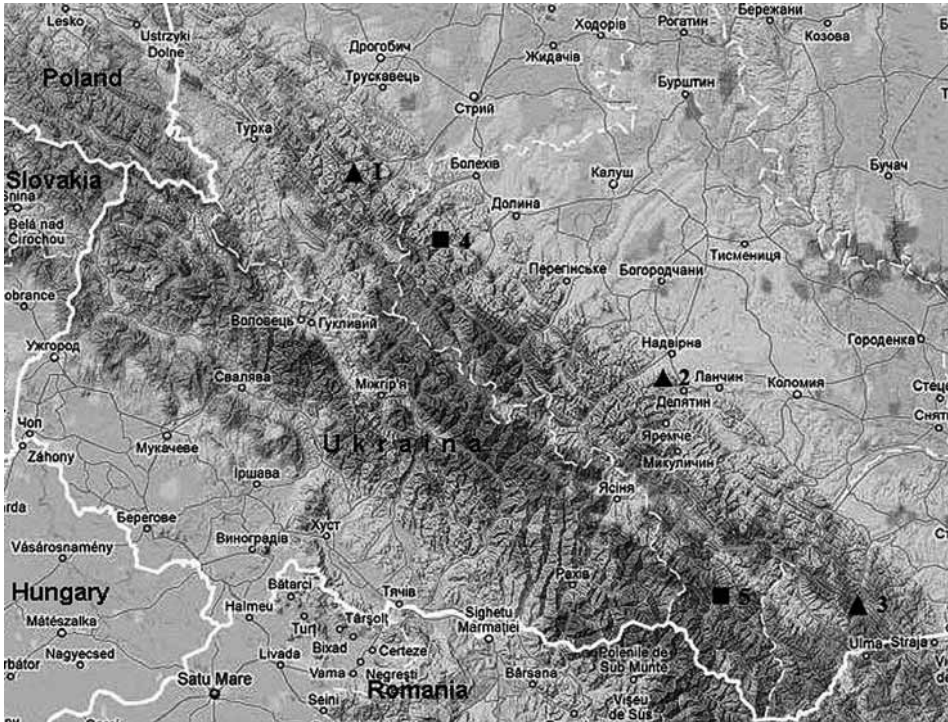


Figure 2. Distribution of former, present and proposed *E. bison* herds in the Eastern Carpathians. 1 – Maydan sub-population, 2 – Nadvirna sub-population; 3 – Bukovyna sub-population; 4, 5 – proposed new locations for *E. bison* herds.

another five animals (4 males, 1 female) were brought from the Bavaria Forest National Park (Germany) and from the Marshfeld Castles Wildlife Restoration Centre (Austria) after a 30-day quarantine, the animals were released to the wild. The two groups of bison merged into one herd.

The area of the Eastern Carpathians cannot support a population of 500 or more individuals, therefore, according to the most realistic model for the management of this species there, established should be several, spatially isolated small-sized sub-populations of 50 to 150 individuals. In addition to two currently available home ranges with a suitable habitat for *E. bison* (Maydan and Bukovyna), we have selected on the basis of analytical data on biotic, abiotic, and anthropogenic factors, two more areas in the Eastern Carpathians which environmental conditions are appropriate for introduction of *E. bison*. One such area is situated on the northern side of the Eastern Carpathians in the mixed forest zone within Ivano-Frankivsk region, the other one is in the southern part of the range near the Romanian border (Fig. 2).

The northern side of the Eastern Carpathians is partially covered with a beech forest with an admixture of fir and spruce. The share of coniferous stands amounts to 50% of forested area.

Generally, typical for the area are gentle slopes relief, temperate continental climate with sufficient humidity, variable weather in spring, moderately hot summer, warm autumn and mild winter, all these factors being favourable for establishing E. bison population there.

In the southern part of the Eastern Carpathians (the proposed home range for new E. bison sub-population), 60% of the area is covered by the forest, about 13% are pastures, and over 7% – hay meadows.

The E. bison numbers in Ukraine amount to over 200 individuals which are separated into seven sub-populations. However, in each six sub-populations, the number of animals ranges from 7 to 40 individuals – which puts them at risk of extinction. The largest is the Uladiv sub-population (Vinnytsya region), which constitutes about 40% of E. bison in Ukraine. This sub-population could be a source of animals for breeding stations. Thus, in 2008, within the framework of the project "Conservation and enlargement of E. bison populations in the area of Lviv region", 12 animals were brought to the area of State Enterprise "The Styr Game Management Unit". However, the Uladiv sub-population was established with only 6 individuals (2 males and 4 females) that were brought to Vinnytsya region from the Tsuman sub-population (Volyn region) in 1979. Therefore, there is a risk of an inbred, which implies a necessity for the correction of the genetic variability once or twice for one generation by introducing there 3–4 males. The supplementation of new animals should be performed according to current genetic parameters of the sub-population and certification of the origin of introduced individuals.

For the purpose of conservation of genetic polymorphism and an increase of a potential for new introductions there is a need for the establishment of breeding stations for E. bison in the Eastern Carpathians. The most suitable areas for such facilities are the Skolyvski Beskydy National Nature Park and the Vyzhnytsya National Nature Park. For the possibly the best preservation of the species' genetic diversity and minimization of negative effects of inbreeding, the animals for reproduction in the breeding stations should origin not only from Ukraine (the Uladiv sub-population) but also from Germany, Russia, and other European countries.

Conclusions

Current numbers of E. bison in the Eastern Carpathians are not high (little over 40 individuals), which generates a need for implementing measures on the species protection and restoration. The restitution of the Maydan bison sub-population is continued since 2009. However, the future of the Bukovyna bison sub-population is an object of concern. Its numbers are decreasing every year. Therefore, top-priority measures on restoration of E. bison population in the Eastern Carpathians involve:

- the establishment of breeding centres within the area of Skolyvski Beskydy National Nature Park and Vyzhnytsya National Nature Park;
- introduction of animals from the Uladiv sub-population (Ukraine), Germany, Russia, and other European countries to establish E. bison herds in newly created breeding centres;
- the establishment of new E. bison ranges in the Eastern Carpathians within Ivano-Frankivsk region;
- a supplementation of Bukovyna sub-population with new animals.

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Perspektywy restytucji żubra w Karpatach Wschodnich na Ukrainie

Streszczenie: Restytucja żubra w ukraińskich Karpatach Wschodnich jest prowadzona od 1965 roku. Na początku lat 90-tych XX wieku liczba tych zwierząt osiągnęła maksymalny stan – około 270 osobników. Istniały wówczas trzy subpopulacje żubra (Majdańska, Nadworniańska, Bukowińska). Od lat 90-tych notowany jest spadek liczebności tego gatunku. Ostatni żubr subpopulacji Nadworniańskiej zginął pod koniec lat 90-tych zeszłego wieku, a ostatni osobnik z subpopulacji Majdańskiej prawdopodobnie w zimie 2008–2009. Zmniejszyła się również istotnie liczebność subpopulacji Bukowińskiej. Obecna łączna liczebność subpopulacji Bukowińskiej i Majdańskiej jest niska, nieco ponad 40 osobników, co dowodzi konieczności działań na rzecz ochrony i odtworzenia tych stad żubrów. Perspektywy restytucji żubra w Karpatach Wschodnich obejmują: (1) tworzenie zagród hodowlanych w Parku Narodowym "Skoliwskie Beskidy" oraz Wyżnym Parku Narodowym; (2) import zwierząt z subpopulacji Uladiwskiej (Ukraina), Białorusi, Polski, Rosji i innych krajów europejskich, aby utworzyć hodowlane stada o możliwie niskim stopniu spokrewnienia; (3) utworzenie dwóch nowych ostoi żubrów w Karpatach Wschodnich na terenie obwodu Iwano-Frankowskiego; (4) zasilenie nowymi osobnikami subpopulacji Bukowińskiej.
