

# The Carpathian bison *Bison bonasus*: its past and future

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**Abstract** A preliminary study was made of the status of the European bison *Bison bonasus* population in the Polish, Slovakian, and Ukrainian Carpathian mountains, in order to provide the background knowledge necessary to initiate a reintroduction program for this montane bison population. Three free-ranging herds were identified in Poland, all in the Bieszczady Mountains, and four were located in the Ukraine (Rozlucz, Skole, Nadvirna, Bukovina). Their present numbers vary from as few as 16 animals at Skole, to over 200 animals at Bukovina. In Slovakia, just nine bison survive in captivity. The population in the Polish Bieszczady Mountains has been stable in recent years, but in the Ukraine the overall population has been in decline for several years. The potential for re-establishing the European bison over its former Carpathian range is discussed, and the necessary components of such a reintroduction program, including analyses of the current population structure, reproduction and mortality factors, habitat assessment, and feasibility study, are all appraised.

**Key words:** *Bison bonasus*, Carpathians, reintroduction, population, habitat

## INTRODUCTION

The indigenous population of the European bison *Bison bonasus* in the Carpathian Mountains had been extirpated by the 19th century. Since the extinction of the last two free-living populations of the species, in 1919 at Białowieża Forest, and in 1927 within the Caucasus, a number of efforts have been made to restore the species on the basis of the few individuals remaining in captivity (Pucek 1986).

In order to separate spatially the pure Białowieża line of lowland bison from the Caucasus genotype, some bison of mixed origin were transferred in 1963 and 1974 to the Bieszczady Mountains in south-eastern Poland. Those initial groups were released into the wild, and since then several unrestrained herds have lived in Bieszczady (Głowaciński 1996, Jaroński and Pepera 1969, Żabiński 1968).

In the Ukraine, the last wild bison were killed during the period from 1919 to 1926. The first attempts

to reintroduce bison there were made in 1937, but were not completed because of the intervention of the second World War. In 1965 and in subsequent years, bison from the Białowieża Forest have been translocated to the northern part of the Ukraine, and later to several sites in the Ukrainian Carpathians (Pilarski 1989, pers. comm.).

A preliminary survey of the bison population currently living within the Carpathian Ecoregion has shown that few herds there have the potential for exchanging individuals through natural migration, and most of those are in the Polish Bieszczady Mountains. The Ukrainian herds, with the exception of two small neighbouring groups in Skole and Rozlucz, remain isolated, and in so far as Slovakia, there are only captive bison. The population trends of scattered, isolated groups of bison remain mostly unknown, but they are believed to be at risk because of the high likelihood of inbreeding, resulting from the fact that the possibilities for them to extend their range

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are strongly limited. Any program aiming to re-establish a free-ranging bison population in the Carpathian Mountains should consider analyses of the current population structure and genetics, should define reproduction and mortality factors, assess habitat quality, and should also include a feasibility study taking into consideration the local human population.

## MATERIALS AND METHODS

This study has been based on the records of the State Forest Administration in Poland and the Ukraine from the area of the Bieszczady Mountains (eight forest districts), from Beskydy and Czernohora (four forest districts), and on reports from Bieszczady National Park. In both countries, population censuses are made at the end of March, thus the numbers given reflect

the status of the population after the winter season. Population estimates performed by Forest Service and National Park personnel, are based on a combination of tracking (in snow), and on direct observation at foraging sites. Finally, forestry and park records were compared with recent European Bison Pedigree Books (Pilarski 1989, Raczyński 1998).

## RESULTS

Within the Carpathian Ecoregion, there are presently four free ranging herds in the Ukraine, and three major herds in Poland. In Slovakia, a small group of nine bison remains confined in an enclosure (Fig. 1).

The bison population of the Bieszczady Mountains, Poland, consists of several groups not separated by geographical or man made boundaries (Fig. 2). Bison



Fig. 1. Distribution of existing bison herds in the Carpathian Mountains of Poland, Slovakia, and the Ukraine (1 = Topolcanki; 2, 3, 4 = Bieszczady; 5 = Rozlucz; 6 = Skole; 7 = Nadvira; 8 = Bukovina), showing the locations of planned reintroductions, the areas of potential population nuclei, and future routes for bison migrations along the Carpathian range.





Fig. 2. Distribution of home ranges of bison herds in the Polish Bieszczady Mountains.

population dynamic data from the area over 15 years shows a distinct decline between 1988 and 1993. The current population, of about 160 individuals, has reached the same level that it was at in the mid 1980s (Fig. 3). At the moment, bison numbers at the end of winter (31 March), are recorded in only four of the forest districts of the Bieszczady Mountains, in Baligród, Brzegi Dolne, Lutowiska and in Stuposiany, however during the summer when vegetation is actively growing, bison can be found within the boundaries of Bieszczady National Park. The numbers recorded vary from as few as 13 in Brzegi Dolne to as many as 70 in the Lutowiska Forest District.

Mortality, with the exception of very limited selective hunting or culling for scientific purposes, does not usually exceed a few percent, and is related to age and disease (Fig. 4). There are no known cases

of bison being attacked by large predators in the area (Forest Service pers. comm.).

The Ukrainian population of the European bison consists of four herds. Two small groups, at Rozlucz

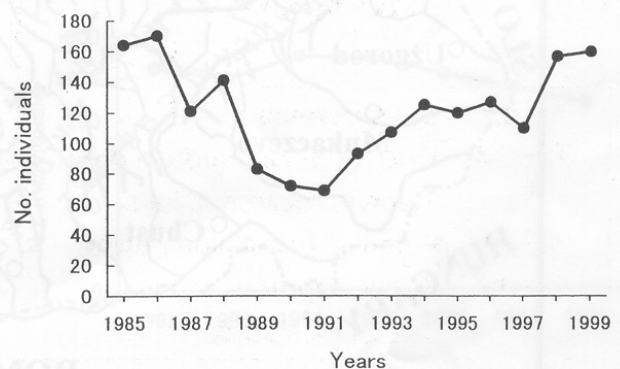


Fig. 3. Population dynamics of the European bison in the Bieszczady Mountains, Poland, from 1985 to 1999, based on records from the State Forest Administration.

and Skole, live relatively close to the Polish border. The other two groups, at Nadvirna and Bukovina, remain physically separated (Fig. 5). Population dynamics show a general decline since the mid 1990s, especially noticeable in the largest (Bukovina) and smallest (Nadvirna) herds (Figs. 6 and 7).

### DISCUSSION

In natural ecosystems, large herbivores play an essential role in maintaining biodiversity by restricting the dominant growth of woody vegetation through their grazing and browsing behaviour, thus delaying locally the process of natural succession. Their activity results in a mosaic pattern of forest stands of various age classes, intermixed with patches of open grassland or shrub communities. In this way niches are created or maintained for other species that would otherwise be unable to penetrate closed forest habitats. As a result of hunting, however, large herbivore species have become extinct, or have retreated to re-

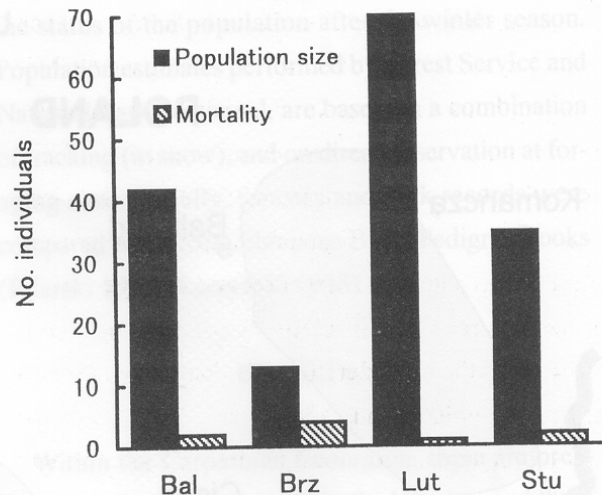


Fig. 4. Population size and mortality of European bison in four forest districts in the Bieszczady Mountains (Bal = Baligród; Brz = Brzegi Dolne; Lut = Lutowska; Stu = Stuposiany) during the 1998/99 season.

mote areas that are difficult to access or that are of little use to people (Kampf 1998).

In the mountains of Central and Eastern Europe, the only large herbivore species remaining in consid-

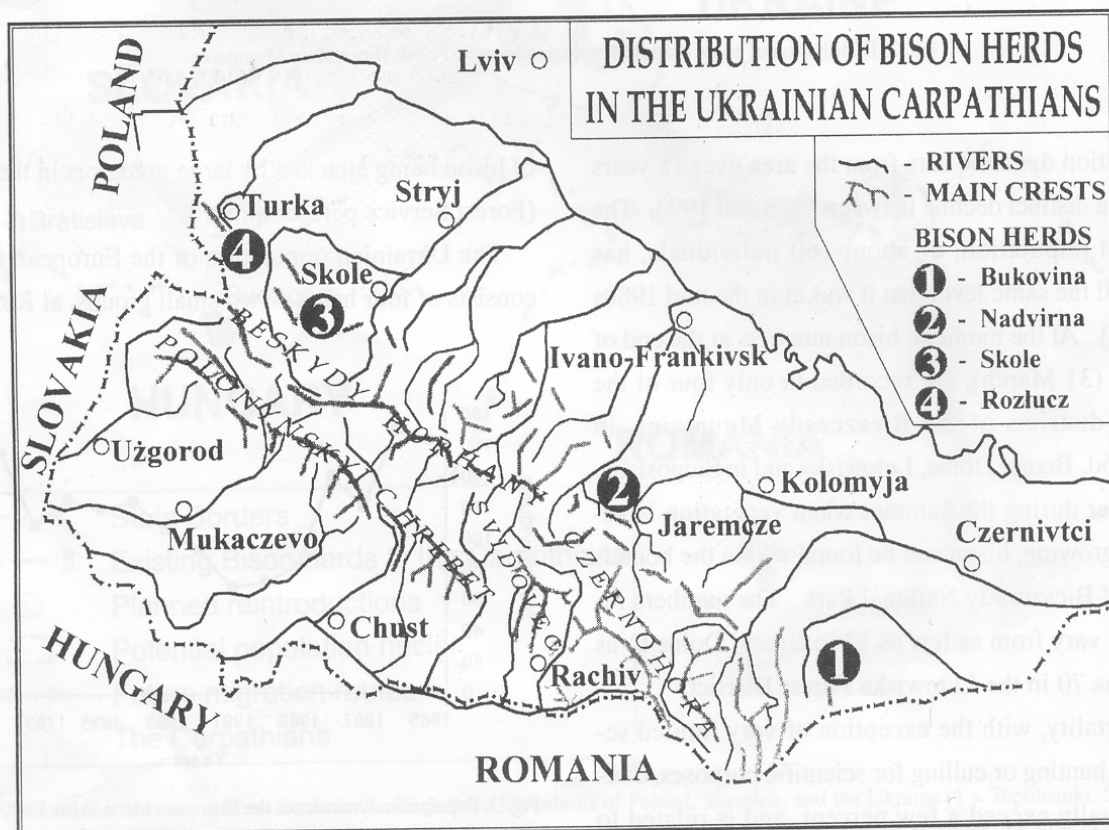


Fig. 5. Distribution of bison herds in Ukrainian Carpathians.



erable numbers are red deer *Cervus elaphus* and roe deer *Capreolus capreolus*, which, according to their foraging behaviour, can be classified as browsers - intermediate feeders, or concentrate selectors. Since the extinction of the aurochs and the bison, the niche of a large grazer has remained empty. The present approach to nature conservation and management of protected areas is still relatively passive, and obviously lacks the consideration of the dynamic aspects of habitat evolution and adaptation. Thus, protected areas in mountains for example, become increasingly dominated by old growth forest with a closed canopy. These conditions are not favourable for maintaining

high biodiversity, and leave the habitat at risk from large scale destructive processes such as forest fires, pest infestation, and wind-throw.

The data on bison distribution and numbers in the Carpathians reveal that this species currently survives in small, usually isolated groups that have a very high likelihood of inbreeding and genetic drift, which may be a proving to be a limiting factor to their population growth. Even now, nothing is known of the species' seasonal movements, or of the reasons for recent declines such as has happened to the Polish herd during the 1990s (Fig.3). Without such information, it is not possible to design and secure potential linking wildlife corridors allowing for genetic exchange between the herds. The existing herds may in fact be too small to be considered genetically viable over a prolonged period of time.

The potential exists for promoting an exchange of individuals among bison herds in the neighbouring areas of the Ukraine, Poland, and Slovakia, where the establishment of two new herds would create a bison population inhabiting a zone of about 200 km along the Carpathian Range. Similarly, along the border between Romania and the Ukraine, there is a chance to establish a new population nucleus consisting of the largest Ukrainian "Bukovina" herd, and the first free ranging herd in the Romanian Carpathians (Fig. 1).

The initial phase of the project should provide detailed information on the current population status and on habitat conditions. A high degree of inbreed-

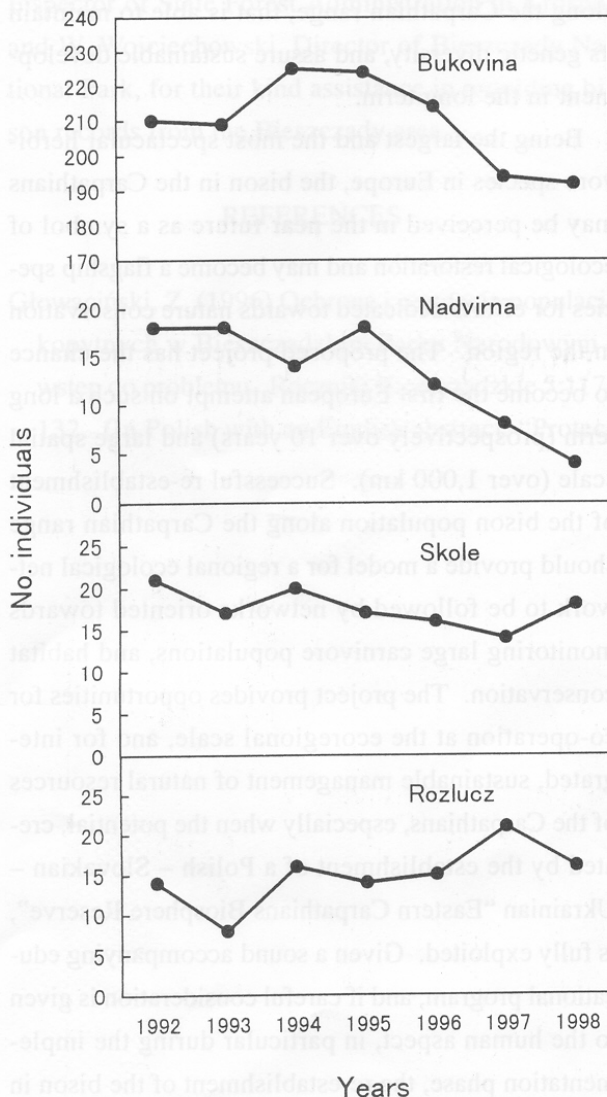


Fig. 6. Population dynamics of four bison herds in Ukrainian Carpathians between 1992 - 1998.

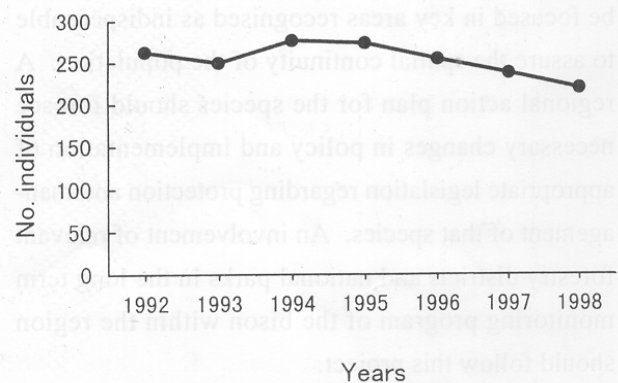


Fig. 7. Changes in bison numbers in Ukrainian Carpathians between 1992 - 1998.

ing, within the surviving European bison population requires careful selection of individuals for reintroduction. Intensive forestry and the close proximity of agricultural areas, makes feasibility studies necessary for every potential reintroduction site. Therefore, a data base for a herd should consist of the origin of reintroduced individuals, their location, their approximate home range, a habitat description, the present number of animals and their population trends, herd age and sex structure (if possible), estimated mortality (including an estimate of present health status), and recruitment rate. Habitat assessment should be based on the evaluation of a site regarding its carrying capacity, the quality of its refuges, the potential for conflict with human interests, and the possibility for an exchange of individuals with neighbouring herds via wildlife corridors (Pucek 1984).

The final output of this phase of the project should be a report on population status and trends, supplemented with habitat evaluation for present bison ranges and indicating optimal sites for reintroduction. That would allow for the designing of a potentially natural range of the species in the Carpathian ecoregion and the Ukraine including the linkage of sites. Analysis of the feasibility of reintroduction should include such spatial factors as: the distance between already existing herds and potential new sites, reproduction rate, migration rate, the possibility of obtaining new animals for reintroduction, and the potential threats to the population.

Reintroduction should, ideally, begin at sites that serve to link ranges currently inhabited by bison, and be focused in key areas recognised as indispensable to assure the spatial continuity of the population. A regional action plan for the species should foresee necessary changes in policy and implementation of appropriate legislation regarding protection and management of that species. An involvement of relevant forestry districts and national parks in the long term monitoring program of the bison within the region should follow this project.

During the initial phase of the project, genetic aspects will have to be solved on the basis of the current

bison pedigree books. Because of the high degree of inbreeding within the present world bison population, a study on the genetic distances between herds, and of individual genetic variability will be indispensable in the near future. Similarly, the health status of the herds will need to be monitored to look for incidences of diseases common among ungulates and also to look for health problems related to inbreeding.

The regional action plan should consist of a final design for a population network, and should be accompanied by a general map of the species' present distribution, GIS models of optimal and potential habitats, and of existing and potential linkages among the sub-populations. The ultimate goal should be regarded as re-establishing a wild bison population along the Carpathian range, that is able to maintain its genetic diversity, and assure sustainable development in the long term.

Being the largest and the most spectacular herbivore species in Europe, the bison in the Carpathians may be perceived in the near future as a symbol of ecological restoration and may become a flagship species for efforts dedicated towards nature conservation in the region. The proposed project has the chance to become the first European attempt on such a long term (prospectively over 10 years) and large spatial scale (over 1,000 km). Successful re-establishment of the bison population along the Carpathian range should provide a model for a regional ecological network to be followed by networks oriented towards monitoring large carnivore populations, and habitat conservation. The project provides opportunities for co-operation at the ecoregional scale, and for integrated, sustainable management of natural resources of the Carpathians, especially when the potential, created by the establishment of a Polish – Slovakian – Ukrainian "Eastern Carpathians Biosphere Reserve", is fully exploited. Given a sound accompanying educational program, and if careful consideration is given to the human aspect, in particular during the implementation phase, the re-establishment of the bison in the Carpathians should not only avoid new human – wildlife conflicts, but also contribute considerably to



the improved public image of the area, and contribute to its increased attractiveness for visitors, especially to eco-tourists.

The planned re-establishment of the bison over its former Carpathian range fulfils all of the objectives listed in the IUCN guidelines for re-introductions (1998): it enhances the long term survival of the species, brings back a keystone species for the ecosystem, increases the local biodiversity, contributes to the local economy, and promotes conservation awareness.

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#### STUDY AREA

The Deraa Plains (latitudes 34°-45° to 35°-40° N, longitudes 75°-35°-50° E) are located in Baltistan (16,190 km<sup>2</sup>), Northern Areas, Pakistan. In Northern Areas three mountain ranges, the Himalayas, Karakoram, and Hindu Kush, converge. Skardu is the headquarters of Baltistan, bounded by Gilgit and Chitral in the north, by Ladakh in the east, by the state of Kashmir in the south, and in the west by Deraa and Gilgit regions.