

## **Causes of European bison death in the western part of Ukraine**

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**Abstract:** In the second half of the XXth century, 6 subpopulations of European bison were created in the western part of Ukraine: three in the mountains and three at the plains. In the 70ties of the XXth century, Klevan subpopulation ceased to exist, at the beginning of the XXIth century Tsuman and Skole subpopulations were on the verge of disappearance, and E. bison numbers in Bukovyna became strongly reduced. A study on the influence of environmental factors upon the bison numbers in the western part of Ukraine was held between 1999 and 2010. In that period, 131 cases of bison death were registered. Seven major causes of bison death have been identified: food shortage, poaching, diseases, accidents, ageing, predation. The main factors which caused reduction of E. bison population numbers were poaching and diseases, and in the mountain conditions this was also a shortage of forage. In many cases it turned out to be impossible to determine the cause of animals' death.

**Key words:** population, environmental factors, food shortage, illegal hunting

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### **Introduction**

In the past, the European bison (*Bison bonasus* Linnaeus, 1758) used to be a common species of the fauna of Ukraine as well as the whole Europe. As the result of unrestricted hunting, degradation of natural habitats caused by the economic activity of people, the species reached the edge of extinction. The last E. bison in Ukraine was, most probably, seen in the Carpathians in 1762 (Hakhlyk 1972). Attempts to re-introduce the species to the territory of Ukraine were made at the beginning of the XXth century. Regular works towards its re-acclimatization were initiated in 1965 when first E. bison were brought to the western part of the country, where a variety of natural conditions occur: plains and mountains, forests, forest-steppe and forest-meadow habitats. During 1965–1976, 6 subpopulations of the species were formed here – three in lowlands (Klevan, Tsuman, Lopatyn), and three in the mountains (Maydan, Nadvirna, Bukovyna). However, not all attempts of re-acclimatization were a success; in particular the Klevan subpopulation existed only for 11 years (1967–1978).

This species became most numerous in the western region of Ukraine at the beginning of the 90-ties of the XXth century, when it counted some 400–450 individuals, which made up about 70% of the whole Ukrainian population.

However, already since mid 90-ties of the XXth century, a decline of its population numbers was registered. At the end of the XXth century, the Nadvirna subpopulation ceased to exist, at the beginning of the XXIth century Skole and Tsuman subpopulations became almost extinct, and the size of Bukovyna subpopulation are decreasing continuously. Explanations of the reasons of such tendency are important for the further efforts towards the preservation of the species.

### Material and methods

On the basis of existing documentation, described was the history of E. bison reintroduction to the western part of Ukraine, population distribution and its numbers.

The study on causes of E. bison death has been conducted during 1999–2010. In order to trace the number of cases, the time, and reasons of the death, a questionnaire-pooling method was applied (Bondarenko, Delehan 1989). To identify the causes of death, autopsy protocols were used, either done by veterinarians or by the author.

### Results

In the Western part of Ukraine first populations of E. bison were formed in Lvov (Maydan) and Volyn (Tsuman) regions in 1965 (Table 1).

**Table 1.** History of *Bison bonasus* population in the western part of Ukraine.

Oblast / name of the population	Year of establishment	Initial number of animals	Termination of population existence	Longevity of a population (in years)	Present number of animals
Volynska / Tsuman	1965	15	–	45	15–20
Lvivska / (lowland population – Lopatyn)	1980–1981	12	–	30	24
(mountain population – Maydan)	1965	10	–	45	7
Rivnenska / Klevan	1967	8	1978	11	–
Chernivetska / Bukovyna	1970	19	–	40	30
Ivano Frankivska / Nadvirna	1976, 1978, 1982	8, 2, 8	1999	34	–

To the mountainous part of Lvov region, E. bison were brought first in May 1965 from Bialovezhka Forest (Belarus), to the game enterprise “Maydan” in the amount of 10 individuals (4 males, 6 females) (Tatarynov 1973). Population numbers were the highest there (over 40 individuals) during 1985–1988. In the 90-ties of the XXth century, a reduction in the number of Maydan subpopulation was recorded. The last bison died here, most probably, in February 2008. In order to restore the population, the project “Restoration of the European Bison Population in the Eastern Ukrainian Carpathians” was initiated in 2005, being co-financed by the Large Herbivore Foundation in cooperation with European Bison Friends Society (Poland). In June 2009, 6 individuals were brought from the Zoo of Gera (Germany), in May 2010 the animals were released from the enclosure into the wild.

In Maydan subpopulation the primary reason for the reduction of E. bison numbers was the shortage of forage in the period of severe winters, when, as the result of snowfalls and strong frosts, limited was the access to forage resources. In the winter of 1985, after an intensive snowfall, ten animals were spotted close to the top of the mountain ridge, where from they could not move down because of a deep snow, approaching the height of the bison. Accessibility of forage at the mountain ridge was too low. The animals ate spruce, willows, but that was insufficient, and all bison died (Khoyetskyy 2002).

Another death reason were accidents. For example – three exhausted individuals could not leave the bog, in other case – while passing the bridge across the river one bison was pushed down by the other, fell down, broke his spine and died. Altogether 6 individuals died from accidents (Khoyetskyy 2003).

Considerable effect on the number of bison in the 90ties of the XXth century had the illegal hunting. In 1999, the home range of Maydan subpopulation became a part of the national park “Skolyvski Beskydy”. Since then a protective measures there became more tight. As the result, the poaching went down, however, this did not help to save the animals which were the descendants of individuals brought in 1965.

Existence of Tsuman subpopulation (Volyn region) dates from May-June 1965, when 15 individuals were brought (6 males, 9 females) from Bialowezha Forest (Belarus) to the state game-preserve “Tsuman”. The largest population (about 200 individuals) was there at the beginning of the 90ties of the XXth century; however by 2010 only about 15 individuals were left there. On the Tsuman subpopulation of bison, no significant material has been collected. However, according to the results of this study, one of the main reasons for the reduction of E. bison numbers there is poaching. In the 90ties of the XXth century, the Ministry of Environmental Protection of Ukraine allowed for selective hunts of old bison. Hunting licences were sold to foreign hunters, for the grounds of the game enterprise. Between 1991–1999 foreigners got 29 animals there. Over this period eliminated were from 1.0 to 4.1% of the total

population number. The main criteria used for the selection was a “bad fatness” of the animal. According to informal data, foreign hunters were shooting not ill bison, but the individuals with the best trophy qualities.

To Rivne region, 8 bison (3 males, 5 females) were brought from the game enterprise “Klevan” in Bialowiezha Forest in 1967. Animals were held in the enclosure for about 8 months, and in December 1967, they were released to the wild. Over the period of 1967–1971 the recruitment rate there was 9 individuals, but also 9 animals died. In 1970 and 1971 there were no newborns. The bison population existed there until 1978 (Halaka 1973). To explain the reasons for its termination it is necessary to conduct a more thorough study. It is known anyway, that similarly like in all other locations of E. bison occurrence, where railways were nearby (Nadvirna, Tsuman), cases of death due to collisions with the train were registered.

At the beginning of October 1970 from Berezyna Reserve (Belarus) to the state game enterprise “Bukovyna” (Chernivtsi region), 6 individuals were brought (2 males, 4 females), from Okskii reserve (Russia) – 9 individuals (5 males, 4 females) and from Prioksko-Terrasnyi reserve (Russia) – 4 bison (2 males, 2 females) (Herus, Kryzhanivskyy 2005). During the next 20 years an increase in E. bison number was recorded there. The population was the most numerous in 1994–1995 counting over 200 individuals then. Since 1996 the decline of E. bison numbers was observed. Over the period from 1996 to 2007 the numbers of this subpopulation decreased by 2.6 times. One of the main factors was shortage of forage. In winter 1995/1996, when a considerable snow cover remained in the Carpathians from November until March (over 150 days) and severe frosts from –10 to –35°C, nineteen bison died. Until the beginning of the 90ties of the XXth century, hay in the Carpathians was produced in large amounts to feed the livestock during winter. Small haystacks were left for winter in the hayfields, where they were accessible for bison and could be consumed by them in hard winter times. The accessibility of this supplemental source of food considerably decreased after economic and political changes in the country.

A substantial cause of the reduction in Bukovyna subpopulation is illegal hunting. The last reliable case was traced in January 2010. Cases of poaching were also registered in the past, some culprits were arrested or paid considerable fines. In 2003 during a hunt for ungulates, as the result of unprofessional shot (at the unclearly visible target) a young bison perished. Cases of bison death due to blood intoxication resulting from earlier injuries were also registered.

Deaths of bison caused by bears (*Ursus arctos* L.) have been reported from Bukovyna subpopulation. Such cases were not reported from Skole subpopulation. Bears hunt bison from an ambush, and get the bison by breaking its spine.

During 1980–1981, 12 individuals were brought from Lithuania to the lowland part of Lvov region to state game enterprise “Lopatyn”. During

1980–2007 their number was low, and did not exceed 14 individuals. In order to restore the population during 2008–2009, 14 bison were brought from Uladvivska subpopulation (Ukraine). After a considerable (2–3 months) adaptation period in the enclosure, bison were released into the game-reserve. During a long period of time the number of individuals in this subpopulation, in comparison with others, was the lowest, which made possible a precise registration of death cases. The most frequent reasons of death were: illegal hunting and diseases. Cases of such diseases as purulent peritonitis (sepsis), leading to body intoxication and death of animals were registered there. In Lopatynska bison subpopulation recorded was the mortality among one or two-month old individuals. Deliveries, ending with death of cow and the calf were registered in Nadvirna subpopulation.

Nadvirna subpopulation (Ivano-Frankivsk region) was formed during 1976–1982 on the basis of 18 individuals brought from the reserves of Russia (Oka, Pryoksko-Terasne). The subpopulation became the most numerous (26 individuals) in 1990–1991, and since 1992 observed was the reduction of its numbers, the last bison there were registered in 1999–2000. Five factors influencing population numbers were identified. In 1980 all males were affected by balanopostitis (a disease of male reproductive organs). Many individuals were affected by flukes. Population was reduced also during snowy winters with strong frosts, causing problems with thermoregulation and bronchopneumonia in bison. Deep snow cover limited access to the forage, causing animal exhaustion and death (Bondarenko *et al.* 1999). Incorrect was also the place of release (densely populated area of the region, death of animals in collisions with means of transport (trains), high antropopression). The proportion of the death cases in males and females was 1:1.7.

In general, seven major causes of bison death have been identified. Most frequently registered death was due to the shortage (inaccessibility) of forage, caused by weather conditions in the winter period. Sometimes, deep snow cover made it impossible for the animals to move, and access the natural food or feeding stations, which led to hunger, exhaustion and death of individuals. Once a simultaneous death of several bison due to food shortage was registered by a game ranger (Table 2).

Altogether, 26% of cases of bison death were caused by the shortage of forage in the winter period, all in the mountains. In lowlands, even in unfavourable weather conditions (snow cover, frost), no death of bison due to forage shortage was registered.

In 23.7% of cases there was no possibility to trace the reasons for bison death. The remnants of animals were in the condition making impossible to determine the sex or age. Quite often dead individuals, especially in the mountains, were found earlier by predators, in particular bears, which fed upon the bison carcasses even in the winter period. Sometimes only the skeleton or its parts were found.

**Table 2.** Cases and causes of death of E. bison, registered in Ukraine between 1999 – 2010.

Causes	Subpopulation				
	Maydan	Tsuman	Bukovyna	Lopatyn	Nadvirna
Food shortage	10	2	19		3
Poaching	4	3	6	3	3
Accidents	6		5	1	4
Diseases	2	1	4	3	5
Transportation	1	2			6
Old age	1	1	2		1
Predators			2		
Not identified	5	6	9	1	10
<b>Total</b>	<b>29</b>	<b>15</b>	<b>47</b>	<b>8</b>	<b>32</b>

However, death due to predation constitutes only 1.5% of the overall number of death cases, and was lower than the death rate resulting from old age (3.8%).

One of the main reasons for bison death was poaching, in particular in the 90ties of the XXth century. Most probably, there were more cases of illegal hunting, but confirmed were only 19 of them, which makes up 14.5% of the total number of death cases. Illegal hunting was registered in all sites of E. bison occurrence. In some old animals during an autopsy, bullets encapsulated in the skin were found, which could have been the result of poaching or attempts to scare bison away from agricultural lands.

A considerable percent (12.2%) of death cases was due to accidents – the reason for the death of 16 individuals. Cases of accidents with train (7) and car (2) amounted to 6.9% of the overall number of death cases. Some animals died after eating considerable amounts of fermented forages (e.g. beets, clover). In densely populated industrial districts, registered were deaths of bison due to water poisoning by the discharge of industrial waste.

Death of bison from diseases was confirmed in 11.4% of cases analyzed. Among them were: cardiomyopathy, chronic catarrhal bronchopneumonia, obstruction and inflammation of digestive tract, palsy of the centres of cardiovascular system caused by intoxication of the body as the result of decontamination of liver and lungs with helminths (dicroceliasis, dictyocaulosis) (Tatarynov, Dyakun 1969). There were no confirmed cases of anthrax and brucellosis.

Not always the animals were well prepared for the transportation to new locations; some animals were exhausted during the journey, some of them died.

## Conclusions

The problem of protection and restoration of European bison both in the world, and in Ukraine remains unsolved. Bison still needs care of people; this species cannot be left alone with its current problems. In the western part of Ukraine in the XXth century, 6 subpopulations of European bison existed, but in the beginning of the XXIst century, only 4 have remained. In the whole region, 131 cases of bison death were registered, seven factors have been identified that lead to the reduction of E. bison numbers. The main of them are poaching, diseases – over 25% of the cases, and in the mountains – also the shortage of forage in the winter period (26%). In the mountains, E. bison are also hunted by bears. E. bison death due to collisions with transportation means was registered in the places with developed network of railways and motorways. Over 12% of death cases were the accidents. In almost 24% of cases the reason of death could not be determined.

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### Przyczyny upadków żubrów w zachodniej części Ukrainy

**Streszczenie** W drugiej połowie XX wieku utworzono w zachodniej części Ukrainy sześć populacji żubra, trzy na terenach górskich i trzy na nizinach. W latach 70. XX wieku Klewańska subpopulacja przestała istnieć, dwie inne (Tsuman i Skole) były bliskie wyginięcia, a w populacji Bukowińskiej liczba osobników zmniejszyła się znacząco. W latach 1999–2010 prowadzono badania wpływu czynników środowiskowych na liczebność populacji żubra. W tym okresie zarejestrowano 131 przypadków śmierci żubra. Wyróżniono siedem głównych przyczyn upadków: brak pokarmu, kłusownictwo, choroby, wypadki, wiek, drapieżnictwo oraz transport. Głównymi czynnikami powodującymi zmniejszenie populacji żubra było kłusownictwo i choroby, a w warunkach górskich również brak pokarmu. Jednak w wielu przypadkach nie było możliwe określenie przyczyny śmierci.

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