december 2014
ZOO report
the magazine for friends of the Brno Zoo
BRNO

European bison return to the Czech nature

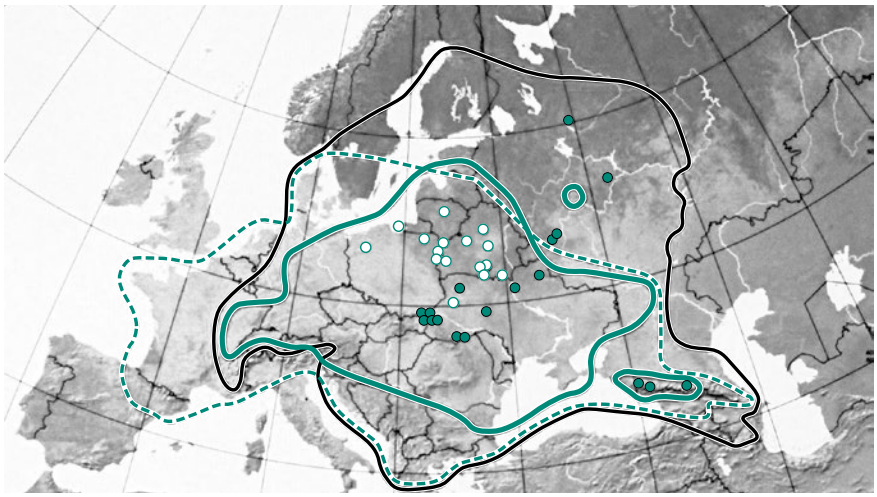
Bison in Białowieża National Park **Photo: Krzysztof Onikijuk**

In our era, irreversibly scarred by loss of biodiversity, sometimes a more optimistic message gets through concerning the fact that an animal that previously was completely or nearly extinct has restored its population, and is returning to places from where it was chased away in the past.

Zooreport also takes notice of such cases. For example, in this issue we can find information about the return of wolves to North Bohemia after about two hundred years. Earlier issues of our magazine also brought information about the rediscovery of sea eagles and the Eurasian beaver in the Czech Republic, and the protection of the European otter.

This specialized supplement deals with the return of the largest European land mammal to many states of the old continent, including our country. The following text is a shortened and slightly adapted version of a publication by authors Dalibor Dostál, Miloslav Jirků, Martin Konvička, Lukáš Čížek and Martin Šálek named "Return of the European bison (Bison bonasus) to the Czech Republic: Potential contribution to the national conservation/developmental measures and perspective reintroduction localities", published by the Česká krajina charitable society in 2012.

The European bison *(Bison bonasus)* and American bison *(Bison bison)* are the last two living species of the *Bison* genus, which is classified as part of the *Bovinae* sub-family and *Bovidae* family. They are close relatives, are similar in appearance, and have shared similar fates: Both have approached the very edge of extinction and, at the last minute, were rescued by humans from complete destruction. It was humans, of course, who brought about this situation in the first place.



The map depicts various interpretations of the historic range of the European bison. The areas with documented finds from a period extending from 8,000 years ago up to the present day (from the middle and late Holocene) are enclosed by a thick line. A weaker line demarcates the area reconstructed on the basis of paleoclimate and paleovegetation models. The broken line represents the boundary according to the traditional reconstruction of the area described in older literature sources. The circles with white centres depict the locations where wild populations (of more than ten individuals) of bison of the lowland (Białowieża) line can be found, while black circles mark the locations where populations of bison of the lowland-Caucasian line (again, of more than ten individuals) exist. ***Map: Miloslav Jirků***

The original territory occupied by bison used to take up a major part of the old continent, stretching from the Atlantic ocean to the Caspian Sea. However, there were no bison in southern Europe or in the north of Scandinavia. The centre of their range was in eastern and central Europe. As a result of excessive hunting, the numbers of bison were in decline from the Middle Ages onwards. Additionally, with ongoing changes to the landscape as it was converted for agricultural use, their natural habitat dwindled and became fragmented. By the 19th century, bison lived only in the Caucasus and in the Białowieża Forest, which lies on the border between Poland and Belarus. They remained at these locations for a long time, as these were the traditional hunting grounds for Polish and Russian rulers; thus bison were protected there.

Disappearance of species and current population

Bison disappeared from the wild after World War I. In the Carpathians, the last bison was hunted in 1762, while the last Białowieża bison was killed by the poacher Spakowitz on 9th February 1919; and the last wild bison in the Caucasus died in 1927. Fortunately,

Bison at the Židlov nature reserve. The bison look frightening, but they are shy herbivores that ignore people providing they are not approached or irritated. If they are, they can attack out of fear, which mainly occurs when a mother tries to protect her calves. One hundred metres is a safe distance for humans. Bison see dogs as a great threat, as they had to defend themselves against wolves during their evolution. ***Photo: Jiří Suda***

in the 1920s, there were still several tens of bison left in Europe in zoological gardens and in enclosures belonging to aristocratic families. From 1923, zoologists in the International Society for the Preservation of the European Bison put together a twelve-member group of founder animals whose ancestors make up the current purebred population of about four thousand individuals. The International Studbook, founded in 1924 and now kept by specialists from the Białowieża National Park, registered 2,956 bison living in the wild and in semi-wild animal-keeping enclosures in 2010, and 1,475 bison living in captivity. The bison is protected in all countries due to its rarity: The IUCN Red Book lists it as a vulnerable species.

The first successful reintroduction took place between 1952 and 1966, when 38 bison (14 males and 24 females) bred in zoological gardens or enclosures were released in the Polish part of Białowieża National Park. At present, bison also live in the wild at other locations in Poland and also in Slovakia, Belarus, Lithuania, Ukraine, and Russia. They have also returned to semi-wild enclosures in Germany, the Netherlands, Spain, Romania, and the Czech Republic. It is expected that the very first project to reintroduce bison in the wild in the Czech Republic will be implemented in the spring of 2015.

Bison on Czech territory in the past and today

Bison probably disappeared from the countryside of what is now the Czech Republic as early as the Middle Ages (exact date unknown). Skeletal remains are rare or of doubtful origin, as they are very similar to the remains of aurochs, which were once common here. The biography by Einhard of the Roman and Frankish King Charles the Great says that the monarch stopped to hunt bison with his party in "Hyrcan Forest" during his campaign in southeastern Europe in 803. This was probably the Šumava Forest. Other references only concern breeding in captivity: Members of the high aristocracy enjoyed keeping bison in enclosures over the centuries.

The first Czech zoo to begin keeping bison was Prague Zoo. It acquired crossbred bison even before World War II (other animals weren't available at that time) and, after the war, it kept pure-blooded bison. At present, bison are kept by four Czech zoos: Zoopark Chomutov, Prague Zoo, Pilsen Zoological and Botanical Gardens, and Hodonín Zoo. Czech zoological gardens are contributing to saving the bison not only by breeding but also by returning bison to the wild. Zoopark Chomutov participated in the reintroduction of bison to Poloniny National Park in Slovakia. The first pair of young animals from Chomutov joined the herd in Poloniny in 2005. The herd had been created one year earlier by importing five individuals from Holland, Italy, and Switzerland. These animals were soon joined by a male named Pišta, who came from the wild population of bison found in the Bieszczady Mountains in Poland. A female imported from Chomutov, Cvinka, gave birth to a young male in June 2007. (In the autumn of the previous year, she had been observed mating with a male called Archie, who had been brought in from Holland.) In 2006, another female (named Cvrcala) arrived in Poloniny from Zoopark Chomutov, and the female Pupava was moved there from Bratislava Zoo.

Reintroduction of bison to the Polish Bieszczady National Park, which neighbours on Poloniny National Park, started as early as the 1960s, and a herd of about three hundred lives there now. In order to reinforce the genetic fund, Prague Zoo brought six animals to Bieszczady. The transfer involved one pair in 2005, and a single female named Prvosenka in 2006. After a pause of several years, another female, Princezna, with a male, Prokop, arrived from Prague; and a female called Prga was also sent there eventually.

Since the 1990s, when farm breeding of bison commenced, the efforts of non-governmental organisations to return these animals to the Czech countryside have been increasing: National parks and, particularly, military areas which the army is leaving or has already left seem to be suitable locations for the release. The first semi-wild breeding area was established by the state-owned enterprise Vojenské lesy a statky in the Židlov enclosure, which lies within the Ralsko former army training area. The Česká krajina charitable trust has already bought five breeding animals – one male and four females – from an international organisation, European Bison Friends Society, which, through its headquarters in Poland, is coordinating the return of bison to the European countryside. In 2014, three more bison purchased in Poland should be added to the group. Probably in the spring of 2015, the whole group will be released into an acclimatisation enclosure and later set free in our largest army training area in Doupovské vrchy.

Subspecies, hybrid origins, and genetic lines

Three geographical subspecies of bison are distinguished, sometimes being classified as individual species: the European bison *(Bison bonasus bonasus)*, the somewhat smaller mountain subspecies known as the Caucasian wisent *(Bison bonasus*

Bison at the Židov nature reserve ***Photo: Jana Bucharová***

caucasicus), and its close relative the Carpathian wisent *(Bison bonasus hungarorum)*. While efforts to save the European bison were successful thanks to breeding in captivity, the Caucasian and Carpathian wisents have become extinct. Two genetic lines exist in the current population, which is due to the fact that one bull of Caucasian origin was among the twelve founders (five males and seven females) selected in 1923 from the bison originating from Białowieża's primeval forest and kept in captivity. The bison population without any admixture of Caucasian blood, which make up the so-called lowland (Białowieża) line, owe their existence to only seven founders (four males and three females). The animals of this pure-blooded line live wild or semi-wild in northwestern and northeastern Poland, Belarus, and Latvia. The genes of Caucasian wisent now survive in the so-called lowland-Caucasian line, in whose creation all of the twelve founders participated. The populations are always bred or released into the wild separately so that the lines don't mix.

Evolutionally, the bison is a very young species which evolved as late as the end of the last Ice Age. DNA analyses have revealed that it is a crossbreed of two extinct bovids, the steppe bison *(Bison priscus)*, which lived on cold and dry mammoth-inhabited steppe; and the aurochs *(Bos primigenius)*, inhabitants of temperate forests. Even though aurochs and steppe bison inhabited very different habitats, their localities were joined (probably in the area of eastern and central Europe) when the mammoth-inhabited steppe gradually retreated and forests expanded at the end of the last Ice Age. The oldest known bison remains come from between 12,000 to 10,000 years ago.

In the Russian part of the Caucasus, but also in other places in Russia, there is an isolated population of bison crossbreeds whose existence is considered to be undesirable. Despite that, its importance as a comparative biological entity is undeniable. The unusual adaptability and reproductive potential of the crossbreeds noted in the harsh high mountain climate where they live suggest that they possess similar innate characteristics to other bison.

The first crossbreed between bison and domestic cattle (known as a zubron) was born in Poland in 1847. From 1958 until the 1980s, in connection with the drive to save the bison, the Polish Academy of Sciences experimented with the crossbreeding of bison and cattle in laboratories near Białowieża:

Zubron in Białowieża National Park ***Photo: Wikimedia***

A European bison checks his new surroundings after being relocated to Armenis village in the Tarcu mountains of southeastern Romania. The 18 European bison from five different countries were brought back to the Tarcu Mountains in May 2014 by the Dutch organisation Rewilding Europe together with its partner WWF-Romania. The wisets are now roaming in a 160 ha area, ten times larger than the quarantine area (which was around 15 ha) in which they spent their first four months after arrival. The herd have adapted very well to their new home, and should grow to about 500 individuals in the future. ***Photo: Costas Dumitrescu***

Several zubrons can be seen in the enclosure at the local reservation even today. The crossbreeds are a lot larger than either cattle or bison, with males reaching a weight of up to 1,200 kg. Zubrons were supposed to become a great asset for the production of meat and milk. However, the hope that breeding would be lucrative faded with the fact that male young are infertile, so that a bison or cattle bull would have to mate with the second generation of female zubron.

Requirements regarding environment and reproduction

Earlier, closed forests were considered to be the optimum environment for bison, but it now appears that they were probably just their last place of shelter. The original living environment for bison was made up of deciduous and mixed forests with rich undergrowth and clearings. Bison can also live in deciduous forest steppes or not-very-steep mountain terrain with a sufficient proportion of open areas and grasslands; before their extinction in the Caucasus, they lived at heights of up to 2 100 m above sea level. Their adaptability is demonstrated by their occurrence in areas with prevailing coniferous vegetation, e.g. in the Belarusian part of the Białowieża primeval forest. Nevertheless, they prefer grazing in open areas and along the edges of forests.

In the 19th century and at the beginning of the 20th century, Russian zoologists discovered when observing the original Caucasian population that bison do not bathe, unlike many other large bovines, the only exception being when they need to overcome water obstacles during migrations. Bison enjoy bathing in dust in places with dry porous soil or sand. Another important requirement as regards the bison's environment is the presence of soil deposits rich in minerals or mineral water springs. In the Caucasus, there are many mineral lick locations which are regularly visited by bison together with other ungulates.

Only males aged 6 to 12 can reproduce in the wild. Younger ones are prevented from mating by older bulls, and males over 12 years of age are not successful in the competition for females. Bison females usually mature at the age of three and remain fertile until the end of their lives, which are approximately 18 to 20 years in length in wild populations. The mating period in wild populations lasts from August until October. Females usually have one calf or, in exceptional cases, two. The young suckle for 6 to 8 months, and stay with their mother until they are between two and three years of age. The speed of growth slows down significantly at the age of 5 to 6 years. Male bison reach a weight of between 530 and 920 kg, while females achieve about half this weight, 320 to 540 kg. The maximum body dimensions of bulls at six years of age and older recorded in Białowieża were the following: height at the withers 188 cm, with a body length of 300 cm. In adult cows from the same population, the maximum height at the withers was 167 cm and the maximum body length was 270 cm. The maximum recorded age of bison in captivity is 23 years for males and 28 years for females. However, males don't live for more than 14 to 16 years in the wild; and the oldest female in the Białowieża primeval forest lived for 24 years.

Population structure, migration

The bison is a herd animal, and the basic population units are either mixed or exclusively male. Mixed groups, usually led by one dominant female, include young animals aged 2 to 3 and adult females with their young. These are temporarily joined by adult bulls. On average, such a group consists of between 8 and 13 animals, and it is not a family group. Groups of bulls are small, consisting of only two members on average.

Bison in Białowieża National Park ***Photo: Krzysztof Onikijuk***

Bison are non-migratory animals: All introduced herds have remained in the place where they were released, regardless of the area or the character of the terrain and vegetation. Rarely, however, an individual animal, most frequently a young male, may migrate over a greater distance. On average, a herd moves 1–3 km per day, though it often remains in one place for several days. Summer migrations are influenced by the local food on offer, and their origin can also be connected to the social structure and density of the bison population. Long distance migrations have been observed in Poland, Belarus and Lithuania: one known record was set by a bull which moved approximately 300 km in 28 days from the Bieszczady Mountains towards the north-west.

Good conditions for the reintroduction of the bison

Even though zoological gardens have played an essential role in the rescue of the bison, their importance in this field is decreasing today. It is obvious that the conditions needed for the permanent sustenance of the species could not be provided even if all the breeding facilities were joined together: Zoological gardens just don't have sufficient capacity. The expansion of breeding, particularly of large species, in the form of the foundation of new wild and semi-wild populations is the only way to "relieve" zoological gardens and improve the quality of breeding in the zoos themselves thanks to the larger number of animal keepers available. Certain localities in Czech national parks and mainly extensive areas on army training grounds can provide a favourable environment for reintroduction. The total surface area of our national parks is 119,500 hectares, while army land covers 129,600 hectares. Only about 5% of the area at the locations used for training has been devastated by soldiers; otherwise, the countryside has remained almost undisturbed.

The role of large grazers

As people attempt to protect large ungulate species, they are coming to think of them as a means of maintaining protected areas with biotopes close to those of the original natural landscape. In the past, the countryside wasn't only made up of deep continuous forests, as one might imagine. As a result of various disturbances such as fires, floods, gales and water or wind erosion, lighter areas without woody cover were created where many species of plants and animals found a suitable niche that wasn't available for them in the forests. Natural successive overgrowths of cleared areas did not occur: forest-free islands couldn't be covered by an invasion of woody species as the landscape was occupied by so-called large grazers – bison, wild horses and aurochs. These three herbivores in particular maintained the rich mosaic of biotopes and thus also high biodiversity. As the amounts of large grazers declined, their role was gradually taken over by domesticated animals. However, domesticated grazers had almost disappeared from the landscape by the middle of the 20th century as agricultural methods changed. Replacing them by other means of keeping vegetation under control, for example by mowing grass and cutting down woody plants, is expensive and inefficient.

Apart from the effort to return the bison to other nature reserves, there are also projects for the release of bred-back tarpans and aurochs. Let's remember that the last European wild ancestor of the domestic horse, the tarpan *(Equus ferus)*, was killed in 1879 in Ukraine, while the last wild ancestors of domestic cattle, the aurochs *(Bos primigenius)*, died in Poland in 1627.

The replacement of natural ecosystems within wider landscape units is based on a pragmatic approach – it should make the maintenance of the landscape easier and cheaper while rendering remote areas more attractive and stimulating local economies via the development of tourism.

This supplement was prepared with the use of the publications listed below by

Eduard Stuchlík

Literature:

Dostál, D., Jirků, M., Konvička, M., Čížek, L., a Šálek, M., 2012: Návrat zubra evropského *(Bison bonasus)* do České republiky: Potenciální přínosy a perspektivní lokality. Česká krajina, Kutná Hora, 120 s.

Internet links:

http://www.ceska-krajina.cz/wp-content/uploads/2014/01/Navrat_zubru_do_Ceske_republiky_2012.pdf; http://data.abicko.avcr.cz/2013/04/09/