

ZAMĚŘENO NA PŘÍRODU

MILITARY LIFE FOR NATURE

Restoration of steppe habitats in Blšanský chlum Special Area of Conservation



**Case study of the Military LIFE for Nature project
implemented between 2016 and 2022**

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INTRODUCTION

Military areas are comparable in importance to the most valuable Czech protected areas; mainly due to the occurrence of nowadays rare non-forest habitats, such as dry grasslands, heathlands, wetlands or even sand dunes. These habitats have been preserved here due to the absence of urbanization and industrial agriculture, as well as due to the army activities. The activities of soldiers in the field unintentionally simulated natural processes for many decades – the so-called disturbances, which otherwise disappeared from the cultural landscape. Disturbances generally disrupt the established state of the ecosystem, prevent the gradual overgrowth of the landscape and thus ensure the constant restoration of non-forest habitats. Infantry, heavy vehicles, and exploding ammunition shaped the landscape just like herds of large ungulates, natural landslides, windthrows, and fires once did.

The aim of the Military LIFE for Nature project was to provide management of five biologically extremely valuable sites in the Czech Republic, which were formed in the past by military training: Načeratický kopec near Znojmo, Pánov near Hodonín, Blšanský chlum, and Mašovická střelnice together with Havranické vřesoviště. For this purpose, four management methods were selected, which are being introduced in the Czech nature conservation: heavy and military equipment activity, motocross, free grazing of sheep and goats and grazing of „wild“ horses. The advantage of these approaches is, on the one hand, that they make it possible to create much-needed heterogeneity in the environment. On the other hand, they can also be effective in large areas, such as military areas, often at relatively low financial costs, especially with the involvement of local communities. The project also sought to raise public awareness of the natural significance of abandoned military areas and the involvement of local people in the management of these sites.

Blšanský chlum was the only project site in Bohemia. Its landscape was influenced not only by military activities that took place here for 50 years, but also by earlier long-term stone quarrying. The dominant feature of the whole site, which covers approximately 29 hectares, is the neovolcanic phonolite inselberg of Blšanský chlum (273 m above sea level) and, towards the south, Malý Chlum (283 m above sea level). The bare, sunlit slopes have become a refuge for thermophilous insects, especially butterflies, including such rare species as lulworth skipper (*Thymelicus action*) and chaste pellicle (*Watsonarctia casta*). After the army left, the whole hill began to overgrow with shrubs, the open steppes were disappearing, and rare plants and insects were in danger of extinction. Their rescue required the removal of unwanted dense shrubs and self-seeding woody plants. Subsequently, it was necessary to prevent further overgrowth. For this purpose, a flock of sheep and goats was provided, which return here regularly in the spring and late summer, and later a fence was built to allow the pasture to survive and further develop in the future.

The Military LIFE for Nature project was launched in September 2016 with a five-and-a-half-year implementation period. Its main researcher was the professional conservation organization Beleco, z.s., in close cooperation with partners: the organization Česká krajina (which provided grazing of wild horses in Mašovice and Havraníky), the company Wetland s. r. o. (which carried out restoration interventions in Pánov) and the Ministry of the Environment.

This document was created at the very end of the project and is intended to serve as a case study in order to record and share important information about the initial state, course and results of conservation interventions on Blšanský chlum. Emphasis is placed on retrospective evaluation of measures and transfer of experience gained, which can be used in the conservation of similar areas in the future. We thank the European Union's LIFE programme and the Ministry of the Environment of the Czech Republic for their support of the entire project and the publication of this case study.

CHARACTERISTICS OF THE AREA

■ Historical development

While the flat lands around Blšanský chlum were farmed in the past, stone quarrying took place on the hill itself from the mid-19th century (see map 1). The stone was cut by hand, probably for the purpose of gravelling roads, until the 1930s. After mining, the overall jagged character with perpendicular columnar rocky outcrops remained.

The army began to use Blšanský chlum only after the Second World War, and more intensively since the 1950s, when the 28th Mechanized Regiment moved here from Terezín in 1950. Following infantry training, a number of trenches have been preserved at the western foot of the hill and the adjoining plateau. In 1958, it was reorganized into the 3rd Motorized Rifle Regiment and in 1977 rearmed to infantry fighting vehicles (IFV). At the end of the 1970s, when driver training was most intensive, there were up to ten IFV vehicles, five to six armoured personnel carriers and three to four tanks in the area. The regiment was also equipped with 18 self-propelled 122 mm howitzers (2S1 Gvozdika) and, for its own defence, 9K31 Strela-1 anti-aircraft missiles and 18 9M14 Malyutka anti-tank missiles on BRDM-2 vehicles. At that time, the site had a dense network of roads made by heavy machinery, even around the rock inselberg. In connection with rearmament, a training range for IFV was built in the western part at the end of the 1970s. The mentioned regiment operated in Louny until 1991, when it was reorganized into the 3rd Mechanized Regiment, which was abolished a year later, thus completely ending military activities at the training ground.

After the army left, Blšanský chlum was not used in any way. The habitats of dry grasslands, previously maintained by military training, have proven to be of great scientific value, especially for rare butterfly species. However, over time, these open habitats were subject to natural scrub overgrowth and threatened with extinction, along with the extinction of rare species populations. In 2004, the area was declared Special Area of Conservation (SAC) with the subject of protection of Jersey tiger (*Euplagia quadripunctaria*) (Doležalová 2014). Although the total area of the former military training ground reached 120 ha, SAC was declared at less than 29 ha. In 2012, a Natural Monument was declared for a slightly larger area. Its aim is to protect the local mosaic of early succession habitats, especially habitats with exposed substrate, sparse to stratified grasslands with solitary to loose shrubs and species associated with them (Čížek et al. 2009). The remaining areas of the training ground were used in various ways – a model airport, a photovoltaic power plant and a new development of family houses were created in the immediate vicinity of the protected area.

■ Natural conditions

Blšanský chlum SAC is located between the villages of Louny, Blšany u Loun, and Chlumčany, covering 28.6 ha of the former training ground. The dominant feature of the site is the neovolcanic phonolite inselberg of Blšanský chlum (273 m above sea level) and, towards the south, Malý Chlum (283 m above sea level). The rest of the training ground is flat and lies on Cretaceous marl. The massif of both hills is covered with sparse thermophilous steppe grasslands, overgrown with self-seeding shrubs in places. From a botanical point of view, the most important is the phonolite outcrop with extreme xerothermic habitats, which is inhabited by thermophilous and xerophytic endangered plant species, which mix with other thermophilous dry steppe grasslands on the outcrop slopes and form species-rich dry steppe grasslands dominated by typical high-stemmed grasses such as upright brome (*Bromus erectus*) or hairy feather grass (*Stipa capillata*). On deeper soils on a plateau with a marl bedrock, the steppe vegetation turns into broadleaved dry grasslands with a significant proportion of dicotyledons (taken from Čížek et al. 2009). There is an abandoned orchard on the northern slope of Blšanský chlum. The summit of Blšanský chlum is a popular tourist destination.



Fig. 1: Neovolcanic phonolite inselberg of Blšanský chlum after removal of part of the self-seeding shrubs. (Photo: Beleco, 2020)

■ Species important from the conservation point of view

Blšanský chlum is an important refuge of thermophilous species of plants and animals. The vegetation of the site consists mainly of steppe communities on the south-facing slopes and thermophilous broad-leaved grasslands on less exposed parts with deeper soils. The species composition of the communities is similar to the steppe hills of the Lounské středohoří; however, due to the significantly smaller area of Blšanský chlum, it is depleted of species. On the hill itself and on the steppe hillsides, there are *Seseli hippomarathrum*, *Oxytropis pilosa*, the milk-vetch sp. *Astragalus austriacus*, yellow bluestem (*Bothriochloa ischaemum*), *Melica transsilvanica*, and, in places, hairy feather grass (*Stipa capillata*). Rush skeletonweed (*Chondrilla juncea*), Spanish catchfly (*Silene otites*) and purple mullein (*Verbascum phoeniceum*) grow in places with exposed substrate. On deeper soils, the steppe vegetation turns into broadleaved dry grasslands with a significant proportion of dicotyledons. Typical species here are large-flowered selfheal (*Prunella grandiflora*), numerous dragon's teeth (*Tetragonolobus maritimus*) and others.

The zoological significance of Blšanský chlum is determined primarily by invertebrate communities. The best researched group are butterflies. Diurnal butterflies include Lulworth skipper (*Thymelicus acteon*), mallow skipper (*Carcharodus alceae*) and silver-spotted skipper (*Hesperia comma*), green-underside blue (*Glaucopteryx alexis*), and bloodword burnet (*Zygaena laeta*). Of the nocturnal butterflies, probably the most significant occurrence is the endangered chaste pellicle (*Watsonarctia casta*); there is also Jersey tiger (*Euplagia quadripunctaria*), which is the subject of protection of the SAC.

The fauna of phytophagous beetles is relatively well known. There are a number of conservation-important species of weevils (e.g., *Tychius tridentinus*, *Brachysomus setiger*, *Cathormiocerus spinosus*, *Centricnemus leucogrammus*, *Otiorhynchus velutinus*, *Trachyphloeus alternans* from *Trachyphloeus spinimanus*) and Chrysomelinae (*Bruchidius cinerascens*, *Luperus xanthopoda*, *Longitarsus quadriguttatus*).

Due to its small area, the importance of the site for vertebrates is low. Among birds, typical species of sparse shrubs such as corn bunting (*Emberiza calandra*) nest here, and hoopoe (*Upupa epops*) occurs regularly.

The table below shows the selection of the most conservation-important species found at the site since 2010. Only species listed in the CR (critically endangered) and EN (endangered) categories of the relevant red lists (RD) and specially protected species (SPS) included in the KO (critically endangered according to Czech law) category are included.

| Latin name | English name | Family | RD | SPS |
|-------------------------------|------------------|-------------|-----|-----|
| Beetles | | | | |
| <i>Anthaxia candens</i> | | Buprestidae | EN | |
| <i>Bruchidius cinerascens</i> | | Bruchidae | CR | |
| Hymenoptera | | | | |
| <i>Bembix tarsata</i> | | Crabronidae | EN | |
| Butterflies and moths | | | | |
| <i>Dicallomera fascelina</i> | dark tussock | Erebidae | EN | |
| <i>Hyles euphorbiae</i> | spurge hawk-moth | Sphingidae | EN | O* |
| <i>Thymelicus acteon</i> | Lulworth skipper | Hesperiidae | EN | |
| <i>Watsonarctia casta</i> | chaste pellicle | Erebidae | EN | SO* |
| <i>Zygaena laeta</i> | bloodword burnet | Zygaenidae | EN | |
| Birds | | | | |
| <i>Emberiza calandra</i> | corn bunting | | VU* | KO |
| <i>Upupa epops</i> | hoopoe | | EN | SO* |

*VU = vulnerable, O = endangered according to Czech law, SO = very endangered according to Czech law

■ Important stakeholders

Landowners:

- The village of Blšany u Loun
- The village of Chlumčany
- Private owners of smaller plots

Agricultural entities:

- Wilomena Winery – manages vineyards in the immediate vicinity of Blšanský chlum SAC

SPA Administration:

- Mgr. Radovan Douša, Officer of the Department of Environment and Agriculture, Regional Office of the Ústí nad Labem Region

INITIAL STATE

Despite the SAC status, no targeted conservation management took place at Blšanský chlum at least until 2009 (Čížek et al. 2009). The area was used by the public only for trips or occasionally for motocross. It was overgrown with self-seeding shrubs, especially the fast-spreading dog rose. Several years before the Military LIFE for Nature project, initial remediation interventions took place here. Nevertheless, at the beginning of the Military LIFE for Nature project in 2015, large parts, formerly bare, were already covered with stratified shrubs. The last remnants of rare sparse grassland occurred mainly on paths created by trampling and riding of vehicles. Succession also had a significant effect on Blšanský chlum's hill with the former quarry, where the shrubs had overgrown the quarry bottom and more gentle sloping marginal areas. However, due to less trophic conditions, quite a few valuable areas with loose substrate and sparse grasslands have been preserved here, especially at the very top, where there were populations of *Seseli hippomarathrum* and *Oxytropis pilosa* along with fescue and other species of extreme habitats. These areas often survived due to occasional motocross activities (Čížek et al. 2009). The old orchard was also overgrown with shrubs, where many of the original trees have been preserved, mostly in poor condition. The remnants of fruit trees were also on the west side along the road. Overall, the initial state of the site in terms of nature conservation had been neglected for a long time and there was a very serious risk of losing sparse grasslands and conservation-important species of plants and animals associated with them.



Fig. 2: Before the project measures, Blšanský chlum was densely overgrown with shrubs. (Photo: Beleco, spring 2017)

PROJECT MEASURES

The aim of the Military LIFE for Nature project was to restore the area and quality of sparse grasslands to their original form (i.e., when the army was there), and thus ensure suitable conditions for survival and strengthening the populations of conservation-important species associated with them. However, the aim was not to create one uniform type of habitat over the entire area of the site during the restoration. Instead, the aim was to create a mosaic of habitats and microhabitats at different stages of succession development – with exposed substrate, sparse to stratified grassland and sparse solitary shrubs. Such a presence of various habitats and microhabitats in a relatively small area generally allows the protection of a wider range of conservation-important species, and, in particular, it is crucial in the protection of butterflies, which are the main domain of Blšanský chlum. Butterflies alternate between four life forms (egg, larva, pupa, adult) during their lifetime, and each of them can have (and, in the case of endangered species, they often do) different environmental requirements. It must also be taken into account that even within one life form, an individual needs different resources (food, sun, shade, shelter from predators and bad weather, but also other individuals for mating), which due to poor long-distance mobility must all be located in close proximity at a relatively small area (Konvička et al. 2005).

The first step in the grassland restoration was a significant reduction of shrubs and opening of the entire area. Subsequently, it was possible to proceed to the reduction of unwanted regrowth and to the regeneration of herbaceous communities. For this purpose, long-term extensive grazing of a mixed flock of sheep and goats was chosen as the most appropriate tool. Grazing generally provides a more heterogeneous habitat pattern than the more commonly used blanket mowing. In addition, the presence of goats in the herd ensures not only the grazing of grass biomass, but also the reduction of young self-seeding woody plants. In the first years of grassland restoration, grazing took place in a „wandering“ way, i.e. without fences and under the supervision of a shepherd and herding dogs. During the project, work began on a fence that would enable year-round, ideally community grazing as a long-term sustainable and community-friendly activity, which would simultaneously be financially undemanding for the state.



*Fig. 3: Measures implemented within the project have significantly strengthened the population of critically endangered chaste pellice (*Watsonarctia casta*).*

■ **Removal of self-seeding shrubs and subsequent regrowth cutting**

The self-seeding shrubs were cut on a total area of 7 hectares (see map 2). It was mainly dogwood, rose, and hawthorn, but also acacia. Approximately 80% of shrubs were removed. Solitary trees and small groups of trees were left, especially fruit trees. Cutting took place manually during the dormant period (from the beginning of October to the end of March), in two stages – the first in the period 2017/18 (4 ha), the second in the period 2018/19 (3 ha). The cut material was removed from the site.

In the following years, it was necessary to remove unwanted regrowth on areas with cut shrubs. This was done by brush cutter, always from the beginning of August to the end of March, on each area twice at consecutive intervals. During the first cutting, all material was removed, during the second it was left to decay. In addition to two-phase cutting, the grazing animals also contributed greatly to the reduction of regrowth (see Restoration grazing). Nibbling the regrowth, especially by goats, reduced the vitality of the young shoots, thus increasing the overall efficiency of their removal.



Fig. 4: Removal of self-seeding shrubs from the slopes of Blšanský chlum. (Photo: Beleco, 2018)

■ Restoration grazing

Restoration grazing with a mixed flock of sheep and goats started on the site in 2017 and continued for all five growing seasons until 2021. Grazing was done in an extensive, open way, under the supervision of a shepherd and herding dogs. In total, it covered an area of 13 hectares (see map 3), starting in the first year in a much smaller area and gradually expanding to areas where shrubs were removed. These areas were grazed twice in the first year, at the beginning and end of the grazing season, in order to ensure more intensive grazing pressure on potential regrowth. The other areas were grazed only once during the season.

Each year, the grazing lasted 100 days, and this period was divided into two sub-stages – the first part from April to the end of June lasted 60 days, the second part from the beginning of September to the end of November lasted 40 days. The herd of at least 100 individuals consisted of sheep with a smaller proportion of goats (at least 5 individuals). At night, the grazing animals were located outside the project site (see map 3).



Fig. 5: Free restoration grazing on Blišanský chlum without a fence. (Photo: Beleco, 2020)

■ Construction of permanent pasture

The project intention was to build a grazing enclosure with a shelter for animals on Blšanský chlum, which would enable year-round extensive grazing of sheep and goats. The presence of such a fence would significantly facilitate the subsequent management of the area. The form of community grazing seemed to be ideal; it was first introduced at Kamenínské slanisko within the project Restoration of endemic Pannonian saltmarshes and sand dunes in southern Slovakia (LIFE10 NAT/SK/083). With this in mind, we approached the village of Blšany u Loun and discussed the possibilities of its involvement in the subsequent community grazing project. The parameters of the planned enclosure were designed to suit the purpose of community grazing and to allow the grazing of various types of livestock, including horses.

First, the landowners and other stakeholders were contacted and negotiations started on the technical design and exact location of the enclosure. The design provided for the passage of the enclosure for the public using gates on the access roads. In order to communicate the intention and promote the nature conservation of Blšanský chlum, two public events took place in 2020. Although the actual negotiations with the stakeholders took place without major complications, changes of ownership and the outbreak of Covid-19 pandemic, due to which it was desirable to limit personal contact, significantly slowed down the whole plan. The project design and the geodetic survey took place only in 2021. A building permit was not required for the implementation. The construction of the enclosure with a total area of 20 ha is currently underway.



Fig. 6: For the conditions of Blšanský chlum, a similar type of fence was chosen as at another project site, Havranické vřesoviště, where Exmoor ponies are already grazing successfully. Acacia poles placed about 8 metres apart and 4 rows of an electric fence wire will be used. (Photo: Beleco, 2019)

MONITORING

Throughout the project, vegetation and entomological monitoring took place of the impacts of restoration measures on communities of interest and plant and animal species. The starting point for the evaluation is the data obtained in the first year of monitoring, which was completed in October 2017. Subsequently, monitoring was repeated every year, based to the methodology described below. The obtained data are currently being processed. The monitoring results will help both to optimize the implemented measures for the future, and contribute to general knowledge about the use of individual managements.

■ Vegetation monitoring

Within vegetation monitoring, three mutually complementary methods of data collection were applied:

- 1. Monitoring of target habitats:** 3 transects 20 to 60 m long were fixed in the area and placed on the basis of subjective selection on a gradient from the optimal habitat to the degraded habitat. Based on the on-site calibration, an indication group of species was determined. In the regular network of squares 0.5 m x 0.5 m (n = 63), the presence or absence of species was determined and the status of the area was recorded as optimal or degraded. Every two years, the ratio of optimal and degraded areas was evaluated.
- 2. Phytocoenological images:** 18 images were fixed in the area. Each image was fixed in the corners with a metal mark. The cover of individual species was estimated on the Braun-Blanquet nine-member scale; the total cover, living vegetation cover, old grass cover and moss layer cover was recorded.
- 3. Vegetation maps:** vegetation maps were made in the first and last year of the project (2016 and 2021) in the form of an outline of habitat extension boundaries. Habitats were recorded in accordance with the updated Habitats Catalogue.

■ Entomological monitoring

The model groups of monitoring were spiders (Araneae), true bugs (Heteroptera), butterflies and moths (Lepidoptera), and selected families of beetles (Coleoptera): ground beetles (Carabidae), weevils (Curculionidae), and Chrysomelidae. Data collection was ensured by a combination of methods: pit traps, sweep netting, light traps, and time-lapse images of diurnal butterflies.

A total of 12 pairs of pit traps were installed 10 m apart in selected parts of the area (see map 4). Pit traps were exposed three times during the growing season (first half of May, mid-June, August) for 10 days each time. The fixing medium was alcohol vinegar. At each of the pairs of traps, the surrounding vegetation was swept (always 100 times), a light trap for one night was installed here, and a time-lapse image was taken for the registration of diurnal butterflies. The collection of data on butterflies and moths (time-lapse image for the registration of diurnal butterflies and light traps) was installed also separately (without reference to other methods) in the second half of July.

RESULTS

The introduction of grazing significantly helped the restoration of steppe grasslands. Where the open character of the habitats was still maintained at the beginning of the project, after five years of grazing, the grasslands acquire the character of long-standing traditional pastures with structurally diverse grass and herbaceous stands, where ungrazed areas alternate with intensively grazed areas. This creates low flowery steppes with thyme and the milk-vetch species *Astragalus austriacus*, especially around the main peak of Blšanský chlum. On the slopes, where the shrubs were removed, large areas with bare soil were created. Here, the pasture has created heavily disturbed sunlit steppe habitats, where thermophilous, currently rare weeds of traditional agriculture, such as summer pheasant's-eye (*Adonis aestivalis*) or Roman wormwood (*Artemisia pontica*) thrive. Brown nonea (*Nonea pulla*), which is typical of pastures, also grows here.

During the project, the subject of protection – Jersey tiger – and the critically endangered species of butterfly – chaste pellicle – were supported. At the beginning and during the first half of the project, the Jersey tiger occurred in a numerically weak population on the verge of observability. It was not captured between 2017 and 2019 during the capture of butterflies and moths carried out every year at stationary points. Due to habitat changes, the number of populations increased and in 2020 and 2021 it was also recorded as part of monitoring (nine and three individuals, respectively). The results indicate stabilization of the species at the site. A significant increase in the number of populations also occurred in the chaste pellicle, which is probably the most important butterfly species on the site. At the beginning of the project, only individuals were captured within the monitoring (the number was higher only in the climatically favourable year 2018); between 2020 and 2021, there was a significant increase in the population.

Both species are indicators of changes that occur at the site as part of the project. Similar population changes can be expected for other invertebrate species with similar habitat requirements.

| | 2017 | 2018 | 2019 | 2020 | 2021 |
|-----------------|------|------|------|------|------|
| Jersey tiger | 0 | 0 | 0 | 9 | 3 |
| chaste pellicle | 5 | 15 | 4 | 27 | 16 |

The resulting extent of individual measures

| Measure | Result |
|---------------------|-------------------------|
| Shrub clearance | 7 ha |
| Regrowth cutting | 7 ha |
| Restoration grazing | 13 ha |
| Pasture fencing | about 2500 m of fencing |



Fig. 7: General view of the final state of the SAC Blšanský chlum with both peaks (the peak of the same name Blšanský chlum in the background, Malý chlum in the foreground). The site has regained its original open character. (Photo: Beleco, 2021)



Fig. 8: A mixed flock of sheep and goats maintains a mosaic of short-grazed grass, bare areas, ungrazed areas, and solitary trees. (Photo: Beleco, 2018)



Fig. 9: In summer, these inconspicuous steppes bloom in many colours. (Photo: Beleco, 2019)



Fig. 10: Large areas with bare soil were created on the slopes where shrubs were removed (Photo: Beleco, 2018)



Fig. 11: Intensively disturbed semi-vegetated steppe grasslands were eventually created on these slopes under the influence of grazing. (Photo: Beleco, 2019)



Fig. 12. The solitary trees which were left on the site are an important landscape element. Among other things, they provide the necessary shade for grazing animals in the warmer months. (Photo: Beleco, 2019)



Fig. 13: For the general public, we organized two excursions to Blšanský chlum with expert interpretation. A large part of the participants were locals and families with children. (Photo: Beleco, 2020)

LONG-TERM SUSTAINABILITY

■ **Basic approach:**

- ▶ The site will be maintained by grazing of a mixed flock of sheep and goats. To facilitate the grazing, the site was fenced with an electric fence as part of the project.

■ **Specifying conditions:**

- ▶ Grazing will take place all year round.
- ▶ The optimal grazing load will be set to a maximum of 50 animals and the impact on the site will be monitored. With regard to the long-term development of the vegetation of the site, the size of the herd will be adjusted if necessary.
- ▶ The economic sustainability of grazing will be supported by the inclusion of most of the area of Blšanský chlum in the system of LPIS land use and a suitable subsidy title will be drawn there.
- ▶ It would be appropriate to supplement the grazing with other types of grazers, especially horses. The inclusion of horses would more effectively regulate areas with wood small-reed, bulbous oat grass and other expansive grass species.

■ **Other activities:**

- ▶ It is necessary to control the regrowth of the shrubs removed during the project implementation and to mechanically remove them when they re-grow.
- ▶ It is absolutely necessary to control the regrowth of acacias in the area in the central part of the site and, in the event of their re-occurrence, to remove the regrowth with a suitable herbicide.

SUMMARY

- ▶ Extensive all-season grazing is the most suitable basic way of management of Blšanský chlum Nature Monument.
- ▶ Disposal of acacia, tree of heaven, and other invasive woody plants is desirable to perform by a more technically demanding method of injecting herbicide into pre-prepared holes. Removal by simple felling (whether on a low or high stump) without the use of herbicide, followed by manual regrowth removal, is extremely laborious and time consuming.
- ▶ Sheep and goat grazing is a less suitable way of management for areas where expansive grasses such as bulbous oat grass have developed. For these areas, it would be desirable to apply the grazing of other types of grazers specialized in grasses, especially horses.

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REFERENCES

Beleco – results of site monitoring within the Military LIFE for Nature project

Doležalová J. (2014): Souhrn doporučených opatření pro evropsky významnou lokalitu Blšanský chlum. AOPK ČR, Regionální pracoviště Ústecko, 13 pp.

NDOP AOPK ČR (accessed 1. 2. 2022)

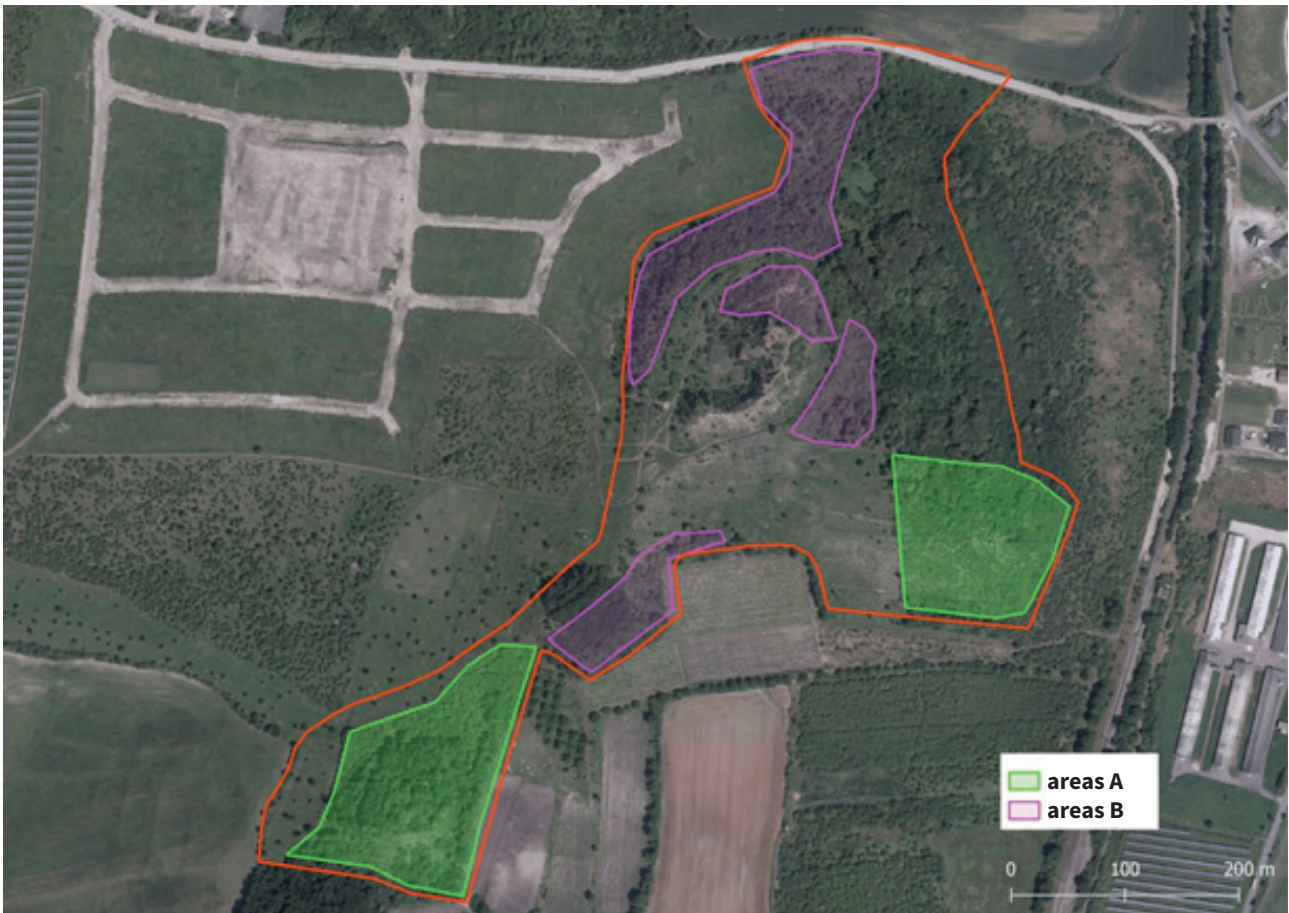
Čížek O., Šamata J. & Marhoul P. (2009): Plán péče o Přírodní památku Blšanský chlum (návrh na vyhlášení) na období 2011–2020 . Msc. Depon. in: Krajský úřad Ústeckého kraje, Ústí nad Labem, 103 pp.

Konvička M., Beneš J. & Čížek L. (2005): Ohrožený hmyz nelesních stanovišť: ochrana a management. Sagitaria Olomouc.

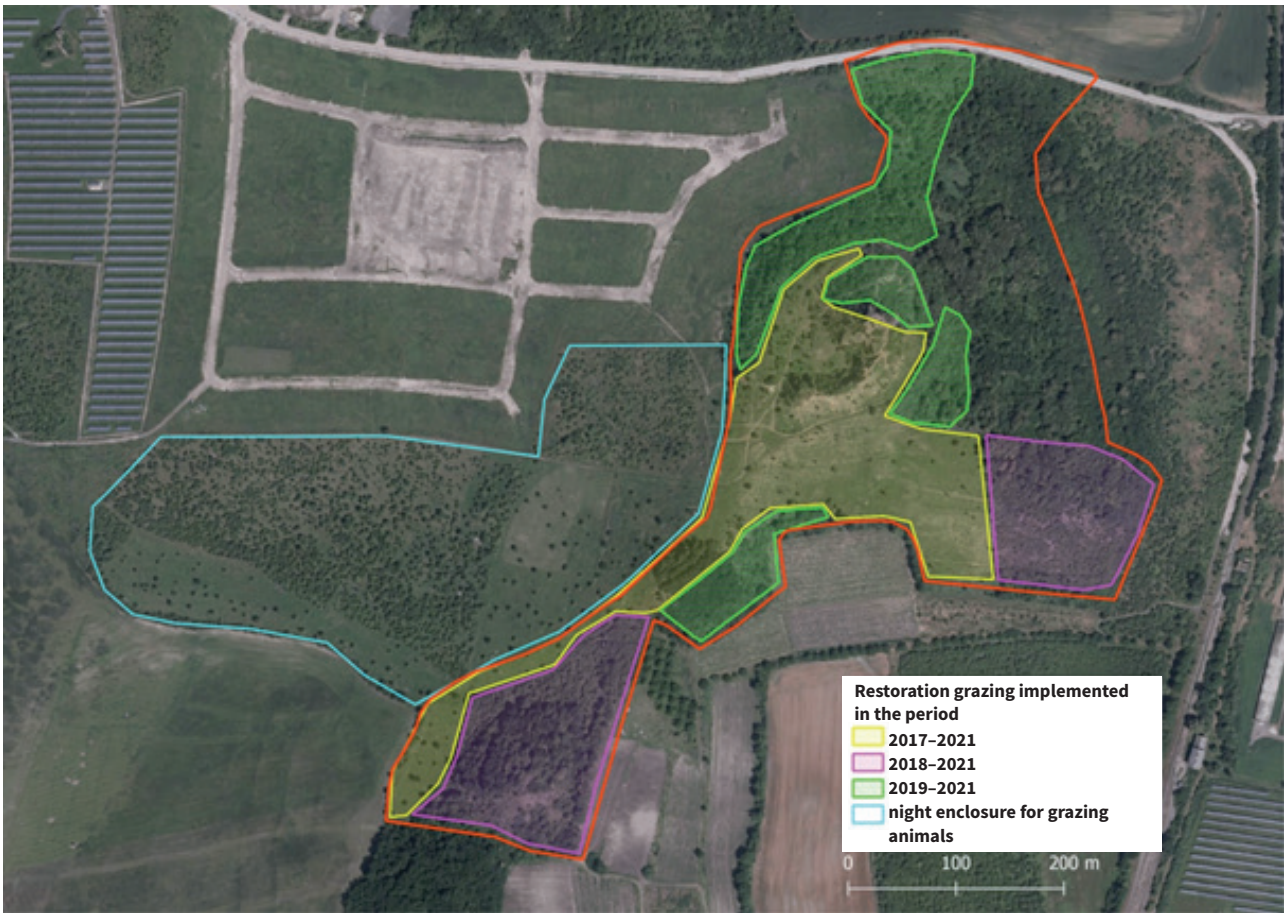
MAP ATTACHMENTS



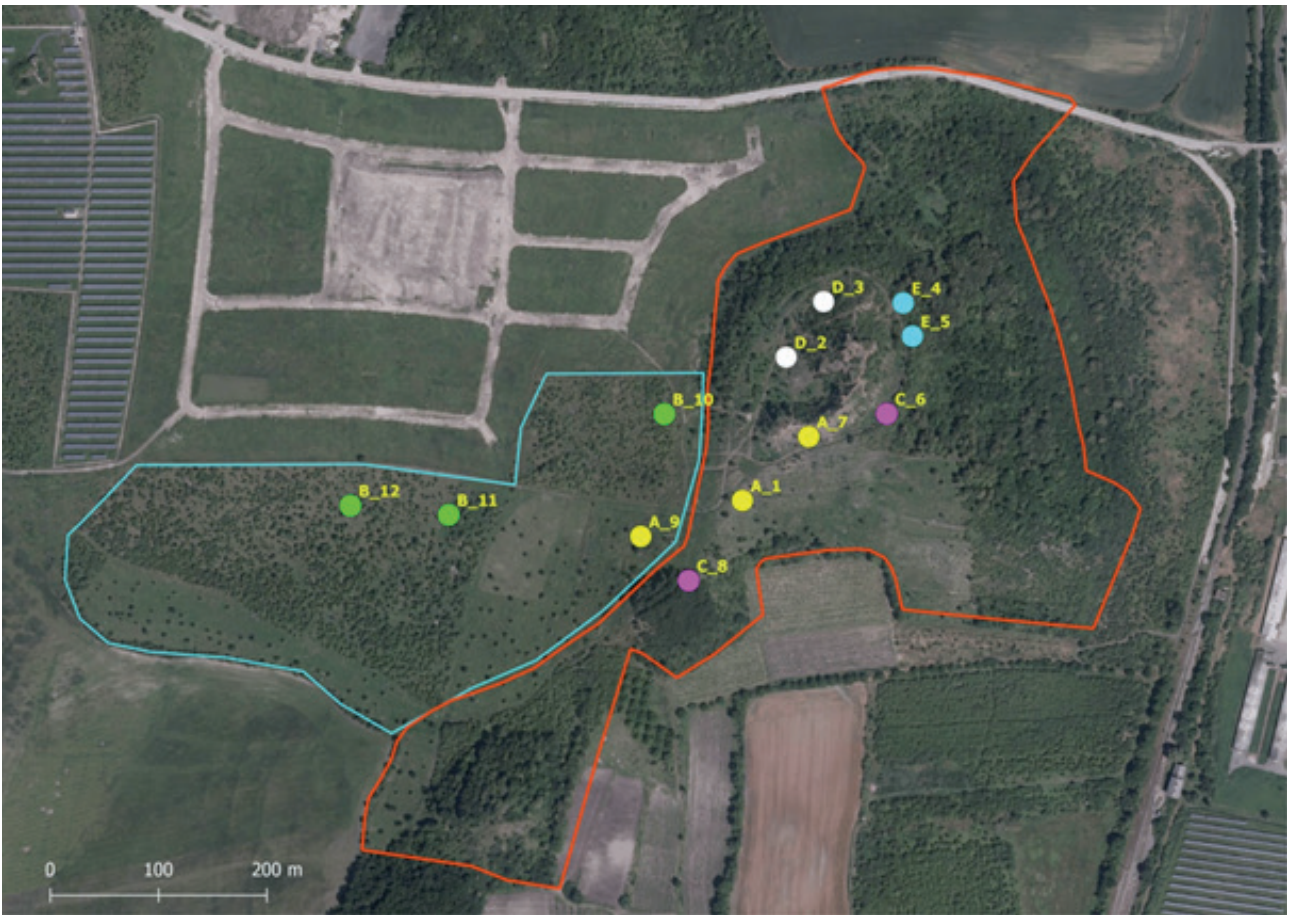
Map 1: Aerial survey image from 1938; the border of the current SAC Blšanský chlum is marked in red.
(Created by: Beleco)



Map 2: Aerial image of Blšanský chlum (initial state) showing the extent of self-seeding shrub reduction and subsequent regrowth removal. The shrubs were removed to the planned extent: in area A in the dormant period 2017/2018, in area B in the same period 2018/2019. (Created by: Beleco)



Map 3: Aerial image of Blšanský chlum (initial state) showing the extent of restoration grazing in individual years. (Created by: Beleco)



Map 4: Location of entomological monitoring traps. Trap codes reflect different combinations of compared managements in terms of their impact on invertebrate model groups: A – no shrubs, grazing; B – shrubs, grazing; C – shrubs, without grazing; D – shrubs for cutting, grazing; E – without shrubs, without grazing. (Created by: Beleco)

**Restoration of steppe habitats in Blšanský chlum
Special Area of Conservation –
case study of the Military LIFE for Nature project**

*Obnova stepních biotopů na evropsky významné lokalitě
Blšanský chlum – případová studie projektu
Military LIFE for Nature*

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