

# Unique Natural Values of the Military Training Area Záhories

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*The article presents the results of natural science research on plant and animal communities in the military training area Záhorie. Nineteen habitats of Community Interest and six habitats of National Interest have been recorded in the area. The paper underlines the importance of the existing military training areas and military activities for biodiversity conservation, and also notes the need to implement measures to rescue valuable habitats.*

**Keywords:** military district, military training area, biodiversity, military activity, Sites of Community Importance (SCI), flora, fauna, habitat

## Introduction

The public usually considers military training areas to be devastated landscape. This opinion is widespread especially among those who have never been to a military area, or who lack the necessary information. People are often convinced that military exercises in the military areas cause large-scale contamination by chemical or radioactive combat substances, fuels, destruction of vegetation and soil, killing animals or disturbance by excessive noise. These negative factors, if they do occur, usually affect only small sites within the military areas which are intensively used for training. Much larger areas of military districts, however, serve only as a “buffer zone” for the intensively used parts and military operations are almost never carried out there, or only irregularly and very rarely. Such extensive buffer zones are needed primarily for safety reasons. They often serve as important refuges for endangered species and communities. Human activities with negative impact on the natural environment, such as over-intensive agriculture and forestry, construction, industry and recreation, are excluded in the long term from the areas of active military operations. Moreover, the regular disruption of land cover during military operations supports the maintenance of several habitats of community interest (on Aeolian sands it often replaces the natural function of wind). Most animals (birds, mammals) are able to adapt relatively well to the occasional disturbance and noise resulting from military activities. Some rare species of animals find ideal conditions right at the shooting ranges. Sparse oak and pine plantations are an ideal habitat for them; therefore their populations here reach the highest abundance and density within the whole of Slovakia. Several rare species of plants and invertebrates are totally dependent on military activities which help to maintain their habitats.

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## Basic Information about the Military District Záhorie

There are three military districts (MD) in Slovakia – MD Záhorie, MD Valaškovce and MD Lešť, with a total area of 54 200 hectares. MD Záhorie is the largest and most well researched military district. There are three smaller military training areas (MTA) – MTA Kuchyňa, MTA Turecký vrch and MTA Záhorie. (Figure 1)

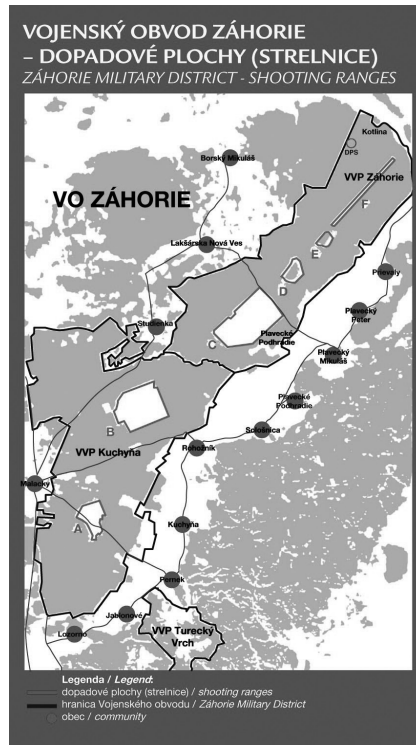


Figure 1. The map of the Military district Záhorie. [2]

Záhorie MD is Slovakia's oldest military district; it has been used for training the armed forces since 1923, hence before the large-scale intensive use of landscape. Since that time, the entire area has been used predominantly for military purposes. Other human activities have been restricted to services for the military area only. This very specific land use has resulted in conservation of a unique area of great natural value, which differs from the surrounding intensively used lowland landscape in terms of: [1]

- low level of fragmentation – it represents the largest continuous complex of a lowland forest in Slovakia;
- prevalence of natural and semi-natural ecosystems (forests, wetlands, grasslands, sand dunes);
- high diversity of habitats at different stages of succession development – frequently as a direct consequence of military actions;
- refuges of endangered wildlife (e.g. black stork) – many wildlife species have thrived here only thanks to the presence of the military area;

- natural water resources are still largely unspoiled by residuals of fertilizers and pesticides unlike in the adjacent agricultural landscapes;
- restricted access of public to the military area.

Záhorie MD is located in the central and eastern part of the Záhorská nížina lowland in western Slovakia; a small part also stretches over the Malé Karpaty Mountains. Its current size is 27 650 hectares. Záhorie MD is part of the geomorphologic unit Borská nížina lowland, which is a part of Záhorská nížina lowland. It stretches over the largest area of Aeolian sands in Slovakia with a total area more than 570 square kilometers. Under such specific conditions a diverse mosaic of extremely rare (and, on the territory of Slovakia, often unique) communities has evolved. Running and still waters and wetlands alternate with dry sand dunes. Thanks to extraordinary habitat diversity, there are a high number of species and communities with different ecological requirements in a relatively small area. Forest biotopes cover more than 72% of the area in a wide range of forest communities, from fen alder woods to dry pine-oak woods. [2] Nineteen habitats of Community interest and six habitats of National interest have been recorded in the area. (Table 1)

Table 1. Habitat types of Community interest in Záhorie Military District. [3]

Code	Habitat type
2340*	Pannonic inland dunes
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition – type vegetation
3160	Natural dystrophic lakes and ponds
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation
3270	Rivers with muddy banks with Chenopodium rubri p.p. and Bidention p.p. vegetation
4030	European dry heaths
6410	Molinia meadows on calcareous, peaty or clay-silt-laden soils (Molinion caeruleae)
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)
7140	Transition mires and quaking bogs
7150	Depressions on peat substrates of the Rhynchosporion
7230	Alkaline fens
9190	Old acidophilous oak woods with Quercus robur on sandy plains
91E0*	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)
91F0	Riparian mixed forests of Quercus robur, Ulmus laevis and Ulmus minor, Fraxinus excelsior or Fraxinus angustifolia, along the great rivers (Ulmion minoris)
91G0*	Pannonic woods with Quercus petraea and Carpinus betulus
91I0*	Euro-Siberian steppic woods with Quercus spp.
91D0*	Bog woodland

Explanatory notes: \* indicates priority habitat types

Code – European significant habitat code under Annex I of the Habitats Directive No. 92/43/EEC - Natura 2000 code; this is the four digit code given in the Natura 2000 standard data-entry form.

Thanks to the unique natural richness of Záhorie MD, parts of this area have been included in the NATURA 2000 network. In 2004, the Government of the Slovak Republic approved a “National list of proposed Sites of Community Importance” (SCI) and submitted it to the European Commission for endorsement. [4] The European Commission approved this proposal in 2007 for sites in Pannonian biogeographical region (to which Záhorie belongs as well). [5] [6]

At present, ten SCI with a total area of almost 5 000 hectares are located in Záhorie MD, while proposals of other sites have been elaborated. (Figure 2)

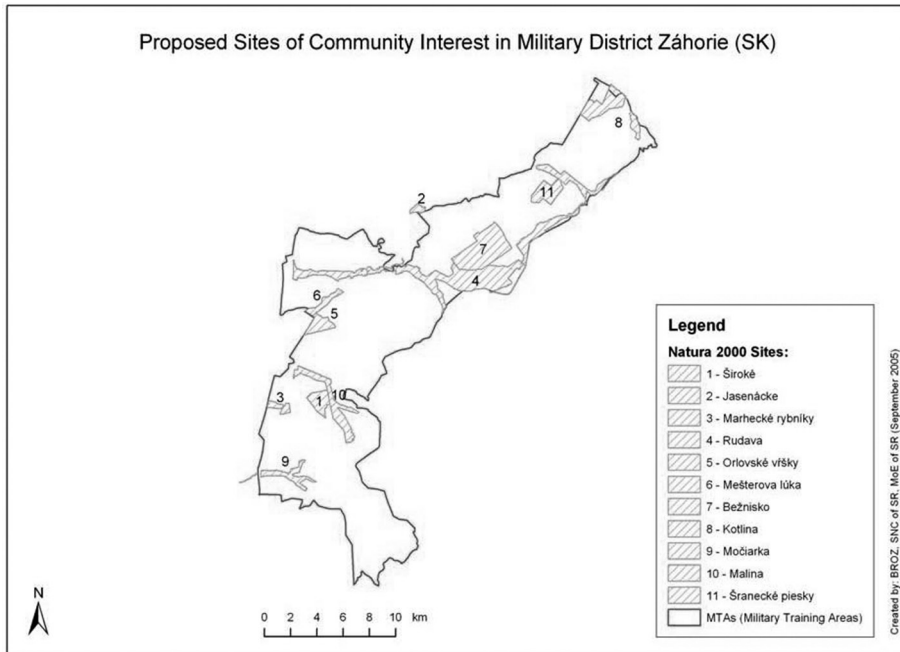


Figure 2. Proposed Sites of Community (SCI) in Military District Záhorie. [10]

Natural non-forest communities on open sand dunes are among the most threatened habitats in central Europe. In the area of Borská nížina lowland these communities represent a priority habitat of Community Interest 2340 *Pannonic inland dunes* and a habitat of Community Interest 4030 *European dry heaths*. Habitats of the sand dunes with open swards are characterized by the occurrence of several critically endangered plant and animal species creating unique communities.

The largest and best-preserved habitats of sand dunes and dry heaths within the whole of Slovakia are located right in the Záhorie MD, where they have been preserved largely thanks to the regular disruption of land cover during military activities. Four of the so called “impact areas” (shooting ranges) are included in the European network of protected areas NATURA 2000.

## Flora of the Military District Záhorie

On the open (non-forested) sand dunes of the Záhorie MD rare plant communities occur over large areas. The living conditions are considerably difficult here, therefore these areas are colonized largely by the so called psammophyte species (preferring sandy soils or areas). They are adapted to extreme drought and high summer temperatures; therefore they are able to survive here. Priority habitat of Community interest 2340 Pannonic inland dunes is unique due to the occurrence of species such as Grey Hair-grass (*Corynephorus canescens*), Wing-stem Spurry (*Spergula pentandra*), Morison's Spurry (*Spergula morisonii*), Wild Thyme (*Thymus serpyllum*) or a Feather Grass (*Stipa borysthena*). Among the rare species a Fescue (*Festuca dominii*), Late-coming Pink (*Dianthus serotinus*), Dillenius' Speedwell (*Veronica dillenii*) or Dwarf Everlast (*Helichrysum arenarium*) also grow here. Non-vascular pioneer plant species (the first to colonize the new areas during the initial succession stage) found here include the bryophyte Fire Moss (*Ceratodon purpureus*), species of the Haircap Moss (*Polytrichum* sp.) and Racomitrium Moss (*Racomitrium* sp.), as well as many terrestrial species of Cup Lichens (*Cladonia* sp.). The second rare habitat of Community interest is the European dry heaths (4030) with the dominant abundance of the Common Heather (*Calluna vulgaris*). Other species typical for this habitat are Black Yellow Late Broom (*Lembotropis nigricans*), Hairy Greenweed (*Genista pilosa*), Dyer's Greenweed (*Genista tinctoria*) and Common Broom (*Sarothamnus scoparius*). [2]

The occurrence of some of the plant species, such as Alpine Bulrush (*Trichophorum alpinum*), Meadow Bistort (*Polygonum bistorta*), Wild Calla (*Calla palustris*), Round Leaf Sundew (*Drosera rotundifolia*) and some Peat Moss species (*Sphagnum* spp.), in Záhorie Military District is indeed remarkable as they represent the species that have been sustained in the region since last glaciation when there was a sub-arctic climate in Záhorie. The tiny Fen Orchid (*Liparis loeselii*) is one of the rarest species of Community interest that can be found within the area. (Picture 1) Moreover, the Záhorie MD harbours the largest population of a Fen Orchid in Slovakia.



Picture 1. Fen Orchid (*Liparis loeselii*).  
(Photo by Jaroslav ŠÍBL)

With respect to wetland forests, especially 2 types of fen alder woods deserve attention – i.e. communities of sedge – alder wood and alder wood with Crested Fern (*Dryopteris cristata*). These natural communities with relict species are nowadays in greater extent only present in Záhorie. They grow in slacks and along the Rudava River where the water table is high and they are also frequently flooded. While Common Alder (*Alnus glutinosa*) is a dominant tree species, Elongated Sedge (*Carex elongata*) is a characteristic species commonly found on the forest floor of an alder fen. Among the other frequently found species are: Greater Tussock-Sedge (*Carex paniculata*), Fern (*Thelypteris palustris*), Water Violet (*Hottonia palustris*), Bogbean (*Menyanthes trifoliata*) and European Frog-Bit (*Hydrocharis morsus-ranae*). [1]

## Fauna of the Military District Záhorie

Sand dunes are also a unique habitat for many species of animals, many of them being totally dependent on this type of habitat – meaning they cannot live in any other place. These are especially the psammophile (preferring sandy soils or areas) species of invertebrates, many of which in Slovakia are only found in Záhorie region.

The butterfly fauna (*Lepidoptera*) is extremely rich – 112 species. Among the most valuable species is the critically endangered Marsh Fritillary (*Euphydryas aurinia*), Danube Clouded Yellow (*Colias myrmidone*), Tree Grayling (*Hipparchia statilinus*) and Oriental Meadow Brown (*Hyponphele lupinus*). Among the species typical for the Aeolian sands are Rock Grayling (*Hipparchia Alcyone*), Grayling (*Hipparchia semele*) and Large Blue (*Maculinea arion*).



Picture 2. Large Blue (*Maculinea arion*).  
(Photo by Katarína KLIMOVÁ)

The richness and uniqueness of the entomofauna of Aeolian sands is characteristic also for other orders of insect. A detailed survey has been carried out especially for beetles (*Coleoptera*) – where more than 800 species were recorded, out of which many represent glacial relicts; for locusts and grasshoppers (*Orthoptera*) – 48 species; true bugs (*Heter-*

*optera*) – 227 species; and ants, bees and wasps (*Hymenoptera*) – 165 species. Majority of rare beetle species can be found in well-preserved old-grown forests. The priority species of Community interest inhabiting the area is an endangered Hermit Beetle (*Osmoderma eremita*) living exclusively in old hollow trees. Dying out trees, especially oaks are an ideal habitat for a European Stag Beetle (*Lucanus cervus*) and Great Capricorn Beetle (*Cerambyx cerdo*). Remarkable are also Ant-lions (*Myrmeleontidae*), which are similar to dragonflies. [2]

With respect to non-forest habitats, the Rudava River together with transition mires, alkaline fens and Molinia meadows with diverse invertebrate fauna rank among the most valuable. Several dragonfly species of Community interest have been recorded in the area. The Large White-faced Darter Dragonfly (*Leucorrhinia pectoralis*) can only be spotted at well-preserved fens. Unlike larvae of a Green Club-tailed Dragonfly (*Ophiogomphus Cecilia*), which inhabit the sandy riverbed of the Rudava River, the larvae of our greatest dragonfly Balkan Goldenringed Dragonfly (*Cordulega sterheros*) prefer the small forest streams. *Cordulega sterheros* has been only recently recorded in Slovakia and all the records come from Záhorie region. Referring to vertebrates, the Rudava River is also a home of a rare Ukrainian Brook Lamprey (*Eudontomyzon mariae*), which is only known from a few sites in Slovakia and is also ranked among the species of Community Interest. Altogether Rudava harbours 39 fish species, which represents the highest fish species diversity among all 55 tributaries of the Morava River. Fauna of amphibians and reptiles is also diverse (18 species). Sand dunes and dry heaths covered by sparse herbal vegetation with sporadic trees form an ideal habitat for reptiles. Literally with every step here one can meet Slovakia's biggest lizard – European Green Lizard (*Lacerta viridis*). The Smooth Snake (*Coronella austriaca*) is rarer and often preys on the young lizards. Close to wetlands one can find Grass Snake (*Natrix natrix*), which feeds on amphibians. These dry habitats are not very suitable for amphibians; only the Green Toad (*Bufo viridis*) is more common, which is also able to reproduce in shallow pools. Spade foot Toad (*Pelobates fuscus*), European Tree Frog (*Hyla arborea*) or Agile Frog (*Rana dalmatina*), which reproduce in nearby wetlands, occasionally stray into these dry areas too. [7]

Over 70 species of birds occur in these areas, many of them being among the endangered species of the Community interest, such as Hoopoe (*Upupa epops*), European Nightjar (*Caprimulgus europaeus*) and Woodlark (*Lullula arborea*). Among the most valuable are the many colored European Bee-eaters (*Merops apiaster*), resembling flying jewels. They breed in relatively long nest burrows which they dig into vertical loess or sandy walls. Their breeding was recorded for the first time in Záhorie region in 2008 in the abandoned trenches on one of the shooting ranges in Záhorie Military District. Regarding raptor species, the Goshawk (*Accipiter gentilis*), Eurasian Sparrow hawk (*Accipiter nisus*), Common Buzzard (*Buteo buteo*) and Honey Buzzard (*Pernis apivorus*) are the most common. Old trees with holes represent an irreplaceable habitat for bats; eleven species have been recorded here. The populations of several game species are also significant, such as Roe Deer (*Capreolus capreolus*), Red Deer (*Cervus elaphus*) and Wild Boar (*Sus scrofa*). Black Stork (*Ciconia nigra*) is among the most important bird species of the area. It feeds on fish and amphibians. Both, the European Beaver (*Castor fiber*) and Otter (*Lutra lutra*) can be spotted in the streams and large water bodies, though sightings of otters are quite sporadic compared to beavers. Populations of game animals such as European Roe Deer (*Capreolus capreolus*), Red Deer (*Cervus elaphus*) and Wild Boar (*Sus scrofa*) are also important to mention. [1]

## Conclusion

At first view, military practice and nature conservation have little in common. Since military areas are less fragmented and benefit from a rather low impact of agriculture and forestry they are of significant importance to conservation. These are often the only remaining sites in our cultural landscape where the establishment of large protected areas seems possible. Most of the military areas, and especially those used for training, contain significant, even spectacular, amounts of natural habitats and landscapes with corresponding abundances of wildlife. They are among the richest and most important sites for biodiversity in Slovakia. Natural values in the MTA are often several times higher than natural values of the surrounding landscape. Therefore, several nature protection projects were performed on the military areas (*LIFE 2006NAT/SK/000115 – Restoration and Management of Sand Dunes Habitats*, *LIFE 2005NAT/SK/000112 – Restoration of the Wetlands of Záhorie Lowland*). [8]

The end of the Cold War and the expansion of NATO have led to substantial changes in the military sphere since 1990. Military forces have been restructured and reorganized. Because of this, even large sites were taken out of use. Research shows that biodiversity is gradually reduced in these decommissioned military areas. In addition, in those countries which have acceded to the European Union, many military training areas qualified for inclusion in the EU-wide ecological network called Natura 2000. [9]

The knowledge of natural value as well as understanding the importance of their conservation by the military authorities and local people is the best way to gain their support for conservation activity, particularly in military training areas. With the support the military staff it is much easier to ensure the implementation of project activity as well as long-term sustainability of project achievements.

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