



# HOHENFELS TRAINING AREA

*A successful combination: Military training and nature conservation*





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# Foreword

## The Military and Nature Conservation – Disruption and Conservation.

The contradiction could hardly be greater – or so it would seem. Weapons, tanks, and simulated war scenarios do not fit into the peaceful picture of intact nature.

However, various investigations have proven the opposite to be true: the species diversity found in military training areas is exceptionally high. These areas, not accessible to the public, are ideal refuges for numerous animals and plants and even provide valuable habitat for species that have gone extinct in our cultivated landscape. The U.S. Armed Forces at JMRC Hohenfels place very high priority on environmental protection and set it on par with the military significance of the training area.

Natural landscape structures are an essential prerequisite needed to optimally prepare the troops for military deployments. Moreover, a byproduct of military training activities is the creation of valuable habitat for a unique fauna and flora. At first, this kind of land use may appear to be anything but environmentally friendly to the someone from the outside, but – upon closer view –it has been found to be the basis for the survival of numerous endangered species. These organisms find ideal conditions for lasting survival within the intricate network of habitats in JMRC Hohenfels.

The purpose of this brochure is to demonstrate that it is especially the large training areas that present important refuges for habitat and species protection. The enormous expanse of JMRC Hohenfels is one the areas with the richest biodiversity within Bavaria and all of Germany.

Because of its overall European significance as an area contributing to the conservation of natural habitats and species diversity, the JMRC Hohenfels has been designated as an element within the NATURA2000 network.

BERNHARD WEBER  
 Chief / Environmental Division  
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 US Army Garrison Hohenfels

## Setting, Climate, Geology

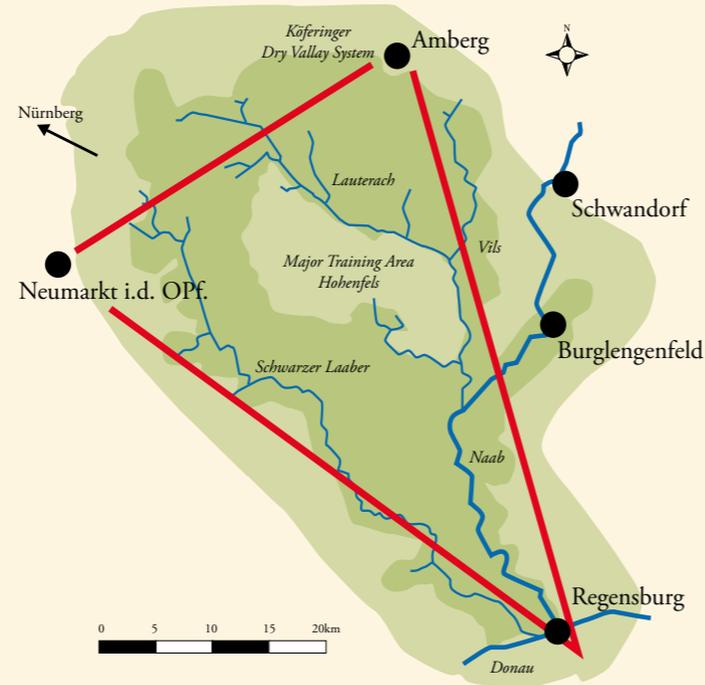
**Setting:** Hohenfels Training Area is part of the Upper Palatinate Jurassic (limestone) Formation. It is situated near the cities of Regensburg, Amberg, and Neumarkt. The valley of the Lauterach River extends along the northern border of the training area.

**Geologic history:** The limestone bedrock that is the foundation of the training area consists of layers of White Jurassic (Malm). They originated from depositions of the Jurassic Sea, which covered large parts of Europe during the Jurassic Era. The top layers consist of dolomite, which is harder than limestone and includes calcium as well as magnesium. The area developed into continental land at the beginning of the Cretaceous, thereby becoming subject to weathering and karst formation. The topmost layers and valley sediments now include mostly loam as well as Cretaceous sand. They consist of protective rock layers (from the last advance of the Cretaceous Sea), glacial deposits (loess loam), and younger loams derived from the weathering process.

**Karst development:** Limestone weathers relatively quickly. It is gradually dissolved by carbonic acid, which is formed from the reaction of water with atmospheric carbon dioxide. Because limestone varies in hardness, erosion is irregular: a typical karst landscape is the result. Its characteristic features, such as craggy ledges, sinkholes, and caves, can be found throughout the training area.

**Landscape:** The training area is a karstified landscape, abundant with caves and characterized by rich structural diversity with a dense mosaic of dolomite hilltops and shallow valleys. Rock outcrops can frequently be found around the dolomite hilltop peaks. The steep slopes are covered with forest, and the valley settings are dominated by grasslands. Military use does not result in sharp borders between areas with different types of land-use. The diverse biotope types merge gradually into one another. Hence, the training area is characterized by richly structured complexes of various habitats, such as semi-dry grasslands, dry grasslands, thermophilous fringes, and sparse forests. From a nature protection point of view, the habitats are well developed and often closely networked with one another.

**Climate:** Hohenfels is located within one of the driest regions of Bavaria. Annual precipitation ranges between 650 mm in the southern part of the training area and 800 mm in the north. A very high percentage of this precipitation evaporates on site or leaches into the subsurface through the water-permeable bedrock.



## Brief Glance at a Long History



### The History of Hohenfels

Conrad von Hohenfels built a fortified castle as a family seat at the beginning of the 12th century. Lutzmannstein, which was founded in the middle of the 12th century, was built to become an impressive castle. It was destroyed during the Thirty Years' War. A new castle was built in 1730.

1937: Hohenfels was designated for use as a training area for the German Armed Forces; relocation of the local population started despite some initial resistance.

April 1939: Beginning of military training activities on an area that was smaller than that of today's installation.

Mid-1945: Temporary quarters for deported foreigners returning to their home countries.

1951: Resumption of use as a military training area by the US Army. The size of the area was extended to approximately 16,000 hectares.

In order to establish the training area, 1,622 persons from 60 settlements had been relocated by 1940. In 1951, another 171 agricultural properties had to be abandoned by acquisition.

### The training area:

After the US Army took over the training area, it was completely reorganized. The resulting facilities were totally new, modern, and much larger. Activities involving live fire were practiced into the nineteen-eighties. They were resumed in 2006, after an interruption of almost 20 years, and are ongoing.

Today, the military training area is used primarily for strategic maneuvers. The soldiers currently prepare for deployment in the Near East. Several M.O.U.T. sites were established in order to make the maneuvers as authentic as possible. The role of the village inhabitants during maneuvers is preferably played by civilians engaged for this purpose.

**Significance:** The combination of Hohenfels Training Area and the neighboring Grafenwöhr Training Area comprises the largest training complex of the US Armed Forces in Europe. Hohenfels and Grafenwöhr are currently under expansion, with almost 1 billion US dollars being invested in infrastructure and housing projects. The US Armed Forces have long been the main employer and most important customer in the immediate vicinity of the Hohenfels training area – 750 jobs are filled with German civilians.



# Military Role of the Military

**Military use creates, promotes, and maintains the ecological value of the landscape.**

Hohenfels Training Area has been in existence for approximately 60 years. Ever since the rural population was relocated between 1938 and 1940 by the German Armed Forces, the training area has only been used for military purposes and no longer for agricultural production (except for a short interval after World War II). In 1951, the western third was added to the current area of approximately 16,000 hectares, which is now known as the Joint Multinational Readiness Center (JMRC) Hohenfels, US Army.



From an ecological perspective, this area has never been affected by the agro-industrial revolution, which began in European agriculture after World War II. This means that most of the area has never had contact with industrial fertilizers, liquid manure, or modern herbicides and pesticides.

Silviculture is performed primarily to support military use and not for lumber production, while preserving the protection functions of the forest. All issues pertaining to silviculture are the responsibility of the Federal Forest Service (Bundesforstamt Schmidmühlen) under the leadership of Dr. Perpeet.

All of these conditions have promoted the development of JMRC Hohenfels as a refuge for numerous rare animal and plant species over the past decades. In the civilian surroundings, most of their habitats have long since been destroyed. Although vegetation is repeatedly damaged by military vehicles during maneuvers, the net ecological damage is comparatively small; in fact, certain, usually endangered species, which have become adapted to settle on open and exposed soils, are actually promoted by this type of use.



Training area management measures that would have the same positive effects as military operations would require much effort and would be much too expensive. When military use is supplemented by qualified nature conservation management, the significance of the major training areas stands comparison with that of large national parks.

The use of the area for military training has created the diverse features of this landscape over the course of decades and guarantees their conservation in the future. New vehicle tracks, open, dry grasslands, fringe habitat, shrubs, and diverse forest formations make up a valuable mosaic abundant with species. Unlike in today's cultivated landscape, there are no sharp borders between different types of use; instead, the structures gradually merge into one another.

A comparison between the military training area and civilian used areas clearly reveals that the training area is more abundant with species and of much greater significance for species and habitat protection. The value of most military training areas for nature conservation decreases dramatically after military use is reduced or – even worse – abandoned.

# Habitats

## Habitats

### Dry Grassland

Dry grasslands occur on unwooded, sun-exposed slopes on water-permeable, shallow soils. Their historical use was restricted to grazing. Extreme habitats of this nature can only be inhabited by specifically adapted plants, which often have inherent protection against evaporation. There are numerous gaps in the vegetation cover, where only mosses and lichens with a high tolerance to dryness can grow.



The most extreme habitats are inhabited by Globe Daisy./ Moor-grass grassland, a sparse, dry grassland community. The roots of the **Common Globe Daisy** can penetrate to a depth of one meter, allowing the plant to survive on barren soils.



Common Globe Daisy

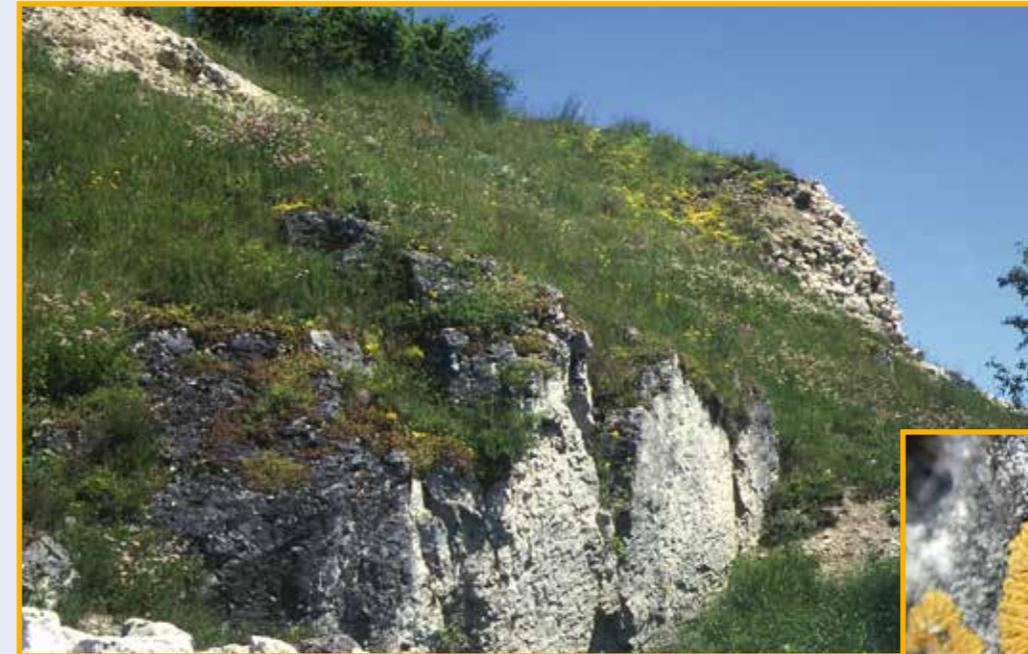


Orange-tipped Grasshopper

The male **Orange-tipped Grasshopper** is characterized by the reddish-yellow color of the tip of its abdomen. This species needs warm and dry conditions. It can be found on short grassland. Its characteristic song, a rising stanza, lasts only two seconds.

### Rock ledges

Typical rock formations occur in the Jurassic geology. Their characteristic vegetation, the rock ledge grassland, grows mainly on sun-exposed dolomite rocks. Here, the soils are shallow, and extreme temperature fluctuations prevail. Vegetation is sparse due to the extreme habitat conditions. Typical plants are annuals or succulents.



The conspicuous rock lichen *Caloplaca saxicola* grows on open, sun-exposed dolomite rocks.



European Owlfly  
(*Libelloides coccajus*)

The attractive and colorful European Owlflies live on extremely thermophilous slopes. They fly at open, sunny sites, where they hunt small insects, such as butterflies, in the air. The larvae live as predators below open talus slopes. Even low-scale shrub invasion, growth of tall herb communities, or matting of the habitat will rapidly result in the local extinction of the population.

# Open Areas

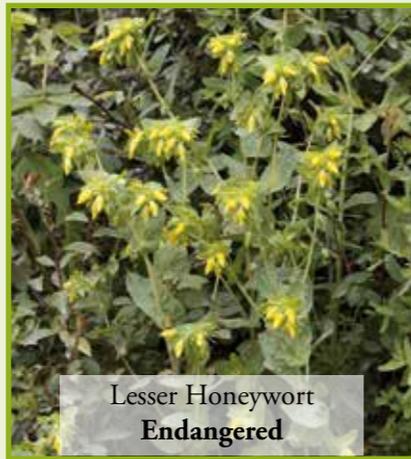


Military vehicle training activities take place mainly in open areas and occasionally in forested areas with sparse tree cover. The open areas consist of more or less richly structured grasslands. Since there is no conventional agricultural use and, of course, no fertilization, the grasslands are characterized by plant communities of nutrient-poor locations.

Damage to the grass cover, as caused by vehicle operations, creates sites with exposed soil. These are quickly colonized by pioneer species. The nutrient-poor condition of the exposed soils promotes the establishment of such species, which practically no longer occur in the standard cultivated landscape. In off-post areas, they are usually displaced by more competitive pioneers of nutrient-rich soils. Thus, it comes as no surprise that specific plant species, which are very rare elsewhere, occur in abundance within JMRC Hohenfels. Many of these are even considered typical of military training areas. Some of them are severely endangered or actually threatened with extinction.



Grass Vetchling  
**Severely endangered**



Lesser Honeywort  
**Endangered**



Sparrows' Tongue  
**Threatened by extinction**

# Forest Edges and Thermophilous Fringes



Unlike in the cultivated landscape outside of the training area, military use does not create sharp borders between habitats. The transition between forest and open area communities is more gradual.

Southerly inclined slopes, in particular, are characterized by a vegetation complex of

layered forest edges, thermophilous shrubs and trees, and fringe communities. The latter are usually in close contact with the existing dry meadows. These richly structured vegetation complexes offer ideal habitat conditions for numerous animal species.



The **Large Speedwell** (*Veronica teucrium*) preferably grows on calcareous, rocky soils. Its bright blue blossoms contribute significantly to the colorful appearance of the dry grasslands and fringes. This plant occurs in fringe communities as well as at forest edges, in small pine forests, and dry grasslands.

*Bupestris novemmaculata*, a metallic wood-boring beetle, is very rare in central Europe. Its larvae live in the wood of recently dead pine trees. Trees are repeatedly damaged due to military training activities. This results in a constant supply of new deadwood. Thus, the habitat of these rare beetles is perpetuated over the long term.



# Forest

## Beech - Pine Forests

About 50 % of the training area is covered with forests of various compositions. The forest areas are managed by the Federal Forest Service according to ecological guidelines.

The forests are dominated by silviculturally determined, mixed stands of beech, spruce, and pine. Near-natural forest communities - especially pure beech forests – are not represented on a large scale. The shallow, dry habitats are covered with rather sparse forests. These are mostly characterized by pine, a coniferous tree with low demands on site conditions.

The forests are kept partly open by the numerous vehicle tracks that are created during military maneuvers.



### Orchid - Beech Forest

Rocky hilltops of mostly southerly exposed slopes are covered with sparse, slow-growing beech stands. The poor growth is caused by the water permeability of the limestone and the high rate of evaporation, which is due to the exposition. The understory is characterized by orchids and thermophilous shrubs. Natural features at extreme sites include a small percentage of pine trees.

### Red Helleborine

*(Cephalanthera rubra)*

The Red Helleborine is an indicator species of thermophilous beech forests. This plant requires semi-shaded areas. It also grows at forest edges and in fringe communities.



Snowdrop Windflower

### Pine Forests

Sparse pine forests are of particular importance from the perspective of species and biotope protection. Trees of the potentially native orchid - beech forest have been replaced by the forest pine at many sites near ledge areas and on dolomite sand due to climatological extreme conditions. The sparse structure of the forests results from grazing practices prior to military use. Today, the understory often includes thermophilous animal and plant species, such as the Snowdrop Windflower (*Anemone sylvestris*) and the Pasque Flower (*Pulsatilla vulgaris*).

## Rare Plants - Optimal Conditions

### Parasites and Semi-parasites

The high number of semi-parasites and full parasites among the plants in dry grasslands is notable. Parasites do not live, or only partly live, on sunlight. They obtain their nutrients from other plant species via special organs. As a rule, these species are extremely sensitive to fertilizers, and for this reason, they have drastically declined outside of military training areas. At JMRC Hohenfels, they often occur with enormous populations. The sizes of these populations probably correspond to those that were common in the Jurassic areas in pre-war times. Above all, the genera of Cow-wheat (*Melampyrum*), Eyebright (*Euphrasia*), Yellow-rattle (*Rhinanthus*), Broomrape (*Orobanch*), and Dodder (*Cuscuta*) are especially noteworthy.



**Field Cow-wheat** (*Melampyrum arvense*)

Field Cow-wheat inhabits field edges as well as dry grassland and fringes. Maneuvers with tracked vehicles result in damage to the soil and thus create conditions that meet the habitat requirements of two characteristic communities: those of raw soils and of sparse, dry grasslands.



**Yellow Broomrape** (*Orobanche lutea*)

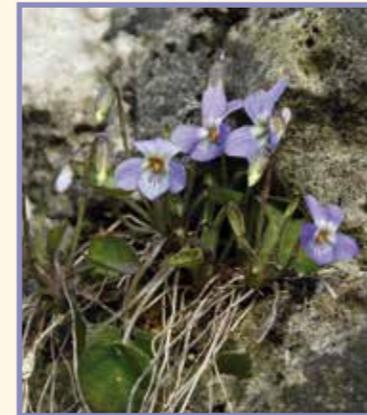
Yellow Broomrape is a full parasite, a fact that is evident by its lack of chlorophyll. It parasitizes on various plants of the Fabaceae family, such as trefoil and medick species. This plant is widespread in the dry grasslands of Hohenfels and occurs here quite frequently, as opposed to the conditions outside of the training area.

## Notable Plants of Dry Grasslands

Dry grassland develops on shallow soils under warm and dry climatic conditions. It is one of the most diverse species communities in our home area.

**Pasque Flower** (*Pulsatilla vulgaris*)

The Pasque Flower is among the most prominent plants of the dry grasslands in the Upper Palatinate Jurassic Formation. It blossoms with an eye-catching blue color in the early spring, when the grass cover is still brown. The plant is covered with hairs as an efficient protection against evaporation.



**Hillside Violet** (*Viola collina*)

The Hillside Violet occurs on soils of dolomite sand along edges of forests and shrubbery. It also occasionally grows in sparse forests with dry grassland vegetation. The seeds have oil-filled appendices, which attract ants. The ants carry the seeds over long distances, thereby contributing to the Hillside Violets's dispersal.

**Tassel Hyacinth** (*Muscari comosum*)

The Tassel Hyacinth is also promoted by vehicle operations during military maneuvers. This thermophilous plant occurs both on dry grasslands and at field edges. Frequent soil damage in these habitats has contributed to this plant's optimal dispersal throughout the training area.



# Orchids

## Home of Rare Orchid Species

The orchid family is characterized by numerous species with splendid blossom shapes and colors. Moreover, orchids are important environmental indicators because they are highly sensitive to nutrient enrichment. This is due to the orchids' low competitiveness and the biocenosis with fungi that live on the orchids' roots.

Conventional agriculture has not been practiced at JMRC Hohenfels for many decades. No fertilizers or herbicides are used, and the local conditions for orchid species are very good.

### **Lady's Slipper** (*Cypripedium calceolus*)

The Lady's Slipper with its inflated, shoe-like lower lip is one of the best-known orchids. It grows with an underground horizontal stem (rhizome) and, therefore, often occurs in tussocks.



### **Lady Orchid** (*Orchis purpurea*)

The Lady Orchid is among the largest orchids in our area. It grows up to a height of almost one meter in sparse forests and in nutrient-poor grasslands.

### **Fly Orchid** (*Ophrys insectifera*)

The lip of the Fly Orchid resembles an insect body. Two petals point upward and look like insect antennae.



### **White Helleborine** (*Cephalanthera damasonium*)

The White Helleborine occurs in sparse and thermophilous beech forests. About 3 to 20 off-white blossoms are loosely arranged close to the stem. The blossoms are 15 to 20 millimeters long and do not open very wide. This orchid blossoms in the spring and prefers semi-shaded habitats with rocky and loamy soils. The White Helleborine lives not only from sunlight, but also derives nutrients through mycorrhizae that occur in the root area of trees.



### **Military Orchid** (*Orchis militaris*)

The Military Orchid was named for the appearance of its petals, which have the shape of a military helmet. It blossoms from early May until late June. This plant is characteristic of semi-dry grasslands. It also occurs in sparse stands of shrubs, at field edges, and on embankments.



### **Burnt Orchid** (*Orchis ustulata*)

The Burnt Orchid is an orchid species typical of semi-dry grasslands. It also occurs in open meadows and in sparse stands of shrubs. It was named after its reddish-brown flower buds, which make the plant look as if were burnt. The Burnt Orchid is severely endangered on a nationwide scale because it is highly sensitive to fertilizer.

# Lichens

## Lichens

Epiphytic (living on tree bark) lichens rely solely on nutrient transport through wind and rain. They are adapted to absorb the very first moisture at the beginning of a rain shower. These first drops of rain contain the most dust particles and, consequently, the most minerals.

JMRC Hohenfels is home to a particularly well developed and diverse lichen flora because it features complex vegetation structures with a variety of micro-climatic conditions.

Lichens react sensitively to air pollutants (exhaust emissions, soot, residues from combustion). Hence, the condition of the lichens is an important indicator of the excellent hygienic condition of the air quality within the training area.



This lichen (*Bryoria fuscescens*) is rather typical of regions subject to high precipitation. It also occurs at low elevations. It grows on free-standing trees, mostly along roadsides.



This conspicuous lichen species (*Ramalina fraxinea*) used to be widespread throughout the region. It grows on the bark of free-standing deciduous trees.



The strikingly yellow lichen *Xanthoria fallax* grows on the bark of deciduous trees. It needs a certain supply of dust in order to grow.

# Fauna

## The Fauna of JMRC Hohenfels

### No Yellow-bellied Toads without Tanks!



Dynamic processes are of essential importance for certain animal and plant species. The Yellow-bellied Toad used to find its standard habitat in stream and river valleys. The forces released by flooding and rapid water flow created new structures on a regular basis. Among these were shallow puddles that were used by the Yellow-bellied Toad for reproduction. Nowadays, most streams and rivers are regulated, and there is a lack of suitable reproduction habitat.

Numerous depressions that can become filled with rainwater are created as a result of military maneuvers, particularly when tracked vehicles are involved.

The countless pools and puddles are used by various species of amphibians for reproduction. JMRC Hohenfels is home to definitely one of the largest Yellow-bellied Toad populations in Bavaria. The survival of these populations of statewide significance can only be ensured by permanent maneuver operations.



When in danger, the Yellow-bellied Toad shows its brightly colored underside—an indication of this amphibian's toxicity.

# Bats – Hunters by night

After centuries of adaptation to the cultivated landscape, bats face increasing difficulties in today's environment. Drastic declines in populations have been noticed among all species and on a nationwide scale in recent decades. Bats' requirements are simply too high for the prevailing conditions in the modern landscape. These animals require square kilometers of richly structured landscape complexes with a plentiful insect supply, water surfaces, fringe habitats, and structured forest edges. Furthermore, roosting and winter quarters need to be quiet and undisturbed, for example, in stands of mature trees, underground structures, caves, or buildings. Since JMRC Hohenfels still offers good conditions for bats, it is inhabited by large populations. Therefore, the personnel in charge of these areas bear a special responsibility when it comes to bat protection. The following examples demonstrate how this responsibility is implemented at JMRC Hohenfels.



## Frost-free karst caves

Bats that do not migrate from our area spend the winter hibernating. For this purpose, they need frost-free caves with high humidity and constant temperature conditions. Most natural caves occur in the Jurassic formation, but old cellars, tunnels, and bunkers are also used by bats. The so-called forest bats use deep crevices and woodpeckers' holes in thick trees as winter quarters.

To date, 19 of the 21 bat species known to occur in Bavaria have been recorded at JMRC Hohenfels. Numerous breeding quarters, as well as winter quarters, have been found. The training area is one of the most important bat refuges in Bavaria. This is due to the Karst caves and the structural diversity resulting from military use.



## Bechstein's Bat

The Bechstein's Bat is one of the so-called forest bats and is hardly found outside of forests. Sparse, multistoried deciduous forests are particularly suited as habitat for the Bechstein's Bat. Of course, the availability of tree cavities (woodpeckers' holes, trunks with rot holes) is of crucial importance.

## Noctule

The Noctule is among the bat species that migrate over long distances to reach their winter quarters. It lives in tree cavities and nesting boxes as well as in crevices on buildings. Breeding quarters are preferably established in woodpeckers' holes in oaks.



## Barbastelle

The Barbastelle is a rather rare bat species in Bavaria. It lives in villages or on old buildings in the summer, but its hunting grounds are in the forests. Breeding quarters are often located behind the bark of dying or dead trees. Frost-free caves are usually used as winter quarters.

# A Paradise for Butterflies and Moths

At JMRC Hohenfels, 90 butterfly species and 535 moth species have been recorded during various surveys. The enormous species diversity, with a total of 625 macrolepidoptera, including a high percentage of rare and endangered species, indicates the training area's great importance for this animal group.



**a burnet moth** (*Zygaeana carniolica*)

The burnet *Zygaeana carniolica* is a diurnal moth. It uses Sainfoin (*Onobrychis* spec.) as a substrate for egg deposition and as food for the adults. The moths' and the caterpillars' food plant occur primarily in dry, warm, nutrient-poor grasslands. The bright red-and-black color of the moth is a warning coloration, indicating to birds that it is inedible.

**Fox Moth** (*Macrothylacia rubri*)

The caterpillars of the Fox Moth feed not only on blackberries, but also on numerous different species of the family Fabaceae and other herbaceous plants. The moths are explicit open-area inhabitants and occur mainly in dry grasslands.



**Emperor Moth** (*Saturnia pavonia*)

The Emperor Moth lives in a variety of habitats, but preferably in dry grasslands with minor shrub invasion. The eggs are deposited on the bark of blackthorn twigs, from which the highly conspicuous black caterpillars later hatch.

**Pearly Heath** (*Coenonympha arcania*)

The Pearly Heath is widespread across Europe. It belongs to the meadow browns, which are characterized by an eye-shaped pattern with a white center on the wings. The caterpillar of this species lives on Prairie Junegrass, a grass species occurring at dry sites. The butterfly flies mainly in June in near-natural areas abundant with shrubs, but can still be observed until late July.



**Scarce Swallowtail** (*Iphiclides podalirius*)

The Scarce Swallowtail can be observed on sun-exposed slopes with rock outcrops and adjacent dry grasslands, such as for example, those around the ruins of Hohenburg Castle. In our region, it occurs only at such extreme locations. The butterflies are easily distinguished by their elegant gliding flight at exposed sites during mating season. Stunted blackthorns, which grow only at extremely dry sites, are required for the larval development of this species.

**Silver-studded Blue** (*Plebejus argus*)

Thousands of Silver-studded Blues can be observed in the training area at certain times of the year. These butterflies gather at shallow puddles in vehicle tracks where they can take up vital minerals from the soil. The caterpillars of the Silver-studded Blue live on Horseshoe Vetch with its yellow blossoms, on Crown Vetch, or Common Bird's-foot-trefoil in the dry Jurassic grasslands. They preferably inhabit particularly warm, highly disturbed and open grasslands, such as those created as a result of maneuvers with military vehicles.



# Rich Bird Fauna

To date, 118 breeding bird species have been recorded at JMRC Hohenfels. Many of these species used to be widespread and frequent in the cultivated landscape up until the nineteen-sixties, but many are severely endangered in off-post areas today. JMRC Hohenfels offers optimal habitats for numerous bird species. Accordingly, the overall populations of the individual species are quite large. The population sizes within the training area are at least as impressive as the species variety. The significance of JMRC Hohenfels to the bird fauna becomes even more apparent, when the training area is compared to areas in its immediate vicinity.

## Woodlark

The Woodlark is a bird species with highly specific requirements, which can practically no longer be fulfilled in today's cultivated landscape. At JMRC Hohenfels, however, this bird finds almost ideal habitat conditions. The smooth transition from forest to open area and the high percentage of sparse tree stands, which result from military use of the area, are essential to the Woodlark's survival.



## Red-backed Shrike

The Red-backed Shrike benefits immensely from the complex landscape structure within JMRC Hohenfels. Multi-layered forest edges, shrubs, and hedges are some of the most important features required by this bird. It uses hedges and similar structures as perches for singing and hunting. Large prey is stored by spearing it on the thorns of suitable bushes.



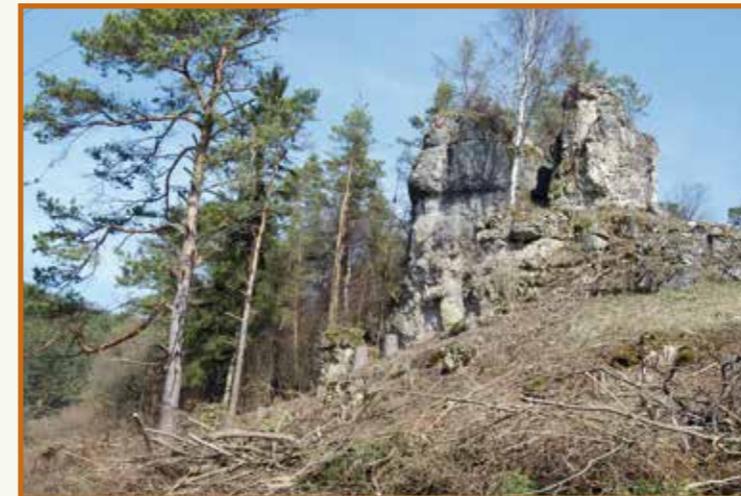
## Whinchat

The Whinchat is a characteristic species of low-intensity-use grasslands. It breeds in suitable grasslands throughout the entire training area. Raised perches for hunting and resting are important for this bird.



## Eagle Owl (*Bubo bubo*)

The Eagle Owl is the largest owl in our region. It is almost as large as the Golden Eagle. Its ear tufts and orange-red eyes give it a very distinctive appearance. The wing-span of 160 - 170 centimeters is impressive. The call of this bird is a characteristic "ooh-hu" (which led to the name "Uhu" in German). Eagle Owls require richly structured landscapes with open, and forest-covered, areas for hunting and breeding. Common breeding locations are on rock ledges. Hence, open, vertical rock faces are important as resting and breeding sites. Numerous ledges at the margins of the training area have become overgrown with shrubs and trees and can no longer be used for nesting.



Specific management measures, such as those implemented near Friesmühle, can be taken to clear the ledges from overgrowth. The clearing activities restore the Eagle Owl's habitat and simultaneously promote colonization by, and development of, the typical rock ledge flora.



# Abandoned Settlements – Traces of Former Villages

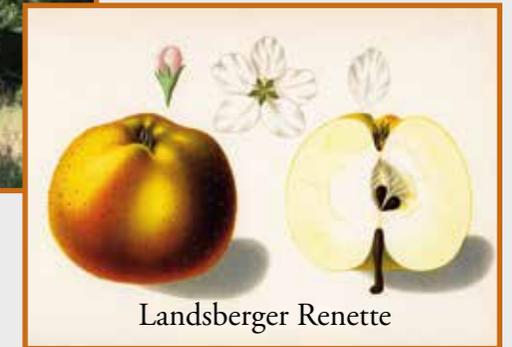
## Remnants of the pre-military landscape

Approximately 50 abandoned settlements, including the ruins and foundations of smaller and larger localities, are distributed throughout JMRC Hohenfels. Many of them are heavily overgrown, and they are often surrounded by other remnants of rural landscapes: village Lime trees, cellar vaults, rainwater collection ponds, and enchanted orchards hidden under plum thickets. These reminders of the former cultivated landscape are preserved by specific management measures taken to ensure the survival of formerly cultivated species and varieties into the future.



Abandoned Settlement Waltersheim

# Old Orchards



Landsberger Renette

Fruit trees and small stands of shrubs and trees can be found along former trails and roads, partly on embankments, and along old recessed roadways in the vicinity of abandoned settlements. They also grow within the former settlements as former “house trees”. Most of the orchards on-site are not subject to management measures, have a high percentage of deadwood, and are partly overgrown by small stands of wild trees and shrubs. Endangered species, such as hornets, find adequate habitats at such sites.

The remaining orchards include numerous old cultivated fruit varieties, some of whose names have been lost, and which disappeared outside of the training area long ago. They were systematically recorded and are now preserved and re-cultivated where feasible.



## Angle Shades (*Phlogophora meticulosa*)

The Angle Shades is a migrating moth that comes to our area from southern Europe. It may be very frequent in the fall. Before it heads back south again, it feeds on ripe fruit.

## Environmental Protection in the Training Area

The Environmental Management Office (EMO) is part of the Directorate of Public Works of the US Army Garrison Hohenfels. Its responsibility covers the management of all aspects of environmental protection within JMRC Hohenfels. The spectrum ranges from technical environmental protection - including handling of hazardous materials, waste separation, landfill management, erosion protection and prevention - to planning activities, such as the preparation of environmental and NATURA-2000 management plans and applied nature conservation. After long years of surveys of endangered and protected plant and animal species, the emphasis of EMO's activities is now focused on the implementation of the management and development recommendations. These recommendations include large-scale shrub removal from calcareous, dry grasslands threatened by succession and clearing of the valuable rock outcrops. Furthermore, sheep grazing in the entire open area is being coordinated more strongly according to ecological aspects. Specific species action plans are being implemented for severely endangered bats, birds, amphibians, butterflies, and other groups.



Where compatible with training operations, open areas are managed by grazing.

## Erosion Control

High-intensity training activities result in rutting of the topmost soil layer and can cause large parts of the training area to have sparse or even no vegetation for several weeks at a time. Heavy rain events and thunderstorms, occurring during these periods of increased sensitivity, can lead to massive flushing of soil material. In the past, the masses of mud affected the settlements in the immediate vicinity, as well as the streams and rivers and their fish.

In the meantime, numerous rainwater retention basins have been constructed in order to intercept these mud and water masses within JMRC Hohenfels and to gradually transport the water to the off-post areas. Today, most of the surface water seeps into the ground almost completely within the borders of the training area.



# Land Management

## Environmental Management Measures

High military use areas are located especially in the center of JMRC Hohenfels. The marginal areas, in particular, are exempted from training activities for safety reasons. Since no there is no conventional land use, these areas are subject to natural succession. This means that, without interference, open areas become colonized by shrubs and trees and eventually mature to become forest. However, open, dry grasslands are of high importance to species and habitat protection in this particular type of landscape. Appropriate management measures are undertaken to re-open dry grassland habitats that have been degraded by shrub encroachment.



Heavily shrub-invaded, dry grassland near Hohenburg

The same dry grassland after shrub removal



# Monitoring

## Plot monitoring as a success indicator

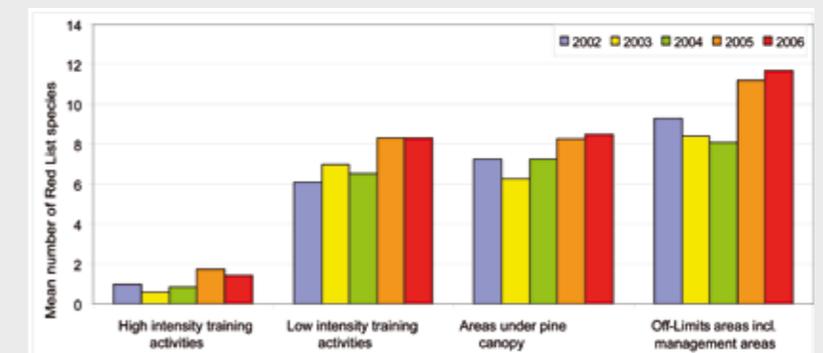
In 2002, a program was developed for JMRC Hohenfels with the goal to monitor the conditions and development of the most important ecological groups over time. Further objectives of this annual Monitoring Program include:

- Highlighting the development of the ecological value in areas subject to different use intensities;
- Observing the development of the species spectra of the studied groups over time to include the effects of changes in land-use patterns;
- Studying the effects of military use on the condition of the area from a conservation perspective;
- Monitoring the ensuing development after implementation of management actions;
- Developing long-term trend analyses.

The main objects of the surveys under this program are the vegetation of open, unwooded areas. The program has a botanical aspect, which includes the vascular plants, lichens, and mosses, as well as a zoological aspect, which includes the amphibians and butterflies.



The actual field monitoring is based on standard methods. Specific transects and recording locations are defined at the beginning of the surveys and monitored at certain time intervals for their ecological condition and, in particular, their species spectrum. Presently, the program includes approximately 100 recording locations. The results allow a good overview of the developments throughout the entire training area.



**Military use and protection measures taken by the US Armed Forces contribute to the preservation of this extraordinary landscape of nationwide significance.**



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