





State Forests

Forests for Natura

The project for the protection of species and natural habitats





Printed on 100% recycled paper.

Publisher:
Coordination Centre for Environmental Projects (CCEP)
www.ckps.lasy.gov.pl

Graphic design:
EURO PILOT sp. z o.o.
www.europilot.com.pl
Design, composition and maps: Ewa Chmielewska
Translation: Marta Gil-Kruczała

Collective work of CCEP employees:
Paweł Jaczewski, Anna Krasoń, Ewa Osińska, Wojciech Powierza, Aneta Rychlicka
Editors: Paweł Pawlikowski supported by the General Directorate of State Forests team

ISBN: 978-83-941866-7-8

Warsaw, 2023

Forests for Natura

The project for the protection of species and natural habitats

European Funds
Infrastructure and Environment

Republic of Poland

Coordination Centre for Environmental Projects

European Union
Cohesion Fund



Source: CCEP

Introduction

Much of the valuable national natural habitats and associated plant and animal species are located in areas managed by the State Forests. For us, the hosts of these lands, it is a great responsibility.

Fortunately, the development of civilization is accompanied by a growing awareness of the progressive loss of biodiversity and reflection on the consequences of this process. In Poland, nature conservation activities have a long tradition — we have learned a lot about nature itself and its dependencies and we have taken several actions aimed to protect it. Many valuable ecosystems have been covered by a variety of nature conservation legal forms. We have also introduced certain social and economic mechanisms that allow people and nature to coexist.

The Natura 2000 network introduced by EU directives (the so-called birds and habitats directives) is a program focusing on the protection of biodiversity throughout the European Union. The idea of the Natura 2000 network is to increase the effectiveness of conservation measures by creating an additional, coherent mechanism that complements and strengthens existing systems of area

and species protection. An important instrument in this respect is the planning and implementation of the conservation of habitats and species in Natura 2000 sites by establishing appropriate documents, conservation plans (covering the period of the next 20 years), or conservation task plans (covering the period of the next 10 years), having the status of local laws and providing a new tool within the scope of the national valuable natural assets protection.

Responding, on the one hand, to the needs of nature conservation and, on the other, to the formal requirements resulting from documents defining conservation tasks, the State Forests undertook to implement a "Comprehensive project for the protection of species and natural habitats in areas managed by the National Forest Holding >The State Forests<", which began in 2017. The project is co-financed by the Infrastructure and Environment Programme. The total cost of the project is over PLN 35 million and EU funding amounts to approximately PLN 22 million. The project is implemented by more than 100 forest districts in more than 100 Natura 2000 sites and it executes the provisions of strategic documents established for these areas, mainly conservation task plans (ctp). The assumption made during the implementation of the project is also its successive extension with new tasks, resulting from newly approved ctp, throughout its course, i.e. until 2023.

We know there's still a lot to do. We must face the challenge of tackling climate change and stopping the extinction of species. Education aimed at shaping the right attitudes, but also the fascination with nature, plays an important role at the heart of effective actions. We hope that this publication about the most interesting species and habitats included in the project will become an inspiration for you not only to expand your knowledge about the surrounding natural environment, but also to take active measures for nature.



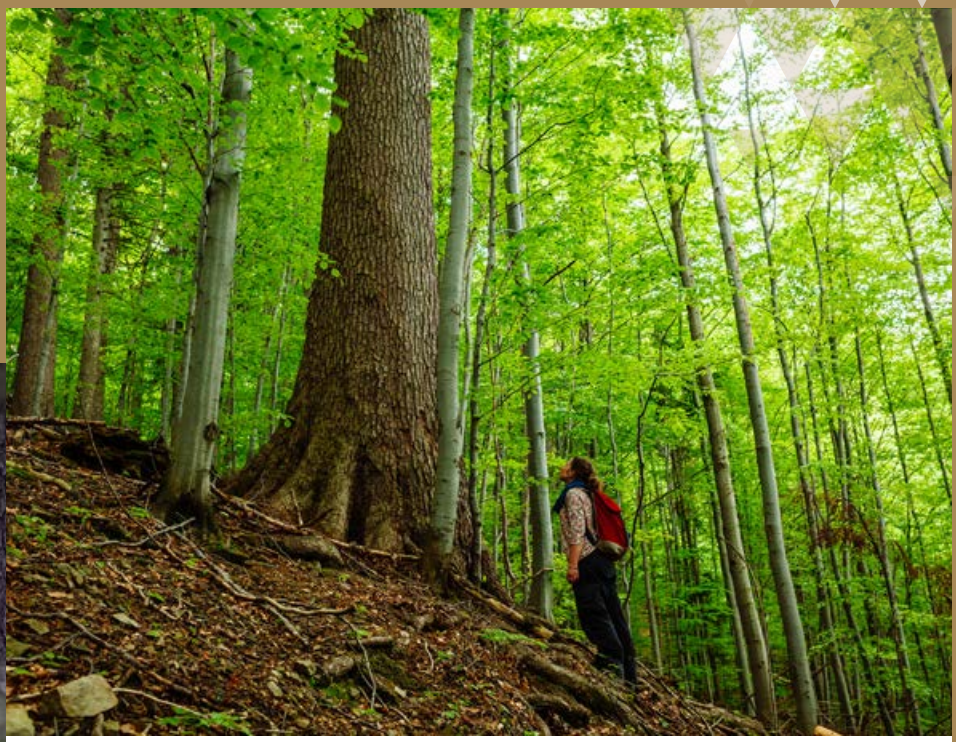
Source: CCEP

02

Why do we protect nature?



Source: CCEP



Source: CCEP



Nature conservation aims to preserve habitats, species, ecosystems, and processes, as well as the diversity of these elements. Nature is the asset of humanity, a value in itself, and man should not allow the destruction of its precious resources.

Looking for the fundamentals of nature conservation, the utility aspect cannot be missed. Nature provides us with renewable raw materials, such as wood, provides food of plant and animal origin, oxygen through photosynthesis processes, and substances used for the production of drugs, cosmetics, clothes, etc. It satisfies the basic needs of life. Humans are linked to the environment in which they live, and the functioning of ecosystems can largely depend on human activity. It is worth mentioning that currently natural resources can be valued in the context of economic benefits, as well as the ethical reasons for their protection (respect for living beings) and finally cultural and aesthetic qualities. The admiration for the beauty of nature has been accompanying human civilization for centuries, and also nowadays nature is the source of inspiration and fascination. The question of nature can be approached both scientifically and emotionally. Breathtaking views, attractive tourist areas, rare species, unique plant formations, and various "natural wonders" – all these elements attract, excite and dazzle.



Source: CCEP

Issues

Nature protection is not a simple matter – most people will agree that nature needs to be protected, not destroyed. However, man's growing pressure on nature is not always due to bad will or lack of respect.

In many cases, it comes from transport, construction, logistics, industrial needs, and many others. We want to have access to food, work, and housing. We dream about having good quality roads and a developed rail network, convenient places to live and easily accessible sites where we can rest and relax, factories, shops, efficient electronic devices and household appliances, housing equipment, means of transport... Nature either adapts, or it can either "come out of the way" or remain unchanged in the spaces we have left for it to be. This does not mean, of



course, that we should abandon the path of development of our civilization and not benefit from its achievements. However, we should do it responsibly, balancing development with respect for natural values.

Several mechanisms in place help to reconcile the interests of mankind and nature. There are some documents governing the conservation and management of natural resources: international conventions, strategies, management plans, laws, and regulations. Their implementation usually requires large financial outlays, which is a huge barrier to carrying out protective measures. This is why some nature conservation stakeholders rely on external funding – EU and other funds. It is worth emphasizing that in such cases a considerable own contribution is often required, i.e. money coming from the sources of a given country.

What can we do? We can do a lot, even if we don't engage directly in activities for environmental protection. First of all, we cannot be indifferent. Secondly, we should cooperate more with each other. Cooperation and dialogue between different environments, state administration, scientists, environmentalists, local governments, foresters, naturalists, and citizens – although often difficult, brings desired results. Thirdly, we should constantly educate – shaping social sensitivity and responsibility for nature is one of the best investments for nature.

Activities

To the question: protect actively or passively? the answer is: it depends. Some species or ecosystems exist best without human intervention, while others cannot cope on their own. Therefore, it is necessary to act well-prepared: diagnose problems, set goals and choose methods.

This is how planning documents – protection plans, conservation task plans and forest management plans adopted by competent authorities managing protected sites, previously consulted with interested parties, and approved under local law – are constructed. Thus, we can say that while performing conservation tasks, we fulfill the best available and applicable standards in the field of nature conservation.

Modern environmental protection is faced with many problems, including climate crisis, loss of biodiversity, smog, pollution of air, soil, and water, over-production of waste and its management, and others. All these factors constitute significant threats to our world and we cannot remain indifferent.



Broadleaved forest, photo by Paweł Fabijański



Dystrophic lake, photo by Agata & Mateusz Matysiakowie/ fotomatysiak.pl

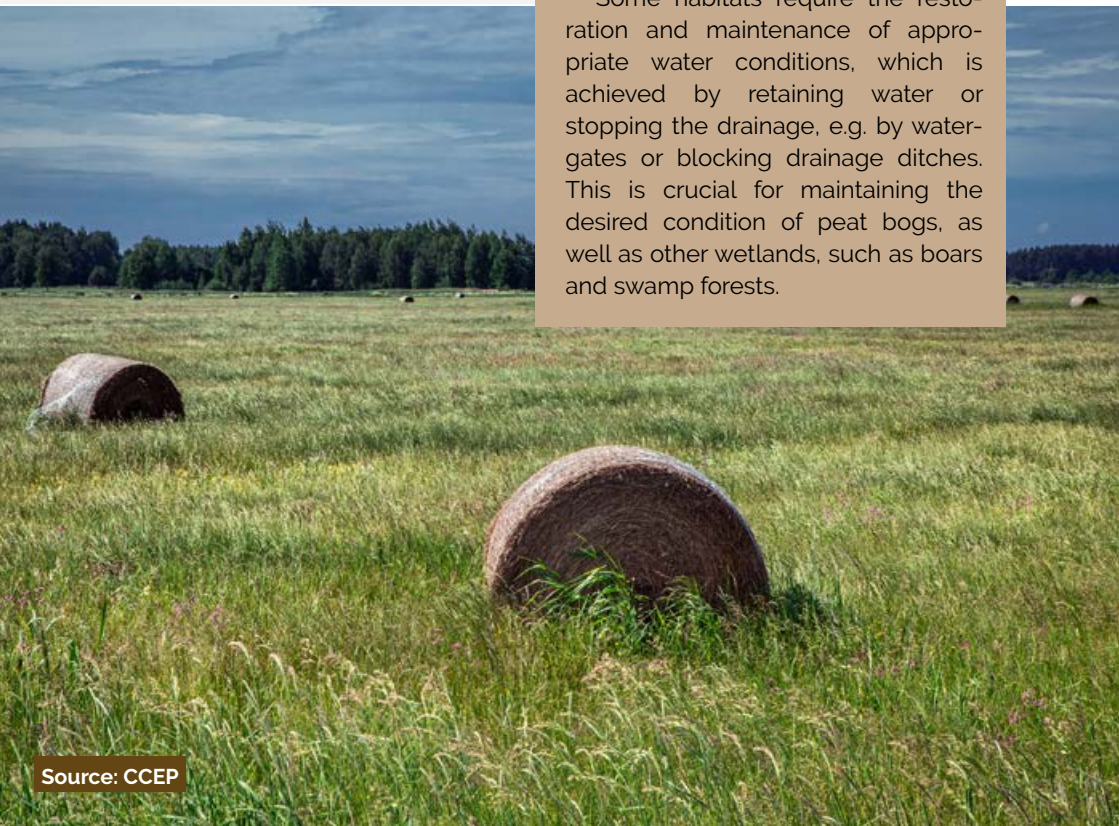
Examples

Part of ecosystems, especially non-forest ecosystems (meadows, xerothermic grasslands, some wetlands) require active protection, first and foremost, removing and stopping succession (overgrowing) by cutting new trees and shrubs.

Such activities constitute a significant group of activities described in the project.

A separate threat to valuable habitats is invasive alien species, i.e. organisms originating from geographically remote regions. They threaten the resources of a native ecosystem and harm biodiversity. Fighting against this issue is difficult and requires a notable amount of work and funds.

Some habitats require the restoration and maintenance of appropriate water conditions, which is achieved by retaining water or stopping the drainage, e.g. by watergates or blocking drainage ditches. This is crucial for maintaining the desired condition of peat bogs, as well as other wetlands, such as boars and swamp forests.



Source: CCEP

Sometimes conservation measures require adaptation to habitat conditions, for example, removal of plants that are competitive with a protected species, modifying the soil around its sites, and ensuring adequate lighting. In such communities as acid beech, the conditions for the development and spontaneous renewal of the beech should be created, and the pine and spruce should be removed in a controlled manner.

Active protection concerning species differs because it depends on their specificity and requirements. For example, bats should be able to hibernate undisturbed by human presence when taking winter shelters in caves and old aditries. For this purpose, metal bars or gratings at the inlets to the wintering are installed. To preserve rare species of butterflies, you can take care of their main food source – grow plants that feed on their caterpillars. Amphibians to survive need small, not overgrown reservoirs filled with water. European pond turtle, the only turtle naturally occurring in Poland, is endangered, among others, due to predators' activity which results in destroyed egg deposits and young turtles being hunted. Active protection includes the following activities: protecting nests from predators with a special net and transferring young turtles right after they are hatched directly to water reservoirs.

Tourism can pose a real threat to nature's frailty however, sometimes it is enough to properly direct the visitors' traffic so that they can stroll and admire nature without jeopardizing its well-being.

Our project includes these and more than 300 other individual conservation activities implemented in more than 100 Natura 2000 sites.

Fun facts

✔ The study of environmental awareness of Polish men and women carried out in 2021[1] showed that in recent years the understanding of environmental protection has increased significantly, and the majority of people in our country support pro-ecological attitudes.



50% of respondents believe that the environmental situation of the world is bad and immediate repair measures should be taken.



9% of respondents say that people are doing enough to care for the environment.



71% of respondents believe that people should do more.

[1] *Ecological attitudes. Study of attitudes and opinions of Polish men and women. Report 2021. Blue Media Research.*

Participants in the projects

114 forest districts

The project supports

30 types of habitats

32 species

Active conservation activities are carried out in

118 Natura 2000 sites in Poland

14 420 ha total area

"Comprehensive project for the protection of species and natural habitats in areas managed by the National Forest Holding >The State Forests<"



Budget of the project

PLN **21,9** million
EU funding

PLN **14,0** million
the State Forests' resources

03

Cladonia forest



Cladonia forest, photo by Paweł Fabijański



Cladonia, photo by Paweł Fabijański



Cladonia forests are a form of dry forests, i.e. pine forests growing on poor and dry grounds. The tree stand is dominated by common pine, which grows slowly in such extreme conditions. These forests usually grow on poor and dry sandy habitats, most often on podzolic soil which cover dunes. This habitat owes its name to Cladonia – fungi, whose whitish-gray feathers give it a unique, characteristic appearance. Among the many local species of bush-like lichens, the following types of Cladonia can be mentioned: *Cladonia rangiferina* (reindeer moss), *Cladonia arbuscula*, and *Cladonia gracilis*. Herbaceous plants and forest shrubs (e.g. heather) are only an addition to the lichen-moos-like carpet. Cladonia forests are rarely a permanent forest community growing on the driest and poorest soils. Their presence is most often related to human activity, namely the intensive, centuries-old use of dry forests by the rural population, consisting of collecting branches for fuel and raking mosses and lichens previously used to seal walls and roofs of huts.



Cladonia forest, photo by Paweł Jaczewski

Issues

In Poland, for years, there has been a rapid disappearance of Cladonia forests and their subsequent replacement by dry and fresh forests with grassy or mossy undergrowth.

This situation is caused by eutrophication, i.e. an increase in fertility of these habitats, as a result of which grasses and mosses very quickly and effectively displace Cladonia and other lichens. In the past, the systematic depletion of the forest undergrowth was conducive to the preservation of Cladonia forests. Today, for decades, no one has been raking needle litter, collecting branches and deadwood, or collecting moss from vast surfaces.

Activities

The most suitable way to protect this habitat is to imitate the processes that in the past enabled it to exist.

For this purpose, the dead wood (limbs, branches) created as a result of natural processes (wind, crown snow-load, etc.) and wood remained after care treatments and forest thinning are removed.



Cladonia, photo by Paweł Jaczewski

Examples

The removal of dead wood created as a result of natural processes and economic activities is practiced in Cladonia forests located in several forest districts.

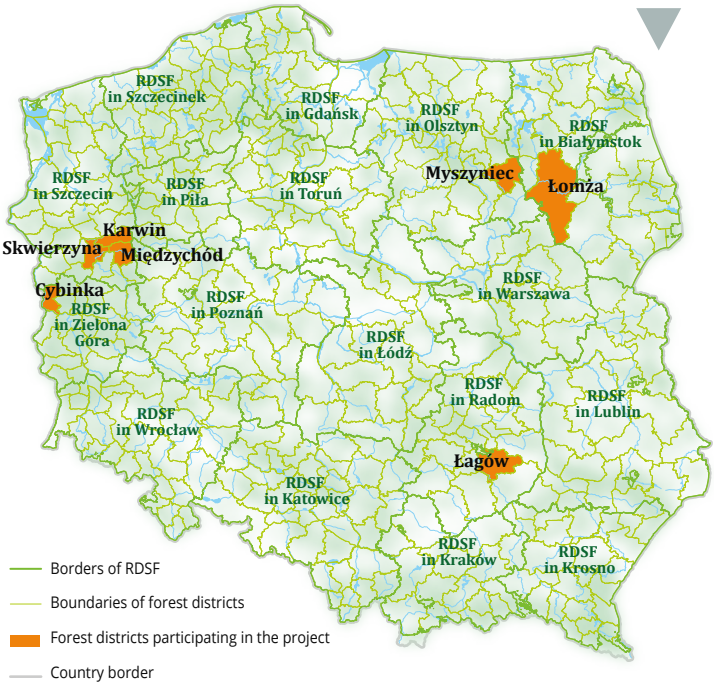
The remaining wood is either removed outside the habitat or left for natural decomposition.

This type of project activity is carried out in 5 Natura 2000 sites, on an area of over 1 200 ha.



Dead wood in Cladonia forest, photo by Paweł Jaczewski

Forest districts participating in the project



Fun facts

- ✔ Lichens are the effect of symbiosis between fungi and green algae or cyanobacteria (in the case of Cladonia – with green algae). In this way, lichens are pioneer organisms, capable of inhabiting the most extreme and inhospitable habitats. The nature of the fungi-green algae relationship is not obvious: it doesn't necessarily have to be a symbiosis.
- ✔ Paradoxically, Cladonia forests are similar to bog woodlands. Both habitats are characterized by extremely poor fertility, and even though they are extremely different in terms of humidity, pine trees grow similarly – slowly and they never reach impressive sizes.
- ✔ As a result of the disappearance of Cladonia forests, certain lichen species, such as alpine Cladonia, are increasingly rare in Poland being threatened with extinction. Therefore, they are under strict species protection.
- ✔ The Polish name is derived from the word "creak", which is the sound of dried lichens crushing under the feet. During periods of higher humidity, these lichens soften, and become flexible and the characteristic sound is no longer audible.

04

Swamp woods and forests



Swamp forest, photo by A. Marszałkowski



Ditch dam, photo by Paweł Fabijański



Swamp woods and forests can be found throughout Poland, both in the lowlands and in the mountains up to a height of approx. 1 300 m a.s.l. The highest density of this habitat communities occurs in the lakeland belt in northern Poland. In the mountains, swamp woods and forests mostly occupy mountain valleys, among others in the Stołowe Mountains, the Sudety Mountains, the Silesian Beskids, Gorce, and the Orava-Nowy Targ Basin in the Carpathians.

This habitat includes diverse forests on low-productive (poorly fertile) peat bogs. Swamp forests do not contain only alders, i.e. alder and alder-birch trees (except for peat alders), growing on productive low peat bogs, which constitute other type of habitat. The tree stand includes pine, spruce, or downy birch in various proportions. The most common and popular nearly all over Poland are pine swamp forests, while the occurrence of marsh spruce trees is limited to mountain areas and northeastern parts of the country, while marsh birch trees – primarily to the northern regions of the country. These forests grow on peat bogs of various types – from high (swamp forests) to low (bog birch).

The undergrowth of forests and woods is dominated by numerous species of sphagnum moss, sedges, shrublets such as marsh Labrador tea, bog whortleberry, and cottongrass (including hare's-tail cottongrass which during its fruiting period gives the swamp forests a spectacular appearance), as well as other species, often rare and endangered, specific to the various subtypes of this habitat.



Blooming marsh cranberry,
photo by Arkadiusz Marszałkowski

Issues

Swamp woods and forests, usually permanent forest communities growing on peat bogs, are threatened by dryness.

This phenomenon has many different causes, starting from deliberate man-made dehydration practiced in the past to climate change and declining levels of surface water. Although the swamp forests habitats have been protected by the State Forests for years, their survival may be threatened by still operating old drainage ditches. In consequence, the conversion of the undergrowth of swamp forests and woods (e.g. the disappearance of marsh Labrador tea and cottongrass in pine swamp forests) into other forest communities, as well as eutrophication, i.e. excessive fertilization of these habitats, is observed.

Activities

The activities shall focus on maintaining natural water relations characteristic of swamp forests or preventing further habitat drying.

To this end, small gates and dams are built on existing drainage ditches to stop the man-caused drainage of water and retain water in the wetlands. In areas of habitat damaged by dehydration, the removal of spruce and birch understorey makes it possible to reproduce species typical of swamp woods and forests.



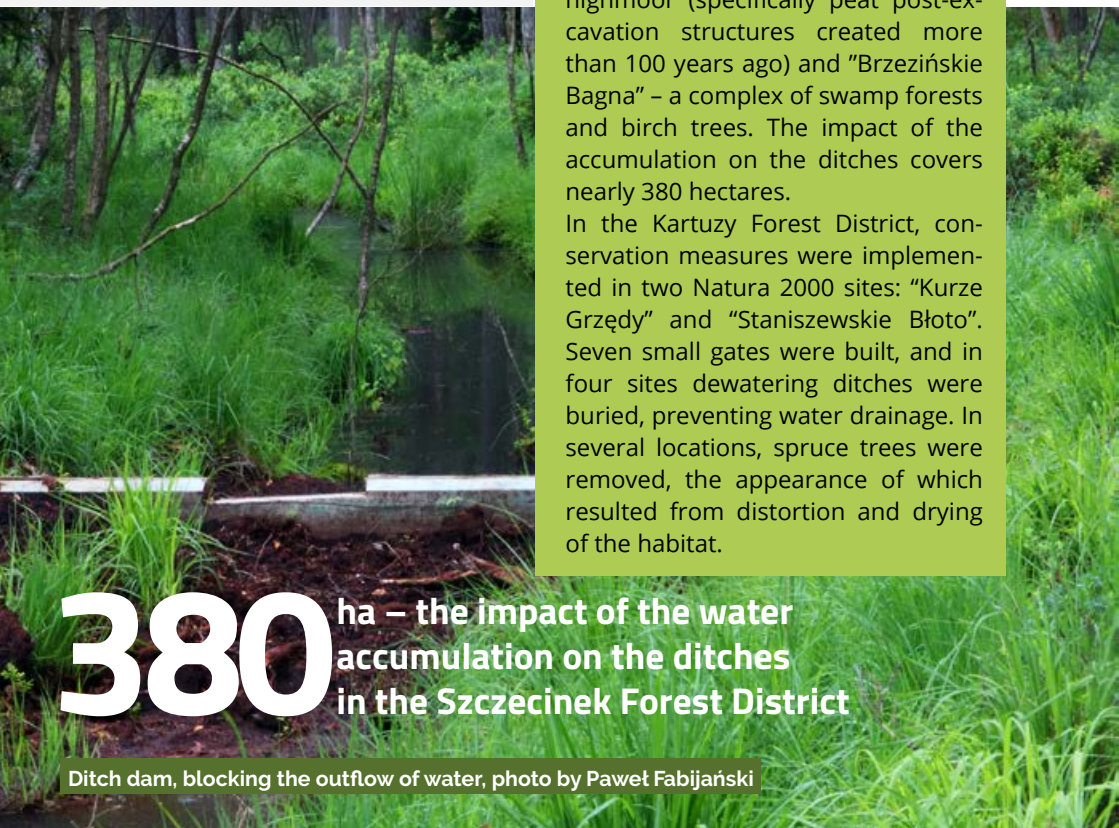
Ditch dam in the Szczecinek Forest District, photo by Paweł Fabijański

Examples

Active protection treatments are performed on over 550 hectares in 12 Natura 2000 sites.

One of the most interesting projects is dams made of wood and earth located in the Szczecinek Forest District, which served to prevent the water drainage from swamp forests in the Szczecineckie Lakes. As part of the project, the forest district built as many as 34 such facilities. This area includes, among others, the "Wielkie Błoto" ecological site, protecting the remnant of a Baltic-type highmoor (specifically peat post-excavation structures created more than 100 years ago) and "Brzezińskie Bagna" – a complex of swamp forests and birch trees. The impact of the accumulation on the ditches covers nearly 380 hectares.

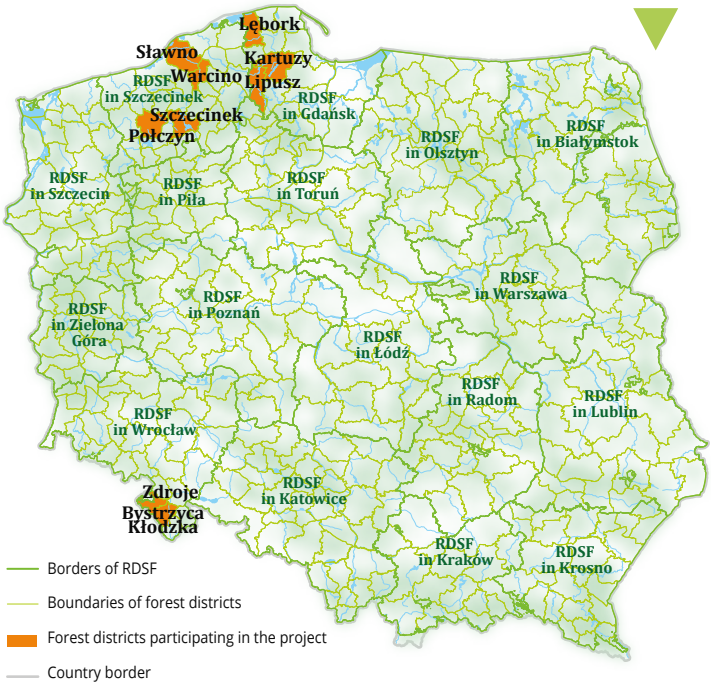
In the Kartuzy Forest District, conservation measures were implemented in two Natura 2000 sites: "Kurze Grzędy" and "Staniszewskie Błoto". Seven small gates were built, and in four sites dewatering ditches were buried, preventing water drainage. In several locations, spruce trees were removed, the appearance of which resulted from distortion and drying of the habitat.



380 ha – the impact of the water accumulation on the ditches in the Szczecinek Forest District

Ditch dam, blocking the outflow of water, photo by Paweł Fabijański

Forest districts participating in the project

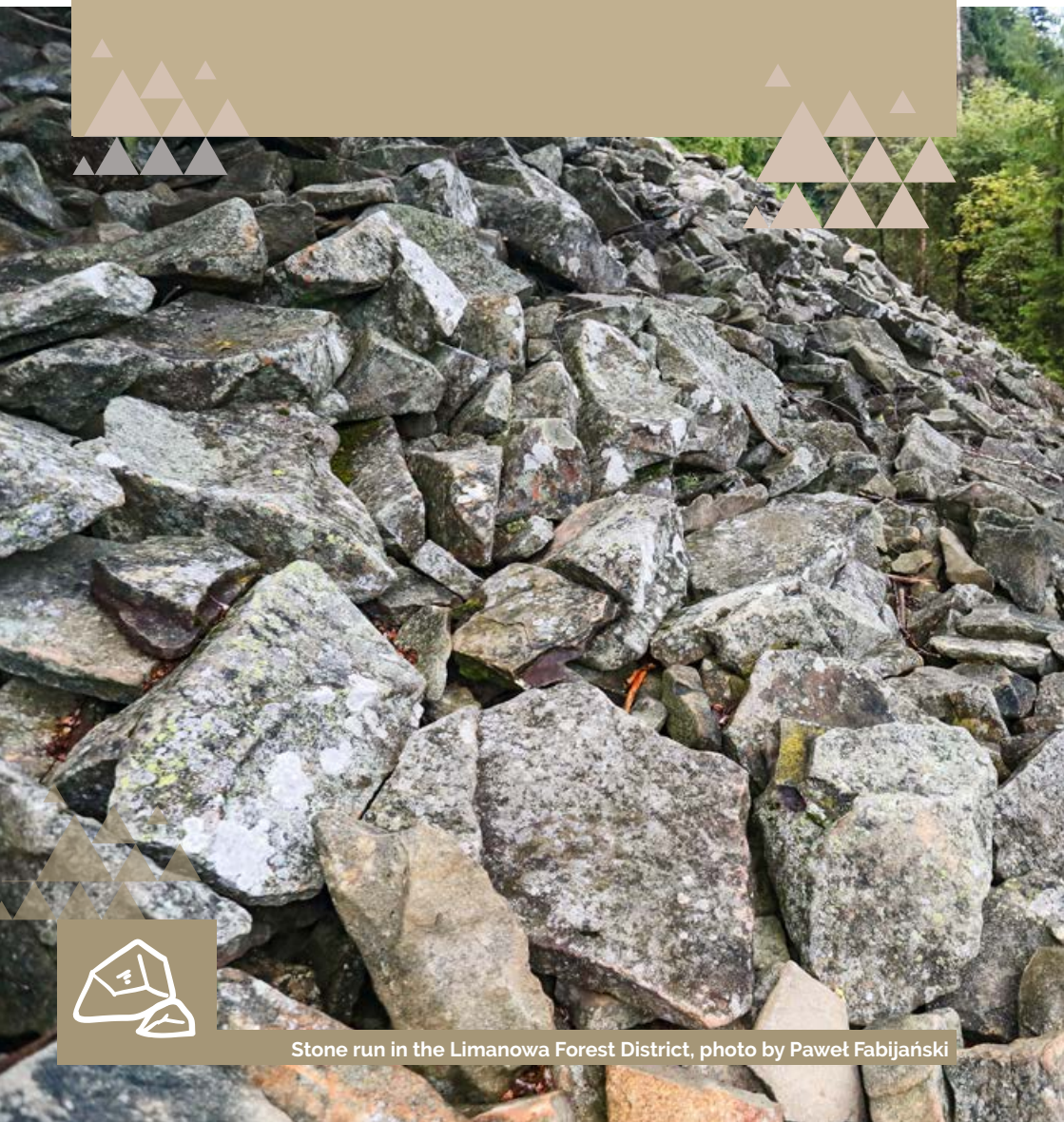


Fun facts

- ✔ Spruce forests growing on peat bogs of northeastern Poland resemble both in terms of landscape and species the forests of the taiga. That is why the Romincka Forest, the most "northern" Polish forest complex, where many species of plants typical of the taiga region grow in-between spruce trees, is sometimes called the Polish taiga.
- ✔ Pine swamp forests, the most common form of the discussed habitat in Poland, are characterized by a low pine tree stand with a characteristic "umbrella-shaped" type. Tree growth in extremely unfavorable peat bog conditions is poor; however, pine trees, despite their inconspicuous size, are often century-old (even several hundred years old).
- ✔ The swamp forests are also associated with several plants considered to be glacial relics, which, as a result of the warming of the climate, after the end of the last glaciation, almost completely disappeared in Poland. Some of them, however, have persisted to this day on peat bogs and in the local forests and are now some of the rarest elements of the Polish flora. These include, for example, *Chamaedaphne calyculata*, cloudberry, and softleaf sedge.

05

Stone run



Stone run in the Limanowa Forest District, photo by Paweł Fabijański



Stone run clearing, photo by Paweł Fabijański

This type of habitat is rare in Poland, can be found in the Świętokrzyskie Mountains, the Island Beskids (Luboń Wielki), the Ślęża Massif in the Kaczawskie Hills and the Bieszczady Mountains.

As one can imagine, the habitat conditions prevailing among boulders on the stone runs are very extreme and inhospitable to plants. They only allow the development of undemanding species of bryophytes and lichens and a few vascular plants. Emerging tree and shrub seedlings usually die quickly due to lack of water and rooting potential (they wither during summer droughts), so the central part of the stone run remains deforested.

Why are stone runs under protection? These habitats are deforested enclaves, "islands" in the forest landscape, on which rare, pioneering species of moss (like *Grimmia crinita*) grow, liverworts (representatives of the genus of *Barbilophozia*), ferns (northern spleenwort – *Asplenium septentrionale*) and a colorful floral plant – yellow foxglove.

However, the situation is different on the edges of stone runs. Here, on the border of open space rubble and forest, rock debris is more abundant in organic matter. Leaves, needles, branches, and sometimes even whole branches or trees fall on the stone sea. In such places, single shrubs (usually European raspberry – *Rubus idaeus* or blackberry species) appear the fastest, and among the trees – mountain-ash (so-called rowan) can cope with such difficult habitat conditions.



Stone run overgrowing in the Baligród Forest District, source: CCEP



Issues

This habitat is heavily threatened by natural succession. It is proved by the presence of former stone runs in the Carpathians, now completely overgrown with forest

There is an ongoing process of stabilization and overgrowth, leading inevitably to the reduction of open space areas, and treeless stone runs.

The natural formation of this habitat in new places is a long-lasting process, dependent on geological processes.

Activities

The protection of stone runs consists primarily of removing seedlings, tree saplings and shrubs overgrowing the stone runs and cutting down trees shading these habitats. To stop the succession (overgrowth) it is crucial to move the biomass obtained in this way outside the area of stone runs.



Stone run clearing in the Limanowa Forest District, photo by Paweł Fabijański

Examples

The rarity of this habitat is proved by the fact that there is only one such Natura 2000 site in the project.

It is a stone run in Luboń Wielki, located in the Island Beskids in the Limanowa Forest District. The conservation measures applied in that district include cutting down trees, shrubs entering the stone run, and shading trees removal.



Stone run clearing in the Limanowa Forest District, photo by Paweł Fabijański

Forest districts participating in the project



Fun facts

- ✔ Stone runs are one of the very few places situated outside the high mountains, where boulders are overgrown by the map lichen (*Rhizocarpon geographicum*) – a lichen forming yellow or yellow-green thallus, deludingly similar to maps that are associated with colluvium areas in the Tatra Mountains.
- ✔ Among the peculiar species moss growing on stone runs, you can find representatives of the *Tetraphidaceae* family of mosses, a rare species belonging to an unusual group of so-called coprophilic mosses, i.e. growing only organic substrate of animal origin – feces, bones, etc.
- ✔ The total area of the stone run habitat in Poland is only approx. 70 hectares (less than 1 km^2)!

06 The broadleaved forest



Undergrowth of broadleaved forest in spring, photo by Paweł Fabijański



Broadleaved forest in autumn, photo by Paweł Fabijański

A typical broadleaved forest is a species-rich multi-layer forest. The upper layer of the natural broadleaved forest is composed of magnificent peduncle oaks growing at some distance from each other, surrounded by lindens, maples, sometimes firs, spruces, and ashes. Underneath them develops a second, but the most important for this type of forest, lush and compact layer usually dominated by hornbeams with lindens, maples, elms, and many other species.

Depending on the humidity and fertility, different types of this habitat are distinguished. Low broadleaved forests similar in species composition to elm-ash forests grow in moist places, in lowlands, and on poorer soils – high broadleaved forests, similar to mixed forests. On the other hand, the most popular subtype, is a typical broadleaved forest, occupying fertile and fresh habitats (with moderate humidity – neither moist nor dry). A unique type of broadleaved forest is the so-called slope broadleaved forest with the dominance of linden and maple, developing on steep, fertile slopes of river valleys and elevations. In areas with humid climate – in the west of Poland and lower mountainous locations – broadleaved forests are replaced by another type of fertile deciduous forest, namely beech trees.

Broadleaved forests are a type of habitat consisting of multi-species deciduous forests, less frequently mixed, which in the past dominated the landscape of Poland, but suffered severely due to the development of human civilization. They occupied the most convenient places in terms of settlement and fertile soils exploited for agriculture. As a result, the expansion of housing and crops led to the loss of many millions of hectares of broadleaved forests from the Middle Ages to modern times.



Grove anemone, photo by Łukasz Skalski



Issues

The value of this habitat is supported by the fact that the majority of nature reserves in Poland were established precisely for the protection of the forest.

Nowadays, the survival of broadleaves forests is threatened by, among others, introducing alien species such as pine, planting excess spruce, or introducing species outside their natural range (beech, larch). The habitat in question may also be adversely affected by excessive favoring oaks during forest renewals, which disturbs the structure of the tree stand and the proportions between species typical of the habitat. Broadleaved forests also suffer, as other habitat types, from the spreading of invasive alien species, which pose dangerous competition for native ones. It applies not only to the vegetation of undergrown and underlay but also to the layer of trees. Alien species that have come or have been brought from afar do not usually have natural enemies in the new environment. Because of that, they eliminate native species occupying their ecological niches.

Activities

The primary activity taken to maintain the best developed fragments of the habitat is to preserve natural processes and leave old-growth trees, as well as remove trees and other alien plants, in terms of the habitat and geography, including invasive alien species.

Among the most challenging opponents is the wild black cherry (*Prunus serotina*), which until a few decades ago, raised high economic hopes. However, wild black cherry failed to meet these expectations. Instead, it turned out to be a perfect and dangerous colonizer, especially in forests with poorer habitats.

The plant has to be uprooted or grubbed up, and if it already has a tree structure, it is cut-out leaving roots in the ground, protected with anti-growth preparations (only in exceptional circumstances and if permitted by law).

Other intruders most often eliminated from the broadleaved forests, are red oak, black locust, Japanese knotweed, and small balsam. The elimination of herbaceous plants, such as small balsam, is carried out mechanically or, most frequently, by hand. Contrary to popular belief, these treatments are not cheap, especially since the "weeding" of the forest takes place even three times a year.



Broadleaved forest, photo by Paweł Fabijański

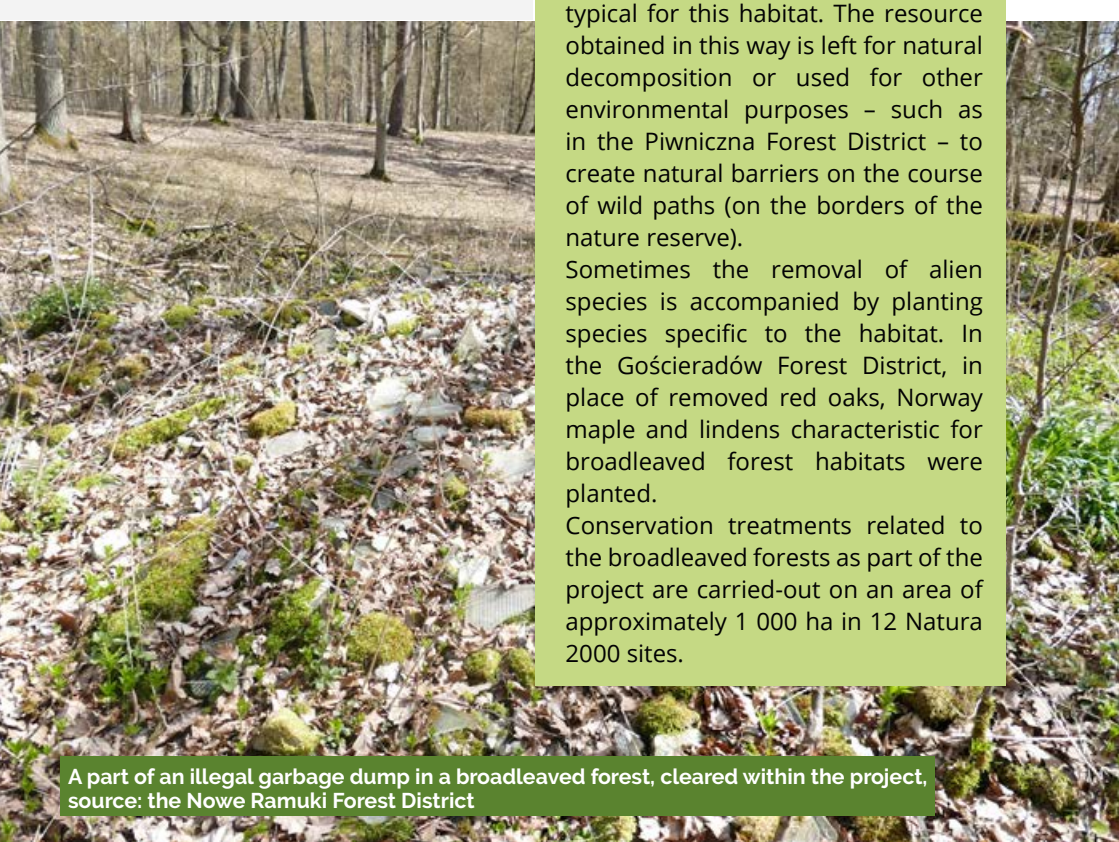
Examples

Sometimes the project involves non-standard tasks that need to be carried-out. In the Nowe Ramuki Forest District, an unauthorized landfill of municipal and construction waste of more than 50 years located in the forest had to be removed.

In the case of broadleaved forests, the adaptation of the species composition to the needs of the habitat usually consists of removing, upon previous consultation with the Regional Directorate for Environmental Protection, selected low-intensity trees incompatible with the habitat type. Such treatments improve the conditions for the growth of hornbeams, lindens, and other species typical for this habitat. The resource obtained in this way is left for natural decomposition or used for other environmental purposes – such as in the Piwniczna Forest District – to create natural barriers on the course of wild paths (on the borders of the nature reserve).

Sometimes the removal of alien species is accompanied by planting species specific to the habitat. In the Gościeradów Forest District, in place of removed red oaks, Norway maple and lindens characteristic for broadleaved forest habitats were planted.

Conservation treatments related to the broadleaved forests as part of the project are carried-out on an area of approximately 1 000 ha in 12 Natura 2000 sites.



A part of an illegal garbage dump in a broadleaved forest, cleared within the project, source: the Nowe Ramuki Forest District

Forest districts participating in the project



Fun facts

- ✔ The best-preserved broadleaved forests survived mainly in forest complexes, which avoided logging because they were on the state-ethnic borderlands, and, in addition, from the Middle Ages, they were the hunting grounds of the nobles and magnates (e.g. in the case of the Białowieża Forest and the Borecka Forest).
- ✔ It is one of the most floristically spectacular forest habitats in Poland. In early spring, undergrowth plants bloom profusely in order to have time before the leaves on the trees develop, which will cut them off from the light. In the oak-hornbeam forests we will meet fields of snow-white or yellow anemones, bear's garlic or purple *Corydalis*.

07

Riparian forests



Riverside willow riparian forest during the flood, photo by Piotr Chara



The riparian forests are the most fertile and one of the most diverse forest communities in Poland. They are mainly related to the valleys of larger and smaller rivers, and the condition for their existence is annual short-term flooding. Contrary to alder forests, water flows through riparian forests rather than stagnates. Regular flooding ensures a constant supply of organic matter and makes the terrain extremely fertile (alluvial and silt-gley soils).

There are two groups of riparian forests in Poland. The first group is the forests located in the valleys of large and medium-sized rivers on very fertile soils (alluvial soils). Elms, oaks, willows, poplars, and ash trees dominate in the tree stands of oak-ash-elm forests and poplar and willow communities. Nowadays, such well-developed riparian forests are a rarity on a national scale. On the other hand, the second group consists of the riparian forests growing by smaller rivers and watercourses, sometimes around lakes. They mainly grow on silt-gley soils, sometimes organic. The tree stand is dominated primarily by alder and European ash.

Riparian forests, as part of the ecological corridor, that is each river valley, stabilize water relations and promote natural water retention. These forests play significant roles from the flood protection point of view. During floods, they stop and delay the freshet wave, reducing the water strength, and absorbing a part of the floodwaters. Riparian forests also act as natural wastewater treatment plants. They take nutrients from the water – nitrogen, phosphorus, and residues of pesticides. Trees growing in the side course of the river create an obstacle that slows down the water flow, and the slower the water flows, the better it is purified. On the other hand, forests growing on the river banks strengthen and protect them from lateral erosion and reduce the amount of soil entering the rivers from the fields.



Ash-alder riparian forest, photo by Paweł Jaczewski



Poplar and willow riparian forest, photo by Paweł Fabijański

Issues

The declining level of groundwaters and the resulting changes in the structure of the forest threat the existence of some riparian forests.

However, the greatest damage to the riparian forest was caused the rivers regulation, the construction of reservoirs and flood embankments, and their conversion into agricultural lands, like meadows. Cutting off the riparian forests from periodic floods inevitably leads to their vanishing or at least degeneration. The regulation of rivers and the liquidation of natural floodplains, which, according to the belief of many engineers, was supposed to prevent floods, turned out to be counterproductive. The riparian forests growing on the banks of the rivers constitute a buffer zone: their absence accelerates the flow of water and raises the level of flood waves.

Since in Poland there are fewer riparian forests in comparison to other types of habitats and since they grow on considerably small surfaces, invasive alien species, in particular the impatiens glandulifera and the box elder, may pose a significant danger to their existence. The latter, until recently eagerly planted in cities and parks, is characterized by high self-seeding and gets out of control easily. It spreads particularly well in river valleys and in the vicinity of flood embankments, displacing many native herbaceous and woody species.

Activities

The basis for the protection of riparian forests is primarily the protection of the habitat conditions in which this type of ecosystem functions, especially the protection of water conditions within the framework of national water management.

The active protection of the riparian habitats within the scope of the project consists of the elimination of invasive alien species – in addition to the aforementioned box elder, also Japanese knotweed, wild black cherry, and black locust. In some cases, at a local scale, the tree stand reconstruction consisting of the removal of ecologically alien species, e.g. pine or spruce, introduced to this habitat by artificial plantings is carried-out. Depending on the number of alien trees, the reconstruction takes the form of a forest thinning (young tree stand) or a complex clear-cutting (older tree stand). The elimination of undesirable species facilitates the growth of species specific to this habitat.

It is worth knowing that riparian forests have high regenerative capacity, and underneath the layer of trees originating from artificial plantings, tree stands with a composition similar to natural riparian forests can develop.



Undergrowth of oak-ash-elm riparian forest in spring, photo by Łukasz Skalski

Examples

The active protection measures on the largest scale are carried-out in the Natura 2000 area of Rogalińska Dolina Warty, in the forest districts of Babki and Konstantynowo.

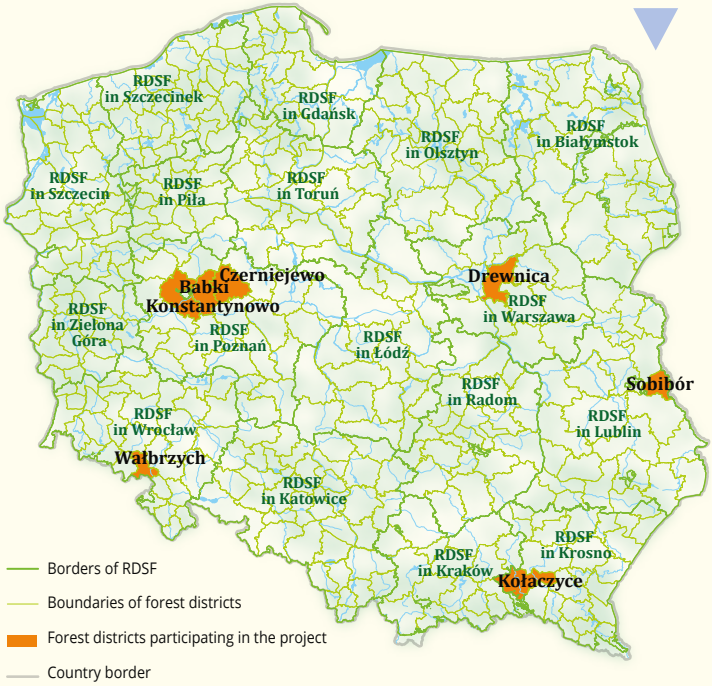
They involve the removal of wild black cherry and black locust by grubbing them up or uprooting. In the case of woody forms, the tree felling is allowed with simultaneous protection of the trunk with anti-growth preparations.

In total, the project includes 7 Natura 2000 sites and habitats with an area of approximately 60 hectares.



American bird cherry, photo by Paweł Fabijański

Forest districts participating in the project



Fun facts

- ✔ The best preserved areas of oak-elm-ash riparian forests, not only in Poland but even in Europe, can be found in the valley of the Odra River in Lower Silesia, as well as by the Warta River in the vicinity of Krajków and Czeszew.
- ✔ Long-term floods may damage the tree stand of the local riparian forests. For example, the great flood in 1997 caused the disappearance of several hundred hectares of trees growing by the Odra River. Such disasters, however, are inscribed in the ecology of those forest ecosystems that can function under stressful conditions.
- ✔ The Polish word used for naming the riparian forests – ”łęg” (also ”łęk”) comes from the praslovian language and means bending or curvature. It is assumed that originally the word ”łęg” was used to name the bends of the river, which is evidenced by the preserved village names: Łąg, Łężek, Załęże.

08

Thermophilous oak forest
(luminous oak forest)



Thermophilous oak forest, photo by Paweł Fabijański



The name of this habitat reflects its characteristics – thermophilous oak forest, also called the luminous oak forest of low tree crown over, a modest layer of underbrush, and a lush, flower undergrowth.

Oaks produce new leaves late so that the bottom of the forest is sunny in the spring. That is why many light-loving plants can bloom before the leaves develop. High daylight availability allows the unprecedented in other types of forests co-existence of species typical for forest and open areas, including many meadows and thermophilic plants.

Thermophilous oak forest is associated with the continental climate and grows mainly in the central and eastern parts of Poland and the Kaczawskie Hills. The forests usually occupy warm and dry sites, e.g. sunlit slopes with a southern or western exhibition, with deep groundwater levels.

Due to the abundance and diversity of flora (and thus also fauna, especially insects) and the presence of numerous rare and endangered species, the thermophilous oak forests are an exceptional refuge for biodiversity. Two national types of oak dominate in the tree stand – common oak and sessile oak. They are often accompanied by Scotch pine, birch, and fruit trees and shrubs – wild apple trees, pears, and cherries, as well as haws, roses, and blackthorns. Because of that, the oak tree forests wonderfully bloom in the spring. However, the expansion of the hornbeam often dominates in the underbush, which usually proves the transformation of luminous oak forests into shadowy broadleaved ones, and, in consequence, the disappearance of the habitat.

In the undergrowth of oak forests, you can find so many species that it is impossible to name them all. Among the fields dominated by the lily of the valley and grass, you will meet species of deciduous forests, woods, forest edges, and – which distinguishes the thermophilous oak forest from other forest communities – colorful meadow plants, such as common hedgenettle, and dyer's plumeless saw-wort, and formerly (currently very rarely) also sword lily (*Gladiolus imbricatus*), globeflower and Siberian iris. Also, there is a group of typically forest species associated with luminous oak forests, such as white cinquefoil, narrow-leaved lungwort, bastard balm, and black pea.

Communities of luminous oak forests currently occupy small areas and are becoming less and less common. The pace at which this formerly widespread forest community disappears is incomparable to any other ecological process in Polish forests.



Spring in luminous oak forest, photo by Anna Krasoń



Goats grazing in the Miechów Forest District, photo by Robert Michałowski

Issues

The existence of oaks for many centuries depended on the traditional human economy.

Livestock grazing was crucial. It is supposed that livestock cows and horses have replaced the currently extinct species of large herbivores – aurochs and tarpans. Thus, it is possible that the luminous oak forest was once developed naturally, without the man factor.

However, the list of benefits of oak forests did not end with grazing. Slowly decomposing oak leaves were used as bedding for animals in the barns. In autumn, the forest was raked. The forest was also the source of a heating material – firewood, which even more impoverished the habitat in organic matter and affected habitat conditions.

The abandonment of traditional methods of oak exploitation, especially since the middle of the 20th century, resulted in the intensive development of trees and shrubs, and thus – the shading of the forest undergrowth and the disappearance of photophilous species. The former human economy limited the tree crown cover of the forest (especially underbrush) and reduced the fertility of the habitat (due to the removal of leaf litter and deadwood).

Since thermophilic oaks have a bright character and thin tree crown cover, they are very susceptible to invasions of alien species: black locust, red oak, and above all, the wild black cherry.

Activities

As traditional methods of forest exploitation have disappeared irretrievably, thermophilic oak forests can be preserved or reconstructed through appropriate forest management in commercial forests.

Essential for maintaining this habitat are treatments involving the reduction of the tree layer and underbush, to ensure access to daylight to the forest undergrowth. For this purpose, the regrowths of trees and shrubs are cut out or mowed down. The harvested biomass is removed from the bottom of the forest so that it does not shade the undergrowth and hinder its development, and also to prevent soil fertilization because the photophilous undergrowth of oak forests is utterly susceptible to the increase in fertility of the habitat.



American bird cherry in the thermophilous oak forest, photo by Paweł Fabijański

Examples

The project covers more than 140 hectares of habitat in 8 Natura 2000 sites. It consists primarily of thinning the underbush and reducing the tree crown cover.

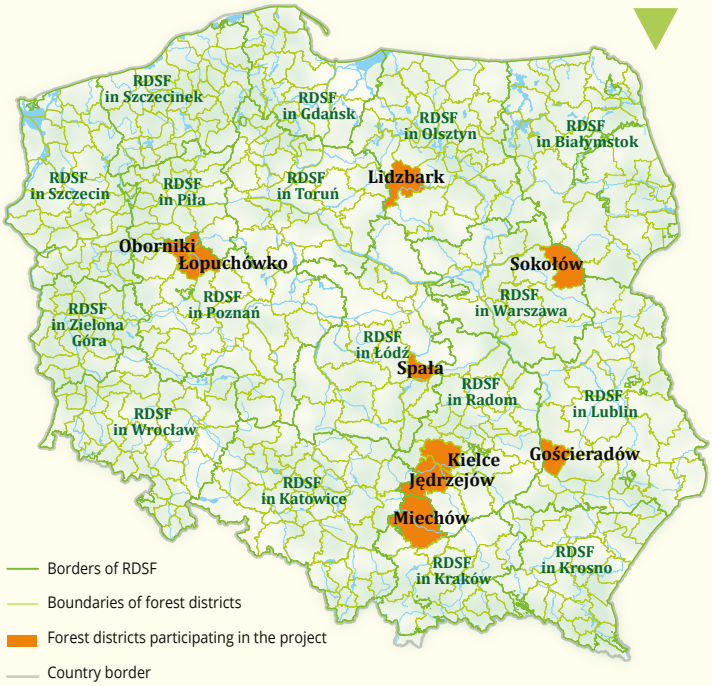
A promising method of protecting thermophilic oaks is a controlled grazing of hoofed herbivores. In the Oborniki Forest District, in the Dąbrowy Obrzyckie Natura 2000 area, Polish primitive horses (*konik polski*) help to maintain and restore luminous oak forests. By selectively biting the undergrowth and tree seedlings, they change the forest landscape – the forest as a result of grazing takes on the nature of a park or even savanna-like pasture, with a loose stand and a rich grassy-flower undergrowth. Fifteen hectares of oak forests have been grazed in this forest district.



15 ha of luminous oak forests have been grazed in the Oborniki Forest District

Grazing of Polish primitive horses (*konik polski*), photo by Paweł Fabijański

Forest districts participating in the project



Fun facts

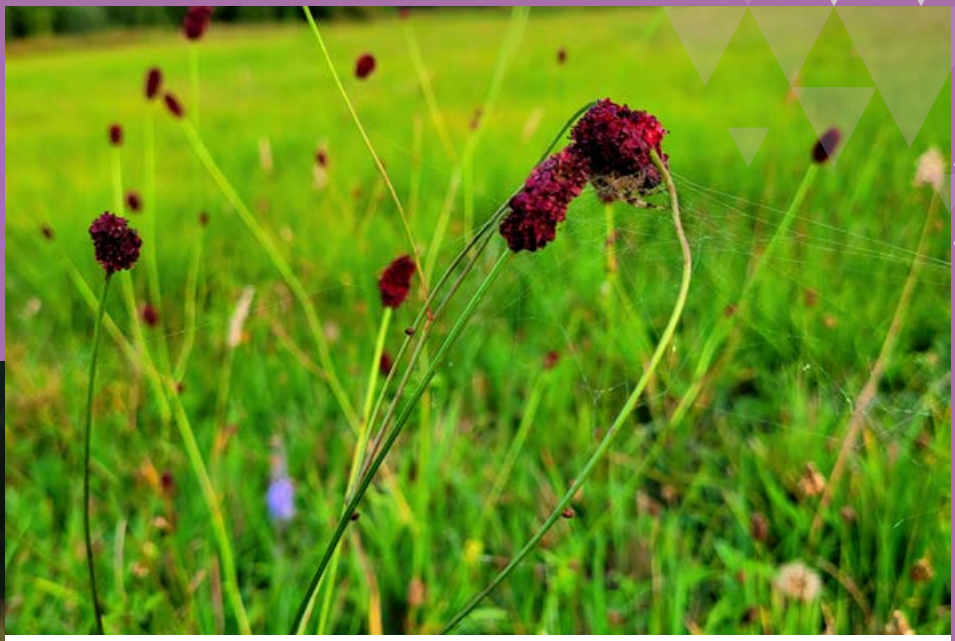
- ✔ The nature reserve "Bielinek" (north-western Poland) is the only place in this country where the thermophilic oak forest with a mossy tree stand grows. It is the only site in Poland where you can meet downy oak, a southern European species whose range extends south of the arc of the Carpathians. There are many indications that this species has been brought into the valley of the Odra River by humans. One of the hypotheses is associated with the nearby Cistercian monastery, which made wine barrels from this oak, the other – is the fact that the acorns of this species were valued food for pigs. For this reason, oaks forests were once a popular site for grazing pigs, and their delicacy was acorns. Pig grazing in oak forests is practiced until this day in southern Europe (Italy, Spain).
- ✔ Many nature reserves have been established for the purpose of the conservation of luminous oak forests. However, the lack of active protection has caused many to disappear.

09

Molinia meadows



Siberian irises on the Molinia meadow, photo by Marek Lotarski



Great burnet, photo by Łukasz Skalski



On the Molinia meadows live many specimens of flowering plants (orchids, irises, sword lilies, cloves), which are more associated with the garden rather than with wild nature. In botanical terms, they have no equal due to changes in the water level characteristic for this habitat: high in spring and autumn, and low in summer. It is the place where both dry-loving and moisture-loving (or even those characteristic for peat bogs) species grow next to each other, as well as many other species associated with fresh habitats (neither moist nor dry).

Molinia meadows usually develop on the edges of the middle and small river valleys. It would not be possible without extensive agricultural activity. They used to be widespread throughout the country, but at the same time, they were the least productive type of meadow. They were usually mowed late and grazed, which favored the proper condition of these communities. Sometimes the meadows were mowed earlier, and hay was used as bedding in barns or feed during periods of bad harvest. This diversity of exploitation in time and space favored species diversity.

There are many species characteristic and typical for meadows of variable moisture. They include (apart from the ubiquitous *Molinia caerulea* and relatively common northern bedstraw and *Selinum carvifolia*) several disappearing, colorfully blooming species, such as Succisa pratensis, common hedge-nettle, fringed pink, *Gladiolus imbricatus*, Siberian iris, marsh gentian or a peculiar *Polystichum* – adder's-tongue.



Molinia meadow, photo by Paweł Fabijański



Issues

Molinia meadows almost vanished from our landscape mainly due to their fertilization, conversion into intensive agricultural lands (like maize cultivation), the abandonment of mowing, and consequential overgrowing.

Cessation of its exploitation triggers the processes of succession and soil turfing by grass. Deposition of unmowed biomass (plant residues) affects habitat conditions, especially access to light and fertility. These habitats are threatened by deliberate dehumidification and the general decline in groundwater levels resulting from climate change.

Activities

Like other semi-natural habitats, these meadows require active protection that imitates traditional methods of their use.

It consists primarily of extensive mowing, at the turn of summer and autumn, after the blooming period of most plant species. Mowing does not necessarily have to take place every year. The mowing height should not be less than 10 cm from the surface of the soil, and the hay should be collected after each haymaking. Haymaking prevents the growth of expansive grasses and the development of tree and shrub seedlings.



Succisa pratensis, photo by Marek Lotarski

Examples

Meadows covered by the project protection are located in 8 Natura 2000 sites, covering a total of about 22 ha. These are usually areas of several hectares, sometimes smaller patches of habitats.

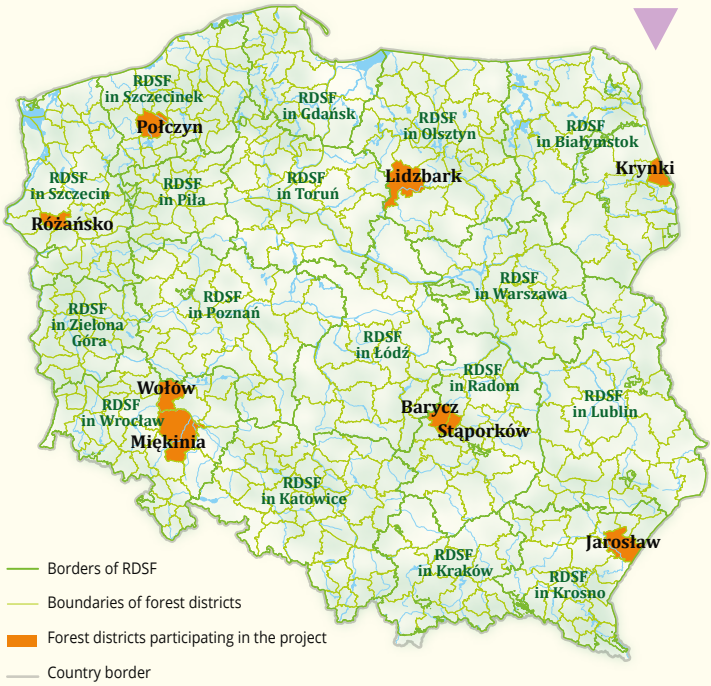
In the Stąporków Forest District, the area of the Molinia meadows partially overlaps with the protected area where the butterfly named marsh fritillary (Euphydryas aurinia) occurs. Therefore, the applied treatments need to be adjusted to these two protection projects. The meadows' maintenance activities mainly consist of cutting shrubs and trees and are carried out every three years, while the preservation of the marsh fritillary habitats consists of mowing from mid-September to the end of October – once a year, different areas each time. The remaining biomass, branches, and hay are removed outside the habitat. As far as possible, haymaking is traditionally carried out by hand using a scythe or light cutters to minimize the destruction of the soil surface. After three years, we can see the first effects of works and changes in the landscape: the expansion of the trees has been contained, and the meadows recovered their open character.



22 ha the Molinia meadows are protected in the project

Molinia meadow, photo by Marek Lotarski

Forest districts participating in the project



Fun facts

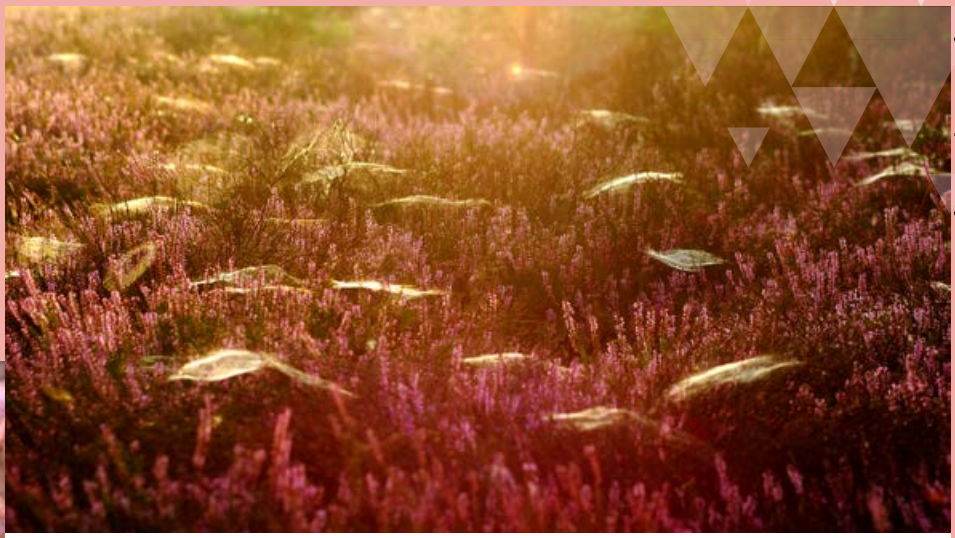
- ✔ Molinia meadows are a paradise for butterflies. The plants found here (like *Succisa pratensis*, great burnet) create unusual and complex relations with insects. These species are associated with rare, protected butterfly species whose caterpillars prey exclusively on the flowers or leaves of the selected species, which are their only host plants! In the case of the great burnet, these are scarce large blue butterflies – teleius and nausithous, and in the case of Succisa pratensis leaves – the marsh fritillary. In addition, the wintering of the chrysalis of the mentioned scarce large blue butterflies is dependent on the presence of anthills of specific species of ants. Unfortunately, this means that if the meadow changes its character, with the disappearance of plant species or ants, we will also lose the butterflies dependent on them.
- ✔ Changes in rural architecture have had a significant impact on the disappearance of the Molinia meadows. Moving away from the roofing of huts with thatched straw caused straw – formerly a valuable building material – to replace hay originating from the Molinia meadows as bedding in the barns, which made their traditional mowing meaningless.

10

Dry heaths



Dry heaths, photo by Jakub Smarczewski



Dry heaths, photo by Paweł Brankiewicz



Dry heaths are naturally formed due to forest fires and are often only a "moment in the life of the forest" because the pine rapidly returns to the site after the fire, and the tree stand is reborn. Smaller patches of the habitat develop on the edges of clearcutting areas, crop fields, or forest roads. However, the majority of heaths in Poland grow on military training grounds. Paradoxically, running over the undergrowth and soil with heavy military equipment and periodic fires kept the area deforested and promoted the formation of micro-habitats, especially the gaps in the heath, where many rare and endangered plant species found the perfect place to develop. The most notorious, extensive fields of purple flowering heathers grow on former military training grounds in Przemków, Drawsko, and Borne Sulinowo Forest Districts.

Heathlands occupy the poorest soils, acidic, often sandy, in dune areas. In general, they are dominated by heather shrubs and common boric mosses. They may seem monotonous, but they are very diverse due to the participation of other plants. On heathlands, especially the moist ones, you can find several species most endangered with extinction in Poland, such as – formerly classified as fern – the common moonwort, semiparasitic plants (such as the common lousewort) and rare euphrasies, and even some representatives of lycopods, orchids, and gentian. It is these plants, occupying ecological niches, that make heathlands so valuable.

The landscape of heathlands is enriched with pine and birch trees – the only woody species that manage well in such barren and dry habitats. However, their growing population is a sign of the forest expansion and the overgrowing of the heath.



Dry heaths in autumn, photo by Paweł Brankiewicz



Issues

The main issue is the mass renewal of light-seed, pioneering species, especially birch trees.

Like all habitats dependent on human activity, the heathlands of anthropogenic origin disappear in front of our eyes when the influence of anthropopressure ceases. It can be seen in the ranges abandoned by the army, where the forest began to invade the heaths. A small proportion of trees is typical for heathlands because heather, as a heliotropic species, prefers unshaded and barren soils. Meanwhile, the development of trees and shrubs reduces sunlight and promotes the accumulation of dead organic matter, increasing the fertility of the habitat.

Activities

The primary way to protect heathlands is to remove invading trees and shrubs, which must be redone every few years due to the regrowth of the birch.

There are no alternatives to tree felling: uprooting young trees or shrubs on huge areas (post-range heaths can occupy several hundred hectares) would absorb considerable resources.
In addition to stopping the succession process, it is necessary to rejuvenate heather shrubs. Regeneration is usually initiated by traditional methods such as grazing or mowing, although more radical ways appear to be more effective, such as burning selected habitat areas.

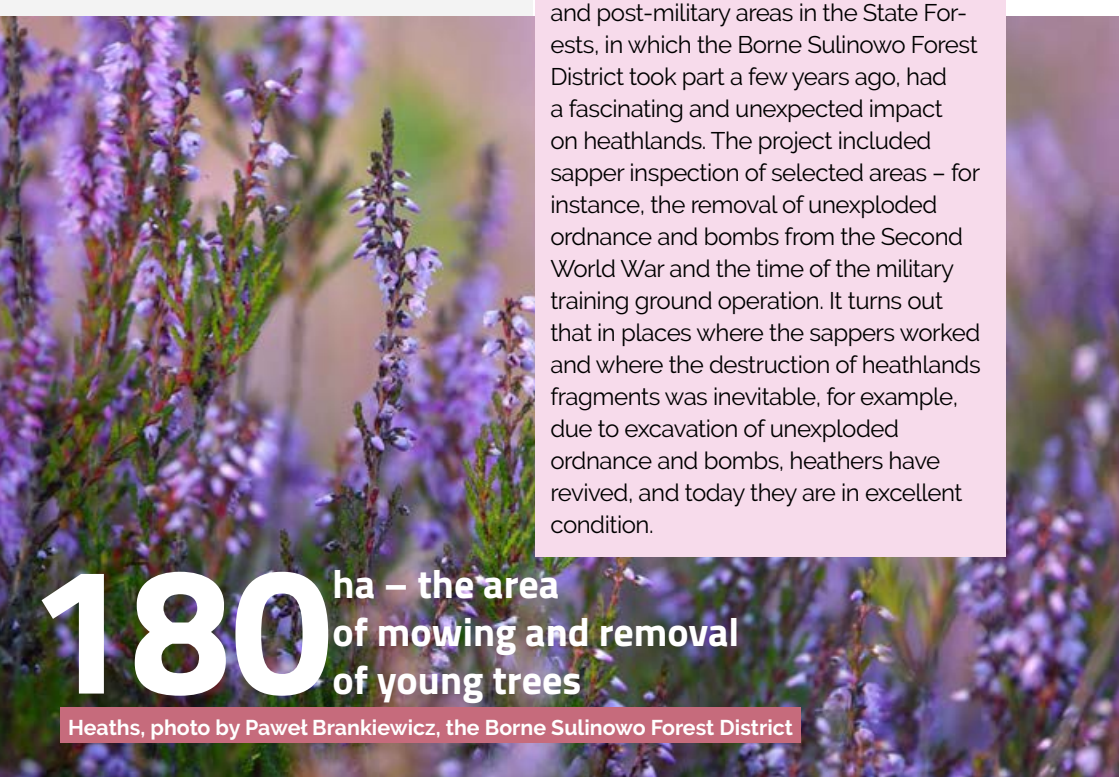


Dry heaths, source: the Borne Sulinowo Forest District

Examples

The area of heathlands under the protection of the project amounts to more than 242 hectares in 2 Natura 2000 sites: Diabelskie Pustacie and Lower Odra. A large part of the first area is located in the Borne Sulinowo Forest District and has also been under protection as a nature reserve.

The biggest challenge that the forest district is currently facing is the overgrowth of heathlands by expansive birches and aspens. The expansion of trees and shrubs is suppressed mechanically, but these species quickly grow back in the next growing season. Therefore, the work is repeated gradually, every year in different areas. The entire biomass is removed outside the heaths. In Borne Sulinowo, mowing and removal of young trees cover an area of over 180 hectares. The project of reclamation of degraded and post-military areas in the State Forests, in which the Borne Sulinowo Forest District took part a few years ago, had a fascinating and unexpected impact on heathlands. The project included sapper inspection of selected areas – for instance, the removal of unexploded ordnance and bombs from the Second World War and the time of the military training ground operation. It turns out that in places where the sappers worked and where the destruction of heathlands fragments was inevitable, for example, due to excavation of unexploded ordnance and bombs, heathers have revived, and today they are in excellent condition.



180 ha – the area of mowing and removal of young trees

Heaths, photo by Paweł Brankiewicz, the Borne Sulinowo Forest District

Forest districts participating in the project



Fun facts

- ✔ The original idea to protect dry heaths is controlled burning under the supervision of scientists. For several years this method has been used as an experiment on the Przemkowskie Heathlands. The range of the fire should not exceed several hectares, different areas each time. The fire burns old heather clumps, without damaging the underground part and allowing these shrubs to be renewed. According to the 2015 fire monitoring, 85 % of heather clumps resumed growth, and 75 % bloomed. In Poland, however, this method is still considered an experiment.
- ✔ Heathlands on active and former military training grounds are important refuges of black grouses in Poland, a species dying at a dramatic rate, as well as other valuable animal species, like a zigzag viper and rare butterflies.
- ✔ In the Polish language, the word *heather* (wrzos) is the source of the name September (wrzesień), but currently, this plant blooms at the beginning of August. Does this indicate climate change?

11

Xerothermic grasslands



Xerothermic grasslands in the Pińczów Forest District, photo by Lech Drożdżowski



According to the etymology of their name, these grasslands develop in dry and warm places (from Greek: *xeros* and *thermos*) on a substrate rich in calcium carbonate. The intense insolation of the soil makes it able to heat up to 50°C. It is no wonder that there are many species typical of the steppe zone on xerothermic grasslands.

Among the species typical of these habitats are plants with epizoochory seeds, namely transferred on the hair of animals (originally large herbivores, which used to be numerous in the steppes; later – sheep, goats, etc.). Particularly interesting in this respect are the stipas, like the *Stipa capillata*, the seeds of which "screw" into the hair of animals using a long „bone" serving as a „pinwheel". Many thermophilic species of animals are associated with these grasslands, including gophers, European mantis, rare orthopterous species (commonly called locusts), and numerous butterflies (e.g., scarce swallowtail and the Old World swallowtail).

An unusual group of plants covering the grasslands is orchids, as many species are growing here, often very impressive and threatened with extinction. Orchids often „deceive" insects, pretending to offer nectar. Their method of using two-leaf insects is very peculiar – their flowers imitate females of specific species of *Hymenoptera*, and in addition, they produce aromatic sexual attractants. In this way, they attract male wild bees, who try to copulate with these plants, enabling fertilization and seed development. In turn, moccasin flowers have trap flowers, in which insects, deceived by a promising sweet reward, not only do not find nectar but end up in a deadly trap instead. Only a few find the way out, which requires squeezing next to the pistil and stamens to enable pollination.

We distinguish two main types of xerothermic grasslands– flower grasslands (dominated by colorfully blooming perennials) and Stipa grasslands (composed of tussock grasses) occupying more extreme habitats.



Fly orchid, photo by Jakub Smarczewski



Traditional goats grazing on grasslands, source: CCEP

Issues

The main factors for the formation and maintenance of grasslands are the ones preventing their overgrowth and transformation into bush and forest communities.

Natural grasslands may have persisted on rocky and steep outcrops or river-washed valleys, but most of them were formed due to human activity. In the past, they were favored by a traditional, extensive economy, primarily livestock grazing, mainly by sheep and goats.

Initially, there were attempts to protect grasslands passively; to this end, several so-called steppe reserves were created, which banned grazing. It led to the disappearance of – theoretically protected – grasslands; we have lost even more of them in the past due to plowing.

Activities

Traditional grazing is by far the most effective way to protect the habitat. However, plans for grassland protection often include mowing.

This method is the only solution where grazing goats or sheep is impossible. Therefore, while some valuable grasslands are grazed, many others are mowed. Grazing is a challenge, especially where the availability of suitable animals is limited or simply lacking.

In the case of xerothermic grasslands transformed due to their abandonment – mainly heavily overgrown by shrubs, often involving very expansive black locust – before grazing or mowing, it is necessary to cut or uproot trees and shrubs, which are then removed outside the habitat. Unused grasslands will rapidly deteriorate due to the deposition of the so-called felt, meaning the layers of last year's residues of grasses and other plants on the surface of the soil.



Snowdrop anemone, photo by Jacek Koba

Examples

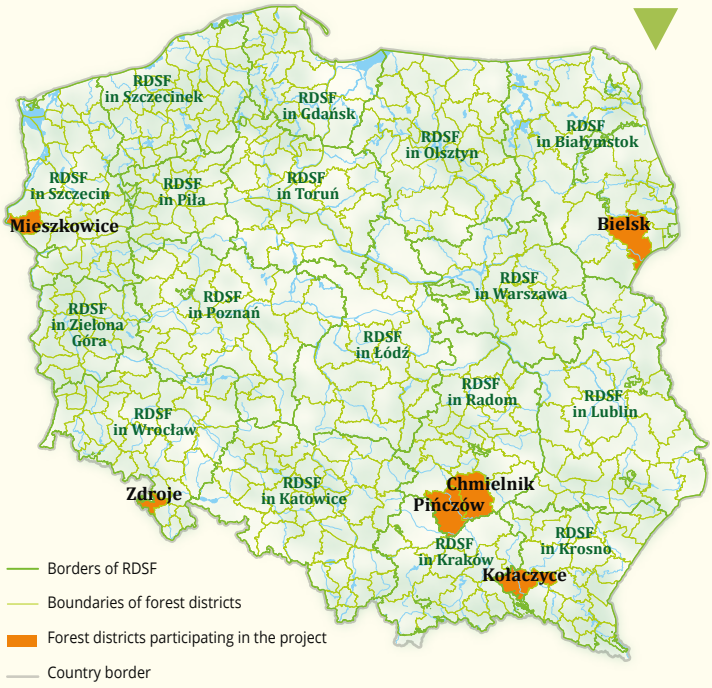
The total xerothermic grassland surface protected under the project is nearly 23 hectares in 6 Natura 2000 sites. These are usually small patches, the size of several dozen acres, although they happen to be larger surfaces.

One is in Polana Polichno Reserve in the Pińczów Forest District, an exceptional gift of nature, well-known among plant enthusiasts. This floral reserve has been operating for almost half a century to protect steppe vegetation, including Pannonian peas, and many species of orchids. The three clearings on which the grassland has been preserved are mowed once a year, from September to mid-October. According to the plan of conservation tasks, mowing is carried out on a selected part of the habitat, every year on a different surface. In the first year of the project, shrubs covering a part of the grasslands were disposed of. It led to an increase in grassland insolation which improved the well-being of the moccasin flowers blooming lavishly in the following years.



Lady orchid, photo by Ewa Osińska

Forest districts participating in the project



Fun facts

- ✔ The xerothermic grasslands are one of the most floral habitat types in Poland as they are rich in various colorful and vibrant perennials. During the growing season, from early spring to autumn, species coloring the grasslands bloom at a specific time, due to which the grasslands in early spring turn light green and yellow, late spring – green-white-pink, early summer – yellow-blue-purple; in late summer, however, only a few species bloom and the grasslands look like dry hay.
- ✔ Grasslands often develop on steep slopes, unsuitable for plowing but ideal for grazing animals, mainly sheep. Currently, we associate sheep primarily with mountains, but only a few decades ago they were commonly bred throughout Poland. Sheep grazing is believed to facilitate the spread of steppe plants, as their seeds attached to dense and entangled sheep wool were scattered over a wide area.
- ✔ Due to climate warming, unlike many other habitats described herein, xerothermic grasslands have a good chance of increasing their prevalence in the future – as long as the species that form them survive.

12

High, transitional, and alkaline peatlands



High peatland, photo by Paweł Fabijański



Peatlands are profoundly valuable ecosystems, fulfilling several principal natural functions. Their nature lies between aquatic and terrestrial environments, and it often occurs at the junction of these two.

Peatlands form in areas of water accumulation caused by limited drainage or complete lack thereof. As a result, the terrain gets constantly flooded, and there is no oxygen, preventing the total decay of the organic matter. In consequence, under the conditions of a very slow rate of plants' decomposition, non-decomposed organic matter is deposited in the substrate in the form of peat deposits. Peatlands store significant amounts of water, thus preventing flooding and giving away excess water during periods of drought.

They are also a place of occurrence of many species specific to this habitat, including rare and dying species, as well as relics – which are the remnants of the flora of past glaciation. A characteristic feature of high, transitional, and alkaline peatlands is a deficiency of nutrients such as nitrogen and phosphorus. The unavailability of these elements for plants causes carnivorous plants – sundews, bladderworts, and butterworts – can be found in these unique ecosystems.

Wetlands, especially peatlands, also play a crucial role in the environmental element cycle (mainly carbon and nitrogen). By accumulating carbon in peat, absorbed by plants through photosynthesis, the concentration of CO_2 present in the atmosphere is reduced, which is crucial in terms of climate change. On the other hand, dehumidification of peatlands triggers the reverse process – the release of carbon stored in peatlands. It is another reason why these habitats should be protected.

The type of peatland and its vegetation depends primarily on the origin and chemical composition of the water supplying it; the terrain is also essential. The peatland's ecohydrology is such a complex issue that ecologists often repeat that each peatland is different and unique in terms of habitat conditions. Peatlands supplied by rainwater, almost deprived of contact with groundwater and associated with areas with high rainfall, are called high peatlands. Usually, they are characterized by a peat deposit raised above the surroundings. If, on the other hand, the groundwater supplying the peatland is poor in minerals, transitional peatlands are formed.

Most of the area of Poland lies in a zone dominated by low peatlands. Most of them are naturally poor, and only a small portion of low peatlands is classified as Natura 2000 habitats. Within this diverse group of peatland ecosystems, the richest natural and most endangered alkaline peatlands are dependent on the supply of mineral-rich waters. Because of that, they are alkaline or close to neutral, and the concentration of nutrients is low.

Mosses play the most crucial role in the vegetation construction and the peat-forming process in all three types of peatlands included in the project.



Transitional peatland, photo by Paweł Fabijański

Issues

From an economic point of view, wetlands, including peatlands, used to be wastelands or meadows of poor quality, and therefore for centuries humans have been transforming them into exploitable areas. This was especially true for meadows which productivity was increased by drainage. Another form of human activity that has contributed to the vanishing of peatlands is the exploitation of peat – formerly mainly used for fuel, today – for horticulture needs.

The primary threat to peatlands is their drying out, causing the decomposition (oxidation) of peat, habitat changes, the disappearance of typical peatland species, and the release of the deposited carbon and nitrogen into the atmosphere. The consequence of these habitats drying out is also their overgrowth. Trees and shrubs enter the open, wood-free peatlands when the water level drops. Wetlands protection mainly consists of water retention – in different ways, depending on local conditions – and preventing the succession of scrub and forest vegetation. Particularly valuable areas are successively taken under protection as nature reserves. The measures taken to actively protect peatlands require good awareness of the habitat conditions and threats, and once they have been implemented – their succeeding continuation in order to ensure the durability of the achieved results.

Activities

Peatlands' overgrowth can be contained by removing undesirable trees and shrubs and removing high perennials (including cane).

However, this process requires treatments repeated every year or every two years. Restoration or maintenance of proper water conditions plays an important role in keeping peatlands in good condition. First of all, it is necessary to prevent water drainage, e.g. by building water gates on drainage ditches.

Alkaline peatlands require special handling preventing the destruction of the vegetation structure and the top layer of peat. The open character of the habitat can be restored by removing overgrowing trees and shrubs (birch, pine, willow) and regularly cutting the cane and other reed species. The harvested biomass should be removed from the habitat area.



Kielce peatland after mowing, photo by Robert Płaski

Examples

The project includes protective measures implemented on peatlands with a total area of approx. 550 hectares in 28 Natura 2000 sites. These tasks include the prevention of habitat overgrowth and the maintenance of proper water conditions.

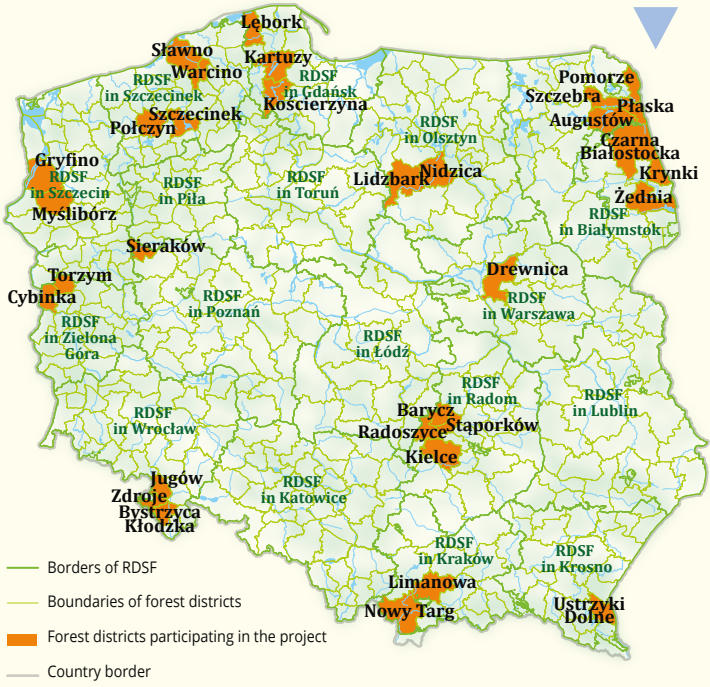
The Wielkie Błoto peatland in the Szczecinek Forest District is a remnant of a high peatland, i.e. a specific form of high peatland typical of the northern part of the country. Formerly, the local peat used to be widely utilized. To restore the habitat conditions and renew the peat vegetation, several dozen small water gates were constructed on ditches, preventing excessive water drainage.

A very unusual protected peatland is located in the Uroczysko Łopień area, in the mountainous Limanowa Forest District, in the landslides zone. In this area, expansive willows were removed and the drainage of water was prevented by a natural groove created by rainfall. Due to the specificity of the site and the inability to build water gates or other durable structures, the damming system was made of locally acquired wood and rock material.



High peatland, photo by Agata & Mateusz Matysiakowie/ fotomatysiak.pl

Forest districts participating in the project



Fun facts

- ✔ In the past, peatlands were the source of crop plants, including edible plants (especially cranberries). Some have also been used for other purposes, such as the marsh Labrador tea, formerly a common moles repellent. As a result of intensive harvest, this species had to be taken under protection and currently cannot be harvested without authorization.
- ✔ These habitats are specific biological archives, containing detailed information about changes in the natural environment occurring over thousands of years, including vegetation, climate, and human settlement. Peat preserves not only pollen, but also animal skeletons and human products, and even conserved human remains.

13

European pond turtle



European pond turtle, photo by Paweł Fabijański



The European pond turtle is the only native species of turtle in Poland. Although the species used to inhabit the entire country, today the European pond turtles are rare and inhabit isolated patches of land. The most populated habitats have been preserved in Polesie Lubelskie, Masuria and Warmia, and the valley of Zwolenka River. Since 1935, it has been under strict protection. It is one of the few animals that need different environments to survive, meaning water reservoirs and dry places where it can lay eggs.

Turtles are reptiles that have an exoskeleton. The dorsal part of the armature is called the carapax, and the abdominal one is called the plastron. The European pond turtle's carapax is olive-brown and covered with smooth, regular corneal shells. A well-developed plastron is covered with large, irregular bright spots. The head, neck, and legs are dotted with small, numerous yellow spots, although there are also black specimens. The length of the armature rarely exceeds 20 cm, and the body weight is 1 kg.

The European pond turtle inhabits small water reservoirs such as lakes, ponds, forest ponds, and slowly flowing rivers with muddy bottoms. Turtles swim and dive well. They are predators hunting and feeding underwater, where they can remain for up to an hour. Their diet includes water insects, their larvae, snails, tadpoles, frogs, and small fish. They either won't say no to the carcass. They also eat aquatic plant shoots. Like any cold-blooded species, they like to bask in the sun. They spend the winter buried in the mud at the bottom of the water reservoir for about 5 months. They wake up around April and hold a mating lasting for a few days. When laying the eggs (depending on the weather conditions at the end of May or early June), the turtles come out ashore and look for places with sandy, loose ground, allowing them to dig up the appropriate cave for nesting. These places must be adequately sunny and dry. When they find a good spot, the turtles dig nests close to each other, usually in the same places as in previous years. Typically, they are situated a few hundred meters from the water. Once the eggs are buried in sand, the females close and camouflage the nests, and return to their home reservoirs. Young turtles hatch after about 100 days, are about 2.5 cm long, and have a soft armature. They get out of the nest and start their journey in search of a suitable water reservoir or bury themselves into deeper layers of soil for wintering. For effective reproduction, European pond turtles need a sufficiently long and warm summer. If the summer is too short and too sunny, the young specimens may not hatch by the autumn, but wait until the next spring buried in the sand. Only after 6 years the armature hardens enough to allow turtles not to be afraid of predators.



European pond turtle, photo by Paweł Fabijański

Issues

At the beginning of the 20th century, there was a significant decrease in the population of European pond turtles in our country, mainly related to the disappearance of habitats occupied by this species.

The main reason for this phenomenon was a decrease in groundwater levels caused by unilateral drainage systems. The development and afforestation of sandy clearings also had a negative impact, as being deprived of access to such places, these reptiles aren't able to reproduce. Also, increased traffic poses a serious danger to this species. In search of a spot suitable to lay their eggs, females set off on a long journey, during which they often have to cross busy roadways. Having laid the eggs, females must return to their home reservoir, covering a dangerous route one more time. Researchers note that females often choose roadside nests or less sandy roads where eggs are not safe. Young turtles after getting out of the nest are looking for suitable water reservoirs. During their journey, they are threatened by predators: foxes, badgers, raccoon dogs, raccoons, or the American mink, wild. This threat has increased significantly in recent years due to the number of foxes. It happens that the young turtles aren't able to hatch because predators rob nests and consume the eggs laid therein. The population of the European pond turtle in our country needs immediate actions dedicated to its active protection.

Activities

Activities related to the European pond turtle protection provided under the project consist primarily of protecting breeding grounds from overgrowth by removing invasive trees and shrubs and mowing.

The predators are also subject to ongoing elimination. The active protection of breeding sites is aimed to decrease the number of nests robbed by predators. It consists of the fact that in the spring period when eggs are laid, the breeding ground is under observation, and when females leave the nesting area, a steel net is installed as a protective measure. In the autumn, when young turtles start hatching, the nests secured during the spring are under supervision. When the young reptiles try to leave the nests, protective nets are removed and the turtles are transferred to the local water reservoirs.



Secured nest, the Chełm Forest District, photo by Paweł Fabijański

Examples

Active protection of the European pond turtle is implemented in 5 forest districts in 4 Natura 2000 sites.

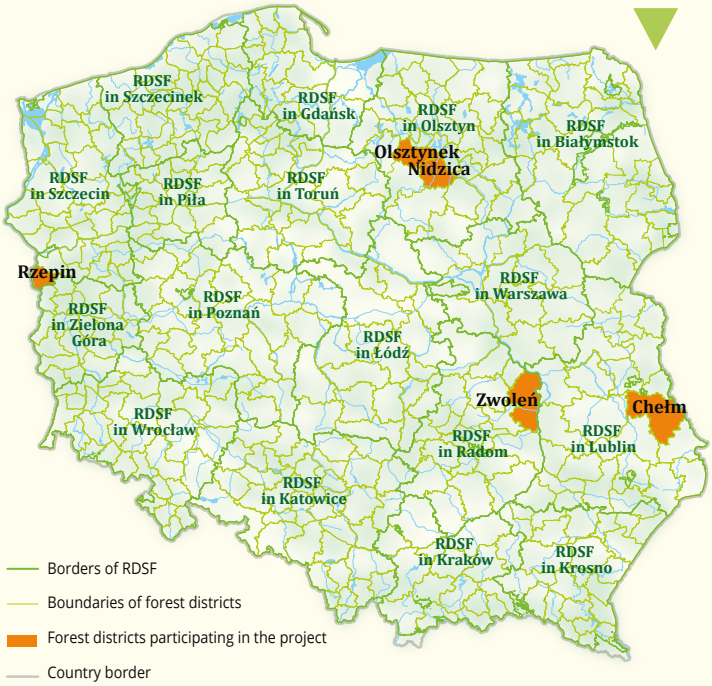
Active protection of nests is implemented in the Chełm Forest District in the area of two breeding grounds. In 2018-2022, 222 nests were secured, from which 1728 young turtles were transferred to the adjacent water reservoirs.

The Nidzica Forest District holds an annual cull of the fox. Along with the breeding sites' protection against overgrowth in the Nidzica Forest District, thermophilic inland sand grasslands are also secured.



Water reservoir in the Chełm Forest District, photo by Paweł Fabijański

Forest districts participating in the project



Fun facts

- ✔ Turtles are long-lived, and their life span in nature can exceed 120 years.
- ✔ The sex of developing embryos is determined by the warmth of the surrounding environment.
- ✔ These animals are very secretive and attached to their places of existence, which makes it sufficient for the destruction of the entire local population to change the wetland into a recreational reservoir.
- ✔ In Poland, 5 nature reserves and 50 Natura 2000 sites were created for the purpose of European pond turtle protection.

14

Newts and fire-bellied toads



Great crested newt, photo by Paweł Fabijański



European fire-bellied toad, photo by Paweł Fabijański

There are 19 native amphibian species in Poland. These are salamanders, newts, fire-bellied and spadefoot toads, toads, European tree frogs, and frogs. Some sources demonstrate the presence of 18 amphibian species in Poland – until recently eastern tree frog was not considered a separate species, since it was not included in the existing "Regulation of the Minister of the Environment on animal species protection". Other species are subject to protection: strict or partial.

These animals, which are quite numerous throughout the country, are adapted to live simultaneously in two environments – land and water. They can move efficiently on the ground, breathe atmospheric oxygen, and have developed mechanisms to protect against drying out. During the mating period, which in Poland starts in March, most amphibians set off on a journey to the water reservoir, where females lay eggs. The water tank does not have to be large – it can be a small pond, a garden pond, a puddle, or a ditch. It is crucial, however, that the water stays in the reservoir for a few weeks, because it is there that young amphibians are born and developed.



Water reservoir, source: CCEP

Issues

Amphibians are endangered for many reasons, and the most important of them is the loss of breeding sites, i.e. small water reservoirs.

The reasons for this state of affairs may be natural (overgrowth, drying-out) or human-made – river regulation, backfilling of garden ponds, ponds, and small watercourses, water pollution, and climate change. Dehumidification of meadows, swamps, and wetlands also harms amphibians. Increasing traffic and constructing roads along the routes of these amphibians cause collisions between these animals and vehicles and prevent or hinder their movement.

The European fire-bellied toad and the great crested newt are subject to protection in Natura 2000 sites. Both these species winter and reproduce in similar places, often share the same water reservoirs and are susceptible to similar threats. The conservation measures mainly involve the maintenance of their habitats by preventing the overgrowth and swallowing of ponds.

Activities

Active protection of amphibians is mostly focused on the protection of their breeding sites, i.e. small water reservoirs.

Care should be taken to prevent the overgrowing of the sites and, if necessary, deepening the reservoirs, cleansing them (but only at specific periods of the year) from excess vegetation and sediment remaining at the bottom. If there are no or very few breeding sites in the area, new ones should be created. The identification of the location and routes of seasonal amphibian migrations and the detection of any significant barriers or traps on the way to breeding sites and shelters are crucial elements.



Water reservoir, source: CCEP

Examples

Conservation treatments of the European fire-bellied toad and the great crested newt are implemented in 6 Natura 2000 sites.

In the area of the Szczecineckie Lakes in the Szczecinek Forest District, water damming with the use of a water gate resulted in creating a shallow backwater, which can be inhabited by amphibians.

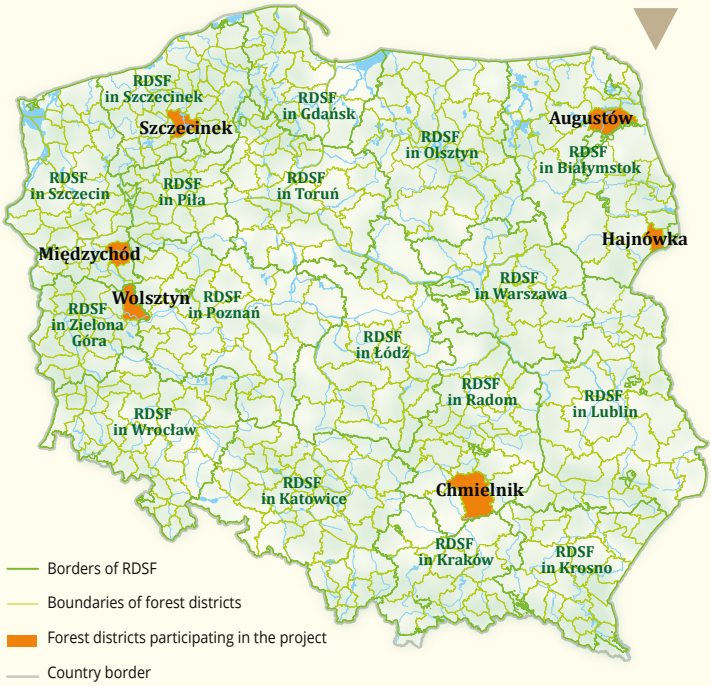
The Chmielnik Forest District in Ostoja Szaniecko-Solecka desludges the reservoir waters regularly, preventing its disappearance. In 2019, as a result of intense precipitation, the protective wall surrounding the mid-forest pond, the place of the great crested newt occurrence, was damaged. Thanks to the funds allocated to the project, it was possible to restore the previous state by constructing a new dam in the place of breaking the dyke.

In other places (the Augustów and Hajnówka Forest Districts) shallowing and overgrowing of the reservoirs is contained by preventing the water surface from excessive shadowing, which consists of removing shrubs growing in the direct neighborhood of the reservoirs.



Water reservoir in the Chmielnik Forest District, photo by Ewa Osińska

Forest districts participating in the project



Fun facts

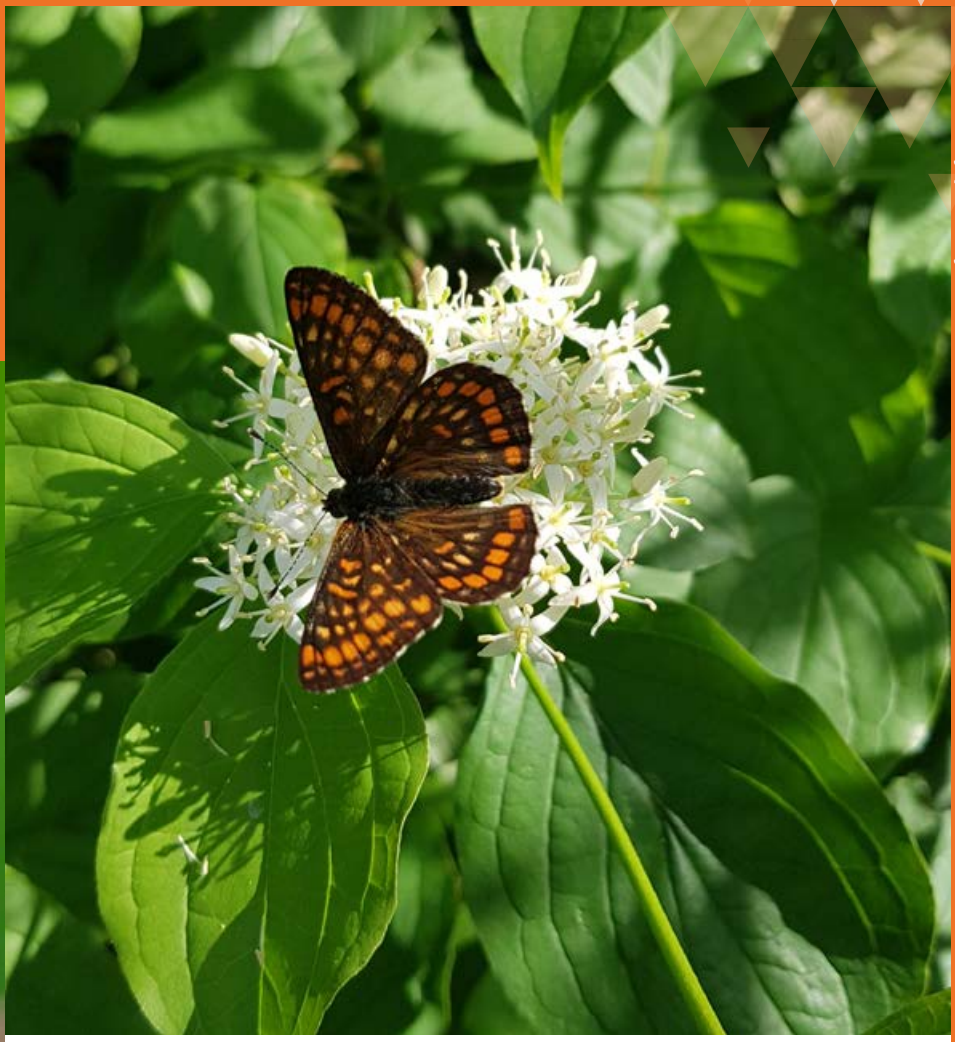
- ✔ Newts are small salamanders, similar to lizards, from which they can be distinguished by the number of fingers on the front limbs. The lizards have 5 fingers, while the newts have 4. In Poland, there are 4 species of newts. During the mating season, male newts produce characteristic fragrances and can take on expressive and even exotic colors. The great crested newt owes its name to the large skin comb present on the back and tail of the males during the mating period.
- ✔ The fire-bellied toads are tailless amphibians similar to small toads whose body is covered with bumps. In Poland, there are two species of fire-bellied toads: the European fire-bellied toad and the yellow-bellied toad. These amphibians reach a body length of only 4 to 6 centimeters. During warm evenings, especially before the storm, they make characteristic, "roaring" sounds: croak, croak, croak, which is hard to confuse with others.

15

Butterflies



Large copper, photo by Agata & Mateusz Matysiakowie/ fotomatysiak.pl



Scarce fritillary, photo by Adrian Smolis

Butterflies are winged insects, also known as lepidopterans. Typically, they are divided into two groups due to the time of their occurrence – day butterflies and night butterflies, i.e. moths. In Poland, there are more than 3,200 species of butterflies, of which 149 are day butterflies. Unfortunately, with every decade, this number is decreasing. Butterflies contribute to plants pollination, produce silk, and in some countries, their caterpillars serve as food for humans. The Habitats Directive protects butterflies and the places where they live. One of the most attractive habitats for butterflies is riparian forests and wet meadows, which is why by protecting those habitats, we also protect butterflies.



Marsh fritillary, photo by Paweł Fabijański

Issues

The number of species of butterflies endangered by extinction is constantly increasing. The main causes are intensive farming, the application of plant protection products, progressive urbanization, and the expansion of cities and industrial areas.

In addition, numerous butterflies, or more precisely their caterpillars, are exterminated as dangerous crop pests in the fields and gardens. Butterflies' survival makes it difficult to abandon traditional, extensive methods of meadow exploitation, such as low-intensity grazing and lack of late mowing, which lead to the transformation and disappearance of their habitats. In addition, many butterflies at different stages of their development depend on the presence of other plant species and animals, without which they will not survive. The example of these insects proves the chain effect and nature of the decline in natural biodiversity.

Activities

The protection of each species of butterfly requires an individual approach. Most often, the project involves activities such as mowing with biomass removal and supplementing the food base, which consists of planting the European ash and guelder rose, and leaving ash and common dogwood for natural renewal.



Coral viburnum, photo by Agata & Mateusz Matysiakowie/ fotomatysiak.pl

Examples

Active protection measures to protect butterflies and other species, such as marsh fritillary, large copper, and scarce large blue, are implemented on over 48 hectares.

During the project's first four years, only three forest districts in the valley of the Odra River near Wrocław, planted more than 12,000 viburnum pieces, being one of the most important host plants for one of the protected species of butterflies – scarce fritillary. Its caterpillars mainly feed on the leaves of ash and viburnum. The butterflies occur from mid-June to the end of July. They lay their eggs on ash leaves, choosing the youngest trees reaching a height of up to a few meters or lower hanging branches. The young individuals feed on them in groups until autumn and then go down to the leaf litter for wintering. In the spring, they feed individually, again on ash, and other trees and shrubs, like guelder rose or goat willow.

Therefore, population survival depends on maintaining the availability of food necessary during a specific stage of fritillary growth. Plantings were made partly as a supplement to the composition of the habitat's species, and partly as linear plantings along roads and flood embankments. This species inhabits clearings and the edges of damp riparian and oak-hornbeam forests.

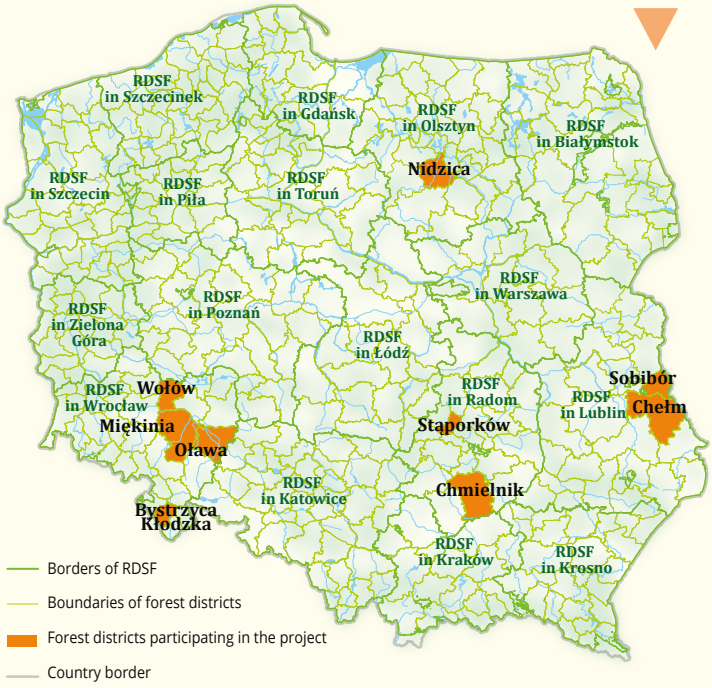
12000

pieces of viburnum were planted in the valley of the Odra River near Wrocław



Viburnum seedling in the Wołów Forest District, photo by Kamila Wilk

Forest districts participating in the project



Fun facts

- ✔ The scarce large blue has a very particular life cycle. The female lays eggs on the young inflorescences of a great burnet, which serves as food for young caterpillars. Then the caterpillar falls to the ground and pretends to be the ants' lost larvae. At the same time, the scarce large blue caterpillar release substances that encourage ants to adopt it, and when the insect is taken to the anthill, it feeds on ants' eggs and larvae. During this period, the caterpillar increases the weight of its body up to a hundred times. Pupation occurs in June in the upper layers of the anthill. Then an adult butterfly is hatched and leaves the anthill.
- ✔ Plants especially liked by butterflies include buddleia, lilac, honeysuckle, echinacea, floks, lavender, zinnia, goosefoot, thyme, hollyhock, speedwell, sage, and evening-scented stock. When planning to plant plants attracting butterflies, it is worth choosing primarily native species.

16

Bats



Greater mouse-eared bats, photo by Anna Kmiecik



Lesser horseshoe bat, photo by Anna Kmiecik

Flight ability, nocturnal lifestyle, and resting upside down are the main characteristics that distinguish bats from other mammals. Because of these features, bats have mastered many ecological niches inaccessible to other animals. Bats can be found in various environments, from deserts to jungles, in forests, mountains, developed areas, and even in big city centers. Most species live in tropical zone. These mammals have a very diverse diet. The vast majority are insectivorous, some eat fruit, other pollen, and nectar, but you can also find species that hunt small vertebrates (rodents, lizards, small birds, or even fish). Three species of the leaf-nosed bat family feed on the blood of warm-blooded animals.

Bats are rather small animals, the majority of them weigh only a few dozen grams. Their most characteristic feature – wings – evolved from the transformed front limbs. The prime sense of the spatial orientation of bats is echolocation, which reflects in the structure, physiology, and life of these animals (poorly developed eyes, characteristic ears, or nocturnal lifestyle).

So far, 27 bat species have been identified in Poland. These are bats catching small invertebrates, mainly insects. Their life cycle is determined by climate. In spring and summer, bats are extremely active animals. During this period, females are grouped into breeding colonies of different sizes, in which they give birth and raise their young. The offspring are born in June, and after two months young bats become independent. In winter, when food is inaccessible, they fall into a state of hibernation – during which metabolic processes significantly slow down, and body temperature lowers. During this time, most species find shelters in various underground structures – caves, tunnels, or cellars. Some hang directly on walls or ceilings, while others hide in the tightest splits.



Geoffroy's bat, photo by Anna Kmiecik

Issues

Bats do not have many natural enemies, and even in the case of the most dangerous of them – owls – the share of bats as their food is insignificant.

They may be affected by adverse climatic conditions (cold and rainy summers that make it difficult to get enough food and a long and harsh winter). However, it was human activity that led to bats being one of the most endangered species of animals today. The main factors that harm bats include:

- ✔ changes in land exploitation, the disappearance of trees, avenues of old trees, parks, and wetlands, as well as the chemicalisation of agriculture (reduction of the food base, disappearance of feeding grounds, and migration routes),
- ✔ the decreasing number of suitable shelters (old buildings with attics, cellars, shutters, and numerous splits are increasingly rare, and modern, sealed construction does not always correspond to bats' needs),
- ✔ the exploitation of caves and all underground structures for economic purposes (their transformation into landfills, warehouses, destruction, and bricking up entrances),
- ✔ the penetration undergrounds by tourists, cavers, and various seekers.

Activities

There are many protective measures implemented to save bats. First of all, they focus on securing their habitats – places of wintering and reproduction, against destruction, anthropopression, or change in the form of their use.

Sites occupied by bats are fitted with elements that imitate their natural shelters (e.g. bricks, and wooden structures). The replacement of outdoor lighting in the vicinity of bats' habitats, and the preservation of appropriate forms of trees are also highly significant. Both clumpy and linear trees allow safe passages from summer shelters to feeding grounds and back. The availability of watering holes also plays an important role – ponds, garden ponds, etc., especially when feeding young. Conservation activities are paired with natural education through the popularization of knowledge about bats and the need to protect them.

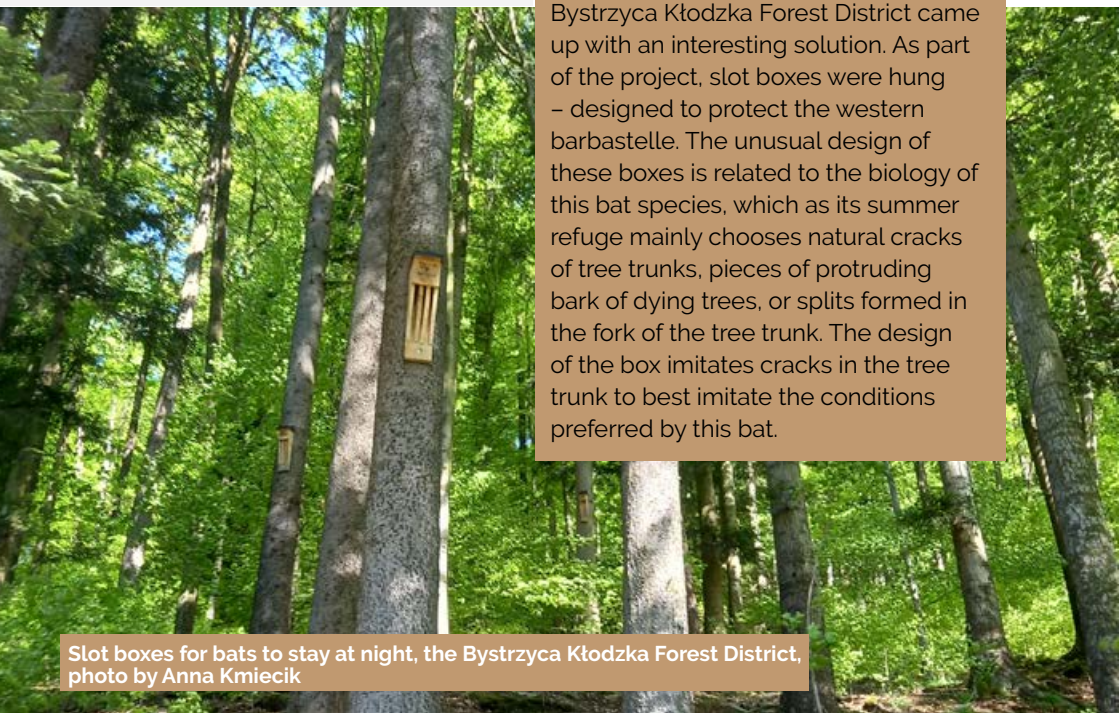


Grating securing the entrance to the cave in the Bardo Śląskie Forest District, photo by Paweł Fabijański

Examples

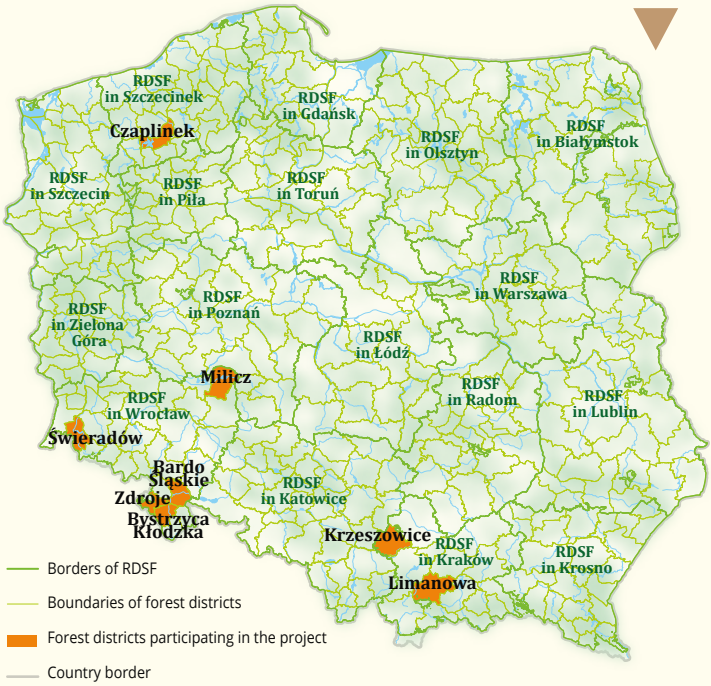
Bat protection activities are carried out in 8 forest districts in 10 Natura 2000 sites. Such species as lesser horseshoe bats, western barbastelle, Geoffroy's bats, greater mouse-eared bats, and other bats that want to benefit from the shelters in the forest districts are subject to natural protection.

Bat protection activities in the project are mainly focused on the protection and provision of suitable places for bats wintering. First of all, the entrances to the adit and cave openings are secured by the installation of gratings, doors, and other protections. Bat shelters are cleansed of debris, leaves, earth, or garbage, and fortifications protecting against the collapse of underground corridors are renovated. In addition, in forests with a low number of tree hollows, the number of shelters is increased by hanging specially constructed bat boxes. The Bystrzyca Kłodzka Forest District came up with an interesting solution. As part of the project, slot boxes were hung – designed to protect the western barbastelle. The unusual design of these boxes is related to the biology of this bat species, which as its summer refuge mainly chooses natural cracks of tree trunks, pieces of protruding bark of dying trees, or splits formed in the fork of the tree trunk. The design of the box imitates cracks in the tree trunk to best imitate the conditions preferred by this bat.



Slot boxes for bats to stay at night, the Bystrzyca Kłodzka Forest District, photo by Anna Kmiecik

Forest districts participating in the project



Fun facts

- ✔ The Latin name of bats – *Chiroptera*, literally means “hand wings”.
- ✔ There are approx. 1000 bats species, which corresponds to nearly 1/5 of all mammalian species. They are the largest group of these animals following the rodents.
- ✔ Many valuable breeding colonies of bats inhabit the attics of old churches. Therefore, some protective measures involve roof renovation, cleaning, and conversion of church attics. Thanks to them, modernization works are carried out in a manner that is friendly to these mammals, and at the same time, increases the level of ecological awareness and acceptance of the presence of these animals in buildings used by humans.

17

Birds in Natura 2000 areas



Boreal owl, photo by Agata & Mateusz Matysiakowie/ fotomatysiak.pl

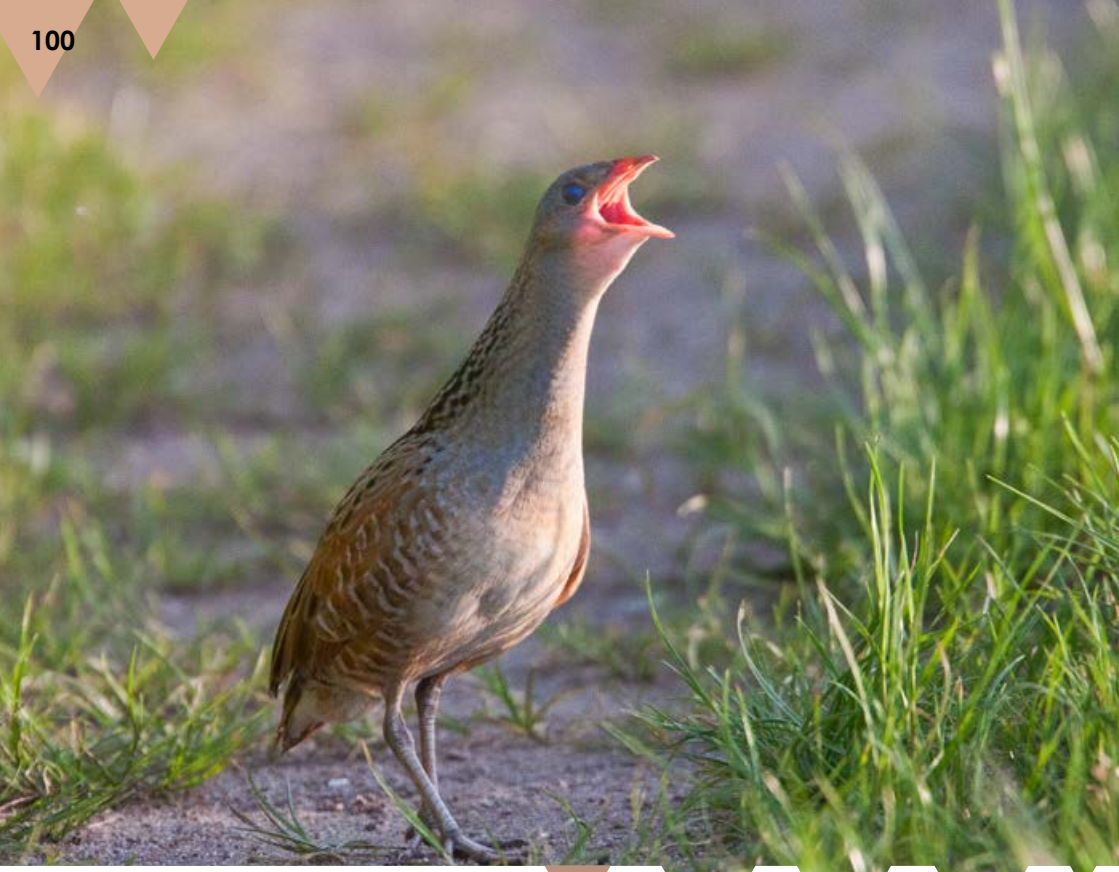
The Directive on the conservation of wild birds (the so-called Birds Directive) has been helping to protect these animals and their habitats across the EU for many years. Based on its provisions, Natura 2000 bird protection areas have been established. Those areas protect bird species which are particularly endangered, susceptible to changes in their natural environment, and rare due to small and limited local populations.

Birds are a very appealing group of animals to observe, recognize voices, or photograph because of their diurnal lifestyle (usually) and a variety of species. Spring is the breeding season. During this time, you can listen to their songs and territorial sounds, which confirm the occupied areas and high breeding period. Summer is a stage of an intensive school of life for countless young generations and the reproductive period of the species which, at the latest or the longest, raise their offspring. Autumn, in turn, is a migration period. Some species leave for Africa or Asia to spend the winter there, others migrate to western Europe, and others remain in Poland. Winter is a season of struggle for survival, during which birds focus on searching for food and convenient hiding places.

Each species is characterized by a skill set of ecological adaptations and habitat requirements that determine its presence in a given area. Some can adapt, and it seems that there aren't many things that can harm them. Others are sensitive enough to react to changes occurring in the environment, which results in a rapid decline in the population.



Nesting box, photo by Natalia Barszczewska



Corncrake, photo by Paweł Fabijański

Issues

Many factors negatively affect the population of individual bird species. One of the biggest threats is poverty and loss of habitats.

Some habitats are devastated by human activities (pollution or permanent conversion of habitats) or transformed by plant succession, declining groundwater levels, or progressive climate change. For some species, increased pressure from predators, including the emergence of invasive alien species, may impact the population numbers significantly, while for others, intensive tourism development.

Activities

Sometimes it's sufficient to help birds on a small scale by increasing the availability of nesting places or limiting illegal entry to their habitats.

Conservation measures must, of course, be appropriate to the needs of a given species, taking into account their impact on the populations of co-occurring species.

The protective measures under the project also consist of preventing succession and maintaining the open character of grasslands, which are the birds feeding areas, for example, a lesser spotted eagle. This species nests in forests, but mainly preys in open spaces such as meadows, pastures, wastelands land, and arable farming. Also, other species, for which the availability of open spaces is essential for their existence, benefit from these actions.

A separate, significant element of the project is the restoration of capercaillie in the Lower Silesian Forest area. Comprehensive actions aimed at restoring the capercaillie population consist in improving the quality of habitats and the complicated process of introduction of capercaillies into the habitat. All this is to gradually strengthen the local population contributing to the increase of its number.

The project also includes measures to reduce predatory pressure on bird populations by reducing the predators' population and protecting nesting sites against predatory mammals (mainly martens) using deterrent substances impeding access to nests.



Lesser spotted eagle, photo by Michał Androsiuk

Examples

Conservation treatments for different bird species are carried out in 15 Natura 2000 sites by 29 forest districts.

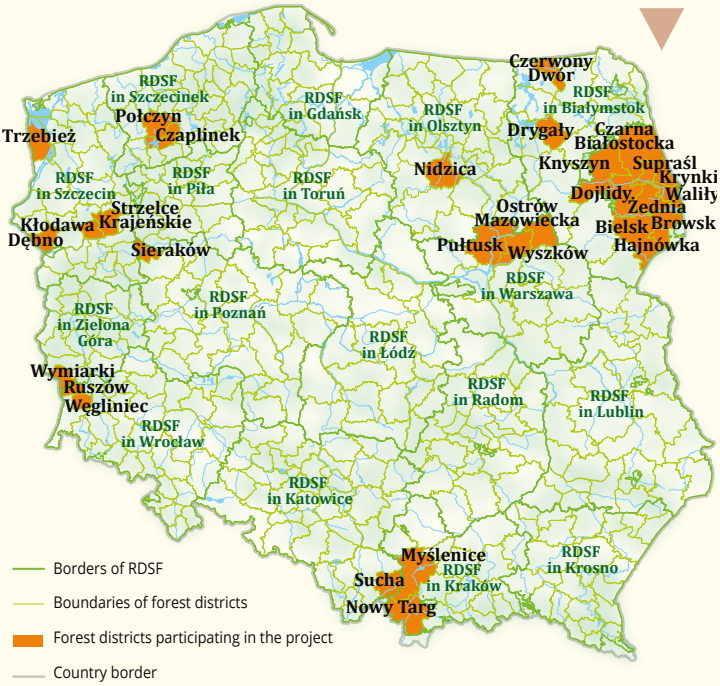
In the Bielsk Forest District, mowing and disposal of trees and shrubs with simultaneous biomass removal from sites where the corncrake occurs are carried out. These birds inhabit various types of grassland with poor vegetation. If such an area overgrows too much, it ceases to be attractive to the corncrake, and the bird looks for a new place. Therefore, preventing the natural succession (overgrowth) of habitats is a crucial activity aiming to preserve the bird population in our landscape.

In the Czaplinek and Połczyn Forest Districts, nesting boxes for boreal owls are available. The boreal owl is a small owl with a round silhouette, a large head, and a short tail. It mainly occupies hollows carved by a black woodpecker. When there aren't any hollows available in the neighborhood, we can help the species by increasing the availability of places convenient for shelter or breeding.



Nesting box, photo by Natalia Barszczewska

Forest districts participating in the project



Fun facts

✔ The black stork, due to its small population and high wildness, is not a frequently observed species. Their nests are located deep in the forest, usually on the branches of old oaks in places not frequented by people. The basis of the black stork menu is fish, so its feeding grounds are secluded wetlands. For this reason, it is much harder to meet the black stork than the white one. To meet the growing demand for wildlife exploration, the State Forests have launched an online transmission from the nest of a black stork, thanks to which we can watch the lives of these mysterious birds without the risk of frightening them.

18

Capercaillie



Capercaillie, photo by Paweł Fabijański



Capercaillie, photo by Paweł Fabijański

Capercaillie is Europe's largest ground-feeding bird. It inhabits the northern and central parts of Eurasia. In Poland, this species is extremely endangered. Its population is approx. 500-600 individuals living in four isolated refuges (Western Carpathians, Solska Forests and Janowska Forests, Augustowska Forest, and Bory Dolnośląskie). The capercaillie was a wild bird for a long time. It was not until 1995 that it was subject to strict species protection. The areas of permanent residence of these birds shall be subject to zone protection: year-round – within a radius of up to 200 m and periodic, from February to June – within a radius of up to 500 m from mating or breeding sites.

Sexual dimorphism is visible in the case of capercaillie, both in terms of size and plumage of birds. Capercaillies live in vast, inaccessible forests and avoid contact with humans. They prefer old woods with a loose tree stand, poorly developed undergrowth, and ground cover dominated by shrubs, especially blueberries. These are sedentary birds. They feed on leaves, shoots, and fruits, especially blueberries; during winter, they eat needles of pine, spruce, and fir, and in summer, also invertebrates. Capercaillies swallow small pebbles that facilitate the digestion of food, constituting the so-called gastroliths. During the day, the birds dwell on the earth, seeking food, and spend the night in the crowns of trees. The females plant nests in the pits on the ground. They fill them out with dry grass, needles, and moss. Once a year, they lay 7-11 eggs. The chicks hatch covered with down and are immediately ready to leave the nest.



Capercaillie leaving the adaptive aviary, source: CCEP

Issues

Since the beginning of the second half of the twentieth century, a drastic decline in the number of capercaillies has been observed. The causes of this concerning trend are many, and it is hard to act against all of them at the same time.

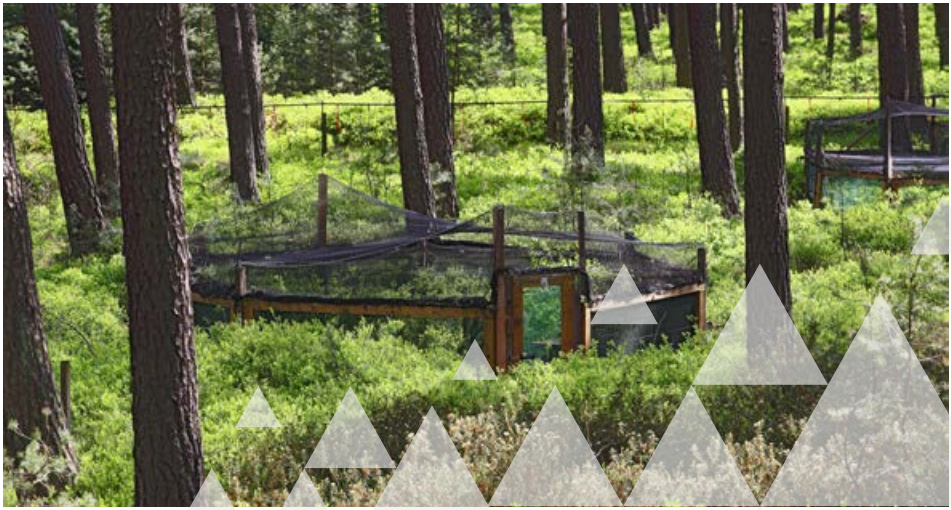
Capercaillies are extremely shy and they need extensive, well-preserved woods to survive. Formerly changes in the environment, such as forest fragmentation, the conversion of natural, age-differentiated forests into single-century economic tree stands, changes in water relations, and the logging of coniferous, old trees harm the preservation of the population. Currently, forest management in the capercaillie refuges strives to be consistent with the requirements of the protection of this species. A significant threat to the species is human activity (shooing or compacting the road network), and the increase in the number of natural enemies, mainly the fox. For years, the State Forests in Poland have been involved in the protection and reintroduction programs of forest gallinaceans, like capercaillie and blackcock, also through breeding.

Activities

Comprehensive protection of capercaillies includes a variety of activities focusing on the improvement of the living conditions of these birds. These include, among others:

- ✔ Adapting the site inhabited by birds to meet their habitat requirements in the best way possible. Excess undergrowth is removed, including invasive species, mainly meadowsweets and wild black cherry.
- ✔ Increasing birds' safety by removing fences or weaving pine branches into the nets surrounding the coppices. The metal mesh/net in the forest can be invisible to birds, and a collision with such an obstacle, e.g. when taking to the air, can cause serious injury or death.
- ✔ Reducing the pressure of predators (raccoon dog, raccoon, fox, and marten) by culling them or catching them in live traps (in the case of hawks and buzzards).
- ✔ Enriching the food base by planting bog whortleberry and mowing old berries to rejuvenate them.

In addition to activities related to the environment of capercaillies, forest districts are trying to work to increase the population of these birds.

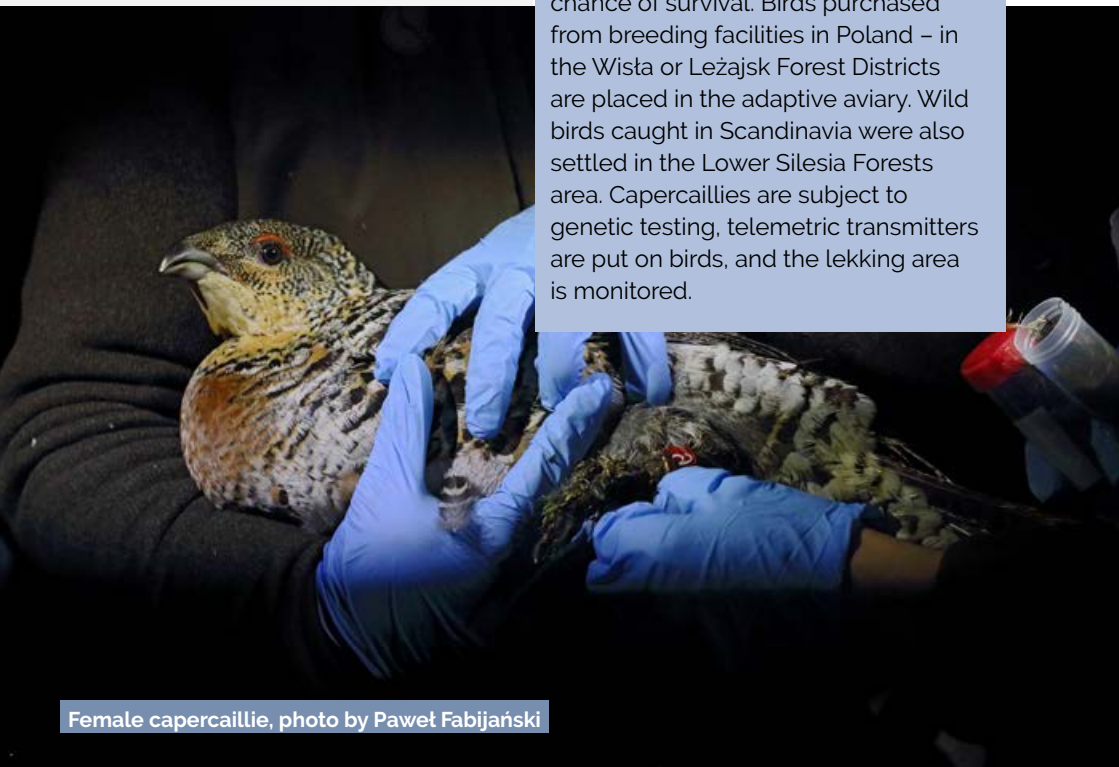


Adaptive aviary, photo by Paweł Fabijański

Examples

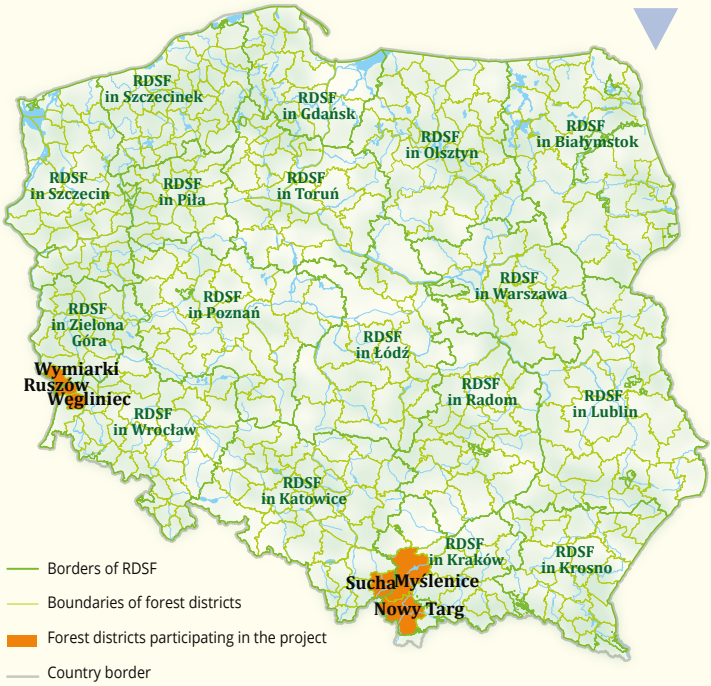
The capercaillie protection under the project is carried out in 6 forest districts in 2 Natura 2000 sites. For several years, in the Ruszów Forest District (Lower Silesia Forests), an innovative method of rearing and capercaillies introduction has been used, called "born to be free".

When trying to strengthen the capercaillie population in Poland, the adaptation of human-bred individuals to natural conditions may be problematic. According to the method used in the project, hatched chicks or young individuals are placed in aviaries located in the natural environment. From day one, they can move freely outside the aviary, where the mother resides, independently acquire food, and learn natural behaviors, including avoiding predators. It gives young birds a better chance of survival. Birds purchased from breeding facilities in Poland – in the Wisła or Leżajsk Forest Districts are placed in the adaptive aviary. Wild birds caught in Scandinavia were also settled in the Lower Silesia Forests area. Capercaillies are subject to genetic testing, telemetric transmitters are put on birds, and the lekking area is monitored.



Female capercaillie, photo by Paweł Fabijański

Forest districts participating in the project

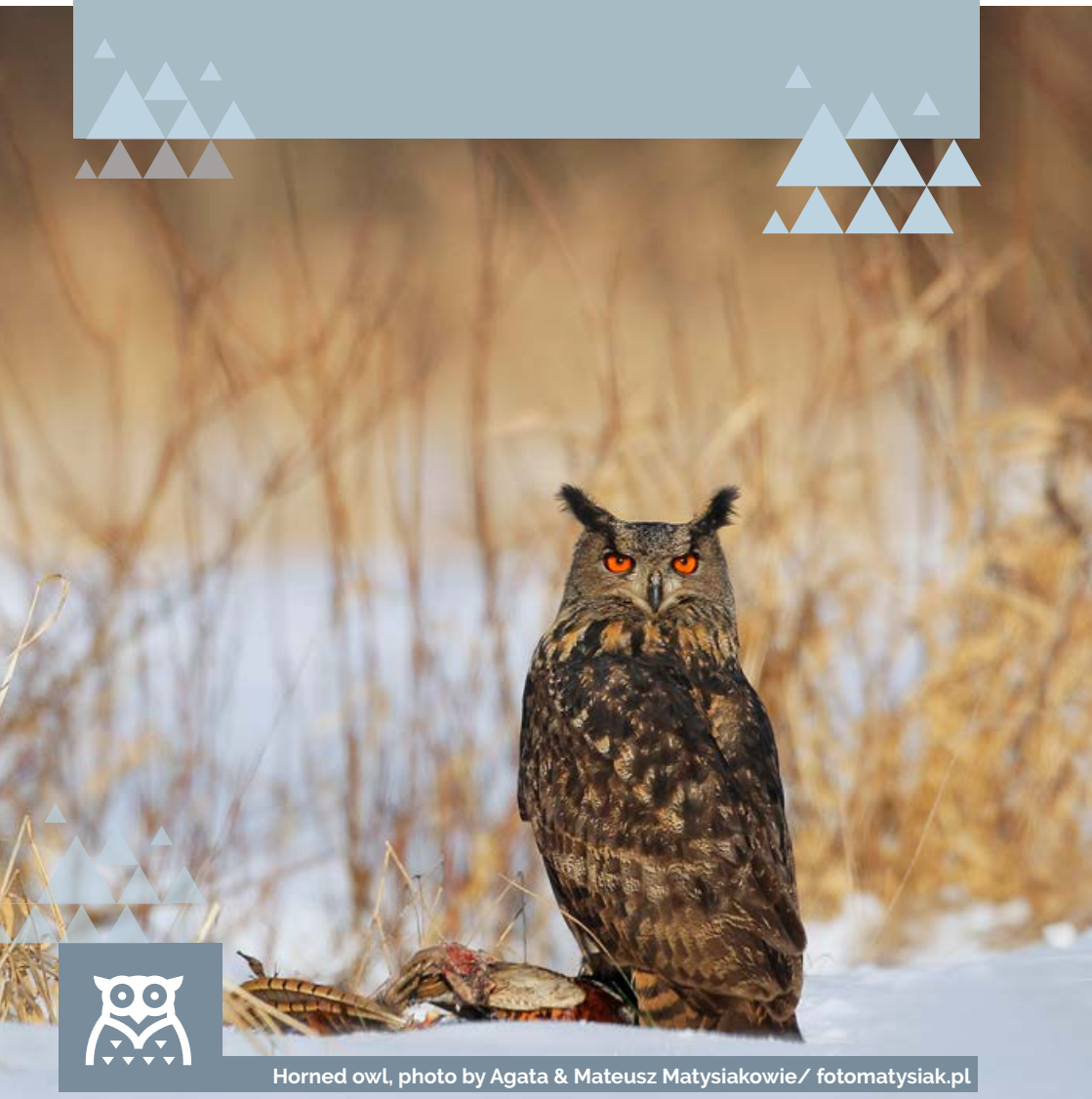


Fun facts

- ✔ The hybrid between the capercaillie and the blackcock is called the Rackelhahn. However, these birds are infertile. The Rackelhahns were found in areas where one of the aforementioned gallinacean species was very rare, and finding a partner from their species was very difficult. Currently, both species are so rare that such hybrids are no longer seen.
- ✔ Capercaillies love to take sand baths, e.g. on mid-forest roads or in places created by a windthrow (a hollow in the ground with the roots of a tree overturned by the wind).
- ✔ When the females take care of the chicks, the males change plumage, turning them briefly into flightless bird. At the same time, they replace their beak cover, which makes their beaks soft for some time. During this time, the males, scattering their feathers around the area, attract the attention of predators. In addition, deprived of the ability to fly efficiently, they are unable to take refuge in the trees, so they wander on the ground in search of appropriately soft food, e.g. berries. In this way, they detract the predators from the places.

19

Horned owl and osprey



Horned owl, photo by Agata & Mateusz Matysiakowie/ fotomatysiak.pl



Osprey, photo by Piotr Chara

The **horned owl** is the largest owl in the world. Wingspan in some individuals can reach up to 2 meters and weighs up to 4 kilograms. In Poland, the horned owl is dispersed and very rare, as it can be seen only in certain regions of this country. It prefers areas with diversified landscapes in lowland and mountainous areas creating a mosaic of forests, peat bogs, marshes, waters, and open spaces. It does not build its nests. The bird uses rock shelves or old nests of large birds, e.g. eagle or black stork, instead. It can also nest on the ground, e.g. underneath fallen trees. The horned owl is sensitive to startling and disturbance during the breeding period. Therefore, protection zones are established around the identified nests.

Osprey is a large migratory bird of prey, widely prevalent in the world. In Poland, however, it is a rare animal, which occurs only in the north-eastern part of the country and in the Greater Poland region on the border with Western Pomerania. Usually, nests are built in old pine woods, on exposed, high trees. It nests equally willingly on artificial platforms placed on high-voltage poles. It feeds almost exclusively on fish, which is why a crucial element of the nesting area are water reservoirs, as they are the place of feeding. The bird is strictly protected, and its nests are subject to protection zones.



Osprey, photo by Cezary Korkosz

Issues

In the case of the horned owl, one of the problems is the destruction of ground nesting areas by predators.

Changes in the environment (disappearance and overgrowth of wetlands) or collisions with energy lines, for example, also harm the condition of the national population of horned owl, which is already very low and oscillates around 270-380 breeding pairs.

In the case of the osprey, it is hard to indicate what restrains the bird population in our country. Comprehensive protective measures to increase the food base, the availability of nesting sites, bird safety, and the state of knowledge are implemented. Poaching, startling by the fish ponds, reduced nutritional abundance of feeding grounds, and lack of optimal breeding sites (old and high trees) were indicated as the leading causes of population decline. Comprehensive conservation activities of the species carried out in recent years by the State Forests and the Committee for the Conservation of Eagles resulted in a slight improvement in the condition of the osprey population in Poland, as confirmed by the results of the State Monitoring of Polish Birds from 2021.

Activities

Both species are sensitive to startling and disturbance. They are subject to protection in the Natura 2000 sites of the Notecka and Barlinecka Forests.

The conservation plans applicable for these areas among the main threats to the horned owl and osprey population enumerate human activity. To this end, the project implements actions aimed at minimizing the negative impact of this threat on both bird species.

Breeding platforms are assembled and maintained to increase the availability of places for the safe upbringing of their offspring. Artificial nests not only complement the existing nesting base but can also replace damaged nests, e.g. due to heavy weight or adverse weather conditions.

For years, the State Forests have been concerned about the condition of the horned owl and osprey population. They monitor their habitats, search for nests requiring appropriate protection, and conduct scientific research and campaigns to raise public awareness of these species. In order to find the reason for the decline in osprey numbers and to improve the condition of the national population, foresters with the Committee for the Protection of Eagles in the years 2016-2021 carried out the project "Osprey protection in selected SPA Natura 2000 sites in Poland" co-financed by the LIFE program.



Nesting platform, photo by Marcin Kaczmarek

Examples

The project envisages the realization of protective treatments for the horned owl and osprey in 3 Natura 2000 sites in 4 forest districts.

So far, the Sieraków Forest District in the Notecka Forest has mounted about ten artificial nests for the osprey and horned owl. The Dębno and Kłodawa Forest Districts installed two new nesting platforms and performed repairs and modernization of another five existing artificial nests.
In addition to the above tasks implemented by the forest districts, forest management takes into account the needs of the above species, e.g. leaving old-growth clumps to the natural decay, limiting activity on marsh habitats, or conducting activities aimed at retaining water in the forest. Moreover, the obligations arising from the conservation tasks plans for Natura 2000 sites or the establishment of the protection zones around nesting sites are observed.



Nesting platform, photo by Jakub Pruchniewicz

Forest districts participating in the project



Fun facts

✔ What does an artificial nest look like, and how much does it cost? A nesting platform – the technical term for an artificial nest – is a wreath-like structure formed from branches, assembled with wire, supplemented with appropriate plant or mineral material, and firmly attached to a tree, building, or energy pole. The cost of preparing and setting up such a nest reaches several thousand Polish zlotys (1000-2000 euros). Its assembly requires the participation of people trained to work at heights, and in the case of mounting them on high-voltage line poles, it is also necessary to temporarily turn off the current in the power line. Also, other species (e.g. peregrine falcons) can occupy the artificial nests, thanks to which conservation activities have a wider ecological dimension.

20

Black woodpecker



Black woodpecker, photo by Paweł Fabijański



Woodpeckers are birds commonly occurring in Poland, associated with the forest and the characteristic sound of knocking on a tree. They move around the trunks, extracting food from under the bark. However, not everyone is aware of the diversity of the woodpecker world. In Poland, there are ten woodpecker species, and all are protected. The most famous and widespread is the great spotted woodpecker, with black and white plumage and a red cap in males. Similar colors are also characteristic for several other species of spotted woodpeckers: the middle spotted woodpecker, which came here relatively recently from the southwest, the Syrian woodpecker, the rare white-backed woodpecker, and the smallest of the Polish woodpeckers – lesser spotted woodpecker. The woodpecker family also includes the green woodpecker, the grey-headed woodpecker, and the black woodpecker.

The black woodpecker is the largest of the Polish species of woodpeckers, and it is entirely black. The male has a red cap on his head, and the female has a red spot on the occiput. It can be found throughout the country, although it is not very numerous. It feeds not only insect larvae feeding under the tree bark, but also ants – in winter, it happens that he digs up anthills. In early spring, both males and females forge the hollows in trees. This activity produces a pretty loud sound, which resembles hammering, audible even from a long distance. During the spring period, these birds can be really noisy, and easily identifiable within the occupied territory.

Some bird species depend on the availability of hollows carved by woodpeckers; moreover, by a particular species of woodpecker, which depends on the diameter of the inlet opening. The black woodpecker is the only Polish species that forges large hollows later used by larger birds. These hollows are ideal nesting places for goldeneyes, boreal owls, or stock doves.

Therefore, the presence of woodpeckers in the forest determines the existence of other bird species. Birds aren't the only ones who enjoy such attractive shelters. Bees, bats, dormice, or squirrels are equally eager to use them. Woodpeckers are called forest ecosystem engineers.



Hollows, source: CCEP



Black woodpecker, photo by Paweł Fabijański

Issues

The presence of most woodpeckers is also associated with dead wood in the forest, i.e. old, dying trees, left to their biological death, where they can search for food and forge their hollows. It is hard to spot them on young farm tree stands.

The protection of woodpeckers, and thus also the black woodpecker, consists of providing them with adequate living conditions – large, old trees and peace, especially during breeding.

A crucial factor in woodpecker protection is leaving dead trees in the forest, which should be kept in mind when planning timber harvesting and logging. It also applies to hollow trees, which are skipped when thinning.

Activities

In Natura 2000 sites, forest management should correspond to nature requirements. To this end, detailed conditions for the tree treatments, time limits, and rules of conduct should be strictly specified, especially during breeding.

Restrictions may apply to forest management, agriculture, hunting, and fishing, depending on the area characteristics and the species to be protected. Woodpeckers are subject to protection in many Natura 2000 areas. To maintain the adequate condition of the woodpecker population, foresters retain a proper amount of old trees (cf. 100 years) in commercial forests and an appropriate number of dying trees and dead wood. They also leave hollow trees.

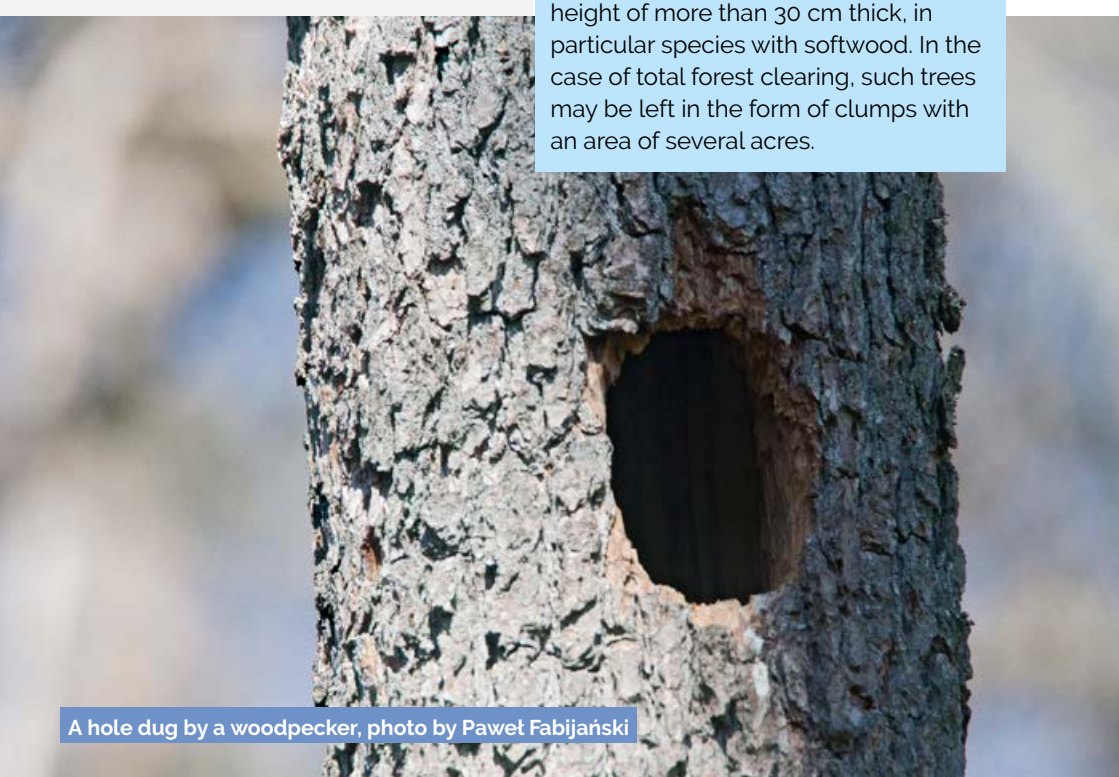


Black woodpecker, photo by Paweł Fabijański

Examples

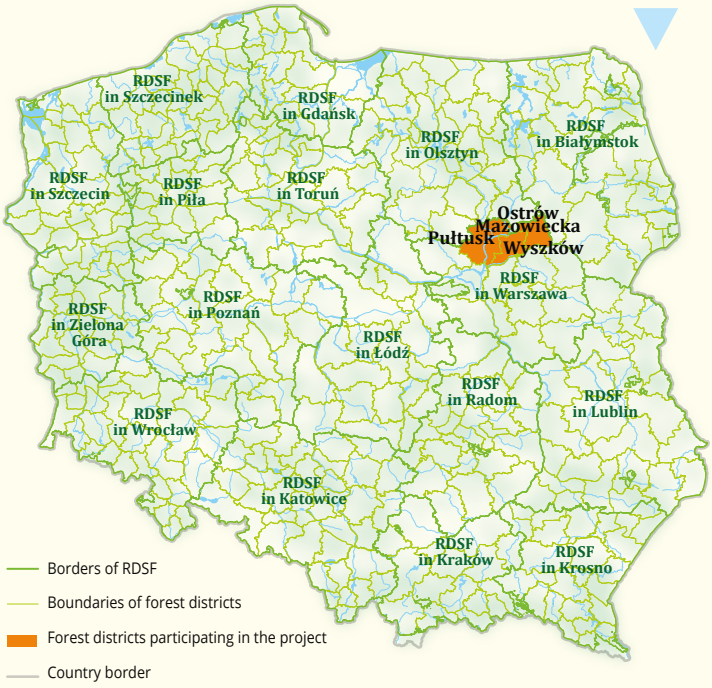
The Biała Forest is a so-called Natura 2000 bird area located in the Mazowieckie Voivodeship. It is a vast complex of pine and mixed woods and is an important refuge for the black woodpecker in the country.

According to the adopted conservation rules, forest districts that manage these areas must inspect the trees before proceeding with the treatment to determine the nesting of the black woodpecker. If a tree turns out to be occupied, the treatment should be postponed within a radius of up to 50 m from the hollow after the breeding period, which lasts from March to July. It is also necessary to leave hollow trees and thick trees in the forest, with a diameter at breast height of more than 30 cm thick, in particular species with softwood. In the case of total forest clearing, such trees may be left in the form of clumps with an area of several acres.



A hole dug by a woodpecker, photo by Paweł Fabijański

Forest districts participating in the project



Fun facts

- ✔ The black woodpecker is one of the world's largest woodpeckers. Currently, after the two largest American species are most likely extinct in recent decades, only the great slaty woodpecker inhabiting the equatorial forests of Southeast Asia is larger.
- ✔ Woodpeckers are distinguished by an unusual anatomical structure. They have long, sticky, and hooked tongues with which they extract insects from under the bark. Thanks to the unique skull structure, including the hyoid bone (not permanently connected to the skull) surrounding the brain, shocks are absorbed while forging the hollows.

21

Prairie anemone and lady's slipper



Prairie anemone in the Myszyniec Forest District, photo by Martyna Gross



Lady's slipper, source CCEP



Prairie anemone is one of the earliest blooming species of early spring, and its magnificent purple-blue flowers animate and adorn the winter forest undergrowth. The characteristic feature of this beautiful plant is a dense coat of whitish hair, covering young shoots, leaves, buds, and flowers. It protects the plant from early spring frosty nights.

Prairie anemone grows in pine forests, especially at their edges, in highly sunny places with the character of warm, dry grasslands or heathland. As a thermophilic and limestone-loving plant, typical of the Eurasian steppe zone, it also grows on xerothermic grasslands on the slopes of the southern exhibition.

The **lady's slipper** is one of our most recognizable orchids. It is characterized by the unique shape of a flower which is similar to the shape of a lady's shoe. This large, characteristic yellow "shoe" acts as an insect trap for capturing and then forcing the imprisoned insect to search for the only way to escape during which pollination can occur. It blooms from mid-May to June.

The development of seedlings depends on the presence of specific mushrooms, and the first flowers appear only after 6-8 years of development. It grows in medium or low shade conditions, in bright deciduous forests, thermophilic scrubs, xerothermic grasslands, and even in moist forests at the edges of alkaline peat bogs; however, the abundance of the substrate in calcium ions is always necessary. Prefers nitrogen-poor soils that are close to inert.



Lady's slipper in the Pińczów Forest District, photo by Jacek Koba

Issues

The most serious threat to the prairie anemone is the shade caused by trees (especially spruce), shrubs (e.g., invasive American black cherry), and high perennials.

The prairie anemone is a plant extremely resistant to undergrowth fires; it is believed that the fire is conducive to its renewal. The largest, most branched individuals grow on burned or grazed grounds. Periodic disturbances promote the production of more flowers and fruits. The commonly observed mass disappearance of the prairie anemone positions is caused by the spontaneous expansion of undergrowth species after the abandonment of traditional forms of exploitation (grazing, raking of litter) and limiting the role of natural disturbances (e.g. fires). In non-forest ecosystems (grasslands, heathlands), after abandoning grazing, the population of prairie anemones is limited by secondary succession.

The threat to the lady's slipper is the deterioration of light conditions due to the development of the shrubs layer, and in some places also digging wild plants for domestic cultivation and picking flowers.

Activities

The prairie anemone is supported by shaping multi-generation, visible pine tree stands without a strongly shading undergrowth of spruce, with a loose layer of shrubs composed of juniper and a moss-shrubs undergrowth.

Access to light is provided by eliminating (by mowing, manual uprooting) expansive undergrowth species, as well as shrubs and trees (especially spruce). In order to enable the germination and development of young plants, spots with uncovered soil, devoid of both layers of litter and competition from other plant species, should be prepared within the sites.

In the case of the lady's slipper, active protection measures consisting of removing parts of trees and shrubs to reduce shade and shape the clearings on which the plant grows are implemented. It is also often necessary to mow or cut out expansive plant species threatening the lady's slipper positions.



Prairie anemone, photo by Paweł Fabijański

Examples

Protective treatments for the prairie anemone are carried out on almost 36 hectares.

Forest districts within the sites of this species are mowing expansive species, removing invasive species, and spruces shading the prairie anemone sites.

The lady's slipper positions in the project are protected on an area of about 16.5 hectares. The work consists primarily of removing trees, shrubs, and expansive plants that shade the clusters of the species.

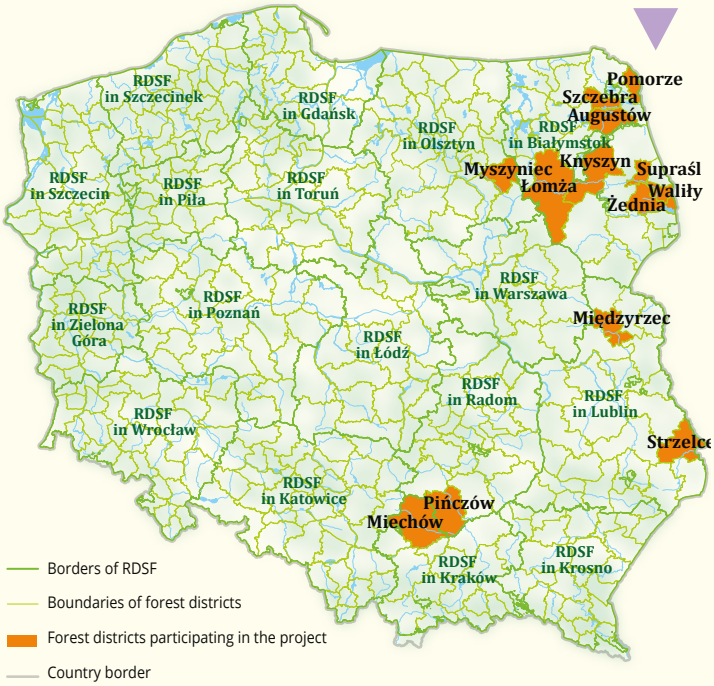
The maintenance treatments are carried out by the forest districts in Ostoja Narwiańska, Ostoja Knyszyńska, Ostoja Augustowska, and Myszynieckie Bory Sasankowe.



36 ha – the area of prairie anemone protection

Prairie anemone, photo by Paweł Fabijański

Forest districts participating in the project



Fun facts

- ✔ Climatic factors have a significant impact on the condition of the plant, including the intensity of flowering or the number of individuals. Mild winters with warming periods adversely affect, while frosty years, with more snow cover, promote the improvement of the condition and abundance of plants.
- ✔ The lady's slipper flowers are an example of trap flowers pollinated by wild bees. Insects are attracted by a fragrance resembling a mixture of vanilla and lemon. After entering the center of the bloated "slipper", the insects are trapped, and the only way out requires taking the plant pollen or pollinating the plant with pollen brought from another flower. The lady's slipper does not produce nectar, but in the depths of the flower, there are edible hairs that point to insects the only way they can get out of the trap. However, many of the insects trapped in it are unable to get out – and die.

22

Fen orchid



Fen orchid, photo by Agata & Mateusz Matysiakowie/ fotomatysiak.pl

The fen orchid is an inconspicuous orchid whose species name commemorates the famous German botanist. Unlike many of its grand and colorful relatives from the orchid family, its flowers are rather modest – petite, yellowish green, and usually with only two leaves.

The fen orchid's seeds (like many other orchids) do not contain nutrients, so to be able to germinate, they need a partner to help them. For this purpose, the seeds must come into contact with the mushroom hyphae, with which the orchid enters into a close, complicated relationship. It can have a very different course and character. First of all, it is not entirely known who benefits from whom and whether it is "cooperation" or "exploitation" of the fungus by the orchid (or vice versa). This type of coexistence of two organisms is called mycorrhiza.

How challenging the growth process is for the fen orchid is evidenced by the fact that the first leaf appears only in the 3-4 years of the plant age, and the flowers can only be seen after about seven years. In terms of reproduction, the fen orchid is quite self-sufficient, because it reproduces by self-pollination, which is favored by... raindrops.

A peculiar feature of the fen orchid are – usually hidden in the moss carpet – underground organs, i.e. – as experts say – pseudobulbs. One of them (last year) grows leaves and a stem topped with an inflorescence, while in the other (this year's) the orchid stores nutrients that will allow it to grow a stem in the next season.

The fen orchid is one of the Polish orchids which exclusively grow in open, forestless wetlands. Its favorite habitat is low peat bogs (also called the moss patches), i.e. those that develop in places supplied by groundwater, with a lush layer of moss.



Fen orchid, photo by Krzysztof Fiedorowicz



Fen orchid, source: the Pomorze Forest District

Issues

The most serious threat to the species is the drying and disappearance of open peatlands. As a result of water scarcity, peat growing for hundreds, or usually thousands of years, decomposes (oxidates), and the fertility of the habitat increases.

It enables the development of expansive species – high perennials, trees, and shrubs – which, by expanding, eliminate plants typical of natural peat bogs, such as fen orchid. This succession then leads to the transformation of open wetlands into forests and bushes. Therefore, the overgrowth of fen orchids causes these tiny, light-desirable plants to be cut off from full insolation, which is indispensable for their development and survival, and the disappearance of appropriate habitats. These processes accelerate the abandonment of traditional mowing of swamp meadows.

Activities

The fen orchid protection consists primarily of the preservation of its habitat, i.e. highly wet, mossy low peat bogs.

Since such wetlands are frequently over-dried, it is necessary to improve their hydration level. Since this orchid belongs to extremely light-loving plants and is not very impressive, the necessary form of improvement of habitat conditions is cutting out expansive trees and shrubs and the removal of vegetation at its sites.



Willows in the bog can grow back very quickly after mowing, photo by Paweł Fabijański

Examples

Conservation treatments under the project are carried out on an area of almost 10 hectares in 3 Natura 2000 sites.

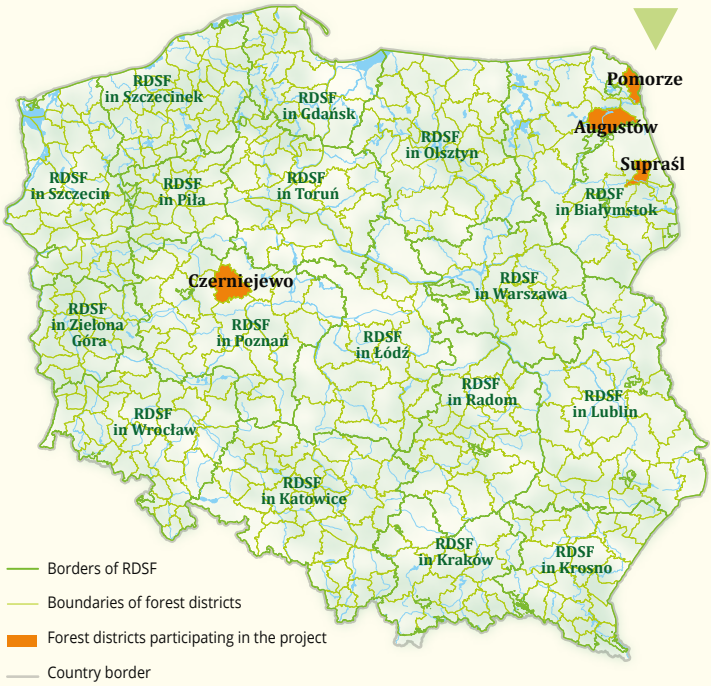
In the Czerniejewo Forest District, the fen orchid was discovered 6 years ago in 2 places, in the lowest hollow of the swamp overgrown with willow and cane. It was found that the peat bog can preserve a significant reservoir of seeds of this plant, so it is worth recreating good habitat conditions. For this purpose, willow scrubs have already been removed twice, and the area of a dozen acres near orchids is mowed twice a year. Mostly cane is cut out and removed: in summer, even before flowering at the turn of June and July, and in winter, after the growing season. Unveiling the terrain is to provide the orchids with an optimal amount of light.

Regardless of the active protection carried out as part of the project, the forest district is also trying to maintain proper water conditions on the peat bog, preventing water outflow from its area.



The fen orchid habitat in the Czerniejewo Forest District, photo by Maciej Gołembowski

Forest districts participating in the project



Fun facts

- ✔ The fen orchid is the only European liparis, but there are more than 350 species in the world growing on all continents except Antarctica and even on many oceanic islands. Some are epiphytes (plants growing on other plants) in equatorial forests.
- ✔ Over the course of the 20th century, the species, formerly found in almost all of Poland, has disappeared or has become a great rarity almost everywhere except for lake districts in the northern part of the country. An exception to this rule are surprising, newly created plant areas in man-made, wet sand excavations in Dąbrowa Górnicza on the Silesian Upland, where the liparis found favorable conditions for growing.
- ✔ Despite its inconspicuous appearance and small size, according to many lovers of native nature, the fen orchid is a “botanical gem” and an object of often long-lasting (as it is usually very rare) search.

23 Anthropopression on valuable areas



Tourist trail in the Lębork Forest District, photo by Paweł Fabijański

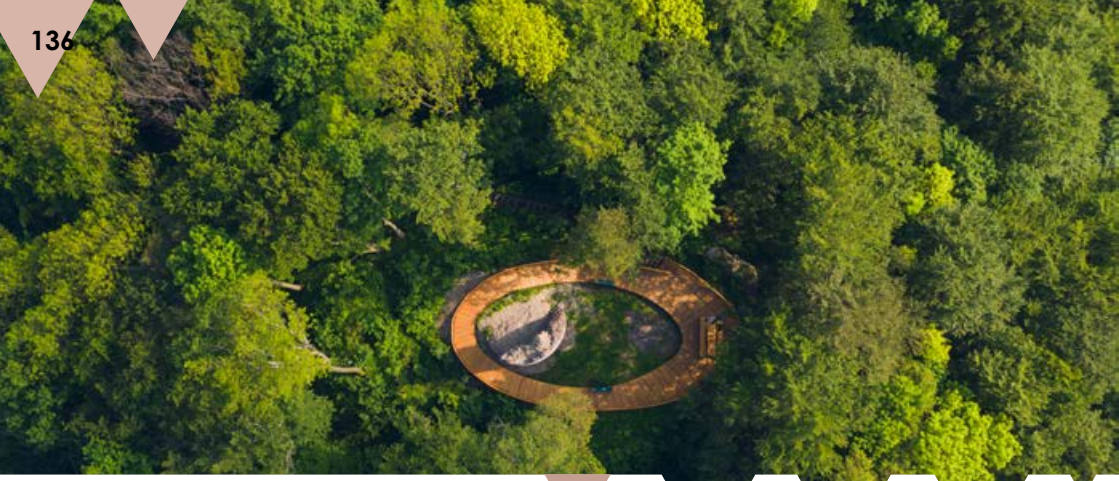


Tourist path in the Mierzeja Sarbska reserve, photo: Paweł Fabjański

The most valuable places in terms of nature, for example, by the sea, lakes, or mountains, are frequently visited by tourists. During the tourist season, they can be really overcrowded. Mountain trails are designed in a way, to enable visitors to admire the most attractive values in a given area, taking into account safety considerations and the preservation of natural and cultural values. Good practices in this regard are applied in many national parks, where tourism is an important element of functioning, right next to the primary role of the park, which is to protect the most valuable national natural resources.

A large part of Natura 2000 sites overlaps with other forms of nature conservation: reserves, landscape parks, national parks, and many more. Tourism in Poland is currently an intensively developing sector of the economy – we prefer to visit areas where nature has been preserved in a relatively unchanged state. However, the uncontrolled development of the tourism industry poses a threat to nature, which is why strategic thinking is necessary in this field. It does not mean foreclosure of certain areas, but creating appropriate conditions: trails, paths, resting places, and functional facilities in such a way that nature can be admired without jeopardizing it and bearing in mind the idea of sustainable development.

Tourist and recreational activities are only one of the anthropogenic factors negatively affecting the objects of protection in Natura 2000 areas. Humans are also responsible for the spread of invasive alien species. Fighting them is challenging and requires time-consuming and costly treatments. Alien species are transferred and introduced into the environment not only by accident but also intentionally. Many plant species from different parts of the world were introduced into Europe as ornamental plants in parks and gardens or for other purposes such as profit motives. Over time, some of them, such as the American black cherry, have spread in Poland in a very expansive and invasive way, threatening native valuable plant communities.



A footbridge around the ruins Homole Castle, the Zdroje Forest District, photo by PS Studio

Issues

Man leaves many traces that nature can not always cope with. Waste, noise, pollution, trampling of plants, disturbing animals – all this can be a side effect indicating high tourist traffic in a given place. A lot depends on us.

Legal regulations and properly designed recreational infrastructure will not work without showing and teaching people the right culture and a responsible attitude of respect towards nature.

The famous crocuses meadow in the Chochołowska Valley is the destination of countless crowds of tourists during the flowering period of these beautiful, delicate plants. Tens of thousands of people can arrive in one season. At the same time, cases of extreme behavior are shared with the public every year. Every year, the Tatra National Park engages its services, city guards, police, and volunteers to prevent negative attitudes.

Coastal ecosystems and high mountain areas are particularly sensitive to tourism. Forest habitats under direct anthropopression can also degrade, to which the trampling of "wild" paths, soil erosion due to cycling or quads, noise, littering, and frightening of animals contribute. Despite the already high awareness of what species protection is, unfortunately, it still happens that tourists destroy or dig up protected plants in order to transplant them into their gardens.

Activities

The conservation tasks established for Natura 2000 sites mainly focus on active conservation measures aimed at habitat and species protection.

Plans for protective tasks rarely impose the need to design specific solutions addressed to tourists. If this is the case, it applies to areas with strong touristic pressure, such as mountain trails or coastal zones. The fundamental protective mechanism is the so-called sewerage of tourist traffic, i.e. directing the stream of visitors along a convenient route around a valuable place so that they can admire it without destroying it. Education is a necessary complement to conservation measures, so natural paths are often fitted with information boards that also present appropriate rules of conduct.



Tourist path in the Mierzeja Sarbska reserve, the Lębork Forest District, photo by Paweł Fabijański

Examples

The ruins of the Homole Castle, a tourist attraction gaining popularity, are located in the "Grodczyn and Homole near Duszniki" Natura 2000 area, near the Main Sudecki Trail.

The Zdroje Forest District installed a comfortable wooden footbridge over a valuable meadow habitat, together with infrastructure, information boards, benches, stairs leading to the top of the Gomoła mountain, and a terrace surrounding the remains of the castle's ruins. Thanks to this, tourists can conveniently visit this place without destroying valuable natural habitats.

The Mierzeja Sarbska area is one of the most beautiful places on our coast, which is a miniature of the famous dunes of the Slavonic National Park. The pressure of tourists is such a strong threat to this area that it was decided to design and build an educational path "Nordic walking" type in the Lębork Forest District, located in the neighborhood of the Park. A path of approx. 7 kilometers, located between the Baltic coast and Lake Sarbsko, leading tourists along a comfortable trail through forest communities and dunes to the seaside beach was constructed.



Tourist footbridge at the ruins of the Homole Castle in the Zdroje Forest District, photo by PS Studio

Forest districts participating in the project



Fun facts

✔ In the Krościenko Forest District, there is an area where the *Erysimum pieninicum* grows, a plant that is a Carpathian endemite – a species found in a limited, small area and nowhere else. The task of the forest district is to secure the location of the species in the close vicinity of the tourist trail. There are few endemites in Poland, mainly in the mountains. It is due to the history of past geological periods. Glaciation in Poland gave way relatively late, and only from that moment the revived nature developed. In addition, the area of Poland is mostly lowland, without barriers to the movement of plant and animal species.



Erysimum pieninicum, photo by Tomasz Dziedzic



Contents

01 Introduction 2
02 Why do we protect nature? 4
03 Cladonia forest 14
04 Swamp woods and forests 20
05 Stone run 26
06 The broadleaved forest 32
07 Riparian forests 38
08 Thermophilous oak forest (luminous oak forest) 44
09 Molinia meadows 50
10 Dry heaths 56
11 Xerothermic grasslands 62
12 High, transitional, and alkaline peatlands 68
13 European pond turtle 74
14 Newts and fire-bellied toads 80
15 Butterflies 86
16 Bats 92
17 Birds in Natura 2000 areas 98
18 Capercaillie 104
19 Horned owl and osprey 110
20 Black woodpecker 116
21 Prairie anemone and lady's slipper 122
22 Fen orchid 128
23 Anthropopression on valuable areas 134

European Funds
Infrastructure and Environment

Republic of Poland

State Forests

European Union
Cohesion Fund







