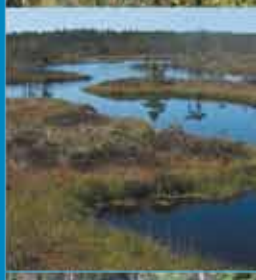
NATURA 2000



Natura 2000 in the **Boreal Region**

EUROPEAN COMMISSION

environment

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European Commission
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Bog woodland, Finland © Jorma Luhta

The Boreal Region

– land of forests and water

With its endless expanse of coniferous forests, mires and lakes, the Boreal Region forms part of a distinct band of vegetation which circles the entire northern hemisphere. Habitat types blend seamlessly into one another, creating a characteristic mosaic landscape of forests and wetlands. Along the coast, bedrock archipelagos intermingle with low-lying brackish fens and meadows, providing ideal nesting grounds for hundreds of thousands of migratory birds.

The Boreal Region of the European Union includes most of Sweden and Finland, all of Estonia, Latvia and Lithuania and much of the Baltic Sea. It has a relatively flat topography, mostly below 500 m. To the north, the zone merges with the forest-tundra of the Arctic, to the west the ground rises up onto the Fennoscandian mountains and, in the south, there is a transition to the deciduous forests of the Continental Region.

Forests cover around 60% of the region and dominate the landscape. The majority is used commercially and is, consequently, of reduced conservation value compared to the original natural old-growth forests, which now account for less than 5–10% of the resource. The dominant forest type, known as western taiga, contains a mixture of Norway spruce *Picea abies* and Scots pine *Pinus sylvestris*. Its structure is relatively simple with a sparse field layer of mosses, lichens and ericaceous shrubs on shallow soils. Where the soil is more fertile, the understory becomes carpeted in a rich assembly of herbaceous shrubs and bushes.

Overall, the boreal forests harbour a rich array of well adapted plants, insects and other animals. Rare bird species are also ever-present, they include ten species of owl, such as Ural owl *Strix uralensis*, six species of woodpecker like the three-toed woodpecker *Picoides tridactylus* and a range of raptors such as the greater spotted eagle *Aquila clanga*.

Wetlands are the next most common landscape feature. Around 10,000–15,000 years ago the entire Boreal Region was covered in ice. As the massive ice sheet retreated after the last Ice Age, it carved shallow depressions into the hard bedrock of granite and gneiss which over time evolved into lakes, rivers and mires. A significant proportion of Europe's natural lakes and some of its largest bogs are found in this region. In the far north, peatlands can make up 50% of the land surface in places.

The coastline and islands around the Baltic Sea and Gulf of Bothnia are also very characteristic of a boreal environment. Having been depressed under the massive weight of ice, the coastline is once again emerging from the sea. Around the Gulf of Bothnia this is said to be rising by as much as 1 cm a year. As the water recedes, low-lying habitats, ideal for breeding waders and saline tolerant plants, develop. They have been used for centuries for grazing and haymaking which has, in turn, resulted in a number of typical semi-natural habitats of high conservation value such as the boreal Baltic coastal meadows, the Nordic alvar and the natural forests of primary succession stages.

The archipelagos situated off the southern coasts of Finland and Sweden are also very interesting from a conservation perspective. Made up of thousands of islands and islets, dotted amidst a calm and gentle sea, they paint a picture postcard landscape. Flocks of breeding and staging waterfowl and seabirds are drawn here in their thousands, attracted by the clement weather, sheltered bays, shallow waters and abundance of food.

As for the Baltic Sea, this is one of the largest brackish water systems in the world. Its only connection with the open sea is through the shallow sounds between Sweden and Denmark. As a result, it can take up to 35 years for the

Baltic to be fully renewed by water from the North Sea and beyond. This, combined with the fact that the sea is very shallow (average depth 54 m), makes it highly prone to eutrophication.

Demographically, the region is a land of contrasts, with increasingly large urbanised areas in the south (Stockholm, Riga, Helsinki) offset by vast areas in the north where the already low populations are decreasing even further. The south averages 40 inhabitants/km^2 whereas in the north it is more typically around 2–3 inhabitants/km^2.

Large-scale agriculture is also generally concentrated in the south where it is becoming more intensive. The growing season here is 200 days compared to 100 days in the north. This is influenced not just by temperature and soil quality but also by the number of daylight hours and length of snow cover. Commercial forestry is, on the other hand, widespread throughout the region.

Region	Countries involved	% of EU territory
Atlantic	Belgium, Germany, Denmark, Spain, France, Ireland, Portugal, Netherlands, United Kingdom	18.4
Boreal	Estonia, Finland, Latvia, Lithuania, Sweden	18.8
Continental	Austria, Belgium, Bulgaria, Czech Republic, Germany, Denmark, France, Italy, Luxembourg, Poland, Romania, Sweden, Slovenia	29.3
Alpine	Austria, Bulgaria, Germany, Spain, Finland, France, Italy, Poland, Romania, Sweden, Slovenia, Slovakia	8.6
Pannonian	Czech Republic, Hungary, Romania, Slovakia	3.0
Steppic	Romania	0.9
Black Sea	Bulgaria, Romania	0.3
Mediterranean	Cyprus, Spain, France, Greece, Italy, Malta, Portugal	20.6
Macaronesian	Spain, Portugal	0.2

Source:
European Topic Centre on Biological Diversity (European Environment Agency)
http://biodiversity.eionet.europa.eu October 2008

Natura 2000 in the Boreal Region

Natura 2000 habitat types in the Boreal Region

Around third of all habitat types listed in the Habitats Directive occur in the Boreal Region. This is partly explained by its long natural transition zone with the Continental Region. Seventeen of the habitat types concern different types of forests such as old growth western taiga forest, Fennoscandian deciduous swamp woods and bog woodland.

Mires and fens are also well represented. They range from active raised bogs and transition mires within a forest landscape, to extensive aapa mires in the north. Until recently commercial peat extraction was widespread, with some countries losing up to 70% of their peatlands. Despite this, the Boreal Region still harbours some of the largest intact mire complexes in Europe.

Although grasslands only cover 14% of the territory, they include a wide variety of valuable semi-natural habitats. These tend to occur along the coast and further inland around forest edges. A number are unique to the Boreal Region such as the Fennoscandian wooded pastures.

In all five countries, there has been a long tradition of small holdings maintaining clearings for grazing livestock and haymaking. Over time, these have become very rich in specialist plants and animals and are therefore of high conservation interest. Unfortunately, most are now rapidly disappearing through lack of management.

Finally, oligotrophic lakes and Fennoscandian natural rivers are also widespread throughout the region. Because they are relatively young and carved out of hard bedrock, the lakes tend to be shallow, cold, clear and poor in nutrient loads. They are also therefore particularly sensitive to nutrient overload, acid rain and pollution from agriculture and large-scale forestry activities. Rivers are equally important but the majority have been modified to provide hydro-electric power, inland navigation or commercial fishing.

Other typical Boreal habitat types occur along the coast and on the offshore islands, such as the Baltic esker islands or narrow inlets.

Photo © Jorma Luhta

Aapa mires

Aapa mires develop under the combined effects of short summers and long winters with abundant snow. The latter causes long-lasting springtime flooding from the drainage basin of the mire, which prevents it from developing into a proper bog complex. Aapa mires are generally very large, particularly in the flat north, and have a characteristic string and flark pattern where the strings are perpendicular to the slope.

They are also an important source of food for many animals. Cloudberries, cranberries and other fruiting dwarf shrubs grow in abundance here. This, together with the fact that they are away from any disturbance, makes them ideal for breeding birds, such as the wood sandpiper *Tringa glareola*, whooper swan *Cygnus cygnus* and ruff *Philomachus pugnax*.

Photo © Jorma Luhta

Western taiga

Natural old growth forests in the Boreal Region are now extremely rare and represent only a tiny fraction of the original habitat which once covered the region. Intensive forestry has removed many of the characteristic features of natural forests: dead and rotting wood, variation in tree size, age and species composition. Yet, these are essential features for maintaining the rich array of forest plants and animals present.

The lack of natural regeneration through fires is another key problem. Forest fires resulting from lightning strikes were once a common phenomenon and helped to diversify the structure of the forest. Several species even became entirely dependent on these events for their survival, such as the beetle, *Stephanopachys linearis*. Most fires these days are however rapidly brought under control to avoid damage to neighbouring commercial forests.

Western Taiga forest, central Finland – prime habitat for great grey owls © Jorma Luhta

Map of Natura 2000 sites in the Boreal Region

The list of Natura 2000 sites in the Boreal Region was first adopted in January 2005 and later updated in November 2007 and again in December 2008. Altogether, within the Boreal Region, there are 6,266 Sites of Community Importance (SCIs) under the Habitats Directive covering over 111,000 km^2 and further 1,165 Special Protection Areas (SPAs) under the Birds Directive. There is often considerable overlap between some SCIs and SPAs which means that the figures are not cumulative, nevertheless, it is estimated that together they cover more than 12% of the total land area in this region.

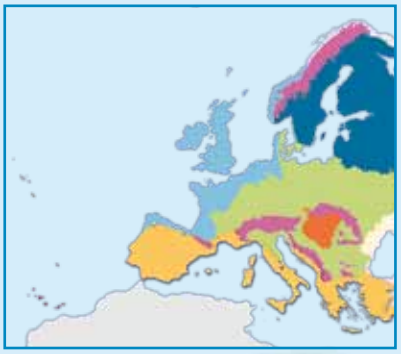
Number of habitat types in Annex I and species or sub-species in Annex II of the Habitats Directive.

Region	Habitat types	Animals	Plants
Atlantic	117	80	52
Boreal	88	70	61
Continental	159	184	102
Alpine	119	161	107
Pannonian	56	118	46
Steppic	25	25	14
Black Sea	58	79	6
Mediterranean	146	158	270
Macaronesian	38	22	159

Source: European Topic Centre on Biological Diversity (European Environment Agency) http://biodiversity.eionet.europa.eu
- *the figures are not cumulative since many habitats and species occur in two or more biogeographical regions*
- *Birds from Annex I of the Birds Directive are not listed as they are not categorized according to biogeographical region*

Region	N° SCI	Total area covered (km^2)	Terrestrial area covered (km^2)	% of total terrestrial area	N° SPA	Total area covered (km^2)	Terrestrial area covered (km^2)	% of total terrestrial area
Atlantic	2,747	109,684	68,794	8.7	882	76,572	50,572	6.4
Boreal	6,266	111,278	96,549	12.0	1,165	70,341	54,904	6.8
Continental	7,475	150,014	135,120	10.8	1,478	147,559	128,432	12.4
Alpine	1,496	145,643	145,643	39.7	365	93,397	93,397	31.1
Pannonian	756	15,858	15,858	12.3	100	19,965	19,965	17.5
Steppic	34	7,210	7,210	19.4	40	8,628*	8,628	24.4
Black Sea	40	10,243	8,298	71.8	27	4,100	3,561	30.8
Mediterranean	2,928	188,580	174,930	19.8	999	147,358	142,350	16.0
Macaronesian	211	5,385	3,516	33.5	65	3,448	3,388	32.3
TOTAL	21,612	655,968	568,463	13.3	5,004	486,571	429,615	10.5

Source: European Topic Centre on Biological Diversity (European Environment Agency) http://biodiversity.eionet.europa.eu October 2008
- *SPAs and SCIs are not cumulative as there is considerable overlap between them*
- *Some sites are on the border between two regions, the database does not allow for the possibility to split sites between regions, therefore some sites may be counted twice*
- *Percentage of marine areas not available*
- *SPAs are not selected according to biogeographical region*
- *SPA area for the Steppic Region are calculated according to available GIS data*



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Young whooper swans in northern mires

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Land upheaval coast in Liminganlahti wetlands

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Western Taiga forests with Siberian jay

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River Vindelälven one the few major unregulated Fennoscandian rivers

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Lake Pihlajavesi complex harbouring endemic Saimaa ringed seals

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Forests and meadows in the Northern Gauja Valley

SACs

SPAs

SPA and SAC

Map based on site coordinates supplied by the European Commission through the University of Leuven, Division SADL, October 2008

Nutrient-poor clear water lakes, Sweden, prime habitat for Black-throated divers © Mats Eriksson

Photo © Jorma Luhta

Natura 2000 species in the Boreal Region

The Boreal Region is relatively rich in species, considering its latitude. Four mammals occur only here within the EU: the flying squirrel *Pteromys volans*, the wild forest reindeer *Rangifer tarandus fennicus*, the freshwater Saimaa ringed seal *Phoca hispida saimensis* and the Baltic ringed seal *Phoca hispida bottnica*. Lynx, beaver and brown bear are also typical.

Characteristic invertebrate species include the hermit beetle *Osmoderma eremita*, a priority species associated with ancient deciduous trees and wooded pastures, and the freshwater pearl mussel *Margaritifera margaritifera*, once common in unregulated stretches of the Fennoscandian rivers.

Although relatively poor in vascular plants there are some notable endemics, such as *Alisma wahlenbergii*, a small water plant found primarily on emerging land upheaval coasts. The larger Baltic islands of Öland and Gotland in Sweden and Hiiumaa and Saaremaa in Estonia are also particularly rich in rare endemics such as the Öland wormwood *Artemisia oelandica* thanks to their calcareous soils. Other typical species of the region include the calypso orchid *Calypso bulbosa*, pendant grass *Arctophila fulva* and Lapland buttercup *Ranunculus lapponicus*.

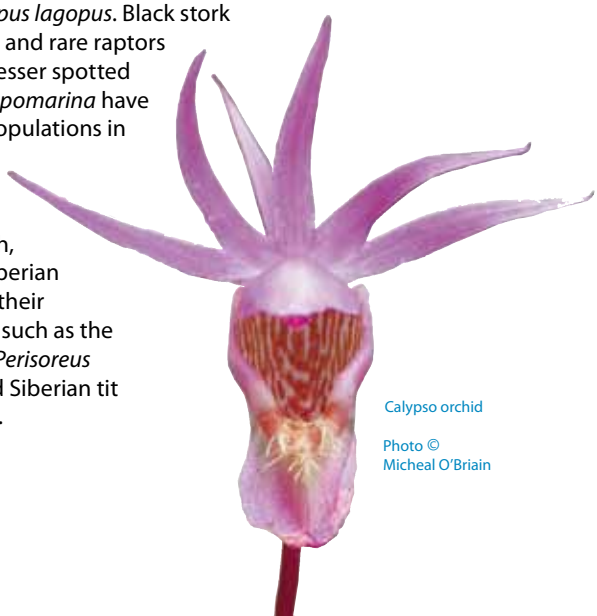
Over half of the European bird species breed in the Boreal Region, including many of those listed in Annex I of the Birds Directive. More easterly species from Russia and beyond are found here and nowhere else in the EU.

Hundreds of thousands of water birds also migrate to the region in summer in search of food, longer daylight hours and undisturbed breeding grounds.

Some flock to the tranquil lakes, estuaries and coastal wetlands, whilst other sensitive species, like the cranes *Grus grus* and jack snipe *Lymnocryptes minimus,* prefer the remote insect-rich mires and fens. Because so much of the migration is concentrated in a relatively narrow channel in the Gulf of Finland, its skies are often filled with migrating birds in spring, offering a truly spectacular sight.

The islands, skerries and islets in the Baltic Sea also have important colonies of seabirds. It is estimated that some nine million seabirds overwinter in the Baltic every year. Its importance as a wintering ground is underlined by the fact that, during mild winters, over 90% of Western Palearctic long-tailed ducks *Clangula hyemalis* and velvet scoters *Melanitta fusca* and half of the divers, mergansers and mute swans are to be found here.

Other characteristic bird species of the Boreal Region are associated more with the forests. These include owls and woodpeckers, as well as large game birds such as the capercaillie *Tetrao urogallus* and willow grouse *Lagopus lagopus*. Black stork *Ciconia nigra* and rare raptors such as the lesser spotted eagle *Aquila pomarina* have important populations in the three Baltic states. Further north, species of Siberian origin make their appearance, such as the Siberian jay *Perisoreus infaustus* and Siberian tit *Parus cinctus*.



Calypso orchid

Photo © Micheal O'Briain

Photo © Jouni Koskela

Ringed seals *Phoca hispida*

The ringed seal is the smallest and commonest of the northern seal species. During the last Ice Age, populations around the Baltic Sea and in the lake systems of Finland and Russia were cut off from the sea and had to adapt to new aquatic conditions. They eventually evolved into three distinct subspecies: the Saimaa ringed seal *P. h. saimensis*, the Baltic ringed seal *P. h. botnica* and the Ladoga ringed seal *P. h. ladogensis*. All three are unfortunately now threatened through a combination of habitat loss, increased recreational pressure and fluctuating water levels in the lakes, combined with entanglement in fishing nets and the accumulation of pollutants in their bodies. A major conservation programme was launched to conserve the Saimaa ringed seal in the lake systems of the Saimaa Region in Southern Finland. Since the start of the work, seal numbers have increased to 200 but remain highly threatened due to the low population size.

Forest reindeer *Rangifer tarandus fennicus*

Hunted to extinction in Finland over a hundred years ago, the wild forest reindeer has begun to return naturally to central eastern Finland from Russian Karelia. Its population in Finland is currently estimated to be about 2,500 animals (including reintroduced populations in the Suomenseikä area). This species is well adapted to forests. It has a slimmer build and longer legs than the semi-domesticated reindeer which are descended from the mountain reindeer *Rangifer tarandus tarandus*. Its antlers are also narrower enabling it to move fast through the forest. To prevent cross breeding, the Finnish government has built an 85 km-long fence along the southern border of the reindeer herding area. Significant tracts of forests are also now protected for the species under Natura 2000.

Photo © Ari Meriruoko

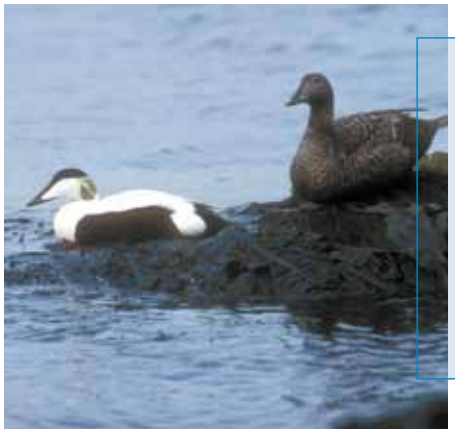


Photo © Mike Read

Common eider *Somateria mollissima*

The common eider is a typical species of the Baltic. It is most commonly found around the 95,000 islands and skerries that make up the archipelagos off the coast of Finland and Sweden. Although it is not a narrow food specialist, blue mussels constitute an important part of the diet, which is in abundance in these shallow waters. It is estimated there are as many as 300,000 breeding pairs in the Baltic today, representing a substantial part of the world population. In recent years numbers have been on the increase but this has not always been the case. Eider ducks were once hunted extensively. Their down feathers were also collected from the nests to make warm garments and duvets, hence, the origin of the word 'eiderdown' to signify a type of warm duvet.

Capercaillie *Tetrao urogallus*

The capercaillie is the largest species of grouse in the world and is a characteristic bird of the coniferous forests of the Boreal Region. It has declined across most parts of Europe. But in Finland and Sweden it remains a game bird, although populations are starting to decline here too. The species is closely associated with the overall health and structure of the forest: it needs open glades for its ritual mating displays and extensive ground cover with *Vaccinium* berries for feeding its young. This is often best achieved through a dynamic and selective forest management approach which ensures that at all times there are enough of the above features in the forest to maintain a viable capercaillie population.

Photo © Jorma Luhta

Haademeeste, Estonia Photo © Mati Kose/EÖU

Selective felling, Finland Photo © Pauliina Kulmala

Management issues in the Boreal Region

Although the Boreal Region has retained most of its original species, including large carnivores, the area covered by natural habitats is much reduced and under increasing pressure. In terms of impact, commercial forestry (based mainly on spruce, pine, birch and oak) has had the greatest influence. Forestry is a major industry in Sweden, Finland and in the Baltic States (in Latvia it accounts for 20% of export earnings, Sweden 15–20%, Finland 35–40%). In Finland, two-thirds of the mires are utilised for commercial purposes, mainly forestry.

The actual area covered by forest has grown thanks to active planting, and the natural reforestation of abandoned fields. However, very few of the truly natural old-growth forests remain. Forestry practice based on clear-felling and replanting, often with associated draining and use of non-native species and fertilisers, has reduced the areas of natural woodland to small islands within the wider forest landscape.

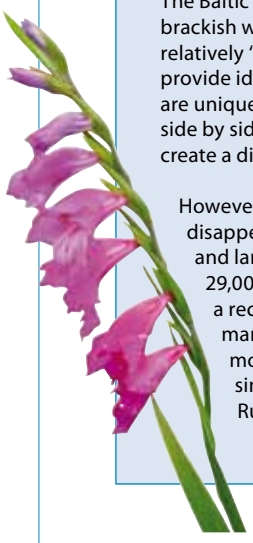
To prevent further loss, several countries in the region have introduced national programmes to buy up the remaining natural forests so that they can be taken out of production.

Many of the rivers in the Boreal Region have also been modified to provide hydro-electric power and navigation. In Sweden, for example, 72% of the rivers capable of providing power have been exploited. Fishing is also very popular and increasingly intensive in some areas.

Baltic coastal habitats

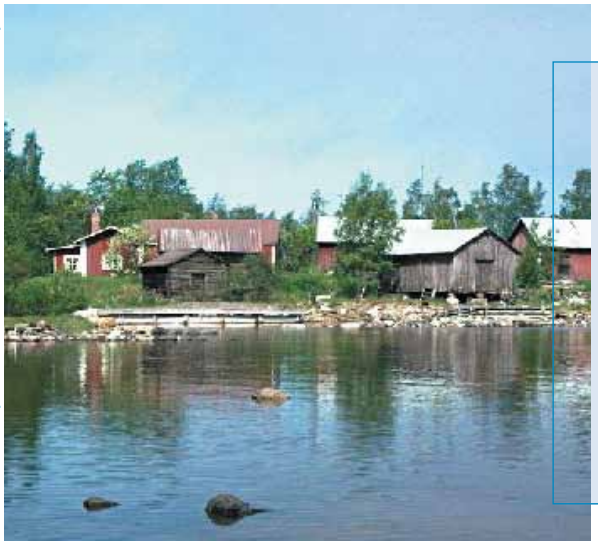
The Baltic coastline is, for the most part, very flat and shelves gently into the shallow brackish waters of the Baltic Sea. There are no tides to speak of and much of the land is relatively 'new' having risen out of the water through the land upheaval process. These provide ideal conditions for the development of the boreal Baltic coastal habitats which are unique to this part of the world. Plants tolerant of varying levels of salinity co-habit side by side, further influenced by centuries of grazing and mowing which helped to create a diverse and highly species-rich mosaic landscape.

However, over the last 50 years, these valuable coastal meadows have started disappearing at an alarming rate through the combined effects of lack of management and large scale cooperative farming. In Estonia, now only around 8,000 ha of the 29,000 ha remains. In the mid-1990s governments and conservation NGOs began a recovery programme for these habitats. Having removed the invading scrub, management agreements were made with farmers to reintroduce grazing and mowing on their land in exchange for regular payments. These payments have since been integrated into a dedicated agri-environment schemes under Estonia's Rural Development Programme.



Marsh gladiolus
Photo © Mati Kose/EÖU

Photo © From best practice guide – coastal meadow management LIFE-Nature project



Rahja Peninsula © Marko Sievänen, Rahjan saariston LIFE-Project

Climate change

The Boreal Region may expect an overall increase in average annual temperature of at least 2°C over the next 50 years. Most of this increase is likely to occur in winter, resulting in increased precipitation and a shorter period of ice cover on the lakes and in the Baltic Sea. The consequences for ecosystems are difficult to predict. Vegetation growth is likely to increase but so may the rate of decomposition within the many mire complexes. There is also a global concern that higher temperatures may lead to the release of greenhouse gases from boreal forests and peat deposits. Native, cold-tolerant species may retreat northwards as species with broader habitat requirements move in from the south. Rare species such as the Saimaa ringed seal, arctic fox and forest reindeer may all be particularly badly affected in due course.

Agriculture is concentrated mainly in the south of the region where, as elsewhere in Europe, there has been much intensification in recent decades. By contrast, many of the natural and semi-natural hay meadows and pastures located in remote rural areas are now under increasing threat of abandonment with only a fraction still under active management.

Particular attention has been paid recently to devising targeted agri-environment schemes that help support and maintain such forms of traditional management. This will be equally important for the floodplain meadows and coastal habitats in the new Member States as pressure to intensify agricultural production mounts.

In the far North of the region, agriculture is replaced by reindeer herding which is a significant economic activity. The scale is such that it also has direct and indirect impacts on the natural environment.

The harvesting of wild berries and mushrooms is also an important economic and recreational activity in the north. This is usually only for local consumption and therefore compatible with the requirements of Natura 2000, provided that the species and habitats present are not significantly affected by these activities.

Hunting is also a popular recreational activity in the Boreal Region and one that can continue to be practiced within Natura 2000 sites, provided that due care is taken to ensure that it is sustainable and does not negatively impact on the species protected under the Habitats and Birds Directives.

Attitudes towards the large predators, however, remains an issue of concern as emotions still run deep despite dwindling populations and very few encounters with man. The wolf population in Finland for instance is down to around 200 animals yet they remain feared and hated.

The wolverine *Gulo gulo*

This elusive predator is the largest member of the Mustelidae family. It lives in the remote tundra and boreal forests of Europe, Siberia and North America. Sweden and Finland are the only countries in the EU to host this highly endangered species (estimated population: ca 500 individuals). Although protected in both countries since the 1960s, its numbers have not increased for at least 40 years. One possible cause may be that parts of its territory overlap with that of the reindeer herding districts of the Sami (Lapp) Communities. Although the law allows problematic individuals to be shot, poaching remains the greatest mortality factor amongst adult individuals.

To address this issue, a new compensation system was introduced in Sweden in the 1990s. The novelty of the system is that it is based on the number of carnivores present in the area and not on the number of reindeer killed. The more wolverines present, the higher the payment rate, which in any case is higher than would otherwise be paid for individual wolverine kills. This innovative system is aimed at encouraging a greater tolerance of the species in reindeer herding districts.

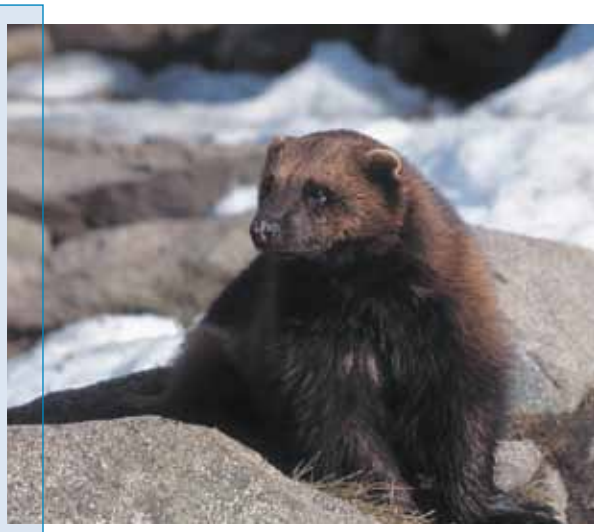


Photo © *NHPA* / Bill Coster

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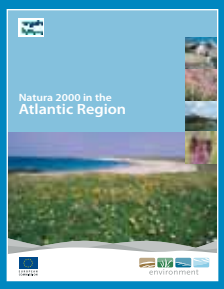
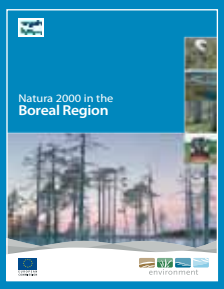
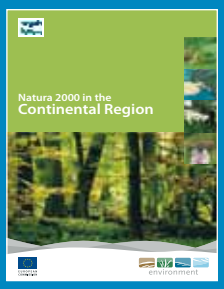


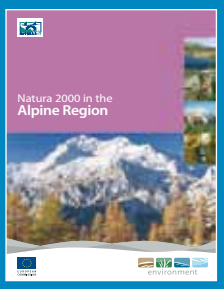
Natura 2000 in the **Atlantic Region**



Natura 2000 in the **Boreal Region**



Natura 2000 in the **Continental Region**



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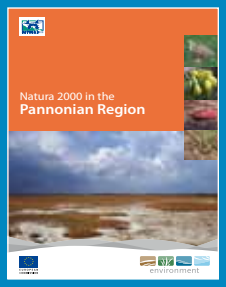

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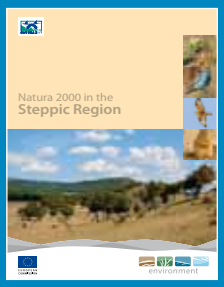

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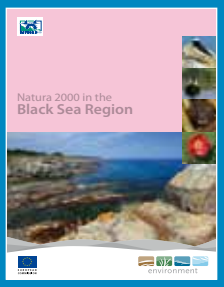

Natura 2000 in the **Black Sea Region**

Natura 2000 in the **Mediterranean Region**

Natura 2000 in the **Macaronesian Region**

The European Union has nine biogeographical regions, each with its own characteristic blend of vegetation, climate and geology. Sites of Community Importance are selected according to each region on the basis of national lists submitted by each Member State within that region. Working at this level makes it easier to conserve species and habitat types under similar natural conditions across a suite of countries, irrespective of political and administrative boundaries. Together with the Special Protection Areas designated under the Birds Directive, the Sites of Community Importance selected for each biogeographical region make up the ecological Natura 2000 network which spans all 27 countries of the EU.

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