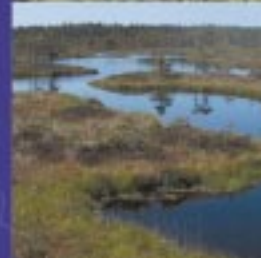


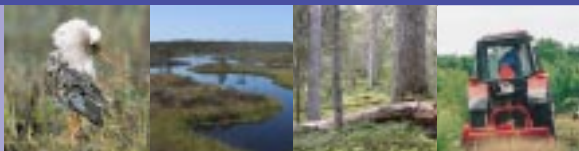


Natura 2000 in the Boreal region



European Commission
Environment Directorate General

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Additional information on the European Union is available on the Internet. It can be accessed through the Europa server (<http://europa.eu.int>).

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The Boreal region – land of trees 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 migrating birds every year.

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, to the south, there is a transition to the deciduous climate-sensitive forests of the Continental region.

Forests dominate the landscape and cover around 60% of the region. The majority is used commercially and is, consequently, of reduced conservation value compared to the original natural old-growth forests, which now account 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, valuable herb-rich spruce forests have evolved. Deciduous trees including birches (*Betula* spp.), aspen (*Populus tremula*), rowan (*Sorbus aucuparia*) and willows (*Salix* spp.) on the other hand tend to occur as early colonisers of bare ground and along rivers and lakes.

Overall, the boreal forests harbour a very rich array of well adapted plants, insects and other animals. Rare bird species are also present, amongst them ten species of owl including the Ural owl (*Strix nebulosa*), six species of woodpecker including 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 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. This explains why there are such a large number of lakes, rivers and mires in the region today. Three quarters of Europe's 600,000 natural lakes and some of its largest bogs are found here. In parts of the far north, peatlands make up 50% of the land surface.

The coastline and islands around the Baltic Sea and Gulf of Bothnia are also very characteristic of the 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. These coastal habitats are ideal for grazing and haymaking and have been used as such for centuries. As a result, a number of semi-natural habitats of high conservation value have developed, which are typical of the Boreal region. These include 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 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.

The Boreal region as a whole is a real magnet for birds. Over half of all European bird species have part of their breeding range in this region.

As for the Baltic Sea itself, 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/km² whereas in the north there are only 2–3 inhabitants/km².

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 a mere 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, the dominant land use, is, on the other hand, widespread throughout the region.

Region	Countries involved	% of EU 25 territory
Atlantic	Ireland, United Kingdom, France, Belgium, Germany, Netherlands, Denmark, Spain, Portugal	20.0
Boreal	Sweden, Finland, Estonia, Latvia, Lithuania	20.4
Continental	Denmark, Sweden, Germany, Poland, Belgium, Luxembourg, France, Italy, Czech Republic, Slovenia, Austria	26.3
Alpine	Spain, France, Italy, Germany, Austria, Slovenia, Sweden, Finland, Poland, Slovakia	7.6
Pannonian	Hungary, Slovakia, Czech Republic	2.9
Mediterranean	Greece, Cyprus, Malta, Italy, Spain, Portugal, France	22.5
Macaronesian	Spain, Portugal	0.3

Source:
European Topic Centre for Nature Conservation (EEA).
Statistics based on data and information submitted by Member States on 31 December 2004.

Natura 2000 habitat types in the Boreal region

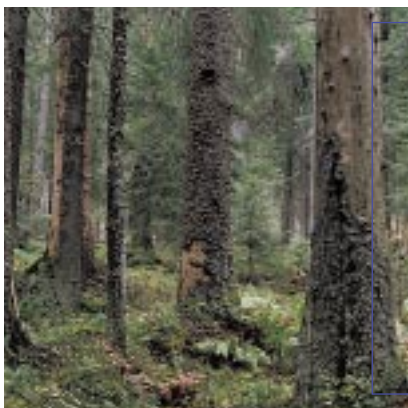
A third of all habitat types listed in the Habitats Directive occur in the Boreal region, partly reflecting its natural transition zone with the continental region. Sixteen of these concern different types of forests, of which seven are now so rare that they have been given priority status. Amongst these are characteristic habitats such as the western taiga, Fennoscandian deciduous swamp woods and natural forests on land upheaval coasts.

Because intensive forestry is widespread, very few of the valuable old-growth natural forests remain. As a result, many of the species that depend on these ecosystems for their survival are also now threatened and the overall biodiversity of many boreal forests is much reduced.

In the case of western taiga, this is further exacerbated by the lack of natural regeneration. Forest fires following lightning strikes were once a common phenomenon. Indeed several species, such as the beetle, *Stephanopachys linearis*, are entirely dependent on these events for their survival. However, most natural forest fires are now rapidly brought under control for fear of damage to commercial forests.

Mires and fens are also well represented. They range from active raised bogs, transition mires and bog woodland, within a forest landscape, to extensive aapa mires in the north. Until recently commercial peat extraction was widespread, with countries like Lithuania losing up to 70% of their peatlands. Nevertheless, all five countries still harbour large intact mires, some of which are amongst the largest in Europe.

Although grasslands only cover 14% of the territory, they include a wide variety of valuable semi-natural habitats (14 habitat types), not just along the coast but also further inland within the forest. A number are unique to the Boreal region such as the Fennoscandian wooded pastures and lowland species-rich dry grasslands. In all five countries, there has been a long tradition of small holdings maintaining clearings for grazing livestock and haymaking.



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. These are however essential for maintaining the particularly rich array of plants and animals that have become adapted to the natural forests. So too were the natural fires that used to stimulate forest regeneration. These are now very rare, but in view of their importance for the habitats and species concerned, conservation organisations have begun experimenting with controlled fires as a management tool for restoring Western Taiga. Otherwise the only option left is to take the natural forests out of production altogether (e.g. through land purchase) and let them develop naturally.



Aapa mires

Minerotrophic aapa mires develop under the combined effects of short summers and long winters with abundant snow. The latter causes long-lasting spring-time flooding from the drainage basin of the mire, which prevents it from developing into a 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. Cloudbberries, 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 nebularia*), whooper swan (*Cygnus cygnus*) and ruff (*Philomachus pugnax*).

Over time, these have become very rich in specialist plants and animals and are therefore of high conservation interest. Unfortunately, they are now also amongst the most threatened habitat types due to their rapid rate of abandonment.

Finally, oligotrophic lakes and Fennoscandian natural rivers are also widespread although the majority have been modified to provide hydro-electric power, navigation courses or commercial fishing. Because they are relatively young and carved out of hard bedrock, they 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.

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



The Boreal list of Natura 2000 sites

In January 2005, the European Commission adopted a first list of Natura 2000 sites for the Boreal region, in accordance with the requirements of the Habitats Directive. In total 5,026 sites are proposed by Sweden and Finland, covering over 82,000 km². Annex I habitats cover around 80% of the Natura 2000 surface area, most of which has been designated for forest and mire habitats.

This Boreal list will be complemented in the near future by further sites from the three new Member States in the Boreal region – Estonia, Latvia and Lithuania – who joined the EU on the 1st May 2004. Sweden and Finland, too, will be required to come forward with additional sites for a number of habitat types and species for which designation is considered insufficient at present.

Region	Habitat types	Animals	Plants
Atlantic	117	81	52
Boreal	87	68	58
Continental	144	149	83
Alpine	105	134	97
Pannonian	54	109	38
Mediterranean	146	160	270
Macaronesian	38	22	129

Source: European Topic Centre for Nature Conservation (Paris)
 – the number of habitats and species per biogeographical region is not definite since the reference lists for the 10 new Member States have still to be finalized, the exception being the Macaronesian region
 – the figures are not cumulative since many habitats and species occur in two or more biogeographical regions

Region	Natura 2000 sites	Total area covered	Terrestrial area covered	Marine area covered	% of terrestrial area of region
Atlantic	2,419	93,811 km ²	64,954 km ²	28,858 km ²	8
Boreal	5,026	82,377 km ²	73,003 km ²	9,375 km ²	12
Continental	4,958	49,194 km ²	40,838 km ²	8,356 km ²	6
Alpine	956	96,751 km ²	96,751 km ²	–	37
Mediterranean	2,783	180,609 km ²	167,898 km ²	12,712 km ²	19
Macaronesian	208	5,310 km ²	3,516 km ²	1,794 km ²	34
Total EU 15	16,193	458,615 km²	397,488 km²	61,127 km²	12

Source: European Topic Centre for Nature Conservation (Paris)
 – SPAs not included in the above table as they are not selected according to biogeographical region
 – Figures for 10 new MS not included as process still underway
 – Figures for Mediterranean region are provisional since the list was not yet officially adopted
 – Some sites are on a border between two regions, database does not allow possibility to split to region; therefore some sites may be counted twice
 – Percentage of marine areas not available



1

Young whooper swans in northern mires



2

Land upheaval coast in Liminganlahti wetlands



13

Western Taiga forests with Siberian jay



3

Lake Pihlajavesi complex harbouring endemic Saimaa ringed seals



River Vindelälven one the few major unregulated Fennoscandian rivers



12

12

1

2

3



4

Finnish Archipelago islands



11

Wooded pastures with ancient oak trees



5

Extensive 'priority Taiga forests in Estonia'



10

Nordic Alvar habitat on the island of Öland



11

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8

Lake Pape wetland complex



7

Forests and meadows in the Northern Gauja Valley



6

Boreal coastal meadows at Häädemeeste



9

The Curonian Spit





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 botnica*). 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, with their calcareous soils, are also particularly rare in endemics such as the Öland wormwood (*Artemisia oelandica*). Other typical species of the region include the calypso orchid (*Calypso bulbosa*), pendant grass (*Arctophila fulva*) and Lapland buttercup (*Ranunculus lapponicus*).

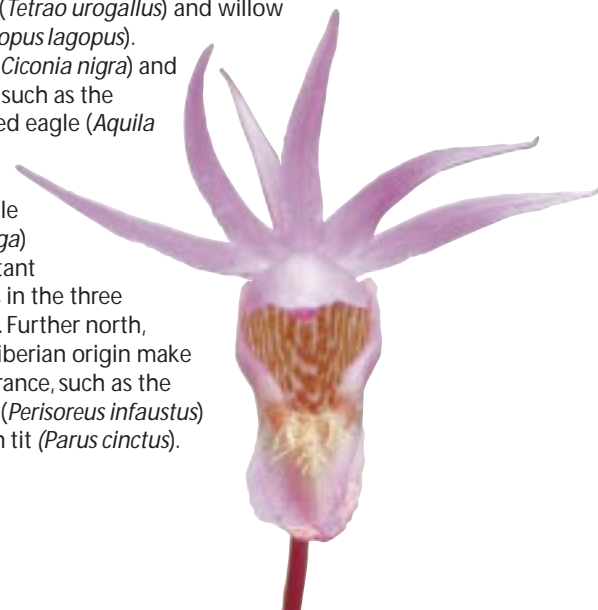
Yet it is its importance for birds that stands out in particular. Over half of the European bird species breed in the Boreal region, including many listed in Annex I of the Birds Directive. More easterly species from Russia and beyond are found here and nowhere else in the EU.

Hundreds of thousands of water birds also migrate here between the Arctic north and the drought-ridden south 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 and sandpipers, 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, the skies are sometimes filled with migrating birds on a spring day, offering a truly spectacular sight.

The islands, skerries and islets in the Baltic Sea also have important colonies of seabirds. It is estimated that as many as 9 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-palaearctic long-tailed ducks and white-winged scoters and half of the divers, mergansers and mute swans are to be found here.

Other characteristic bird species of the Boreal 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*) and greater spotted eagle (*Aquila clanga*) 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*).



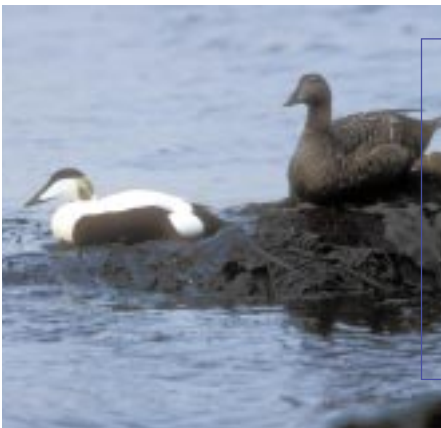


Ringed seals *Phoca hispida*

The ringed seal is the smallest and commonest of the northern seal species. During the last Ice age, populations were cut off and had to adapt to new environments around the Baltic Sea and in the lake systems of Finland and Russia. These 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 by extinction 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. A major conservation programme is underway with financial assistance from the EU to conserve the Saimaa ringed seal, a priority species under the Habitats Directive, in the lake systems of the Saimaa region in southern Finland. The population has since risen to over 200 individuals as a result but remains highly threatened.

Forest reindeer *Rangifer tarandus fennicus*

Hunted to extinction 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 forests. To prevent cross breeding, the Finnish government 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.

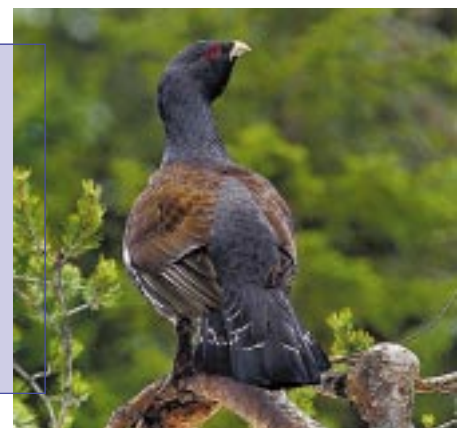


Common eider *Somateria mollissima*

The Common eider is a typical species for the Baltic. They are most commonly found in and amongst the 95,000 islands and skerries that make up the archipelagos off the coast of Finland and Sweden. Although 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 was not always the case, eider ducks were once hunted extensively. Eggs and down feather was also collected from the nests. The latter was used 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 through most parts of Europe. 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 to establish the ritual lek sites where males come before dawn to display to females, open forest with extensive groundcover of *Vaccinium* berries, and suitable breeding sites. Whilst large clear-felling areas in the forest can disrupt the populations a move to more continuous cover forestry with glades and shelter from fallen trees can work alongside the interests of the species.





Management issues in the Boreal region

Although the Boreal region has retained most of its original species, including the 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 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 area covered by forest is increasing both due to active planting, and naturally through the 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 altogether.

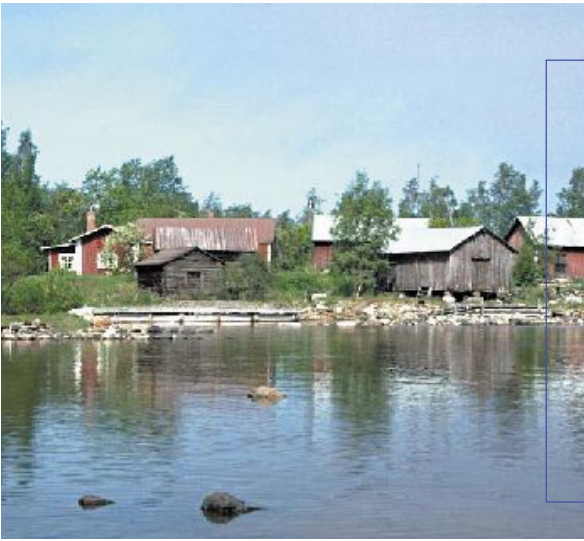
Many lakes and rivers in the Boreal region have also been modified to provide hydro-electric power and navigation. In Sweden, for example, 72% of the lakes and rivers capable of providing power have been exploited. This makes natural rivers quite a rare feature. Fishing, for subsistence, commercial and recreation reasons is also intensive in many 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 have helped create a diverse and highly species-rich mosaic landscape.

However, over the last 50 years, these valuable coastal meadows have been 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. It is expected that this pump priming scheme will now be incorporated into the new agri-environment schemes under the Rural Development Regulation to help secure the long term conservation of these unique habitats.





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, increasing precipitation and decreasing the period of ice cover on lakes and in the Baltic Sea. The consequences for ecosystems are difficult to predict. Vegetation growth is likely to increase but so may the rates of decomposition. 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 and have reduced populations 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 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. To the north, reindeer herding remains a significant economic activity having both direct and indirect impacts on the surrounding environment.

In contrast, much of the land in other remote areas has been abandoned. Natural and semi-natural hay meadows and pastures are now under increasing threat with only a fraction remaining of these valuable species rich habitats.

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 or abandon agricultural production mounts.

Many people in the northern Boreal region continue the traditions to hunt, fish and collect berries and fungi. The

harvesting of wild fruits, berries and mushrooms, remains important for economic and recreational purposes although generally it is for local consumption rather than large-scale commercial distribution. Natura 2000 can accommodate such sustainable uses whilst giving wildlife and their habitats the necessary level of protection through both the Habitats and Birds Directives.

Hunting, which is a popular recreational activity in the Boreal region, can also continue to be practiced in Natura 2000 sites, provided that due care is taken to ensure that it is sustainable and does not negatively impact on other land uses. Attitudes towards the large predators, however, are still an issue of concern as emotions remain strong despite the dwindling population figures and extremely limited number of conflicts between man and predator. The wolf populations in Sweden and Finland are down to 150 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: 250–500 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 more 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. Research is also underway to understand more about this obscure predator.



in this series:

Natura 2000 in the **Alpine** region

Natura 2000 in the **Atlantic** region

Natura 2000 in the **Boreal** region

Natura 2000 in the **Continental** region

Natura 2000 in the **Macaronesian** region



The European Union has seven biogeographical regions, each with its own characteristic blend of vegetation, climate and geology. Natura 2000 sites 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 Natura 2000 sites selected for each biogeographical region make up the ecological Natura 2000 network which spans all 25 countries of the EU.

